Centre No.					
Candidate No.					

Paper Reference						
4	4	0	0	/	3	H

Surname	Initial(s)
Signature	

Examiner's use only

Team Leader's use only

Paper Reference(s)

4400/3H

London Examinations IGCSE

Mathematics

Paper 3H

Higher Tier

Monday 10 May 2004 – Morning

Time: 2 hours

Materials required for examination
Ruler graduated in centimetres and millimetres, protractor, compasses, pen, HB pencil, eraser, calculator. Tracing paper may be used.

Items included with question papers
Nil

Instructions to Candidates

In the boxes above, write your centre number and candidate number, your surname, initial(s) and signature.
The paper reference is shown at the top of this page. Check that you have the correct question paper.
Answer **ALL** the questions in the spaces provided in this question paper.
Show all the steps in any calculations.

Information for Candidates

There are 20 pages in this question paper. All blank pages are indicated.
The total mark for this paper is 100. The marks for parts of questions are shown in round brackets: e.g. **(2)**.
You may use a calculator.

Advice to Candidates

Write your answers neatly and in good English.

Page Numbers	Leave Blank
3	
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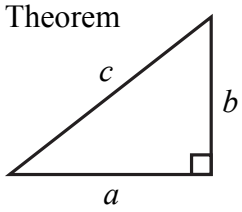
London Examinations
from Edexcel International

IGCSE MATHEMATICS 4400
FORMULA SHEET – HIGHER TIER

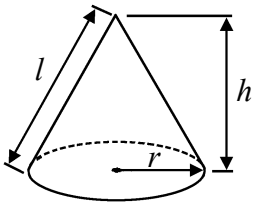
Pythagoras' Theorem



$a^2 + b^2 = c^2$

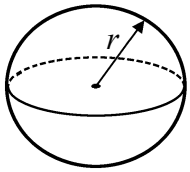
Volume of cone = $\frac{1}{3}\pi r^2 h$

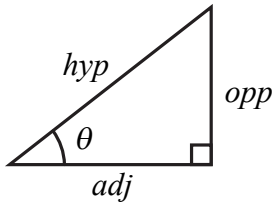
Curved surface area of cone = $\pi r l$



Volume of sphere = $\frac{4}{3}\pi r^3$

Surface area of sphere = $4\pi r^2$





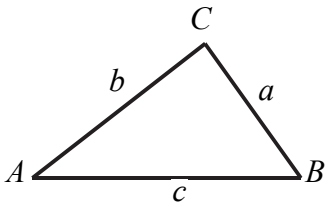
adj = hyp × cos θ
opp = hyp × sin θ
opp = adj × tan θ

or $\sin\theta = \frac{\text{opp}}{\text{hyp}}$

$\cos\theta = \frac{\text{adj}}{\text{hyp}}$

$\tan\theta = \frac{\text{opp}}{\text{adj}}$

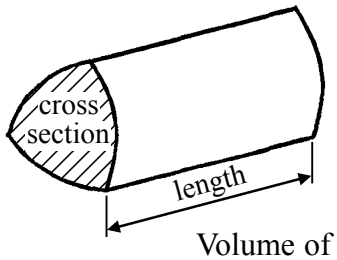
In any triangle ABC



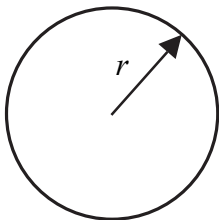
Sine rule $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

Cosine rule $a^2 = b^2 + c^2 - 2bc\cos A$

Area of triangle = $\frac{1}{2}ab\sin C$



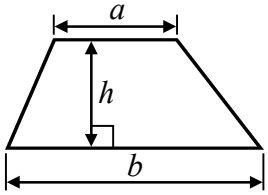
Volume of prism = area of cross section × length

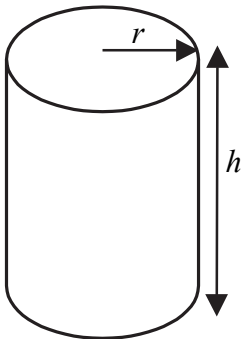


Circumference of circle = $2\pi r$

Area of circle = πr^2

Area of a trapezium = $\frac{1}{2}(a + b)h$





Volume of cylinder = $\pi r^2 h$

Curved surface area of cylinder = $2\pi rh$

The Quadratic Equation
The solutions of $ax^2 + bx + c = 0$ where $a \neq 0$, are given by

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Answer ALL TWENTY questions.

Write your answers in the spaces provided.

You must write down all stages in your working.

Leave blank

1. In July 2002, the population of Egypt was 69 million.
By July 2003, the population of Egypt had increased by 2%.

Work out the population of Egypt in July 2003.

..... million

(Total 3 marks)

Q1

2. (a) Expand $3(2t + 1)$

.....

(1)

(b) Expand and simplify $(x + 5)(x - 3)$

.....

(2)

(c) Factorise $10p - 15q$

.....

(1)

(d) Factorise $n^2 + 4n$

.....

(1)

(Total 5 marks)

Q2

3.

Leave blank

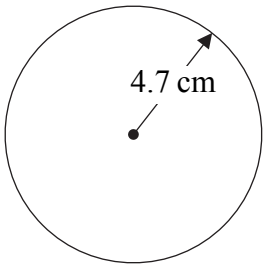


Diagram **NOT** accurately drawn

A circle has a radius of 4.7 cm.

(a) Work out the area of the circle.
Give your answer correct to 3 significant figures.

..... cm^2
(2)

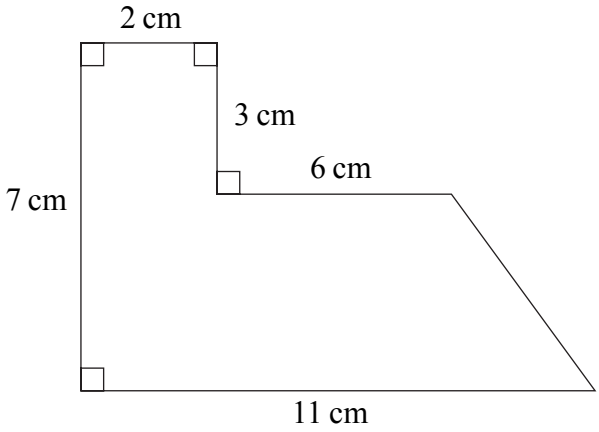


Diagram **NOT** accurately drawn

The diagram shows a shape.

(b) Work out the area of the shape.

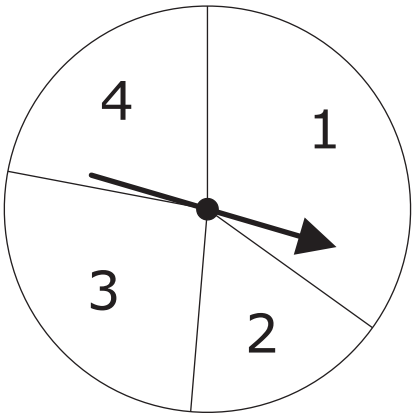
..... cm^2
(4)

Q3

(Total 6 marks)

4. The diagram shows a pointer which spins about the centre of a fixed disc.

Leave blank



When the pointer is spun, it stops on one of the numbers 1, 2, 3 or 4.
The probability that it will stop on one of the numbers 1 to 3 is given in the table.

Number	1	2	3	4
Probability	0.35	0.16	0.27	

Magda is going to spin the pointer once.

(a) Work out the probability that the pointer will stop on 4.

.....

(2)

(b) Work out the probability that the pointer will stop on 1 or 3.

.....

(2)

Omar is going to spin the pointer 75 times.

(c) Work out an estimate for the number of times the pointer will stop on 2.

.....

(2)

Q4

(Total 6 marks)

5. (a) Express 200 as the product of its prime factors.

Leave blank

.....

(2)

(b) Work out the Lowest Common Multiple of 75 and 200.

.....

(2)

Q5

(Total 4 marks)

6. Two points, *A* and *B*, are plotted on a centimetre grid.
A has coordinates (2, 1) and *B* has coordinates (8, 5).

(a) Work out the coordinates of the midpoint of the line joining *A* and *B*.

(..... , ...)

(2)

(b) Use Pythagoras' Theorem to work out the length of *AB*.
Give your answer correct to 3 significant figures.

..... cm

(4)

Q6

(Total 6 marks)

Leave blank

7. $A = \{1, 2, 3, 4\}$
$B = \{1, 3, 5\}$

(a) List the members of the set

(i) $A \cap B$,

.....

(ii) $A \cup B$.

.....

(2)

(b) Explain clearly the meaning of $3 \in A$.

.....

(1)

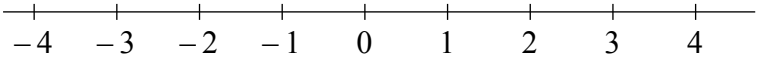
Q7

(Total 3 marks)

8. (i) Solve the inequality $3x + 7 > 1$

.....

(ii) On the number line, represent the solution to part (i).



Q8

(Total 4 marks)

9. The grouped frequency table gives information about the distance each of 150 people travel to work.

Leave blank

Distance travelled (d km)	Frequency
$0 < d \leq 5$	34
$5 < d \leq 10$	48
$10 < d \leq 15$	26
$15 < d \leq 20$	18
$20 < d \leq 25$	16
$25 < d \leq 30$	8

(a) Work out what percentage of the 150 people travel more than 20 km to work.

..... %

(2)

(b) Work out an estimate for the mean distance travelled to work by the people.

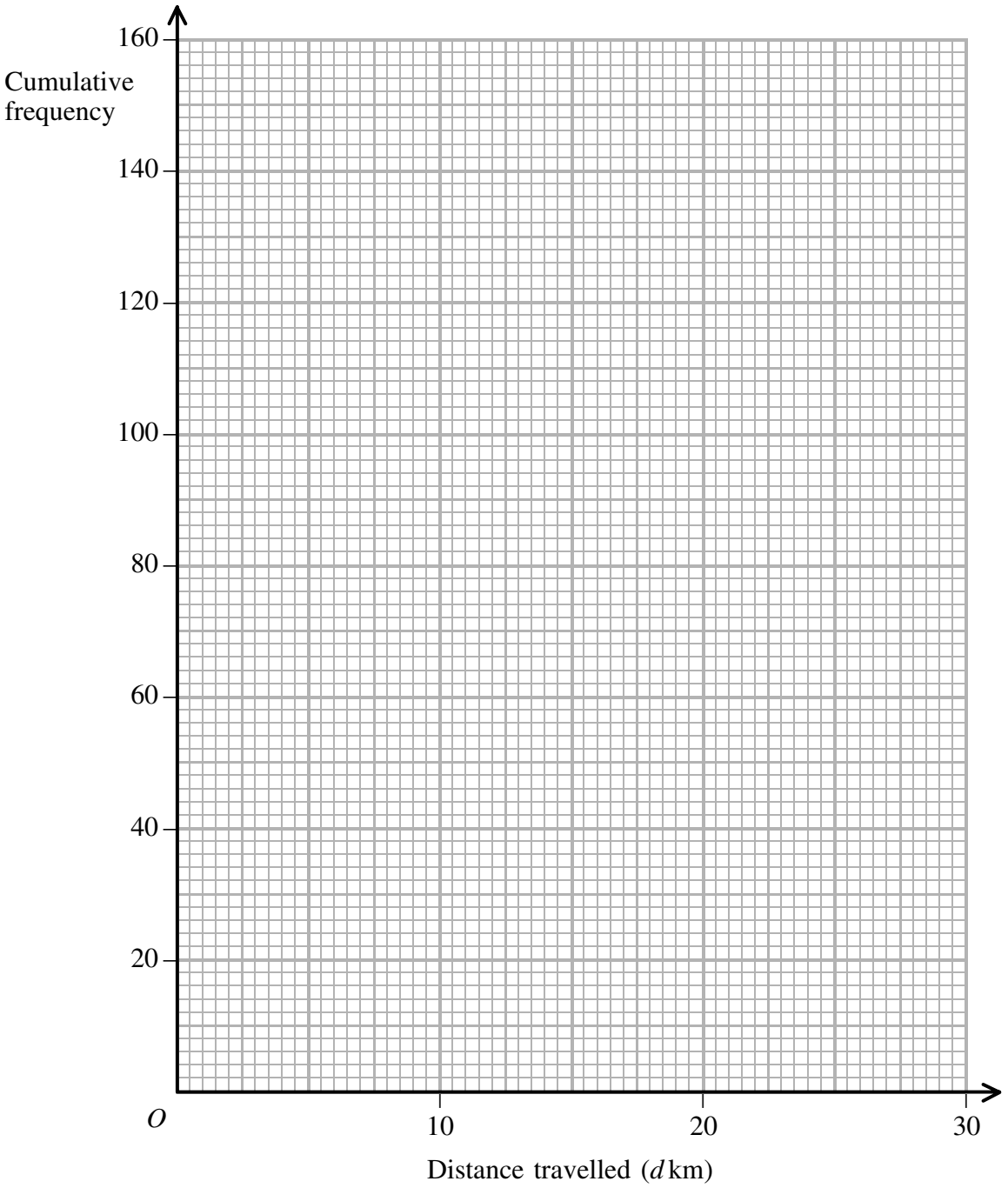
..... km

(4)

(c) Complete the cumulative frequency table.

Distance travelled (d km)	Cumulative frequency
$0 < d \leq 5$	
$0 < d \leq 10$	
$0 < d \leq 15$	
$0 < d \leq 20$	
$0 < d \leq 25$	
$0 < d \leq 30$	

(1)



Leave blank

(d) On the grid, draw a cumulative frequency graph for your table.

(2)

(e) Use your graph to find an estimate for the median of the distance travelled to work by the people.
Show your method clearly.

..... km

(2)

Q9

(Total 11 marks)

10.

Leave blank

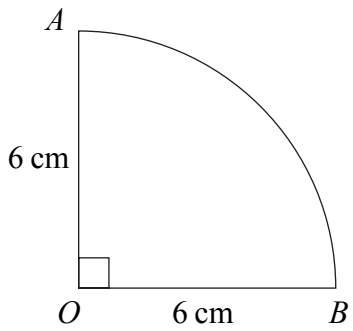


Diagram **NOT** accurately drawn

The diagram shows a shape.
AB is an arc of a circle, centre O.
Angle $AOB = 90°$.
$OA = OB = 6$ cm.

Calculate the perimeter of the shape.
Give your answer correct to 3 significant figures.

..... cm

(Total 4 marks)

Q10

11. The distance between the Earth and the Sun is 150 000 000 km.

(a) Write the number 150 000 000 in standard form.

.....

(1)

The distance between Neptune and the Sun is 30 times greater than the distance between the Earth and the Sun.

(b) Calculate the distance between Neptune and the Sun.
Give your answer in standard form.

..... km

(2)

(Total 3 marks)

Q11

12. (a) Find the gradient of the line with equation $3x - 4y = 15$

Leave blank

.....

(3)

(b) Work out the coordinates of the point of intersection of the line with equation $3x - 4y = 15$ and the line with equation $5x + 6y = 6$

(……. , ……..)

(4)

Q12

(Total 7 marks)

13. A body is moving in a straight line which passes through a fixed point O.
The displacement, s metres, of the body from O at time t seconds is given by

$$s = t^3 + 4t^2 - 5t$$

(a) Find an expression for the velocity, v m/s, at time t seconds.

$v =$ .....

(2)

(b) Find the acceleration after 2 seconds.

..... m/s^2

(2)

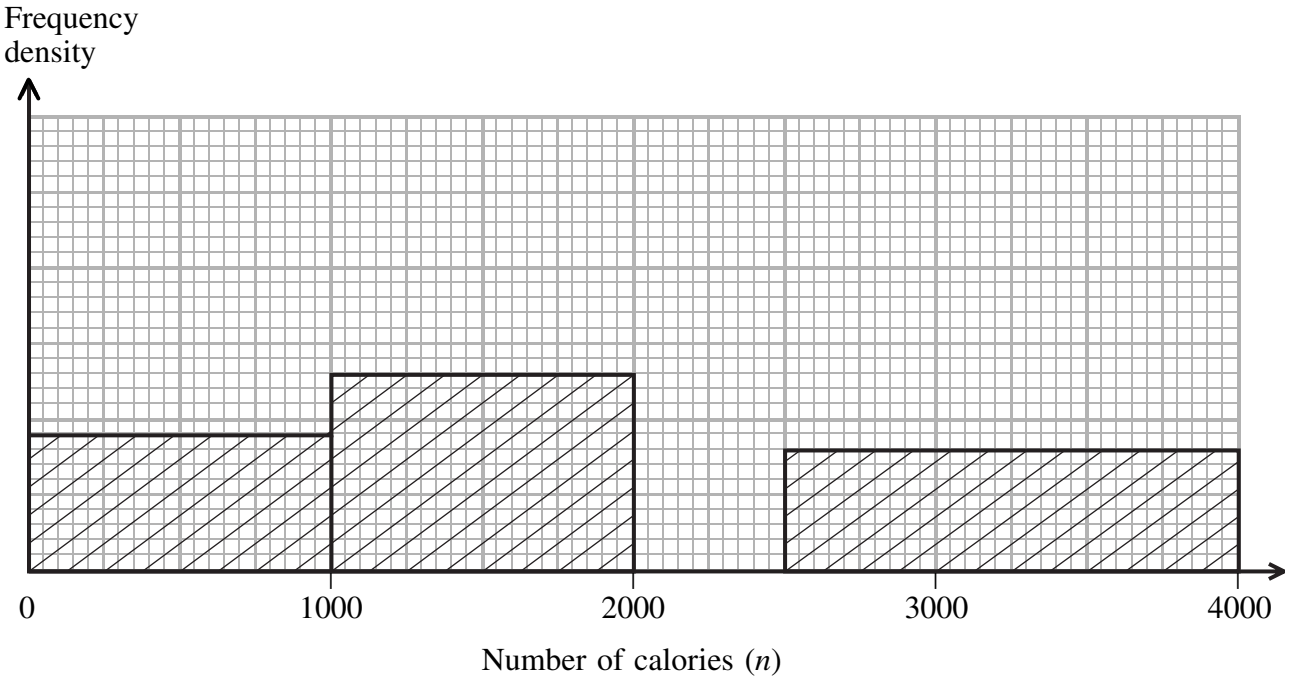
Q13

(Total 4 marks)

14. The unfinished table and histogram show information from a survey of women about the number of calories in the food they eat in one day.

Leave blank

Number of calories (n)	Frequency
$0 < n \leq 1000$	90
$1000 < n \leq 2000$	
$2000 < n \leq 2500$	140
$2500 < n \leq 4000$	



(a) (i) Use the information in the table to complete the histogram.

(ii) Use the information in the histogram to complete the table.

(3)

(b) Find an estimate for the upper quartile of the number of calories.
You must make your method clear.

.....

(2)

Q14

(Total 5 marks)

Leave blank

15. The length of a side of a square is 6.81 cm, correct to 3 significant figures.

(a) Work out the lower bound for the perimeter of the square.

..... cm
(2)

(b) Give the perimeter of the square to an appropriate degree of accuracy.
You must show working to explain how you obtained your answer.

..... cm
(2)

Q15

(Total 4 marks)

16. Express the algebraic fraction $\frac{2x^2 - 3x - 20}{x^2 - 16}$ as simply as possible.

Q16

.....

(Total 3 marks)

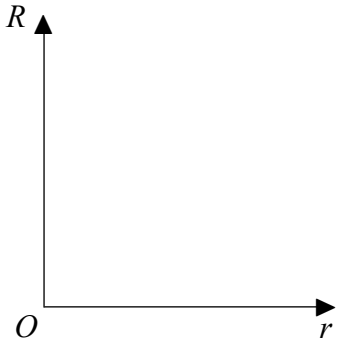
Leave blank

17. An electrician has wires of the same length made from the same material.
The electrical resistance, R ohms, of a wire is inversely proportional to the square of its radius, r mm.
When $r = 2$, $R = 0.9$

(a) (i) Express R in terms of r.

$R =$ .....

(ii) On the axes, sketch the graph of R against r.



(4)

One of the electrician's wires has a radius of 3 mm.

(b) Calculate the electrical resistance of this wire.

..... ohms

(1)

Q17

(Total 5 marks)

18.

Leave blank

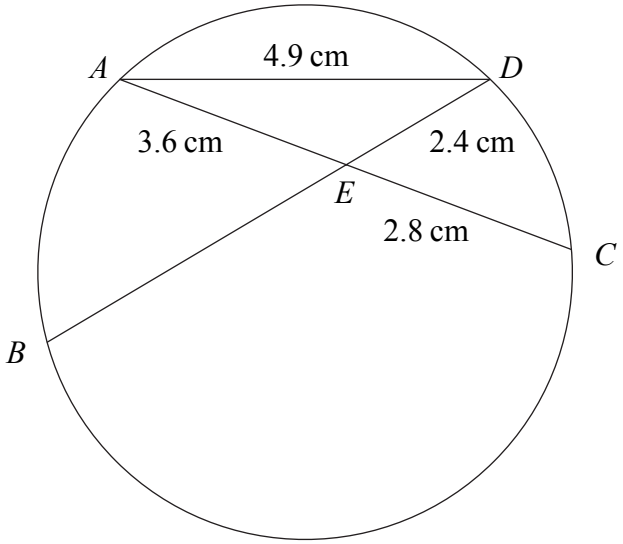


Diagram **NOT** accurately drawn

A, *B*, *C* and *D* are four points on the circumference of a circle.
The chords *AC* and *BD* intersect at *E*.
AE = 3.6 cm, *CE* = 2.8 cm, *DE* = 2.4 cm and *AD* = 4.9 cm.

(a) Calculate the length of *BE*.

..... cm
(3)

(b) Calculate the size of angle *AED*.
Give your answer correct to 3 significant figures.

°
.....
(3)

Q18

(Total 6 marks)

19. $f : x \mapsto 2x - 1$

$$g : x \mapsto \frac{3}{x}, \ x \neq 0$$

Leave blank

(a) Find the value of

(i) f(3),

.....

(ii) fg(6).

.....

(2)

(b) Express the inverse function f^{-1} in the form $f^{-1} : x \mapsto ...$

.....

(2)

(c) (i) Express the composite function gf in the form $gf : x \mapsto ...$

.....

(ii) Which value of x must be excluded from the domain of gf?

$x =$ .....

(2)

Q19

(Total 6 marks)

20.

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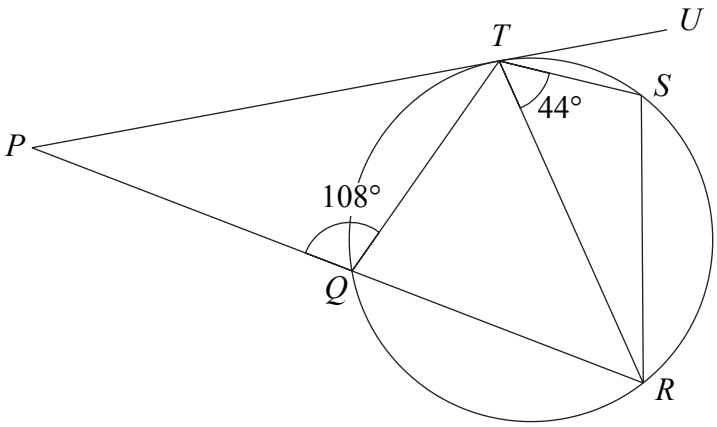

Diagram **NOT** accurately drawn

Q, *R*, *S* and *T* are points on the circumference of a circle.
PU is a tangent to the circle at *T*.
PQR is a straight line.
Angle *PQT* = 108°.
Angle *STR* = 44°.

Work out the size of angle *STU*.
You must give a reason for each step in your working.

° **Q20**

.....

(Total 5 marks)

TOTAL FOR PAPER: 100 MARKS

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IGCSE

IGCSE Mathematics (4400)

Mark Schemes for May 2004 examination session

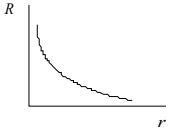
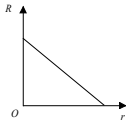
Paper 3H (Higher Tier)

No		Working	Answer	Mark	Notes	
1		$\frac{2}{100}\times 69$ or 1.38 69 + "1.38"	 70.38	3	M1 M1 A1	or M2 for 69×1.02 dep on 1st M1 Accept 70.4 Condone 70 380 000, 70 400 000
2	a		$6t + 3$	1	B1	cao
	b	$x^2 - 3x + 5x - 15$		2	M1	for 4 terms ignoring signs or 3 terms with correct signs
	c		$x^2 + 2x - 15$		A1	
			$5(2p - 3q)$	1	B1	
	d		$n(n + 4)$	1	B1	
3	a	$\pi \times 4.7^2$	 69.4	2	M1 A1	 for 69.4 or better (69.39778…)
	b	Splits shape appropriately eg triangle & 2 rectangles, rectangle & trapezium eg $7\times 2 + 6\times 4$ or 14 + 24 $\frac{1}{2}\times 3\times 4$ or 6	 44	4	M1 M1 M1 A1	 for area of at least one rectangle for area of triangle or trapezium cao
4	ai	$1 - (0.35 + 0.16 + 0.27)$	 0.22	4	M1 A1	 oe
	ii	0.35 + 0.27	 0.62		M1 A1	 oe
	b	0.16×75	 12	2	M1 A1	 cao

No		Working	Answer	Mark	Notes	
5	a	prime factors 2 & 5 seen		2	M1	
			$2\times2\times2\times5\times5$ or $2^3\times5^2$		A1	
	b	$2\times2\times2\times3\times5\times5$		2	M1	for $2\times2\times2\times3\times5\times5$ or for lists of multiples with at least 3 correct in each list
			600		A1	cao
6	a		(5, 3)	2	B2	B1 for each coordinate
	b	$8-2=6$ & $5-1=4$		4	B1	
		6^2+4^2 or 36 + 16 or 52			M1	for squaring & adding
		$\sqrt{6^2+4^2}$ or $\sqrt{52}$ (7.2110…)			M1	(dep on 1st M1) for square root
			7.21		A1	for 7.21 or better
						Either 6 or 4 must be correct for award of M marks
7	i		1, 3	3	B1	Condone repetition
	ii		1, 2, 3, 4, 5		B1	Condone repetition
	iii		"is a member of" oe		B1	
8	i	$3x>-6$		4	M1	SC if M0, award B1 for −2
			$x>-2$		A1	
	ii		line to right of -2 indicated		B1	ft from (i) line must either have arrow or reach 4
			open circle at -2		B1	ft from (i)

No		Working	Answer	Mark	Notes	
9	a	$\frac{16+8}{150}$ or $\frac{24}{150}$ or 0.16		2	M1	
			16		A1	cao
	b	$34\times2.5+48\times7.5+26\times12.5$ $+18\times17.5+16\times22.5+8\times27.5$ or 85+360+325+315+360+220 or1665		4	M1	finds products $f\times x$ consistently within intervals (inc end points) and sums them
					M1	use of midpoints
		$\frac{"1665"}{150}$			M1	(dep on 1st M1) for division by 150
			11.1		A1	Accept 11 if $\frac{1665}{150}$ seen
	c		34, 82, 108, 126, 142, 150	1	B1	cao
	d		Points	2	B1	$\pm$ ½ square ft from sensible table
			Curve		B1	or line segments (dep on 5 pts correct or ft correctly or 5 ordinates from (c) plotted correctly and consistently within intervals but not above end points)
	e	cf of 75 (or 75½) used		2	M1	
			~ 9		A1	ft from sensible graph
10		$\pi\times12$ or 37.6991…		4	M1	
		$\div4$			M1	(dep)
						SC B2 for 3π or 9.4247… seen
		$+2\times6$ or +12			B1	(indep)
			21.4		A1	for 21.4 or better (21.4247…)

No		Working	Answer	Mark	Notes	
11	a		1.5×10^8	1	B1	cao
	b		4.5×10^9	2	M1	4.5×10^n for integer $n > 0$
					A1	for $n = 9$
						SC B1 for 4.5^{09}
12	a	$4y = 3x - 15$		3	M1	
		$y = \frac{3}{4}x - \frac{15}{4}$			M1	for $\frac{"3x-15"}{4}$
			$\frac{3}{4}$		A1	ft from $\frac{"3x-15"}{4}$
	b	eg Eqn (A)$\times3$ or Eqn(B)$\times2$ or Eqn(A)$\times5$ or Eqn(B)$\times3$		4	M1	for clear attempt at first step in correct process to eliminate either or y
		eg Eqn (A)$\times3$ + Eqn(B)$\times2$ or Eqn(A)$\times5$ - Eqn(B)$\times3$			M1	Completes correct process to eliminate either x or y (Condone one error)
		eg $x = 3$			A1	cao for non-eliminated one
			$(3,-1\frac{1}{2})$		A1	cao
13	a		$3t^2 + 8t - 5$	2	B2	(B1 for 2 terms correct)
	b	$6t + 8$		2	M1	for $6t + 8$ or d(a)/dt if at least B1 scored
			20		A1	ft
14	ai		bar correct	3	B1	$28 \pm$ ½ sq
	ii		130, 120		B2	B1 cao for each value
	b	$\Sigma f = 480, \quad \frac{3}{4}\times480 = 360$		2	M1	
			2500		A1	ft from "480" ie Σf

No		Working	Answer	Mark	Notes	
15	a	6.805×4		2	M1	
			27.22		A1	cao
	b	$6.815 \times 4 = 27.26$		2	M1	
			27		A1	cao
16		$(2x+5)(x-4)$ $(x+4)(x-4)$		3	M1 M1	
			$\frac{2x+5}{x+4}$		A1	cao
17	ai	$R = \frac{k}{r^2}$		4	M1	
			$R = \frac{3.6}{r^2}$		A1	
	ii				B2	B1 for graph with negative gradient (increasing or constant) even if it touches of crosses one or both axes eg 
	b		0.4	1	B1	ft from k

No		Working	Answer	Mark	Notes	
18	a	$3.6 \times 2.8 = 2.4 \times BE$		3	M1	Accept $AE \times CE = BE \times ED$
		$\frac{3.6 \times 2.8}{2.4}$			M1	
			4.2		A1	cao
	b	$\frac{3.6^2 + 2.4^2 - 4.9^2}{2 \times 3.6 \times 2.4}$		3	M1	
		-0.3061			A1	at least 3 sf
			108		A1	for 108 or better (107.826…)
19	ai		5	2	B1	cao
	ii		0		B1	cao
	b	eg $\begin{matrix} \times 2 \rightarrow -1 \\ \div 3 \leftarrow +1 \end{matrix}$ or attempt to make x the subject of $y = 2x - 1$		2	M1	
			$\frac{x+1}{2}$ oe		A1	
	ci		$\frac{3}{2x-1}$	2	B1	
	ii		$\frac{1}{2}$		B1	

No	Working	Answer	Mark	Notes	
20	$\angle RST = 108°$		5	B1	
	opposite angles of a cyclic quadrilateral			B1	or exterior angle = opposite interior angle Accept *cyclic quadrilateral*
	$\angle SRT = 28°$			B1	
	angle between chord & tangent = angle in alternate segment			B1	Accept *alternate segment* or *chord & tangent*
		28		B1	
	or				
	$\angle RST = 108°$		5	B1	
	opposite angles of a cyclic quadrilateral			B1	or exterior angle = opposite interior angle Accept *cyclic quadrilateral*
	$\angle PTR = 108°$			B1	
	angle between chord & tangent = angle in alternate segment			B1	Accept *alternate segment* or *chord & tangent*
		28		B1	
	or				
	$\angle UTR = 72°$		5	B2	
	angle between chord & tangent = angle in alternate segment			B1	Accept *alternate segment* or *chord & tangent*
		28		B2	B1 for 72 − 44

Centre No.						Paper Reference							Surname	Initial(s)
Candidate No.						4	4	0	0	/	4	H	Signature	

Paper Reference(s)

4400/4H

Examiner's use only

Team Leader's use only

London Examinations IGCSE

Mathematics

Paper 4H

Higher Tier

Tuesday 11 May 2004 – Morning

Time: 2 hours

Materials required for examination
Ruler graduated in centimetres and millimetres, protractor, compasses, pen, HB pencil, eraser, calculator. Tracing paper may be used.

Items included with question papers
Nil

Page Numbers	Leave Blank
3	
4	
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10	
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12	
13	
14	
15	
16	
Total	

Instructions to Candidates

In the boxes above, write your centre number and candidate number, your surname, initial(s) and signature.
The paper reference is shown at the top of this page. Check that you have the correct question paper.
Answer **ALL** the questions in the spaces provided in this question paper.
Show all the steps in any calculations.

Information for Candidates

There are 16 pages in this question paper. All blank pages are indicated.
The total mark for this paper is 100. The marks for parts of questions are shown in round brackets: e.g. **(2)**.
You may use a calculator.

Advice to Candidates

Write your answers neatly and in good English.

Printer's Log. No.
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Turn over

W850/R4400/57570 4/4/4/4/1/3/1/3/1/3/1000

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London Examinations
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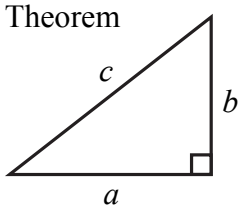
IGCSE MATHEMATICS 4400
FORMULA SHEET – HIGHER TIER

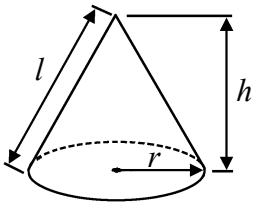
Pythagoras' Theorem



$a^2 + b^2 = c^2$

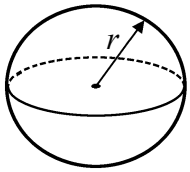
Volume of cone = $\frac{1}{3}\pi r^2 h$

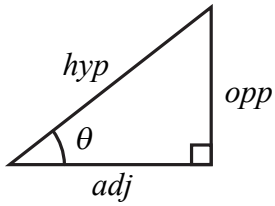
Curved surface area of cone = $\pi r l$



Volume of sphere = $\frac{4}{3}\pi r^3$

Surface area of sphere = $4\pi r^2$





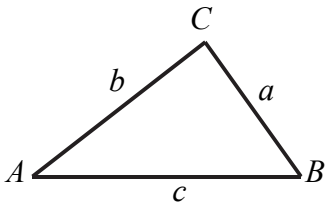
adj = hyp × cos θ
opp = hyp × sin θ
opp = adj × tan θ

or $\sin\theta = \frac{\text{opp}}{\text{hyp}}$

$\cos\theta = \frac{\text{adj}}{\text{hyp}}$

$\tan\theta = \frac{\text{opp}}{\text{adj}}$

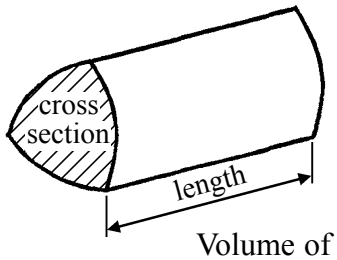
In any triangle ABC



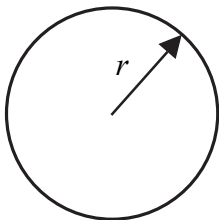
Sine rule $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

Cosine rule $a^2 = b^2 + c^2 - 2bc\cos A$

Area of triangle = $\frac{1}{2}ab\sin C$



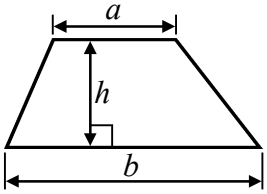
Volume of prism = area of cross section × length

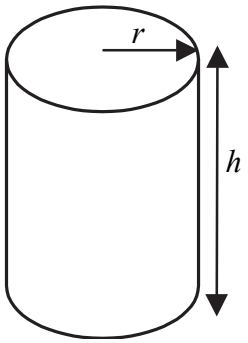


Circumference of circle = $2\pi r$

Area of circle = πr^2

Area of a trapezium = $\frac{1}{2}(a + b)h$





Volume of cylinder = $\pi r^2 h$

Curved surface area of cylinder = $2\pi rh$

The Quadratic Equation
The solutions of $ax^2 + bx + c = 0$ where $a \neq 0$, are given by

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Answer ALL TWENTY TWO questions.

Write your answers in the spaces provided.

You must write down all stages in your working.

Leave blank

1. Work out the value of $\dfrac{6.1+3.4}{5.7-1.9}$

.....

(Total 2 marks)

Q1

2. Suhail cycles 117 km in 4 hours 30 minutes.
Work out his average speed in km/h.

..... km/h

(Total 3 marks)

Q2

3. The word formula gives the time, in minutes, needed to cook a turkey.

Time = 40 × weight in kg + 20

A time of T minutes is needed to cook a turkey with a weight of W kg.

Write down a formula for T in terms of W.

.....

(Total 2 marks)

Q3

Leave blank

4. The mean height of a group of 4 girls is 158 cm.

(a) Work out the total height of the 4 girls.

..... cm
(1)

Sarah joins the group and the mean height of the 5 girls is 156 cm.

(b) Work out Sarah's height.

..... cm
(3)

Q4

(Total 4 marks)

5. Plumbers' solder is made from tin and lead.
The ratio of the weight of tin to the weight of lead is 1 : 2

(a) Work out the weight of tin and the weight of lead in 120 grams of plumbers' solder.

tin ..... g

lead ..... g
(2)

(b) What weight of plumbers' solder contains 25 grams of tin?

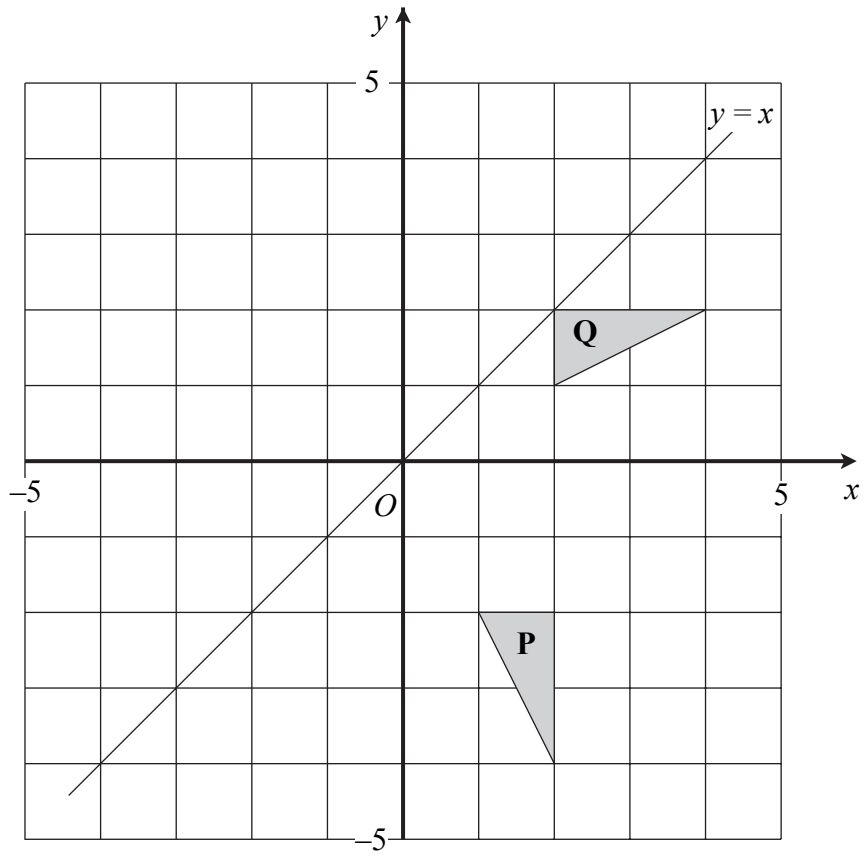
..... g
(1)

Q5

(Total 3 marks)

6.

Leave blank



(a) Describe fully the single transformation which maps triangle **P** onto triangle **Q**.

.....

.....

(3)

(b) Reflect triangle **Q** in the line with equation $y = x$.

(2)

Q6

(Total 5 marks)

7. Work out $2\frac{2}{5} \times 1\frac{7}{8}$

Give your answer as a mixed number in its simplest form.

Q7

.....

(Total 3 marks)

8. This formula is used in science.

Leave blank

$$v = \sqrt{2gh}$$

(a) Hanif uses the formula to work out an estimate for the value of v without using a calculator when $g = 9.812$ and $h = 0.819$

Write down approximate values for g and h that Hanif could use.

approximate value for g .....

approximate value for h .....

(2)

(b) Make h the subject of the formula $v = \sqrt{2gh}$

$h =$ .....

(2)

Q8

(Total 4 marks)

9. (a) Simplify $n \times n \times n \times n$

.....

(1)

(b) Simplify $p^2 \times p^5$

.....

(1)

(c) Simplify $\frac{q^7}{q^3}$

.....

(1)

(d) Simplify $\frac{t^4 \times t^7}{t^8}$

.....

(1)

Q9

(Total 4 marks)

10.

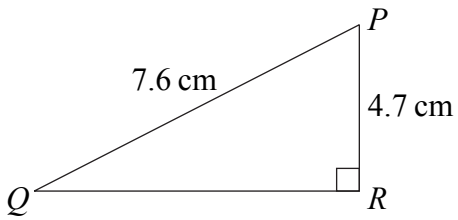


Diagram **NOT** accurately drawn

Leave blank

Triangle PQR is right-angled at R.
$PR = 4.7$ cm and $PQ = 7.6$ cm.

(a) Calculate the size of angle PQR.
Give your answer correct to 1 decimal place.

° .....

(3)

The length, 7.6 cm, of PQ is correct to 2 significant figures.

(b) (i) Write down the upper bound of the length of PQ.

..... cm

(ii) Write down the lower bound of the length of PQ.

..... cm

(2)

Q10

(Total 5 marks)

11. Solve $4(x - 3) = 7x - 10$

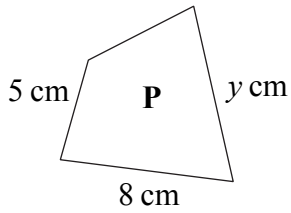
Q11

$x =$ .....

(Total 3 marks)

12.

Leave blank



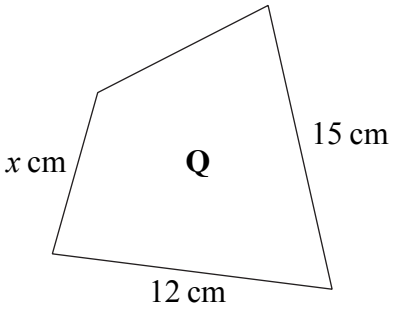


Diagram **NOT** accurately drawn

Quadrilateral **P** is mathematically similar to quadrilateral **Q**.

(a) Calculate the value of x.

$x =$ .....

(2)

(b) Calculate the value of y.

$y =$ .....

(2)

The area of quadrilateral **P** is 60 cm^2.

(c) Calculate the area of quadrilateral **Q**.

..... cm^2

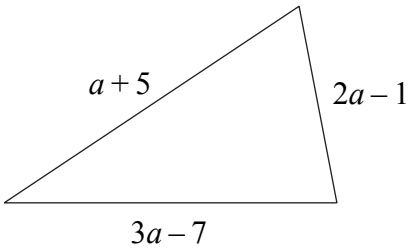
(2)

Q12

(Total 6 marks)

13.

Leave blank



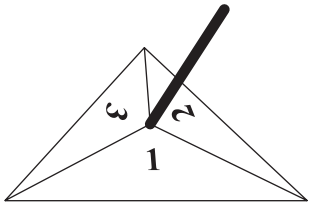
The lengths, in cm, of the sides of a triangle are $(a + 5)$, $(3a - 7)$ and $(2a - 1)$.
The perimeter of the triangle is 24 cm.
Work out the value of a.

Q13

$a =$ .....

(Total 3 marks)

14. Here is a fair 3-sided spinner.



Its sides are labelled 1, 2 and 3 as shown.

(a) Aisha is going to spin the spinner twice.
Work out the probability that it will land on 1 both times.

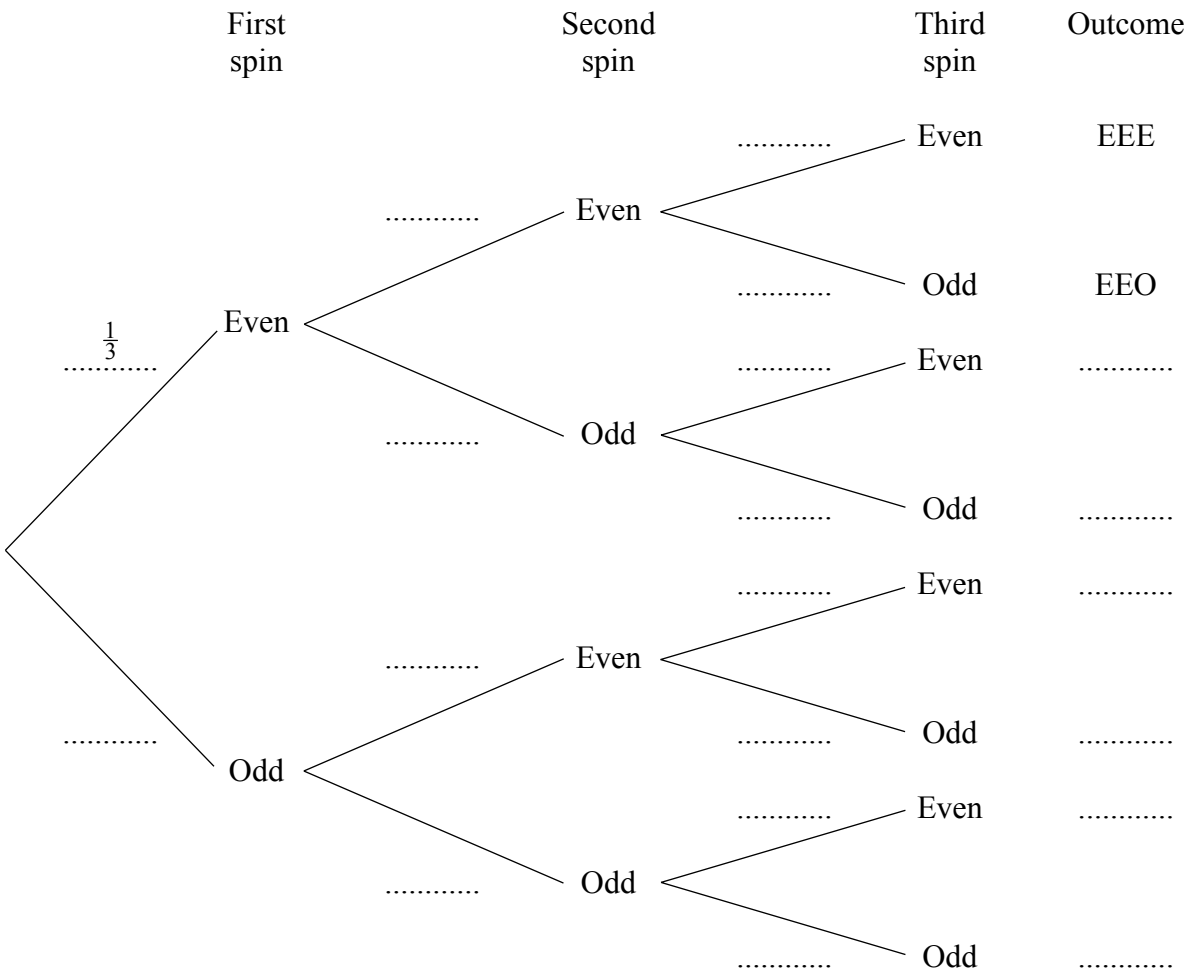
.....

(2)

(b) Harry is going to spin the spinner 3 times.

Leave blank

(i) Complete the probability tree diagram.



(ii) Work out the probability that the spinner will land on an odd number 3 times.

.....

(iii) Work out the probability that the spinner will land on an even number exactly once.

.....

(9)

Q14

(Total 11 marks)

Leave blank

15. In a sale, normal prices are reduced by 12%.
The sale price of a computer is £726

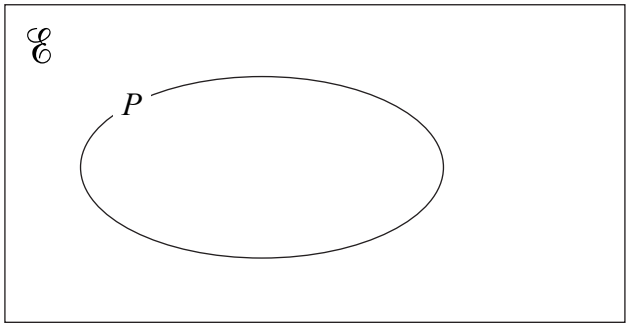
Work out the normal price of the computer.

Q15

£ .....

(Total 3 marks)

16.



Set P is shown on the Venn Diagram.
Two sets, Q and R, are such that

$$R \subset P$$

$$Q \cap R = \varnothing$$

$$P \cup Q = P$$

Complete the Venn Diagram to show set Q and set R.

Q16

(Total 3 marks)

17. Convert the recurring decimal $0.3\dot{2}$ to a fraction.

Q17

.....

(Total 2 marks)

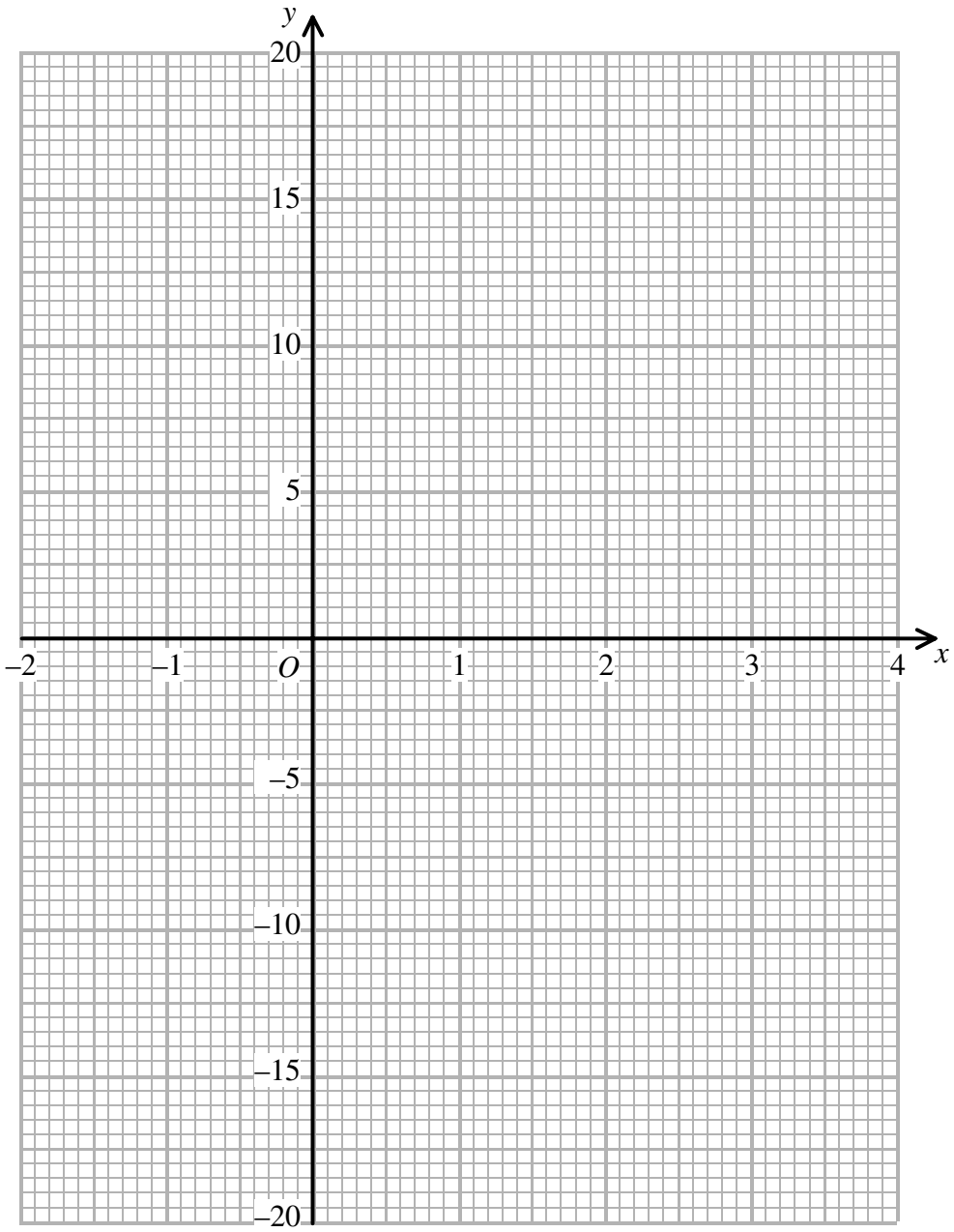
18. (a) Complete the table of values for $y = x^3 - 3x^2 + 2$

Leave blank

x	–2	–1	0	1	2	3	4
y		–2					

(2)

(b) On the grid, draw the graph of $y = x^3 - 3x^2 + 2$



(2)

(c) Use your graph to find estimates, correct to 1 decimal place where appropriate, for the solutions of

Leave blank

(i) $x^3 - 3x^2 + 2 = 0$

.....

(ii) $x^3 - 3x^2 - 4 = 0$

.....

(4)

Q18

(Total 8 marks)

19. (a) Expand and simplify $(3p - 2q)(2p + 5q)$

.....

(2)

(b) Simplify $(2x^2y^4)^3$

.....

(2)

(c) Simplify $(a^4b^{-3})^{-2}$

.....

(2)

(d) Simplify $(27p^6)^{\frac{1}{3}}$

.....

(2)

Q19

(Total 8 marks)

20.

Leave blank

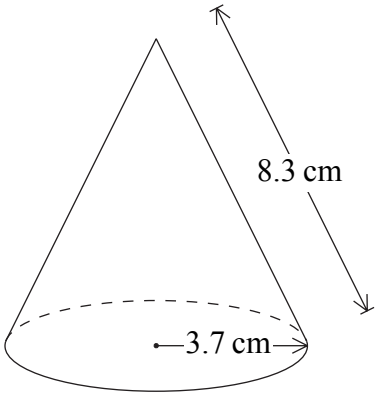


Diagram **NOT** accurately drawn

The diagram shows a solid cone.
The radius of its base is 3.7 cm and the slant height is 8.3 cm.

(a) Calculate the total surface area of the cone.
Give your answer correct to 3 significant figures.

..... cm^2
(2)

(b) Calculate the volume of the cone.
Give your answer correct to 3 significant figures.

..... cm^3
(4)

Q20

(Total 6 marks)

21. Solve the simultaneous equations

Leave blank

$$2x + y = 6$$

$$x^2 + y^2 = 20$$

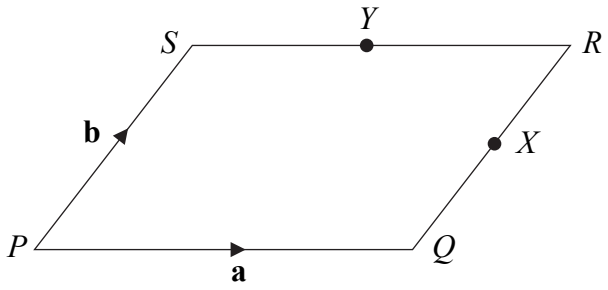
Q21

.....

(Total 7 marks)

22.

Leave blank



PQRS is a parallelogram.
X is the midpoint of *QR* and *Y* is the midpoint of *SR*.
$\overrightarrow{PQ} = \mathbf{a}$ and $\overrightarrow{PS} = \mathbf{b}$.

(a) Write down, in terms of **a** and **b**, expressions for

(i) $\overrightarrow{PX}$

.....

(ii) $\overrightarrow{PY}$

.....

(iii) $\overrightarrow{QS}$

.....

(3)

(b) Use a vector method to show that *XY* is parallel to *QS* and that $XY = \frac{1}{2}QS$.

(2) **Q22**

(Total 5 marks)

TOTAL FOR PAPER: 100 MARKS

END

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IGCSE

IGCSE Mathematics (4400)

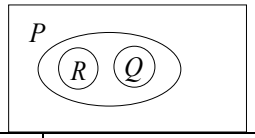
Mark Schemes for May 2004 examination session

Paper 4H (Higher Tier)

No		Working	Answer	Mark	Notes
1		$\frac{9.5}{3.8}$	2.5	2	M1 for 9.5 or 3.8 seen A1 cao
2		4.5 oe seen $\frac{117}{"4.5"}$	26	3	B1 M1 for $\frac{117}{\text{time}}$ eg $\frac{117}{270}$ A1 cao
3			$T = 40W + 20$ oe	2	B2 B1 for T = linear expression in W B1 for $40W + 20$ oe
4	a		632	1	B1 cao
	b	5 x 156 or 780 "780"–"632"	148		M1 M1 (dep M1) A1 cao
5	a		40 80	2	B1 cao B1 cao
	b		75	1	B1 cao
6	a		Rotation 90° (0, 0) or origin	3	B1 not "turn" B1 If 2 transfs given, B0B0B0 B1
	b		Correct image	2	B2 (B1 for 2 vertices correct)

No		Working	Answer	Mark	Notes
7		$\frac{12}{5}\times\frac{15}{8}$ $\frac{180}{40}$ or simpler inc $\frac{9}{2}$	 $4\frac{1}{2}$	3	M1 Not 2.4 x 1.875 A1 Not 4..5 A1 cao
8	a		10 & 0.8 or 9.8 & 1 or 10 & 1	2	B2 B1 for 9.8 & 0.8
	b	$v^2 = 2gh$	 $\frac{v^2}{2g}$ oe	2	M1 A1
9	a		n^4	1	B1 cao
	b		p^7	1	B1 cao
	c		q^4	1	B1 cao
	d		t^3	1	B1 cao
10	a	$\sin\angle PQR = \frac{4.7}{7.6} = 0.6184...$	 38.2	3	M1 for sin & $\frac{4.7}{7.6}$ or 0.6184… M1 $\sin^{-1}$(0.6184..) May be implied A1 for 38.2 or better
	bi		7.65 7.55	2	B1 Accept $7.64\dot{9}$ B1 cao
11		$4x - 12 = 7x - 10$ $-12 + 10 = 7x - 4x$ or $-2 = 3x$	 $-\frac{2}{3}$ oe	3	B1 for $4x - 12$ seen M1 A1

No		Working	Answer	Mark	Notes
12	a	$\frac{12}{8}$ or 1.5 oe seen		2	M1
			7.5 oe		A1
	b	$15 \times \frac{2}{3}$		2	M1
			10		A1 cao
	c	$\left(\frac{3}{2}\right)^2$ or $\frac{9}{4}$ or 2.25 oe		2	M1
			135		A1 cao
13		$a + 5 + 3a - 7 + 2a - 1 = 24$		3	M1
		6a-3=24			M1
			4.5 oe		A1
14	a	$\frac{1}{3} \times \frac{1}{3}$ or all 9 combinations shown		2	M1
		eg 2 way table or list			
			$\frac{1}{9}$		A1
	bi	$\frac{2}{3}$ on bottom LH branch		9	B1
		rest of probabilities correct			B1
		EOE, EOO, OEE, OEO, OOE, OOO			B1
	ii	$\frac{2}{3} \times \frac{2}{3} \times \frac{2}{3}$			M1
			$\frac{8}{27}$ oe		A1 ft if 0 < probs <1
	iii	$\frac{1}{3} \times \frac{2}{3} \times \frac{2}{3}$ in any order or $\frac{4}{27}$			M1
		3 correct paths identified			B1 may be implied by next M1
		"$\frac{4}{27}$"×3			M1 or add 3 correct paths
			$\frac{4}{9}$ oe		A1 ft if 0 < probs <1

No		Working	Answer	Mark	Notes
15		0.88 seen $\frac{726}{0.88}$	 825	3	B1 M1 A1 cao
16				3	B3 B1 for each condition satisfied
17		$10x = 3.222...$	 $\frac{29}{90}$	2	M1 A1 cao
18	a		$-18,(-2),2,0,-2,2,18$	2	B2 for all correct (B1 for 4 or 5 correct)
	b		Points plotted Curve	2	B1 $\pm$ ½ sq ft if at least B1 in (a) B1 ft if awarded B1 for points
	c		$-0.7,1,2.7$	2	B2 ft if awarded $\geq$ B1 in (b) (B1 for 2 correct)
	d	indication that $y = 6$ used or $x^3-3x^2+2 = 6$ or $y = 6$ seen	 3.4	2	M1 eg line, mark on graph A1 ft if awarded $\geq$ B1 in (b)
19	a	$6p^2+15pq-4pq-10q^2$	 $6p^2+11pq-10q^2$	2	M1 for 3 terms correct A1 cao
	b		$8x^6y^{12}$	2	B2 (B1 for 2 of 3 parts correct)
	c		$a^{-8}b^6$	2	B2 (B1 for one part correct) Accept $\frac{1}{a^8b^{-6}}$
	d		$3p^2$	2	B2 (B1 for one part correct)

No	Working	Answer	Mark	Notes
20 a	$\pi \times 3.7^2 + \pi \times 3.7 \times 8.3$	139 to 140	2	M1 A1
b	$8.3^2 - 3.7^2$ or 55.2 $\sqrt{"55.2"}$ or 7.4296… $\frac{1}{3}\pi \times 3.7^2 \times "7.43"$	107	4	M1 M1 dep on 1st M1 M1 A1 for 107 or better (106.512…)
21	$y = 6 - 2x$ $x^2 + (6-2x)^2 = 20$ $x^2 + 36 - 24x + 4x^2 = 20$ $5x^2 - 24x + 16 = 0$ $(5x-4)(x-4) = 0$	$x = 4$ and $x = \frac{4}{5}$ oe $x = \frac{4}{5}, y = 4\frac{2}{5}$ oe and $x = 4, y = -2$	7	M1 for making y (or x) the subject M1 for substitution M1 for correct expansion A1 M1 A1 cao A1 Must be in pairs One pair only, by trial & improvement, or without working, M0A0
22 ai		$\mathbf{a} + \frac{1}{2}\mathbf{b}$ oe	3	B1
ii		$\frac{1}{2}\mathbf{a} + \mathbf{b}$ oe		B1
iii		$\mathbf{b} - \mathbf{a}$ oe		B1
b	$\frac{1}{2}\mathbf{a} + \mathbf{b} - \mathbf{a} - \frac{1}{2}\mathbf{b}$ or $\frac{1}{2}\mathbf{b} - \frac{1}{2}\mathbf{a}$	$\overrightarrow{XY} = \frac{1}{2}\overrightarrow{QS}$	2	B1 B1 Or equivalent. Must use vector not'n dep on 1st B1

Centre No.						Surname	Initial(s)
Candidate No.						Signature	

Paper Reference(s)

4400/3H

Examiner's use only

Team Leader's use only

London Examinations IGCSE

Mathematics

Paper 3H

Higher Tier

Tuesday 2 November 2004 – Morning

Time: 2 hours

Materials required for examination

Ruler graduated in centimetres and millimetres, protractor, compasses, pen, HB pencil, eraser, calculator. Tracing paper may be used.

Items included with question papers

Nil

Page Number	Leave Blank
4	
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20	
Total	

Instructions to Candidates

In the boxes above, write your centre number and candidate number, your surname, initial(s) and signature.
The paper reference is shown at the top of this page. Check that you have the correct question paper.
Answer **ALL** the questions in the spaces provided in this question paper.
Show all the steps in any calculations.

Information for Candidates

There are 20 pages in this question paper. All blank pages are indicated.
The total mark for this paper is 100. The marks for parts of questions are shown in round brackets: e.g. **(2)**.
You may use a calculator.

Advice to Candidates

Write your answers neatly and in good English.

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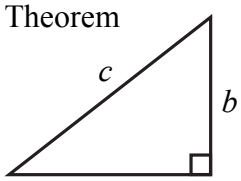
edexcel INTERNATIONAL

IGCSE MATHEMATICS 4400
FORMULA SHEET – HIGHER TIER

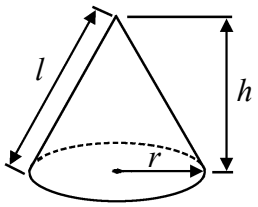
Pythagoras' Theorem



$a^2 + b^2 = c^2$

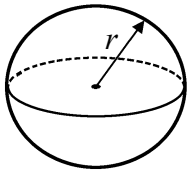
Volume of cone = $\frac{1}{3}\pi r^2 h$

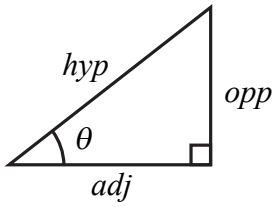
Curved surface area of cone = $\pi r l$



Volume of sphere = $\frac{4}{3}\pi r^3$

Surface area of sphere = $4\pi r^2$





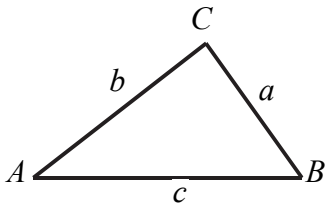
adj = hyp × cos θ
opp = hyp × sin θ
opp = adj × tan θ

or $\sin\theta = \frac{\text{opp}}{\text{hyp}}$

$\cos\theta = \frac{\text{adj}}{\text{hyp}}$

$\tan\theta = \frac{\text{opp}}{\text{adj}}$

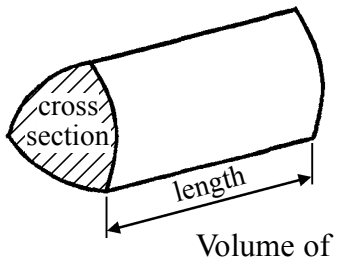
In any triangle ABC



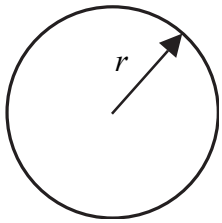
Sine rule: $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

Cosine rule: $a^2 = b^2 + c^2 - 2bc\cos A$

Area of triangle = $\frac{1}{2}ab\sin C$



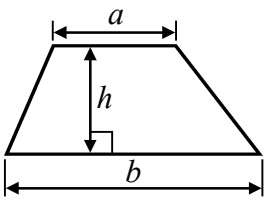
Volume of prism = area of cross section × length

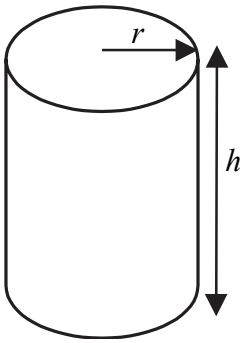


Circumference of circle = $2\pi r$

Area of circle = πr^2

Area of a trapezium = $\frac{1}{2}(a + b)h$





Volume of cylinder = $\pi r^2 h$

Curved surface area of cylinder = $2\pi rh$

The Quadratic Equation.
The solutions of $ax^2 + bx + c = 0$, where $a \neq 0$, are given by

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

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TURN OVER FOR QUESTION 1

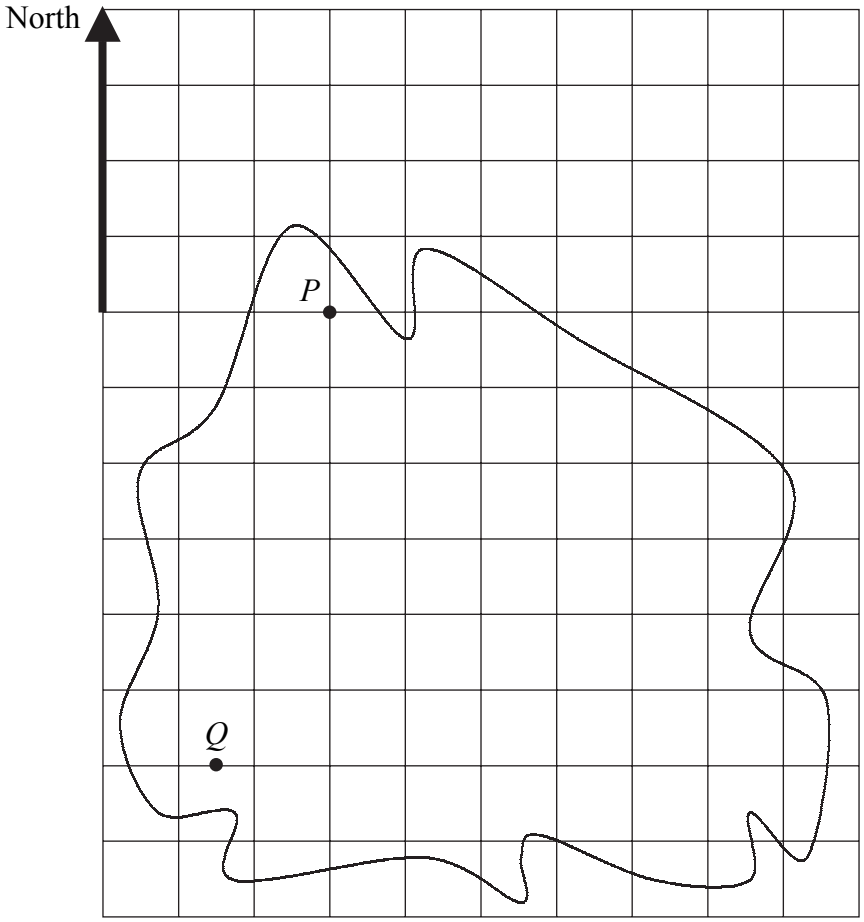
Leave blank

Answer ALL TWENTY questions.

Write your answers in the spaces provided.

You must write down all stages in your working.

1. The diagram shows a map of an island.
Two towns, *P* and *Q*, are shown on the map.



(a) Find the bearing of *Q* from *P*.

.....°

(2)

Leave blank

The scale of the map is 1 cm to 5 km.

(b) Find the real distance between P and Q.

..... km
(2)

Another town, R, is due East of Q.
The bearing of R from P is 135°.

(c) On the map, mark and label R.

(2)

Q1

(Total 6 marks)

Leave blank

2. The table shows the first three terms of a sequence.

Term number	1	2	3		
Term	2	5	10		

The rule for this sequence is

$$\text{Term} = (\text{Term number})^2 + 1$$

(a) Work out the next two terms of this sequence.

....., ...

(2)

(b) One term of this sequence is 101.
Find the term number of this term.

.....

(2)

Q2

(Total 4 marks)

3. (a) Nikos drinks $\frac{2}{3}$ of a litre of orange juice each day.
How many litres does Nikos drink in 5 days?
Give your answer as a mixed number.

.....

(2)

(b) (i) Find the lowest common multiple of 4 and 6.

.....

(ii) Work out $3\frac{3}{4} + 2\frac{5}{6}$.
Give your answer as a mixed number.
You must show all your working.

.....

(3)

Q3

(Total 5 marks)

Leave blank

4. Toni buys a car for £2500 and sells it for £2775.
Calculate her percentage profit.

..... %

(Total 3 marks)

Q4

5. A straight road rises 60 m in a horizontal distance of 260 m.

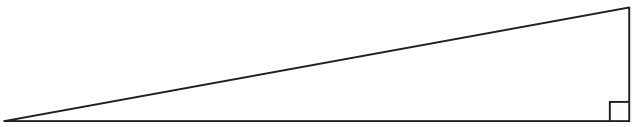


Diagram **NOT** accurately drawn

(a) Work out the gradient of the road.
Give your answer as a fraction in its lowest terms.

.....

(2)

(b) Calculate how far the road rises in a horizontal distance of 195 m.

..... m

(2)

(Total 4 marks)

Q5

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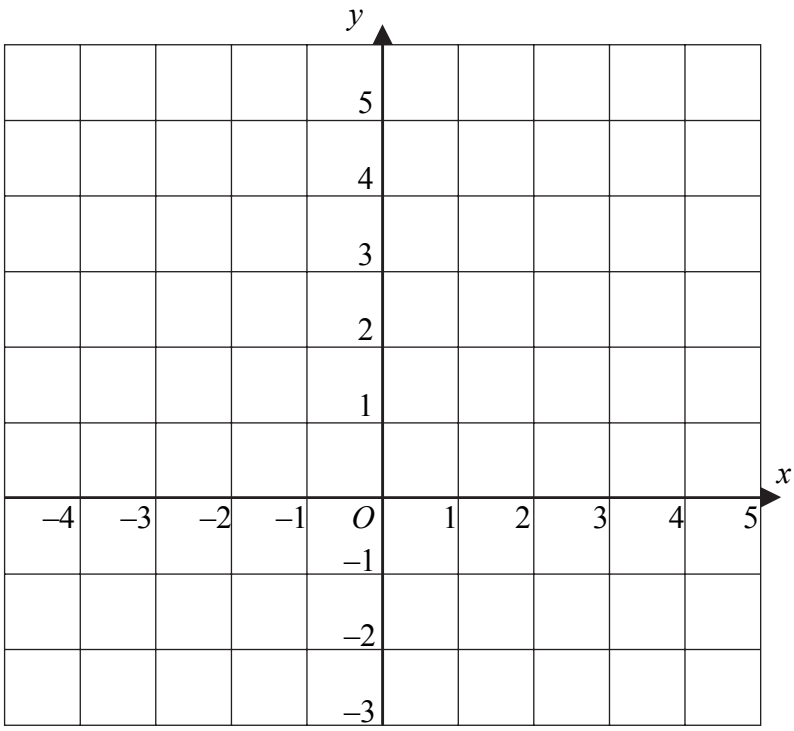
6.



(a) On the grid, draw the line $x + y = 4$.

(1)

(b) On the grid, show clearly the region defined by the inequalities

$x + y \geq 4$

$x \leq 3$

$y < 4$

(4) **Q6**

(Total 5 marks)

Leave blank

7. The diagram shows a circle, centre O.
PTQ is the tangent to the circle at T.
$PO = 6$ cm.
Angle $OPT = 40°$.

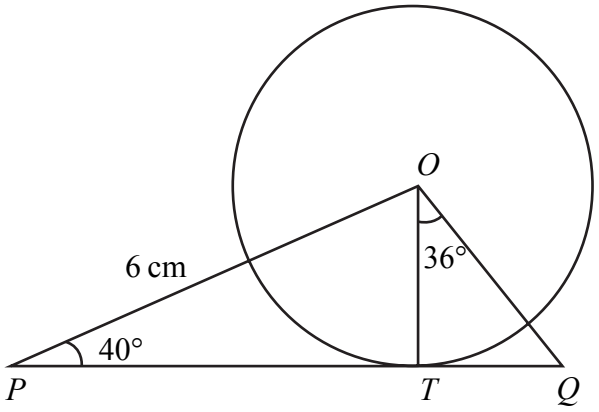


Diagram **NOT** accurately drawn

(a) Explain why angle $OTP = 90°$.

.....

.....

(1)

(b) Calculate the length of OT.
Give your answer correct to 3 significant figures.

..... cm
(3)

(c) Angle $QOT = 36°$.
Calculate the length of OQ.
Give your answer correct to 3 significant figures.

..... cm
(3)

Q7

(Total 7 marks)

Leave blank

8. The table shows information about the ages of 24 students.

Age (years)	Number of students
16	9
17	3
18	8
19	4

(a) (i) Write down the mode of these ages.

..... years

(ii) Find the median of these ages.

..... years

(iii) Calculate the mean of these ages.

..... years

(6)

Another student, aged 18, joins the group.

(b) (i) Without calculating the new mean, state whether the mean will increase or decrease or stay the same.

.....

(ii) Give a reason for your answer to (i).

.....

.....

.....

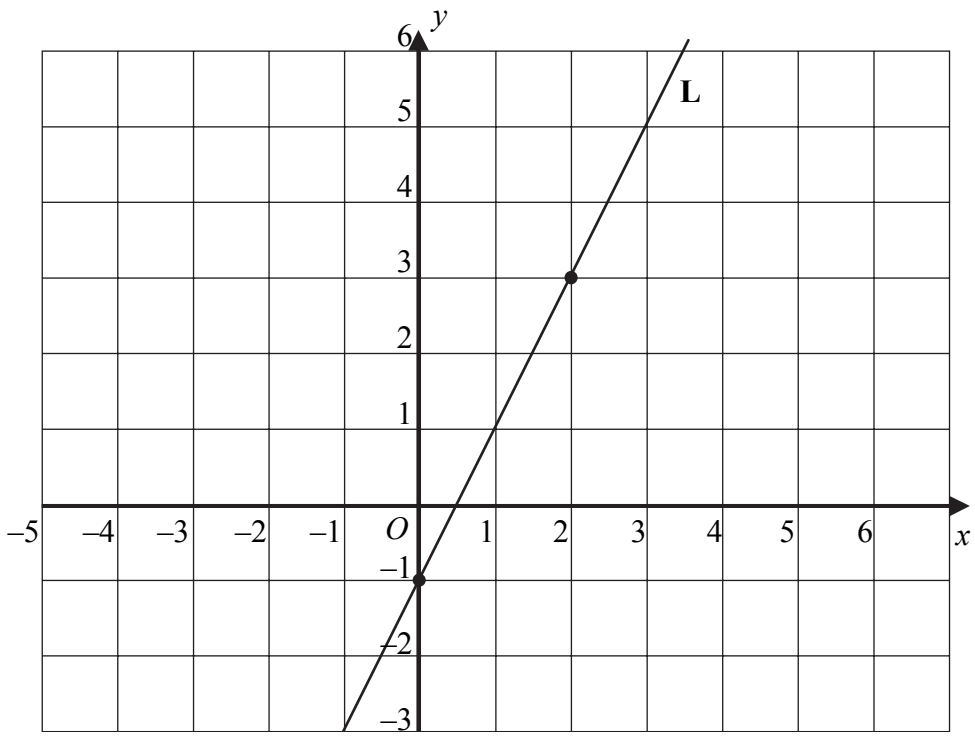
(2)

Q8

(Total 8 marks)

Leave blank

9. The straight line, **L**, passes through the points (0, –1) and (2, 3).



(a) Work out the gradient of **L**.

.....

(2)

(b) Write down the equation of **L**.

.....

(2)

(c) Write down the equation of another line that is parallel to **L**.

.....

(1)

Q9

(Total 5 marks)

Leave blank

10. The table shows the mean distances of the planets from the Sun.

Planet	Mean distance from the Sun (km)
Mercury	5.8×10^7
Venus	1.1×10^8
Earth	1.5×10^8
Mars	2.3×10^8
Jupiter	7.8×10^8
Saturn	1.4×10^9
Uranus	2.9×10^9
Neptune	4.5×10^9
Pluto	5.9×10^9

(a) Which planet is approximately 4 times as far from the Sun as Mercury?

.....

(1)

(b) Find the ratio of the mean distance of Earth from the Sun to the mean distance of Neptune from the Sun. Give your answer in the form 1:n

.....

(2)

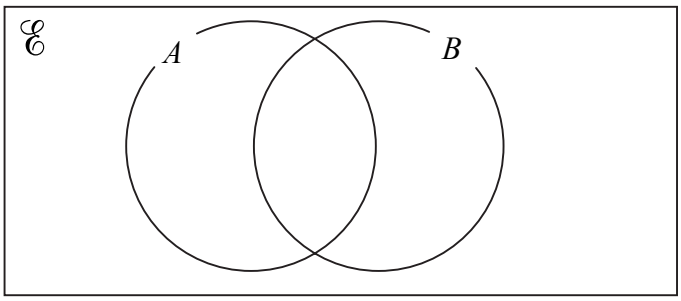
Q10

(Total 3 marks)

Leave blank

11. The universal set, $\mathscr{E}$ = {Whole numbers}
A = {Multiples of 5}
B = {Multiples of 3}

Sets A and B are represented by the circles in the Venn diagram.



(a) (i) On the diagram, shade the region that represents the set $A \cap B'$.

(ii) Write down **three** members of the set $A \cap B'$.

....., ..., ...

(2)

C = {Multiples of 10}.

(b) (i) On the diagram draw a circle to represent the set C.

(ii) Write down **three** members of the set $A \cap B \cap C'$

....., ..., ...

(2) **Q11**

(Total 4 marks)

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12. *A*, *B*, *C* and *D* are points on a circle.
Angle *BAC* = 40°.
Angle *DBC* = 55°.

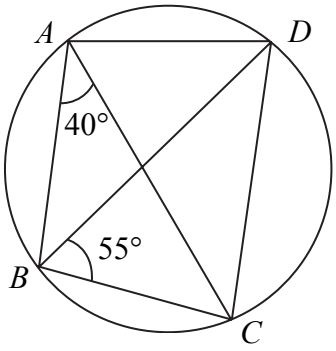


Diagram **NOT** accurately drawn

(a) (i) Find the size of angle *DAC*.

..... °

(ii) Give a reason for your answer.

.....

.....

(2)

(b) (i) Calculate the size of angle *DCB*.

..... °

(ii) Give reasons for your answer.

.....

.....

.....

.....

(3)

(c) Is *BD* a diameter of the circle? .....

Give a reason for your answer.

.....

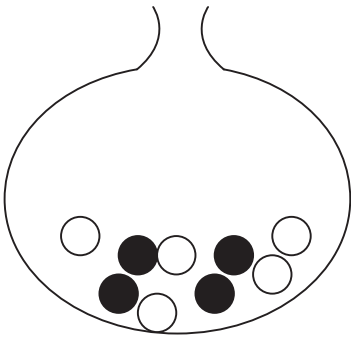
(1)

Q12

(Total 6 marks)

Leave blank

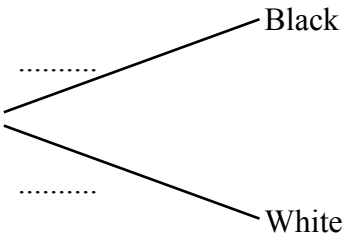
13. A bag contains 4 black discs and 5 white discs.



Ranjit takes a disc at random from the bag and notes its colour.
He then replaces the disc in the bag.
Ranjit takes another disc at random from the bag and notes its colour.

(a) Complete the probability tree diagram to show all the possibilities.

First disc Second disc



(4)

(b) Calculate the probability that Ranjit takes two discs of different colours.

.....

(3) **Q13**

(Total 7 marks)

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14. Oil is stored in either small drums or large drums.
The shapes of the drums are mathematically similar.

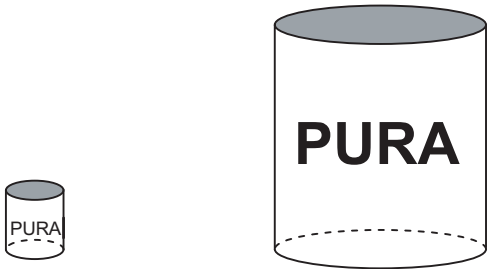


Diagram **NOT** accurately drawn

A **small** drum has a volume of 0.006 m^3 and a surface area of 0.2 m^2.

The height of a **large** drum is 3 times the height of a small drum.

(a) Calculate the volume of a large drum.

..... m^3
(2)

(b) The cost of making a drum is \$1.20 for each m^2 of surface area.
A company wants to store 3240 m^3 of oil in large drums.
Calculate the cost of making enough large drums to store this oil.

\$ .....
(4)

Q14

(Total 6 marks)

Leave blank

15. Solve the equation $3x^2 + 2x - 6 = 0$
Give your answers correct to 3 significant figures.

.....

(Total 3 marks)

Q15

16. (a) Factorise the expression $2x^2 + 5x - 3$

.....

(2)

(b) Simplify fully $\dfrac{x^2 - 9}{x^2 - 9x + 18}$

.....

(3)

(Total 5 marks)

Q16

Leave blank

17. A curve has equation $y = x^2 - 4x + 1$.

(a) For this curve find

(i) $\frac{dy}{dx}$,

.....

(ii) the coordinates of the turning point.

.....

(4)

(b) State, with a reason, whether the turning point is a maximum or a minimum.

.....

.....

(2)

(c) Find the equation of the line of symmetry of the curve $y = x^2 - 4x + 1$

.....

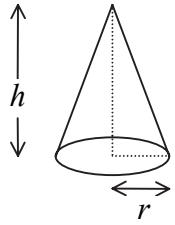
(2)

Q17

(Total 8 marks)

Leave blank

18. A cone has base radius r cm and vertical height h cm.



The volume of the cone is 12π cm^3.
Find an expression for r in terms of h.

$r =$ .....

Q18

(Total 3 marks)

19. Express $\sqrt{98}$ in the form $a\sqrt{b}$ where a and b are integers and $a > 1$.

.....

Q19

(Total 2 marks)

Leave blank

20. A box contains 7 good apples and 3 bad apples.

Nick takes two apples at random from the box, **without** replacement.

(a) (i) Calculate the probability that both of Nick's apples are bad.

.....

(ii) Calculate the probability that at least one of Nick's apples is good.

.....

(4)

Another box contains 8 good oranges and 4 bad oranges.

Crystal keeps taking oranges at random from the box one at a time, **without** replacement, until she gets a good orange.

(b) Calculate the probability that she takes exactly three oranges.

.....

(2) **Q20**

(Total 6 marks)

TOTAL FOR PAPER: 100 MARKS

END

Centre No.						Surname	Initial(s)
Candidate No.						Signature	

Paper Reference(s)

4400/4H

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Team Leader's use only

London Examinations IGCSE

Mathematics

Paper 4H

Higher Tier

Thursday 4 November 2004 – Morning

Time: 2 hours

Materials required for examination
Ruler graduated in centimetres and millimetres, protractor, compasses, pen, HB pencil, eraser, calculator. Tracing paper may be used.

Items included with question papers
Nil

Page Number	Leave Blank
3	
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Total	

Instructions to Candidates

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Answer **ALL** the questions in the spaces provided in this question paper.
Show all the steps in any calculations.

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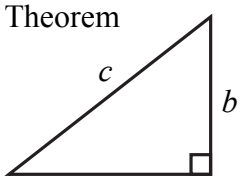
IGCSE MATHEMATICS 4400
FORMULA SHEET – HIGHER TIER

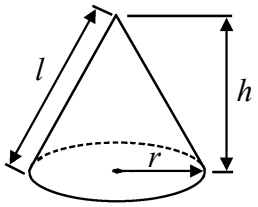
Pythagoras' Theorem



$a^2 + b^2 = c^2$

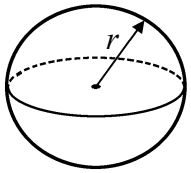
Volume of cone = $\frac{1}{3}\pi r^2 h$

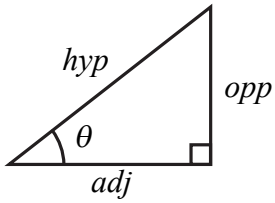
Curved surface area of cone = $\pi r l$



Volume of sphere = $\frac{4}{3}\pi r^3$

Surface area of sphere = $4\pi r^2$





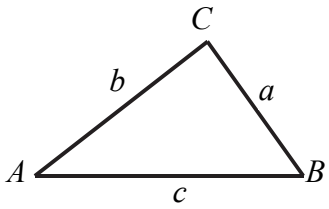
adj = hyp × cos θ
opp = hyp × sin θ
opp = adj × tan θ

or $\sin\theta = \frac{\text{opp}}{\text{hyp}}$

$\cos\theta = \frac{\text{adj}}{\text{hyp}}$

$\tan\theta = \frac{\text{opp}}{\text{adj}}$

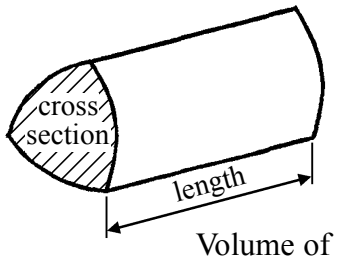
In any triangle ABC



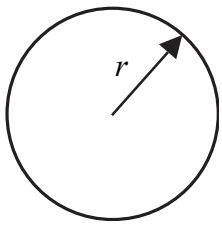
Sine rule $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

Cosine rule $a^2 = b^2 + c^2 - 2bc\cos A$

Area of triangle = $\frac{1}{2}ab\sin C$



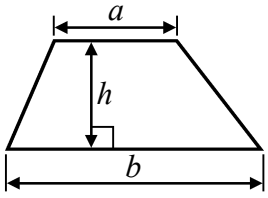
Volume of prism = area of cross section × length

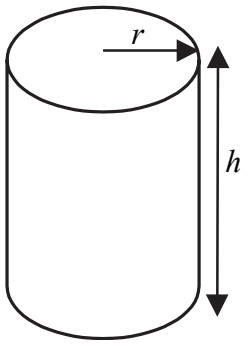


Circumference of circle = $2\pi r$

Area of circle = πr^2

Area of a trapezium = $\frac{1}{2}(a + b)h$





Volume of cylinder = $\pi r^2 h$

Curved surface area of cylinder = $2\pi rh$

The Quadratic Equation
The solutions of $ax^2 + bx + c = 0$ where $a \neq 0$, are given by

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Leave blank

Answer ALL TWENTY THREE questions.

Write your answers in the spaces provided.

You must write down all stages in your working.

1. The total weight of 3 identical video tapes is 525 g.
Work out the total weight of 5 of these video tapes.

..... g

(Total 2 marks)

Q1

2. Solve $5x - 3 = 2x - 1$

$x =$ .....

(Total 3 marks)

Q2

Leave blank

3.

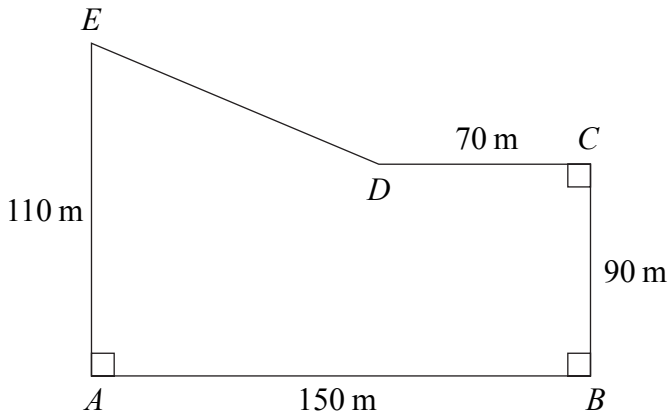


Diagram **NOT** accurately drawn

The shape *ABCDE* is the plan of a field.
AB = 150 m, *BC* = 90 m, *CD* = 70 m and *EA* = 110 m.
The corners at *A*, *B* and *C* are right angles.

Work out the area of the field.

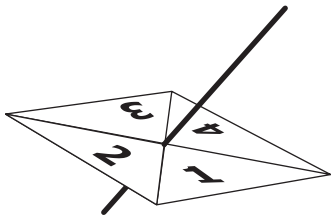
..... m^2

(Total 4 marks)

Q3

Leave blank

4. Here is a 4-sided spinner.



The sides of the spinner are labelled 1, 2, 3 and 4.
The spinner is biased.
The probability that the spinner will land on each of the numbers 1, 2 and 3 is given in the table.

Number	1	2	3	4
Probability	0.2	0.1	0.4	

(a) Work out the probability that the spinner will land on 4

.....

(2)

Tom spun the spinner a number of times.
The number of times it landed on 1 was 85

(b) Work out an estimate for the number of times the spinner landed on 3

.....

(1)

Q4

(Total 3 marks)

Leave blank

5. Calculate the value of $\sqrt{2.6^3 - 3.9^2}$
Write down all the figures on your calculator display.

.....

(Total 2 marks)

Q5

6. (a) Expand $y(y + 2)$

.....

(1)

(b) Expand and simplify $3(2x + 1) + 2(x - 4)$

.....

(2)

(Total 3 marks)

Q6

Leave blank

7. Paul got 68 out of 80 in a science test.

(a) Work out 68 out of 80 as a percentage.

.....%
(2)

Paul got 72 marks in a maths test.
72 is 60% of the total number of marks.

(b) Work out the total number of marks.

.....
(2) **Q7**

(Total 4 marks)

Leave blank

8. The nth term of a sequence is given by this formula.

$$n\text{th term} = 20 - 3n$$

(a) Work out the 8th term of the sequence.

.....

(1)

(b) Find the value of n for which $20 - 3n = -22$

$n =$ .....

(2)

Here are the first five terms of a different sequence.

8 11 14 17 20

(c) Find an expression, in terms of n, for the nth term of this sequence.

nth term = ...

(2)

Q8

(Total 5 marks)

Leave blank

9.

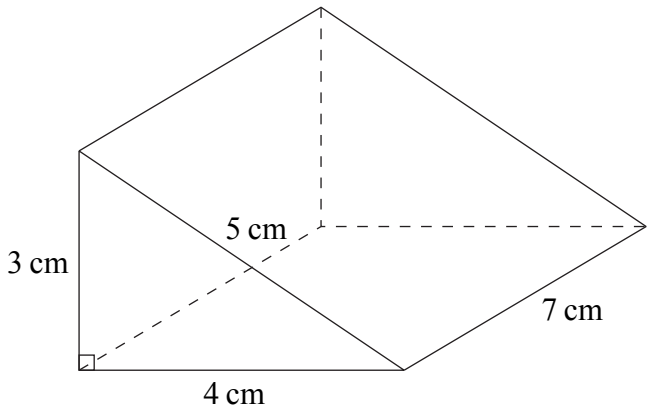


Diagram **NOT** accurately drawn

The diagram shows a prism.
The cross-section of the prism is a right-angled triangle.
The lengths of the sides of the triangle are 3 cm, 4 cm and 5 cm.
The length of the prism is 7 cm.

(a) Work out the volume of the prism.

..... cm^3
(3)

(b) Work out the total surface area of the prism.

..... cm^2
(3)

Q9

(Total 6 marks)

Leave blank

10. The table gives information about the speeds, in km/h, of 200 cars passing a speed checkpoint.

Speed (v km/h)	Frequency
$30 < v \leq 40$	20
$40 < v \leq 50$	76
$50 < v \leq 60$	68
$60 < v \leq 70$	28
$70 < v \leq 80$	8

(a) Write down the modal class.

.....

(1)

(b) Work out an estimate for the probability that the next car passing the speed checkpoint will have a speed of more than 60 km/h.

.....

(2)

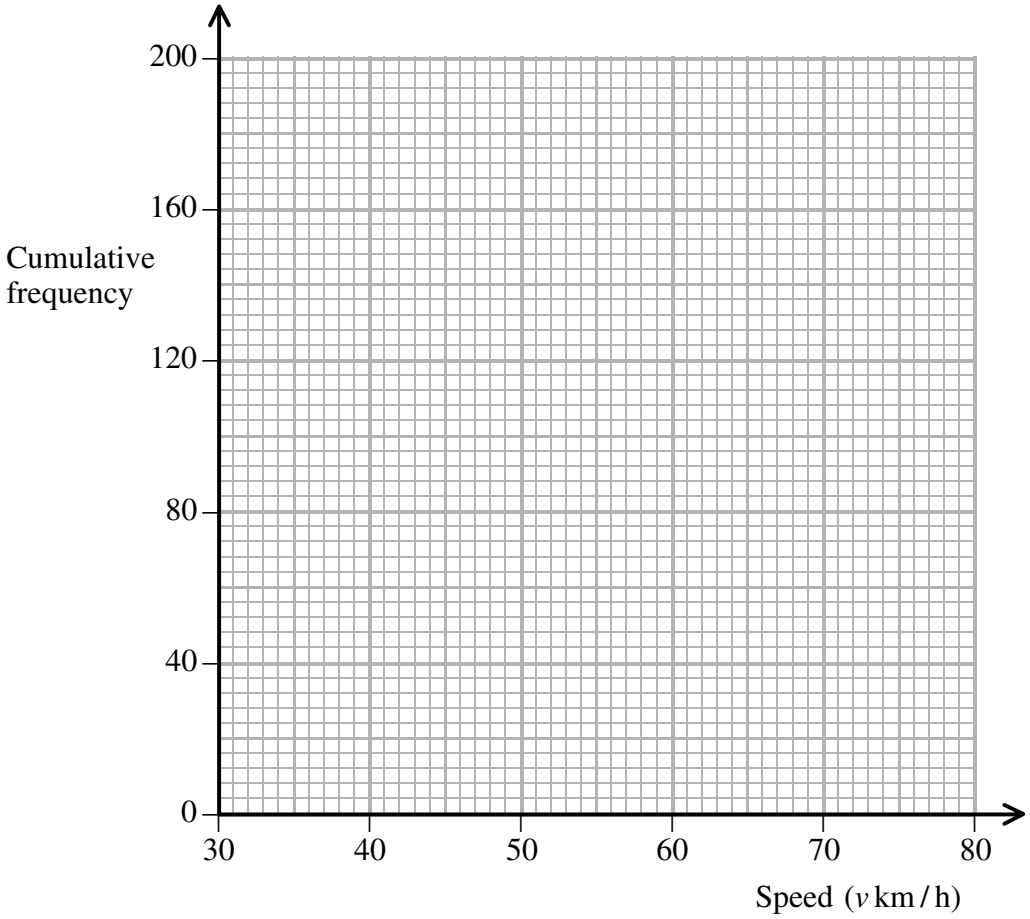
(c) Complete the cumulative frequency table.

Speed (v km/h)	Cumulative frequency
$30 < v \leq 40$	
$30 < v \leq 50$	
$30 < v \leq 60$	
$30 < v \leq 70$	
$30 < v \leq 80$	

(1)

Leave blank

(d) On the grid, draw a cumulative frequency graph for your table.



(2)

(e) Use your graph to find an estimate for the inter-quartile range of the speeds.
Show your method clearly.

..... km/h

(2) **Q10**

(Total 8 marks)

Leave blank

11. (a) Simplify, leaving your answer in index form

(i) $2^4 \times 2^3$

.....

(ii) $3^8 \div 3^2$

.....

(2)

(b) $5^x = 1$

Find the value of x.

$x =$ .....

(1)

Q11

(Total 3 marks)

12. Solve the simultaneous equations

$$6x - 5y = 13$$
$$4x - 3y = 8$$

$x =$ .....

$y =$ .....

Q12

(Total 4 marks)

Leave blank

13.

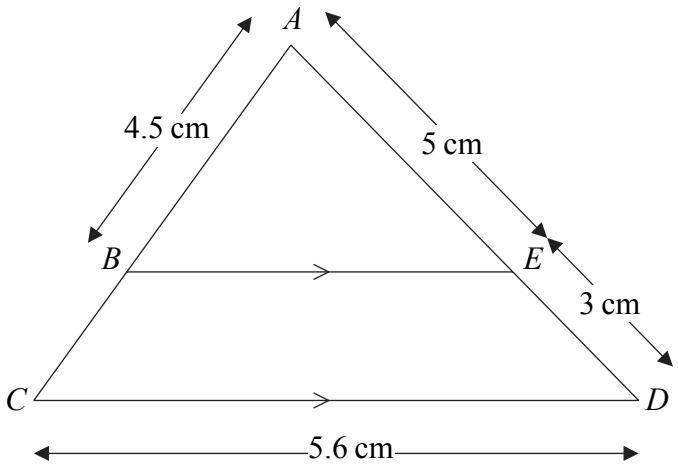


Diagram **NOT** accurately drawn

BE is parallel to *CD*.
AB = 4.5 cm, *AE* = 5 cm, *ED* = 3 cm, *CD* = 5.6 cm.

(a) Calculate the length of *BE*.

..... cm
(2)

(b) Calculate the length of *BC*.

..... cm
(2)

Q13

(Total 4 marks)

Leave blank

14. (a) Find the Highest Common Factor of 75 and 105.

.....

(2)

(b) Find the Lowest Common Multiple of 75 and 105.

.....

(2)

Q14

(Total 4 marks)

15. Make v the subject of the formula $m(v-u)=I$

v = ...

Q15

(Total 3 marks)

Leave blank

16. Kate is going to mark some examination papers.
When she marks for n hours each day, she takes d days to mark the papers.

d is inversely proportional to n.

When $n = 9$, $d = 15$

(a) Find a formula for d in terms of n.

$d =$ .....
(3)

(b) Kate marks for $7\frac{1}{2}$ hours each day.

Calculate the number of days she takes to mark the papers.

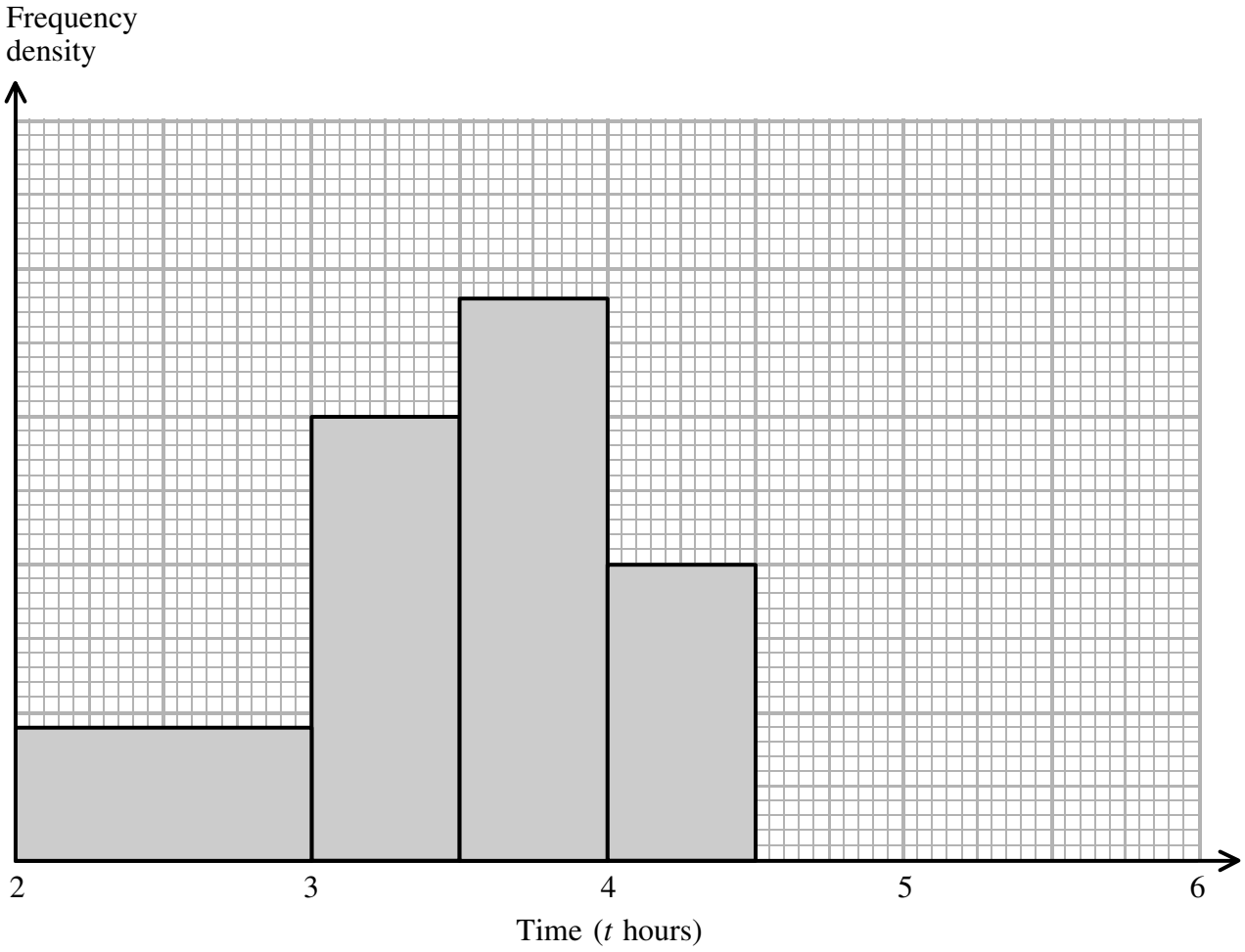
.....
(2)

Q16

(Total 5 marks)

Leave blank

17. The unfinished histogram and table give information about the times, in hours, taken by runners to complete the Mathstown Marathon.



Time (t hours)	Frequency
$2 \leq t < 3$	
$3 \leq t < 3.5$	1200
$3.5 \leq t < 4$	
$4 \leq t < 4.5$	800
$4.5 \leq t < 6$	1440

(a) Use the histogram to complete the table.

(2)

(b) Use the table to complete the histogram.

(1) **Q17**

(Total 3 marks)

Leave blank

18.

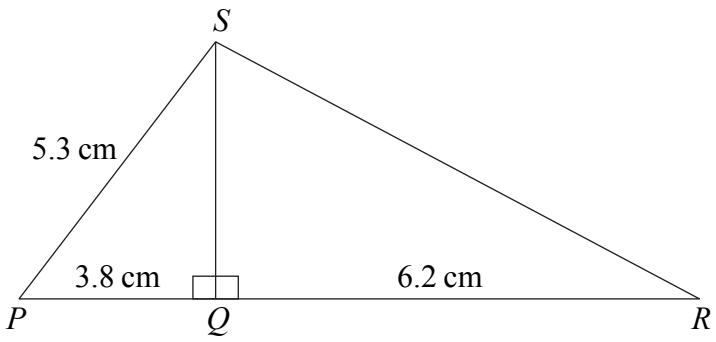


Diagram **NOT** accurately drawn

Angle $PQS = 90°$.
Angle $RQS = 90°$.
$PS = 5.3$ cm, $PQ = 3.8$ cm, $QR = 6.2$ cm.

Calculate the length of RS.
Give your answer correct to 3 significant figures.

..... cm

(Total 5 marks)

Q18

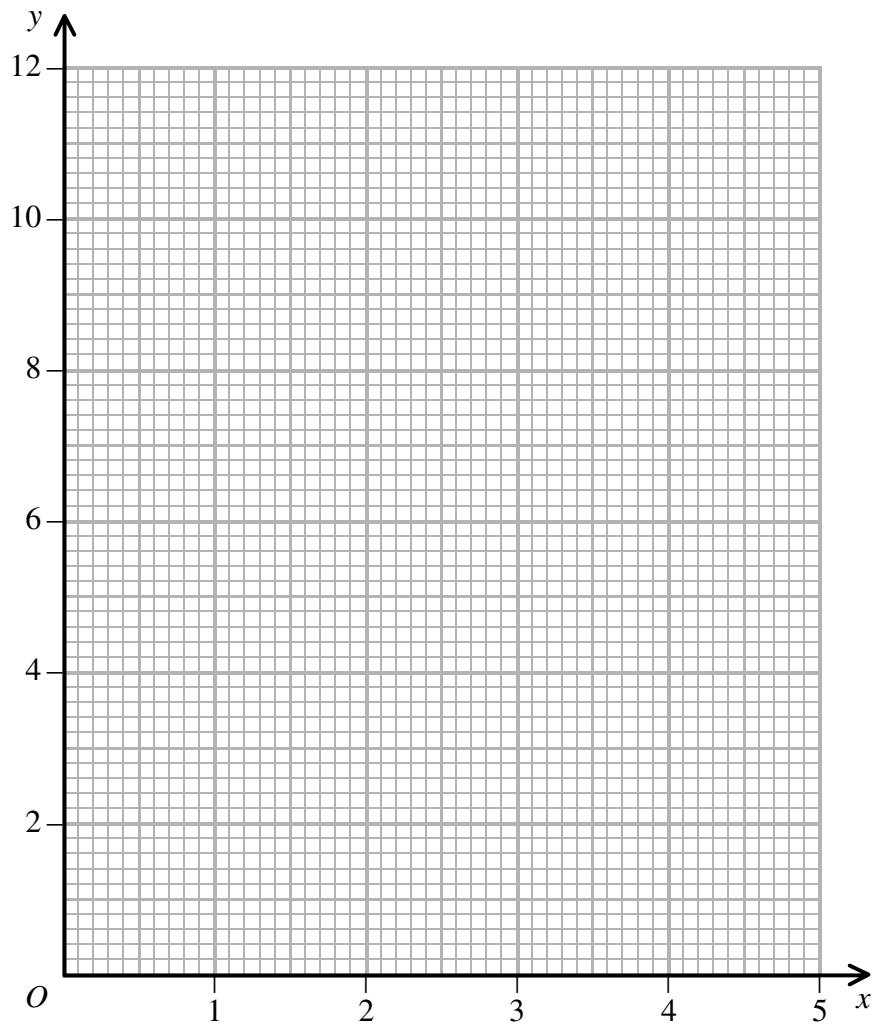
Leave blank

19. (a) Complete the table of values for $y = x + \frac{2}{x}$

x	0.2	0.4	0.6	0.8	1	1.5	2	3	4	5
y	10.2		3.9		3	2.8		3.7		5.2

(2)

(b) On the grid, draw the graph of $y = x + \frac{2}{x}$ for $0.2 \leq x \leq 5$



(2)

Leave blank

(c) Use your graph to find estimates for the solutions of the equation

$$x + \frac{2}{x} = 4$$

$x =$ ..... or $x =$ .....

(2)

The solutions of the equation $2x + \frac{2}{x} = 7$ are the x-coordinates of the points of intersection of the graph of $y = x + \frac{2}{x}$ and a straight line **L**.

(d) Find the equation of **L**.

.....

(2) **Q19**

(Total 8 marks)

Leave blank

20.

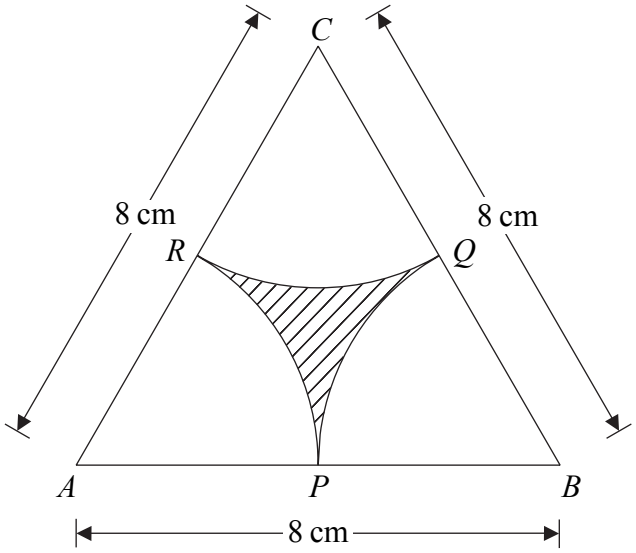


Diagram **NOT** accurately drawn

ABC is an equilateral triangle of side 8 cm.
With the vertices *A*, *B* and *C* as centres, arcs of radius 4 cm are drawn to cut the sides of the triangle at *P*, *Q* and *R*.
The shape formed by the arcs is shaded.

(a) Calculate the perimeter of the shaded shape.
Give your answer correct to 1 decimal place.

..... cm
(3)

Leave blank

(b) Calculate the area of the shaded shape.
Give your answer correct to 1 decimal place.

..... cm^2
(4)

Q20

(Total 7 marks)

21. Correct to 1 significant figure, $x = 7$ and $y = 9$

(a) Calculate the lower bound for the value of xy

.....
(2)

(b) Calculate the upper bound for the value of $\frac{x}{y}$

.....
(3)

Q21

(Total 5 marks)

Leave blank

22.

$$f(x) = x^2$$

$$g(x) = x - 6$$

Solve the equation $fg(x) = g^{-1}(x)$

.....

Q22

(Total 5 marks)

Leave blank

23. There are 10 beads in a box.
n of the beads are red.
Meg takes one bead at random from the box and does not replace it.
She takes a second bead at random from the box.
The probability that she takes 2 red beads is $\frac{1}{3}$.

Show that $n^2 - n - 30 = 0$

Q23

(Total 4 marks)

TOTAL FOR PAPER: 100 MARKS

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Centre No.					
Candidate No.					

Surname	Initial(s)
Signature	

Paper Reference(s)

4400/3H

Examiner's use only

Team Leader's use only

London Examinations IGCSE

Mathematics

Paper 3H

Higher Tier

Friday 4 November 2005 – Morning

Time: 2 hours

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23	
Total	

Materials required for examination

Ruler graduated in centimetres and millimetres, protractor, compasses, pen, HB pencil, eraser, calculator. Tracing paper may be used.

Items included with question papers

Nil

Instructions to Candidates

In the boxes above, write your centre number and candidate number, your surname, initial(s) and signature.
The paper reference is shown at the top of this page. Check that you have the correct question paper.
Answer ALL the questions in the spaces provided in this question paper.
Show all the steps in any calculations.

Information for Candidates

There are 24 pages in this question paper. All blank pages are indicated.
The total mark for this paper is 100. The marks for parts of questions are shown in round brackets: e.g. (2).
You may use a calculator.

Advice to Candidates

Write your answers neatly and in good English.

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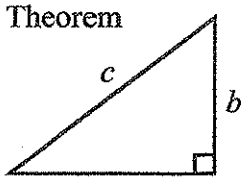
IGCSE MATHEMATICS 4400
FORMULA SHEET – HIGHER TIER

Pythagoras' Theorem



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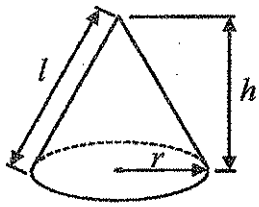
Volume of cone = $\frac{1}{3}\pi r^2 h$

Curved surface area of cone = $\pi r l$



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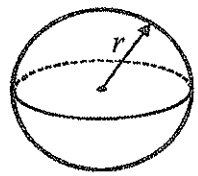
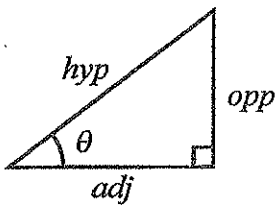




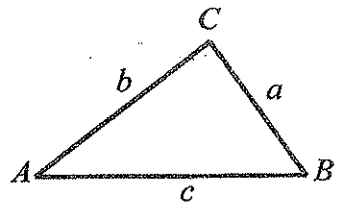
adj = hyp × cos θ
opp = hyp × sin θ
opp = adj × tan θ

or $\sin\theta = \frac{\text{opp}}{\text{hyp}}$

$\cos\theta = \frac{\text{adj}}{\text{hyp}}$

$\tan\theta = \frac{\text{opp}}{\text{adj}}$

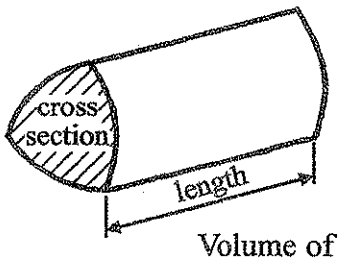
In any triangle ABC



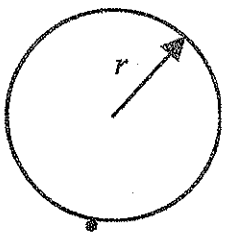
Sine rule: $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

Cosine rule: $a^2 = b^2 + c^2 - 2bc\cos A$

Area of triangle = $\frac{1}{2}ab\sin C$



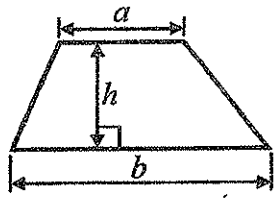
Volume of prism = area of cross section × length

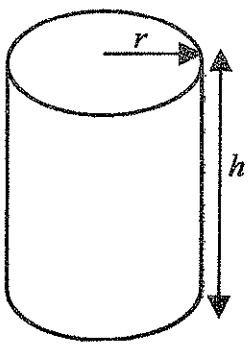


Circumference of circle = $2\pi r$

Area of circle = πr^2

Area of a trapezium = $\frac{1}{2}(a+b)h$





Volume of cylinder = $\pi r^2 h$

Curved surface area of cylinder = $2\pi rh$

The Quadratic Equation.
The solutions of $ax^2 + bx + c = 0$, where $a \neq 0$, are given by

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

N 2 3 0 6 8 A 0 2 2 4

Leave blank

Answer ALL TWENTY ONE questions.

Write your answers in the spaces provided.

You must write down all stages in your working.

1. (a) Use your calculator to work out the value of

$$2.6 - \frac{9.8}{2.7 + 1.2}$$

Write down all the figures on your calculator display.

.....

(2)

(b) Give your answer to part (a) correct to 2 significant figures.

.....

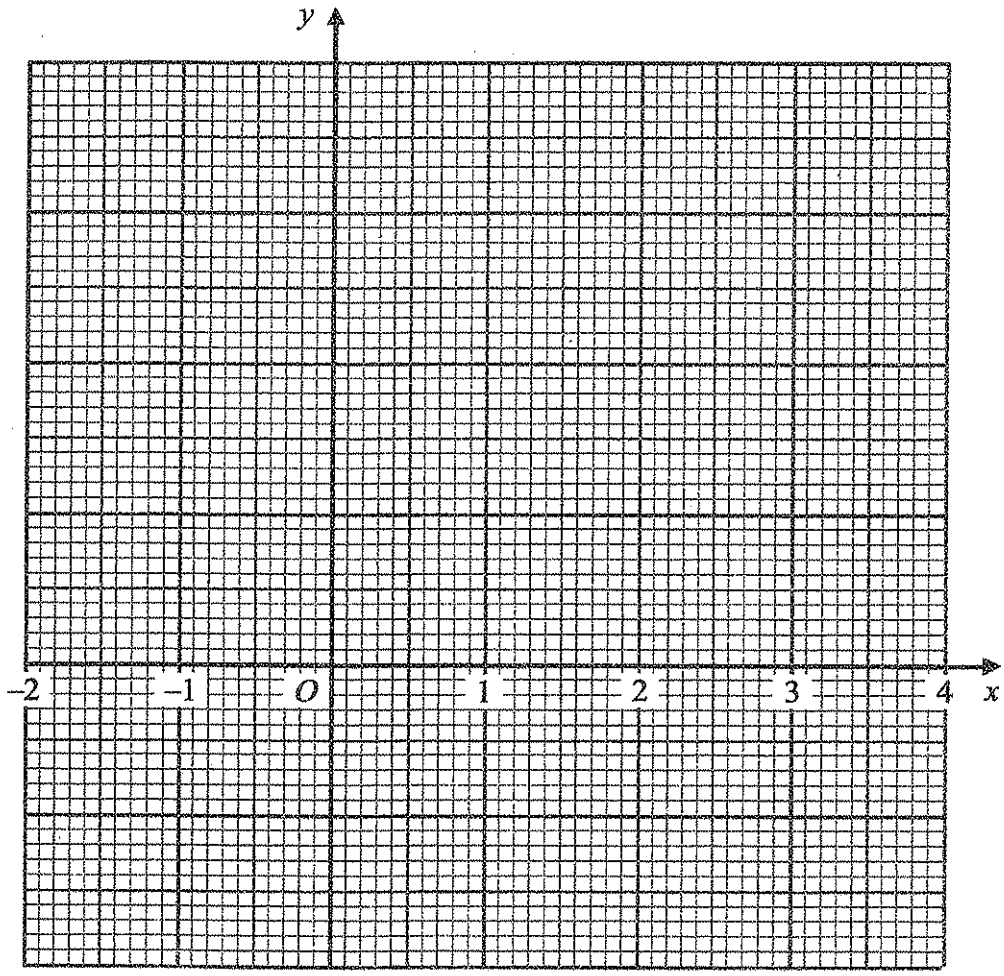
(1)

(Total 3 marks)

Q1

Leave blank

2. On the grid, draw the graph of $y = 3x + 5$ from $x = -2$ to $x = 4$



Q2

(Total 3 marks)

Leave blank

3. The lengths of two of the sides of a kite are 7.6 cm and 4.3 cm.
The length of the shorter diagonal of the kite is 5.2 cm.

In the space below, use ruler and compasses to **construct** an accurate, full-size drawing of the kite.
You must show all construction lines.

Q3

(Total 4 marks)

Leave blank

4. The table shows information about the number of bananas the students in class 1B ate in one week.

Number of bananas	Frequency
0	1
1	6
2	5
3	2
4	7
5	4

(a) Find the mean number of bananas.

.....

(3)

There are 575 students in the school.
The numbers of bananas eaten by students in class 1B are typical of the numbers eaten by students in the whole school.

(b) Work out an estimate for the number of students in the whole school who will eat exactly one banana next week.

.....

(3) Q4

(Total 6 marks)

Leave blank

5.

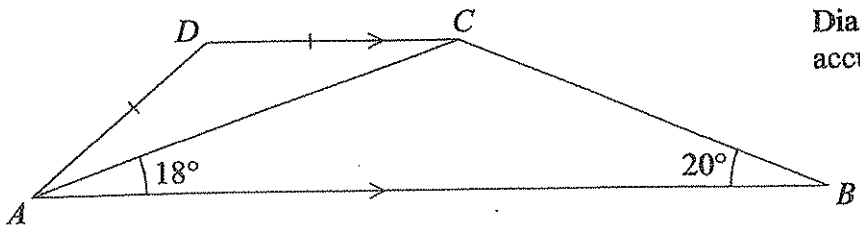


Diagram **NOT** accurately drawn

ABCD is a trapezium.
AB is parallel to *DC*.
Angle *BAC* = 18°.
Angle *ABC* = 20°.
AD = *DC*.

Calculate the size of angle *ADC*.
Give a reason for each step in your working.

.....°

(Total 5 marks)

Q5

Leave blank

6. $$f = \frac{uv}{u+v}$$

Work out the value of f when $u = 5.7$ and $v = -7.6$

$f =$ .....

(Total 3 marks)

Q6

7. The amount of petrol a car uses is directly proportional to the distance it travels.
A car uses 3 litres of petrol when it travels 50 km.

(a) Work out the amount of petrol the car uses when it travels 125 km.

..... litres

(2)

(b) Work out the distance the car travels when it uses 5.7 litres of petrol.

..... km

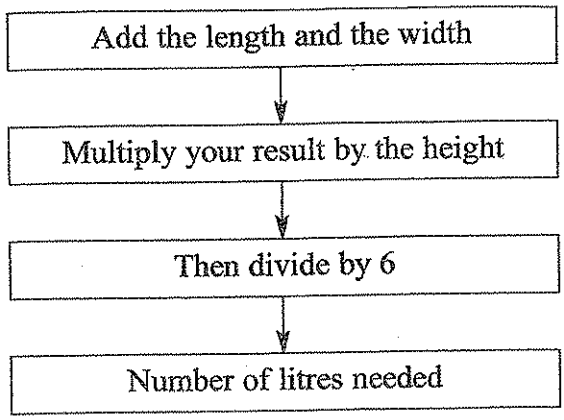
(2)

(Total 4 marks)

Q7

Leave blank

8. This rule can be used to work out the number of litres of paint needed to cover the walls of a room, using the length, width and height, in metres, of the room.



A room has length L metres, width W metres and height H metres.
N litres of paint are needed to cover the walls of the room.

(a) Find a formula for N in terms of L, W and H.

.....

(3)

The perimeter of the room is P metres.

(b) Find a formula for N in terms of P and H.

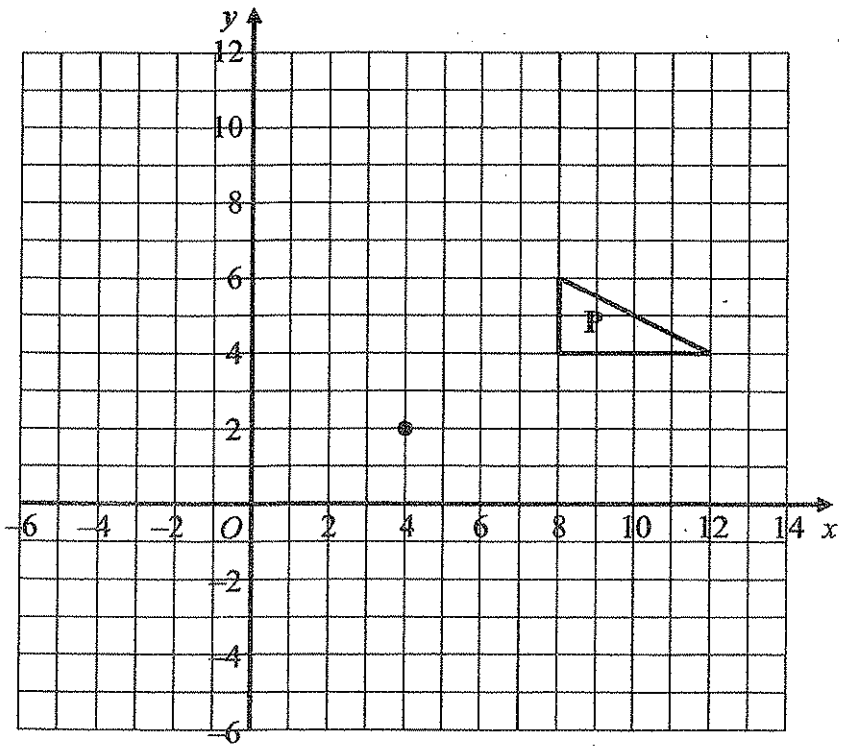
.....

(2) Q8

(Total 5 marks)

Leave blank

9. (a)

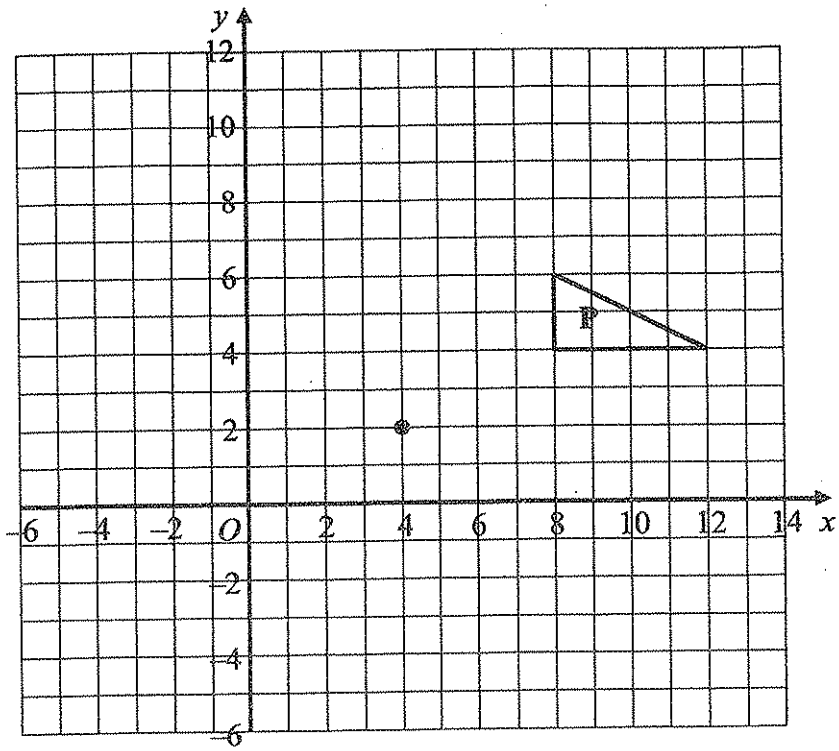


On the grid, rotate triangle P 90° anti-clockwise about the point (4, 2).

(2)

Leave blank

(b)



On the grid, enlarge triangle P with scale factor $\frac{1}{2}$ and centre (4, 2).

(2) Q9

(Total 4 marks)

Leave blank

10. Pat drops a ball onto a wooden floor.
The ball bounces to a height which is 26% less than the height from which it is dropped.

(a) Pat drops the ball from a height of 85 cm.
Calculate the height to which it first bounces.

..... cm
(3)

(b) Pat drops the ball from a different height.
It first bounces to a height of 48.1 cm.
Calculate the height from which he dropped it.

..... cm
(3)

(Total 6 marks)

Q10

11. Solve $\frac{5x+4}{3}=2$

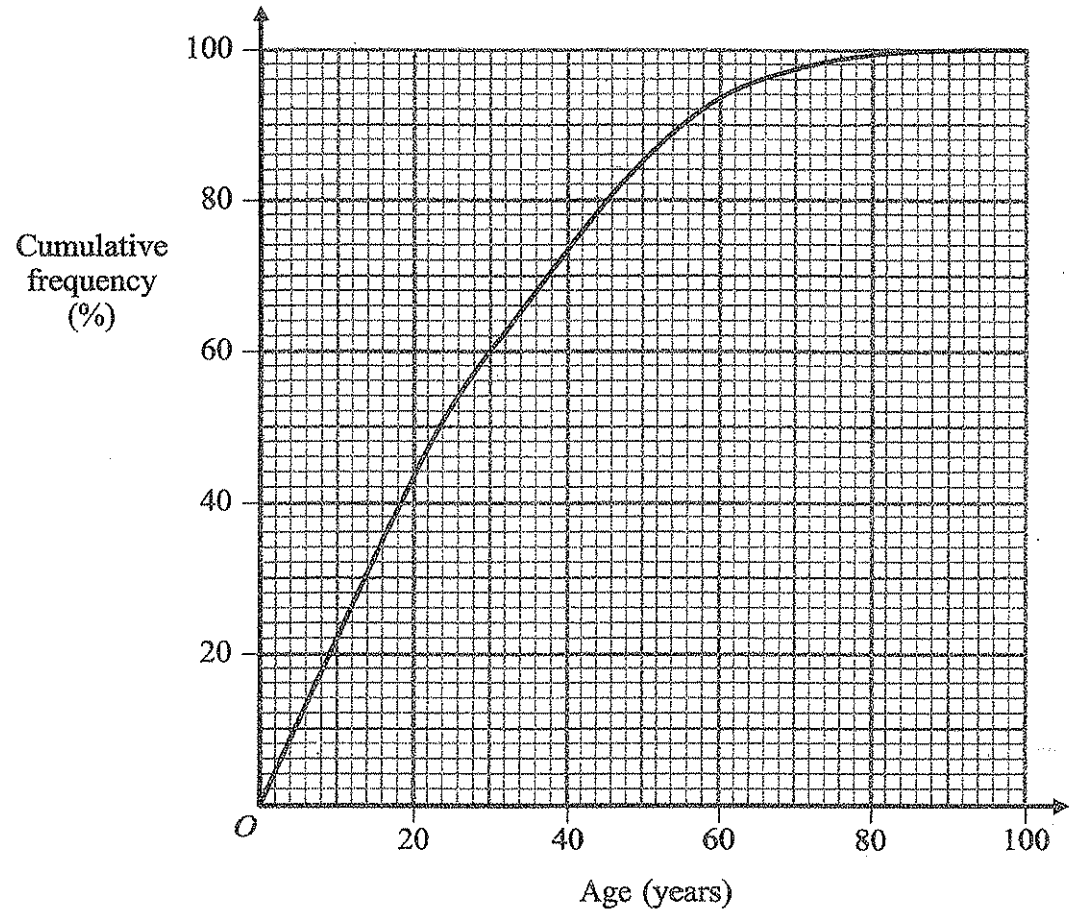
$x =$ .....

(Total 3 marks)

Q11

Leave blank

12. The cumulative frequency graph gives information about the ages of people in India. The cumulative frequency is given as a percentage of all the people in India.



(a) Use the cumulative frequency graph to find an estimate for the percentage of people in India who are

(i) aged less than 20,

.....%

(ii) aged 54 or over.

.....%

(2)

(b) Find an estimate for the interquartile range of the ages of people in India.

..... years

(2)

Q12

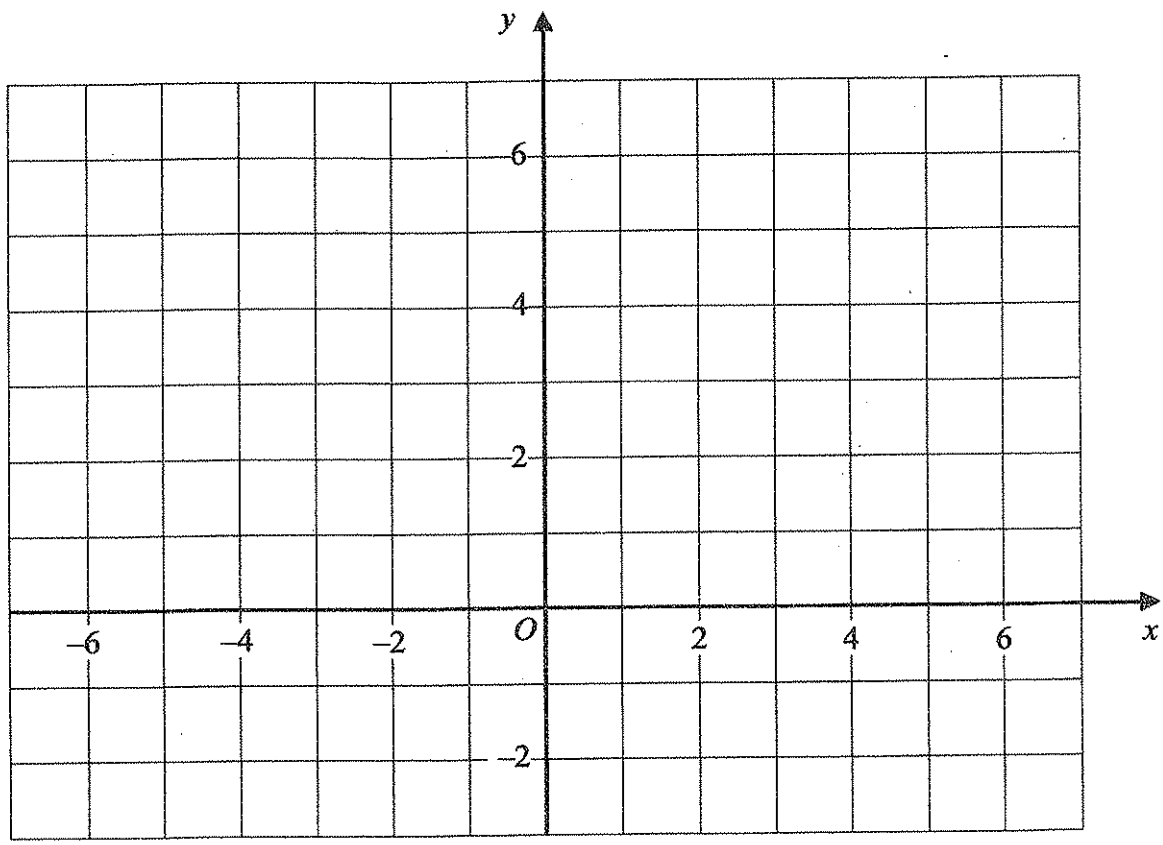
(Total 4 marks)

Leave blank

13. Show, by shading on the grid, the region which satisfies all three of these inequalities.

$x \geqslant 1$ $y \geqslant x$ $x + 2y \leqslant 6$

Label your region **R**.



Q13

(Total 4 marks)

Leave blank

14.

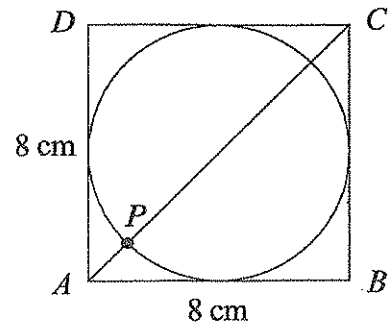


Diagram NOT accurately drawn

The diagram shows a circle of radius 4 cm inside a square $ABCD$ of side 8 cm.
P is a point of intersection of the circle and the diagonal AC of the square.

(a) Show that $AP = 1.66$ cm, correct to 3 significant figures.

(4)

(b) Calculate the length of DP.
Give your answer correct to 3 significant figures.

..... cm

(3) Q14

(Total 7 marks)

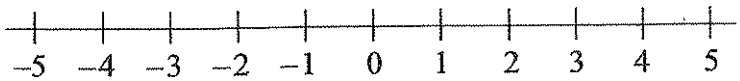
Leave blank

15. (a) Solve the inequality $x^2 \leqslant 4$

.....

(2)

(b) On the number line, represent the solution set of $x^2 \leqslant 4$



(2)

(Total 4 marks)

Q15

Leave blank

16.

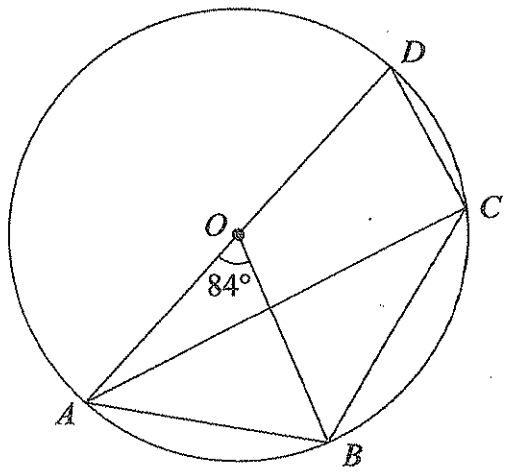


Diagram **NOT** accurately drawn

A, *B*, *C* and *D* are points on a circle with centre *O*.
AOD is a diameter of the circle.
Angle *AOB* = 84°.

(a) (i) Calculate the size of angle *ACB*.

°

.....

(ii) Give a reason for your answer.

.....

(2)

(b) Calculate the size of angle *BCD*.

°

.....

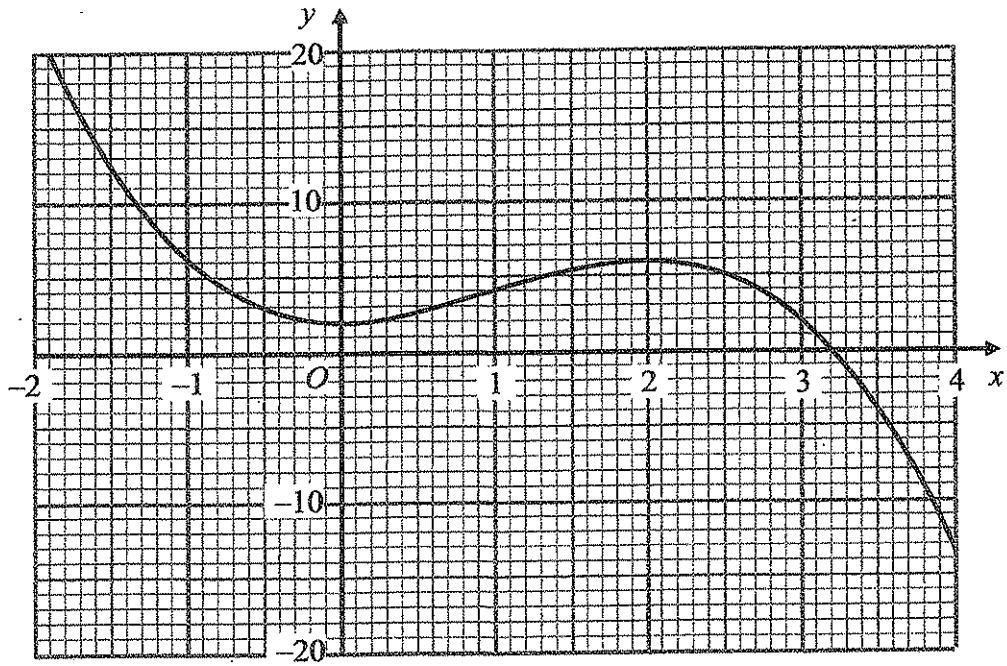
(2)

Q16

(Total 4 marks)

Leave blank

17. The diagram shows part of the graph of $y = f(x)$.



(a) Find f(3).

.....

(1)

(b) Solve $f(x) = 6$

.....

(2)

(c) Find ff(1).

.....

(2)

Leave blank

(d) Find an estimate for the gradient of the curve at the point where $x = -1$

.....

(3)

The equation $f(x) = k$, where k is a number, has 3 solutions between $x = -2$ and $x = 4$

(e) Complete the inequalities which k must satisfy.

..... $< k <$ .....

(2)

Q17

(Total 10 marks)

Leave blank

18.

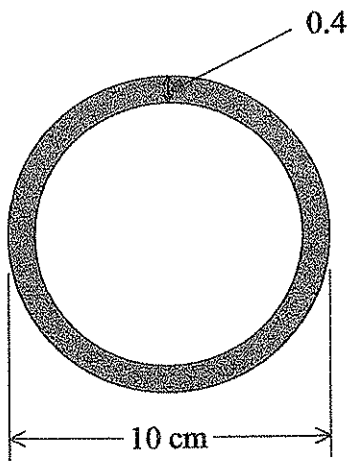


Diagram **NOT** accurately drawn

The outer diameter of a hollow spherical ball is 10 cm.
The ball is made from rubber which is 0.4 cm thick.

Calculate the volume of rubber needed to make the ball.
Give your answer correct to 3 significant figures.

..... cm^3

Q18

(Total 4 marks)

Leave blank

19. The probability that Gill will walk to school on Monday is $\frac{3}{5}$.
If Gill walks to school on Monday, the probability that she will walk to school on Tuesday is $\frac{1}{6}$.
If she does **not** walk to school on Monday, the probability that she will walk to school on Tuesday is $\frac{7}{10}$.

(a) Calculate the probability that she walks to school on Monday but not on Tuesday.

.....

(2)

(b) Calculate the probability that she walks to school on **at least** one of the two days.

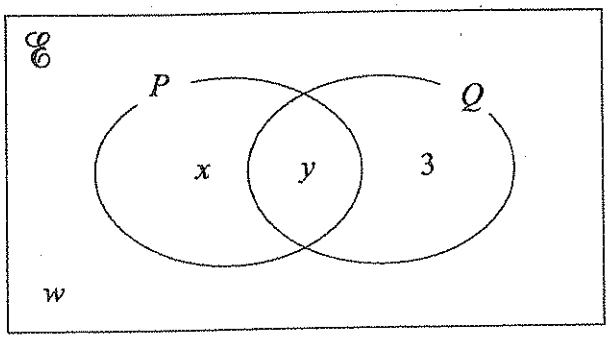
.....

(3) Q19

(Total 5 marks)

Leave blank

20.



In the Venn diagram, 3, w, x and y represent the **numbers** of elements.
$n(\mathscr{E}) = 24$ $n(P') = 8$ $n((P \cap Q)') = 15$

(a) Find the value of (i) w (ii) x (iii) y

(i) $w =$ .....

(ii) $x =$ .....

(iii) $y =$ .....

(3)

(b) (i) Find $n(P' \cap Q)$.

.....

(ii) Find $n(P' \cup Q')$.

.....

(iii) Find $n(P \cap Q \cap P')$.

.....

(3)

(Total 6 marks)

Q20

Leave blank

21. Solve the simultaneous equations $y = 3x^2$
$y = 2x + 5$

.....

.....

(Total 6 marks)

Q21

TOTAL FOR PAPER: 100 MARKS

END

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N 2 3 0 6 8 A 0 2 4 2 4

Centre No.						Surname	Initial(s)
Candidate No.						Signature	

Paper Reference(s)

4400/3H

Examiner's use only

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London Examinations IGCSE

Mathematics

Paper 3H

Higher Tier

Friday 5 May 2006 – Morning

Time: 2 hours

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Total	

Materials required for examination
Ruler graduated in centimetres and millimetres, protractor, compasses, pen, HB pencil, eraser, calculator.
Tracing paper may be used.

Items included with question papers
Nil

Instructions to Candidates

In the boxes above, write your centre number, candidate number, your surname, initial(s) and signature.
The paper reference is shown at the top of this page. Check that you have the correct question paper.
Answer **ALL** the questions in the spaces provided in this question paper.
Show all the steps in any calculations.

Information for Candidates

There are 20 pages in this question paper. All blank pages are indicated.
The total mark for this paper is 100. The marks for parts of questions are shown in round brackets: e.g. **(2)**.
You may use a calculator.

Advice to Candidates

Write your answers neatly and in good English.

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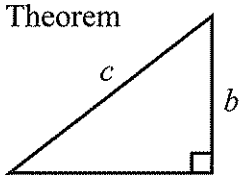
IGCSE MATHEMATICS 4400
FORMULA SHEET – HIGHER TIER

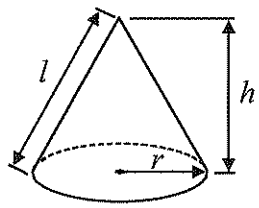
Pythagoras' Theorem



$a^2 + b^2 = c^2$

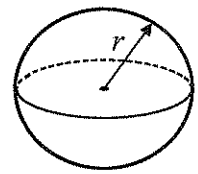
Volume of cone = $\frac{1}{3}\pi r^2 h$

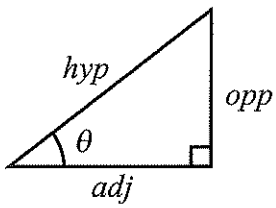
Curved surface area of cone = $\pi r l$



Volume of sphere = $\frac{4}{3}\pi r^3$

Surface area of sphere = $4\pi r^2$





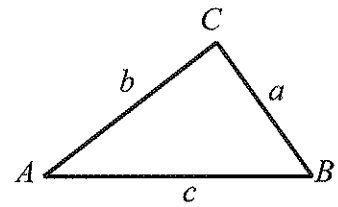
adj = hyp × cos θ
opp = hyp × sin θ
opp = adj × tan θ

or $\sin\theta = \frac{\text{opp}}{\text{hyp}}$

$\cos\theta = \frac{\text{adj}}{\text{hyp}}$

$\tan\theta = \frac{\text{opp}}{\text{adj}}$

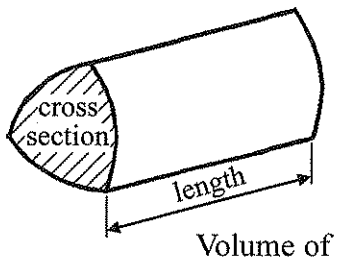
In any triangle ABC



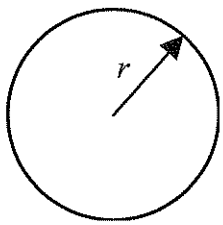
Sine rule $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

Cosine rule $a^2 = b^2 + c^2 - 2bc\cos A$

Area of triangle = $\frac{1}{2}ab\sin C$



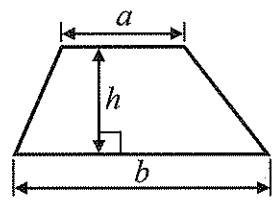
Volume of prism = area of cross section × length

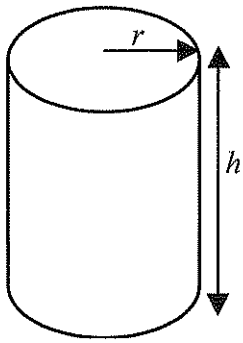


Circumference of circle = $2\pi r$

Area of circle = πr^2

Area of a trapezium = $\frac{1}{2}(a+b)h$





Volume of cylinder = $\pi r^2 h$

Curved surface area of cylinder = $2\pi rh$

The Quadratic Equation
The solutions of $ax^2 + bx + c = 0$, where $a \neq 0$, are given by

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

N 2 4 6 4 6 B 0 2 2 0

Leave blank

Answer ALL TWENTY-THREE questions.

Write your answers in the spaces provided.

You must write down all stages in your working.

1. The surface area of the Earth is 510 million km^2.
The surface area of the Pacific Ocean is 180 million km^2.

(a) Express 180 million as a percentage of 510 million.
Give your answer correct to 2 significant figures.

.....%
(2)

The surface area of the Arctic Ocean is 14 million km^2.
The surface area of the Southern Ocean is 35 million km^2.

(b) Find the ratio of the surface area of the Arctic Ocean to the surface area of the Southern Ocean.
Give your ratio in the form 1 : n.

1 : .....
(2)

(Total 4 marks)

Q1

2. Solve $7 - 4x = 10$

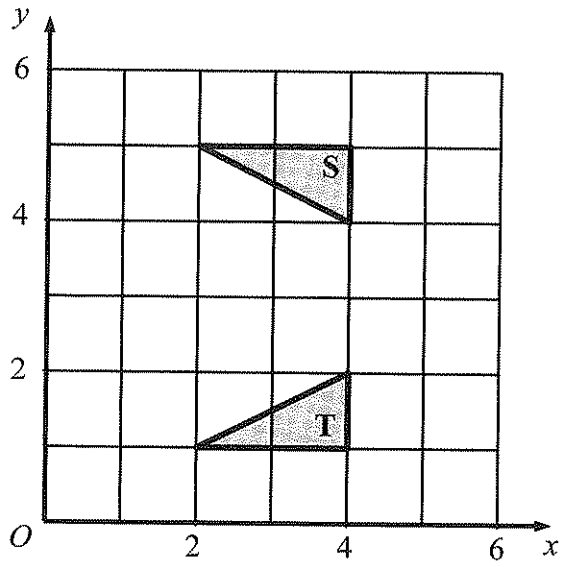
x = ...

(Total 3 marks)

Q2

Leave blank

3.



Describe fully the single transformation that maps triangle **S** onto triangle **T**.

.....

(Total 2 marks)

Q3

4. (a) Work out the value of $y^2 - 4y$ when $y = -3$

.....

(2)

(b) Simplify

(i) $p^3 \times p^5$

.....

(ii) $q^7 \div q$

.....

(2)

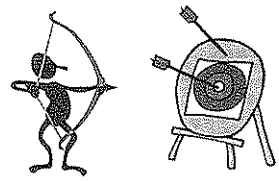
Q4

(Total 4 marks)

N 2 4 6 4 6 B 0 4 2 0

Leave blank

5. Robin fired 15 arrows at a target.
The table shows information about his scores.



Score	Frequency
1	6
2	3
3	1
4	1
5	4

(a) Find his median score.

.....

(2)

(b) Work out his mean score.

.....

(3)

Q5

(Total 5 marks)

Leave blank

6. (a) Work out $\frac{2}{15} \times 6$

Give your answer as a fraction in its simplest form.

.....

(2)

(b) Work out $2\frac{2}{3} \div \frac{5}{6}$

Give your answer as a mixed number in its simplest form.

.....

(2) **Q6**

(Total 4 marks)

7.

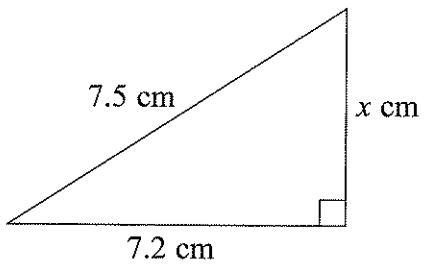


Diagram **NOT** accurately drawn

Work out the value of x.

$x =$ .....

Q7

(Total 3 marks)

N 2 4 6 4 6 B 0 6 2 0

Leave blank

8. The perimeter of a triangle is 54 cm.
The lengths of its sides are in the ratios 2 : 3 : 4

Work out the length of the longest side of the triangle.

..... cm

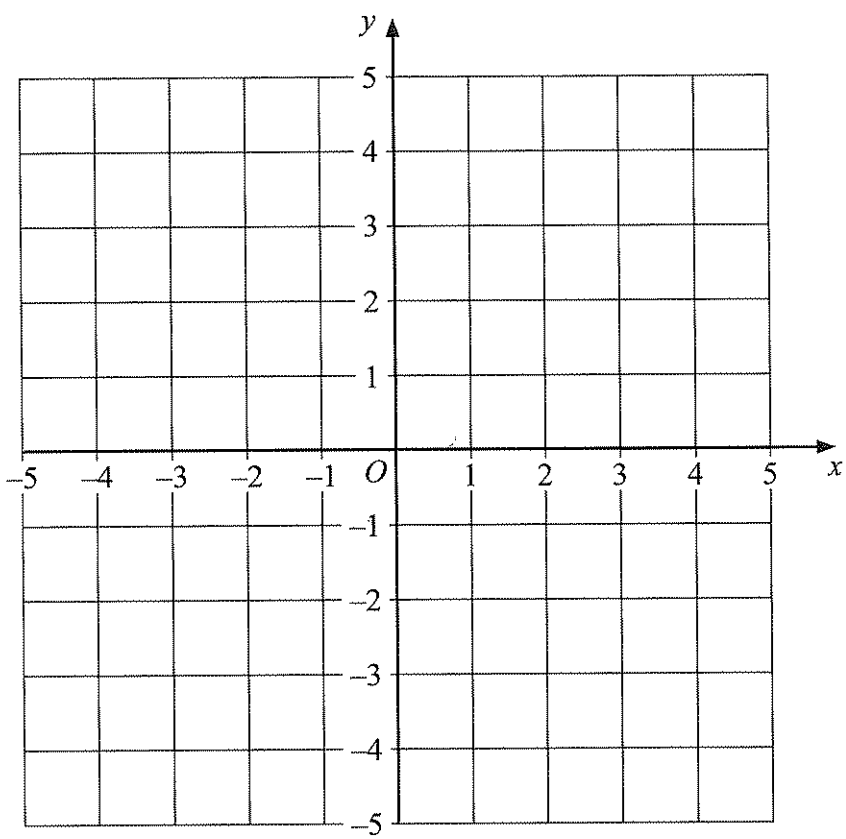
(Total 2 marks)

Q8

9. Show, by shading on the grid, the region which satisfies these inequalities

$1 \leqslant x \leqslant 3$ **and** $-4 \leqslant y \leqslant -2$

Label your region **R**.



(Total 3 marks)

Q9

Leave blank

10.

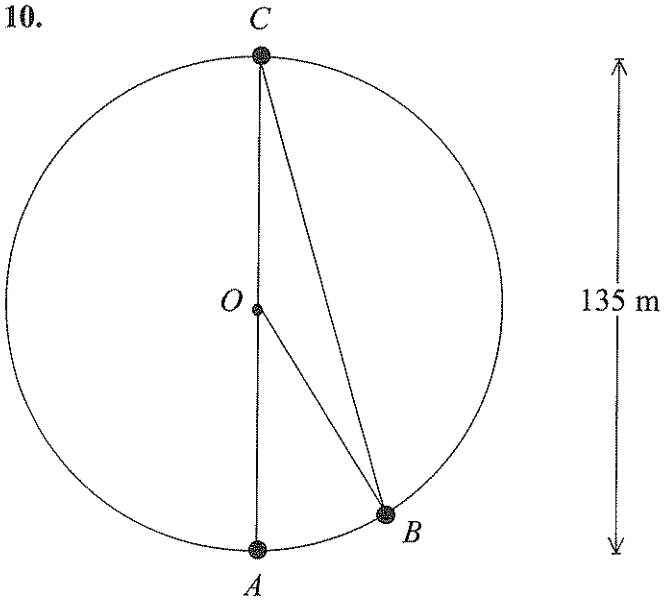
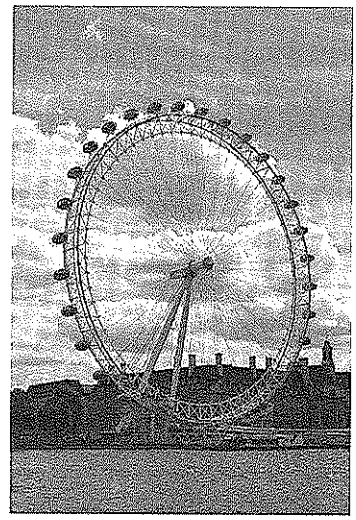


Diagram **NOT** accurately drawn



The diagram represents part of the London Eye.
A, B and C are points on a circle, centre O.
A, B and C represent three capsules.
The capsules at A and B are next to each other.
A is at the bottom of the circle and C is at the top.

The London Eye has 32 equally spaced capsules on the circle.

(a) Show that angle $AOB = 11.25°$.

(1)

(b) Find the size of the angle between BC and the horizontal.

.....°

(3)

N 2 4 6 4 6 B 0 8 2 0

Leave blank

The capsules move in a circle of diameter 135 m.

(c) Calculate the distance moved by a capsule in making a complete revolution.
Give your answer correct to 3 significant figures.

..... m
(2)

The capsules move at an average speed of 0.26 m/s.

(d) Calculate the time taken for a capsule to make a complete revolution.
Give your answer in minutes, correct to the nearest minute.

..... min
(3)

(Total 9 marks)

Q10

11. Write as ordinary numbers

(i) 3.6×10^5

.....

(ii) 2.9×10^{-3}

.....

(Total 2 marks)

Q11

Leave blank

12.

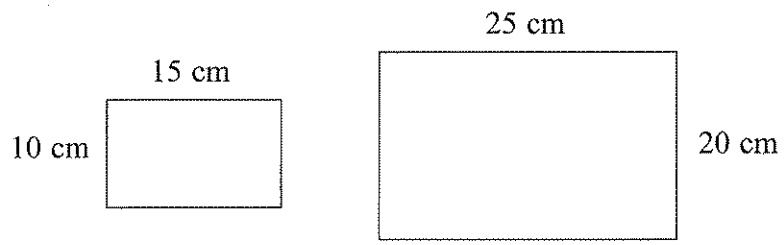


Diagram **NOT** accurately drawn

Are the two rectangles mathematically similar?
Tick (✓) the appropriate box.
You must show working to justify your answer.

Yes ☐ No ☐

Q12

(Total 3 marks)

13. (a) Expand and simplify $(3x - 5)(4x + 7)$

.....

(2)

(b) Simplify $(2p^4)^3$

.....

(2)

(c) Simplify $(64y^6)^{\frac{2}{3}}$

.....

(2)

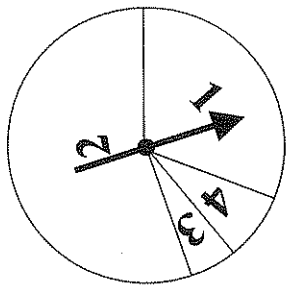
Q13

(Total 6 marks)

N 2 4 6 4 6 B 0 1 0 2 0

Leave blank

14. Here is a biased spinner.



When the pointer is spun, the score is 1 or 2 or 3 or 4
The probability that the score is 1 is 0.3
The probability that the score is 2 is 0.6

Hajra spins the pointer once.

(a) Work out the probability that

(i) the score is 1 or 2

.....

(ii) the score is 3 or 4

.....

(3)

Nassim spins the pointer twice.

(b) Work out the probability that

(i) the score is 1 both times,

.....

(ii) the score is 2 exactly once.

.....

(5)

Q14

(Total 8 marks)

Leave blank

15. $\mathcal{E} = \{1, 2, 3, 4, 5, 6, 7, 8\}$
$P = \{2, 3, 5, 7\}$

(a) List the members of P'

.....

(1)

The set Q satisfies both the conditions $Q \subset P$ **and** $n(Q) = 3$

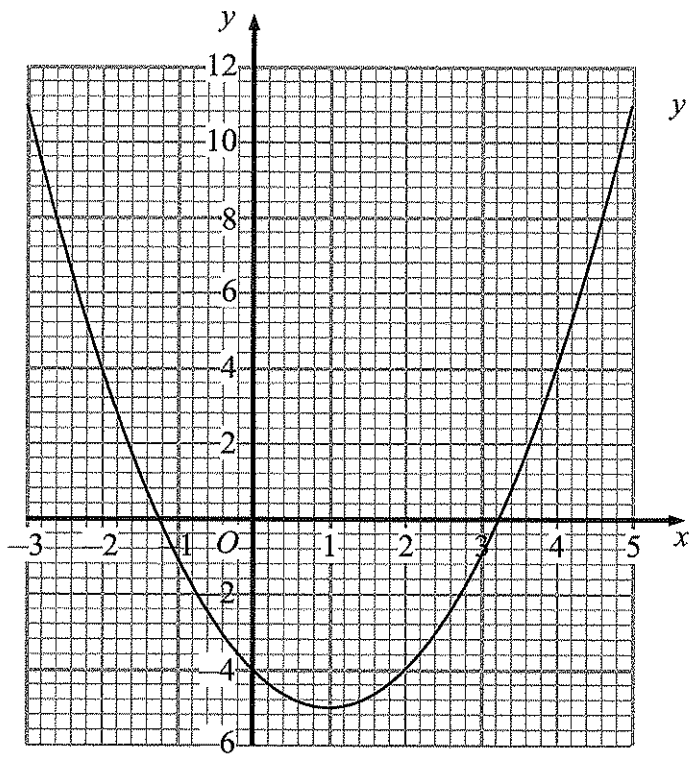
(b) List the members of **one** set Q which satisfies both these conditions.

.....

(2) **Q15**

(Total 3 marks)

16. Part of the graph of $y = x^2 - 2x - 4$ is shown on the grid.



$y = x^2 - 2x - 4$

N 2 4 6 4 6 B 0 1 2 2 0

Leave blank

(a) Write down the coordinates of the minimum point of the curve.

(..... , ...)

(1)

(b) Use the graph to find estimates of the solutions to the equation $x^2 - 2x - 4 = 0$
Give your answers correct to 1 decimal place.

.....

(2)

(c) Draw a suitable straight line on the grid to find estimates of the solutions of the equation $x^2 - 3x - 6 = 0$

.....

(3)

(d) For $y = x^2 - 2x - 4$

(i) find $\frac{dy}{dx}$,

.....

(ii) find the gradient of the curve at the point where $x = 6$

.....

(4)

Q16

(Total 10 marks)

Leave blank

17. Michael says *"When the fraction $\frac{n}{45}$ is converted to a decimal, it never gives a terminating decimal."*

(a) (i) Find a value of n which shows that Michael is wrong.

$n =$ .....

(ii) Write down the name of the type of number n must be, when $\frac{n}{45}$ gives a terminating decimal.

.....

(2)

(b) $\frac{62}{45} < \sqrt{2} < \frac{64}{45}$

Use these bounds to write the value of $\sqrt{2}$ to an appropriate degree of accuracy.
You must show your working and explain your answer.

.....

(2)

Q17

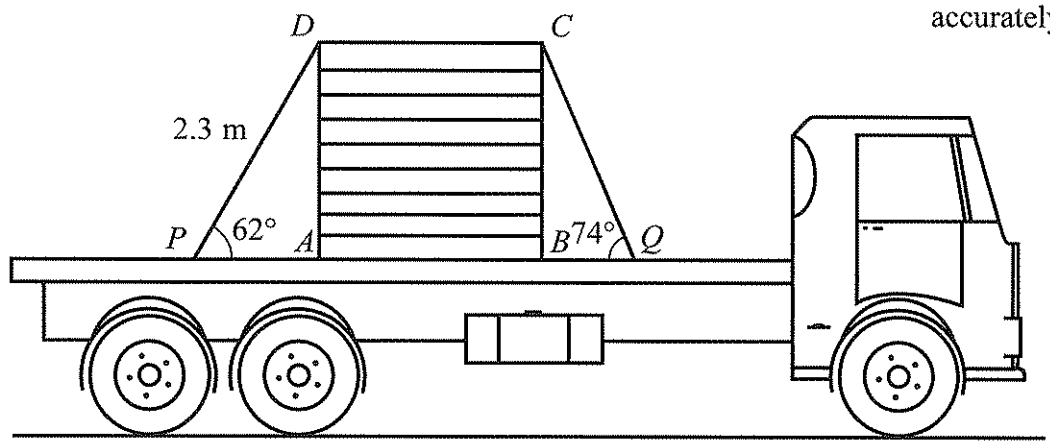
(Total 4 marks)

N 2 4 6 4 6 B 0 1 4 2 0

Leave blank

18.

Diagram **NOT** accurately drawn



The diagram shows a side view of a rectangular box *ABCD* on a lorry.
The box is held down on the horizontal flat surface of the lorry by a rope.
The rope passes over the box and is tied at two points, *P* and *Q*, on the flat surface.

DP = 2.3 m.
Angle *APD* = 62°.
Angle *BQC* = 74°.

Calculate the length of *BQ*.
Give your answer correct to 3 significant figures.

..... m

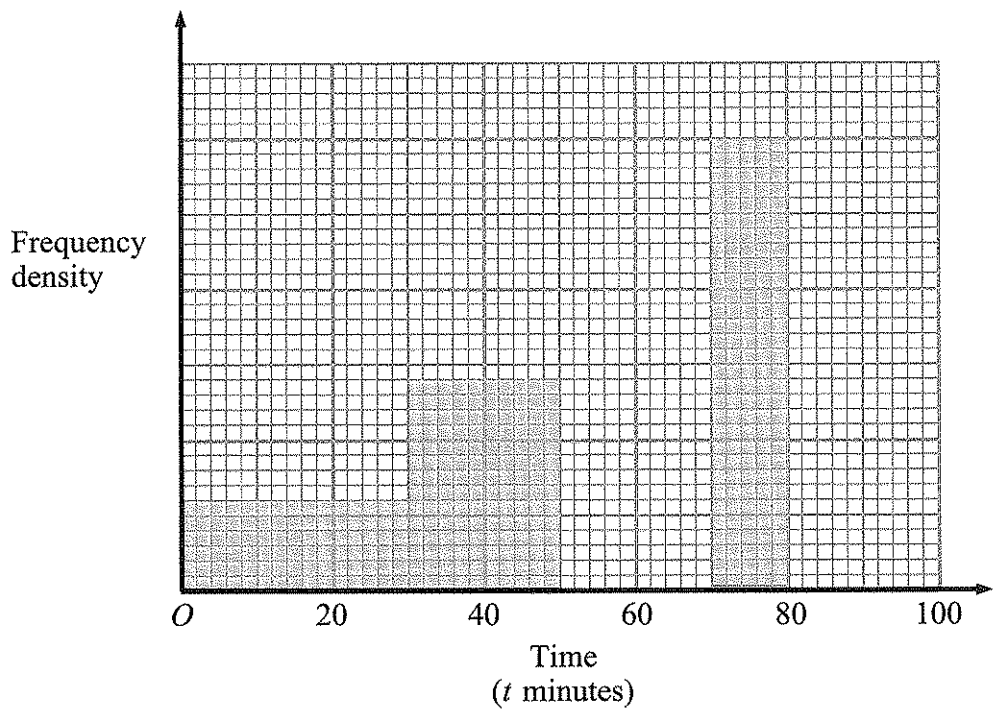
(Total 5 marks)

Q18

Leave blank

19. The unfinished table and histogram give information about the times taken by some students to complete a science test.

Time (t minutes)	**Frequency**
$0 < t \leqslant 30$	
$30 < t \leqslant 50$	70
$50 < t \leqslant 70$	85
$70 < t \leqslant 80$	
$80 < t \leqslant 90$	40



(a) Use the information in the table to complete the histogram.

(2)

(b) Use the information in the histogram to complete the table.

(2) **Q19**

(Total 4 marks)

N 2 4 6 4 6 B 0 1 6 2 0

Leave blank

20. Make R the subject of the formula $A = \pi(R + r)(R - r)$

$R =$ .....

(Total 4 marks)

Q20

21. $(1+3\sqrt{5})^2 = p+q\sqrt{5}$ where p and q are integers.
Find the value of p and the value of q.

$p =$ .....

$q =$ .....

(Total 2 marks)

Q21

Leave blank

22.

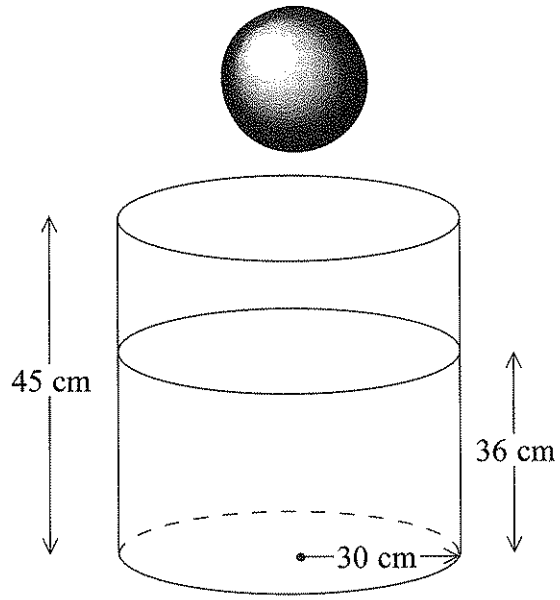


Diagram **NOT** accurately drawn

A cylindrical tank has a radius of 30 cm and a height of 45 cm.
The tank contains water to a depth of 36 cm.

A metal sphere is dropped into the water and is completely covered.
The water level rises by 5 cm.

Calculate the radius of the sphere.

..... cm

(Total 5 marks)

Q22

N 2 4 6 4 6 B 0 1 8 2 0

Leave blank

23. $f(x) = x^2$

$g(x) = 2x + 3$

Solve $fg(x) = f(x)$.

.....

Q23

(Total 5 marks)

TOTAL FOR PAPER: 100 MARKS

END

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Team Leader's use only

London Examinations IGCSE

Mathematics

Paper 4H

Higher Tier

Tuesday 9 May 2006 – Morning

Time: 2 hours

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Total	

Materials required for examination
Ruler graduated in centimetres and millimetres, pen, HB pencil, eraser, calculator.
Tracing paper may be used.

Items included with question papers
Nil

Instructions to Candidates

In the boxes above, write your centre number, candidate number, your surname, initial(s) and signature.
The paper reference is shown at the top of this page. Check that you have the correct question paper.
Answer **ALL** the questions in the spaces provided in this question paper.
Show all the steps in any calculations.

Information for Candidates

There are 16 pages in this question paper. All blank pages are indicated.
The total mark for this paper is 100. The marks for parts of questions are shown in round brackets: e.g. **(2)**.
You may use a calculator.

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Write your answers neatly and in good English.

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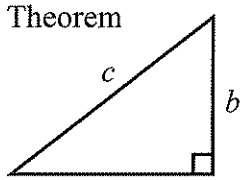
IGCSE MATHEMATICS 4400
FORMULA SHEET – HIGHER TIER

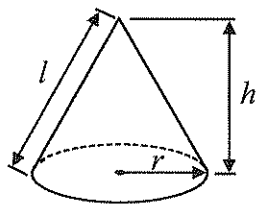
Pythagoras' Theorem



$a^2 + b^2 = c^2$

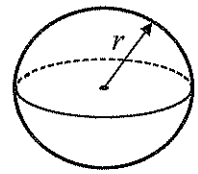
Volume of cone $= \frac{1}{3}\pi r^2 h$

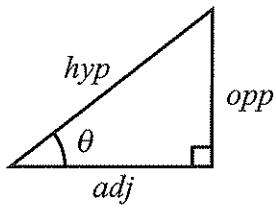
Curved surface area of cone $= \pi r l$



Volume of sphere $= \frac{4}{3}\pi r^3$

Surface area of sphere $= 4\pi r^2$





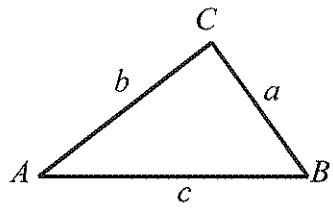
adj = hyp × cos θ
opp = hyp × sin θ
opp = adj × tan θ

or $\sin\theta = \dfrac{\text{opp}}{\text{hyp}}$

$\cos\theta = \dfrac{\text{adj}}{\text{hyp}}$

$\tan\theta = \dfrac{\text{opp}}{\text{adj}}$

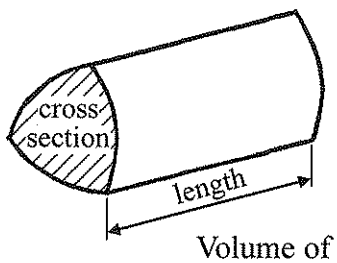
In any triangle ABC



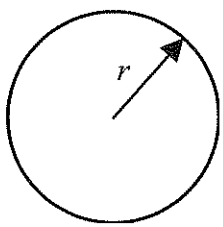
Sine rule $\dfrac{a}{\sin A} = \dfrac{b}{\sin B} = \dfrac{c}{\sin C}$

Cosine rule $a^2 = b^2 + c^2 - 2bc\cos A$

Area of triangle $= \frac{1}{2}ab\sin C$



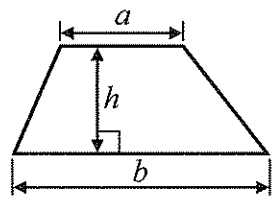
Volume of prism = area of cross section × length

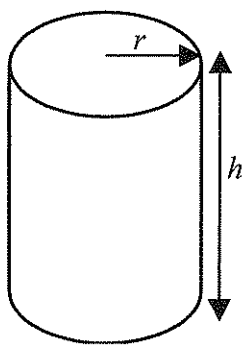


Circumference of circle $= 2\pi r$

Area of circle $= \pi r^2$

Area of a trapezium $= \frac{1}{2}(a + b)h$





Volume of cylinder $= \pi r^2 h$

Curved surface area of cylinder $= 2\pi rh$

The Quadratic Equation
The solutions of $ax^2 + bx + c = 0$, where $a \neq 0$, are given by

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

N 2 4 6 4 7 B 0 2 1 6

Leave blank

Answer ALL EIGHTEEN questions.

Write your answers in the spaces provided.

You must write down all the stages in your working.

1. In the diagram, ABC and ADE are straight lines.
CE and BD are parallel.
$AB = AD$.
Angle $BAD = 38°$.

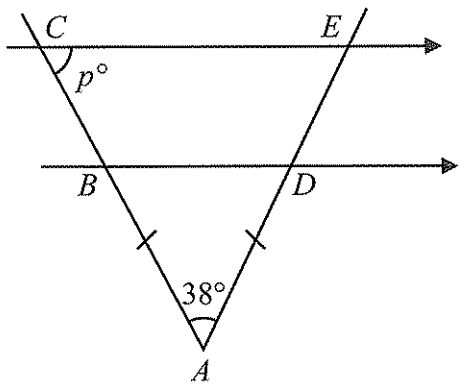


Diagram **NOT** accurately drawn

Work out the value of p.

Give a reason for each step in your working.

Q1

(Total 4 marks)

Leave blank

2. (a) Factorise $3x^2 - 2x$

.....

(1)

(b) Expand $y^3(y - 4)$

.....

(2)

(c) Here is a formula used in physics.

$$v = u + at$$

Find the value of t when $v = 30$, $u = 5$ and $a = 10$

$t =$ .....

(2)

Q2

(Total 5 marks)

3. Arul had x sweets.
Nikos had four times as many sweets as Arul.

(a) Write down an expression, in terms of x, for the number of sweets Nikos had.

.....

(1)

Nikos gave 6 of his sweets to Arul.
Now they both have the same number of sweets.

(b) Use this information to form an equation in x.

.....

(2)

(c) Solve your equation to find the number of sweets that Arul had at the start.

.....

(2)

Q3

(Total 5 marks)

Leave blank

4. (a) The diagram shows triangle PQR.
$PQ = 4$ cm.
$PR = 8$ cm.
Angle $PQR = 90°$.

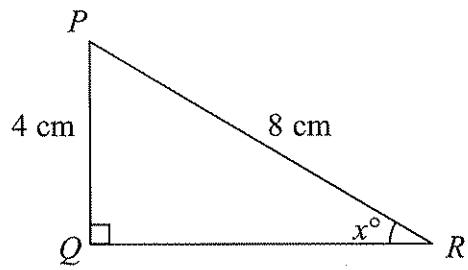


Diagram **NOT** accurately drawn

Calculate the value of x.

$x =$ .....

(3)

(b) The diagram shows triangle LMN.
$MN = 12$ cm.
Angle $LMN = 32°$.
Angle $MLN = 90°$.

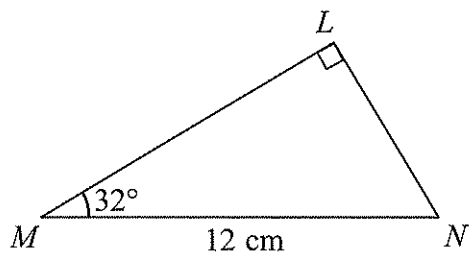


Diagram **NOT** accurately drawn

Calculate the length of ML.
Give your answer correct to 3 significant figures.

..... cm

(3)

Q4

(Total 6 marks)

Leave blank

5. (a) A = {Quadrilaterals with two pairs of parallel sides}
B = {Quadrilaterals with at least one right angle}

Write down the mathematical name for the quadrilaterals in

(i) A, ...

(ii) $A \cap B$. .....

(2)

(b) The universal set $\mathscr{E}$ = {Positive whole numbers}
P = {Multiples of 3 less than 11}
Q = {Multiples of 5 less than 11}

(i) What is $P \cap Q$?

.....

(ii) Is it true that $10 \in P \cup Q$?

.....

Explain your answer.

.....

.....

(2) Q5

(Total 4 marks)

6.

Symbols
+ − × ÷ ( )

Using only symbols from the box, make the following into true statements.

(a) 2 3 4 = 14

(1)

(b) 2 3 4 = 1.25

(1)

(c) 2 3 4 = $2\frac{2}{3}$

(1) Q6

(Total 3 marks)

N 2 4 6 4 7 B 0 6 1 6

Leave blank

7. (a) Four numbers have a mean of 6
Three of the numbers are 3, 7 and 10
Find the other number.

.....

(2)

(b) Three numbers have a mode of 5 and a mean of 6
Find the three numbers.

.....

(2)

(c) Find four numbers which have a mode of 7 and a median of 6

.....

(2)

(Total 6 marks)

Q7

8. (a) Solve $3(x + 4) = 27$

$x =$ .....

(3)

(b) Solve $y^2 - 2y - 120 = 0$

$y =$ .....

(3)

(Total 6 marks)

Q8

Leave blank

9. (a) A farmer arranges 90 m of fencing in the form of an isosceles triangle, with two sides of length 35 m and one side of length 20 m.

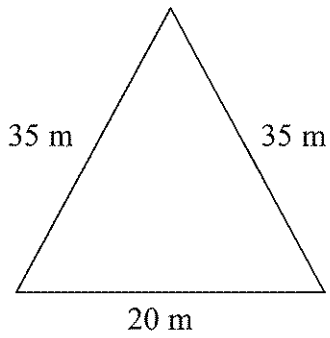


Diagram **NOT** accurately drawn

Calculate the area enclosed by the fencing.
Give your answer correct to 3 significant figures.

..... m^2
(4)

(b) Later, the farmer moves the fencing so that it forms a different triangle, *ABC*.

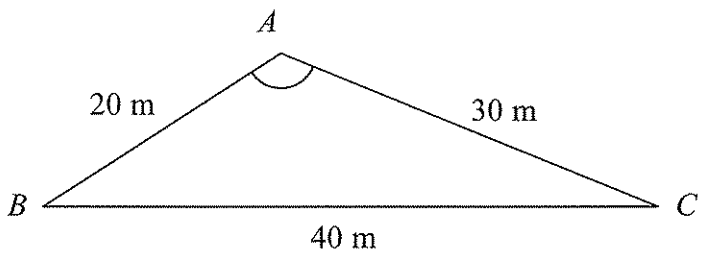


Diagram **NOT** accurately drawn

AB = 20 m *BC* = 40 m *CA* = 30 m

Calculate the size of angle *BAC*.
Give your answer correct to 1 decimal place.

°
.....
(3)

Q9

(Total 7 marks)

N 2 4 6 4 7 B 0 8 1 6

Leave blank

10. A mobile phone company makes a special offer.
Usually one minute of call time costs 5 cents.
For the special offer, this call time is increased by 20%.

(a) Calculate the call time which costs 5 cents during the special offer.
Give your answer in seconds.

..... seconds
(2)

(b) Calculate the cost per minute for the special offer.

..... cents
(2)

(c) Calculate the percentage decrease in the cost per minute for the special offer.

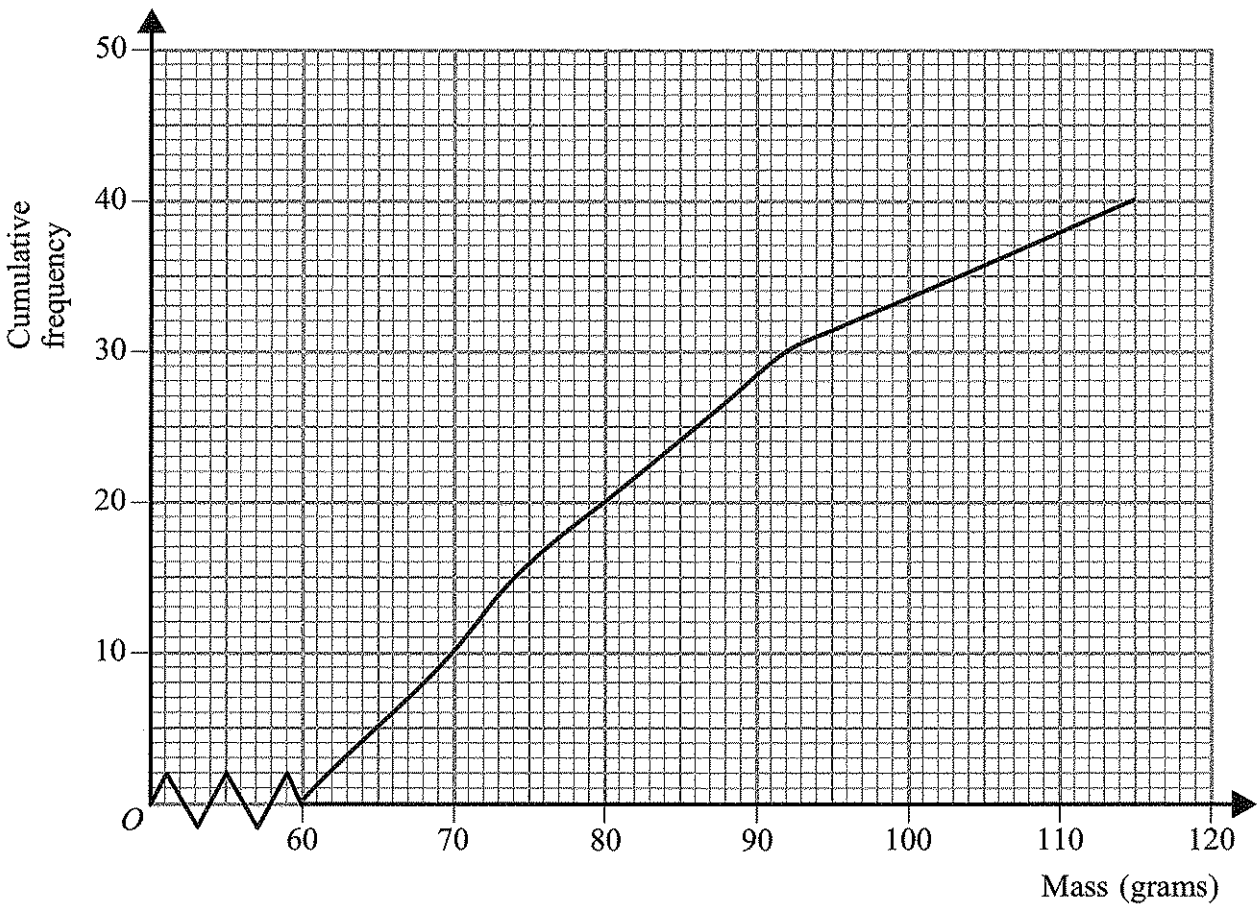
.....%
(3)

Q10

(Total 7 marks)

Leave blank

11. A sample of 40 stones was collected.
The cumulative frequency graph gives information about their masses.



(a) Find an estimate of the median mass.

..... g
(1)

(b) Find an estimate of the interquartile range of the masses.

..... g
(2)

(c) How many stones had masses between the lower quartile and the upper quartile?

.....
(1)

(d) Find an estimate of the number of stones which had masses of more than 100 grams.

.....
(2)

Q11

(Total 6 marks)

Leave blank

12. (a) Factorise completely $10x^2 - 2x$

.....

(2)

(b) Factorise $x^2 - 9$

.....

(1)

(c) Factorise $3x^2 - 13x + 4$

.....

(2) **Q12**

(Total 5 marks)

13. (a) Express $8^{\frac{1}{2}}$ as a power of 2

.....

(2)

(b) Express $\sqrt{3}$ as a power of 9

.....

(2)

(c) Express $\frac{1}{4\sqrt{2}}$ as a power of 2

.....

(3) **Q13**

(Total 7 marks)

Leave blank

14. $OABC$ is a parallelogram.

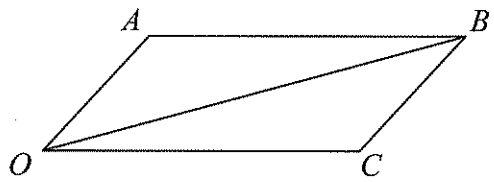


Diagram **NOT** accurately drawn

$\overrightarrow{OA} = \begin{pmatrix} 1 \\ 2 \end{pmatrix}$, $\overrightarrow{OC} = \begin{pmatrix} 4 \\ 0 \end{pmatrix}$.

(a) Find the vector $\overrightarrow{OB}$ as a column vector.

( )

.....

(1)

X is the point on OB such that $OX = kOB$, where $0 < k < 1$

(b) Find, in terms of k, the vectors

(i) $\overrightarrow{OX}$,

.....

(ii) $\overrightarrow{AX}$,

.....

(iii) $\overrightarrow{XC}$.

.....

(3)

(c) Find the value of k for which $\overrightarrow{AX} = \overrightarrow{XC}$.

.....

(2)

(d) Use your answer to part (c) to show that the diagonals of the parallelogram $OABC$ bisect one another.

.....

.....

.....

(2)

Q14

(Total 8 marks)

Leave blank

15. A ball is dropped from a tower.
After t seconds, the ball has fallen a distance x metres.

x is directly proportional to t^2.

When $t = 2$, $x = 19.6$

(a) Find an equation connecting x and t.

.....

(3)

(b) Find the value of x when $t = 3$

$x =$ .....

(2)

(c) Find how long the ball takes to fall 10 m.

..... seconds

(3)

Q15

(Total 8 marks)

Leave blank

16. The sides of a fair six-sided dice are numbered from 1 to 6
The dice is thrown three times.
Find the probability that it shows a 1 at least twice.

.....

(Total 4 marks)

Q16

17. Solve the equations

$$y = 2x + 1$$
$$x^2 + y^2 = 13$$

.....

(Total 6 marks)

Q17

N 2 4 6 4 7 B 0 1 4 1 6

Leave blank

18. A particle moves along a line.
For $t \geqslant 1$, the distance of the particle from O at time t seconds is x metres, where

$$x = \frac{20}{t}$$

Find an expression for the acceleration of the particle.

..... m/s^2 **Q18**

(Total 3 marks)

TOTAL FOR PAPER: 100 MARKS

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Paper Reference(s)

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London Examinations IGCSE

Mathematics

Paper 3H

Higher Tier

Monday 6 November 2006 – Morning

Time: 2 hours

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Total	

Materials required for examination
Ruler graduated in centimetres and millimetres, protractor, compasses, pen, HB pencil, eraser, calculator.
Tracing paper may be used.

Items included with question papers
Nil

Instructions to Candidates

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You may use a calculator.

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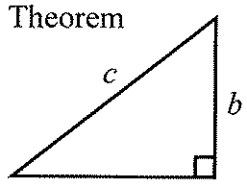
IGCSE MATHEMATICS 4400
FORMULA SHEET – HIGHER TIER

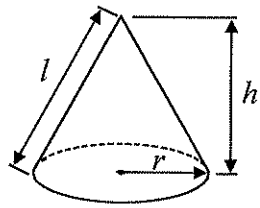
Pythagoras' Theorem



$a^2 + b^2 = c^2$

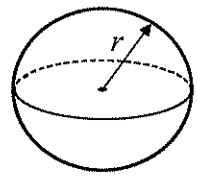
Volume of cone $= \frac{1}{3}\pi r^2 h$

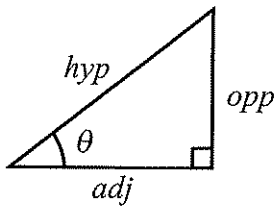
Curved surface area of cone $= \pi r l$



Volume of sphere $= \frac{4}{3}\pi r^3$

Surface area of sphere $= 4\pi r^2$





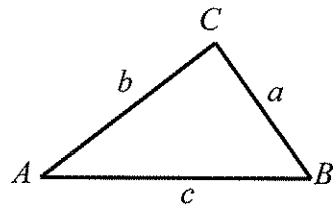
adj = hyp × cos θ
opp = hyp × sin θ
opp = adj × tan θ

or $\sin\theta = \frac{\text{opp}}{\text{hyp}}$

$\cos\theta = \frac{\text{adj}}{\text{hyp}}$

$\tan\theta = \frac{\text{opp}}{\text{adj}}$

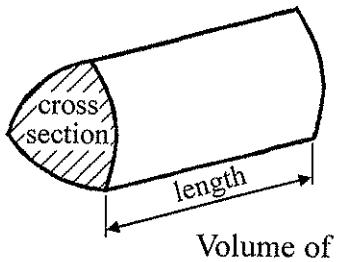
In any triangle ABC



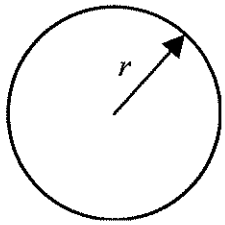
Sine rule $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

Cosine rule $a^2 = b^2 + c^2 - 2bc\cos A$

Area of triangle $= \frac{1}{2}ab\sin C$



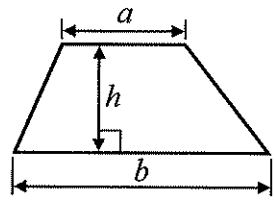
Volume of prism = area of cross section × length

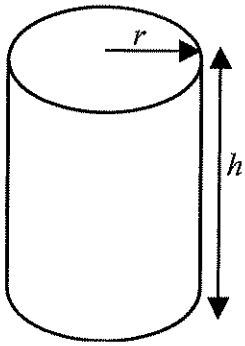


Circumference of circle $= 2\pi r$

Area of circle $= \pi r^2$

Area of a trapezium $= \frac{1}{2}(a + b)h$





Volume of cylinder $= \pi r^2 h$

Curved surface area of cylinder $= 2\pi r h$

The Quadratic Equation
The solutions of $ax^2 + bx + c = 0$, where $a \neq 0$, are given by

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

N 2 4 6 9 1 A 0 2 2 4

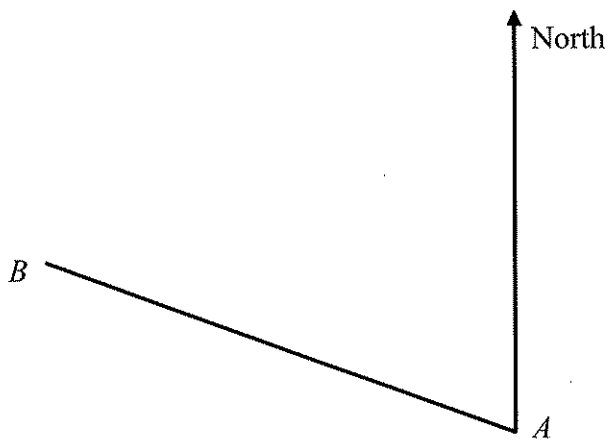
Leave blank

Answer ALL TWENTY-ONE questions.

Write your answers in the spaces provided.

You must write down all the stages in your working.

1.



(a) By measurement, find the bearing of B from A.

.....°

(2)

(b) The bearing of another point, C, from A is 226°.
Work out the bearing of A from C.

.....°

(2) **Q1**

(Total 4 marks)

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2. Rectangular tiles have width x cm and height $(x + 7)$ cm.

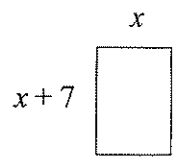


Diagram **NOT** accurately drawn

Some of these tiles are used to form a shape.
The shape is 6 tiles wide and 4 tiles high.

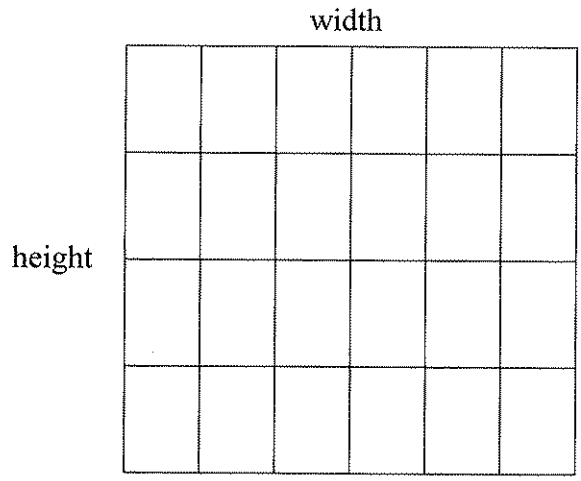


Diagram **NOT** accurately drawn

(a) Write down expressions, in terms of x, for the width and height of this shape.

width = ... cm

height = ... cm

(2)

(b) The width and the height of this shape are equal.

(i) Write down an equation in x.

.....

(ii) Solve your equation to find the value of x.

x =.....

(4)

Q2

(Total 6 marks)

Leave blank

3.

Andrea's Café

Delicious cakes
Only $4.00 each

Andrea buys 100 cakes to sell in her café.
She pays $1.80 for each cake.

On Monday she sells 60 cakes.
She sells these cakes for $4.00 each.

On Tuesday she reduces the price of each cake by $\frac{1}{5}$

She sells 35 cakes at this reduced price.

Andrea then gives away the 5 unsold cakes.

Calculate the total profit that Andrea makes on the cakes.

$.....

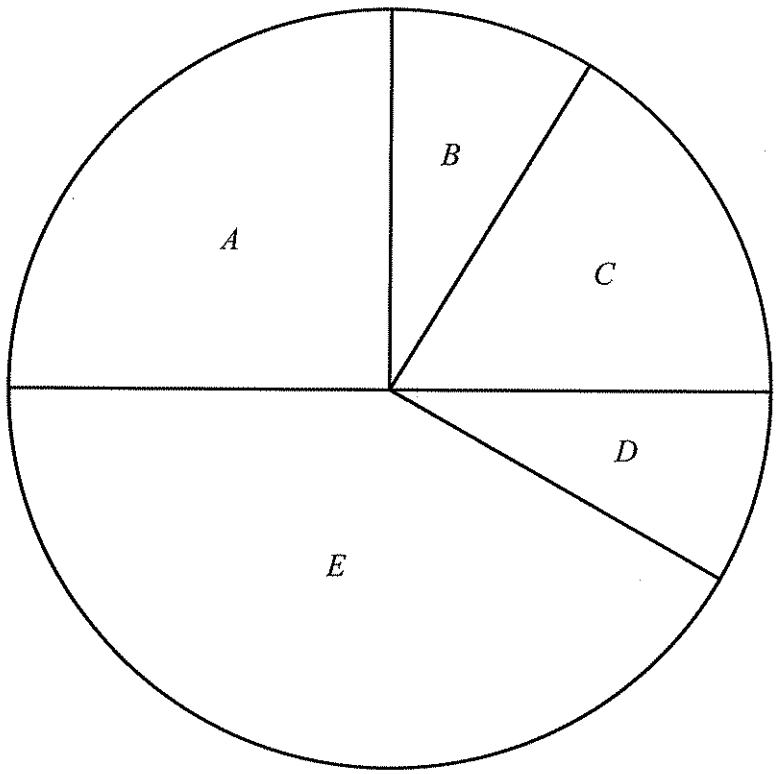
Q3

(Total 6 marks)

Leave blank

4. There are 5 classes in a school.

(a) The pie chart shows information about the number of students in each class.
The pie chart is accurately drawn.



A student from the school is chosen at random.
Find the probability that this student is in class E.

.....

(2)

Leave blank

(b) The table shows information about the ages of the students.

Age, x years	Frequency
$9 \leqslant x < 11$	30
$11 \leqslant x < 13$	12
$13 \leqslant x < 15$	18
$15 \leqslant x < 19$	60

Calculate an estimate of the mean age of these students.
Give your answer correct to 3 significant figures.

..... years
(4)

(Total 6 marks)

Q4

5. The number of workers in a factory decreases from 60 to 48
Work out the percentage decrease in the number of workers.

..... %

(Total 3 marks)

Q5

Leave blank

6. Rajesh and Gudi share some money in the ratio 2:5
Rajesh receives £240

Work out the amount of money that Gudi receives.

£ .....

Q6

(Total 2 marks)

7. Solve the inequality $9x - 2 < 5x + 4$

.....

Q7

(Total 3 marks)

Leave blank

8. Four girls run in a race.
The table shows the probability that each of three girls will win the race.

Name	Probability
Angela	0.5
Beverley	0.1
Caris	0.3
Danielle	

Calculate the probability that either Caris or Danielle will win the race.

.....

(Total 3 marks)

Q8

Leave blank

9. ABC is a triangle.
$AB = AC = 13$ cm.
$BC = 10$ cm.
M is the midpoint of BC.
Angle $AMC = 90°$.

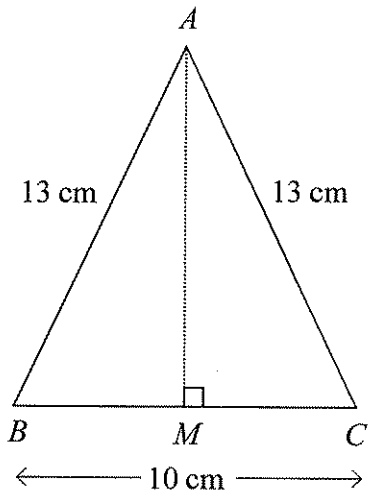


Diagram **NOT** accurately drawn

(a) Work out the length of AM.

..... cm
(4)

Leave blank

(b) A solid has five faces.
Four of the faces are triangles identical to triangle *ABC*.
The base of the solid is a square of side 10 cm.

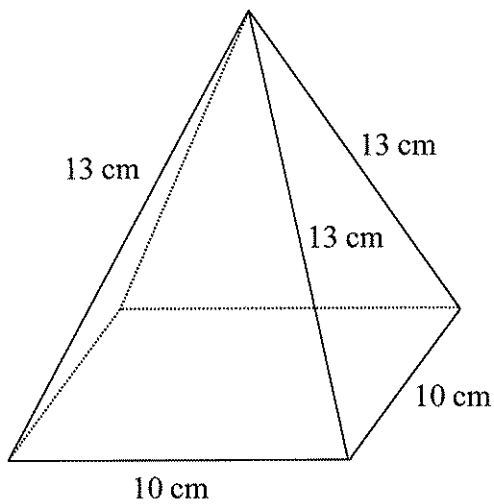


Diagram **NOT** accurately drawn

Calculate the total surface area of this solid.

..... cm^2

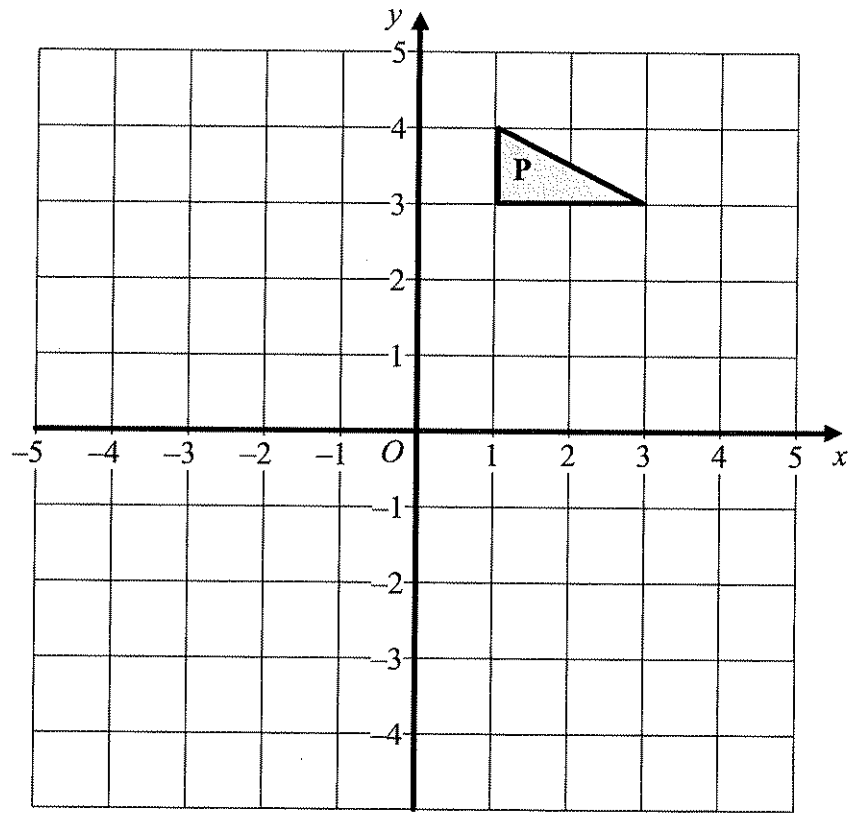
(4)

Q9

(Total 8 marks)

Leave blank

10.



Reflect triangle **P** in the *y*-axis to give triangle **Q**.
Then rotate triangle **Q** about *O* through 90° clockwise to give triangle **R**.

Describe fully the **single** transformation which maps triangle **P** onto triangle **R**.

.....

.....

Q10

(Total 4 marks)

Leave blank

11. There are 15 students in class *A*.

In a test, the students gained these marks.

2 1 2 5 5 6 9 2 5 6 7 5 6 5 6

(a) Find the interquartile range of these marks.

.....

(3)

The students in class *B* took the same test.
Their marks had a median of 7 and an interquartile range of 2

(b) Make **two** comparisons between the marks of the two classes.

(i) .....

.....

(ii) .....

.....

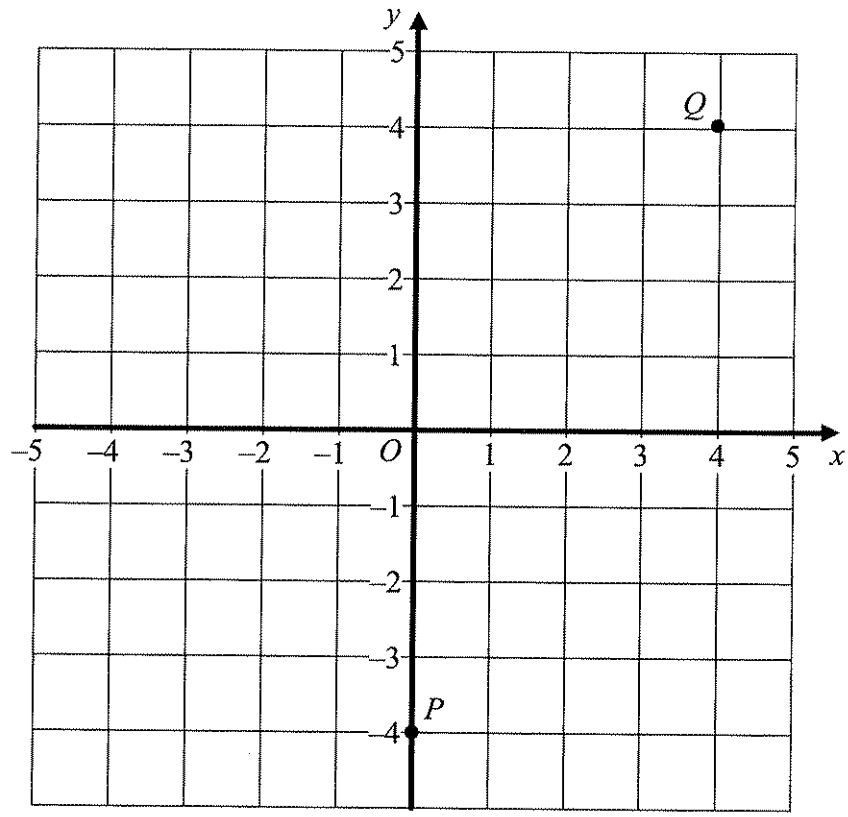
(2)

Q11

(Total 5 marks)

Leave blank

12.



(a) P and Q are points with coordinates (0, –4) and (4, 4).
Find the equation of the straight line which passes through P and Q.

.....

(4)

(b) On the grid, draw the line with equation $y = -\frac{1}{2}x + 1$

(3)

Q12

(Total 7 marks)

Leave blank

13. Evaluate the following.
Give your answers as fractions.

(a) 2^{-3}

.....
(1)

(b) $\left(\frac{27}{343}\right)^{\frac{1}{3}}$

.....
(1)

(c) $\left(\sqrt{\frac{3}{8}}\right)^{4}$

.....
(1)

Q13

(Total 3 marks)

Leave blank

14. (a) For the equation $y = 5000x - 625x^2$, find $\frac{dy}{dx}$.

.....

(2)

(b) Find the coordinates of the turning point on the graph of $y = 5000x - 625x^2$.

(..... , ...)

(3)

(c) (i) State whether this turning point is a maximum or a minimum.

.....

(ii) Give a reason for your answer.

.....

.....

(2)

(d) A publisher has to set the price for a new book.
The profit, £y, depends on the price of the book, £x, where

$$y = 5000x - 625x^2$$

(i) What price would you advise the publisher to set for the book?

£.....

(ii) Give a reason for your answer.

.....

.....

(2)

(Total 9 marks)

Q14

Leave blank

15.

Maxicool!!

The new ice cream sensation

A Maxicool consists of a cone full of ice cream with a hemisphere of ice cream on top.
The radius of the hemisphere is 3 cm.
The radius of the base of the cone is 3 cm.
The height of the cone is 10 cm.

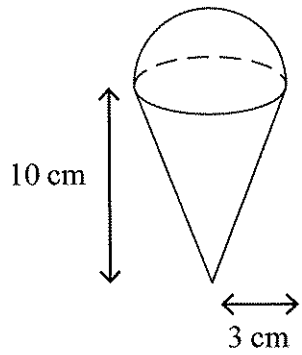


Diagram **NOT** accurately drawn

Calculate the total volume of ice cream in a Maxicool.
Give your answer correct to 3 significant figures.

..... cm^3

Q15

(Total 4 marks)

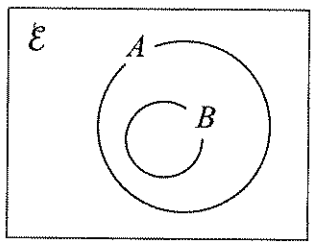
Leave blank

16.

Statements				
$A \subset B$	$B \subset A$	$A \cup B = \mathcal{E}$	$A \cap B = \emptyset$	$A \cap B = A$

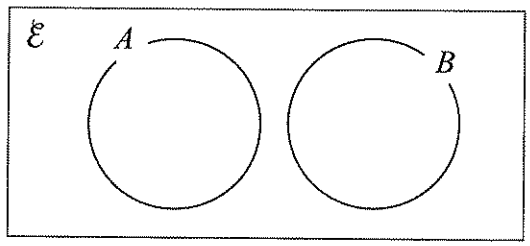
Choose a statement from the box that describes the relationship between sets A and B.

(i)



.....

(ii)



.....

Q16

(Total 2 marks)

N 2 4 6 9 1 A 0 1 8 2 4

Leave blank

17. The function f is defined as $f(x) = \dfrac{x}{x-1}$.

(a) Find the value of

(i) f(3),

.....

(ii) f(–3).

.....

(2)

(b) State which value(s) of x must be excluded from the domain of f.

.....

(1)

(c) (i) Find ff(x).
Give your answer in its most simple form.

ff(x) = ...

(ii) What does your answer to (c)(i) show about the function f?

.....

.....

(4)

(Total 7 marks)

Q17

Leave blank

18. Solve the simultaneous equations

$$y = x^2$$
$$y = 2x + 15$$

$x =$ ..... , $y =$ .....

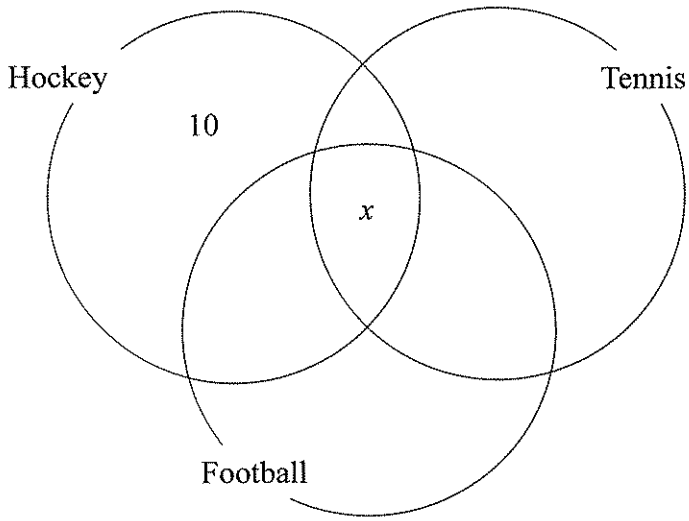
$x =$ ..... , $y =$ **Q18**

(Total 5 marks)

Leave blank

19. Each student in a group plays at least one of hockey, tennis and football.

10 students play hockey only
9 play football only.
13 play tennis only.
6 play hockey and football but not tennis.
7 play hockey and tennis.
8 play football and tennis.
x play all three sports.



(a) Write down an expression, in terms of x, for the number of students who play hockey and tennis, but not football.

.....

(1)

There are 50 students in the group.

(b) Find the value of x.

$x =$ .....

(3)

Q19

(Total 4 marks)

Leave blank

20. (a) The ratio of the areas of two similar triangles is $1:k$.
Write down, in terms of k, the ratio of the lengths of their corresponding sides.

.....

(1)

(b)

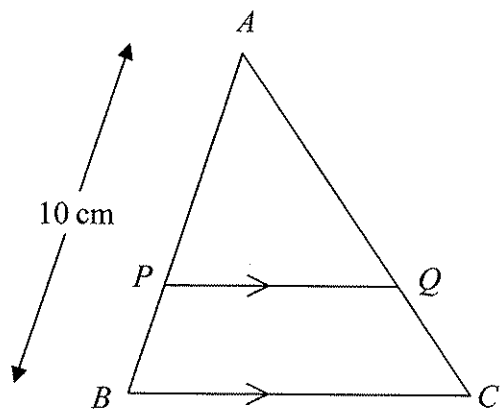


Diagram **NOT** accurately drawn

$AB = 10$ cm.
PQ is parallel to BC.

The area of triangle APQ is half the area of triangle ABC.

Calculate the length of AP.
Give your answer correct to 2 significant figures.

..... cm

(2)

(Total 3 marks)

Q20

Leave blank

21. $\frac{1}{3}$ of the people in a club are men.

The number of men in the club is n.

(a) Write down an expression, in terms of n, for the number of people in the club.

.....

(1)

Two of the people in the club are chosen at random.

The probability that both these people are men is $\frac{1}{10}$

(b) Calculate the number of people in the club.

.....

(5) **Q21**

(Total 6 marks)

TOTAL FOR PAPER: 100 MARKS

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Centre No.						Surname	Initial(s)
Candidate No.						Signature	

Paper Reference(s)

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London Examinations IGCSE

Mathematics

Paper 4H

Higher Tier

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Time: 2 hours

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Total	

Materials required for examination
Ruler graduated in centimetres and millimetres, protractor, compasses, pen, HB pencil, eraser, calculator.
Tracing paper may be used.

Items included with question papers
Nil

Instructions to Candidates

In the boxes above, write your centre number, candidate number, your surname, initial(s) and signature.
The paper reference is shown at the top of this page. Check that you have the correct question paper.
Answer **ALL** the questions in the spaces provided in this question paper.
Show all the steps in any calculations.

Information for Candidates

There are 20 pages in this question paper. All blank pages are indicated.
The total mark for this paper is 100. The marks for parts of questions are shown in round brackets: e.g. **(2)**.
You may use a calculator.

Advice to Candidates

Write your answers neatly and in good English.

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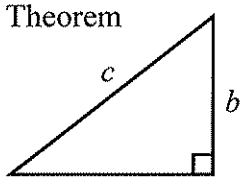
IGCSE MATHEMATICS 4400
FORMULA SHEET – HIGHER TIER

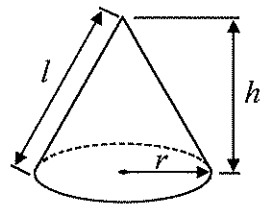
Pythagoras' Theorem



$a^2 + b^2 = c^2$

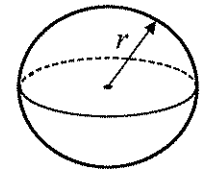
Volume of cone $= \frac{1}{3}\pi r^2 h$

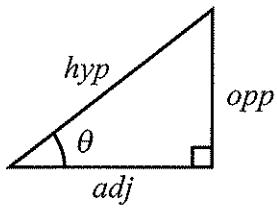
Curved surface area of cone $= \pi r l$



Volume of sphere $= \frac{4}{3}\pi r^3$

Surface area of sphere $= 4\pi r^2$





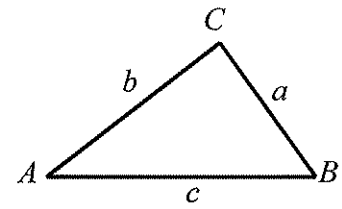
adj = hyp × cos θ
opp = hyp × sin θ
opp = adj × tan θ

or $\sin\theta = \frac{\text{opp}}{\text{hyp}}$

$\cos\theta = \frac{\text{adj}}{\text{hyp}}$

$\tan\theta = \frac{\text{opp}}{\text{adj}}$

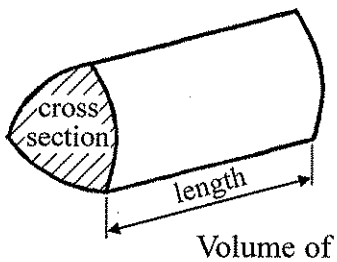
In any triangle ABC



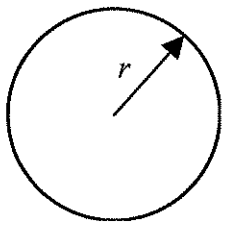
Sine rule $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

Cosine rule $a^2 = b^2 + c^2 - 2bc\cos A$

Area of triangle $= \frac{1}{2}ab\sin C$



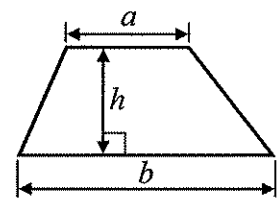
Volume of prism = area of cross section × length

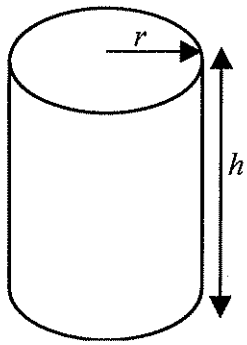


Circumference of circle $= 2\pi r$

Area of circle $= \pi r^2$

Area of a trapezium $= \frac{1}{2}(a + b)h$





Volume of cylinder $= \pi r^2 h$

Curved surface area of cylinder $= 2\pi rh$

The Quadratic Equation
The solutions of $ax^2 + bx + c = 0$, where $a \neq 0$, are given by

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

N 2 4 6 9 2 A 0 2 2 0

Answer ALL TWENTY-FIVE questions.

Write your answers in the spaces provided.

You must write down all stages in your working.

Leave blank

1. Work out the value of $\frac{6.46}{1.8+1.6}$

.....

Q1

(Total 2 marks)

2. (a) Expand $3(2t + 5)$

.....

(1)

(b) Expand $y(y^2 - 3y)$

.....

(2)

(c) Expand and simplify $(x + 3)(x + 7)$

.....

(2)

(d) Simplify $p^4q^2 \times p^3q^6$

.....

(2)

Q2

(Total 7 marks)

Leave blank

3. The total of Kim's age and Pablo's age is 45 years.
The ratio of Kim's age to Pablo's age is 1 : 4

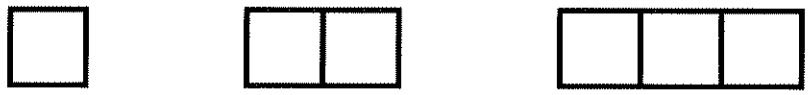
Work out Kim's age.

..... years

(Total 2 marks)

Q3

4. Here is a pattern of shapes made from centimetre squares.



Shape number 1 | Shape number 2 | Shape number 3

This rule can be used to find the perimeter of a shape in this pattern.

Add 1 to the Shape number and then multiply your answer by 2

P cm is the perimeter of Shape number n.

(a) Write down a formula for P in terms of n.

.....

(3)

(b) Make n the subject of the formula in part (a).

$n =$ .....

(3)

(Total 6 marks)

Q4

N 2 4 6 9 2 A 0 4 2 0

Leave blank

5. Bridget flew from the UK to Dubai.
Her flight from the UK to Dubai covered a distance of 5456 km.
The flight time was 7 hours 45 minutes.

Work out the average speed of the flight.

..... km/h

(Total 3 marks)

Q5

6. $\mathcal{E}$ = {**even** numbers less than 19}
M = {multiples of 3}
F = {factors of 12}

(a) (i) Explain why it is **not** true that $9 \in M$.

.....

(ii) List the members of M.

.....

(2)

(b) List the members of $M \cap F$.

.....

(2)

(Total 4 marks)

Q6

Leave blank

7.

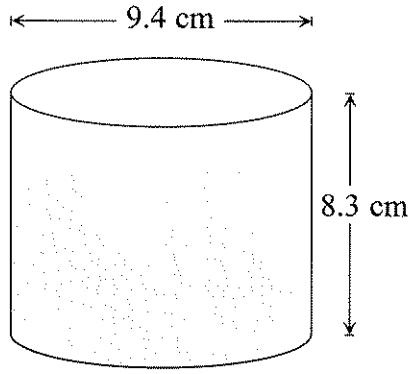


Diagram **NOT** accurately drawn

A solid cylinder has a diameter of 9.4 cm and a height of 8.3 cm.

Work out the volume of the cylinder.
Give your answer correct to 3 significant figures.

..... cm^3 **Q7**

(Total 3 marks)

8. $y = 4x - 1$

Work out the value of x when $y = -7$

$x =$ **Q8**

(Total 2 marks)

Leave blank

9. There are 48 beads in a bag.
Some of the beads are red and the rest of the beads are blue.
Shan is going to take a bead at random from the bag.

The probability that she will take a red bead is $\frac{3}{8}$

(a) Work out the number of red beads in the bag.

.....

(2)

Shan adds some **red** beads to the 48 beads in the bag.

The probability that she will take a red bead is now $\frac{1}{2}$

(b) Work out the number of red beads she adds.

.....

(2)

(Total 4 marks)

Q9

10. Express 225 as the product of powers of its prime factors.

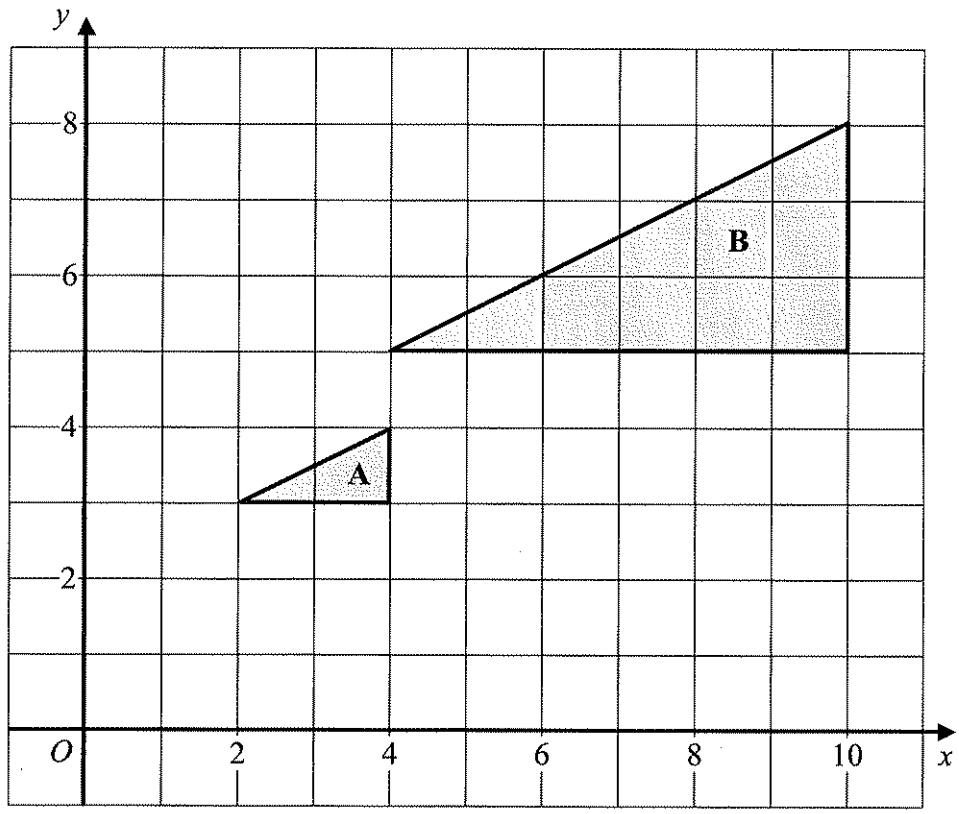
.....

(Total 3 marks)

Q10

Leave blank

11.



(a) Describe fully the **single** transformation which maps triangle **A** onto triangle **B**.

.....

.....

(3)

(b) On the grid, translate triangle **A** by the vector $\begin{pmatrix} -1 \\ 3 \end{pmatrix}$.

Label the new triangle **C**.

(2) **Q11**

(Total 5 marks)

N 2 4 6 9 2 A 0 8 2 0

Leave blank

12. Solve the simultaneous equations

$$6x + 5y = 5$$

$$3x - 10y = 15$$

$x =$ .....

$y =$ .....

(Total 3 marks)

Q12

13. (a) Write the number 78 000 000 in standard form.

.....

(1)

(b) Write 4×10^{-3} as an ordinary number.

.....

(1)

(c) Work out the value of $\dfrac{3 \times 10^{-2}}{8 \times 10^{9}}$

Give your answer in standard form.

.....

(1)

(Total 3 marks)

Q13

Leave blank

14.

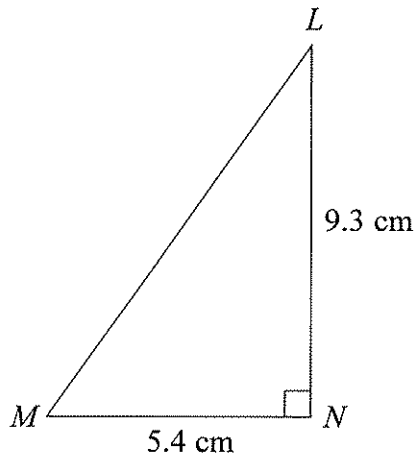


Diagram **NOT** accurately drawn

Triangle LMN is right-angled at N.
$MN = 5.4$ cm and $LN = 9.3$ cm.

(a) Work out the size of angle LMN.
Give your answer correct to 1 decimal place.

..... °

(3)

The length of MN is 5.4 cm, correct to 2 significant figures.

(b) (i) Write down the upper bound of the length of MN.

..... cm

(ii) Write down the lower bound of the length of MN.

..... cm

(2)

Leave blank

The length, 5.4 cm, of MN and the length, 9.3 cm, of LN, are each correct to 2 significant figures.
The line MN is horizontal and the line LN is vertical.

(c) Work out the upper bound for the gradient of the line LM.

.....

(2) **Q14**

(Total 7 marks)

15.

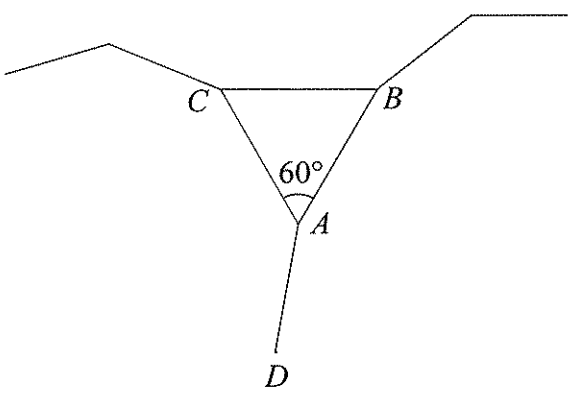


Diagram **NOT** accurately drawn

The sides of an equilateral triangle ABC and two **regular** polygons meet at the point A.
AB and AD are adjacent sides of a regular 10-sided polygon.
AC and AD are adjacent sides of a regular n-sided polygon.

Work out the value of n.

$n =$ **Q15**

(Total 5 marks)

Leave blank

16. The grouped frequency table gives information about the time spent on the Internet last week by each of 80 students.

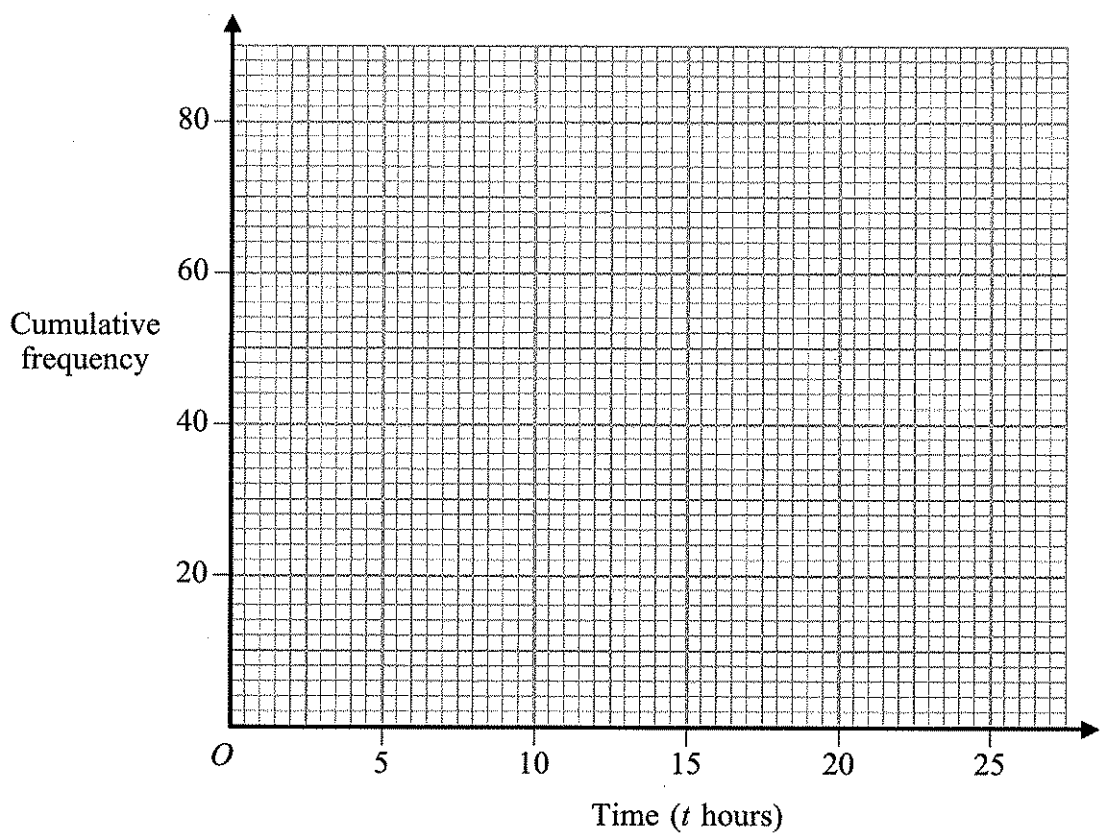
Time (t hours)	Frequency
$0 < t \leqslant 5$	28
$5 < t \leqslant 10$	22
$10 < t \leqslant 15$	14
$15 < t \leqslant 20$	10
$20 < t \leqslant 25$	6

(a) Complete the cumulative frequency table.

Time (t hours)	Cumulative frequency
$0 < t \leqslant 5$	
$0 < t \leqslant 10$	
$0 < t \leqslant 15$	
$0 < t \leqslant 20$	
$0 < t \leqslant 25$	

(1)

(b) On the grid, draw the cumulative frequency graph for your table.



(2)

Leave blank

(c) Use your graph to find an estimate for the number of students who spent more than 17 hours on the Internet last week.
Show your method clearly.

.....

(2) **Q16**

(Total 5 marks)

17.

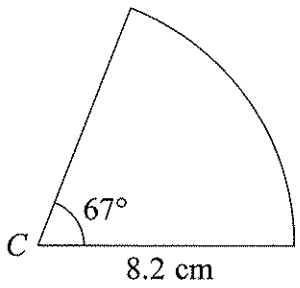


Diagram **NOT** accurately drawn

The diagram shows a sector of a circle, centre C.
The radius of the circle is 8.2 cm.
The angle at the centre of the circle is 67°.

Calculate the area of the sector.
Give your answer correct to 3 significant figures.

..... cm^2 **Q17**

(Total 3 marks)

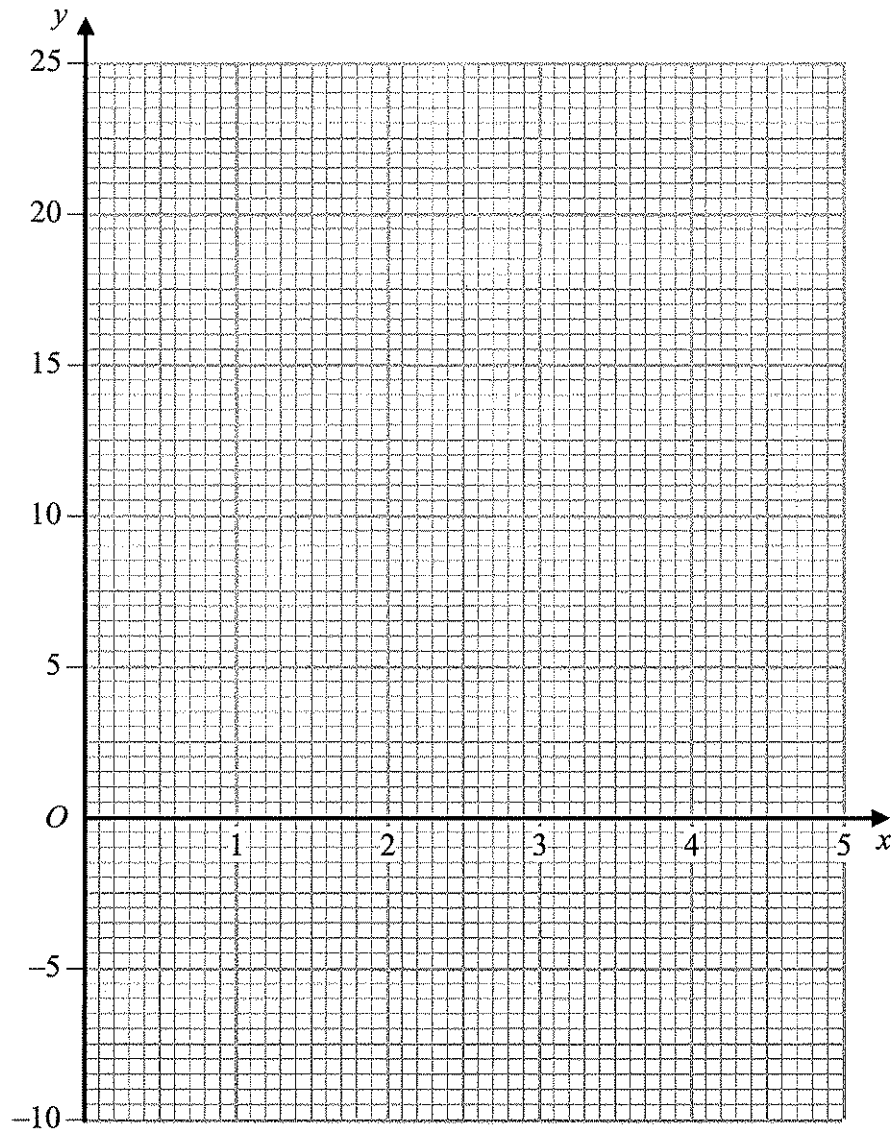
Leave blank

18. (a) Complete the table of values for $y = x^2 - \frac{3}{x}$

x	0.5	1	1.5	2	3	4	5
y	−5.75	−2					24.4

(2)

(b) On the grid, draw the graph of $y = x^2 - \frac{3}{x}$ for $0.5 \leqslant x \leqslant 5$



(2)

Leave blank

(c) Use your graph to find an estimate for a solution of the equation

$$x^2 - \frac{3}{x} = 0$$

$x =$ .....

(1)

(d) Draw a suitable straight line on your graph to find an estimate for a solution of the equation

$$x^2 - 2x - \frac{3}{x} = 0$$

$x =$ .....

(2)

Q18

(Total 7 marks)

19. Convert the recurring decimal $0.\dot{2}\dot{3}$ to a fraction.

.....

Q19

(Total 2 marks)

Leave blank

20.

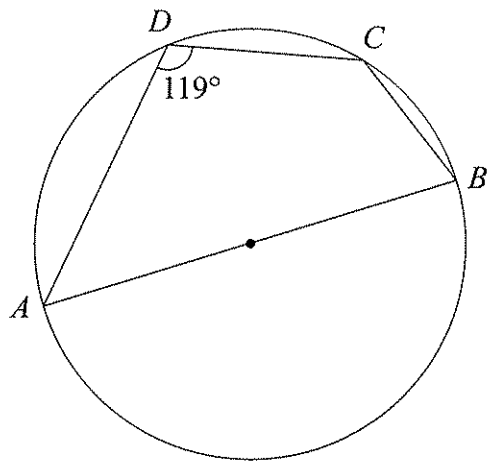


Diagram **NOT** accurately drawn

A, *B*, *C* and *D* are points on the circumference of a circle.
AB is a diameter of the circle.
Angle *ADC* = 119°.

(a) (i) Work out the size of angle *ABC*.

.....°

(ii) Give a reason for your answer.

.....

.....

(2)

(b) Work out the size of angle *BAC*.

.....°

(2)

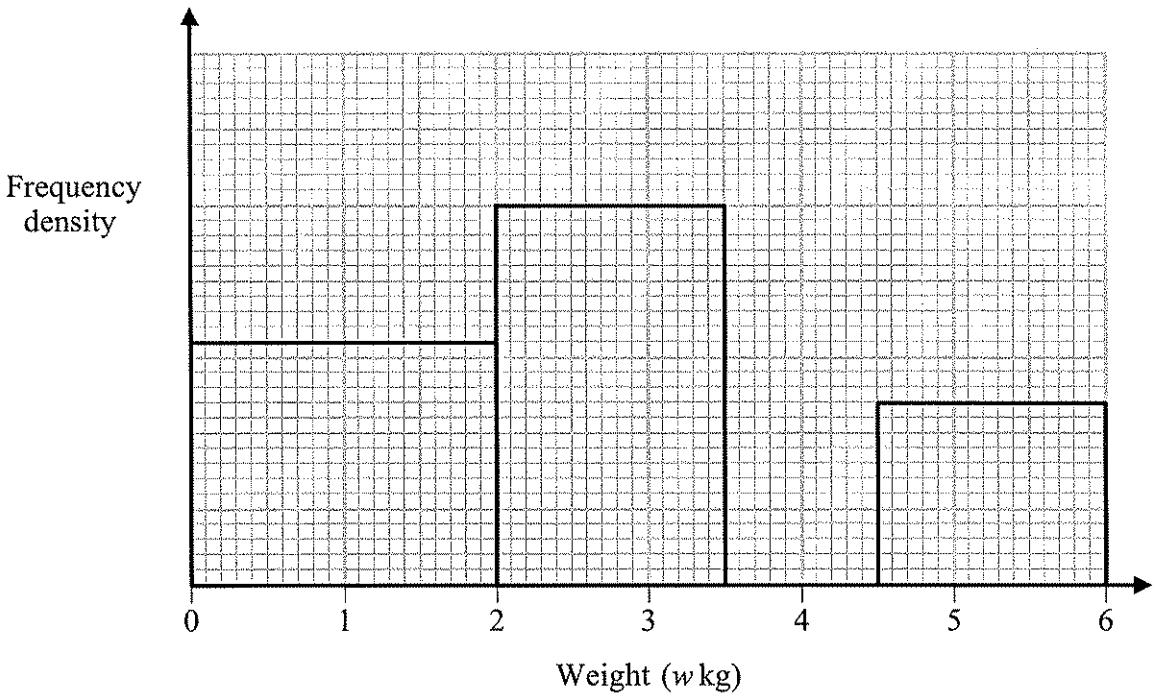
Q20

(Total 4 marks)

N 2 4 6 9 2 A 0 1 6 2 0

Leave blank

21. The unfinished table and histogram show information about the weights, in kg, of some babies.



Weight (w kg)	Frequency
$0 < w \leqslant 2$	
$2 < w \leqslant 3.5$	150
$3.5 < w \leqslant 4.5$	136
$4.5 < w \leqslant 6$	

(a) Use the histogram to complete the table.

(2)

(b) Use the table to complete the histogram.

(1) **Q21**

(Total 3 marks)

Leave blank

22. Younis spins a biased coin twice.
The probability that it will come down heads both times is 0.36

Calculate the probability that it will come down tails both times.

.....

(Total 3 marks)

Q22

23. Simplify fully $\frac{2x^2-5x-12}{4x^2-9}$

.....

(Total 3 marks)

Q23

Leave blank

24.

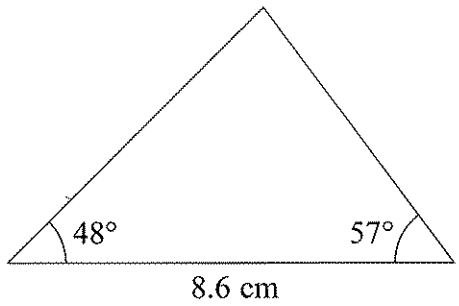


Diagram **NOT** accurately drawn

Calculate the area of the triangle.
Give your answer correct to 3 significant figures.

..... cm^2 **Q24**

(Total 4 marks)

TURN OVER FOR QUESTION 25

Leave blank

25.

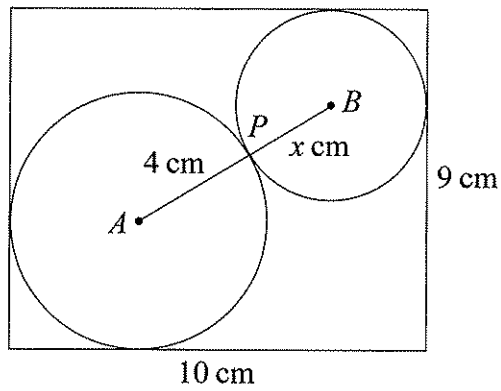


Diagram **NOT** accurately drawn

The diagram shows one disc with centre A and radius 4 cm and another disc with centre B and radius x cm.
The two discs fit exactly into a rectangular box 10 cm long and 9 cm wide.
The two discs touch at P.
APB is a straight line.

(a) Use Pythagoras' Theorem to show that $x^2 - 30x + 45 = 0$

(4)

(b) Find the value of x.
Give your value correct to 3 significant figures.

$x =$ .....

(3)

Q25

(Total 7 marks)

TOTAL FOR PAPER: 100 MARKS

END

Centre No.					
Candidate No.					

Surname	Initial(s)
Signature	

Paper Reference(s)

4400/3H

Examiner's use only

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London Examinations IGCSE

Mathematics

Paper 3H

Higher Tier

Thursday 17 May 2007 – Morning

Time: 2 hours

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20	
Total	

Materials required for examination

Ruler graduated in centimetres and millimetres, protractor, compasses, pen, HB pencil, eraser, calculator. Tracing paper may be used.

Items included with question papers

Nil

Instructions to Candidates

In the boxes above, write your centre number, candidate number, your surname, initial(s) and signature.
Check that you have the correct question paper.
Answer ALL the questions in the spaces provided in this question paper.
You must NOT write on the formulae page. Anything you write on the formulae page will gain NO credit.
If you need more space to complete your answer to any question, use additional answer sheets.

Information for Candidates

The marks for individual questions and the parts of questions are shown in round brackets: e.g. **(2)**.
There are 19 questions in this question paper. The total mark for this paper is 100.
There are 20 pages in this question paper. Any blank pages are indicated.
You may use a calculator.

Advice to Candidates

Write your answers neatly and in good English.

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Turn over

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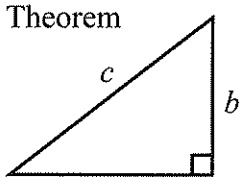
IGCSE MATHEMATICS 4400
FORMULA SHEET – HIGHER TIER

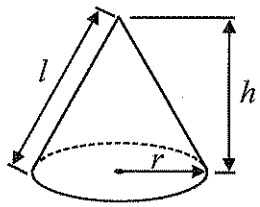
Pythagoras' Theorem



$a^2 + b^2 = c^2$

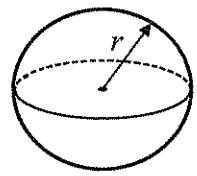
Volume of cone = $\frac{1}{3}\pi r^2 h$

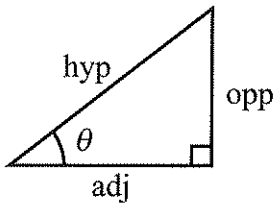
Curved surface area of cone = $\pi r l$



Volume of sphere = $\frac{4}{3}\pi r^3$

Surface area of sphere = $4\pi r^2$





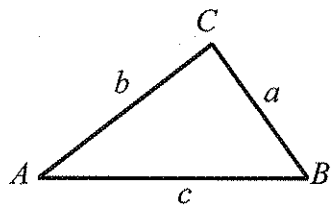
adj = hyp × cos θ
opp = hyp × sin θ
opp = adj × tan θ

or $\sin\theta = \frac{\text{opp}}{\text{hyp}}$

$\cos\theta = \frac{\text{adj}}{\text{hyp}}$

$\tan\theta = \frac{\text{opp}}{\text{adj}}$

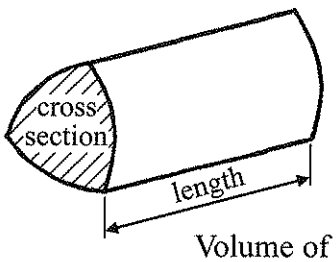
In any triangle ABC



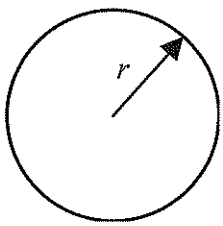
Sine rule: $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

Cosine rule: $a^2 = b^2 + c^2 - 2bc\cos A$

Area of triangle = $\frac{1}{2}ab\sin C$



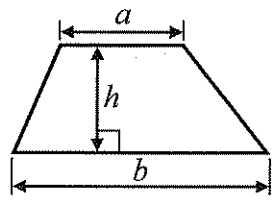
Volume of prism = area of cross section × length

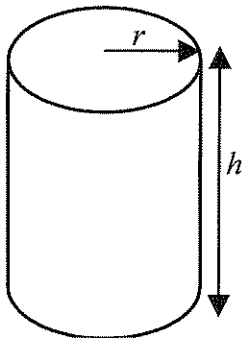


Circumference of circle = $2\pi r$

Area of circle = πr^2

Area of a trapezium = $\frac{1}{2}(a + b)h$





Volume of cylinder = $\pi r^2 h$

Curved surface area of cylinder = $2\pi rh$

The Quadratic Equation
The solutions of $ax^2 + bx + c = 0$, where $a \neq 0$, are given by

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

N 2 5 7 9 9 B 0 2 2 0

Leave blank

Answer ALL NINETEEN questions.

Write your answers in the spaces provided.

You must write down all stages in your working.

1. (a) Use your calculator to work out the value of

$$\frac{(3.7+4.6)^2}{2.8+6.3}$$

Write down all the figures on your calculator display.

.....

(2)

(b) Give your answer to part (a) correct to 2 decimal places.

.....

(1)

Q1

(Total 3 marks)

2. (a) Work out the value of $x^2 - 5x$ when $x = -3$

.....

(2)

(b) Factorise $x^2 - 5x$

.....

(2)

Q2

(Total 4 marks)

Leave blank

3. Hajra counted the numbers of sweets in 20 packets.
The table shows information about her results.

Number of sweets	Frequency
46	3
47	6
48	3
49	5
50	2
51	1

Work out the mean number of sweets in the 20 packets.

.....

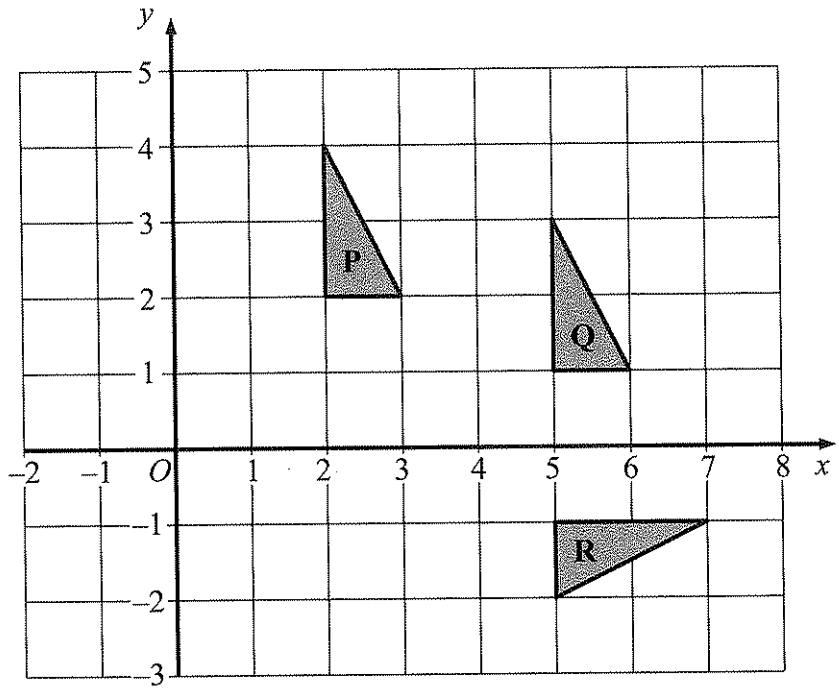
(Total 3 marks)

Q3

N 2 5 7 9 9 B 0 4 2 0

Leave blank

4.



(a) Describe fully the single transformation which maps triangle **P** onto triangle **Q**.

.....

.....

(2)

(b) Describe fully the single transformation which maps triangle **P** onto triangle **R**.

.....

.....

(3)

Q4

(Total 5 marks)

Leave blank

5. (a) Simplify, leaving your answers in index form,

(i) $7^5 \times 7^3$

.....

(ii) $5^9 \div 5^3$

.....

(2)

(b) Solve $\frac{2^9 \times 2^4}{2^n} = 2^8$

$n =$ .....

(2)

(Total 4 marks)

Q5

6. (a) Expand and simplify $3(4x - 5) - 4(2x + 1)$

.....

(2)

(b) Expand and simplify $(y + 8)(y + 3)$

.....

(2)

(c) Expand $p(5p^2 + 4)$

.....

(2)

(Total 6 marks)

Q6

N 2 5 7 9 9 B 0 6 2 0

Leave blank

7. A tunnel is 38.5 km long.

(a) A train travels the 38.5 km in 21 minutes.

Work out the average speed of the train.
Give your answer in km/h.

..... km/h
(3)

(b) To make the tunnel, a cylindrical hole 38.5 km long was drilled.
The radius of the cylindrical hole was 4.19 m.

Work out the volume of earth, in m^3, which was removed to make the hole.
Give your answer correct to 3 significant figures.

..... m^3
(3)

Q7

(Total 6 marks)

Leave blank

8. (a) Shri invested 4500 dollars. After one year, he received 270 dollars interest.
Work out 270 as a percentage of 4500

..... %
(2)

(b) Kareena invested an amount of money at an interest rate of 4.5% per year.
After one year, she received 117 dollars interest.
Work out the amount of money Kareena invested.

..... dollars
(2)

(c) Ravi invested an amount of money at an interest rate of 4% per year.
At the end of one year, interest was added to his account and the total amount in his account was then 3328 dollars.
Work out the amount of money Ravi invested.

..... dollars
(3)

Q8

(Total 7 marks)

N 2 5 7 9 9 B 0 8 2 0

Leave blank

9. (a) Solve $5x - 4 = 2x + 7$

$x =$ .....

(2)

(b) Solve $\frac{7-2y}{4} = 2y + 3$

$y =$ .....

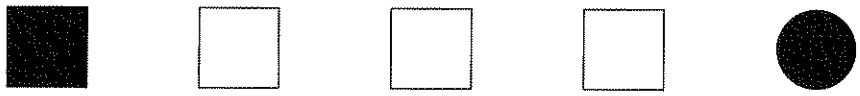
(4)

Q9

(Total 6 marks)

Leave blank

10. Here are five shapes.



Four of the shapes are squares and one of the shapes is a circle.
One square is black.
Three squares are white.
The circle is black.
The five shapes are put in a bag.

(a) Jasmine takes a shape at random from the bag 150 times.
She replaces the shape each time.

Work out an estimate for the number of times she will take a white square.

.....

(3)

(b) Alec takes a shape at random from the bag and does **not** replace it.
Bashir then takes a shape at random from the bag.

Work out the probability that

(i) they both take a square,

.....

(ii) they take shapes of the same colour.

.....

(5) **Q10**

(Total 8 marks)

N 2 5 7 9 9 B 0 1 0 2 0

Leave blank

11.

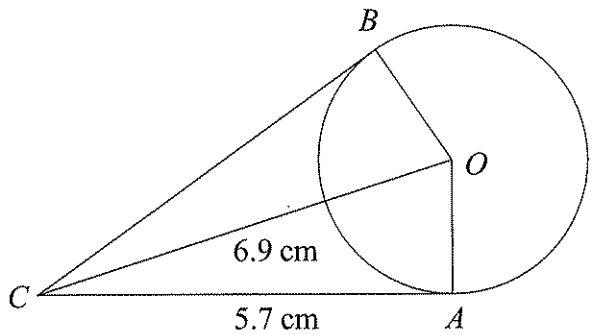


Diagram **NOT** accurately drawn

A and *B* are points on a circle, centre *O*.
The lines *CA* and *CB* are tangents to the circle.
CA = 5.7 cm.
CO = 6.9 cm.

(a) Give a reason why angle *CAO* = 90°.

.....

.....

(1)

(b) Calculate the perimeter of the kite *CAOB*.
Give your answer correct to 3 significant figures.

..... cm

(5)

Q11

(Total 6 marks)

N 2 5 7 9 9 B 0 1 1 2 0

Leave blank

12. The grouped frequency table gives information about the weights of 60 cows.

Weight (w kg)	Frequency
$100 < w \leqslant 200$	10
$200 < w \leqslant 300$	16
$300 < w \leqslant 400$	15
$400 < w \leqslant 500$	9
$500 < w \leqslant 600$	6
$600 < w \leqslant 700$	4

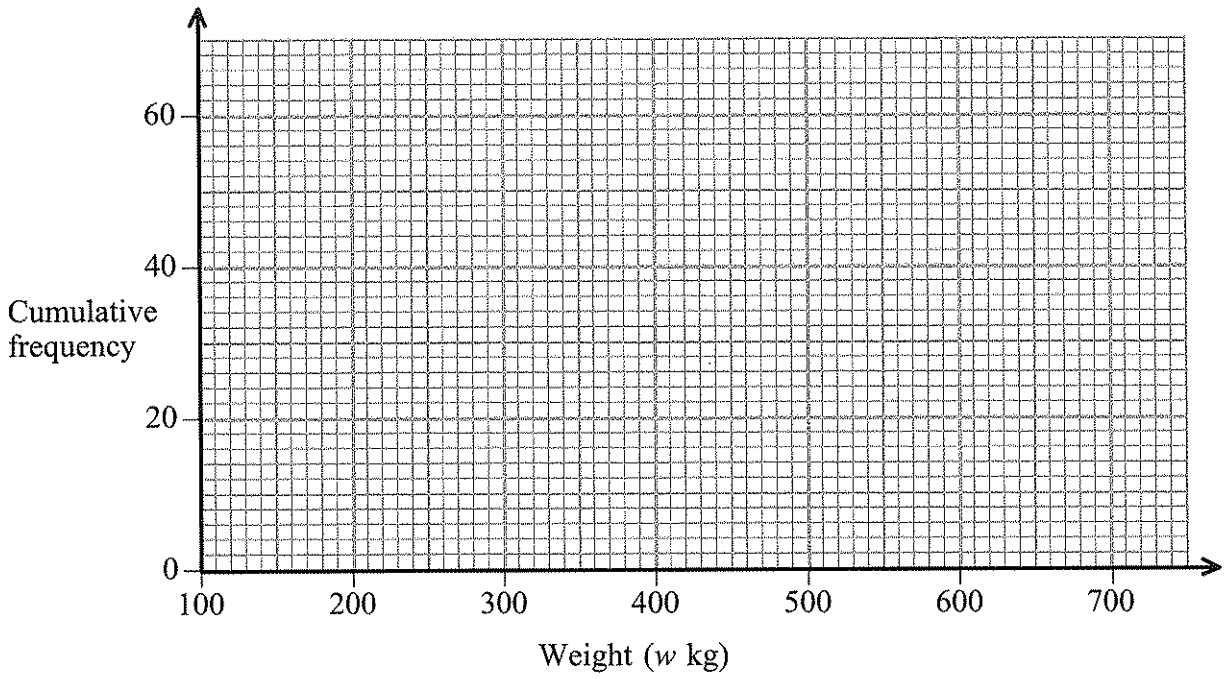
(a) Complete the cumulative frequency table.

Weight (w kg)	Cumulative frequency
$100 < w \leqslant 200$	
$100 < w \leqslant 300$	
$100 < w \leqslant 400$	
$100 < w \leqslant 500$	
$100 < w \leqslant 600$	
$100 < w \leqslant 700$	

(1)

Leave blank

(b) On the grid, draw the cumulative frequency graph for your table.



(2)

(c) Use your graph to find an estimate for the number of cows that weighed more than 430 kg.
Show your method clearly.

.....

(2)

Q12

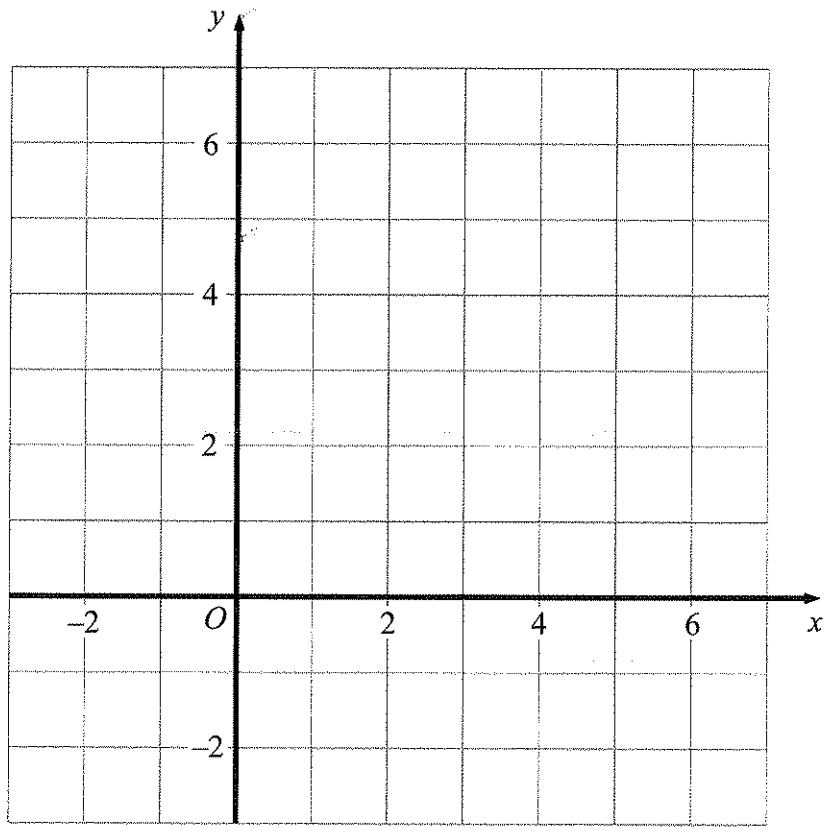
(Total 5 marks)

Leave blank

13. Show, by shading on the grid, the region which satisfies all three of these inequalities.

$$y \leqslant 5 \qquad y \leqslant 2x \qquad y \geqslant x + 1$$

Label your region **R**.



Q13

(Total 4 marks)

Leave blank

14. (a) Make r the subject of the formula $A = \pi r^2$, where r is positive.

$r =$ .....

(2)

The area of a circle is 14 cm^2, correct to 2 significant figures.

(b) (i) Work out the lower bound for the radius of the circle.
Write down all the figures on your calculator display.

..... cm

(ii) Give the radius of the circle to an appropriate degree of accuracy.
You must show working to explain how you obtained your answer.

..... cm

(4)

Q14

(Total 6 marks)

Leave blank

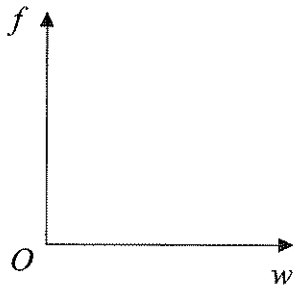
15. The frequency, f kilohertz, of a radio wave is inversely proportional to its wavelength, w metres.

When $w = 200$, $f = 1500$

(a) (i) Express f in terms of w.

$f =$ .....

(ii) On the axes, sketch the graph of f against w.



(4)

(b) The wavelength of a radio wave is 1250 m.
Calculate its frequency.

..... kilohertz

(2)

Q15

(Total 6 marks)

N 2 5 7 9 9 B 0 1 6 2 0

Leave blank

16. PQR is a triangle.
E is the point on PR such that $PR = 3PE$.
F is the point on QR such that $QR = 3QF$.

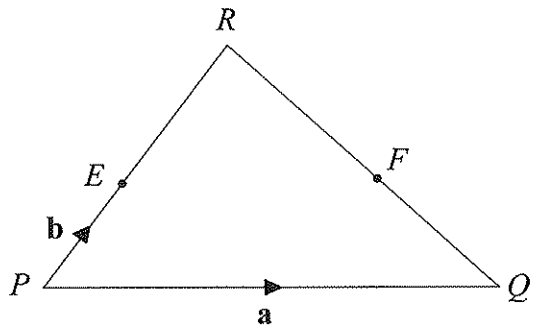


Diagram **NOT** accurately drawn

$\overrightarrow{PQ} = \mathbf{a}$, $\overrightarrow{PE} = \mathbf{b}$.

(a) Find, in terms of **a** and **b**,

(i) $\overrightarrow{PR}$

.....

(ii) $\overrightarrow{QR}$

.....

(iii) $\overrightarrow{PF}$

.....

(3)

(b) Show that $\overrightarrow{EF} = k\overrightarrow{PQ}$ where k is an integer.

(2)

Q16

(Total 5 marks)

Leave blank

17. A curve has equation $y = x^2 + \frac{16}{x}$

The curve has one turning point.

Find $\frac{dy}{dx}$ and use your answer to find the coordinates of this turning point.

.....

Q17

(Total 4 marks)

N 2 5 7 9 9 B 0 1 8 2 0

Leave blank

18.

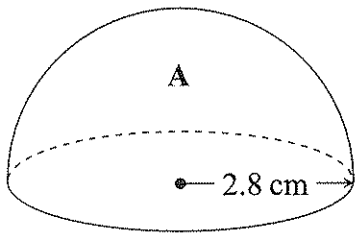


Diagram **NOT** accurately drawn

A solid hemisphere **A** has a radius of 2.8 cm.

(a) Calculate the **total** surface area of hemisphere **A**.
Give your answer correct to 3 significant figures.

..... cm^2
(3)

A larger solid hemisphere **B** has a **volume** which is 125 times the volume of hemisphere **A**.

(b) Calculate the **total** surface area of hemisphere **B**.
Give your answer correct to 3 significant figures.

..... cm^2
(3)

Q18

(Total 6 marks)

PLEASE TURN OVER FOR QUESTION 19

Leave blank

19. Solve the simultaneous equations

$$y = 3x - 1$$

$$x^2 + y^2 = 5$$

.....

Q19

(Total 6 marks)

TOTAL FOR PAPER: 100 MARKS

END

Centre No.					
Candidate No.					

Surname	Initial(s)
Signature	

Paper Reference(s)

4400/4H

Examiner's use only

Team Leader's use only

London Examinations IGCSE

Mathematics

Paper 4H

Higher Tier

Friday 18 May 2007 – Afternoon

Time: 2 hours

ND005973903

Materials required for examination

Ruler graduated in centimetres and millimetres, protractor, compasses, pen, HB pencil, eraser, calculator. Tracing paper may be used.

Items included with question papers

Nil

Page Number	Leave Blank
3	
4	
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14	
15	
16	
17	
18	
19	
Total	

Instructions to Candidates

In the boxes above, write your centre number, candidate number, your surname, initial(s) and signature.
Check that you have the correct question paper.
Answer ALL the questions in the spaces provided in this question paper.
You must NOT write on the formulae page. Anything you write on the formulae page will gain NO credit.
If you need more space to complete your answer to any question, use additional answer sheets.

Information for Candidates

The marks for individual questions and the parts of questions are shown in round brackets: e.g. **(2)**.
There are 21 questions in this question paper. The total mark for this paper is 100.
There are 20 pages in this question paper. Any blank pages are indicated.
You may use a calculator.

Advice to Candidates

Write your answers neatly and in good English.

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Turn over

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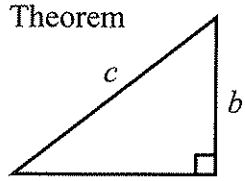
IGCSE MATHEMATICS 4400
FORMULA SHEET – HIGHER TIER

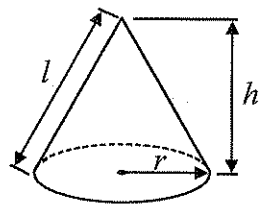
Pythagoras' Theorem



$a^2 + b^2 = c^2$

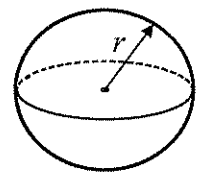
Volume of cone = $\frac{1}{3}\pi r^2 h$

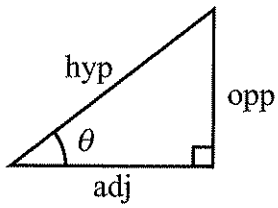
Curved surface area of cone = $\pi r l$



Volume of sphere = $\frac{4}{3}\pi r^3$

Surface area of sphere = $4\pi r^2$





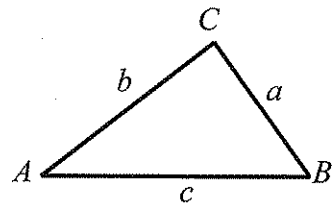
adj = hyp × cos θ
opp = hyp × sin θ
opp = adj × tan θ

or $\sin\theta = \frac{\text{opp}}{\text{hyp}}$

$\cos\theta = \frac{\text{adj}}{\text{hyp}}$

$\tan\theta = \frac{\text{opp}}{\text{adj}}$

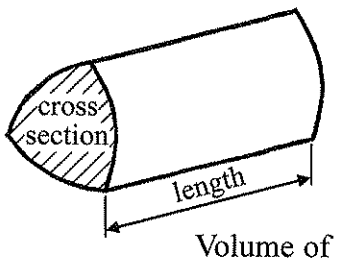
In any triangle ABC



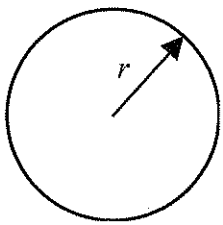
Sine rule: $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

Cosine rule: $a^2 = b^2 + c^2 - 2bc\cos A$

Area of triangle = $\frac{1}{2}ab\sin C$



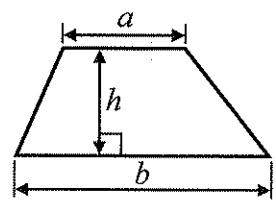
Volume of prism = area of cross section × length

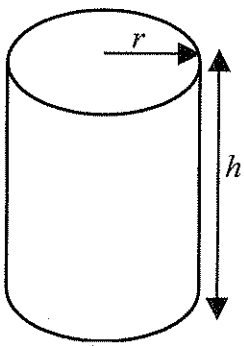


Circumference of circle = $2\pi r$

Area of circle = πr^2

Area of a trapezium = $\frac{1}{2}(a + b)h$





Volume of cylinder = $\pi r^2 h$

Curved surface area of cylinder = $2\pi rh$

The Quadratic Equation
The solutions of $ax^2 + bx + c = 0$, where $a \neq 0$, are given by

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

N 2 5 8 0 0 B 0 2 2 0

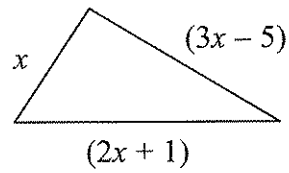
Leave blank

Answer ALL TWENTY ONE questions.

Write your answers in the spaces provided.

You must write down all the stages in your working.

1. The diagram shows the lengths, in cm, of the sides of a triangle.



The perimeter of the triangle is 17 cm.

(i) Use this information to write an equation in x.

.....

(ii) Solve your equation.

$x =$ .....

Q1

(Total 3 marks)

2. Anji mixes sand and cement in the ratio 7 : 2 by weight.
The total weight of the mixture is 27 kg.

Calculate the weight of sand in the mixture.

..... kg

Q2

(Total 3 marks)

Leave blank

3. Solve $5(x - 4) = 35$

$x =$ .....

Q3

(Total 3 marks)

4. Julian has to work out $\frac{6.8 \times 47.6}{2.09}$ without using a calculator.

(a) Round each number in Julian's calculation to one significant figure.

.....

(2)

(b) Use your rounded numbers to work out an estimate for $\frac{6.8 \times 47.6}{2.09}$

Give your answer correct to one significant figure.

.....

(2)

(c) Without using your calculator, explain why your answer to part (b) should be larger than the exact answer.

.....

.....

.....

(2)

Q4

(Total 6 marks)

Leave blank

5. The diagram shows a wall.

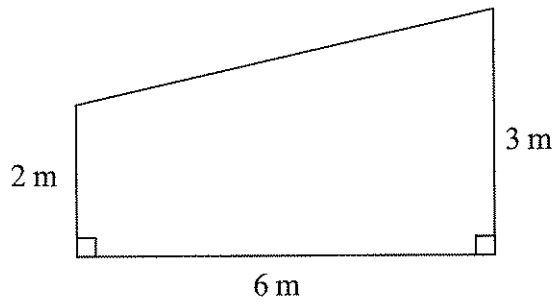


Diagram **NOT** accurately drawn

(a) Calculate the area of the wall.

..... m^2

(2)

(b) 1 litre of paint covers an area of 20 m^2.
Work out the volume of paint needed to cover the wall.
Give your answer in cm^3.

..... cm^3

(3)

Q5

(Total 5 marks)

Leave blank

6. Solve the simultaneous equations

$$y = x + 3$$
$$y = 7x$$

$x =$ .....

$y =$ **Q6**

(Total 3 marks)

N 2 5 8 0 0 B 0 6 2 0

Leave blank

7. (a)

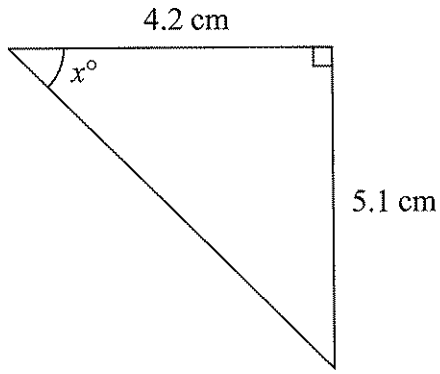


Diagram **NOT** accurately drawn

Calculate the value of x.
Give your answer correct to 3 significant figures.

$x =$ .....

(3)

(b)

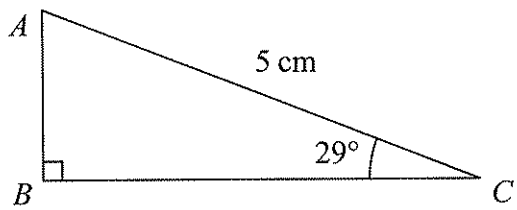


Diagram **NOT** accurately drawn

Calculate the length of AB.
Give your answer correct to 3 significant figures.

..... cm

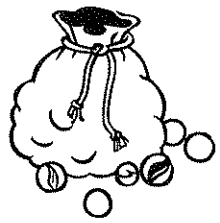
(3)

Q7

(Total 6 marks)

Leave blank

8. A bag contains some marbles.
The colour of each marble is red or blue or green or yellow.



A marble is taken at random from the bag.
The table shows the probability that the marble is red or blue or green.

Colour	Probability
Red	0.1
Blue	0.2
Green	0.1
Yellow	

(a) Work out the probability that the marble is yellow.

.....

(2)

(b) Work out the probability that the marble is blue or green.

.....

(2)

The probability that the marble is made of glass is 0.8

(c) Beryl says "The probability that the marble is green or made of glass is $0.1 + 0.8 = 0.9$"

Is Beryl correct? .....

Give a reason for your answer.

.....

.....

(2)

Q8

(Total 6 marks)

N 2 5 8 0 0 B 0 8 2 0

Leave blank

9.

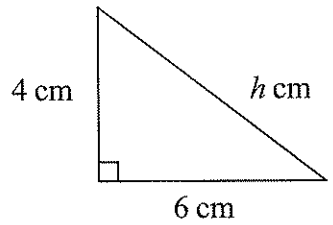


Diagram **NOT** accurately drawn

Calculate the value of h.
Give your answer correct to 3 significant figures.

h = ...

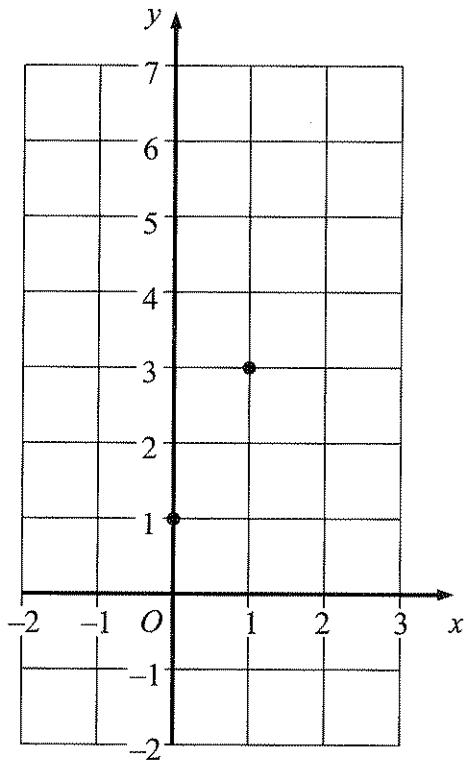
Q9

(Total 3 marks)

PLEASE TURN OVER FOR QUESTION 10

Leave blank

10. (a)



Find the equation of the straight line that passes through the points (0, 1) and (1, 3).

.....

(4)

(b) Write down the equation of a line parallel to the line whose equation is $y = -2x + 5$

.....

(1)

(c) Write down the coordinates of the point of intersection of the two lines whose equations are $y = 3x - 4$ and $y = -2x - 4$

(....., ...)

(1)

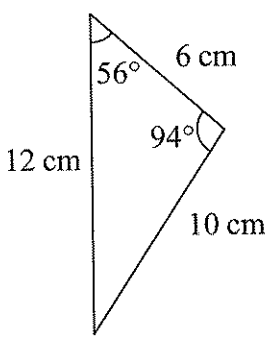
Q10

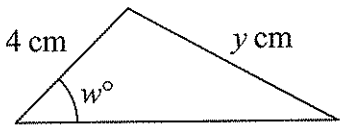
(Total 6 marks)

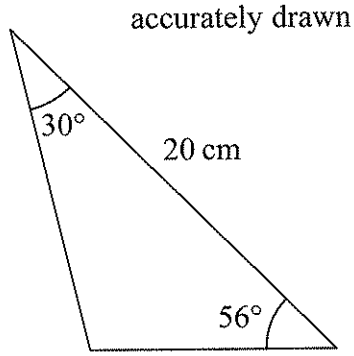
Leave blank

11. Here are three similar triangles.

Diagrams **NOT** accurately drawn







Find the value of

(a) w,

$w =$ .....

(1)

(b) x,

$x =$ .....

(2)

(c) y.

$y =$ .....

(2)

Q11

(Total 5 marks)

Leave blank

12. Simplify

(a) $\dfrac{a^3 \times a^4}{a^2}$

.....

(2)

(b) $(\sqrt{x})^6$

.....

(1)

(c) $\dfrac{3(x+1)^2}{6(x+1)}$

.....

(2)

Q12

(Total 5 marks)

N 2 5 8 0 0 B 0 1 2 2 0

Leave blank

13. Here are the marks scored in a maths test by the students in two classes.

Class A 2 13 15 16 4 6 19 10 11 4 5 15 4 16 6

Class B 12 11 2 5 19 14 6 6 10 14 9

(a) Work out the interquartile range of the marks for each class.

Class A .....

Class B .....

(4)

(b) Use your answers to give one comparison between the marks of Class A and the marks of Class B.

.....

.....

(1) **Q13**

(Total 5 marks)

14. Solve $\frac{5x-7}{x-1} = x+1$

..... **Q14**

(Total 4 marks)

Leave blank

15. There are 35 students in a group.
18 students play hockey.
12 students play both hockey and tennis.
15 students play neither hockey nor tennis.

Find the number of students who play tennis.

.....

Q15

(Total 4 marks)

16. A triangle has sides of length 5 cm, 6 cm and 9 cm.

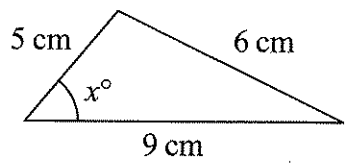


Diagram **NOT** accurately drawn

Calculate the value of x.
Give your answer correct to 3 significant figures.

x =.....

Q16

(Total 3 marks)

N 2 5 8 0 0 B 0 1 4 2 0

Leave blank

17. The functions f and g are defined as follows.

$$f(x) = \frac{1}{x+2}$$

$$g(x) = \sqrt{x-1}$$

(a) (i) State which value of x cannot be included in the domain of f.

.....

(ii) State which **values** of x cannot be included in the domain of g.

.....

(3)

(b) Calculate fg(10)

.....

(3)

(c) Express the inverse function g^{-1} in the form $g^{-1}(x)$ = ...

.....

(4)

Q17

(Total 10 marks)

Leave blank

18. A fair, 6-sided dice has faces numbered 1, 2, 3, 4, 5 and 6
When the dice is thrown, the number facing up is the score.
The dice is thrown three times.

(a) Calculate the probability that the total score is 18

.....

(2)

(b) Calculate the probability that the score on the third throw is exactly double the **total** of the scores on the first **two** throws.

.....

(4)

Q18

(Total 6 marks)

N 2 5 8 0 0 B 0 1 6 2 0

Leave blank

19. (a) Calculate the area of an equilateral triangle of side 5 cm.
Give your answer correct to 3 significant figures.

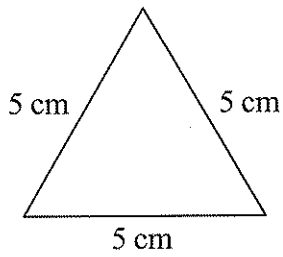


Diagram **NOT** accurately drawn

..... cm^2
(2)

(b) The diagram shows two overlapping circles.
The centre of each circle lies on the circumference of the other circle.
The radius of each circle is 5 cm.
The distance between the centres is 5 cm.

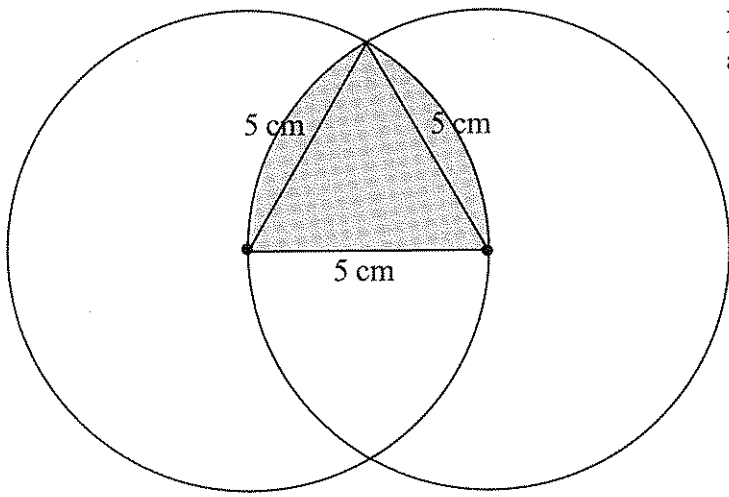


Diagram **NOT** accurately drawn

Calculate the area of the shaded region.
Give your answer correct to 3 significant figures.

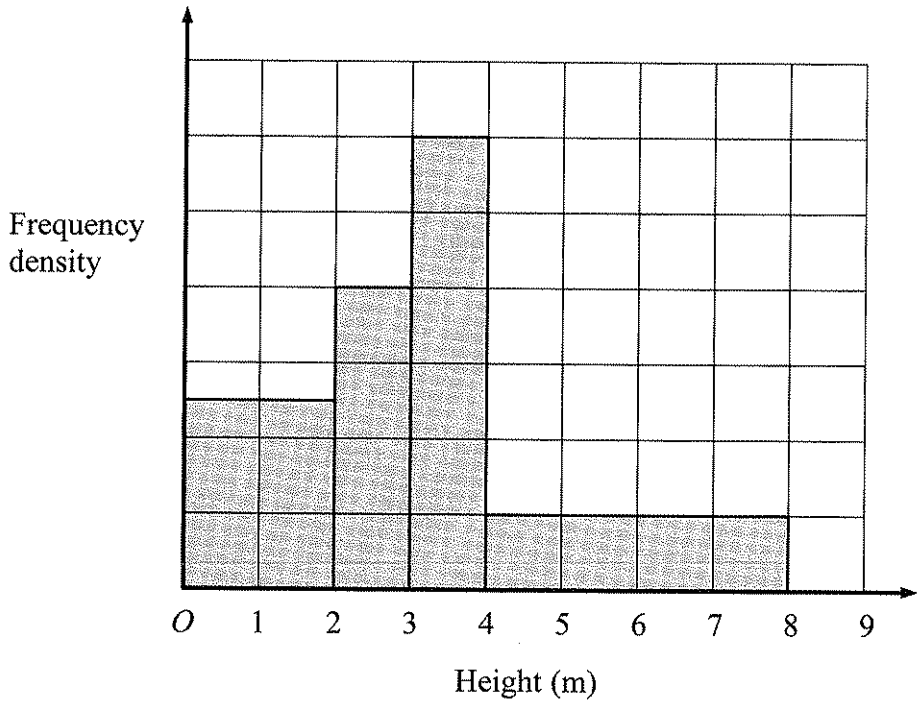
..... cm^2
(3)

Q19

(Total 5 marks)

Leave blank

20. The histogram shows information about the height, h metres, of some trees.



The number of trees with heights in the class $2 < h \leqslant 3$ is 20

Find the number of trees with heights in the class

(i) $4 < h \leqslant 8$

.....

(ii) $3 < h \leqslant 4$

.....

Q20

(Total 3 marks)

N 2 5 8 0 0 B 0 1 8 2 0

Leave blank

21. (a) Factorise $16x^2 - 1$

.....

(1)

(b) Hence express as the product of its prime factors

(i) 1599

.....

(ii) 1.599×10^6

.....

(5) **Q21**

(Total 6 marks)

TOTAL FOR PAPER: 100 MARKS

END

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Centre No.						Surname	Initial(s)
Candidate No.						Signature	

Paper Reference(s)

4400/3H

Examiner's use only

Team Leader's use only

London Examinations IGCSE

Mathematics

Paper 3H

Higher Tier

Monday 5 November 2007 – Afternoon

Time: 2 hours

Materials required for examination

Ruler graduated in centimetres and millimetres, protractor, compasses, pen, HB pencil, eraser, calculator. Tracing paper may be used.

Items included with question papers

Nil

Instructions to Candidates

In the boxes above, write your centre number, candidate number, your surname, initial(s) and signature.
Check that you have the correct question paper.
Answer ALL the questions. Write your answers in the spaces provided in this question paper.
You must NOT write on the formulae page. Anything you write on the formulae page will gain NO credit.
If you need more space to complete your answer to any question, use additional answer sheets.

Information for Candidates

The marks for individual questions and the parts of questions are shown in round brackets: e.g. **(2)**.
There are 21 questions in this question paper. The total mark for this paper is 100.
There are 20 pages in this question paper. Any blank pages are indicated.
You may use a calculator.

Advice to Candidates

Write your answers neatly and in good English.

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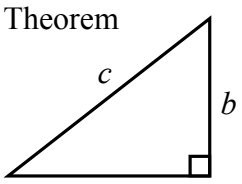
IGCSE MATHEMATICS 4400
FORMULA SHEET – HIGHER TIER

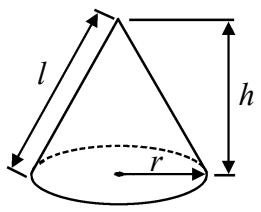
Pythagoras' Theorem



$a^2 + b^2 = c^2$

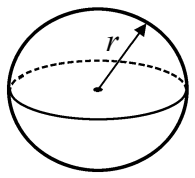
Volume of cone = $\frac{1}{3}\pi r^2 h$

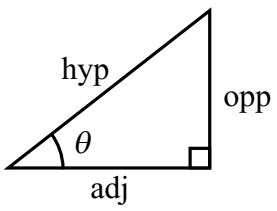
Curved surface area of cone = $\pi r l$



Volume of sphere = $\frac{4}{3}\pi r^3$

Surface area of sphere = $4\pi r^2$





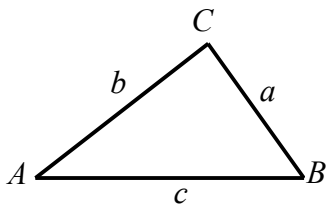
adj = hyp × cos θ
opp = hyp × sin θ
opp = adj × tan θ

or $\sin\theta = \frac{\text{opp}}{\text{hyp}}$

$\cos\theta = \frac{\text{adj}}{\text{hyp}}$

$\tan\theta = \frac{\text{opp}}{\text{adj}}$

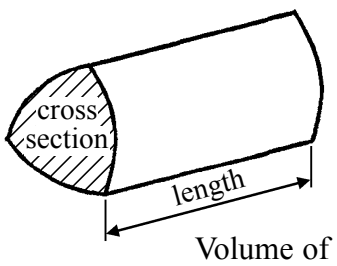
In any triangle ABC



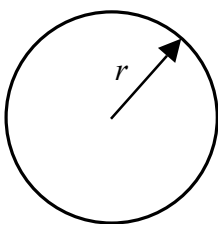
Sine rule: $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

Cosine rule: $a^2 = b^2 + c^2 - 2bc\cos A$

Area of triangle = $\frac{1}{2}ab\sin C$



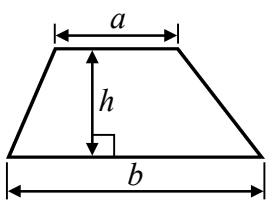
Volume of prism = area of cross section × length

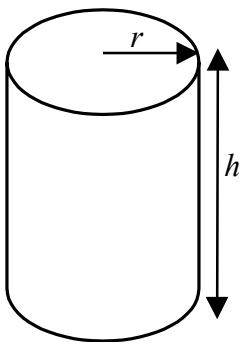


Circumference of circle = $2\pi r$

Area of circle = πr^2

Area of a trapezium = $\frac{1}{2}(a + b)h$





Volume of cylinder = $\pi r^2 h$

Curved surface area of cylinder = $2\pi r h$

The Quadratic Equation
The solutions of $ax^2 + bx + c = 0$, where $a \neq 0$, are given by

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

N 2 4 5 7 8 A 0 2 2 0

Leave blank

Answer ALL TWENTY ONE questions.

Write your answers in the spaces provided.

You must write down all stages in your working.

1. The diagram shows a regular 5-sided polygon, with centre O.

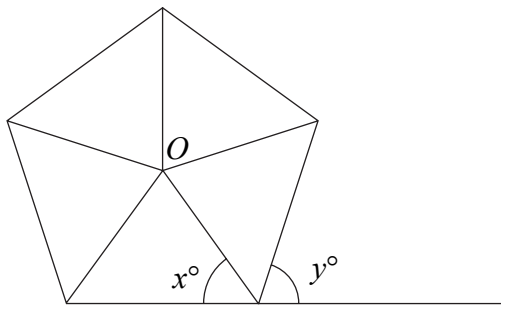


Diagram **NOT** accurately drawn

Work out the value of

(a) x,

$x =$ .....

(3)

(b) y.

$y =$ .....

(2) **Q1**

(Total 5 marks)

N 2 4 5 7 8 A 0 3 2 0

Leave blank

2. The table shows information about the scores in a game.

Score	Frequency
1	5
2	8
3	3
4	4

Work out the mean score.

.....

(Total 3 marks)

Q2

Leave blank

3. A triangle has two equal sides of length $2x$ cm and one side of length x cm.

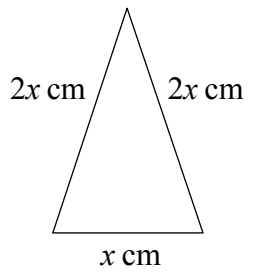


Diagram **NOT** accurately drawn

The perimeter of this triangle is 12 cm.

(i) Use this information to write down an equation in x.

.....

(ii) Solve your equation to find the value of x.

$x =$ .....

(Total 3 marks)

Q3

Leave blank

4. The total number of students in Denton College is 280
160 of the students in Denton College are in Year 1
Express 160 as a percentage of 280
Give your answer correct to 2 significant figures.

.....%

(Total 2 marks)

Q4

Leave blank

5. (a) Calculate the area of a circle of radius 2 m.
Give your answer correct to 3 significant figures.

.....m^2
(2)

(b) A circular pond has a radius of 2 m.
There is a path of width 1 m around the pond.

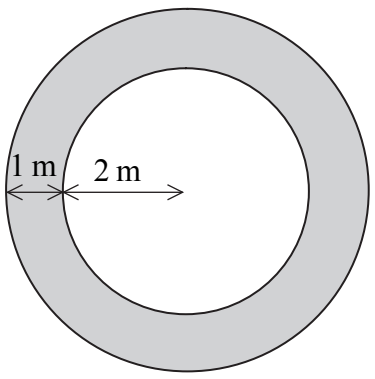


Diagram **NOT** accurately drawn

Calculate the area of the path.
Give your answer correct to 3 significant figures.

.....m^2
(2)

(c) Calculate the outer circumference of the path.
Give your answer correct to 3 significant figures.

..... m
(2)

Q5

(Total 6 marks)

Leave blank

6.

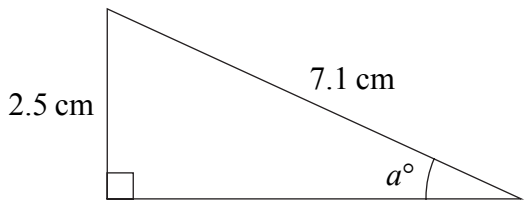


Diagram **NOT** accurately drawn

Calculate the value of a.
Give your answer correct to 3 significant figures.

$a =$ .....

(Total 3 marks)

Q6

7. (a) $A = \{1, 2, 3, 4\}$
$B = \{2, 4, 6, 8\}$

Write down the members of $A \cup B$.

.....

(2)

(b) $\mathcal{E} = \{\text{Positive integers less than 10}\}$
$P = \{3, 4, 5, 6, 7, 8\}$
$P \cap Q = \emptyset$

Write down all the possible members of Q.

.....

(2)

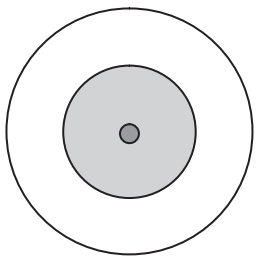
Q7

(Total 4 marks)

N 2 4 5 7 8 A 0 8 2 0

Leave blank

8. Jim fires an arrow at a target.



The table shows all the possible outcomes and the probabilities of three of these outcomes.

Result	Probability
Bull's Eye	
Inner Ring	0.3
Outer Ring	0.4
Miss	0.2

Work out the probability that Jim's arrow will hit either the Bull's Eye **or** the Inner Ring.

.....

(Total 3 marks)

Q8

N 2 4 5 7 8 A 0 9 2 0

Leave blank

9. (a) Expand $4(v+3)$

.....

(1)

(b) Simplify $\dfrac{w^3 \times w^7}{w^2}$

.....

(2)

(c) Solve the equation $\dfrac{17-x}{7}=3$

$x =$ .....

(3)

(d) Solve the inequality $4y-5<6$

.....

(2) **Q9**

(Total 8 marks)

Leave blank

10. The table shows the carbon dioxide emissions, in tonnes, produced by each of four regions in 2001.

Country	Carbon dioxide emissions
USA	5.7×10^9
Africa	8.4×10^8
Russia	1.4×10^9
China	3.2×10^9

(a) Which of these regions produced the lowest carbon dioxide emissions?

.....
(1)

(b) Work out the total carbon dioxide emissions produced by these four regions.
Give your answer in standard form correct to 3 significant figures.

.....tonnes
(2)

(c) $1.4 \times 10^9 = k \times 8.4 \times 10^8$
Calculate the value of k.

k = ...
(2)

Q10

(Total 5 marks)

N 2 4 5 7 8 A 0 1 1 2 0

Leave blank

11. Make x the subject of $3x - y = x + 7$

$x =$ .....

Q11

(Total 3 marks)

12.

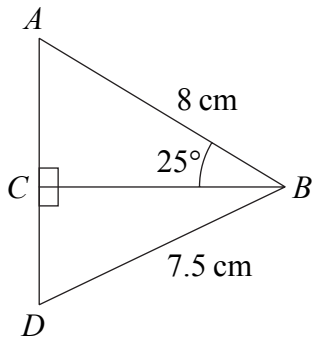


Diagram **NOT** accurately drawn

(i) Calculate the length of BC.

..... cm

(ii) Calculate the length of CD.
Give your answer correct to 3 significant figures.

..... cm

Q12

(Total 5 marks)

Leave blank

13. Factorise

(a) $x^2 - 100$

.....

(1)

(b) $x^2 - x - 12$

.....

(2)

(c) $3x^2 + 7x + 2$

.....

(2) **Q13**

(Total 5 marks)

Leave blank

14. Solve the simultaneous equations

$$2x + 5y = 16$$
$$4x + 3y = 11$$

$x =$ .....

$y =$ .....

(Total 3 marks)

Q14

Leave blank

15. Work out the area of the shaded sector of the circle.
Give your answer correct to 3 significant figures.

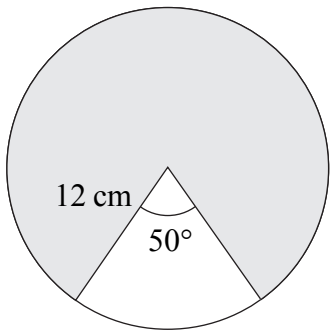


Diagram **NOT** accurately drawn

..... cm^2

Q15

(Total 4 marks)

16. Simplify

(a) $\dfrac{x^2-3x}{2x-6}$

.....

(3)

(b) $\dfrac{2}{x-1}-\dfrac{3}{x}$

.....

(3)

Q16

(Total 6 marks)

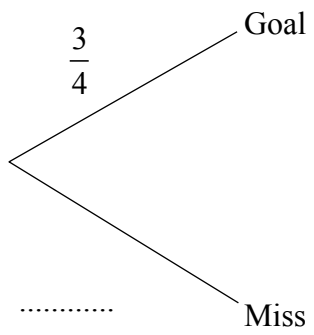
Leave blank

17. Each time Nikos has a shot at goal, the probability that he will score a goal is $\frac{3}{4}$

Nikos takes two shots.

(a) Complete the probability tree diagram.

First shot **Second shot**



(2)

(b) Calculate the probability that Nikos will score

(i) two goals,

.....

(2)

(ii) exactly one goal.

.....

(3)

Leave blank

Nikos now takes another three shots.

(c) Calculate the probability that he will score exactly 1 goal or exactly 2 goals.

.....

(3)

Q17

(Total 10 marks)

18. Some cases have to be lifted by a crane.
Each case has a mass of 68 kg, correct to 2 significant figures.

(a) Write down the upper bound of the mass of a case.

..... kg

(1)

A crane can lift safely a load of 1200 kg, correct to 2 significant figures.

(b) Find the greatest number of cases that the crane can lift safely in one load.

.....

(3)

Q18

(Total 4 marks)

Leave blank

19. A wind turbine generates a power of P kilowatts when the wind speed is w m/s.

P is proportional to w^3.

$P = 300$ when $w = 12$

(a) Find a formula for P in terms of w.

.....

(3)

(b) Calculate the value of P when $w = 7.5$
Give your answer correct to 3 significant figures.

$P =$ .....

(2)

(c) When the wind speed is x m/s, the wind turbine generates twice as much power as it does when the wind speed is 10 m/s.
Calculate the value of x.
Give your answer correct to 3 significant figures.

$x =$ .....

(4)

Q19

(Total 9 marks)

N 2 4 5 7 8 A 0 1 8 2 0

Leave blank

20. (a) Expand $(1+\sqrt{3})^2$
Give your answer in the form $a + b\sqrt{3}$ where a and b are integers.

.....

(2)

(b)

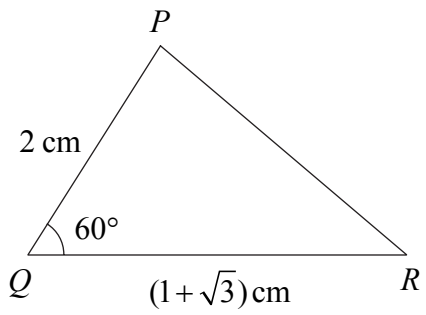


Diagram **NOT** accurately drawn

Calculate the exact length of PR.
Give your answer as a surd.

..... cm

(4)

(Total 6 marks)

Q20

PLEASE TURN OVER FOR QUESTION 21

Leave blank

21. A coin is biased so that the probability that it shows heads on any one throw is p.
The coin is thrown twice.

The probability that the coin shows heads exactly once is $\frac{8}{25}$

Show that $25p^2 - 25p + 4 = 0$

Q21

(Total 3 marks)

TOTAL FOR PAPER: 100 MARKS

END

N 2 4 5 7 8 A 0 2 0 2 0

Centre No.						Surname	Initial(s)
Candidate No.						Signature	

Paper Reference(s)

4400/4H

Examiner's use only

Team Leader's use only

London Examinations IGCSE

Mathematics

Paper 4H

Higher Tier

Wednesday 7 November 2007 – Afternoon

Time: 2 hours

Materials required for examination

Ruler graduated in centimetres and millimetres, protractor, compasses, pen, HB pencil, eraser, calculator. Tracing paper may be used.

Items included with question papers

Nil

Instructions to Candidates

In the boxes above, write your centre number, candidate number, your surname, initial(s) and signature.
Check that you have the correct question paper.
Answer ALL the questions. Write your answers in the spaces provided in this question paper.
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There are 26 questions in this question paper. The total mark for this paper is 100.
There are 20 pages in this question paper. Any blank pages are indicated.
You may use a calculator.

Advice to Candidates

Write your answers neatly and in good English.

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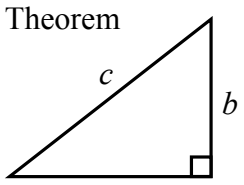
IGCSE MATHEMATICS 4400
FORMULA SHEET – HIGHER TIER

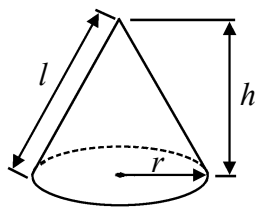
Pythagoras' Theorem



$a^2 + b^2 = c^2$

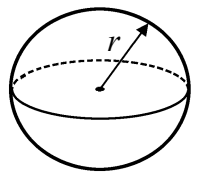
Volume of cone = $\frac{1}{3}\pi r^2 h$

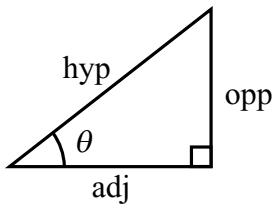
Curved surface area of cone = $\pi r l$



Volume of sphere = $\frac{4}{3}\pi r^3$

Surface area of sphere = $4\pi r^2$





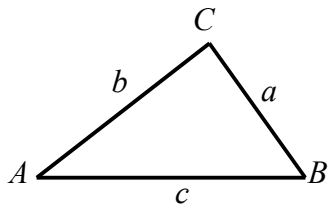
adj = hyp × cos θ
opp = hyp × sin θ
opp = adj × tan θ

or $\sin\theta = \frac{\text{opp}}{\text{hyp}}$

$\cos\theta = \frac{\text{adj}}{\text{hyp}}$

$\tan\theta = \frac{\text{opp}}{\text{adj}}$

In any triangle ABC



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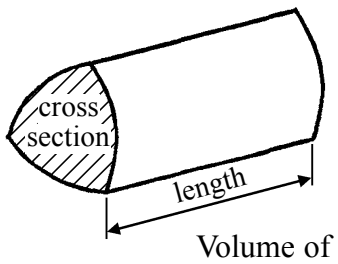
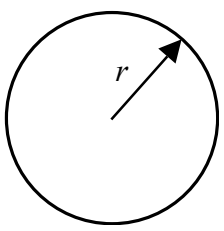
Cosine rule: $a^2 = b^2 + c^2 - 2bc\cos A$

Area of triangle = $\frac{1}{2}ab\sin C$



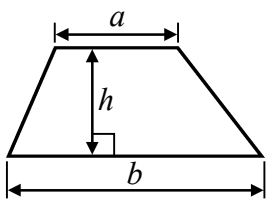
Volume of prism = area of cross section × length

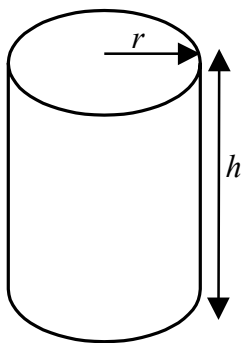


Circumference of circle = $2\pi r$

Area of circle = πr^2

Area of a trapezium = $\frac{1}{2}(a + b)h$





Volume of cylinder = $\pi r^2 h$

Curved surface area of cylinder = $2\pi r h$

The Quadratic Equation
The solutions of $ax^2 + bx + c = 0$, where $a \neq 0$, are given by

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

N 2 9 1 0 7 A 0 2 2 0

Leave blank

Answer ALL TWENTY SIX questions.

Write your answers in the spaces provided.

You must write down all stages in your working.

1. Work out $\dfrac{5.9-4.3}{1.3+1.2}$

.....

(Total 2 marks)

Q1

2. (a) Factorise $5x-20$

.....

(1)

(b) Factorise y^2+6y

.....

(2)

(Total 3 marks)

Q2

3.

£1 = 2.61 New Zealand dollars
£1 = 1.45 euros

Change 630 New Zealand dollars to euros.

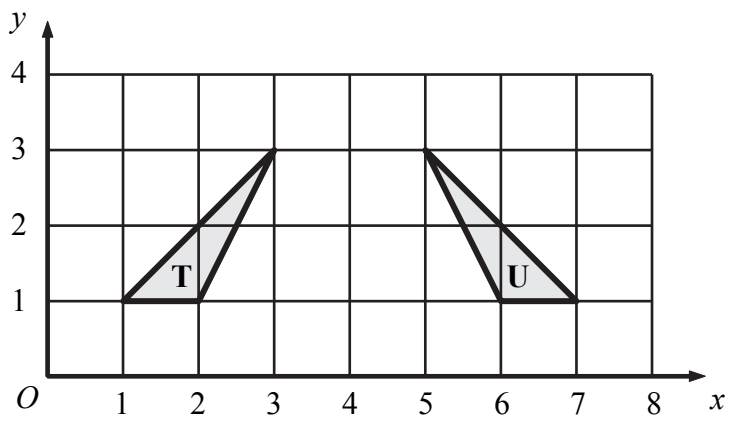
..... euros

(Total 2 marks)

Q3

Leave blank

4.



Describe fully the single transformation which maps triangle **T** onto triangle **U**.

.....

(Total 2 marks)

Q4

5. In 2004, the ratio of the number of planes in Air China's fleet to the number of planes in Malaysian Airlines' fleet was 6 : 7
There were 72 planes in Air China's fleet.

Work out the number of planes in Malaysian Airlines' fleet.

.....

(Total 2 marks)

Q5

Leave blank

6.

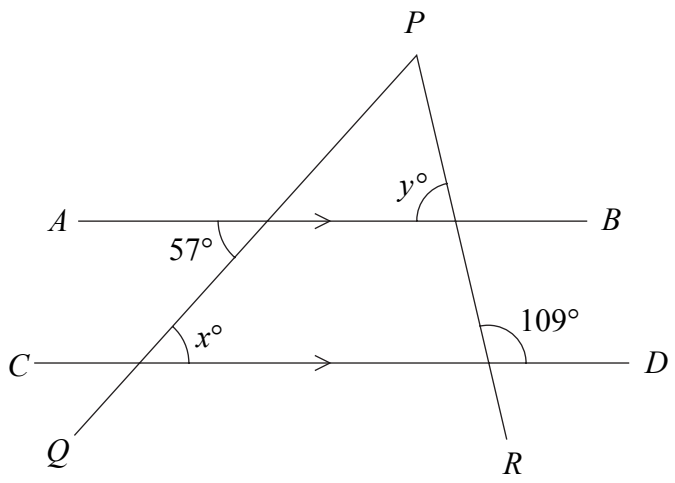


Diagram **NOT** accurately drawn

AB and *CD* are parallel straight lines.
PQ and *PR* are straight lines.

(a) (i) Find the value of *x*.

x = ...

(ii) Give a reason for your answer.

.....

(2)

(b) Find the value of *y*.
Give a reason for each step in your working.

y = ...

(2) **Q6**

(Total 4 marks)

Leave blank

7. There are four grades of egg.
The table shows how many eggs of each grade were laid by a hen last year.

Grade	Number of eggs
Extra large	55
Large	48
Medium	35
Small	12

(a) In the first four months of this year, the hen laid 60 eggs.

Work out an estimate for the number of Extra large eggs the hen laid in these four months.

.....

(3)

(b) The table below shows how the grade of an egg is related to its weight.

Grade	Weight (w grams)
Extra large	$w \geqslant 73$
Large	$63 \leqslant w < 73$
Medium	$53 \leqslant w < 63$
Small	$w < 53$

Work out an estimate for the total weight of 48 Large eggs and 35 Medium eggs.

..... g

(3)

(c) Jody wants to use the information in the table to work out an estimate for the total weight of all the eggs laid by the hen last year.

Explain why it is difficult to do this.

.....

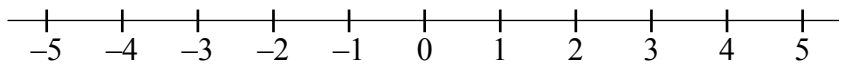
(1)

Q7

(Total 7 marks)

Leave blank

8. (a) On the number line, show the inequality $-2 < x \leqslant 3$



(2)

(b) n is an integer.

Write down all the possible values of n which satisfy the inequality

$$-1 \leqslant n < 4$$

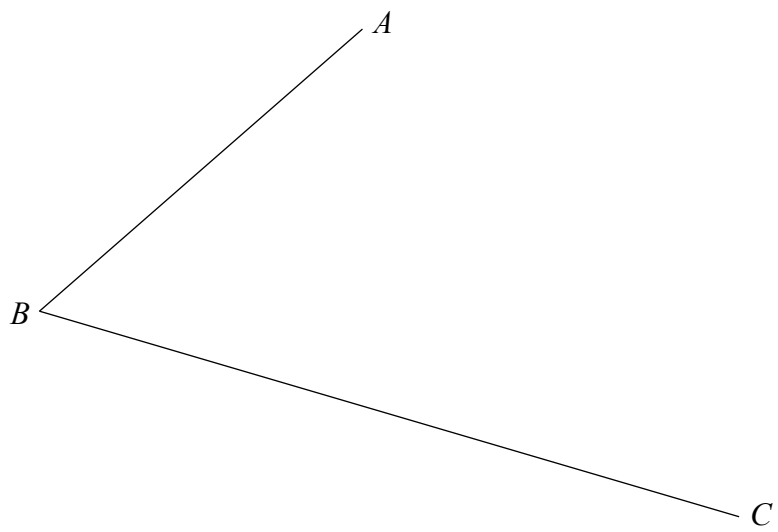
.....

(2)

Q8

(Total 4 marks)

9. Use ruler and compasses to construct the bisector of angle ABC.
You must show all construction lines.



Q9

(Total 2 marks)

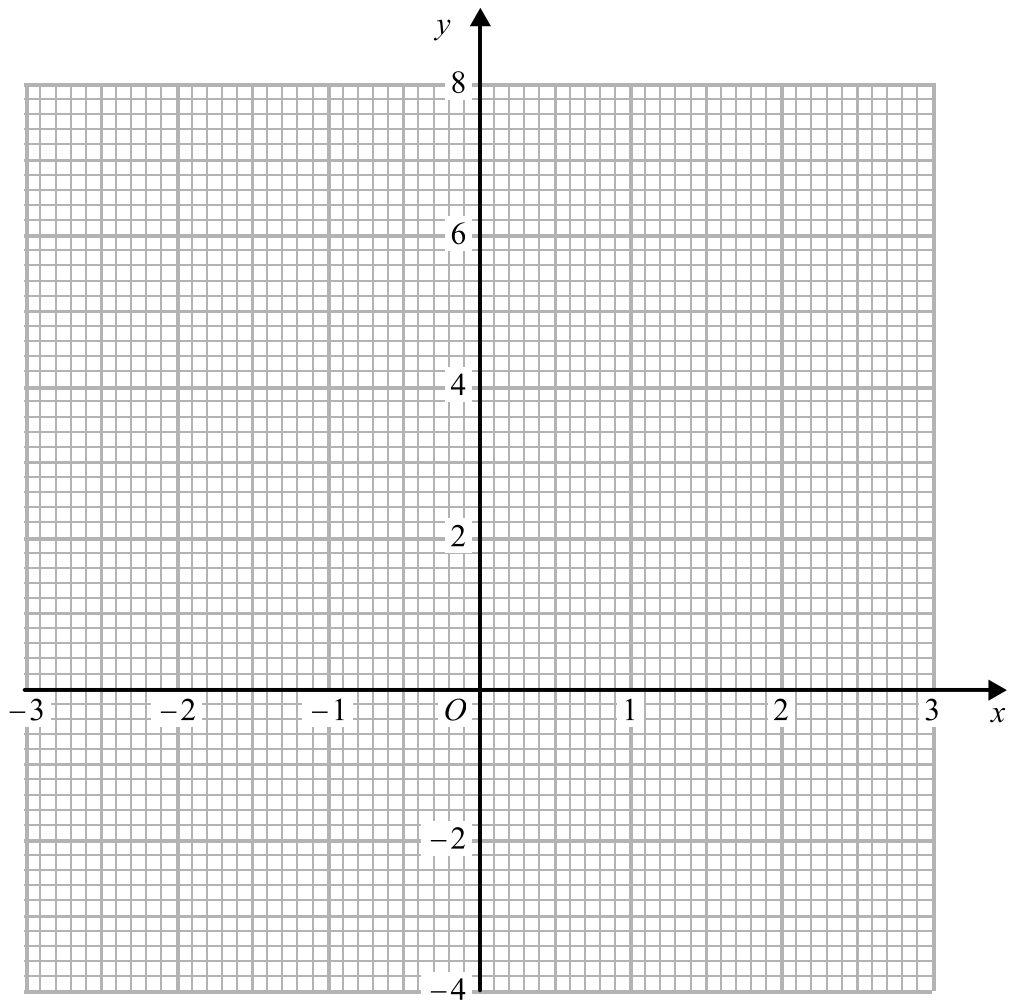
Leave blank

10. (a) Complete the table of values for $y = x^2 - 2$

x	−3	−2	−1	0	1	2	3
y			−1				

(2)

(b) On the grid, draw the graph of $y = x^2 - 2$



(2) **Q10**

(Total 4 marks)

Leave blank

11. 56% of the students in a school are girls.
There are 420 girl students in the school.

Work out the number of students in the school.

..... **Q11**

(Total 3 marks)

12.

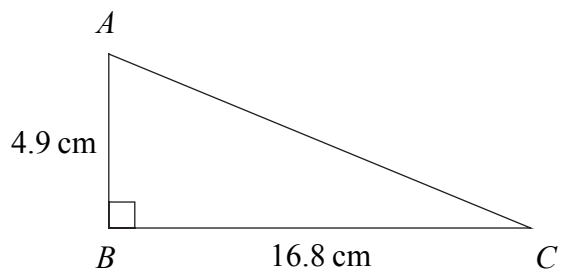


Diagram **NOT** accurately drawn

ABC is a triangle.
Angle *ABC* = 90°.
AB = 4.9 cm.
BC = 16.8 cm.

Calculate the length of *AC*.

..... cm **Q12**

(Total 3 marks)

N 2 9 1 0 7 A 0 9 2 0

Leave blank

13. The distance Jamila drove in 2006 was 14% more than the distance she drove in 2005
She drove 20 805 km in 2006
Calculate the distance she drove in 2005

..... km

(Total 3 marks)

Q13

14. (a) Simplify $2n \times 3n$

.....

(1)

(b) Simplify $\frac{3x^4y^5}{xy^3}$

.....

(2)

(c) Simplify $(t^3)^4$

.....

(1)

(d) Simplify $(2p^{-2})^{-3}$

.....

(2)

(Total 6 marks)

Q14

Leave blank

15.

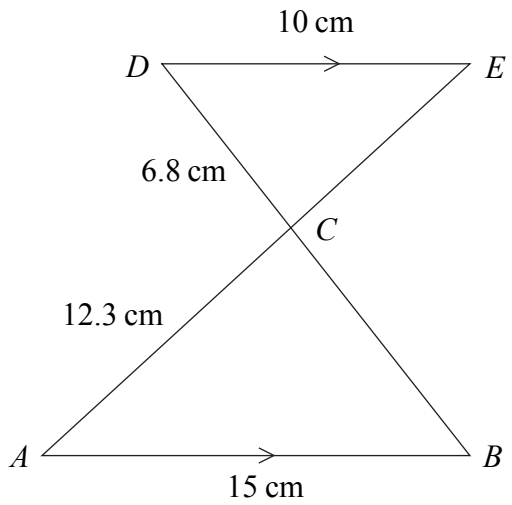


Diagram **NOT** accurately drawn

AB is parallel to *DE*.
The lines *AE* and *BD* intersect at the point *C*.
AB = 15 cm, *AC* = 12.3 cm, *CD* = 6.8 cm, *DE* = 10 cm.

(a) Work out the length of *BC*.

..... cm
(2)

(b) Work out the length of *CE*.

..... cm
(2)

(c) $\dfrac{\text{Area of triangle } ABC}{\text{Area of triangle } CDE} = k$

Work out the value of *k*.

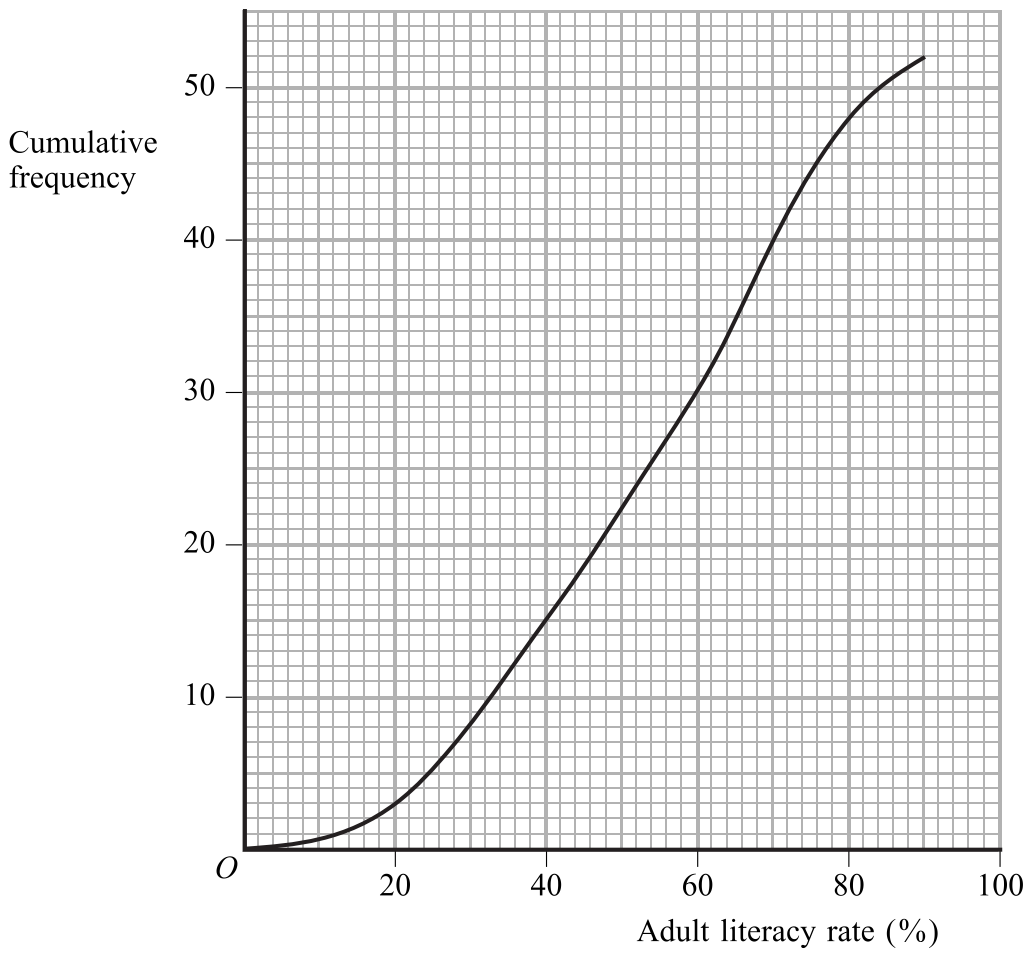
k = ...
(2)

Q15

(Total 6 marks)

Leave blank

16. The cumulative frequency graph gives information about the adult literacy rates of 52 countries in Africa. The adult literacy rates are expressed as percentages of the adults in the countries.



(a) Use the cumulative frequency graph to find an estimate for the number of these 52 countries which have an adult literacy rate of

(i) less than 40%,

.....

(ii) more than 75%.

.....

(2)

(b) Find an estimate for the median adult literacy rate for these 52 countries.

.....%

(2)

Q16

(Total 4 marks)

Leave blank

17. (a) Find the Highest Common Factor of 72 and 90

.....

(2)

(b) Find the Lowest Common Multiple of 72 and 90

.....

(2) **Q17**

(Total 4 marks)

18. (a) The equation of a line **L** is $x + 2y = 6$
Find the gradient of **L**.

.....

(3)

(b) Write down the equation of the line which is parallel to **L** and which passes through the point (0, 5).

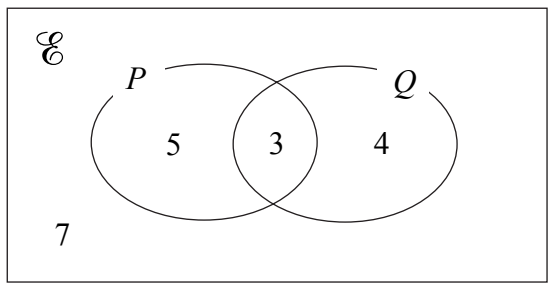
.....

(1) **Q18**

(Total 4 marks)

Leave blank

19.



The numbers are the **number** of elements in each part of the Venn Diagram.

(i) Find n(P)

.....

(ii) Find n(Q')

.....

(iii) Find n($P \cap Q \cap Q'$)

.....

(iv) Find n($P' \cup Q'$)

.....

(Total 4 marks)

Q19

20. A curve has equation $y = x^3 - 5x^2 + 8x - 7$

(a) Find the gradient of the curve at (2, –3).

.....

(4)

(b) What does your answer to part (a) tell you about the point (2, −3)?

.....

(1)

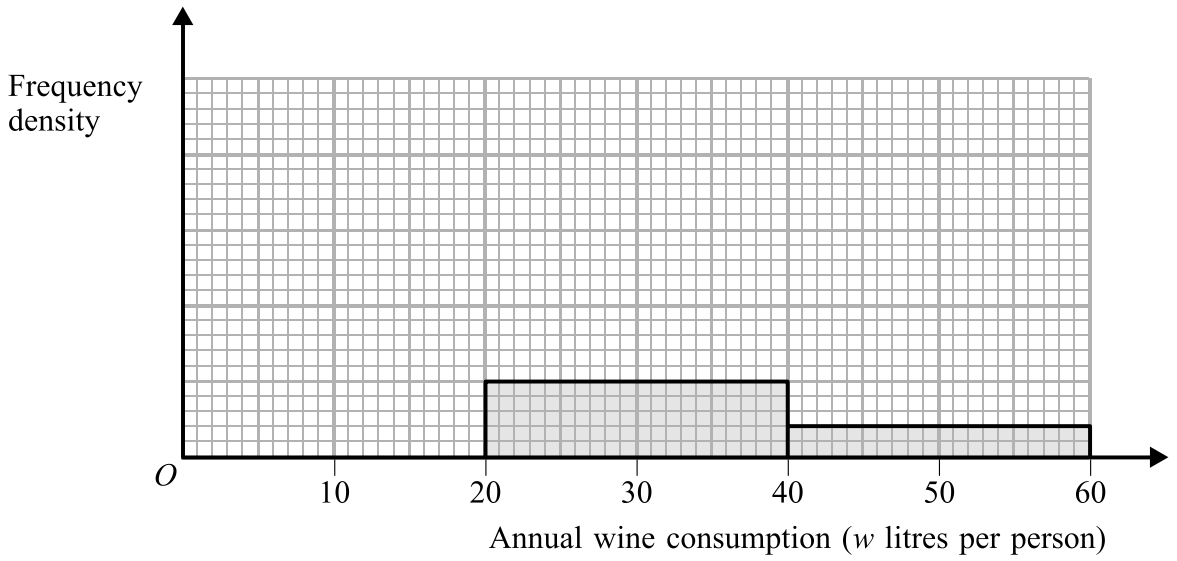
(Total 5 marks)

Q20

Leave blank

21. The unfinished table and histogram show information about the annual wine consumption, in litres per person, in some countries.

Annual wine consumption (w litres per person)	**Frequency**
$0 < w \leqslant 5$	21
$5 < w \leqslant 20$	18
$20 < w \leqslant 40$	20
$40 < w \leqslant 60$	



(a) Use the information in the table to complete the histogram.

(2)

(b) Use the information in the histogram to complete the table.

(1) **Q21**

(Total 3 marks)

Leave blank

22.

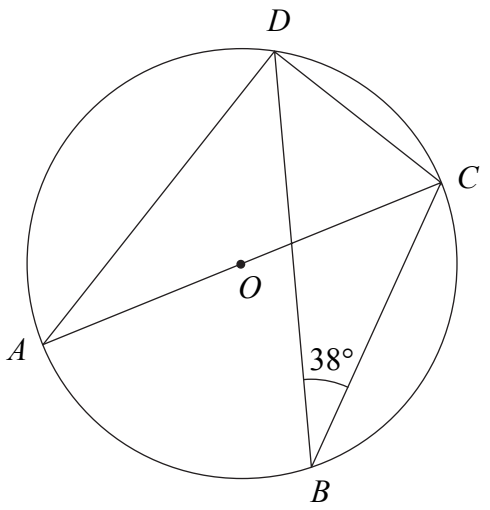


Diagram **NOT** accurately drawn

A, *B*, *C* and *D* are points on a circle, centre *O*.
AC is a diameter of the circle.
Angle *CBD* = 38°.

(a) (i) Find the size of angle *DAC*.

°

.....

(ii) Give a reason for your answer.

.....

.....

(2)

(b) Find the size of angle *ACD*.

°

.....

(2) **Q22**

(Total 4 marks)

Leave blank

23. $f : x \mapsto 3x + 2$ $g : x \mapsto 2x - 5$

(a) Express the composite function fg in the form $fg : x \mapsto ...$
Give your answer as simply as possible.

$fg : x \mapsto$ .....

(2)

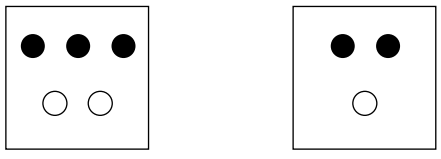
(b) Express the inverse function f^{-1} in the form $f^{-1} : x \mapsto \ldots$

$f^{-1} : x \mapsto$ .....

(2) **Q23**

(Total 4 marks)

24.



Box A Box B

In Box A, there are 3 black counters and 2 white counters.
In Box B, there are 2 black counters and 1 white counter.

Farah takes at random a counter from Box A and puts it in Box B.
She then takes at random a counter from Box B.

Work out the probability that the counter she takes from Box B will be a black counter.

..... **Q24**

(Total 3 marks)

Leave blank

25.

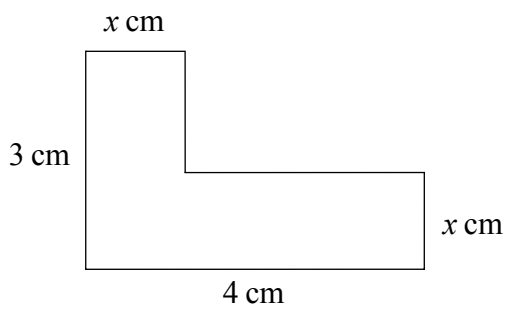


Diagram **NOT** accurately drawn

The diagram shows a shape.
All the corners are right angles.
The area of the shape is 11 cm^2.

(a) Show that $x^2 - 7x + 11 = 0$

(2)

N 2 9 1 0 7 A 0 1 8 2 0

Leave blank

(b) Solve $y^2 - 7y + 11 = 0$
Give your solutions correct to 3 significant figures.

.....

(3)

(c) (i) Use your answer to part (b) to find the value of x in the diagram.

.....

(ii) Give a reason for your answer to (i).

.....

.....

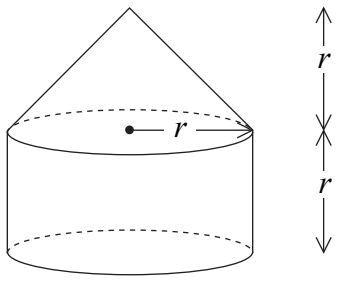
(2) **Q25**

(Total 7 marks)

PLEASE TURN OVER FOR QUESTION 26

Leave blank

26.



The diagram shows a solid made from a cone and a cylinder.
The cylinder has radius r and height r.
The cone has base radius r and height r.

(a) Show that the total volume of the solid is equal to the volume of a sphere of radius r.

(2)

The curved surface area of a cylinder with base radius r and height h is $2\pi rh$.
The curved surface area of a cone with base radius r and slant height l is πrl.

(b) Show that the **total** surface area of the above solid is greater than the surface area of a sphere of radius r.

(3) **Q26**

(Total 5 marks)

TOTAL FOR PAPER: 100 MARKS

END

Centre No.						Paper Reference							Surname	Initial(s)
Candidate No.						4	4	0	0	/	3	H	Signature	

Paper Reference(s)

4400/3H

Examiner's use only

Team Leader's use only

London Examinations IGCSE

Mathematics

Paper 3H

Higher Tier

Thursday 15 May 2008 – Morning

Time: 2 hours

NDO07095103

Materials required for examination
Ruler graduated in centimetres and millimetres, protractor, compasses, pen, HB pencil, eraser, calculator. Tracing paper may be used.

Items included with question papers
Nil

Instructions to Candidates

In the boxes above, write your centre number, candidate number, your surname, initials and signature.
Check that you have the correct question paper.
Answer ALL the questions. Write your answers in the spaces provided in this question paper.
You must NOT write on the formulae page. Anything you write on the formulae page will gain NO credit.
If you need more space to complete your answer to any question, use additional answer sheets.

Information for Candidates

The marks for individual questions and the parts of questions are shown in round brackets: e.g. **(2)**.
There are 22 questions in this question paper. The total mark for this paper is 100.
There are 24 pages in this question paper. Any blank pages are indicated.
You may use a calculator.

Advice to Candidates

Write your answers neatly and in good English.

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N 2 9 4 3 7 A 0 1 2 4

Turn over

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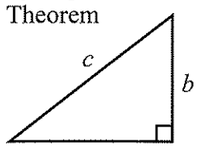
IGCSE MATHEMATICS 4400
FORMULA SHEET – HIGHER TIER

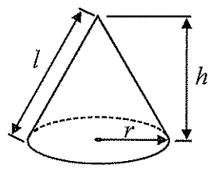
Pythagoras' Theorem



$a^2 + b^2 = c^2$

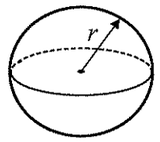
Volume of cone = $\frac{1}{3}\pi r^2 h$

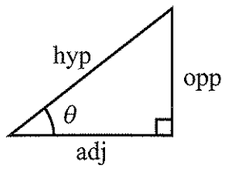
Curved surface area of cone = $\pi r l$



Volume of sphere = $\frac{4}{3}\pi r^3$

Surface area of sphere = $4\pi r^2$





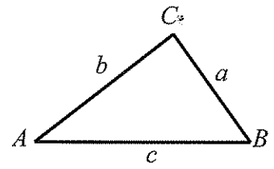
adj = hyp × cos θ
opp = hyp × sin θ
opp = adj × tan θ

or $\sin\theta = \frac{\text{opp}}{\text{hyp}}$

$\cos\theta = \frac{\text{adj}}{\text{hyp}}$

$\tan\theta = \frac{\text{opp}}{\text{adj}}$

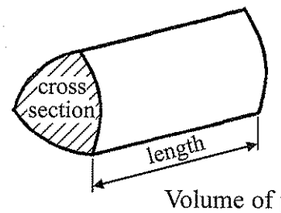
In any triangle ABC



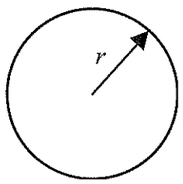
Sine rule: $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

Cosine rule: $a^2 = b^2 + c^2 - 2bc\cos A$

Area of triangle = $\frac{1}{2}ab\sin C$



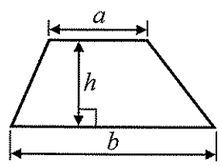
Volume of prism = area of cross section × length

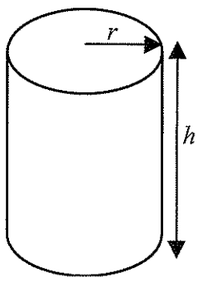


Circumference of circle = $2\pi r$

Area of circle = πr^2

Area of a trapezium = $\frac{1}{2}(a+b)h$





Volume of cylinder = $\pi r^2 h$

Curved surface area of cylinder = $2\pi rh$

The Quadratic Equation
The solutions of $ax^2 + bx + c = 0$, where $a \neq 0$, are given by

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

N 2 9 4 3 7 A 0 2 2 4

Answer ALL TWENTY TWO questions.

Write your answers in the spaces provided.

You must write down all stages in your working.

Without sufficient working, correct answers may be awarded no marks.

Leave blank

1. Find the value of $\frac{3.6\times4.8}{5.6-3.2}$

.....

(Total 2 marks)

Q1

2. A bag contains red discs, black discs and white discs.
The number of black discs is equal to the number of white discs.
Selina is going to take a disc at random from the bag.
The probability that she will take a red disc is 0.6

Work out the probability that she will take a black disc.

.....

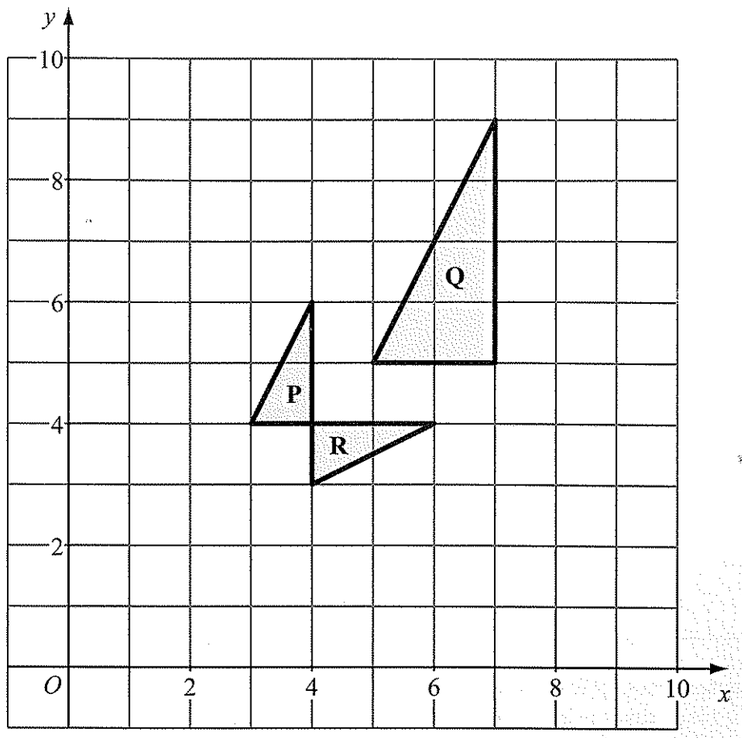
(Total 2 marks)

Q2

N 2 9 4 3 7 A 0 3 2 4

Leave blank

3.



(a) Describe fully the single transformation that maps triangle **P** onto triangle **Q**.

.....

(3)

(b) Describe fully the single transformation that maps triangle **P** onto triangle **R**.

.....

(2) **Q3**

(Total 5 marks)

N 2 9 4 3 7 A 0 4 2 4

Leave blank

4. Bronze is made from copper and tin.
The ratio of the weight of copper to the weight of tin is 3 : 1

Work out the weight of copper in 280 grams of bronze.

..... grams **Q4**

(Total 2 marks)

5. $\mathscr{E}$ = {odd numbers}
A = {1, 5, 9, 13, 17}
B = {1, 9, 17, 25, 33}
C = {7, 11, 15}

(a) List the members of the set

(i) $A \cap B$,

.....

(ii) $A \cup B$.

.....

(2)

(b) Explain why $A \cap C = \varnothing$

.....

.....

(1) **Q5**

(Total 3 marks)

N 2 9 4 3 7 A 0 5 2 4

Turn over

Leave blank

6.

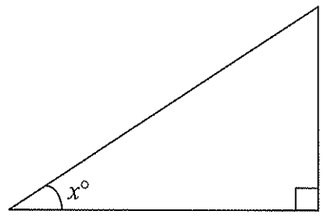


Diagram **NOT** accurately drawn

Work out the value of x.
Give your value correct to 1 decimal place.

$x =$ .....

Q6

(Total 3 marks)

7. The diameter of a circle is 7.8 cm.

Calculate the circumference of the circle.
Give your answer correct to 3 significant figures.

..... cm

Q7

(Total 2 marks)

N 2 9 4 3 7 A 0 6 2 4

Leave blank

8. Here are some patterns made from sticks.

Pattern number 1 | Pattern number 2 | Pattern number 3

This rule can be used to find the number of sticks in one of these patterns.

> Multiply the pattern number by 2 and then add 1

(a) n is the number of sticks in Pattern number p.
Write down a formula for n in terms of p.

.....

(3)

(b) Make p the subject of your formula.

$p =$ .....

(2)

Q8

(Total 5 marks)

N 2 9 4 3 7 A 0 7 2 4

Turn over

Leave blank

9. (a) Solve $7(x - 1) = 5 - 2x$
You must show sufficient working.

$x =$ .....

(3)

(b) (i) Solve the inequality $4x + 5 \leqslant 21$

.....

(ii) n is a positive integer.

Write down all the values of n which satisfy $4n + 5 \leqslant 21$

.....

(4)

(Total 7 marks)

Q9

N 2 9 4 3 7 A 0 8 2 4

Leave blank

10. Cara's salary was increased from \$28 250 to \$29 832

(a) Work out the percentage increase in Cara's salary.

..... %

(3)

Pedro's salary was increased by 5.2%.
After the increase, his salary was \$28 141

(b) Work out his salary before the increase.

\$ .....

(3)

(Total 6 marks)

Q10

N 2 9 4 3 7 A 0 9 2 4

Leave blank

11. The table shows information about the pulse rates of 60 people, when they were resting.

Pulse rate (p beats/min)	**Frequency**
$50 < p \leqslant 60$	7
$60 < p \leqslant 70$	21
$70 < p \leqslant 80$	15
$80 < p \leqslant 90$	14
$90 < p \leqslant 100$	3

(a) Write down the modal class.

.....

(1)

(b) Work out an estimate for the mean pulse rate of the 60 people.

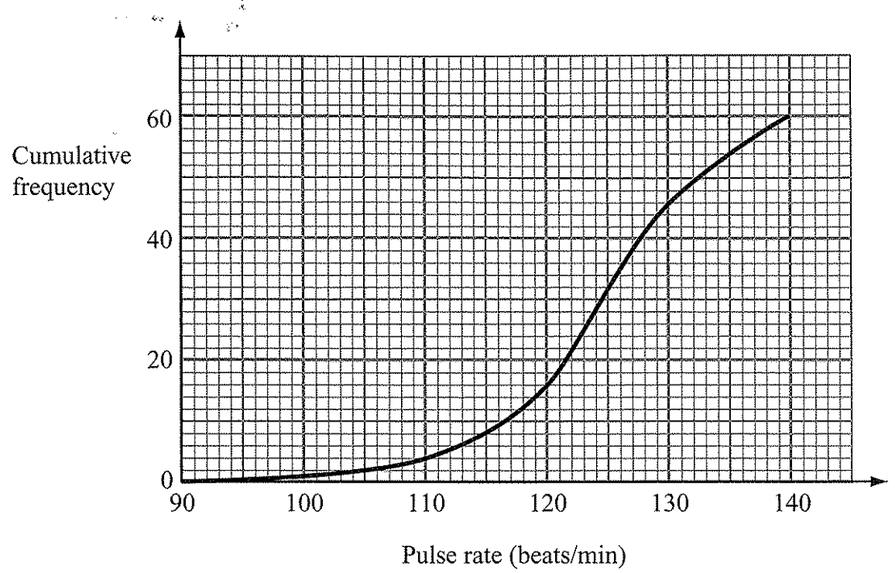
..... beats/min

(4)

N 2 9 4 3 7 A 0 1 0 2 4

Leave blank

The cumulative frequency graph gives information about the pulse rates of the same 60 people, after they have exercised for ten minutes.



(c) Use the graph to find an estimate for the median pulse rate of the 60 people.

..... beats/min

(2)

(d) Use the graph to find an estimate for the number of people with a pulse rate of more than 131 beats/min.

.....

(2)

(Total 9 marks)

Q11

N 2 9 4 3 7 A 0 1 1 2 4

Leave blank

12.

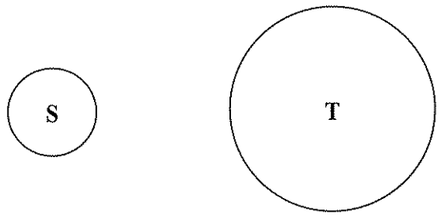


Diagram **NOT** accurately drawn

The area of circle **S** is 4 cm^2.
The radius of circle **T** is 3 times the radius of circle **S**.

Work out the area of circle **T**.

..... cm^2 **Q12**

(Total 2 marks)

N 2 9 4 3 7 A 0 1 2 2 4

Leave blank

13.

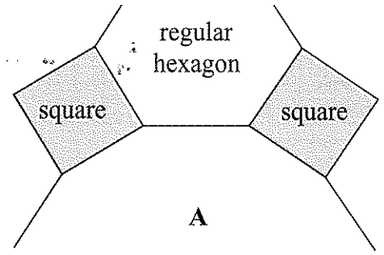


Diagram **NOT** accurately drawn

The diagram shows part of a tiling pattern.
The tiling pattern is made from three shapes.
Two of the shapes are squares and regular hexagons.
The third shape is a regular n-sided polygon **A**.

Work out the value of n.

n = ... **Q13**

(Total 5 marks)

N 2 9 4 3 7 A 0 1 3 2 4

Leave blank

14. (a) Factorise $10y - 15$

.....

(1)

(b) Factorise completely $9p^2q + 12pq^2$

.....

(2)

(c) (i) Factorise $x^2 + 6x - 16$

.....

(ii) Solve $x^2 + 6x - 16 = 0$

.....

(3) **Q14**

(Total 6 marks)

15. Mia's weight is 57 kg, correct to the nearest kilogram.

(a) Write down

(i) the upper bound of her weight,

..... kg

(ii) the lower bound of her weight.

..... kg

(2)

Alice's weight is 62 kg, correct to the nearest kilogram.

(b) Work out the upper bound for the difference between Alice's weight and Mia's weight.

..... kg

(2) **Q15**

(Total 4 marks)

Leave blank

16. Here are 9 cards.
Each card has a number on it.

20	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**

Lee takes a card at random.
He records the number which is on the card and replaces the card.
He then takes a second card at random and records the number which is on the card.

(a) Calculate the probability that he will take two even numbers.

.....

(2)

(b) Calculate the probability that he will take two numbers with a sum of 43

.....

(3) **Q16**

(Total 5 marks)

Leave blank

17. The distance, d kilometres, of the horizon from a person is directly proportional to the square root of the person's height, h metres, above sea level.
When $h = 225$, $d = 54$

(a) Find a formula for d in terms of h.

$d =$ .....
(3)

(b) Calculate the distance of the horizon from a person whose height above sea level is 64 metres.

..... kilometres
(1)

(c) Calculate the height above sea level of a person, when the distance of the horizon is 61.2 kilometres.

..... metres
(2)

(Total 6 marks)

Q17

Leave blank

18.

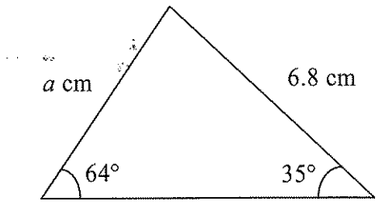


Diagram **NOT** accurately drawn

Calculate the value of a.
Give your value correct to 3 significant figures.

$a =$ .....
(Total 3 marks)

Q18

19. Show that $\frac{12}{\sqrt{8}} = 3\sqrt{2}$

(Total 2 marks)

Q19

Leave blank

20.

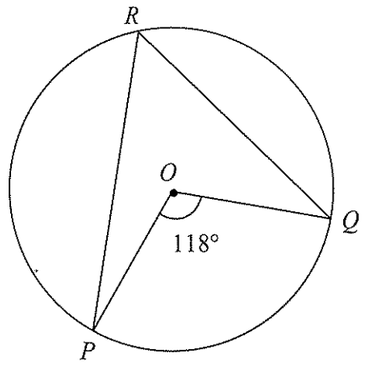


Diagram **NOT** accurately drawn

P, *Q* and *R* are points on a circle, centre *O*.

(a) (i) Find the size of angle *PRQ*.

.....°

(ii) Give a reason for your answer.

.....

.....

.....

(2)

N 2 9 4 3 7 A 0 1 8 2 4

Leave blank

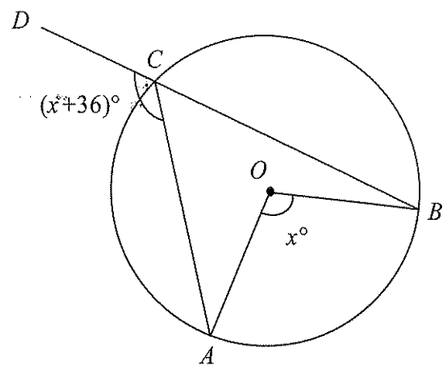


Diagram **NOT** accurately drawn

A, *B* and *C* are points on a circle, centre *O*.
BCD is a straight line.

(b) Find the value of *x*.

x = ...

(5)

Q20

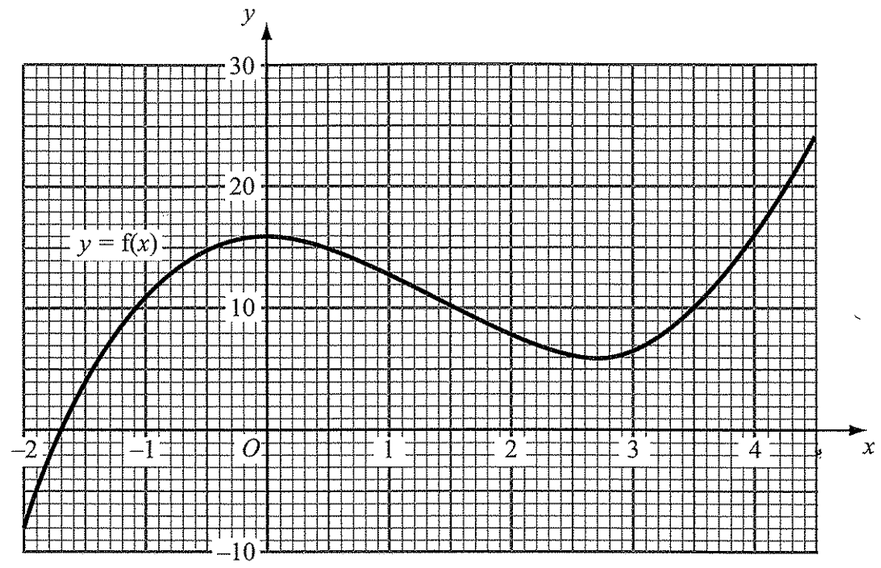
(Total 7 marks)

N 2 9 4 3 7 A 0 1 9 2 4

Turn over

Leave blank

21. The diagram shows part of the graph of $y = f(x)$.



(a) Calculate an estimate for the gradient of the curve at the point where $x = 3$

.....

(3)

Leave blank

(b) Find an estimate for the solution of the equation $f(x) = 0$

$x =$ .....

(1)

The equation $f(x) = mx + c$ where m and c are numbers, has three solutions.
Two of the solutions are $x = -1$ and $x = 1$

(c) (i) Find the value of c.

$c =$ .....

(ii) Find the third solution of the equation $f(x) = mx + c$.

$x =$ .....

$x =$ .....

(4)

(Total 8 marks)

Q21

Leave blank

22.

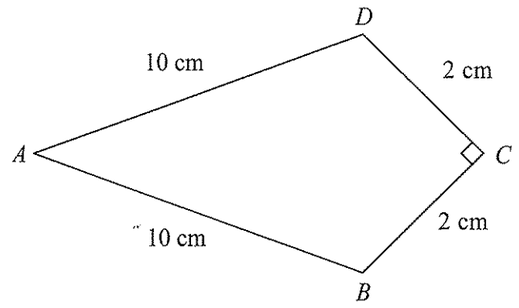


Diagram **NOT** accurately drawn

The diagram shows a kite $ABCD$.
$AB = AD = 10$ cm.
$CB = CD = 2$ cm.
Angle $BCD = 90°$.

Calculate the area of the kite.

..... cm^2 **Q22**

(Total 6 marks)

TOTAL FOR PAPER: 100 MARKS

END

N 2 9 4 3 7 A 0 2 2 2 4

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Centre No.						Paper Reference							Surname	Initial(s)
Candidate No.						4	4	0	0	/	3	H	Signature	

Paper Reference(s)

4400/3H

Examiner's use only

Team Leader's use only

London Examinations IGCSE

Mathematics

Paper 3H

Higher Tier

Thursday 6 November 2008 – Morning

Time: 2 hours

Materials required for examination
Ruler graduated in centimetres and millimetres, protractor, compasses, pen, HB pencil, eraser, calculator. Tracing paper may be used.

Items included with question papers
Nil

Instructions to Candidates

In the boxes above, write your centre number, candidate number, your surname, initials and signature.
Check that you have the correct question paper.
Answer ALL the questions. Write your answers in the spaces provided in this question paper.
Without sufficient working, correct answers may be awarded no marks.
You must NOT write on the formulae page. Anything you write on the formulae page will gain NO credit.
If you need more space to complete your answer to any question, use additional answer sheets.

Information for Candidates

The marks for individual questions and the parts of questions are shown in round brackets: e.g. **(2)**.
There are 20 questions in this question paper. The total mark for this paper is 100.
There are 20 pages in this question paper. Any blank pages are indicated.
You may use a calculator.

Advice to Candidates

Write your answers neatly and in good English.

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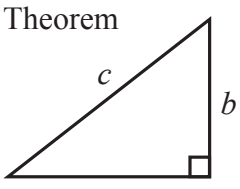
IGCSE MATHEMATICS 4400
FORMULA SHEET – HIGHER TIER

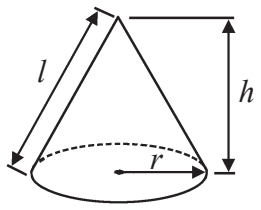
Pythagoras' Theorem



$a^2 + b^2 = c^2$

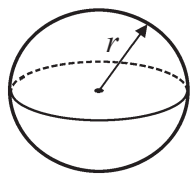
Volume of cone = $\frac{1}{3}\pi r^2 h$

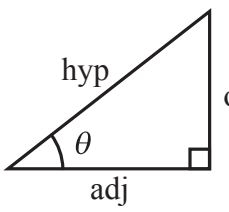
Curved surface area of cone = $\pi r l$



Volume of sphere = $\frac{4}{3}\pi r^3$

Surface area of sphere = $4\pi r^2$





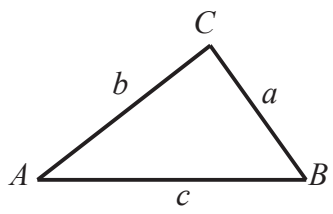
adj = hyp × cos θ
opp = hyp × sin θ
opp = adj × tan θ

or $\sin\theta = \frac{\text{opp}}{\text{hyp}}$

$\cos\theta = \frac{\text{adj}}{\text{hyp}}$

$\tan\theta = \frac{\text{opp}}{\text{adj}}$

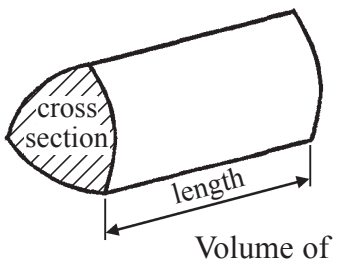
In any triangle ABC



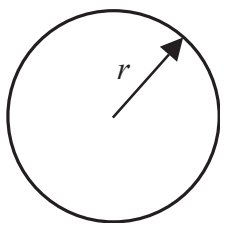
Sine rule: $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

Cosine rule: $a^2 = b^2 + c^2 - 2bc\cos A$

Area of triangle = $\frac{1}{2}ab\sin C$



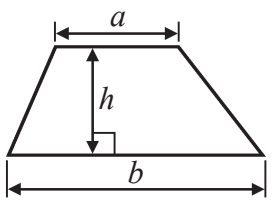
Volume of prism = area of cross section × length

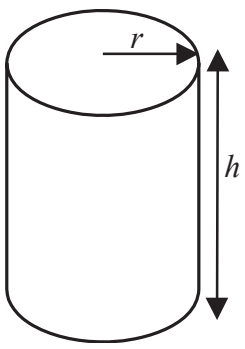


Circumference of circle = $2\pi r$

Area of circle = πr^2

Area of a trapezium = $\frac{1}{2}(a + b)h$





Volume of cylinder = $\pi r^2 h$

Curved surface area of cylinder = $2\pi r h$

The Quadratic Equation
The solutions of $ax^2 + bx + c = 0$, where $a \neq 0$, are given by

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

N 3 1 4 9 1 A 0 2 2 0

Leave blank

Answer ALL TWENTY questions.

Write your answers in the spaces provided.

You must write down all stages in your working.

1. Find the value of $\dfrac{7.9+3.8}{8.6-2.1}$

.....

(Total 2 marks)

Q1

2. (a) Factorise $7p - 21$

.....

(1)

(b) Solve $4(x + 5) = 12$
You must show sufficient working.

$x =$ .....

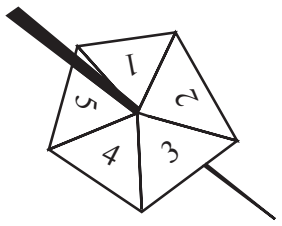
(3)

(Total 4 marks)

Q2

Leave blank

3. Jamila spins this 5-sided spinner 50 times.
The table shows information about her scores.



Score	Frequency
1	10
2	9
3	3
4	17
5	11

(a) Work out the mean score.

.....

(3)

(b) Jamila is going to spin the spinner once more.
Find an estimate of the probability that her score will be

(i) 4

.....

(ii) 1 or 3

.....

(3)

(c) Is the spinner fair?

Tick (✓) the appropriate box.

Yes	No
☐	☐

Give a reason for your answer.

.....

.....

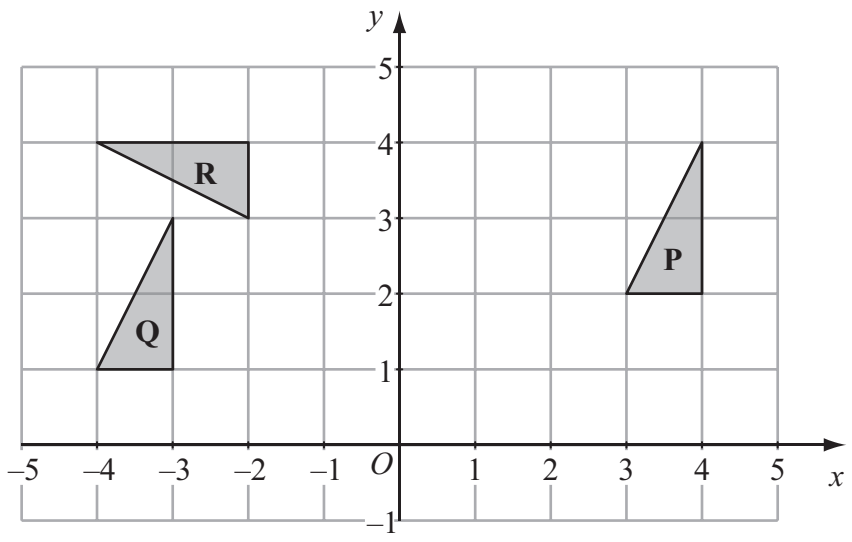
(1)

Q3

(Total 7 marks)

Leave blank

4.



(a) Describe fully the single transformation which maps triangle **P** onto triangle **Q**.

.....

.....

(2)

(b) Describe fully the single transformation which maps triangle **P** onto triangle **R**.

.....

.....

(3)

(Total 5 marks)

Q4

Leave blank

5. In a sale, normal prices were reduced by 35%.

(a) The normal price of a camera was £180
Work out the sale price of the camera.

£ .....
(3)

(b) The normal price of a clock was reduced by £84
Work out the normal price of the clock.

£ .....
(3)

(c) The sale price of a computer was £442
Work out the normal price of the computer.

£ .....
(3)

Q5

(Total 9 marks)

Leave blank

6.

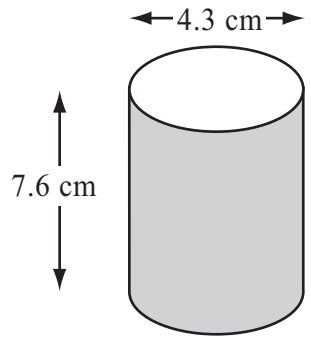


Diagram **NOT** accurately drawn

A solid cylinder has a diameter of 4.3 cm and a height of 7.6 cm.

Work out the volume of the cylinder.
Give your answer correct to 3 significant figures.

..... cm^3

Q6

(Total 3 marks)

7. Show that $\frac{2}{5} \div \frac{4}{7} = \frac{7}{10}$

Q7

(Total 3 marks)

Leave blank

8. (a) Simplify

(i) $p^5 \times p$

.....

(ii) $\dfrac{q^8}{q^3}$

.....

(2)

(b) Expand and simplify $3(4x - 1) - 4(2x - 3)$

.....

(2)

(c) Expand and simplify $(y + 3)(y + 5)$

.....

(2) **Q8**

(Total 6 marks)

Leave blank

9.

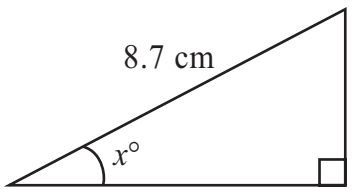


Diagram **NOT** accurately drawn

Work out the value of x.
Give your answer correct to 1 decimal place.

x = ...

(Total 3 marks)

Q9

10. The point A has coordinates (5, 13) and the point B has coordinates (–1, 1).

(a) Work out the coordinates of the midpoint of AB.

(..... , ...)

(2)

The point C has coordinates (0, 7).
The line **L** passes through C and is parallel to the line AB.

(b) Find an equation of the line **L**.

.....

(4)

(Total 6 marks)

Q10

Leave blank

11. The grouped frequency table gives information about life expectancy in the 54 countries of the Commonwealth.

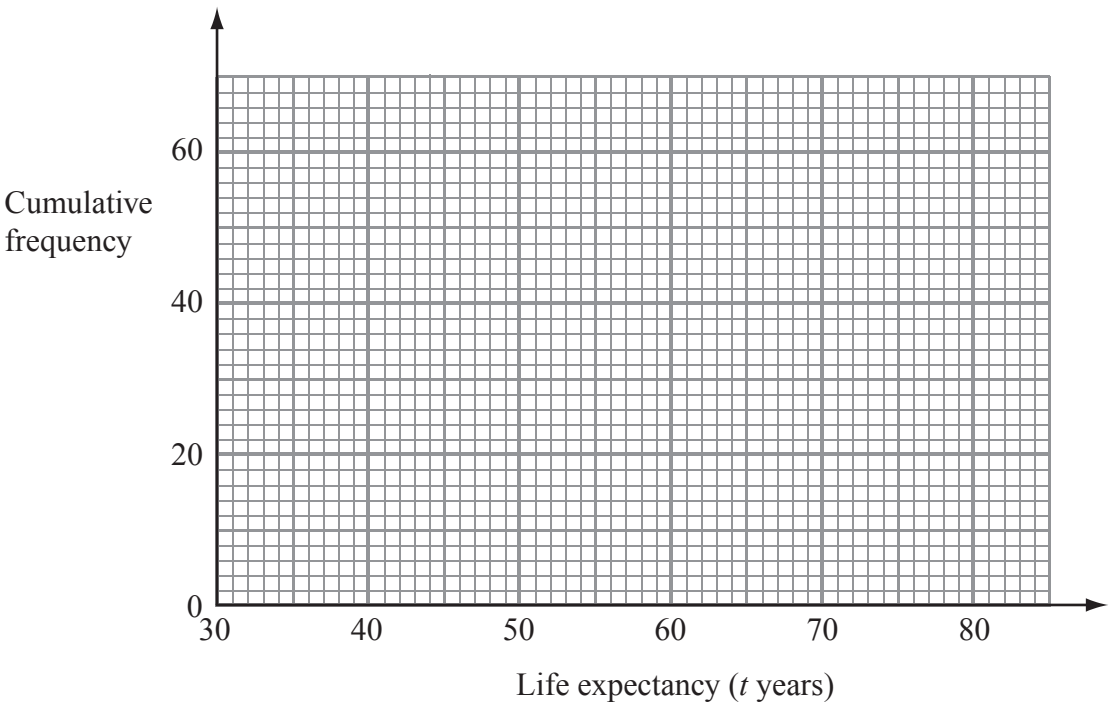
Life expectancy (t years)	**Frequency**
$30 < t \leqslant 40$	4
$40 < t \leqslant 50$	6
$50 < t \leqslant 60$	9
$60 < t \leqslant 70$	14
$70 < t \leqslant 80$	21

(a) Complete the cumulative frequency table.

Life expectancy (t years)	**Cumulative frequency**
$30 < t \leqslant 40$	
$30 < t \leqslant 50$	
$30 < t \leqslant 60$	
$30 < t \leqslant 70$	
$30 < t \leqslant 80$	

(1)

(b) On the grid, draw the cumulative frequency graph for your table.



(2)

Leave blank

(c) Use your graph to find an estimate for the median of the life expectancies in Commonwealth countries.

..... years
(2)

(Total 5 marks)

Q11

12.

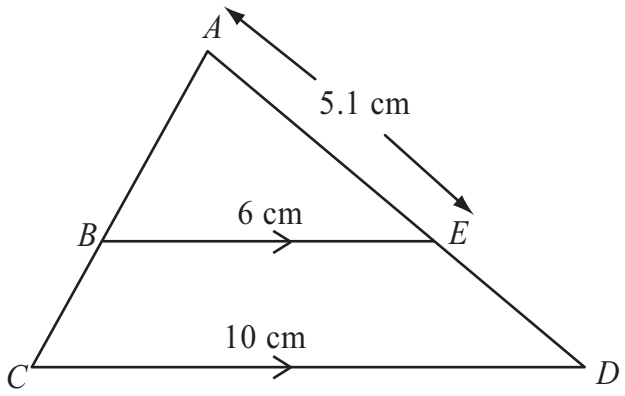


Diagram **NOT** accurately drawn

ABC and *AED* are two straight lines.
BE is parallel to *CD*.
AE = 5.1 cm, *BE* = 6 cm, *CD* = 10 cm.

(a) Calculate the length of *DE*.

..... cm
(3)

(b) Calculate the value of $\dfrac{\text{Area of triangle } ABE}{\text{Area of trapezium } BCDE}$

.....
(3)

(Total 6 marks)

Q12

N 3 1 4 9 1 A 0 1 1 2 0

Turn over

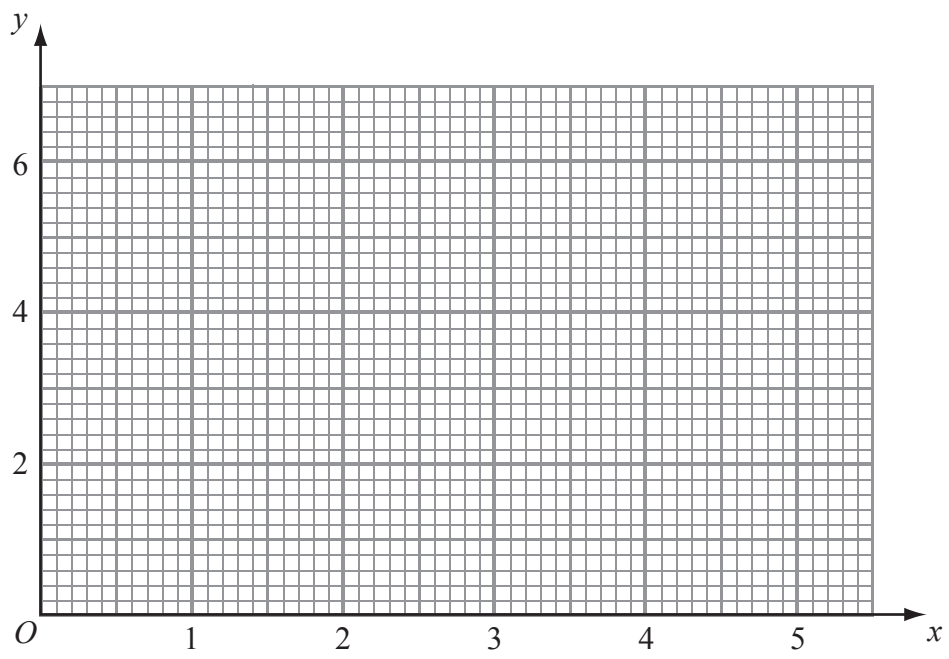
Leave blank

13. (a) Complete the table of values for $y = x + \frac{1}{x^2}$

x	0.5	1	1.5	2	3	4	5
y		2		2.3			5.0

(2)

(b) On the grid, draw the graph of $y = x + \frac{1}{x^2}$ for $0.5 \leqslant x \leqslant 5$



(2)

Leave blank

(c) $x = 1$ is a solution of the equation $x + \frac{1}{x^2} = k$ where k is a number.

(i) Find the value of k.

$k =$ .....

(ii) Use your graph to find an estimate for another solution of the equation

$$x + \frac{1}{x^2} = k$$

Give your estimate correct to 1 decimal place.

$x =$ .....

(2)

Q13

(Total 6 marks)

14. (a) Factorise completely $9ab - 12b^2$

.....

(2)

(b) Simplify $(2ab^2)^3$

.....

(2)

Q14

(Total 4 marks)

Leave blank

15. There are 9 counters in a bag.
7 of the counters are red and 2 of the counters are white.

Ajit takes at random two counters from the bag without replacement.

(a) Calculate the probability that the two counters are red.

.....

(2)

(b) Calculate the probability that the two counters have different colours.

.....

.....

(3)

Q15

(Total 5 marks)

Leave blank

16.

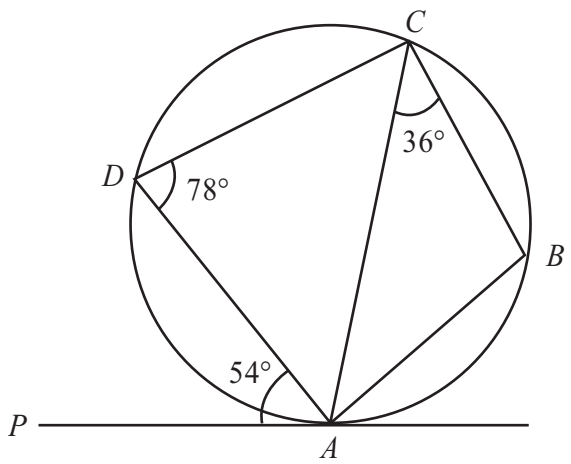


Diagram **NOT** accurately drawn

A, B, C and D are points on a circle.
PA is the tangent to the circle at A.
Angle $PAD = 54°$, angle $ACB = 36°$ and angle $ADC = 78°$.

(a) (i) Find the size of angle ACD.

..... °

(ii) Give a reason for your answer.

.....

.....

(2)

(b) Explain why BD is a diameter of the circle.

.....

.....

(2)

(c) (i) Work out the size of angle ABC.

..... °

(ii) Give a reason for your answer.

.....

.....

(2)

Q16

(Total 6 marks)

Leave blank

17. (a) Convert the recurring decimal $0.\dot{7}$ to a fraction.

.....

(2)

$0.0\dot{y}$ is a recurring decimal.
y is a whole number such that $1 \leqslant y \leqslant 9$

(b) (i) Write the recurring decimal $0.0\dot{y}$ as a fraction.

.....

(ii) $0.1\dot{y}$ is also a recurring decimal.
Using your answer to part (i), or otherwise, convert the recurring decimal $0.1\dot{y}$ to a fraction.
Give your answer as simply as possible.

.....

(3)

Q17

(Total 5 marks)

Leave blank

18. Simplify fully $\dfrac{2}{x+2}+\dfrac{x}{x^2+5x+6}$

.....

(Total 5 marks)

Q18

Leave blank

19.

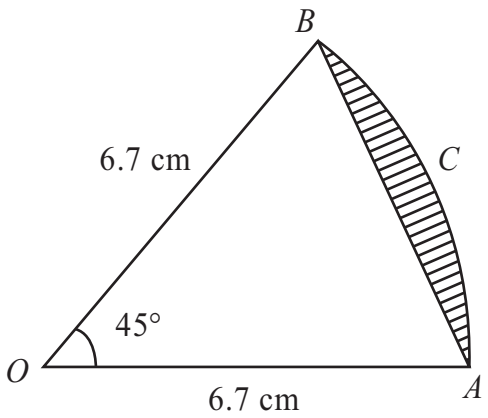


Diagram **NOT** accurately drawn

AB is a chord of a circle, centre *O*.
ACB is an arc of the circle.
OA = *OB* = 6.7 cm.
Angle *AOB* = 45°.

Calculate the area of the shaded segment.
Give your answer correct to 3 significant figures.

..... cm^2

(Total 5 marks)

Q19

Leave blank

20.

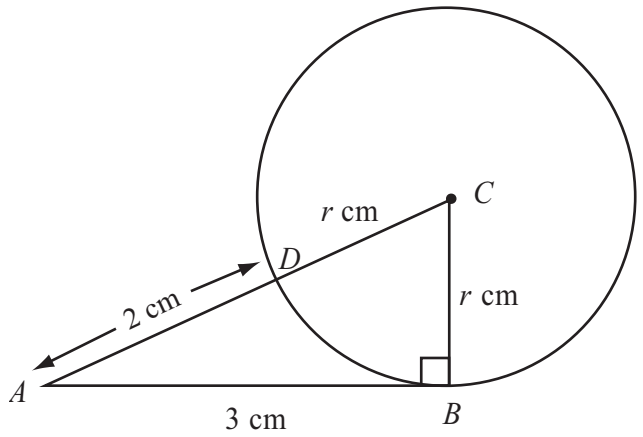


Diagram **NOT** accurately drawn

B and *D* are points on a circle, centre *C*.
AB is the tangent to the circle at *B*.
ADC is a straight line.
AB = 3 cm.
AD = 2 cm.

The radius of the circle is *r* cm.
Find the value of *r*.

r = ...

Q20

(Total 5 marks)

TOTAL FOR PAPER: 100 MARKS

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Centre No.						Paper Reference							Surname	Initial(s)
Candidate No.						4	4	0	0	/	3	H	Signature	

Paper Reference(s)

4400/3H

Examiner's use only

Team Leader's use only

London Examinations IGCSE

Mathematics

Paper 3H

Higher Tier

Monday 18 May 2009 – Afternoon

Time: 2 hours

Materials required for examination
Ruler graduated in centimetres and millimetres, protractor, compasses, pen, HB pencil, eraser, calculator. Tracing paper may be used.

Items included with question papers
Nil

Instructions to Candidates

In the boxes above, write your centre number, candidate number, your surname, initials and signature.
Check that you have the correct question paper.
Answer ALL the questions. Write your answers in the spaces provided in this question paper.
Without sufficient working, correct answers may be awarded no marks.
You must NOT write on the formulae page. Anything you write on the formulae page will gain NO credit.
If you need more space to complete your answer to any question, use additional answer sheets.

Information for Candidates

The marks for individual questions and the parts of questions are shown in round brackets: e.g. **(2)**.
There are 21 questions in this question paper. The total mark for this paper is 100.
There are 24 pages in this question paper. Any blank pages are indicated.
You may use a calculator.

Advice to Candidates

Write your answers neatly and in good English.

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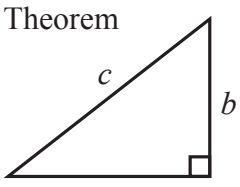
IGCSE MATHEMATICS 4400
FORMULA SHEET – HIGHER TIER

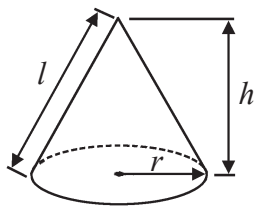
Pythagoras' Theorem



$a^2 + b^2 = c^2$

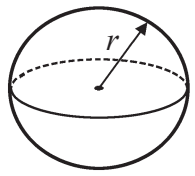
Volume of cone = $\frac{1}{3}\pi r^2 h$

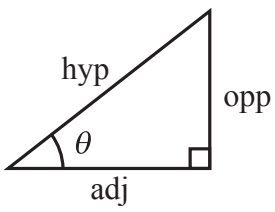
Curved surface area of cone = $\pi r l$



Volume of sphere = $\frac{4}{3}\pi r^3$

Surface area of sphere = $4\pi r^2$





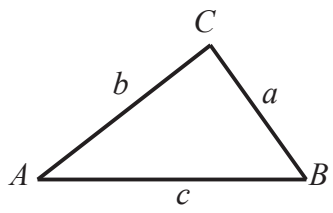
adj = hyp × cos θ
opp = hyp × sin θ
opp = adj × tan θ

or $\sin\theta = \frac{\text{opp}}{\text{hyp}}$

$\cos\theta = \frac{\text{adj}}{\text{hyp}}$

$\tan\theta = \frac{\text{opp}}{\text{adj}}$

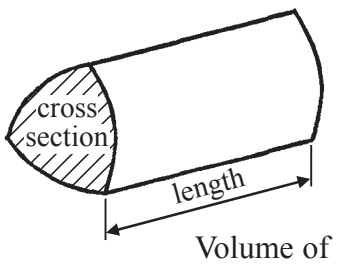
In any triangle ABC



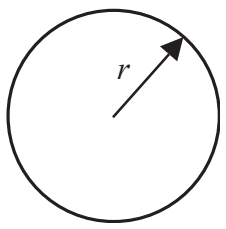
Sine rule: $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

Cosine rule: $a^2 = b^2 + c^2 - 2bc\cos A$

Area of triangle = $\frac{1}{2}ab\sin C$



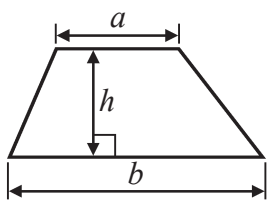
Volume of prism = area of cross section × length

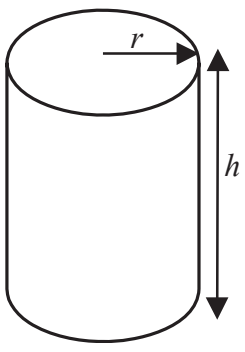


Circumference of circle = $2\pi r$

Area of circle = πr^2

Area of a trapezium = $\frac{1}{2}(a + b)h$





Volume of cylinder = $\pi r^2 h$

Curved surface area of cylinder = $2\pi r h$

The Quadratic Equation
The solutions of $ax^2 + bx + c = 0$, where $a \neq 0$, are given by

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

N 3 4 0 2 2 A 0 2 2 4

Leave blank

Answer ALL TWENTY ONE questions.

Write your answers in the spaces provided.

You must write down all stages in your working.

1. Last year in Mathstown High School, the ratio of the number of candidates for IGCSE mathematics to the number of candidates for IGCSE biology was 5 : 2
The number of candidates for IGCSE mathematics was 80

(a) Work out the number of candidates for IGCSE biology.

.....
(2)

The 80 mathematics candidates were divided between Foundation and Higher in the ratio 1 : 3

(b) Work out the number of Foundation candidates.

.....
(2) **Q1**

(Total 4 marks)

2. Omar travelled from Nairobi to Mombasa by train.
The journey took 13 hours 15 minutes.
The average speed was 40 km/h.

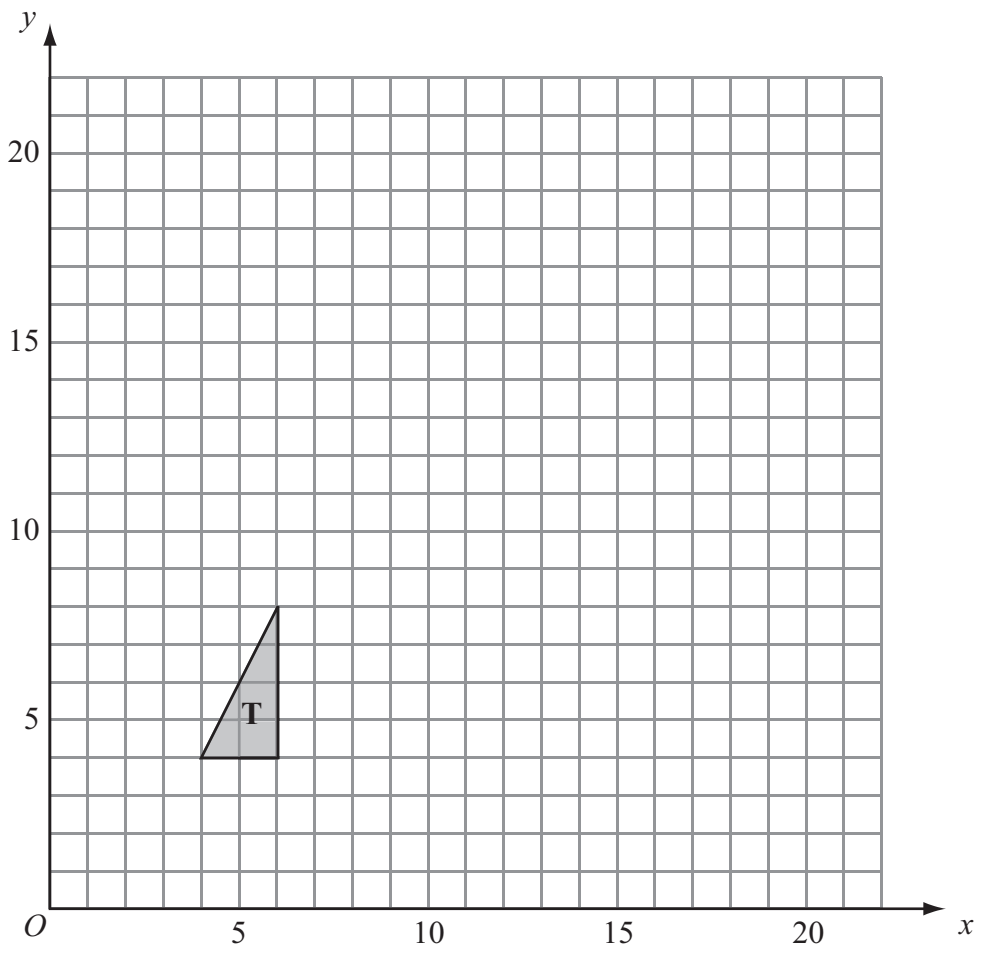
Work out the distance from Nairobi to Mombasa.

..... km **Q2**

(Total 3 marks)

Leave blank

3.



On the grid, enlarge triangle **T** with a scale factor of $2\frac{1}{2}$ and centre (0, 0).

Q3

(Total 3 marks)

4. A bag contains 10 coloured beads.
Ella is going to take at random a bead from the bag.
She says, "The probability that I will take a red bead is 0.35"

Explain why Ella is wrong.
You must show working to justify your answer.

.....

.....

.....

Q4

(Total 2 marks)

N 3 4 0 2 2 A 0 4 2 4

Leave blank

5. (a) Factorise $p^2 + 7p$

.....
(2)

(b) Solve $4 - 5x = 2$

$x =$ .....
(3)

(c) Simplify $t^3 \times t^6$

.....
(1)

(d) Expand and simplify $3(4y + 5) - 5(2y + 3)$

.....
(2) **Q5**

(Total 8 marks)

N 3 4 0 2 2 A 0 5 2 4

Leave blank

6. Brett's weekly pay is $760
He spends $266 on rent.

(a) Express $266 as a percentage of $760

..... %
(2)

Kazia spends $204 a week on rent.
$204 is 30% of her weekly pay.

(b) Work out her weekly pay.

$ .....
(2) **Q6**

(Total 4 marks)

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7.

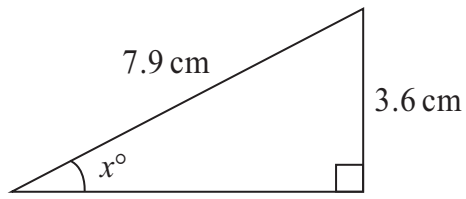


Diagram **NOT** accurately drawn

Work out the value of x.
Give your answer correct to 1 decimal place.

x = ...

(Total 3 marks)

Q7

N 3 4 0 2 2 A 0 7 2 4

Turn over

Leave blank

8. $\mathscr{E}$ = {positive whole numbers}
A = {factors of 27}
B = {factors of 9}
C = {first four even numbers}

(a) List the members of $A \cup B$.

.....

(2)

(b) (i) Is it true that $A \cap C = \emptyset$?

Tick (✓) the appropriate box.

Yes	No
☐	☐

(ii) Explain your answer.

.....

.....

(1)

(c) Complete the Venn Diagram to show the relationship between the sets A, B and C.

(2) **Q8**

(Total 5 marks)

N 3 4 0 2 2 A 0 8 2 4

Leave blank

9.

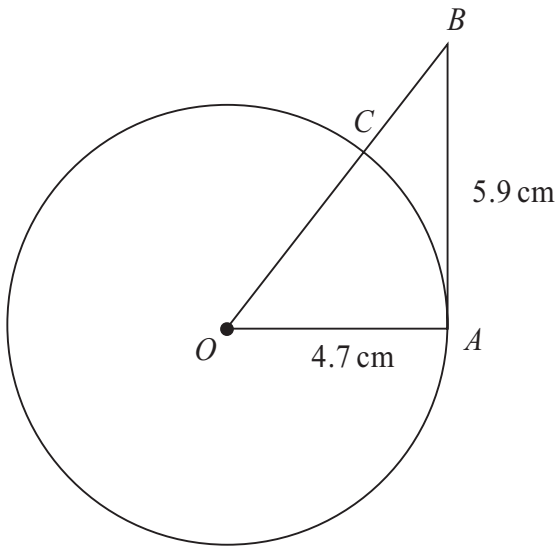


Diagram **NOT** accurately drawn

A is a point on a circle with centre *O* and radius 4.7 cm.
AB is the tangent to the circle at *A*.
AB = 5.9 cm.
OB intersects the circle at *C*.

Calculate the length of *BC*.
Give your answer correct to 3 significant figures.

..... cm

(Total 4 marks)

Q9

Turn over

Leave blank

10. The table shows information about the distances walked in a week by 40 people.

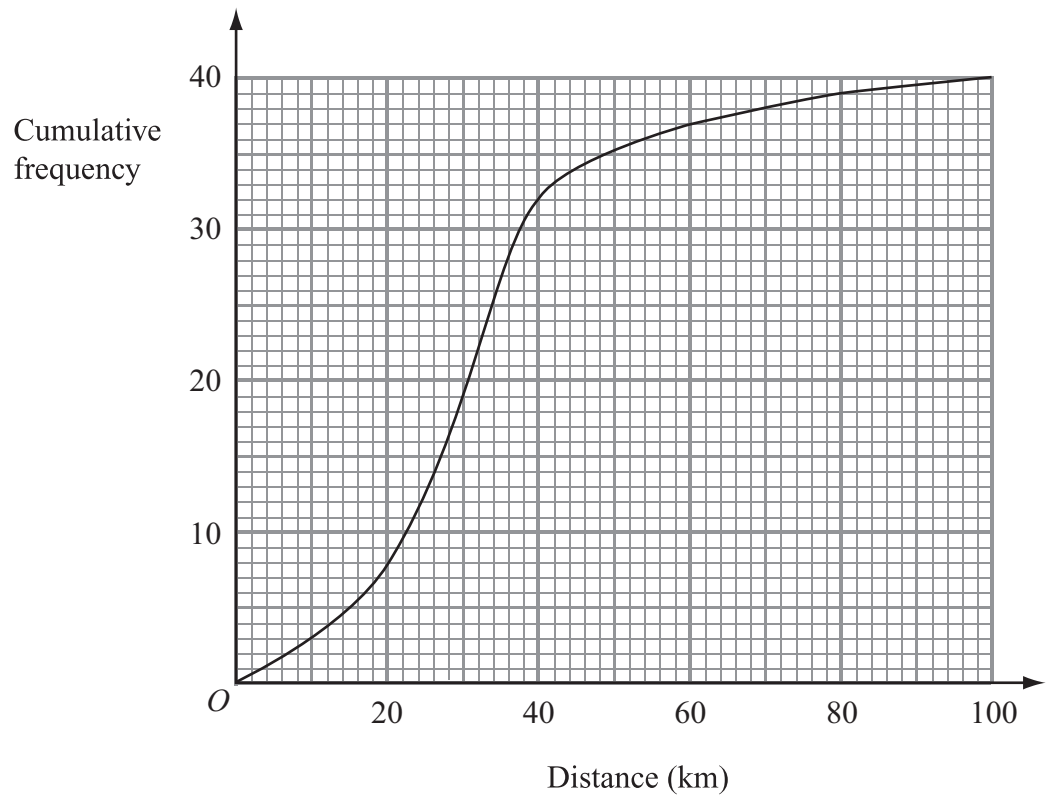
Distance (d km)	**Frequency**
$0 < d \leqslant 20$	8
$20 < d \leqslant 40$	24
$40 < d \leqslant 60$	5
$60 < d \leqslant 80$	2
$80 < d \leqslant 100$	1

(a) Work out an estimate for the mean distance walked in a week by the 40 people.

..... km
(4)

Leave blank

The information in the table was used to draw the cumulative frequency graph.



(b) Find an estimate for the number of people who walked less than 25 km.

.....

(2)

(c) Find an estimate for the interquartile range of the distances walked by the 40 people.

..... km

(2)

Q10

(Total 8 marks)

Leave blank

11. (a) Solve the simultaneous equations

$$2x - 3y = 9$$
$$5x + 4y = 11$$

$x =$ .....

$y =$ .....

(4)

(b) Write down the coordinates of the point of intersection of the two lines whose equations are $2x - 3y = 9$ and $5x + 4y = 11$

(..... , ...)

(1)

Q11

(Total 5 marks)

N 3 4 0 2 2 A 0 1 2 2 4

Leave blank

12. 1 astronomical unit = 150 million kilometres.

(a) Write the number 150 million in standard form.

.....
(2)

The distance from Venus to the Sun is 108 million kilometres.

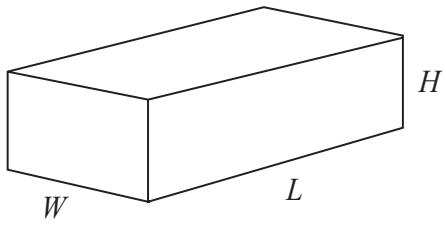
(b) Express 108 million kilometres in astronomical units.
Give your answer in standard form.

..... astronomical units
(2) **Q12**

(Total 4 marks)

Leave blank

13. Here is a cuboid with length L, width W and height H.



The total surface area, A, of the cuboid is given by the formula

$$A = 2(LW + HW + HL)$$

(a) $A = 70$ $W = 4$ $H = 2$
Work out the value of L.

$L =$ .....
(3)

(b) Make W the subject of the formula $A = 2(LW + WH + HL)$

$W =$ .....
(4)

Q13

(Total 7 marks)

Leave blank

14.

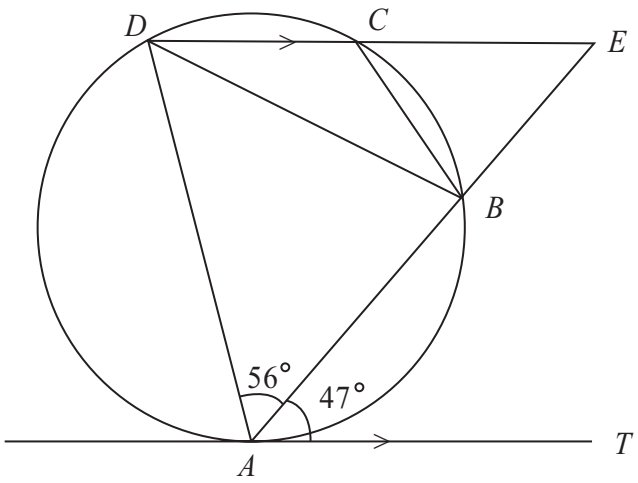


Diagram **NOT** accurately drawn

A, B, C and D are points on a circle.
ABE and DCE are straight lines.
AT is a tangent to the circle.
DCE is parallel to AT.
Angle $EAT = 47°$. Angle $BAD = 56°$.

(a) (i) Find the size of angle AED.

.....
°

(ii) Give a reason for your answer.

.....

(2)

(b) Find the size of angle BCD.

.....
°

(1)

(c) (i) Find the size of angle ADB.

.....
°

(ii) Give a reason for your answer.

.....

.....

.....

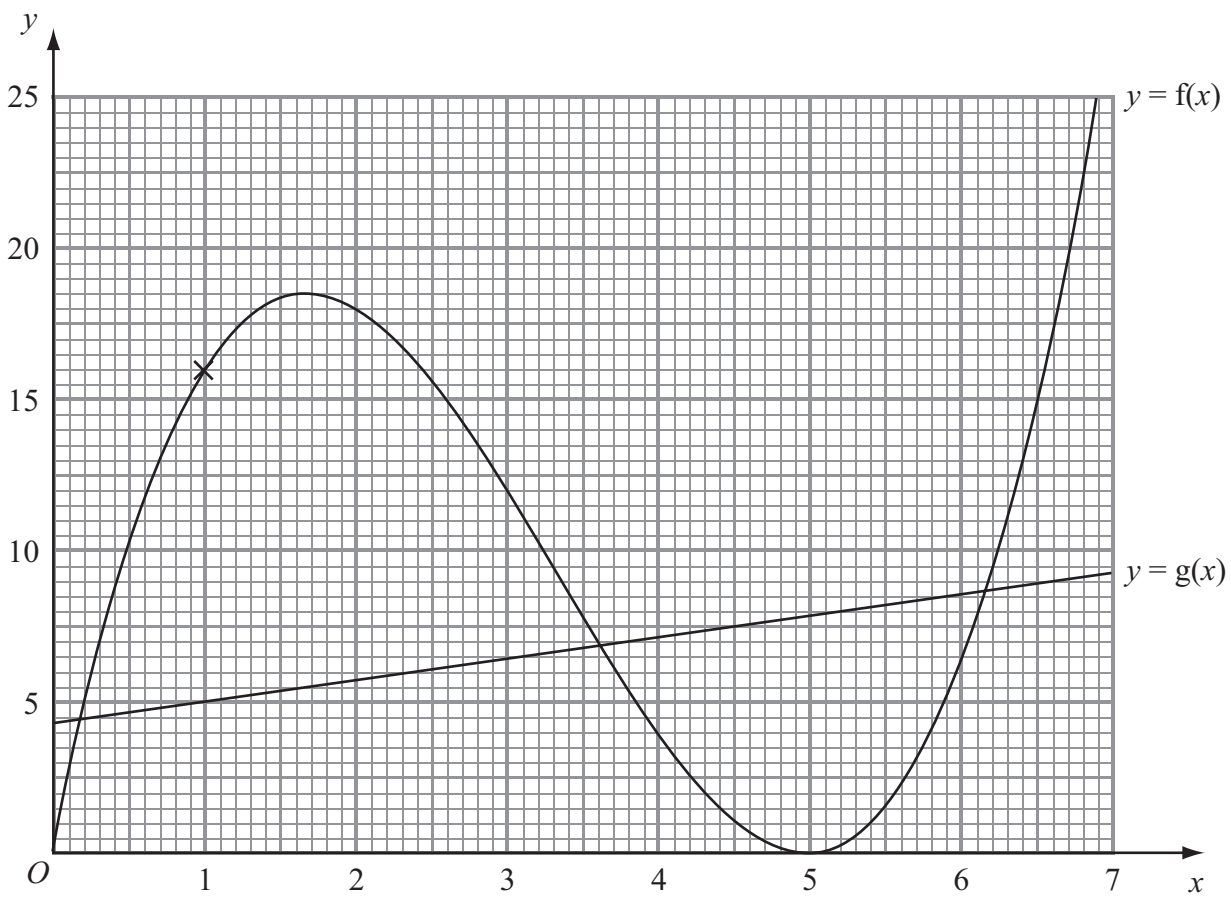
(2) **Q14**

(Total 5 marks)

N 3 4 0 2 2 A 0 1 5 2 4

Leave blank

15. The diagram shows part of the graph of $y = f(x)$ and part of the graph of $y = g(x)$.



(a) Find f(3).

.....

(1)

(b) Solve $f(x) = g(x)$.
Give your answers correct to 1 decimal place.

.....

(2)

(c) Find fg(1).

.....

(2)

N 3 4 0 2 2 A 0 1 6 2 4

Leave blank

(d) Find an estimate for the gradient of the graph of $y = f(x)$ at the point (1, 16).

.....

(3)

Q15

(Total 8 marks)

16.

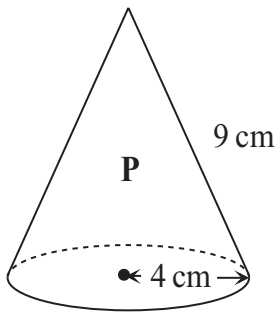


Diagram **NOT** accurately drawn

A solid cone, **P**, has a base radius of 4 cm and a slant height of 9 cm.

(a) Calculate the total surface area of the cone.
Give your answer correct to 3 significant figures.

..... cm^2

(2)

Another solid cone, **Q**, is similar to **P**.
The base radius of **Q** is 6 cm.
The volume of **Q** is k times the volume of **P**.

(b) Calculate the value of k.

k = ...

(2)

Q16

(Total 4 marks)

N 3 4 0 2 2 A 0 1 7 2 4

Leave blank

17. Here are five counters.
Each counter has a number on it.

Layla puts the five counters in a bag.
She takes two counters at random from the bag without replacement.

Calculate the probability that

(i) **both** counters will have the number 3 on them,

.....

(ii) the sum of the numbers on the two counters will be 6

.....

(Total 5 marks)

Q17

N 3 4 0 2 2 A 0 1 8 2 4

Leave blank

18. Simplify fully $\dfrac{5x^2+14x-3}{50x^2-2}$

.....

Q18

(Total 4 marks)

Leave blank

19.

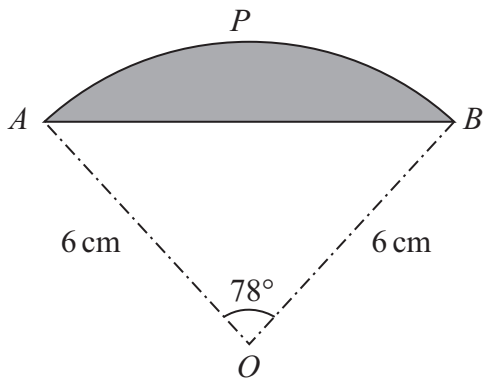


Diagram **NOT** accurately drawn

The diagram shows a sector $OAPB$ of a circle, centre O.
AB is a chord of the circle.
The radius of the circle is 6 cm.
Angle $AOB = 78°$.

Calculate the perimeter of the shaded **segment** APB.
Give your answer correct to 3 significant figures.

..... cm

(Total 6 marks)

Q19

Leave blank

20. Correct to 2 significant figures, the area of a square is 230 cm^2.

Calculate the lower bound for the perimeter of the square.

..... cm

(Total 3 marks)

Q20

Leave blank

21.

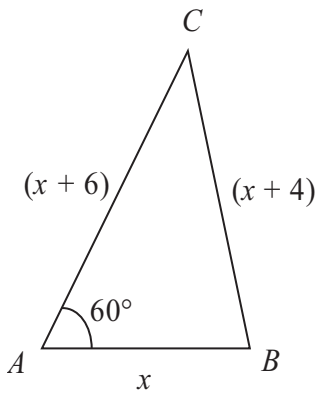


Diagram **NOT** accurately drawn

The diagram shows the length, in centimetres, of each side of triangle ABC.
Angle $BAC = 60°$.

Find the value of x.

$x =$ .....

Q21

(Total 5 marks)

TOTAL FOR PAPER: 100 MARKS

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Centre No.						Paper Reference							Surname	Initial(s)
Candidate No.						4	4	0	0	/	4	H	Signature	

Paper Reference(s)

4400/4H

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London Examinations IGCSE

Mathematics

Paper 4H

Higher Tier

Monday 1 June 2009 – Morning

Time: 2 hours

Materials required for examination

Ruler graduated in centimetres and millimetres, protractor, compasses, pen, HB pencil, eraser, calculator. Tracing paper may be used.

Items included with question papers

Nil

Instructions to Candidates

In the boxes above, write your centre number, candidate number, your surname, initials and signature.
Check that you have the correct question paper.
Answer ALL the questions. Write your answers in the spaces provided in this question paper.
Without sufficient working, correct answers may be awarded no marks.
You must NOT write on the formulae page. Anything you write on the formulae page will gain NO credit.
If you need more space to complete your answer to any question, use additional answer sheets.

Information for Candidates

The marks for individual questions and the parts of questions are shown in round brackets: e.g. **(2)**.
There are 22 questions in this question paper. The total mark for this paper is 100.
There are 20 pages in this question paper. Any blank pages are indicated.
You may use a calculator.

Advice to Candidates

Write your answers neatly and in good English.

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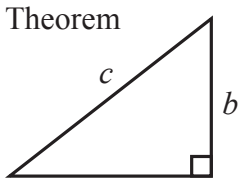
IGCSE MATHEMATICS 4400
FORMULA SHEET – HIGHER TIER

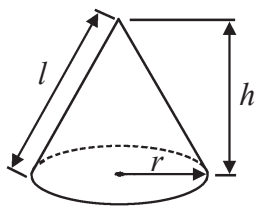
Pythagoras' Theorem



$a^2 + b^2 = c^2$

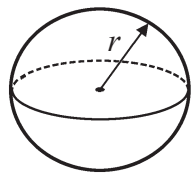
Volume of cone = $\frac{1}{3}\pi r^2 h$

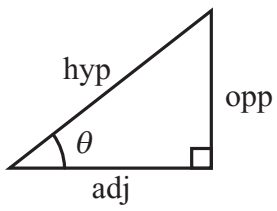
Curved surface area of cone = $\pi r l$



Volume of sphere = $\frac{4}{3}\pi r^3$

Surface area of sphere = $4\pi r^2$





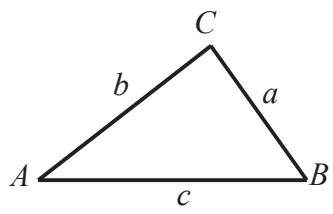
adj = hyp × cos θ
opp = hyp × sin θ
opp = adj × tan θ

or $\sin\theta = \frac{\text{opp}}{\text{hyp}}$

$\cos\theta = \frac{\text{adj}}{\text{hyp}}$

$\tan\theta = \frac{\text{opp}}{\text{adj}}$

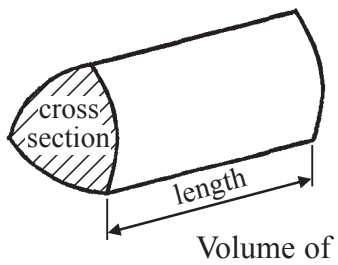
In any triangle ABC



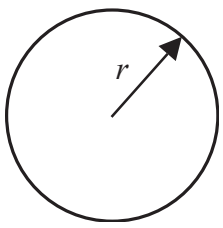
Sine rule: $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

Cosine rule: $a^2 = b^2 + c^2 - 2bc\cos A$

Area of triangle = $\frac{1}{2}ab\sin C$



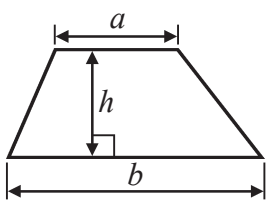
Volume of prism = area of cross section × length

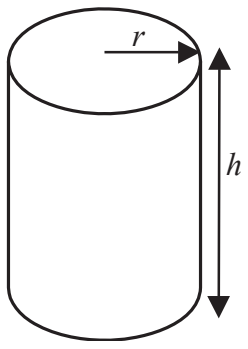


Circumference of circle = $2\pi r$

Area of circle = πr^2

Area of a trapezium = $\frac{1}{2}(a + b)h$





Volume of cylinder = $\pi r^2 h$

Curved surface area of cylinder = $2\pi rh$

The Quadratic Equation
The solutions of $ax^2 + bx + c = 0$, where $a \neq 0$, are given by

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

H 3 4 0 2 3 A 0 2 2 0

Leave blank

Answer ALL TWENTY TWO questions.

Write your answers in the spaces provided.

You must write down all the stages in your working.

1. Show that $\frac{2}{3} \div \frac{5}{9} = 1\frac{1}{5}$

Q1

(Total 3 marks)

2. Angelou has x sweets.
He eats 5 of these sweets.
He puts all the sweets he has left into a bag.

(i) Nina has 3 times as many sweets as the number that Angelou put into the bag.
Nina has 39 sweets.

Use this information to write down an equation in x.

.....

(ii) Solve your equation to find the value of x.

$x =$ .....

Q2

(Total 5 marks)

Leave blank

3. Work out the value of $\frac{a(b+1)}{16}$ when $a = 6$ and $b = -9$

.....

(Total 3 marks)

Q3

4. The table gives information about the shoe sizes of 67 people.

Shoe size	6	7	8	9	10
Number of people	20	19	0	26	2

Find the median shoe size.

.....

(Total 2 marks)

Q4

Leave blank

5. (a) Calculate the circumference of a circle of radius 40 m.
Give your answer correct to 3 significant figures.

..... m
(2)

(b)

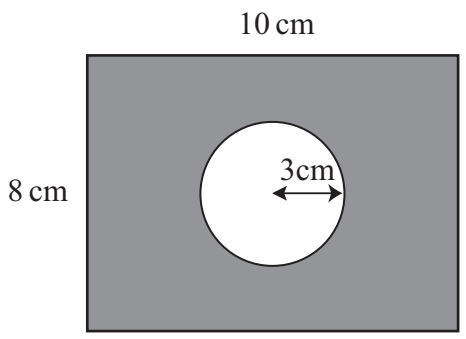


Diagram **NOT** accurately drawn

The diagram shows a circle inside a rectangle.
The rectangle has length 10 cm and width 8 cm.
The radius of the circle is 3 cm.

Calculate the area of the shaded region.
Give your answer correct to 3 significant figures.

..... cm^2
(4)

Q5

(Total 6 marks)

Leave blank

6. The diagram shows a biased spinner, numbered 1, 2, 3 and 4

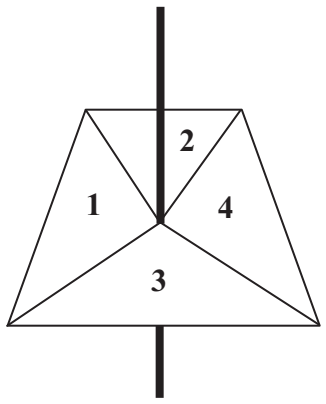


Diagram **NOT** accurately drawn

When the spinner is spun, the number on which it lands is the score.

The table shows the probabilities for three of the scores.

Score	Probability
1	0.3
2	0.1
3	0.4
4	

The spinner is spun once.
Work out the probability that the score is

(a) 4

.....

(2)

(b) an odd number.

.....

(2)

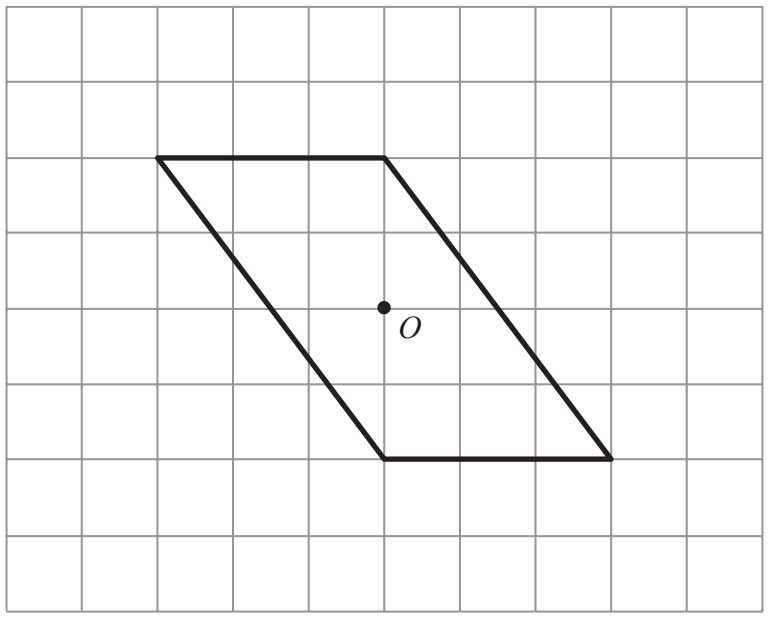
Q6

(Total 4 marks)

Leave blank

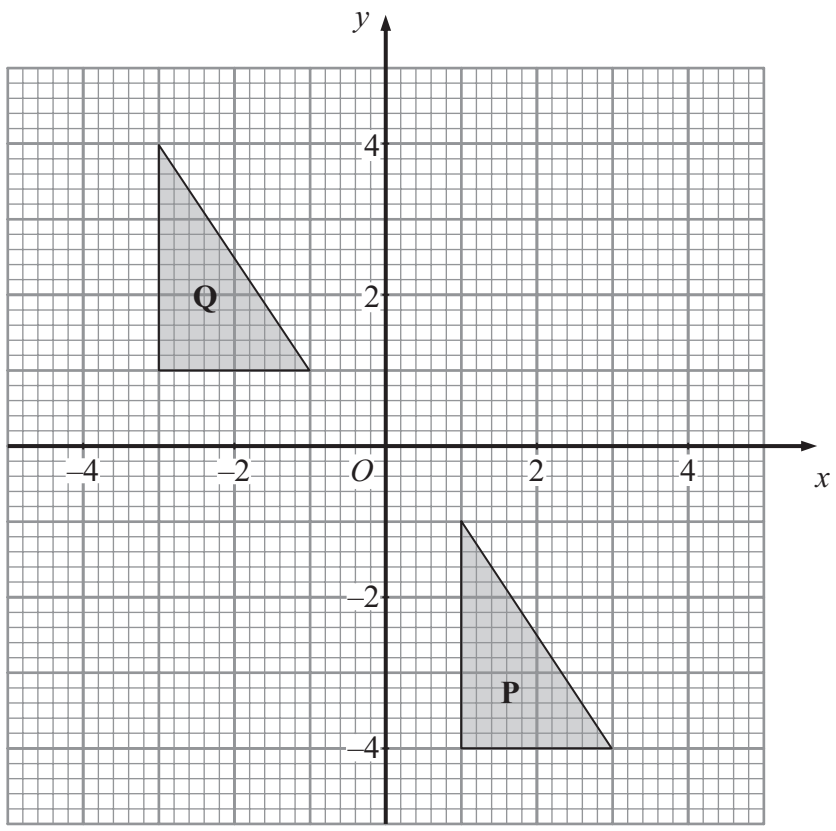
7. The diagram shows a parallelogram.

(a) On the grid, rotate the parallelogram through 90° anticlockwise about the point O.



(2)

(b)



Describe fully the single transformation that maps triangle **P** onto triangle **Q**.

.....

(2)

(Total 4 marks)

Q7

Leave blank

8. (a)

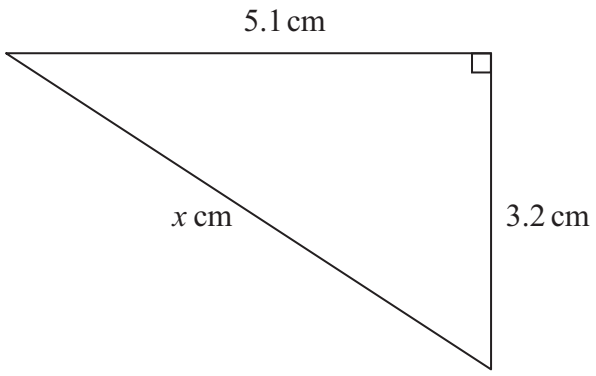


Diagram **NOT** accurately drawn

Calculate the value of x.
Give your answer correct to 3 significant figures.

$x =$ .....

(3)

(b)

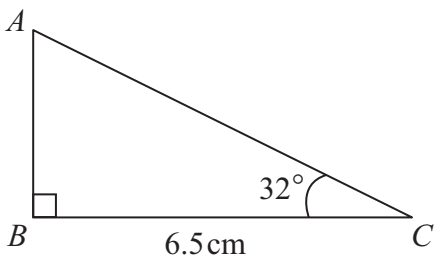


Diagram **NOT** accurately drawn

Calculate the length of AB.
Give your answer correct to 3 significant figures.

..... cm

(3)

Q8

(Total 6 marks)

Leave blank

9. Solve $\dfrac{12 - x}{3} = 7$

$x =$ .....

(Total 3 marks)

Q9

10. Express 132 as a product of its prime factors.

.....

(Total 3 marks)

Q10

Leave blank

11. Jagdeesh has to work out $\dfrac{84.2 \times \sqrt{38.2}}{41.6}$ without using a calculator.

Use suitable approximations to work out an estimate for Jagdeesh's calculation.
You **must** show all your working.

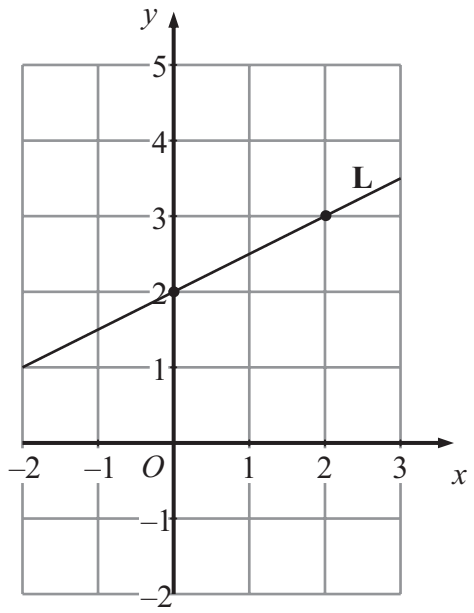
.....

(Total 3 marks)

Q11

Leave blank

12. The straight line, **L**, passes through the points (0, 2) and (2, 3).



(a) Work out the gradient of **L**.

.....

(2)

(b) Find the equation of **L**.

.....

(2)

(c) Write down the equation of a line parallel to **L**.

.....

(1)

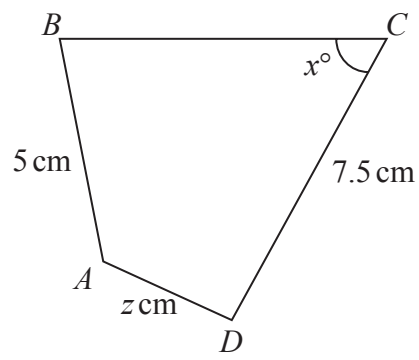
Q12

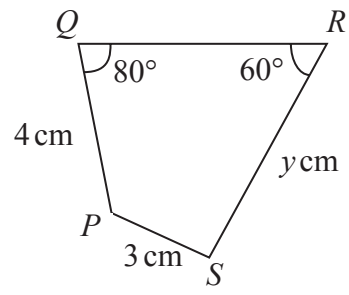
(Total 5 marks)

Leave blank

13. *ABCD* and *PQRS* are two similar quadrilaterals.

Diagrams **NOT** accurately drawn





AB corresponds to *PQ*.
BC corresponds to *QR*.
CD corresponds to *RS*.

Find the value of

(a) *x*,

x = ...
(1)

(b) *y*,

y = ...
(2)

(c) *z*.

z = ...
(2)

Q13

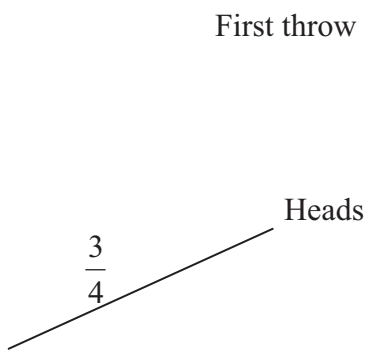
(Total 5 marks)

Leave blank

14. A coin is biased so that when it is thrown, the probability that it will show Heads is $\frac{3}{4}$

The coin is thrown twice.

(a) Complete the probability tree diagram.



(3)

(b) Work out the probability that the coin shows Tails on both throws.

.....

(2)

(Total 5 marks)

Q14

Leave blank

15. (a) Simplify $3c^5d \times c^2d^4$

.....

(2)

(b) Simplify $(2x^3y)^4$

.....

(2)

(c) Simplify fully $\dfrac{2x-6}{x^2-3x}$

.....

(2)

Q15

(Total 6 marks)

16. (a) Factorise $2x^2 - x - 3$

.....

(2)

(b) Hence write down the solutions of $2x^2 - x - 3 = 0$

.....

(1)

Q16

(Total 3 marks)

Leave blank

17. A curve has equation $y = x^2 + 3x$

(a) Find $\frac{dy}{dx}$

.....

(2)

(b) Find the gradient of the curve at the point where $x = -4$

.....

(1)

(c) The curve has a minimum point.
Find the coordinates of this minimum point.

.....

(3)

(Total 6 marks)

Q17

Leave blank

18. The diagram shows a parallelogram, $ABCD$.
M is the midpoint of BC.
N is the midpoint of AD.

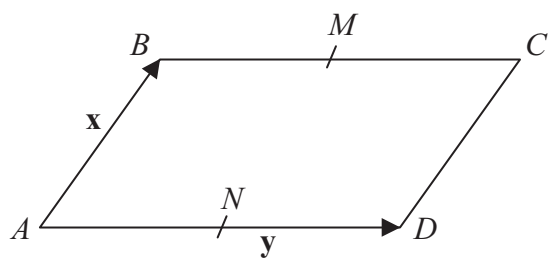


Diagram **NOT** accurately drawn

$\overrightarrow{AB} = \mathbf{x}$

$\overrightarrow{AD} = \mathbf{y}$

Find, in terms of **x** and/or **y**, the vectors

(a) $\overrightarrow{MN}$

.....

(1)

(b) $\overrightarrow{AC}$

.....

(1)

P is the point such that $\overrightarrow{CP} = \mathbf{y} - \frac{1}{2}\mathbf{x}$

(c) Find, in terms of **x** and/or **y**, the vector $\overrightarrow{PA}$
Simplify your answer as much as possible.

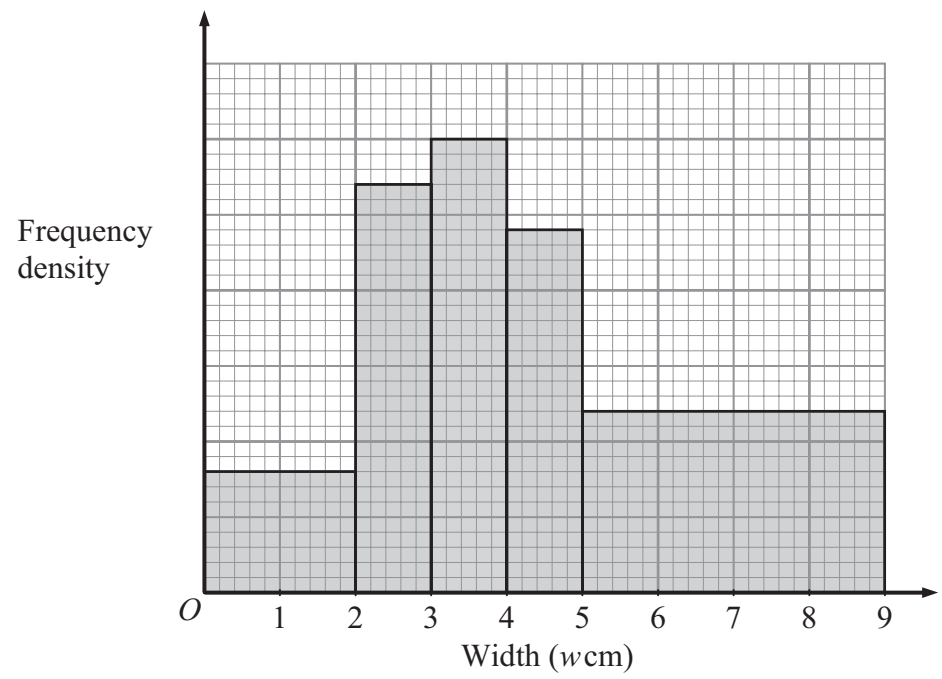
.....

(3) **Q18**

(Total 5 marks)

Leave blank

19. The histogram shows information about the widths, w centimetres, of some leaves.



The number of leaves with widths in the class $3 < w \leqslant 4$ is 15

(a) Find the number of leaves with widths in the class $0 < w \leqslant 2$

.....

(2)

(b) Find an estimate of the number of leaves with widths in the range

$4.5 < w \leqslant 5.5$

.....

(3)

Q19

(Total 5 marks)

Leave blank

20. The diagram shows an equilateral triangle of side 2 m.

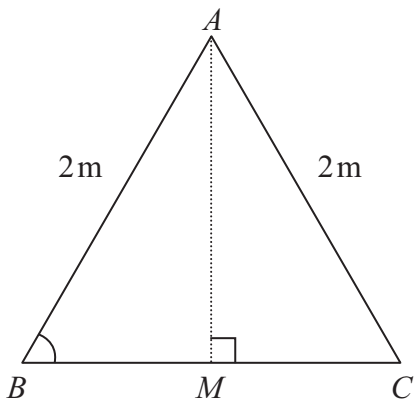


Diagram **NOT** accurately drawn

(a) (i) Use the diagram to show that $\cos 60^\circ = \frac{1}{2}$

(ii) Use the diagram to find the exact value of $\sin 60^\circ$
Give your answer as a surd.

$\sin 60^\circ =$ .....

(4)

(b) Use the exact values of $\cos 60^\circ$ and $\sin 60^\circ$ to show that $(\cos 60^\circ)^2 + (\sin 60^\circ)^2 = 1$

(2)

Q20

(Total 6 marks)

Leave blank

21. (a) Solve $2x^2 + 3x - 1 = 0$
Give your solution(s) correct to 3 significant figures.

.....

(3)

(b) Solve $\frac{2}{x} - \frac{1}{x+1} = 1$

.....

(4)

Q21

(Total 7 marks)

TURN OVER FOR QUESTION 22

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22. (a) Each of the numbers x, y and z is greater than 1 and less than 10

$x \times 10^5 + y \times 10^4 = z \times 10^5$

Find an expression for z in terms of x and y.
Give your answer as simply as possible.

$z =$ .....

(2)

(b) Each of the numbers 3×10^n, 4×10^m and $a \times 10^p$ is in standard form.

$$\frac{3\times10^n}{4\times10^m} = a\times10^p$$

(i) Find the value of a.

$a =$ .....

(ii) Find an expression for p in terms of n and m.

$p =$ .....

(3)

Q22

(Total 5 marks)

TOTAL FOR PAPER: 100 MARKS

END

Centre No.						Paper Reference							Surname	Initial(s)
Candidate No.						4	4	0	0	/	3	H	Signature	

Paper Reference(s)

4400/3H

Examiner's use only

Team Leader's use only

London Examinations IGCSE

Mathematics

Paper 3H

Higher Tier

Thursday 5 November 2009 – Morning

Time: 2 hours

Materials required for examination
Ruler graduated in centimetres and millimetres, protractor, compasses, pen, HB pencil, eraser, calculator. Tracing paper may be used.

Items included with question papers
Nil

Instructions to Candidates

In the boxes above, write your centre number, candidate number, your surname, initials and signature.
Check that you have the correct question paper.
Answer ALL the questions. Write your answers in the spaces provided in this question paper.
Without sufficient working, correct answers may be awarded no marks.
You must NOT write on the formulae page. Anything you write on the formulae page will gain NO credit.
If you need more space to complete your answer to any question, use additional answer sheets.

Information for Candidates

The marks for individual questions and the parts of questions are shown in round brackets: e.g. **(2)**.
There are 25 questions in this question paper. The total mark for this paper is 100.
There are 24 pages in this question paper. Any blank pages are indicated.
You may use a calculator.

Advice to Candidates

Write your answers neatly and in good English.

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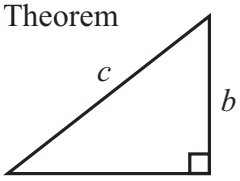
IGCSE MATHEMATICS 4400
FORMULA SHEET – HIGHER TIER

Pythagoras' Theorem



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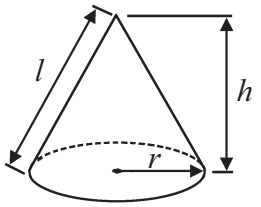

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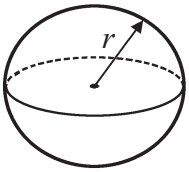
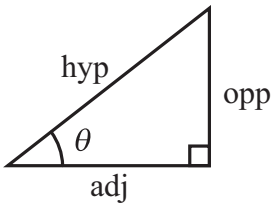
Surface area of sphere = $4\pi r^2$





adj = hyp × cos θ
opp = hyp × sin θ
opp = adj × tan θ

or $\sin\theta = \frac{\text{opp}}{\text{hyp}}$

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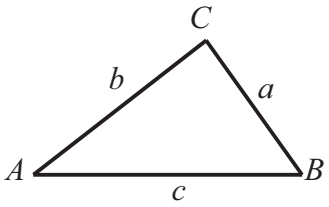
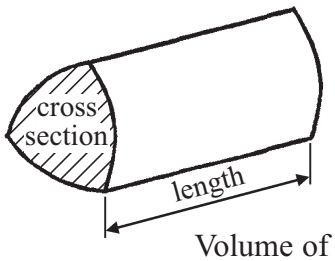
In any triangle ABC



Sine rule: $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

Cosine rule: $a^2 = b^2 + c^2 - 2bc\cos A$

Area of triangle = $\frac{1}{2}ab\sin C$



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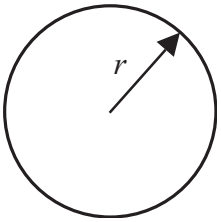

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Area of circle = πr^2

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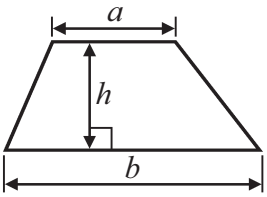

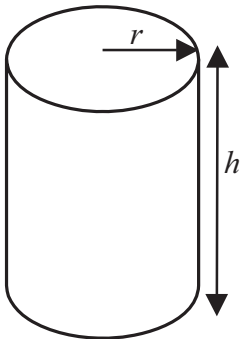

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$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

H 3 4 8 8 4 A 0 2 2 4

Leave blank

Answer ALL TWENTY FIVE questions.

Write your answers in the spaces provided.

You must write down all the stages in your working.

1. Show that $\frac{2}{3}+\frac{1}{5}=\frac{13}{15}$

Q1

(Total 2 marks)

2. Solve $8y - 9 = 5y + 3$

$y =$ .....

Q2

(Total 3 marks)

Leave blank

3. (a) The diagram shows a regular octagon, with centre O.

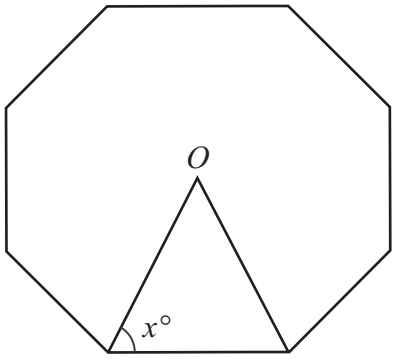


Diagram **NOT** accurately drawn

Work out the value of x.

$x =$ .....

(3)

(b) A regular polygon has an exterior angle of 30°.
Work out the number of sides of the polygon.

.....

(2) **Q3**

(Total 5 marks)

Leave blank

4. In a survey of 36 families, the number of people in each family was recorded.
The table shows the results.

Number of people in the family	Frequency
1	3
2	2
3	7
4	13
5	11

Work out the mean number of people in these 36 families.

.....

Q4

(Total 3 marks)

Leave blank

5. Cups cost x dollars each.
Mugs cost $(x + 2)$ dollars each.

(a) Write down an expression, in terms of x, for the total cost of 12 cups and 6 mugs.

..... dollars
(2)

(b) The total cost of 12 cups and 6 mugs is 57 dollars.
Work out the cost of 1 cup.

..... dollars
(2)

Q5

(Total 4 marks)

Leave blank

6. (a) $S = \{1, 3, 5, 7\}$
$T = \{2, 3, 7, 11\}$

How many members are there in $S \cup T$?

.....

(1)

(b) $U = \{3, 4, 5\}$
$U \cup V = \{1, 2, 3, 4, 5\}$

The set V has as few members as possible.
List the members of the set V.

.....

(1)

(c) $A = \{\text{Cats}\}$
$B = \{\text{Black animals}\}$

Describe the members of $A \cap B$.

.....

(1) **Q6**

(Total 3 marks)

Leave blank

7. (a) Calculate the circumference of a circle of radius 30 cm.
Give your answer correct to 3 significant figures.

..... cm
(2)

(b) The diagram shows a circle with radius 2.1 cm inside a square.
The circle touches the sides of the square.

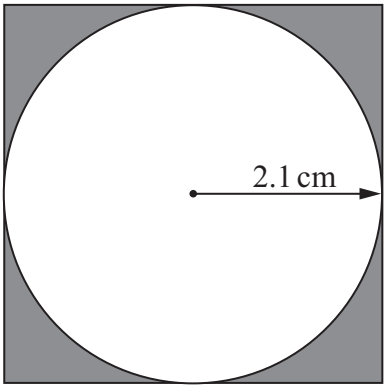


Diagram **NOT** accurately drawn

Work out the shaded area.
Give your answer correct to 3 significant figures.

..... cm^2
(4)

Q7

(Total 6 marks)

Leave blank

8. James throws a biased dice once.
The table shows all the possible scores and their probabilities.

Score	Probability
1	0.4
2	0.3
3	0.1
4	0.1
5	0.05
6	0.05

Find the probability that the score is more than 3

.....

(Total 2 marks)

Q8

Leave blank

9. (a) Expand and simplify fully $2(w - 3) + 3(w + 5)$

.....

(2)

(b) Solve the equation $\frac{x+5}{3} = 9$

$x =$ .....

(2)

(c) Solve the inequality $5y + 7 < 13$

.....

(2)

Q9

(Total 6 marks)

Leave blank

10. The diagram shows a prism.
The cross section of the prism is a right-angled triangle.
The lengths of the sides of the triangle are 8 cm, 15 cm and 17 cm.
The length of the prism is 20 cm.
Work out the total surface area of the prism.

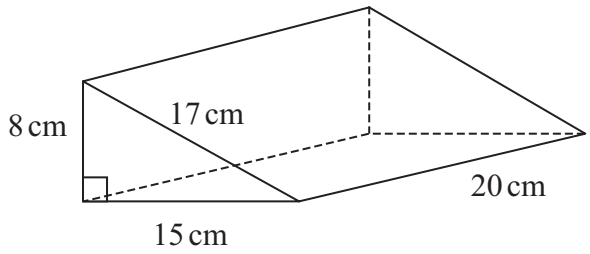


Diagram **NOT** accurately drawn

..... cm^2

Q10

(Total 3 marks)

11. Make a the subject of $P = \sqrt{ab}$

$a =$ .....

Q11

(Total 2 marks)

Leave blank

12. (a)

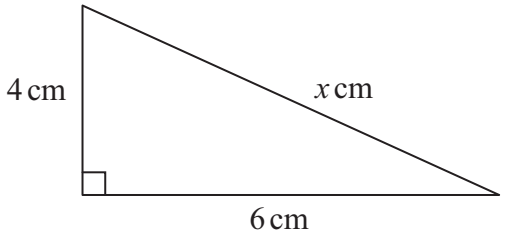


Diagram **NOT** accurately drawn

Calculate the value of x.
Give your answer correct to 3 significant figures.

$x =$ .....

(3)

(b)

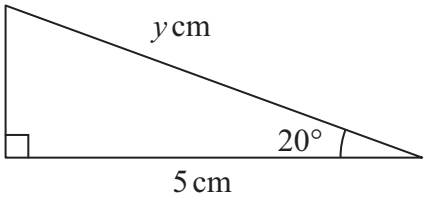


Diagram **NOT** accurately drawn

Calculate the value of y.
Give your answer correct to 3 significant figures.

$y =$ .....

(3)

Q12

(Total 6 marks)

Leave blank

13. The table shows the area, in km^2, of some countries.

Country	Area (km^2)
Algeria	2.4×10^6
Botswana	6.0×10^5
Equatorial Guinea	2.8×10^4
Ethiopia	1.2×10^6
Malawi	1.2×10^5

(a) Which of these countries has the largest area?

.....

(1)

(b) How many times greater is the area of Ethiopia than the area of Malawi?

.....

(1)

(c) Work out the total area of all five countries.
Give your answer in standard form.

..... km^2

(2)

Q13

(Total 4 marks)

Leave blank

14. Solve the simultaneous equations

$$2x - 3y = 3$$
$$3x + 6y = 1$$

$x =$ .....

$y =$ .....

Q14

(Total 3 marks)

15. Jothi bought a car.
Later, Jothi sold the car for £2125
He made a loss of 15%.
Work out the original price of the car.

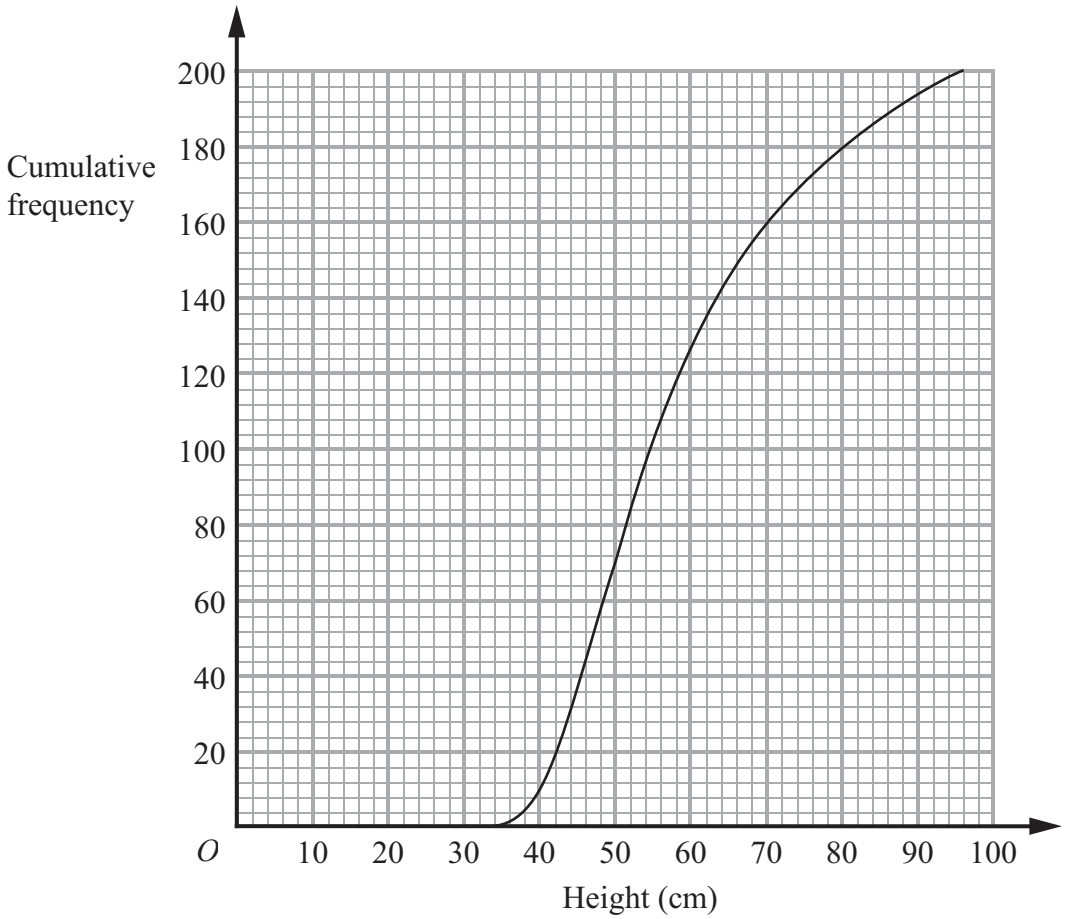
£ .....

Q15

(Total 3 marks)

Leave blank

16. The cumulative frequency diagram shows information about the heights, in centimetres, of 200 plants.



(a) Find an estimate for the median height.

..... cm

(2)

(b) Work out an estimate for the number of plants whose heights are greater than 80 cm.

.....

(2) **Q16**

(Total 4 marks)

Leave blank

17. (a) Factorise $x^2 - y^2$

.....

(1)

(b) Factorise completely $(c + d)^2 - d^2$

.....

(2)

(c) Factorise $2w^2 + w - 3$

.....

(2) **Q17**

(Total 5 marks)

Leave blank

18. In the diagram, a sector of a circle of radius 12 cm is shaded.
The area of the sector is 112π cm^2.
Calculate the value of x.

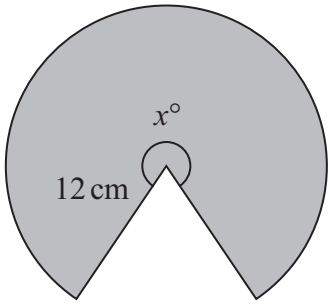


Diagram **NOT** accurately drawn

$x =$ .....

(Total 4 marks)

Q18

Leave blank

19. (a) Simplify $\dfrac{x^2}{x^2-2x}$

.....

(2)

(b) Simplify $\dfrac{2}{2x-1}-\dfrac{1}{x+1}$

.....

(4)

Q19

(Total 6 marks)

Leave blank

20. Each time Jeni plays a computer game the probability that she will win is $\frac{2}{3}$

Jeni plays the computer game 3 times.

Calculate the probability that Jeni will win

(a) all 3 games,

.....

(2)

(b) exactly 2 out of the 3 games.

.....

(3)

Q20

(Total 5 marks)

Leave blank

21. t is proportional to the square root of d.

$t = 12$ when $d = 4$

(a) Find a formula for t in terms of d.

.....

(3)

(b) Calculate the value of t when $d = 9$

$t =$ .....

(2) **Q21**

(Total 5 marks)

Leave blank

22. The diagram shows the positions of two ships, A and B, and a lighthouse L.

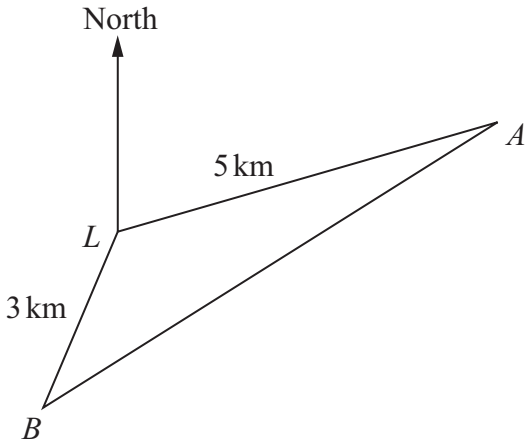


Diagram **NOT** accurately drawn

Ship A is 5 km from L on a bearing of 070° from L.
Ship B is 3 km from L on a bearing of 210° from L.
Calculate the distance between ship A and ship B.
Give your answer correct to 3 significant figures.

..... km

Q22

(Total 3 marks)

Leave blank

23. In a race, Paula runs 25 laps of a track.
Each lap of the track is 400 m, correct to the nearest metre.
Paula's average speed is 5.0 m/s, correct to one decimal place.

Calculate the upper bound for the time that Paula takes to run the race.
Give your answer in minutes and seconds, correct to the nearest second.

.....

Q23

(Total 4 marks)

Leave blank

24. $f(x) = x^2$
$g(x) = x - 3$

(a) (i) Find $gf(x)$

.....

(ii) Find $g^{-1}(x)$

.....

(2)

(b) Solve the equation $gf(x) = g^{-1}(x)$

.....

(3) **Q24**

(Total 5 marks)

Leave blank

25. (a) $(\sqrt{a})^7 = k\sqrt{a}$, where $k = a^n$
Find the value of n.

$n =$ .....

(2)

(b) Express $\dfrac{1}{2\sqrt{2}}$ as a power of 2

.....

(2) **Q25**

(Total 4 marks)

TOTAL FOR PAPER: 100 MARKS

END

Centre No.						Paper Reference							Surname	Initial(s)
Candidate No.						4	4	0	0	/	4	H	Signature	

Paper Reference(s)

4400/4H

Examiner's use only

Team Leader's use only

London Examinations IGCSE

Mathematics

Paper 4H

Higher Tier

Tuesday 10 November 2009 – Morning

Time: 2 hours

Materials required for examination
Ruler graduated in centimetres and millimetres, protractor, compasses, pen, HB pencil, eraser, calculator. Tracing paper may be used.

Items included with question papers
Nil

Instructions to Candidates

In the boxes above, write your centre number, candidate number, your surname, initials and signature.
Check that you have the correct question paper.
Answer ALL the questions. Write your answers in the spaces provided in this question paper.
Without sufficient working, correct answers may be awarded no marks.
You must NOT write on the formulae page. Anything you write on the formulae page will gain NO credit.
If you need more space to complete your answer to any question, use additional answer sheets.

Information for Candidates

The marks for individual questions and the parts of questions are shown in round brackets: e.g. **(2)**.
There are 22 questions in this question paper. The total mark for this paper is 100.
There are 24 pages in this question paper. Any blank pages are indicated.
You may use a calculator.

Advice to Candidates

Write your answers neatly and in good English.

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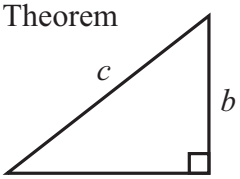
IGCSE MATHEMATICS 4400
FORMULA SHEET – HIGHER TIER

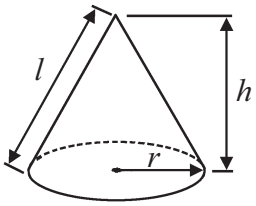
Pythagoras' Theorem



$a^2 + b^2 = c^2$

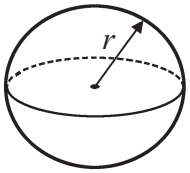
Volume of cone = $\frac{1}{3}\pi r^2 h$

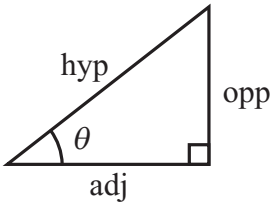
Curved surface area of cone = $\pi r l$



Volume of sphere = $\frac{4}{3}\pi r^3$

Surface area of sphere = $4\pi r^2$





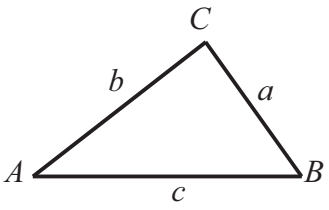
adj = hyp × cos θ
opp = hyp × sin θ
opp = adj × tan θ

or $\sin\theta = \frac{\text{opp}}{\text{hyp}}$

$\cos\theta = \frac{\text{adj}}{\text{hyp}}$

$\tan\theta = \frac{\text{opp}}{\text{adj}}$

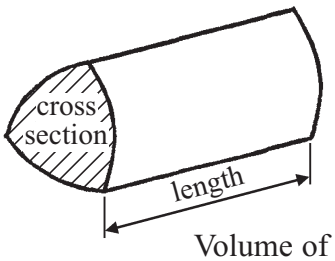
In any triangle ABC



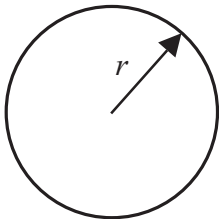
Sine rule: $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

Cosine rule: $a^2 = b^2 + c^2 - 2bc\cos A$

Area of triangle = $\frac{1}{2}ab\sin C$



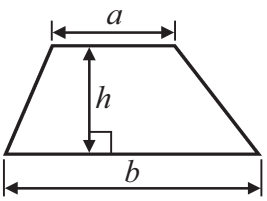
Volume of prism = area of cross section × length

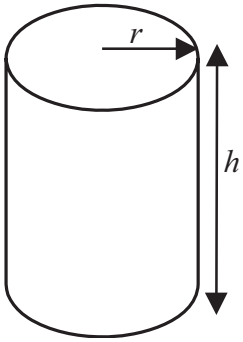


Circumference of circle = $2\pi r$

Area of circle = πr^2

Area of a trapezium = $\frac{1}{2}(a + b)h$





Volume of cylinder = $\pi r^2 h$

Curved surface area of cylinder = $2\pi rh$

The Quadratic Equation
The solutions of $ax^2 + bx + c = 0$, where $a \neq 0$, are given by

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

H 3 4 8 8 5 A 0 2 2 4

Leave blank

Answer ALL TWENTY TWO questions.

Write your answers in the spaces provided.

You must write down all stages in your working.

1. Use your calculator to work out the value of $\dfrac{11.7+18.4^2}{0.3}$

Write down all the figures on your calculator display.

.....

Q1

(Total 2 marks)

2. (a) Factorise $n^2 - 4n$

.....

(2)

(b) Solve $8 - 5x = 2$

$x =$ .....

(3)

Q2

(Total 5 marks)

Leave blank

3.

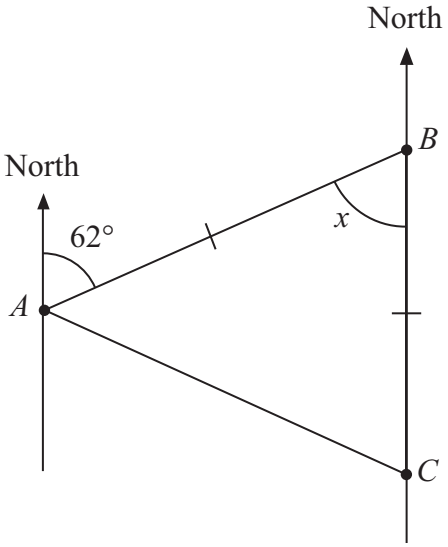


Diagram **NOT** accurately drawn

The bearing of B from A is 062°.
C is due south of B.
$AB = CB$.

(a) (i) Find the size of angle x.

.....°

(ii) Give a reason for your answer.

.....

(2)

(b) Work out the bearing of C from A.

.....°

(2) **Q3**

(Total 4 marks)

Leave blank

4. A bag contains some beads.
The colour of each bead is red or green or blue.
Binita is going to take a bead at random from the bag.
The probability that she will take a red bead is 0.4
The probability that she will take a green bead is 0.5

(a) Work out the probability that she will take a blue bead.

.....
(2)

(b) There are 80 beads in the bag.
Work out the number of red beads in the bag.

.....
(2) **Q4**

(Total 4 marks)

5. (a) Cheng invested 3500 dollars.
At the end of one year, interest of 161 dollars was added to his account.

Express 161 as a percentage of 3500

..... %
(2)

(b) Lian invested an amount of money at an interest rate of 5.2% per year.
After one year, she received interest of 338 dollars.

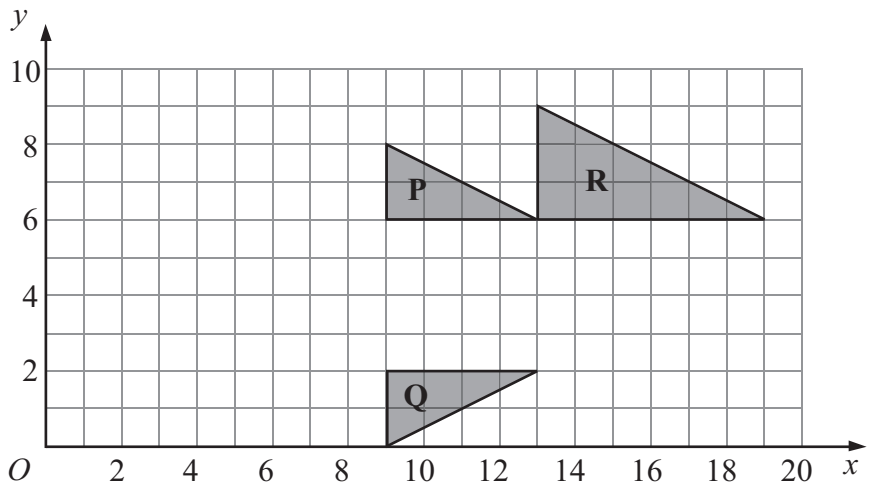
Work out the amount of money Lian invested.

..... dollars
(3) **Q5**

(Total 5 marks)

Leave blank

6.



(a) Describe fully the single transformation which maps triangle **P** onto triangle **Q**.

.....

(2)

(b) Describe fully the single transformation which maps triangle **P** onto triangle **R**.

.....

.....

(3) **Q6**

(Total 5 marks)

Leave blank

7. Carlos mixes cement, lime and sand in the ratios 1 : 2 : 9 by weight.

Work out the weight of cement, the weight of lime and the weight of sand in 60 kg of the mixture.

cement ..... kg

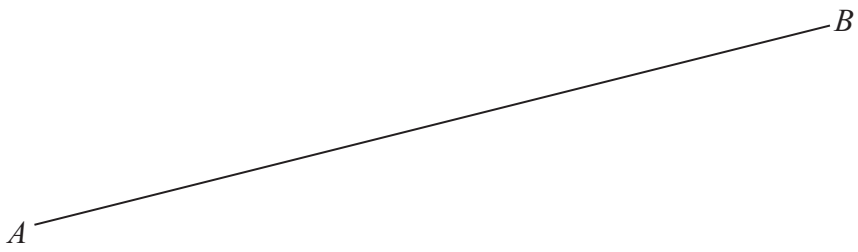
lime ..... kg

sand ..... kg

Q7

(Total 3 marks)

8. Use ruler and compasses to construct the perpendicular bisector of the line AB.
You must show all construction lines.

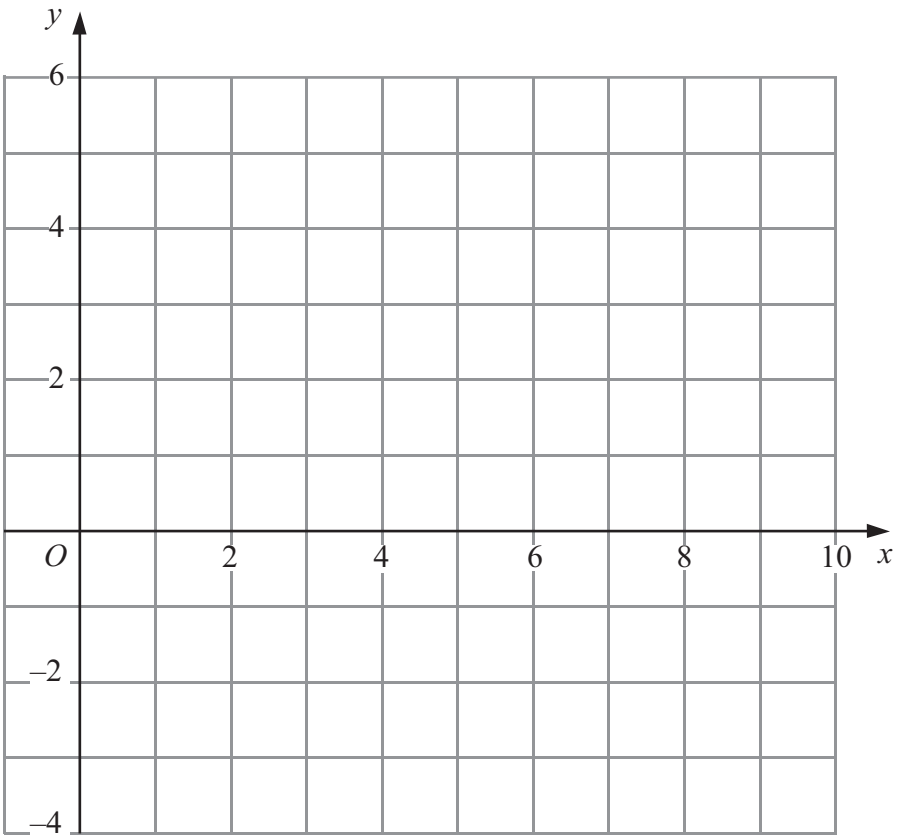


Q8

(Total 2 marks)

Leave blank

9. (a) On the grid, draw the graph of $2x - 3y = 6$ from $x = 0$ to $x = 9$



(2)

Leave blank

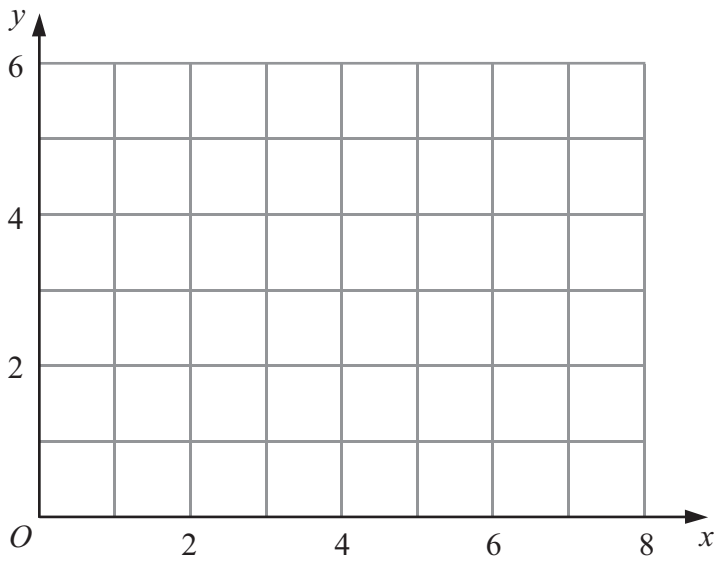
(b) On the grid, show by shading the region which satisfies the inequalities

$3 \leqslant x \leqslant 6$

and

$2 \leqslant y \leqslant 4$

Label your region **R**.



(3) **Q9**

(Total 5 marks)

Leave blank

10. (a) The table shows information about the rainfall in Singapore in December one year.

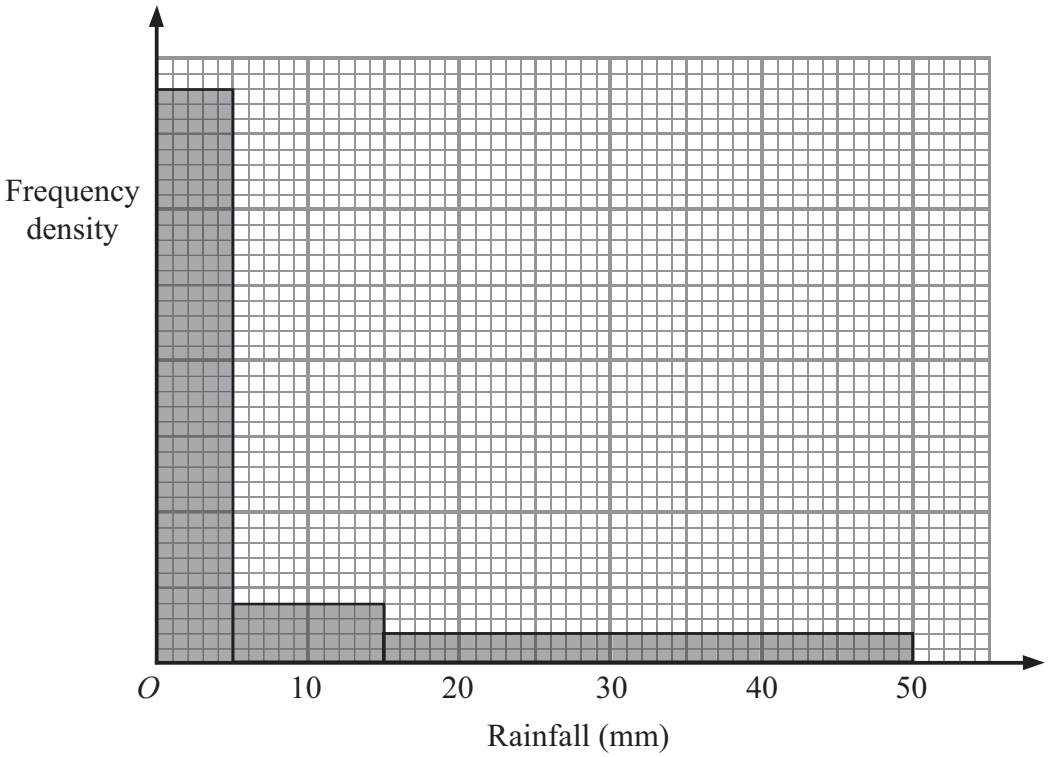
Rainfall (d mm)	**Number of days**
$0 \leqslant d < 10$	23
$10 \leqslant d < 20$	3
$20 \leqslant d < 30$	2
$30 \leqslant d < 40$	3

Work out an estimate for the total rainfall in December.

..... mm
(3)

Leave blank

(b) The histogram shows information, for the same year, about the rainfall in Singapore in November, which has 30 days.
The rainfall was less than 50 mm every day in November.



Complete the table.

Rainfall (d mm)	Number of days
$0 \leqslant d < 5$	.....
$5 \leqslant d < 15$	.....
$15 \leqslant d < 50$	.....

(3) **Q10**

(Total 6 marks)

Leave blank

11. (a) Find the Highest Common Factor of 64 and 80

.....

(2)

(b) Find the Lowest Common Multiple of 64 and 80

.....

(2) **Q11**

(Total 4 marks)

12. (a) Expand and simplify $(p + 7)(p - 4)$

.....

(2)

(b) Simplify $4x^3y^5 \times 3x^2y$

.....

(2)

(c) Simplify $(27q^6)^{\frac{2}{3}}$

.....

(2) **Q12**

(Total 6 marks)

Leave blank

13.

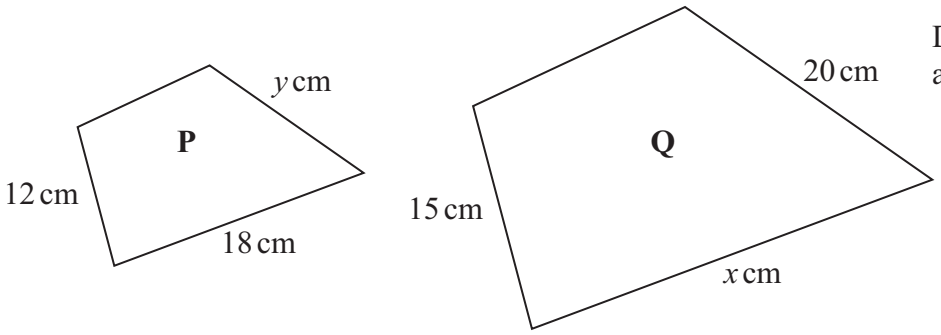


Diagram **NOT** accurately drawn

Quadrilateral **P** is mathematically similar to quadrilateral **Q**.

(a) Calculate the value of x.

x = ...

(2)

(b) Calculate the value of y.

y = ...

(2)

Q13

(Total 4 marks)

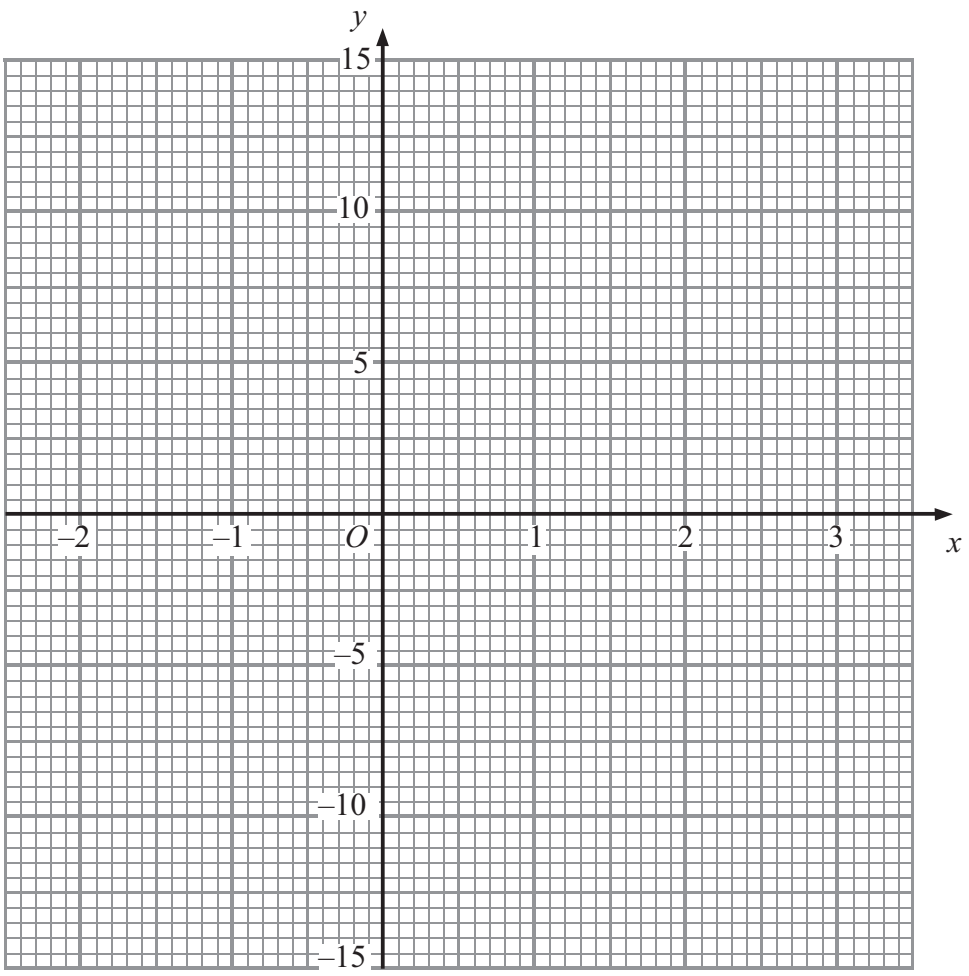
Leave blank

14. (a) Complete the table of values for $y = x^3 - 3x^2 + 12$

x	–2	–1	0	1	2	3
y		8				

(2)

(b) On the grid, draw the graph of $y = x^3 - 3x^2 + 12$



(2) **Q14**

(Total 4 marks)

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15.

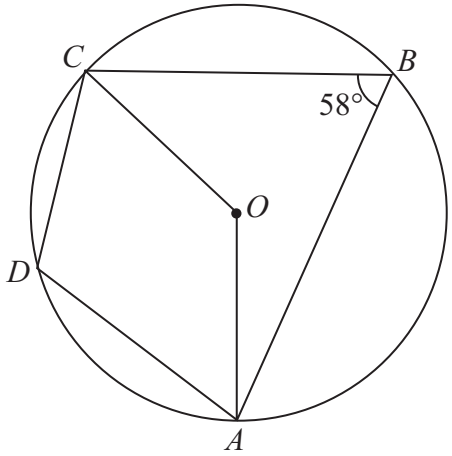


Diagram **NOT** accurately drawn

A, *B*, *C* and *D* are points on a circle, centre *O*.
Angle *ABC* = 58°.

(a) (i) Calculate the size of angle *AOC*.

..... °

(ii) Give a reason for your answer.

.....

.....

(2)

(b) (i) Calculate the size of angle *ADC*.

..... °

(ii) Give a reason for your answer.

.....

.....

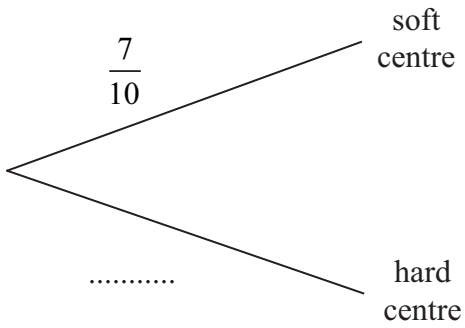
(2) **Q15**

(Total 4 marks)

Leave blank

16. There are 10 chocolates in a box.
7 of the chocolates have soft centres and 3 of the chocolates have hard centres.
Kyla takes at random a chocolate from the box and eats it.
She then takes at random another chocolate from the box and eats it.

(a) Complete the probability tree diagram.



(2)

(b) Calculate the probability that at least one of the chocolates Kyla eats has a hard centre.

.....

(3)

Q16

(Total 5 marks)

Leave blank

17.

$$T = \frac{n(1+e)}{(1-e)}$$

(a) Work out the value of T when $n = 8.6$ and $e = 0.2$

$T =$ .....

(2)

(b) Make e the subject of the formula $T = \frac{n(1+e)}{(1-e)}$

$e =$ .....

(5)

Q17

(Total 7 marks)

Leave blank

18.

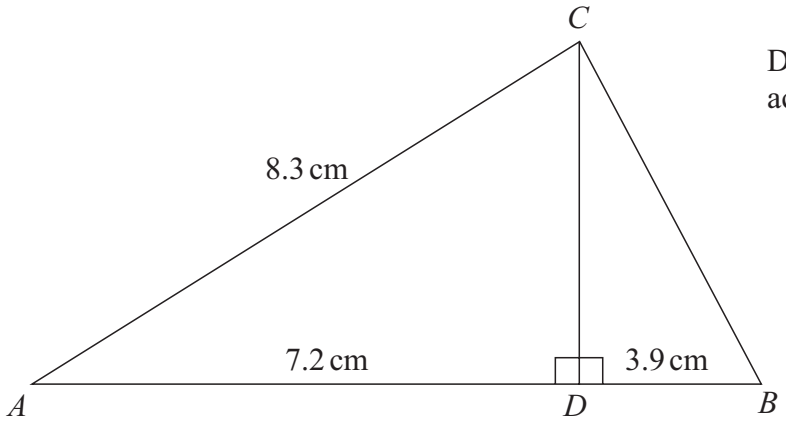


Diagram **NOT** accurately drawn

ABC is a triangle.
D is a point on *AB*.
CD is perpendicular to *AB*.
AD = 7.2 cm, *DB* = 3.9 cm, *AC* = 8.3 cm.

Calculate the size of angle *DBC*.
Give your answer correct to 1 decimal place.

..... °

Q18

(Total 5 marks)

Leave blank

19. A particle moves in a straight line through a fixed point O.
The displacement, s metres, of the particle from O at time t seconds is given by

$$s = t^3 - 5t^2 + 8$$

(a) Find an expression for the velocity, v m/s, of the particle after t seconds.

$v =$ .....

(2)

(b) Find the time at which the acceleration of the particle is $20\,\text{m/s}^2$.

..... seconds

(2)

Q19

(Total 4 marks)

Leave blank

20. P and Q are two sets.
$n(P) = 9$ and $n(Q) = 5$

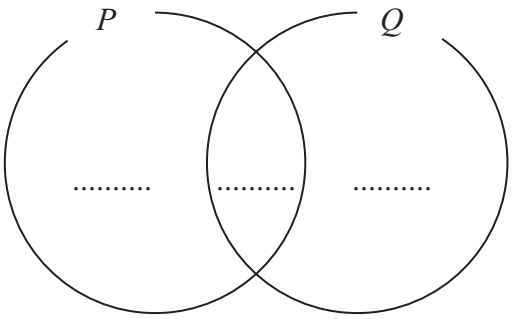
(a) Find the value of $n(P \cup Q)$ when $P \cap Q = \varnothing$

$n(P \cup Q) =$ .....
(1)

(b) Find the value of $n(P \cup Q)$ when $Q \subset P$

$n(P \cup Q) =$ .....
(1)

(c) (i) Complete the Venn Diagram to show **numbers** of elements when $n(P \cap Q) = 3$



(ii) Find the value of $n(P \cup Q)$ when $n(P \cap Q) = 3$

$n(P \cup Q) =$ .....
(3)

Q20

(Total 5 marks)

Leave blank

21.

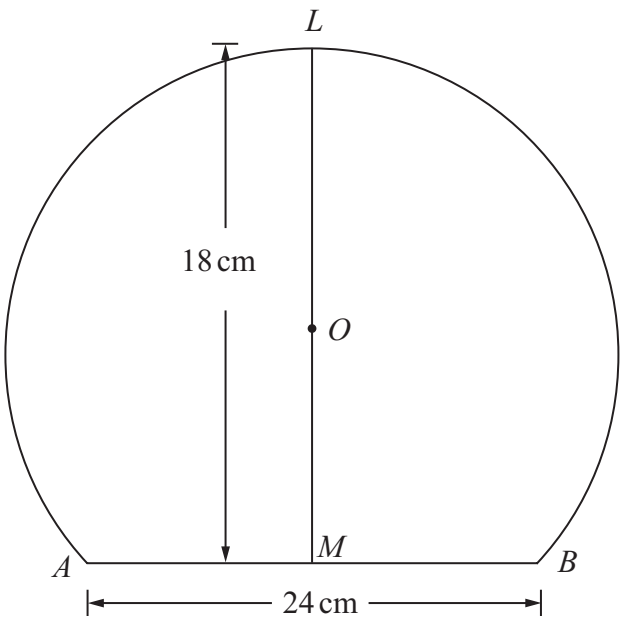


Diagram **NOT** accurately drawn

A, *B* and *L* are points on a circle, centre *O*.
AB is a chord of the circle.
M is the midpoint of *AB*.
LOM is a straight line.
AB = 24 cm.
LM = 18 cm.

Calculate the diameter of the circle.

..... cm

(Total 4 marks)

Q21

Leave blank

22. Solve the simultaneous equations

$$y - 3x = 4$$

$$x^2 + y^2 = 34$$

.....

Q22

(Total 7 marks)

TOTAL FOR PAPER: 100 MARKS

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Candidate No.						4	4	0	0	/	3	H	Signature	

Paper Reference(s)

4400/3H

Examiner's use only

Team Leader's use only

London Examinations IGCSE

Mathematics

Paper 3H

Higher Tier

Monday 7 June 2010 – Afternoon

Time: 2 hours

Materials required for examination
Ruler graduated in centimetres and millimetres, protractor, compasses, pen, HB pencil, eraser, calculator. Tracing paper may be used.

Items included with question papers
Nil

Instructions to Candidates

In the boxes above, write your centre number, candidate number, your surname, initials and signature.
Check that you have the correct question paper.
Answer ALL the questions. Write your answers in the spaces provided in this question paper.
Without sufficient working, correct answers may be awarded no marks.
You must NOT write on the formulae page. Anything you write on the formulae page will gain NO credit.
If you need more space to complete your answer to any question, use additional answer sheets.

Information for Candidates

The marks for individual questions and the parts of questions are shown in round brackets: e.g. **(2)**.
There are 21 questions in this question paper. The total mark for this paper is 100.
There are 20 pages in this question paper. Any blank pages are indicated.
You may use a calculator.

Advice to Candidates

Write your answers neatly and in good English.

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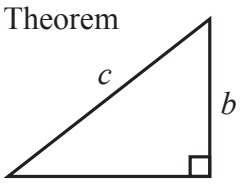
IGCSE MATHEMATICS 4400
FORMULA SHEET – HIGHER TIER

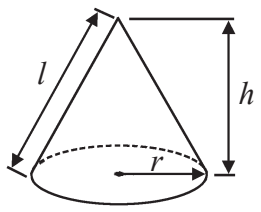
Pythagoras' Theorem



$a^2 + b^2 = c^2$

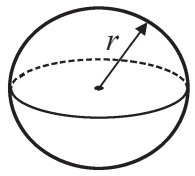
Volume of cone = $\frac{1}{3}\pi r^2 h$

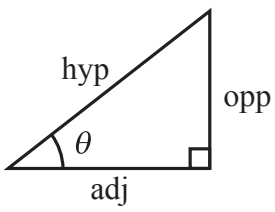
Curved surface area of cone = $\pi r l$



Volume of sphere = $\frac{4}{3}\pi r^3$

Surface area of sphere = $4\pi r^2$





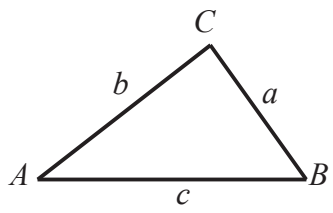
adj = hyp × cos θ
opp = hyp × sin θ
opp = adj × tan θ

or $\sin\theta = \frac{\text{opp}}{\text{hyp}}$

$\cos\theta = \frac{\text{adj}}{\text{hyp}}$

$\tan\theta = \frac{\text{opp}}{\text{adj}}$

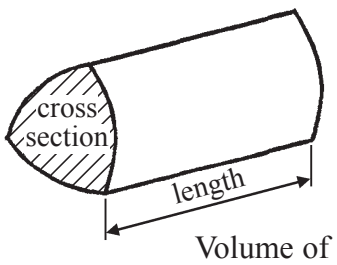
In any triangle ABC



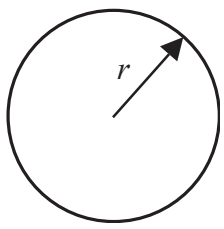
Sine rule: $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

Cosine rule: $a^2 = b^2 + c^2 - 2bc\cos A$

Area of triangle = $\frac{1}{2}ab\sin C$



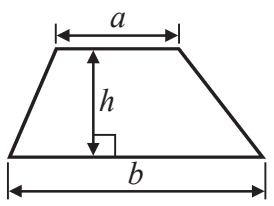
Volume of prism = area of cross section × length

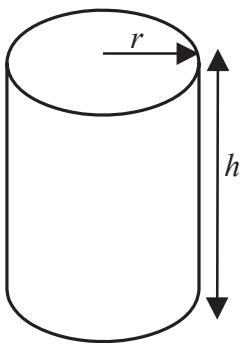


Circumference of circle = $2\pi r$

Area of circle = πr^2

Area of a trapezium = $\frac{1}{2}(a + b)h$





Volume of cylinder = $\pi r^2 h$

Curved surface area of cylinder = $2\pi r h$

The Quadratic Equation
The solutions of $ax^2 + bx + c = 0$, where $a \neq 0$, are given by

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

N 3 6 9 0 4 A 0 2 2 0

Leave blank

Answer ALL TWENTY ONE questions.

Write your answers in the spaces provided.

You must write down all stages in your working.

1. Here are the ingredients needed to make Apple Fool for 6 people.

Apple Fool Ingredients for 6 people
900 g cooking apples 100 g sugar 300 m*l* double cream

(a) Work out the amount of sugar needed to make Apple Fool for 15 people.

..... g
(2)

(b) Work out the amount of cooking apples needed to make Apple Fool for 5 people.

..... g
(2) **Q1**

(Total 4 marks)

N 3 6 9 0 4 A 0 3 2 0

Leave blank

2.

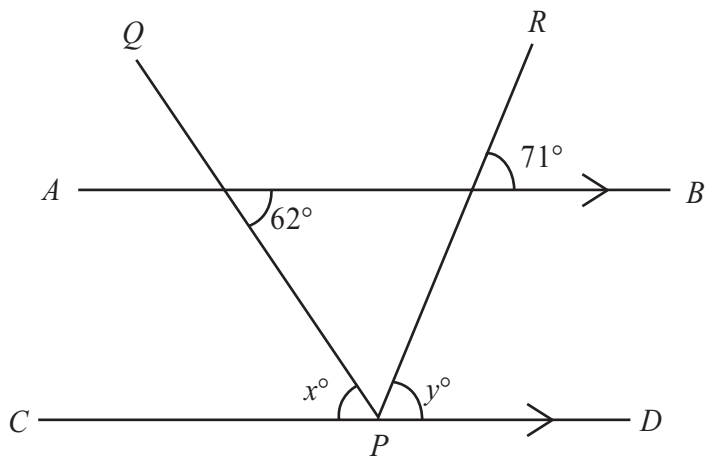


Diagram **NOT** accurately drawn

AB and *CPD* are parallel straight lines.
PQ and *PR* are straight lines.

(a) (i) Find the value of x.

$x =$ .....

(ii) Give a reason for your answer.

.....

(2)

(b) (i) Find the value of y.

$y =$ .....

(ii) Give a reason for your answer.

.....

(2) **Q2**

(Total 4 marks)

3. Three numbers a, b and c have a median of 4 and a range of 7

(a) Find the median of the three numbers $a + 2$, $b + 2$ and $c + 2$

.....

(1)

(b) Find the range of the three numbers $a + 2$, $b + 2$ and $c + 2$

.....

(1) **Q3**

(Total 2 marks)

Leave blank

4. (a) Multiply out $5(n + 6)$

.....
(1)

(b) Simplify $y \times y \times y \times y \times y \times y$

.....
(1)

(c) Solve $4(x - 2) = 3$

$x =$ .....
(3)

Q4

(Total 5 marks)

5. (a) $\frac{3}{10}$ of the members of a tennis club are men.

$\frac{5}{6}$ of these men are right-handed.

Work out the fraction of the members of the tennis club who are right-handed men.

.....
(2)

(b) $\frac{7}{12}$ of the members of a badminton club are women.

$\frac{3}{8}$ of the members of the badminton club wear glasses.

Work out the smallest possible number of members of the badminton club.

.....
(2)

Q5

(Total 4 marks)

Leave blank

6. The table shows information about the volume of water, in m^3, used by each of 80 families in one year.

Volume of water (V m^3)	**Frequency**
$0 < V \leqslant 100$	2
$100 < V \leqslant 200$	4
$200 < V \leqslant 300$	6
$300 < V \leqslant 400$	18
$400 < V \leqslant 500$	44
$500 < V \leqslant 600$	6

(a) Write down the modal class.

.....

(1)

(b) Work out an estimate for the mean volume of water used by the 80 families.

..... m^3

(4)

N 3 6 9 0 4 A 0 6 2 0

Leave blank

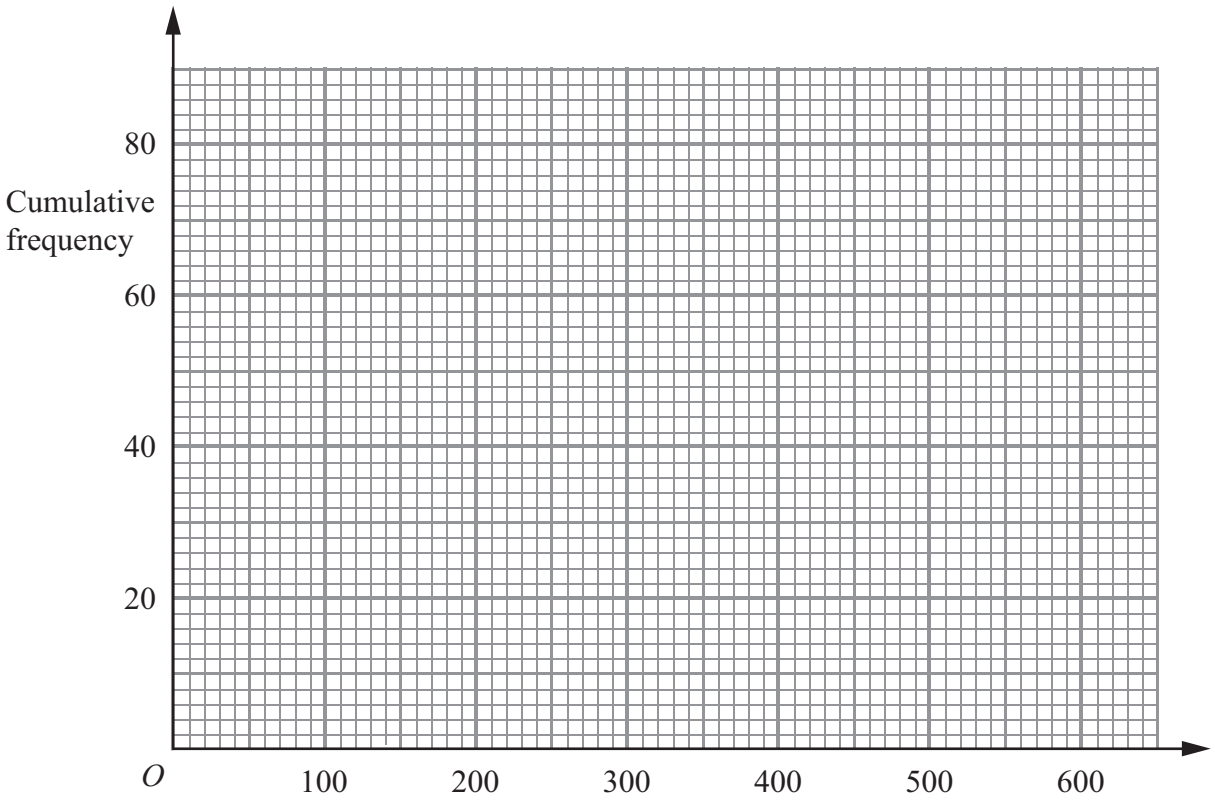
(c) Complete the cumulative frequency table.

Volume of water (V m^3)	**Cumulative frequency**
$0 < V \leqslant 100$	
$0 < V \leqslant 200$	
$0 < V \leqslant 300$	
$0 < V \leqslant 400$	
$0 < V \leqslant 500$	
$0 < V \leqslant 600$	

(1)

(d) On the grid, draw a cumulative frequency graph for your table.

(2)



(e) Use your graph to find an estimate for the median volume of water used by the 80 families.

..... m^3

(2)

Q6

(Total 10 marks)

Leave blank

7.

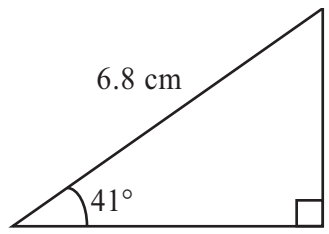


Diagram **NOT** accurately drawn

Work out the value of x.
Give your answer correct to 3 significant figures.

x = ...

Q7

(Total 3 marks)

8. Jade has tax deducted from her income at the rate of 24%.
Last month, after tax had been deducted, \$1786 of her income remained.
Calculate her income last month before the tax was deducted.

\$ .....

Q8

(Total 3 marks)

N 3 6 9 0 4 A 0 8 2 0

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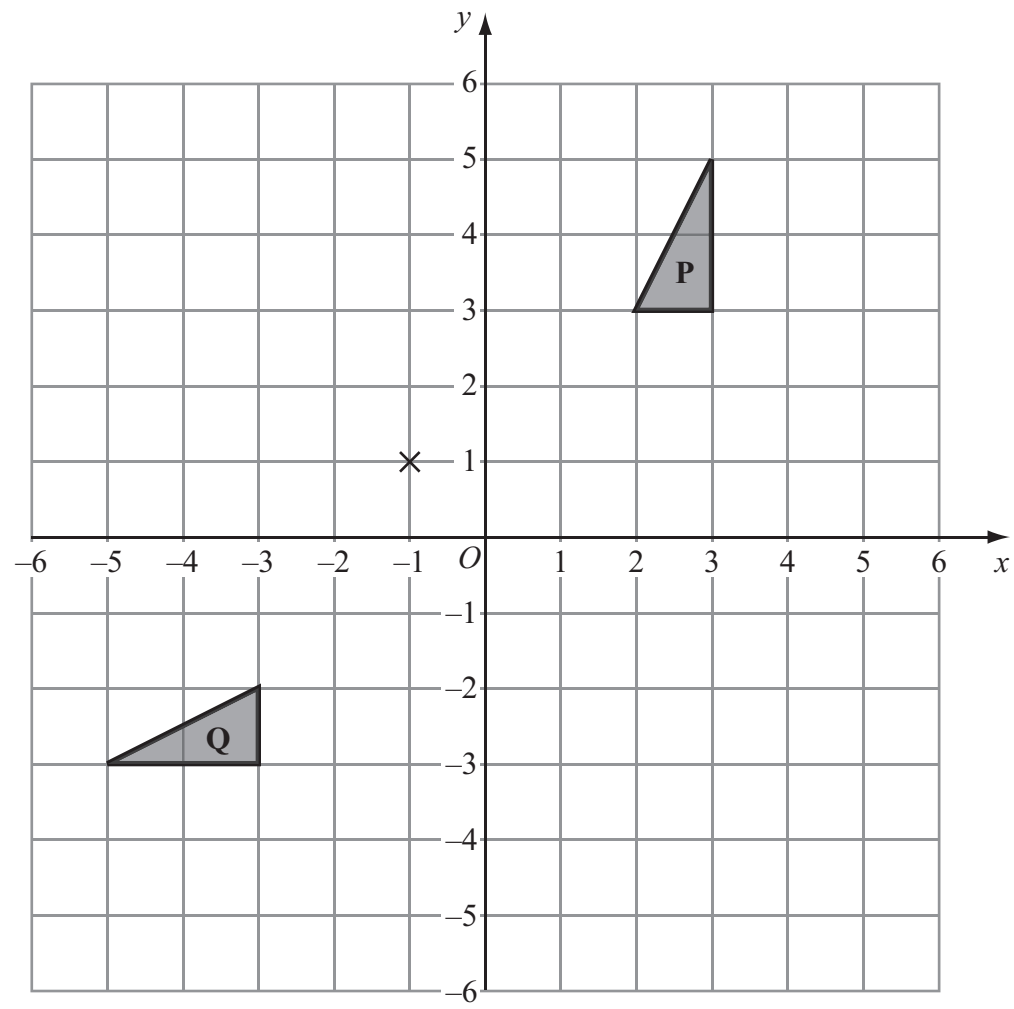
9.



(a) Describe fully the single transformation which maps triangle **P** onto triangle **Q**.

.....

(2)

(b) Rotate triangle **Q** through 90° anti-clockwise about the point (−1, 1).
Label the new triangle **R**.

(2)

(c) Describe fully the single transformation which maps triangle **P** onto triangle **R**.

.....

(2)

Q9

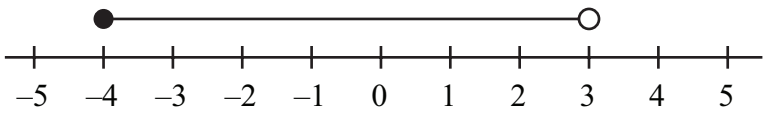
(Total 6 marks)

N 3 6 9 0 4 A 0 9 2 0

Turn over

Leave blank

10. (a)



An inequality is shown on the number line.

Write down this inequality.

.....

(2)

(b) (i) Solve the inequality $2x + 9 > 1$

.....

(ii) n is a **negative** integer.

Write down all the values of n which satisfy $2n + 9 > 1$

.....

(4) **Q10**

(Total 6 marks)

N 3 6 9 0 4 A 0 1 0 2 0

Leave blank

11.

Diagram **NOT** accurately drawn

The diagram shows a fish bowl.
The water surface is a circle with a diameter of 16 cm.

(a) Work out the area of a circle with a diameter of 16 cm.
Give your answer correct to 3 significant figures.

..... cm^2
(2)

(b) The volume of water, V cm^3, in the fish bowl may be found using the formula

$$V = \frac{1}{6}\pi h(3x^2 + 3y^2 + h^2)$$

Find the value of V when $h = 16.4$
$x = 6.5$
and $y = 8$

Give your answer correct to 3 significant figures.

V = ...
(2)

Q11

(Total 4 marks)

N 3 6 9 0 4 A 0 1 1 2 0

Turn over

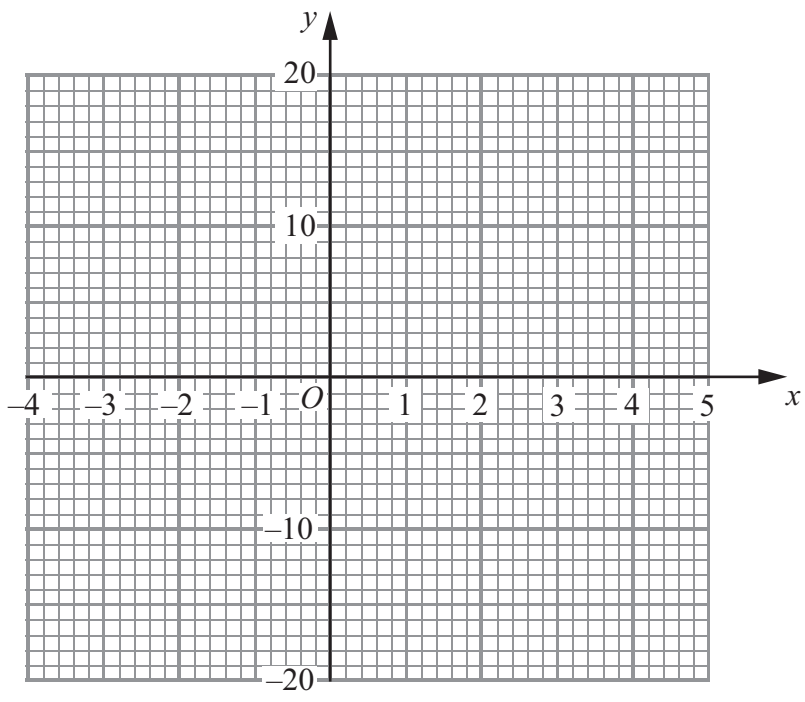
Leave blank

12. (a) Complete the table of values for $y = x^3 - 12x + 2$

x	−3	−2	−1	0	1	2	3	4
y	11						−7	18

(2)

(b) On the grid, draw the graph of $y = x^3 - 12x + 2$ for values of x from −3 to 4



(2)

N 3 6 9 0 4 A 0 1 2 2 0

Leave blank

(c) For the curve with equation $y = x^3 - 12x + 2$

(i) find $\frac{dy}{dx}$

.....

(ii) find the gradient of the curve at the point where $x = 5$

.....

(4) **Q12**

(Total 8 marks)

13.

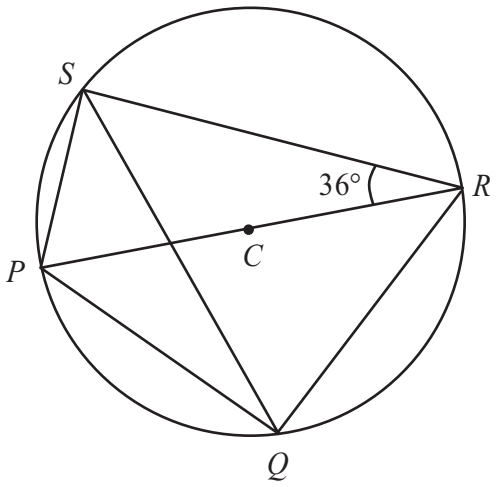


Diagram **NOT** accurately drawn

P, *Q*, *R* and *S* are points on a circle, centre *C*.
PCR is a straight line.
Angle *PRS* = 36°.

Calculate the size of angle *RQS*.
Give a reason for each step in your working.

.....°

Q13

(Total 4 marks)

N 3 6 9 0 4 A 0 1 3 2 0

Turn over

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14.

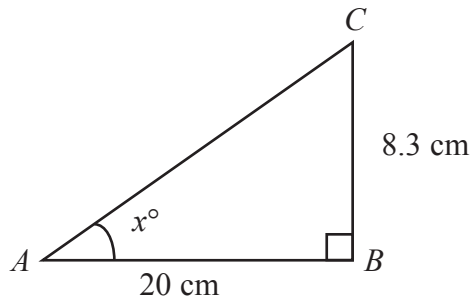

Diagram **NOT** accurately drawn

Triangle ABC is right-angled at B.
$AB = 20$ cm, correct to 1 significant figure.
$BC = 8.3$ cm, correct to 2 significant figures.

(a) Write down the lower bound for the length of

(i) AB,

..... cm

(ii) BC.

..... cm
(2)

(b) Calculate the lower bound for the area of triangle ABC.

..... cm^2
(2)

(c) Calculate the lower bound for the value of tan $x°$.

.....
(3)

Q14

(Total 7 marks)

N 3 6 9 0 4 A 0 1 4 2 0

Leave blank

15. The light intensity, E, at a surface is inversely proportional to the square of the distance, r, of the surface from the light source.

$E = 4$ when $r = 50$

(a) Express E in terms of r.

$E =$ .....

(3)

(b) Calculate the value of E when $r = 20$

$E =$ .....

(1)

(c) Calculate the value of r when $E = 1600$

$r =$ .....

(2)

(Total 6 marks)

Q15

16. Show that $(3-\sqrt{5})^2 = 14-6\sqrt{5}$

Q16

(Total 2 marks)

N 3 6 9 0 4 A 0 1 5 2 0

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17.

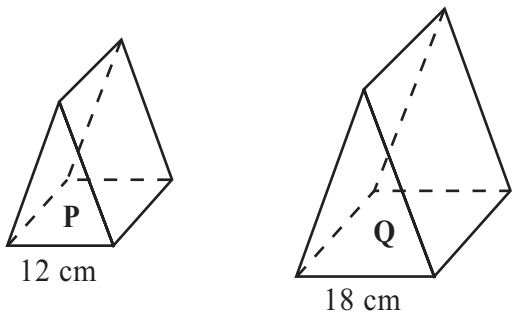

Diagram **NOT** accurately drawn

Two prisms, **P** and **Q**, are similar.
The cross-section of prism **P** is a triangle with a base of length 12 cm.
The cross-section of prism **Q** is a triangle with a base of length 18 cm.
The total surface area of prism **P** is 544 cm^2.

Calculate the total surface area of prism **Q**.

..... cm^2 **Q17**

(Total 3 marks)

18. Simplify fully $\dfrac{x^2+6x}{x^2-36}$

..... **Q18**

(Total 3 marks)

N 3 6 9 0 4 A 0 1 6 2 0

Leave blank

19.

Ashok has six coins in his pocket.
He has one 5 cent coin, two 10 cent coins and three 20 cent coins.
He takes at random a coin from his pocket.
He records its value and puts the coin back into his pocket.
He then takes at random a second coin from his pocket and records its value.

(a) Calculate the probability that he takes two 20 cent coins.

.....
(2)

(b) Calculate the probability that the second coin he takes has a higher value than the first coin he takes.

.....
(3)

Q19

(Total 5 marks)

N 3 6 9 0 4 A 0 1 7 2 0

Leave blank

20.

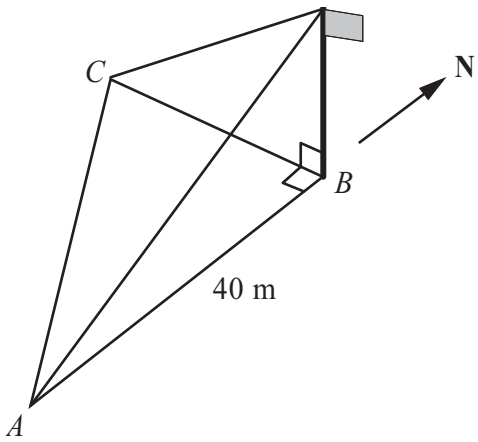

Diagram **NOT** accurately drawn

A, *B* and *C* are points on horizontal ground.
C is due West of *B*.
A is due South of *B* and *AB* = 40 m.
There is a vertical flagpole at *B*.
From *A*, the angle of elevation of the top of the flagpole is 13°.
From *C*, the angle of elevation of the top of the flagpole is 19°.

Calculate the distance *AC*.
Give your answer correct to 3 significant figures.

..... m

(Total 6 marks)

Q20

N 3 6 9 0 4 A 0 1 8 2 0

Leave blank

21. Solve the simultaneous equations

$$y = 2x^2$$
$$y = 3x + 14$$

.....

Q21

(Total 5 marks)

TOTAL FOR PAPER: 100 MARKS

END

N 3 6 9 0 4 A 0 1 9 2 0

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N 3 6 9 0 4 A 0 2 0 2 0

Centre No.						Paper Reference							Surname	Initial(s)
Candidate No.						4	4	0	0	/	3	H	Signature	

Paper Reference(s)

4400/3H

Examiner's use only

Team Leader's use only

London Examinations IGCSE

Mathematics

Paper 3H

Higher Tier

Thursday 11 November 2010 – Morning

Time: 2 hours

Materials required for examination
Ruler graduated in centimetres and millimetres, protractor, compasses, pen, HB pencil, eraser, calculator. Tracing paper may be used.

Items included with question papers
Nil

Instructions to Candidates

In the boxes above, write your centre number, candidate number, your surname, initials and signature.
Check that you have the correct question paper.
Answer ALL the questions. Write your answers in the spaces provided in this question paper.
Without sufficient working, correct answers may be awarded no marks.
You must NOT write on the formulae page. Anything you write on the formulae page will gain NO credit.
If you need more space to complete your answer to any question, use additional answer sheets.

Information for Candidates

The marks for individual questions and the parts of questions are shown in round brackets: e.g. **(2)**.
There are 21 questions in this question paper. The total mark for this paper is 100.
There are 24 pages in this question paper. Any blank pages are indicated.
You may use a calculator.

Advice to Candidates

Write your answers neatly and in good English.

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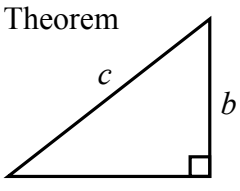
IGCSE MATHEMATICS 4400
FORMULA SHEET – HIGHER TIER

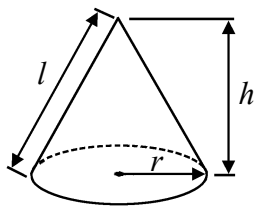
Pythagoras' Theorem



$a^2 + b^2 = c^2$

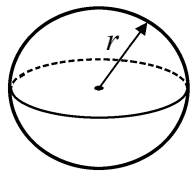
Volume of cone = $\frac{1}{3}\pi r^2 h$

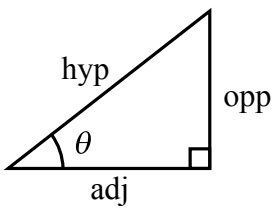
Curved surface area of cone = $\pi r l$



Volume of sphere = $\frac{4}{3}\pi r^3$

Surface area of sphere = $4\pi r^2$





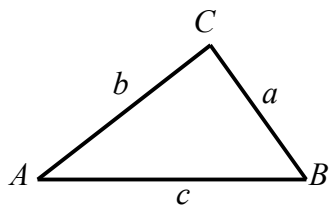
adj = hyp × cos θ
opp = hyp × sin θ
opp = adj × tan θ

or $\sin\theta = \frac{\text{opp}}{\text{hyp}}$

$\cos\theta = \frac{\text{adj}}{\text{hyp}}$

$\tan\theta = \frac{\text{opp}}{\text{adj}}$

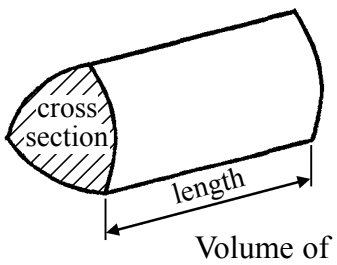
In any triangle ABC



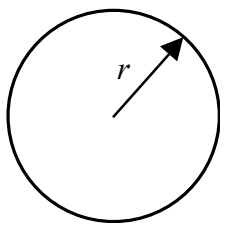
Sine rule: $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

Cosine rule: $a^2 = b^2 + c^2 - 2bc\cos A$

Area of triangle = $\frac{1}{2}ab\sin C$



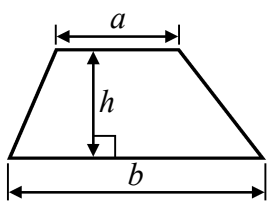
Volume of prism = area of cross section × length

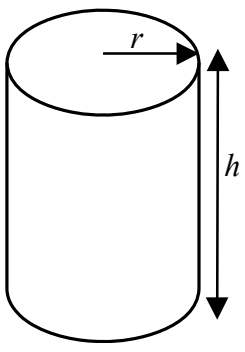


Circumference of circle = $2\pi r$

Area of circle = πr^2

Area of a trapezium = $\frac{1}{2}(a + b)h$





Volume of cylinder = $\pi r^2 h$

Curved surface area of cylinder = $2\pi r h$

The Quadratic Equation
The solutions of $ax^2 + bx + c = 0$, where $a \neq 0$, are given by

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

H 3 7 7 7 0 A 0 2 2 4

Leave blank

Answer ALL TWENTY ONE questions.

Write your answers in the spaces provided.

You must write down all stages in your working.

1. The table shows information about the numbers of children in 25 families.

Number of children in the family	Frequency
1	4
2	9
3	8
4	0
5	4

Work out the mean number of children in these 25 families.

.....

Q1

(Total 3 marks)

Leave blank

2. (a) Expand

(i) $4(c - 3)$

.....

(1)

(ii) $d(d^2 + 4)$

.....

(2)

(b) Factorise $3x - 2x^2$

.....

(2)

Q2

(Total 5 marks)

Leave blank

3. *ABC* is an isosceles triangle.
BA = *BC*.
PA is parallel to *BC*.
Angle *ACB* = 70°.

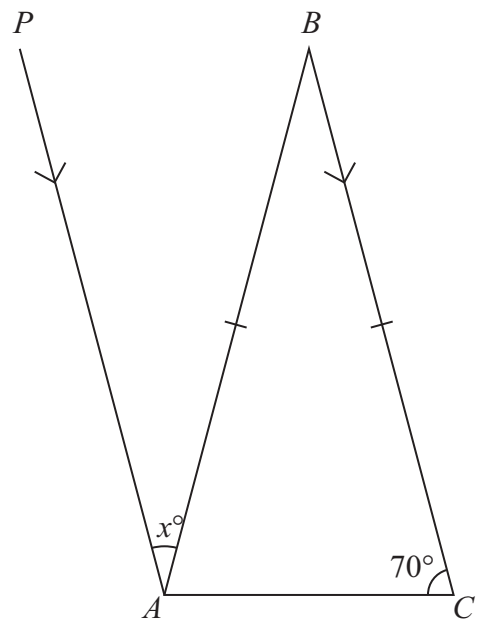


Diagram **NOT** accurately drawn

Find the value of *x*.
Give a reason for each step in your working.

x = ...

(Total 4 marks)

Q3

Turn over

Leave blank

4.

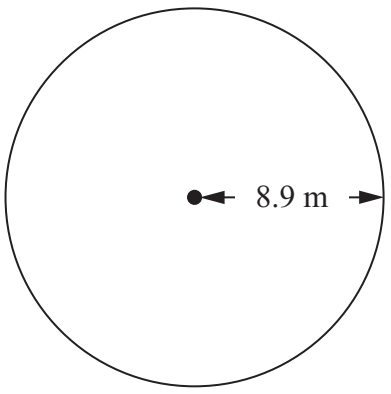


Diagram **NOT** accurately drawn

A circular pond has radius 8.9 m.

(a) Find the area of the pond.
Write down all the figures on your calculator display.
State the units of your answer.

....

(3)

(b) Give the value of your area correct to 2 significant figures.

.....

(1)

Q4

(Total 4 marks)

Leave blank

5. (a) Show that $\frac{6}{7} \div 4 = \frac{3}{14}$

(2)

(b) Show that $3\frac{2}{5} - 1\frac{2}{3} = 1\frac{11}{15}$

(3)

Q5

(Total 5 marks)

Leave blank

6. (a) Solve $7x + 3 = 2x - 4$

$x =$ .....

(3)

(b) Solve $\dfrac{16 - 5y}{3} = 2$

$y =$ .....

(3)

Q6

(Total 6 marks)

Leave blank

7. $\mathcal{E}$ = {Clothes}
A = {Mr Smith's clothes}
B = {Hats}
C = {Mrs Koshi's hats}

(a) (i) Describe the members of the set $A \cap B$

.....

.....

(ii) How many members has the set $A \cap C$?

.....

(2)

(b)

A	B	C	$\mathcal{E}$	$\in$	$\emptyset$	$\cap$	$\cup$

Use a letter or symbol from the box to make each of the following a true statement.

(i) $B \cup C$ = ...

(ii) Mr Smith's favourite shirt ..... A

(2)

Q7

(Total 4 marks)

Leave blank

8. (a)

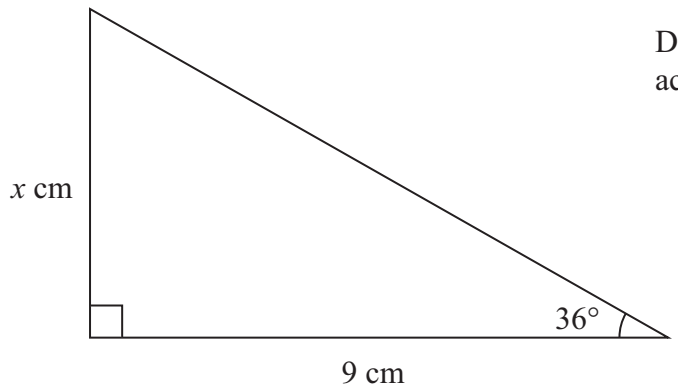


Diagram **NOT** accurately drawn

Calculate the value of x.
Give your answer correct to 3 significant figures.

x = ...

(3)

(b)

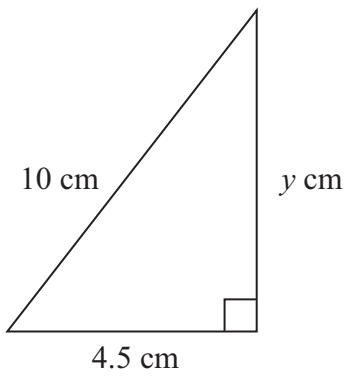


Diagram **NOT** accurately drawn

Calculate the value of y.
Give your answer correct to 3 significant figures.

y = ...

(3)

(Total 6 marks)

Q8

Leave blank

9. (a) Three positive whole numbers are all different.
They have a median of 5 and a mean of 4
Find the three numbers.

.....
(2)

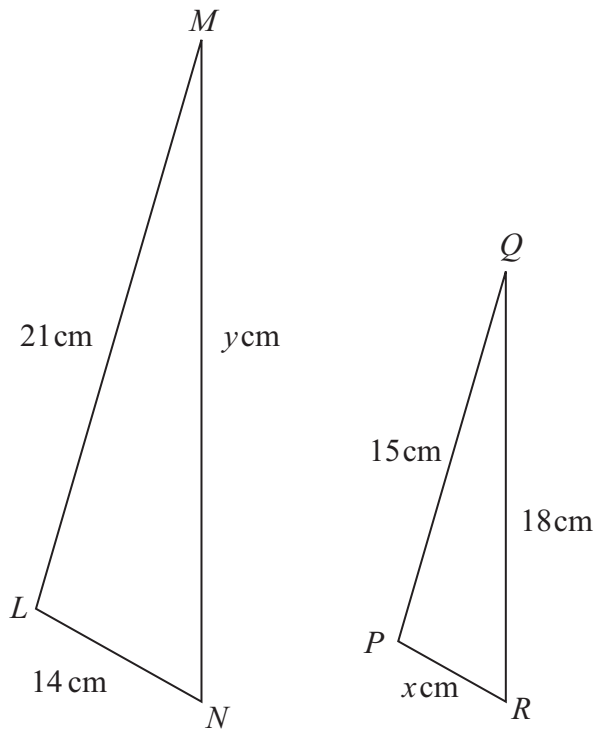
(b) Find four whole numbers which have a mode of 5 and a median of 6

.....
(2) **Q9**

(Total 4 marks)

Leave blank

10. Here are two similar triangles.



Diagrams **NOT** accurately drawn

LM corresponds to *PQ*.
MN corresponds to *QR*.

(a) Find the value of *x*.

x = ...

(2)

(b) Find the value of *y*.

y = ...

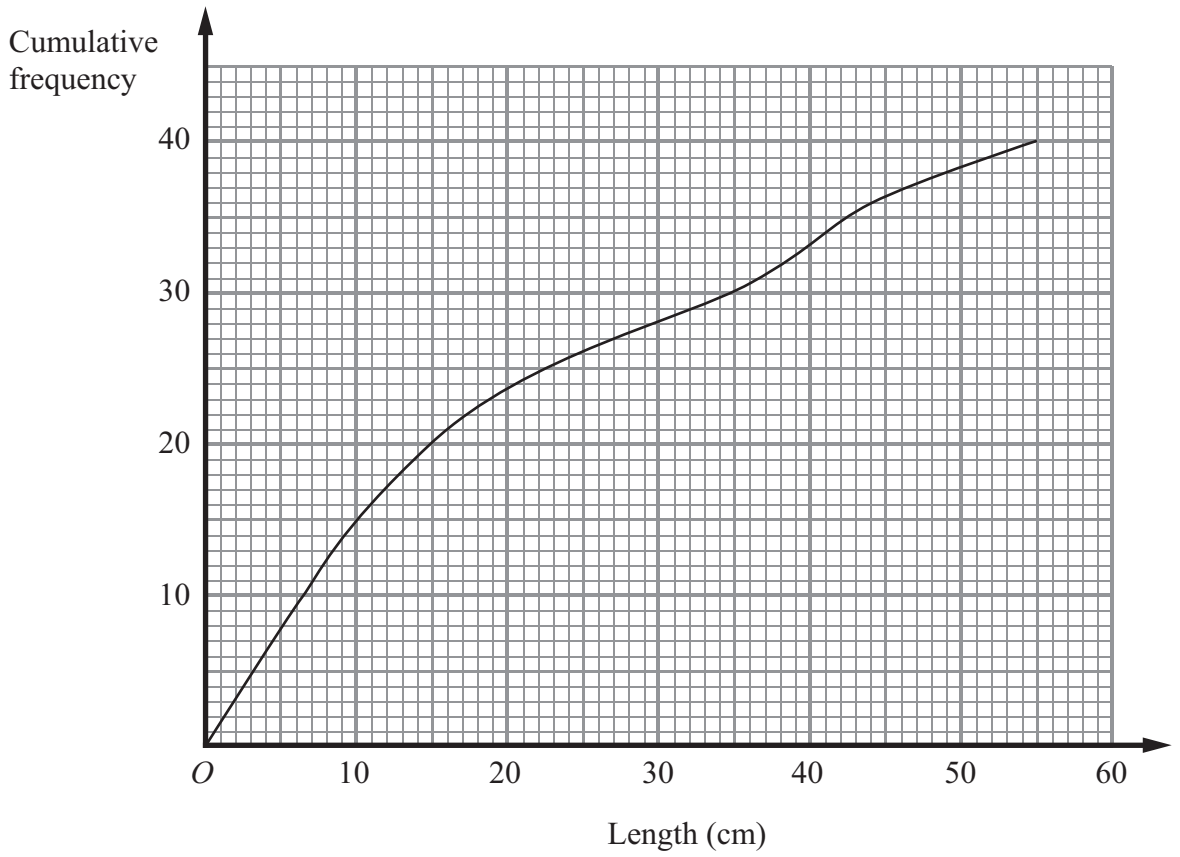
(2)

Q10

(Total 4 marks)

Leave blank

11. The cumulative frequency graph gives information about the lengths of 40 tree branches.



(a) Find an estimate for the median length.

..... cm
(2)

(b) Find an estimate for the interquartile range of the lengths.

..... cm
(2)

(c) Find an estimate for the number of branches with lengths of more than 44 cm.

.....
(1)

(Total 5 marks)

Q11

Leave blank

12. Solve the simultaneous equations

$$2x - 5y = 13$$
$$6x + 3y = 3$$

$x =$ .....

$y =$ .....

(Total 3 marks)

Q12

13. (a) Factorise $x^2 - 8x + 15$

.....

(2)

(b) Factorise $x^2 - 49$

.....

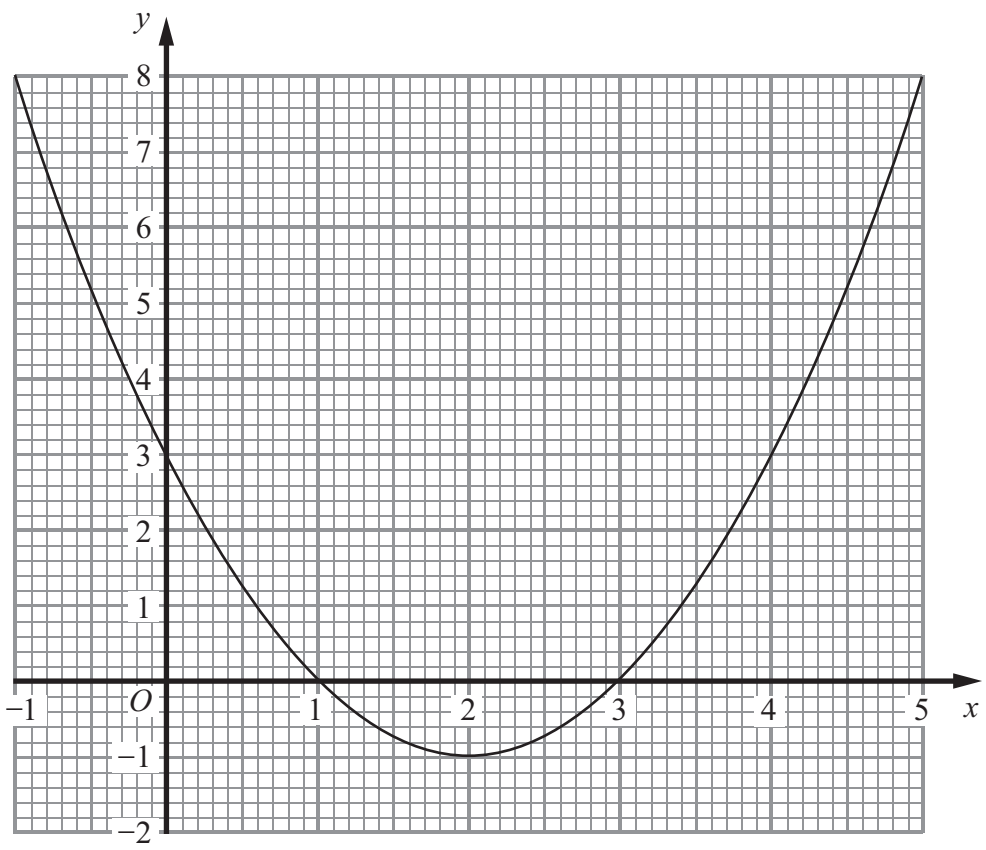
(1)

(Total 3 marks)

Q13

Leave blank

14. The diagram shows the graph of $y = x^2 - 4x + 3$ for $-1 \leqslant x \leqslant 5$



(a) Use the graph to solve the equation $x^2 - 4x + 3 = 2$

.....

(2)

(b) By drawing a suitable straight line on the diagram, solve the equation $x^2 - 4x + 3 = x + 1$

.....

(3)

Q14

(Total 5 marks)

H 3 7 7 7 0 A 0 1 5 2 4

Turn over

Leave blank

15. A solid is made from a cylinder and a hemisphere.
The cylinder has radius 1.5 cm and height 4 cm.
The hemisphere has radius 1.5 cm.

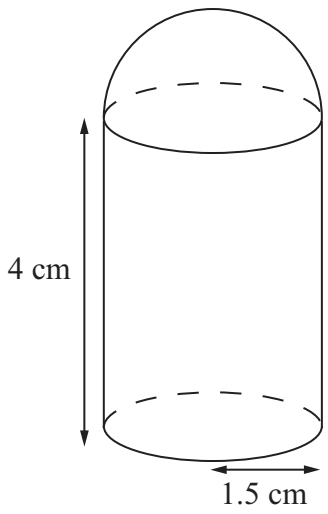


Diagram **NOT** accurately drawn

Work out the total volume of the solid.
Give your answer correct to 3 significant figures.

..... cm^3

Q15

(Total 5 marks)

H 3 7 7 7 0 A 0 1 6 2 4

Leave blank

16. A curve has equation $y = x^3 + 3x^2 - 24x$

(a) Find $\frac{dy}{dx}$

.....

(3)

(b) Find the coordinates of the turning points of the curve.

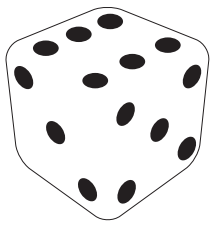
.....

(5) **Q16**

(Total 8 marks)

Leave blank

17. Here is a fair dice.



It has six faces numbered 1, 2, 3, 4, 5 and 6
The dice shows a score of 6

Hari throws the dice three times.

(a) Work out the probability that the sum of the scores is 3

.....

(2)

(b) Work out the probability that the dice shows a score of 1 on exactly one of the three throws.

.....

(3) **Q17**

(Total 5 marks)

Leave blank

18. Make x the subject of $P = \dfrac{100\,(y - x)}{x}$

$x =$ .....

(Total 4 marks)

Q18

Leave blank

19.

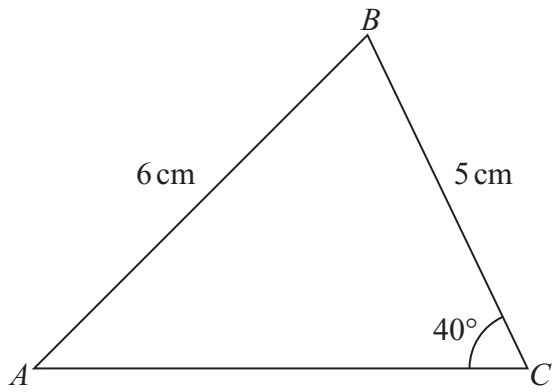


Diagram **NOT** accurately drawn

Calculate the area of triangle *ABC*.
Give your answer correct to 3 significant figures.

..... cm^2

Q19

(Total 6 marks)

Leave blank

20. (a) Write $\frac{1}{16}$ as a power of 2

.....

(2)

(b) Write 2 as a power of 8

.....

(2)

(c) Rationalise the denominator of $\frac{a+\sqrt{a}}{\sqrt{a}}$ where a is a prime number.

Simplify your answer as much as possible.

.....

(2) **Q20**

(Total 6 marks)

Leave blank

21. (a) $f(x) = 2x + 1$

Express the inverse function f^{-1} in the form $f^{-1}(x) = \ldots$

$f^{-1}(x) =$ .....

(2)

(b) $g(x) = 2 + x$
$h(x) = x^2$

Solve the equation $hg(x) = h(x)$.

$x =$ .....

(3)

Q21

(Total 5 marks)

TOTAL FOR PAPER: 100 MARKS

END

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Centre No.						Paper Reference							Surname	Initial(s)
Candidate No.						4	4	0	0	/	4	H	Signature	

Paper Reference(s)

4400/4H

Examiner's use only

Team Leader's use only

London Examinations IGCSE

Mathematics

Paper 4H

Higher Tier

Tuesday 16 November 2010 – Morning

Time: 2 hours

Materials required for examination
Ruler graduated in centimetres and millimetres, protractor, compasses, pen, HB pencil, eraser, calculator. Tracing paper may be used.

Items included with question papers
Nil

Instructions to Candidates

In the boxes above, write your centre number, candidate number, your surname, initials and signature.
Check that you have the correct question paper.
Answer ALL the questions. Write your answers in the spaces provided in this question paper.
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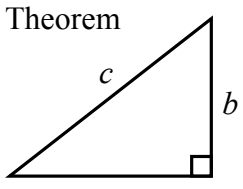
IGCSE MATHEMATICS 4400
FORMULA SHEET – HIGHER TIER

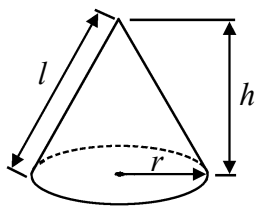
Pythagoras' Theorem



$a^2 + b^2 = c^2$

Volume of cone = $\frac{1}{3}\pi r^2 h$

Curved surface area of cone = $\pi r l$



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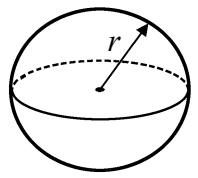
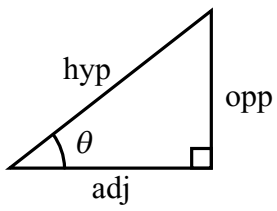
Surface area of sphere = $4\pi r^2$





adj = hyp × cos θ
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opp = adj × tan θ

or $\sin\theta = \frac{\text{opp}}{\text{hyp}}$

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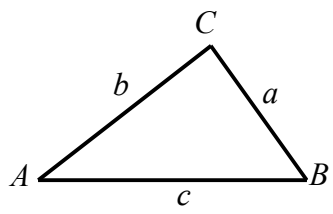
$\tan\theta = \frac{\text{opp}}{\text{adj}}$

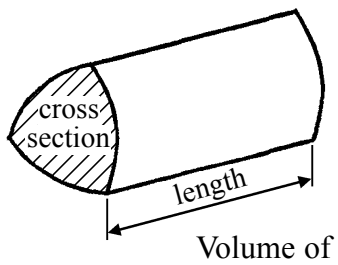
In any triangle ABC



Sine rule: $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

Cosine rule: $a^2 = b^2 + c^2 - 2bc\cos A$

Area of triangle = $\frac{1}{2}ab\sin C$



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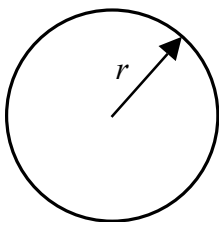
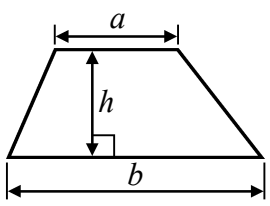
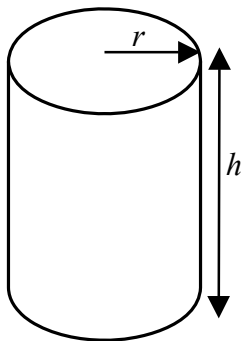


Circumference of circle = $2\pi r$

Area of circle = πr^2

Area of a trapezium = $\frac{1}{2}(a + b)h$





Volume of cylinder = $\pi r^2 h$

Curved surface area of cylinder = $2\pi rh$

The Quadratic Equation
The solutions of $ax^2 + bx + c = 0$, where $a \neq 0$, are given by

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

H 3 7 7 7 1 A 0 2 2 0

Leave blank

Answer ALL TWENTY TWO questions.

Write your answers in the spaces provided.

You must write down all stages in your working.

1. (a) Use your calculator to work out the value of

$$\frac{3.7\times2.9}{5.3}+1.4$$

Give your answer as a decimal.
Write down all the figures on your calculator display.

.....

(2)

(b) Give your answer to part (a) correct to 2 decimal places.

.....

(1)

(Total 3 marks)

Q1

2. Anya flew from Kuala Lumpur to Singapore.
The average speed for the journey was 248 km/h.
The journey time was 1 hour 15 minutes.

Work out the distance from Kuala Lumpur to Singapore.

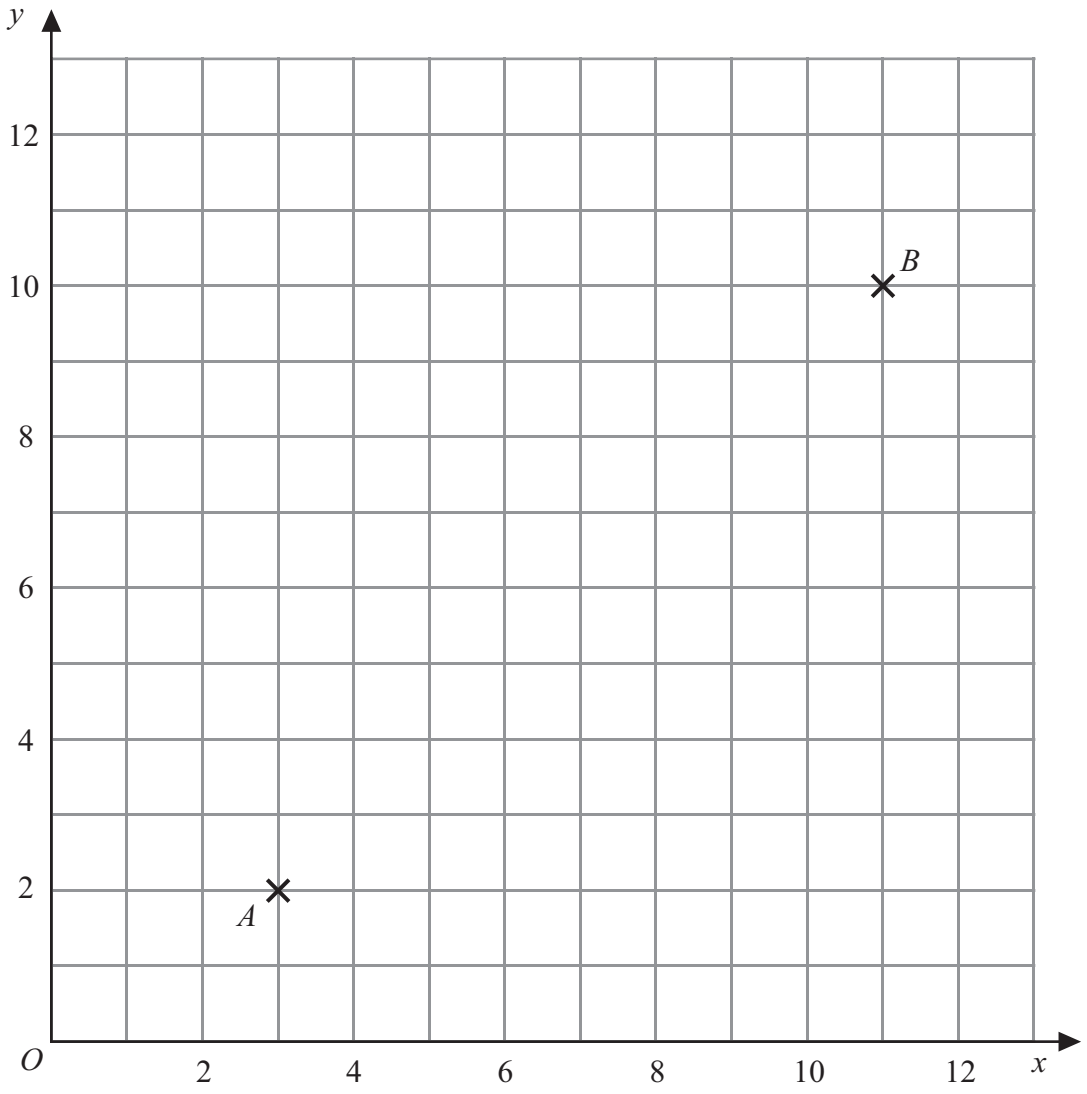
..... km

(Total 3 marks)

Q2

Leave blank

3.



The point A has coordinates (3, 2) and the point B has coordinates (11, 10).

(a) Find the coordinates of the midpoint of AB.

(..... , ...)

(2)

AB is a diameter of a circle.
CD is another diameter of this circle.
CD is perpendicular to AB.

(b) Find the coordinates of C and the coordinates of D.

C (..... , ...)

D (..... , ...)

(2)

Q3

(Total 4 marks)

Leave blank

4. A bag contains some shapes.
Each shape is a circle or a triangle or a square.
Lewis takes at random a shape from the bag.
The probability that he will take a circle is 0.3
The probability that he will take a triangle is 0.1

(a) Work out the probability that he will take a square.

.....
(2)

(b) Work out the probability that he will take a shape with straight sides.

.....
(2)

Grace takes at random one of the shapes from the bag and then replaces the shape.
She does this 160 times.

(c) Work out an estimate for the number of times she will take a circle.

.....
(2) **Q4**

(Total 6 marks)

Leave blank

5.

1 euro = £0.72
£1 = 221 Sri Lankan rupees

Change 50 euros to Sri Lankan rupees.

..... Sri Lankan rupees

Q5

(Total 2 marks)

6. $V = \frac{2}{3}hy^2$

(a) $h = 2.6$ $y = 1.5$
Work out the value of V.

$V =$ .....

(2)

(b) $V = 35$ $y = 2.5$
Work out the value of h.

$h =$ .....

(2)

(c) Make y the subject of the formula $V = \frac{2}{3}hy^2$

$y =$ .....

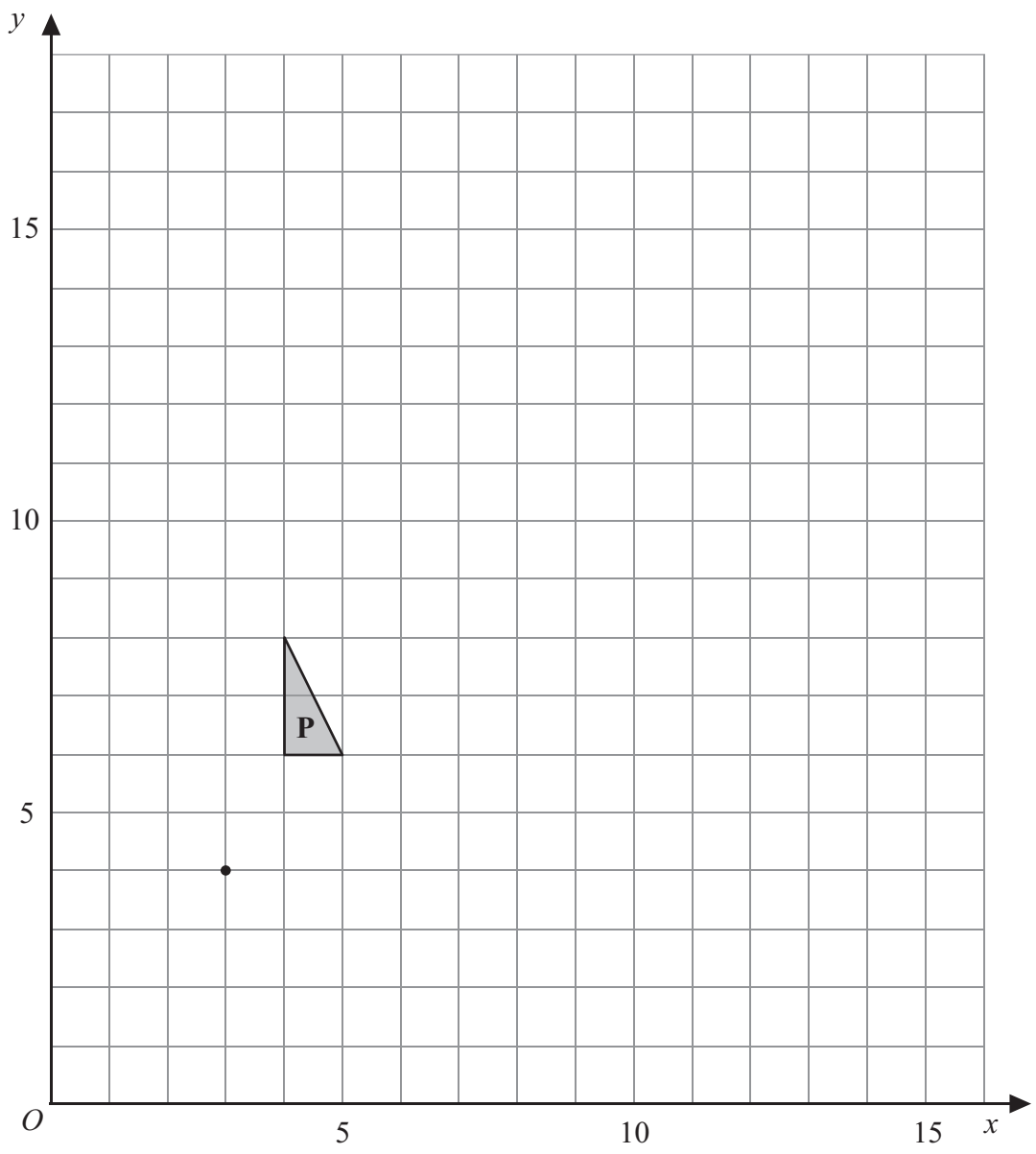
(2)

Q6

(Total 6 marks)

Leave blank

7.



(a) On the grid, enlarge triangle **P** with scale factor 3 and centre (3, 4).
Label the new triangle **Q**.

(3)

(b) On the grid, translate triangle **Q** by the vector $\begin{pmatrix} 4 \\ -8 \end{pmatrix}$

Label the new triangle **R**.

(2)

(c) Describe fully the single transformation which maps triangle **P** onto triangle **R**.

.....

.....

(2)

Q7

(Total 7 marks)

Leave blank

8. The scale of a map is 1 : 50 000
On the map, the distance between two schools is 19.6 cm.

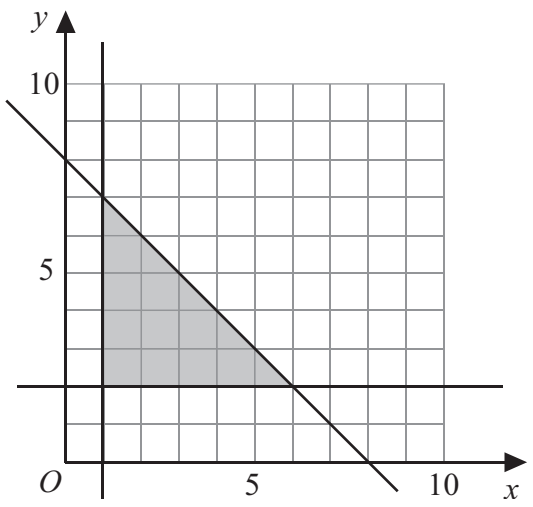
Work out the real distance between the schools.
Give your answer in kilometres.

..... km

(Total 3 marks)

Q8

9.



Write down the 3 inequalities that define the shaded region.

.....

.....

.....

(Total 3 marks)

Q9

Leave blank

10.

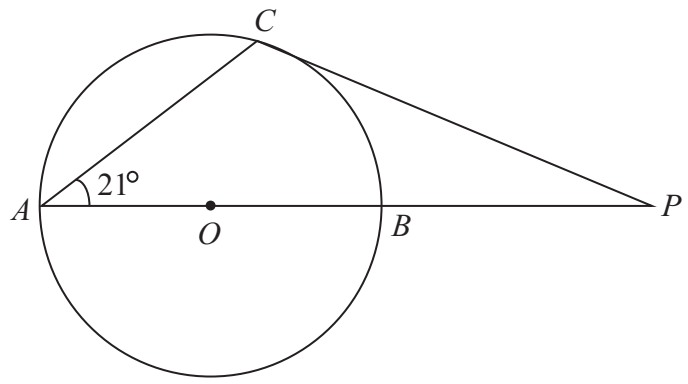


Diagram **NOT** accurately drawn

A, *B* and *C* are points on a circle, centre *O*.
AB is a diameter of the circle.
PC is a tangent to the circle.
ABP is a straight line.
Angle *BAC* = 21°.

Work out the size of angle *APC*.

..... °

Q10

(Total 4 marks)

Turn over

Leave blank

11. Tom buys a painting for $1350
He sells it for $1269

(a) Work out his percentage loss.

..... %
(3)

Kelly bought a boat.
Later, she sold the boat for $9519
She made a profit of 14%.

(b) Work out the original price of the boat.

$ .....
(3)

Q11

(Total 6 marks)

Leave blank

12. The line **L** cuts the *y*-axis at (0, 5).
L also passes through the point (2, 1).

(a) Find the equation of the line **L**.

.....

(3)

(b) Find the equation of the line which is parallel to **L** and which passes through the point (3, 0).

.....

(2) **Q12**

(Total 5 marks)

13. The size of each interior angle of a regular polygon is 11 times the size of each exterior angle.

Work out the number of sides the polygon has.

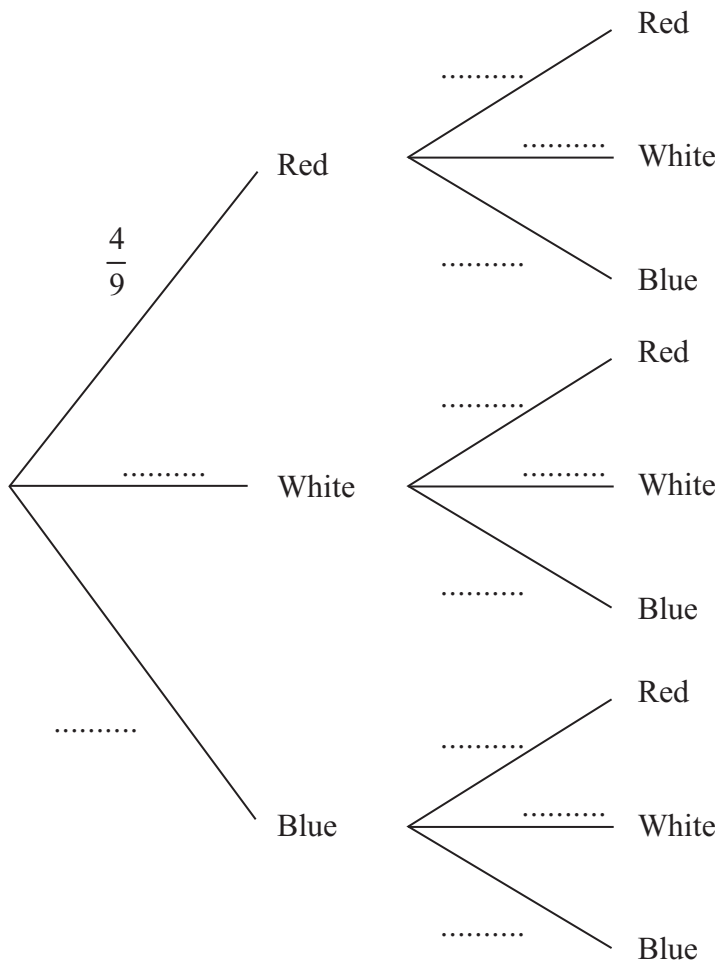
..... **Q13**

(Total 4 marks)

Leave blank

14. There are 9 beads in a bag.
4 of the beads are red.
3 of the beads are white.
2 of the beads are blue.
Sanjay takes at random a bead from the bag and does not replace it.
He then takes at random a second bead from the bag.

(a) Complete the probability tree diagram.



(3)

(b) Calculate the probability that one of Sanjay's beads is red and his other bead is blue.

.....

(3)

(Total 6 marks)

Q14

Leave blank

15. (a) Work out $(9 \times 10^8) \times (4 \times 10^6)$
Give your answer in standard form.

.....

(1)

(b) $x = 7 \times 10^m$ and $y = 5 \times 10^n$, where m and n are integers.

(i) It is given that $xy = 3.5 \times 10^{12}$
Show that $m + n = 11$

(ii) It is also given that $\frac{x}{y} = 1.4 \times 10^{27}$

Find the value of m and the value of n.

$m =$ .....

$n =$ .....

(5)

(Total 6 marks)

Q15

Leave blank

16. P is inversely proportional to V.
$P = 18$ when $V = 24$

(a) Express P in terms of V.

.....

(3)

(b) Find the positive value of V when $P = 3V$

$V =$ .....

(2)

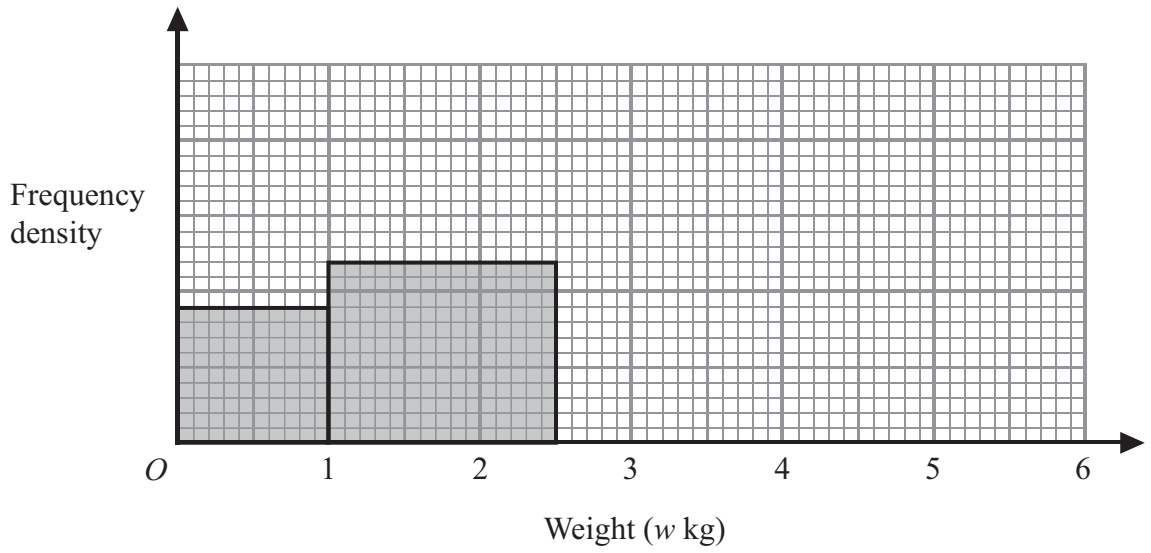
(Total 5 marks)

Q16

Leave blank

17. The incomplete table and histogram show information about the weights of some books.

Weight (w kg)	**Frequency**
$0 < w \leqslant 1$	
$1 < w \leqslant 2.5$	36
$2.5 < w \leqslant 4$	57
$4 < w \leqslant 6$	24



(a) Use the information in the histogram to complete the table.

(1)

(b) Use the information in the table to complete the histogram.

(2) **Q17**

(Total 3 marks)

Leave blank

18. Solve $3x^2 + 8x + 2 = 0$
Give your solutions correct to 3 significant figures.

.....

(Total 3 marks)

Q18

Leave blank

19.

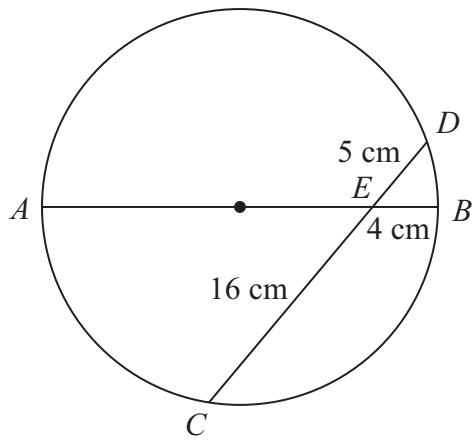


Diagram **NOT** accurately drawn

AB is a diameter of a circle.
CD is a chord of the circle.
AB and *CD* intersect at *E*.
BE = 4 cm, *CE* = 16 cm and *DE* = 5 cm.

(a) Calculate the length of *AE*.

..... cm
(2)

(b) (i) Find the radius of the circle.

..... cm

(ii) Calculate the size of angle *AED*.
Give your answer correct to 1 decimal place.

..... °
(5)

(Total 7 marks)

Q19

Leave blank

20. Solve the simultaneous equations

$$y = x^2$$
$$y = 7x - 10$$

.....

(Total 5 marks)

Q20

Leave blank

21.

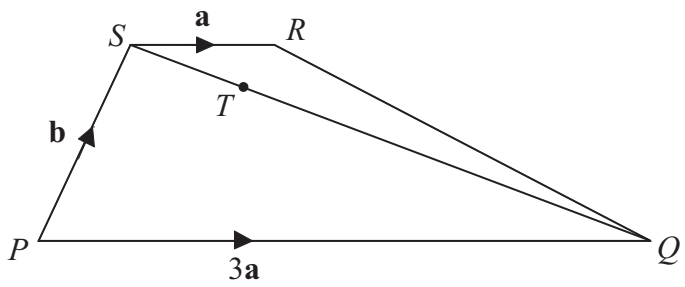


Diagram **NOT** accurately drawn

PQRS is a trapezium with *PQ* parallel to *SR*.

$\overrightarrow{SR} = \mathbf{a}$ $\overrightarrow{PQ} = 3\mathbf{a}$ $\overrightarrow{PS} = \mathbf{b}$

T is the point on *SQ* such that $ST = \frac{1}{4}SQ$.

(a) Find, in terms of **a** and **b**,

(i) $\overrightarrow{PR}$

.....

(ii) $\overrightarrow{SQ}$

.....

(iii) $\overrightarrow{PT}$

.....

(3)

(b) $\overrightarrow{PT} = k\overrightarrow{PR}$ where *k* is a fraction.

(i) What does this result tell you about the points *P*, *T* and *R*?

.....

(ii) Find the value of *k*.

k = ...

(2)

(Total 5 marks)

Q21

Turn over

Leave blank

22. Simplify fully $\quad 1+\dfrac{x^2+x-6}{(x+4)(x-2)}$

.....

Q22

(Total 4 marks)

TOTAL FOR PAPER: 100 MARKS

END

Write your name here

Surname	Other names

Edexcel
International GCSE

Centre Number | Candidate Number

Mathematics A

Paper 4H

Higher Tier

Monday 16 January 2012 – Morning
Time: 2 hours

Paper Reference
4MA0/4H

You must have:
Ruler graduated in centimetres and millimetres, protractor, compasses, pen, HB pencil, eraser, calculator. Tracing paper may be used.

Total Marks

Instructions

- Use **black** ink or ball-point pen.
- **Fill in the boxes** at the top of this page with your name, centre number and candidate number.
- Answer **all** questions.
- Without sufficient working, correct answers may be awarded no marks.
- Answer the questions in the spaces provided
  – *there may be more space than you need.*
- **Calculators may be used.**
- You must **NOT** write anything on the formulae page.
  Anything you write on the formulae page will gain NO credit.

Information

- The total mark for this paper is 100.
- The marks for **each** question are shown in brackets
  – *use this as a guide as to how much time to spend on each question.*

Advice

- Read each question carefully before you start to answer it.
- Check your answers if you have time at the end.

Turn over ▶

P40613A

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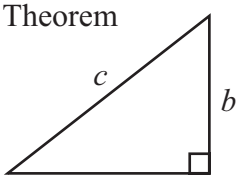
6/6/6/6/3

P 4 0 6 1 3 A 0 1 2 4

PEARSON

International GCSE MATHEMATICS
FORMULAE SHEET – HIGHER TIER

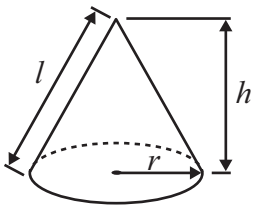
Pythagoras' Theorem



$a^2 + b^2 = c^2$

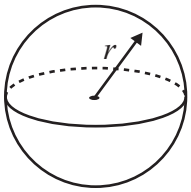
Volume of cone = $\frac{1}{3}\pi r^2 h$

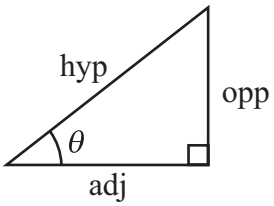
Curved surface area of cone = $\pi r l$



Volume of sphere = $\frac{4}{3}\pi r^3$

Surface area of sphere = $4\pi r^2$





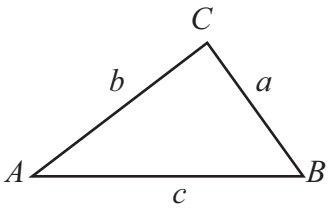
adj = hyp × cos θ
opp = hyp × sin θ
opp = adj × tan θ

or $\sin\theta = \frac{\text{opp}}{\text{hyp}}$

$\cos\theta = \frac{\text{adj}}{\text{hyp}}$

$\tan\theta = \frac{\text{opp}}{\text{adj}}$

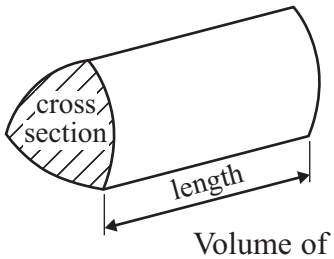
In any triangle ABC



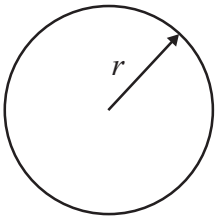
Sine rule: $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

Cosine rule: $a^2 = b^2 + c^2 - 2bc\cos A$

Area of triangle = $\frac{1}{2}ab\sin C$



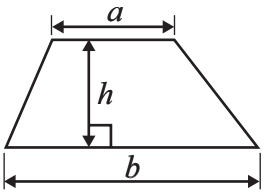
Volume of prism = area of cross section × length

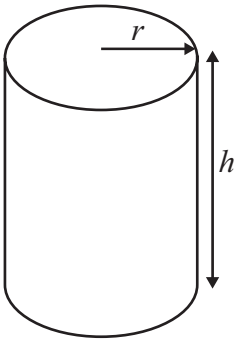


Circumference of circle = $2\pi r$

Area of circle = πr^2

Area of a trapezium = $\frac{1}{2}(a + b)h$





Volume of cylinder = $\pi r^2 h$

Curved surface area of cylinder = $2\pi rh$

The Quadratic Equation
The solutions of $ax^2 + bx + c = 0$, where $a \neq 0$, are given by

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Answer ALL TWENTY TWO questions.

Write your answers in the spaces provided.

You must write down all the stages in your working.

1 Work out the value of $\dfrac{6.7-2.5}{2.8\times 0.4}$

Give your answer as a decimal.

.....

(Total for Question 1 is 2 marks)

2 An aeroplane flew from Qatar to Bahrain.
The distance flown was 135 km.
The average speed was 180 km/h.

Work out the time taken.
Give your answer in minutes.

..... minutes

(Total for Question 2 is 3 marks)

Do NOT write in this space.

3 Solve $7x - 5 = 3x + 2$
Show your working clearly.

$x =$ .....

(Total for Question 3 is 3 marks)

4 Three positive whole numbers have a median of 7 and a mean of 5

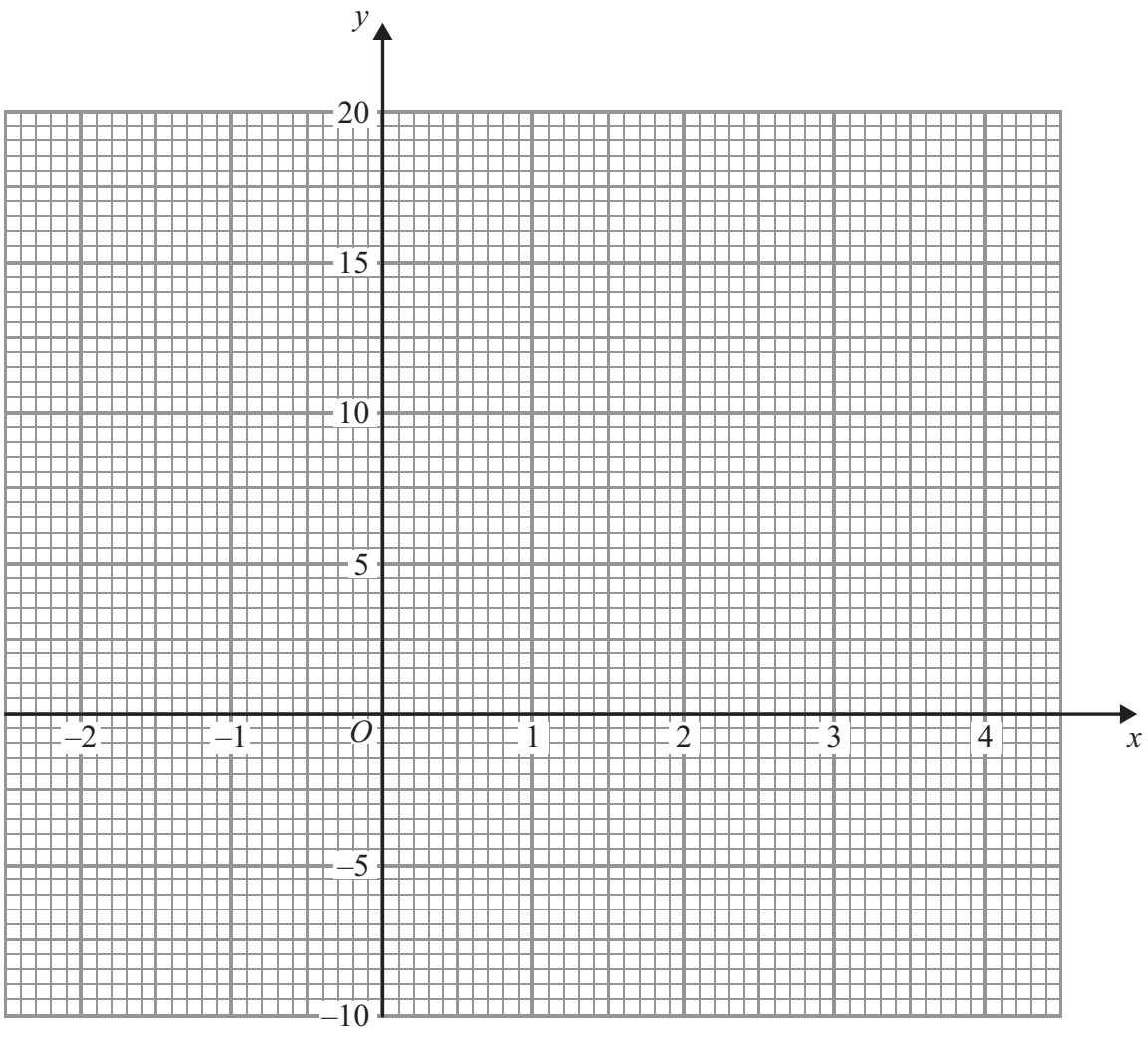
Find the range of these three numbers.

.....

(Total for Question 4 is 3 marks)

Do NOT write in this space.

5 On the grid, draw the graph of $y = 4x - 1$ from $x = -2$ to $x = 4$



(Total for Question 5 is 4 marks)

Do NOT write in this space.

6 (a) There are 32 students in a class.
All the students are either left-handed or right-handed.
The ratio of the number of left-handed students to the number of right-handed students is 1 : 7

Work out the number of right-handed students.

.....

(2)

(b) Sajid makes a scale model of a lorry.
He uses a scale of 1 : 32
The length of Sajid's model lorry is 45 cm.
Chitra makes a scale model of the same lorry.
She uses a scale of 1 : 72

Work out the length of Chitra's model lorry.

..... cm

(3)

(Total for Question 6 is 5 marks)

Do NOT write in this space.

7 Express 200 as a product of powers of its prime factors.

.....

(Total for Question 7 is 3 marks)

8 $\dfrac{y^3 \times y^n}{y} = y^6$

Find the value of n.

$n =$ .....

(Total for Question 8 is 2 marks)

Do NOT write in this space.

9

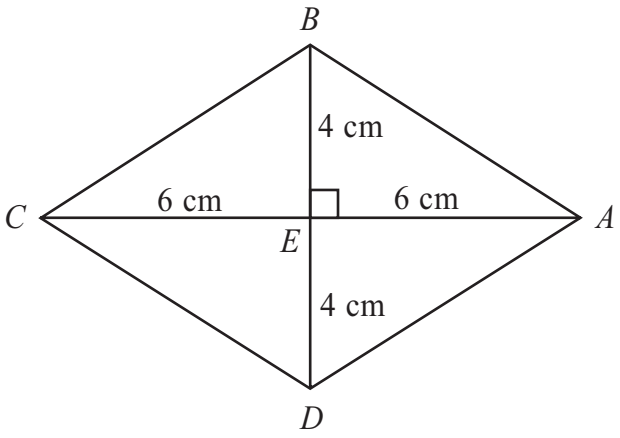


Diagram **NOT** accurately drawn

ABCD is a rhombus.
The diagonals *AC* and *BD* cross at the point *E*.
AE = *CE* = 6 cm.
BE = *DE* = 4 cm.
Angle *AEB* = 90°

(a) Work out the area of the rhombus.

..... cm^2

(3)

(b) Work out the length of *AB*.
Give your answer correct to 3 significant figures.

..... cm

(3)

(Total for Question 9 is 6 marks)

10 (i) Solve the inequalities $-6 < 4x \leqslant 8$

.....

(ii) n is an integer.

Write down all the values of n which satisfy $-6 < 4n \leqslant 8$

.....

(Total for Question 10 is 4 marks)

11 (a) Find the Highest Common Factor (HCF) of 75 and 90

.....

(2)

(b) Find the Lowest Common Multiple (LCM) of 75 and 90

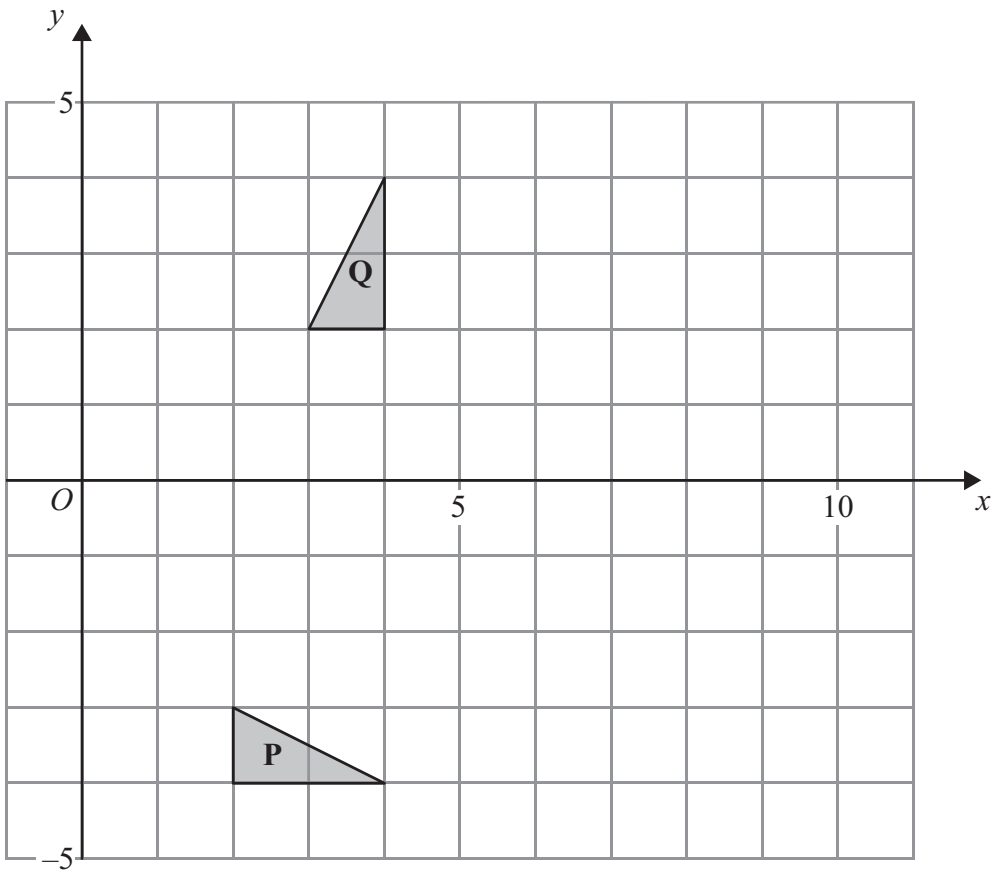
.....

(2)

(Total for Question 11 is 4 marks)

Do NOT write in this space.

12



(a) Describe fully the single transformation which maps triangle **P** onto triangle **Q**.

.....

.....

(3)

(b) On the grid, translate triangle **Q** by the vector $\begin{pmatrix} 4 \\ -2 \end{pmatrix}$

Label the new triangle **R**.

(1)

(c) Describe fully the single transformation which maps triangle **P** onto triangle **R**.

.....

.....

(2)

(Total for Question 12 is 6 marks)

Do NOT write in this space.

13 (a) Find the gradient of the line with equation $3x + 4y = 10$

.....

(3)

(b) Find the coordinates of the point of intersection of the line with equation $3x + 4y = 10$ and the line with equation $5x - 6y = 23$
Show your working clearly.

(..... , ...)

(5)

(Total for Question 13 is 8 marks)

14 The grouped frequency table gives information about the ages of 200 elephants.

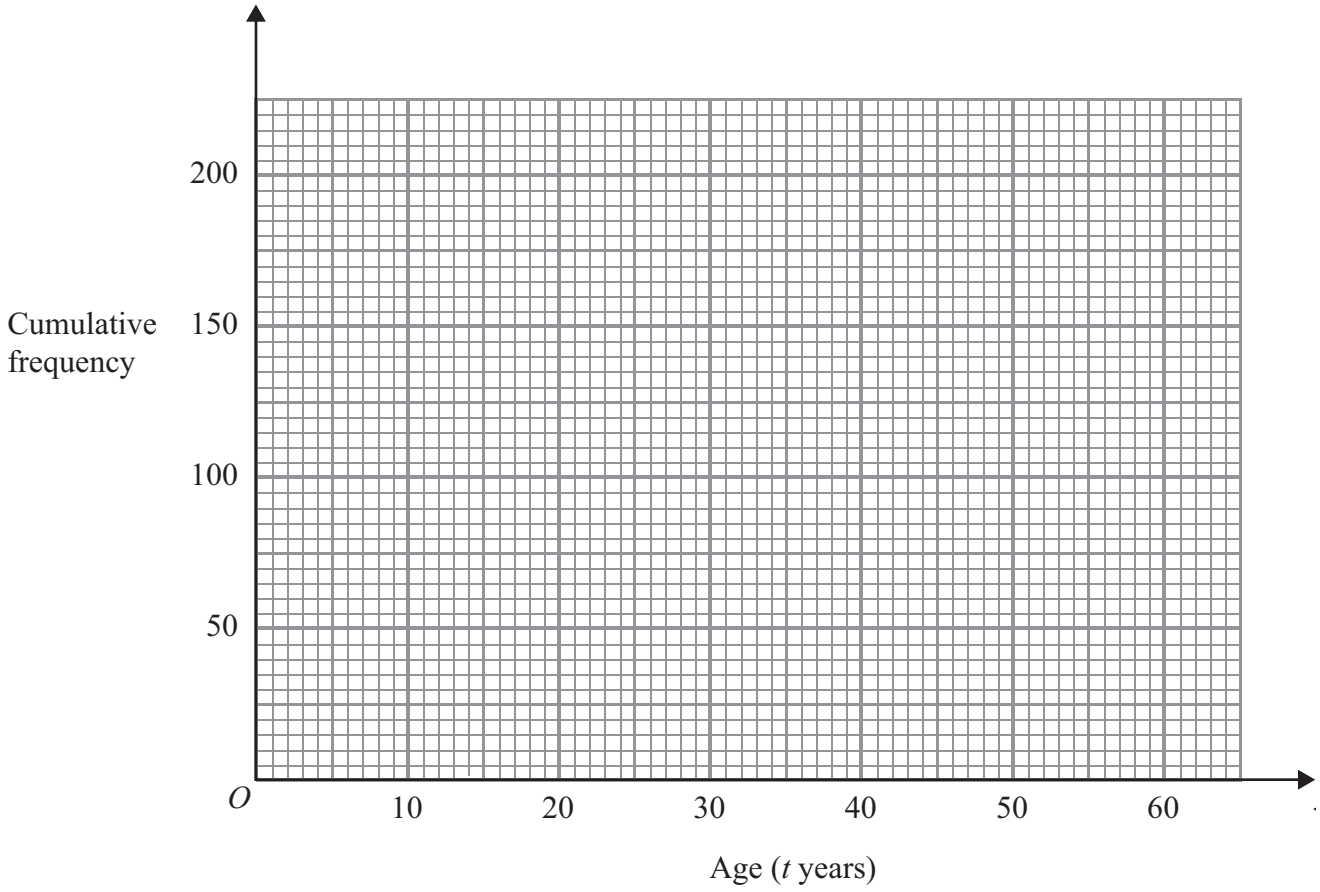
Age (t years)	Frequency
$0 < t \leqslant 10$	55
$10 < t \leqslant 20$	60
$20 < t \leqslant 30$	40
$30 < t \leqslant 40$	22
$40 < t \leqslant 50$	13
$50 < t \leqslant 60$	10

(a) Complete the cumulative frequency table.

Age (t years)	Cumulative frequency
$0 < t \leqslant 10$	
$0 < t \leqslant 20$	
$0 < t \leqslant 30$	
$0 < t \leqslant 40$	
$0 < t \leqslant 50$	
$0 < t \leqslant 60$	

(1)

(b) On the grid, draw a cumulative frequency graph for your table.



(2)

(c) Use the graph to find an estimate for the number of elephants with ages of more than 26 years.

.....

(2)

(Total for Question 14 is 5 marks)

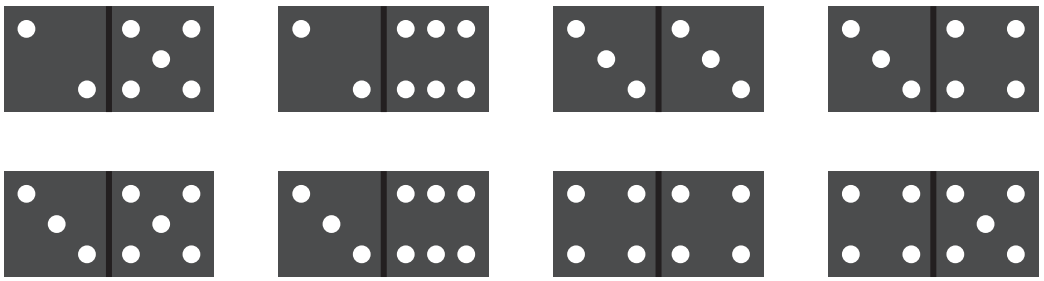
Do NOT write in this space.

15 Solve the inequality $x^2 < 16$

.....

(Total for Question 15 is 2 marks)

16 Here are 8 dominoes.



The 8 dominoes are put in a bag.

Riaz takes at random a domino from the bag.

(a) Find the probability that he takes a domino with a total of 8 spots or a domino with a total of 9 spots.

.....

(2)

Helima takes at random 2 dominoes from the bag of 8 dominoes without replacement.

(b) Work out the probability that

(i) the total number of spots on the two dominoes is 18

.....

(ii) the total number of spots on the two dominoes is 17

.....

(5)

(Total for Question 16 is 7 marks)

Do NOT write in this space.

17 $f(x) = \sqrt{x-6}$

(a) Find f(10)

.....

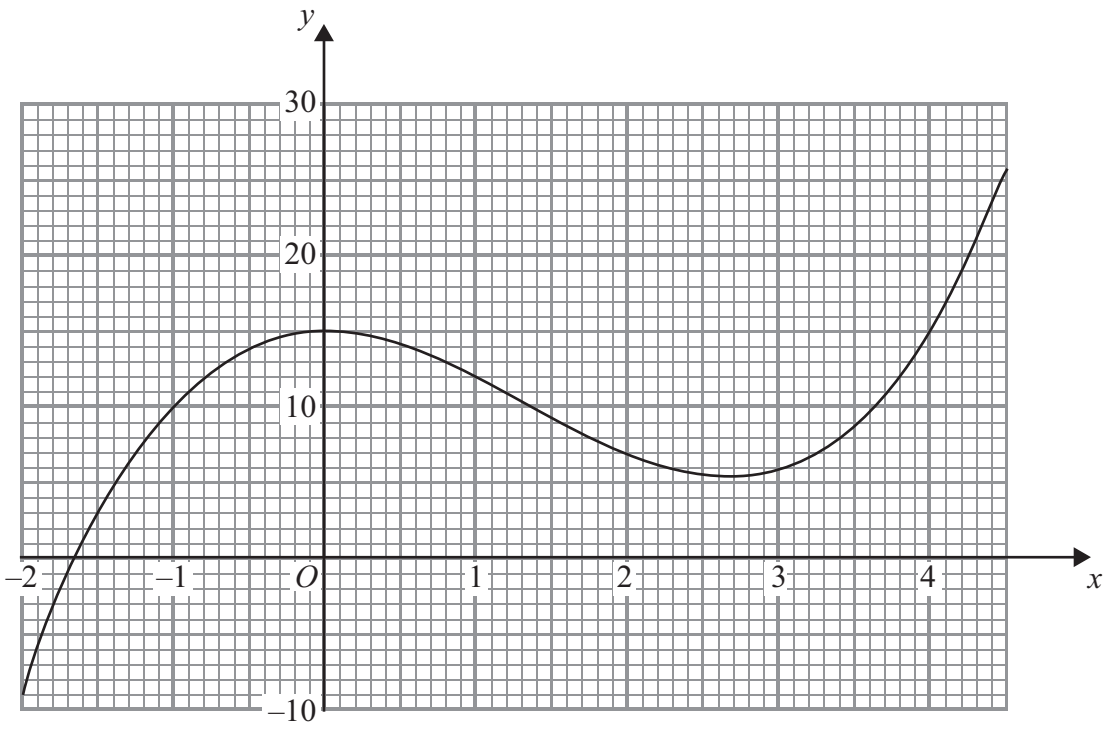
(1)

(b) State which values of x must be excluded from a domain of f

.....

(2)

The diagram shows part of the graph of $y = g(x)$



(c) Find g(2)

.....

(1)

(d) Find fg(0)

.....

(2)

(e) One of the solutions of g(x) = k, where k is a number, is x = 1

Find the other solutions.
Give your answers correct to 1 decimal place.

.....

(3)

(f) Find an estimate for the gradient of the curve at the point where x = 3.5
Show your working clearly.

.....

(3)

(Total for Question 17 is 12 marks)

Do NOT write in this space.

18

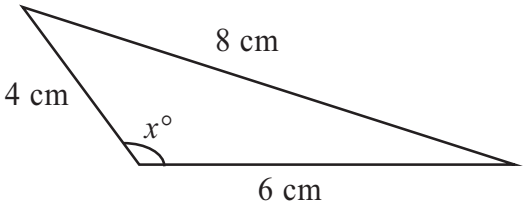


Diagram **NOT** accurately drawn

Calculate the value of x.
Give your answer correct to 1 decimal place.

$x =$ .....

(Total for Question 18 is 3 marks)

Do NOT write in this space.

19 A and B are two sets.

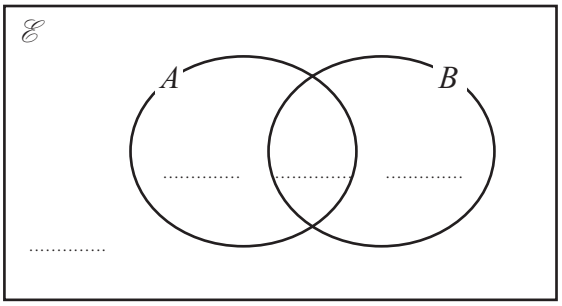
$n(\mathscr{E}) = 37$

$n(A) = 22$

$n(A \cap B) = 12$

$n(A \cup B) = 30$

(a) Complete the Venn Diagram to show the **numbers** of elements.



(2)

(b) Find (i) $n(A \cap B')$

.....

(ii) $n(A' \cup B')$

.....

(2)

(Total for Question 19 is 4 marks)

Do NOT write in this space.

20

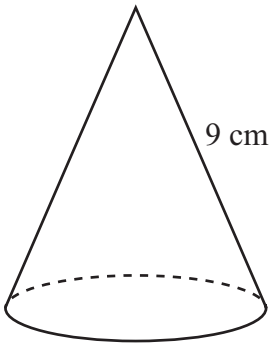


Diagram **NOT** accurately drawn

A solid cone has a slant height of 9 cm.
The **curved** surface area of the cone is 100 cm^2.

Calculate the volume of the cone.
Give your answer correct to 3 significant figures.

..... cm^3

(Total for Question 20 is 5 marks)

21 (a) Simplify $(16y^8)^{\frac{3}{4}}$

.....

(2)

(b) Given that $2^p \times 8^q = 2^n$

express n in terms of p and q.

$n =$ .....

(2)

(Total for Question 21 is 4 marks)

Do NOT write in this space.

22

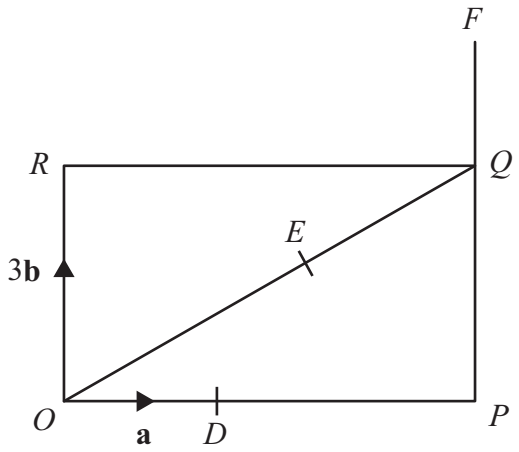


Diagram **NOT** accurately drawn

OPQR is a rectangle.

D is the point on *OP* such that $OD = \frac{1}{3} OP$.

E is the point on *OQ* such that $OE = \frac{2}{3} OQ$.

PQF is the straight line such that $QF = \frac{1}{3} PQ$.

$\overrightarrow{OD} = \mathbf{a}$ $\overrightarrow{OR} = 3\mathbf{b}$

(a) Find, in terms of **a** and **b**,

(i) $\overrightarrow{OQ}$

.....

(ii) $\overrightarrow{OE}$

.....

(iii) $\overrightarrow{DE}$

.....

(3)

(b) Use a vector method to prove that *DEF* is a straight line.

(2)

(Total for Question 22 is 5 marks)

TOTAL FOR PAPER IS 100 MARKS

Do NOT write in this space.

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Do NOT write on this page.

Write your name here

Surname	Other names

Edexcel Certificate
Edexcel International GCSE

Centre Number | | | | | |

Candidate Number | | | | |

Mathematics A

Paper 3H

Higher Tier

Friday 11 May 2012 – Afternoon
Time: 2 hours

Paper Reference
4MA0/3H
KMA0/3H

You must have:
Ruler graduated in centimetres and millimetres, protractor, compasses, pen, HB pencil, eraser, calculator. Tracing paper may be used.

Total Marks

Instructions

- Use **black** ink or ball-point pen.
- **Fill in the boxes** at the top of this page with your name, centre number and candidate number.
- Answer **all** questions.
- Without sufficient working, correct answers may be awarded no marks.
- Answer the questions in the spaces provided
  – *there may be more space than you need.*
- **Calculators may be used.**
- You must **NOT** write anything on the formulae page.
  Anything you write on the formulae page will gain NO credit.

Information

- The total mark for this paper is 100.
- The marks for **each** question are shown in brackets
  – *use this as a guide as to how much time to spend on each question.*

Advice

- Read each question carefully before you start to answer it.
- Check your answers if you have time at the end.

Turn over ▶

P40660A

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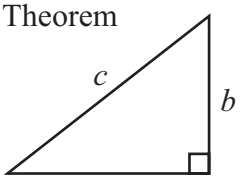
6/6/6/4/4/3

P 4 0 6 6 0 A 0 1 2 4

PEARSON

FORMULAE SHEET – HIGHER TIER

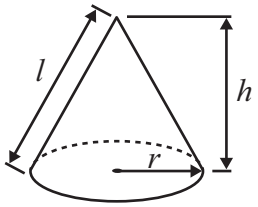
Pythagoras' Theorem



$a^2 + b^2 = c^2$

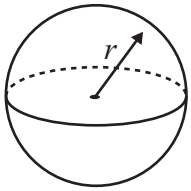
Volume of cone = $\frac{1}{3}\pi r^2 h$

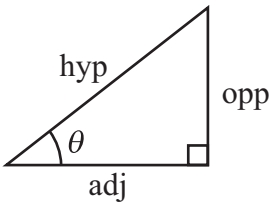
Curved surface area of cone = $\pi r l$



Volume of sphere = $\frac{4}{3}\pi r^3$

Surface area of sphere = $4\pi r^2$





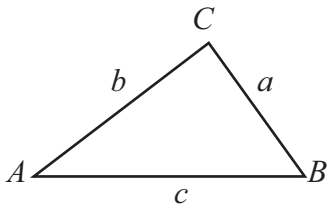
adj = hyp × cos θ
opp = hyp × sin θ
opp = adj × tan θ

or $\sin\theta = \frac{\text{opp}}{\text{hyp}}$

$\cos\theta = \frac{\text{adj}}{\text{hyp}}$

$\tan\theta = \frac{\text{opp}}{\text{adj}}$

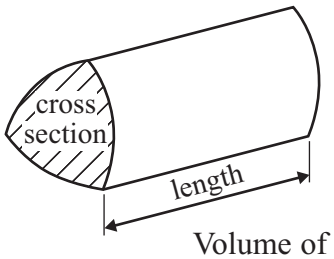
In any triangle ABC



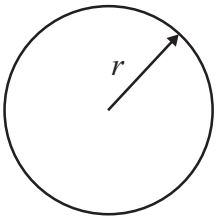
Sine rule: $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

Cosine rule: $a^2 = b^2 + c^2 - 2bc\cos A$

Area of triangle = $\frac{1}{2}ab\sin C$



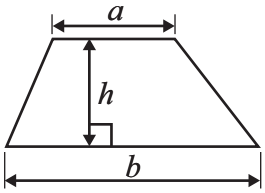
Volume of prism = area of cross section × length

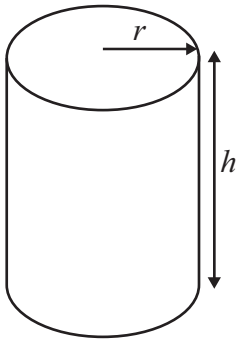


Circumference of circle = $2\pi r$

Area of circle = πr^2

Area of a trapezium = $\frac{1}{2}(a + b)h$





Volume of cylinder = $\pi r^2 h$

Curved surface area of cylinder = $2\pi rh$

The Quadratic Equation
The solutions of $ax^2 + bx + c = 0$, where $a \neq 0$, are given by

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Answer ALL TWENTY ONE questions.

Write your answers in the spaces provided.

You must write down all the stages in your working.

1 (a) The length of an Airbus A300 aeroplane is 54 m.
The ratio of the length of this aeroplane to its wingspan is 6 : 5

Work out the wingspan of the aeroplane.

..... m

(2)

(b) A model is made of the Airbus A300 aeroplane.
The length of the model is 36 cm.
The length of the real aeroplane is 54 m.

Find the ratio of the length of the model to the length of the real aeroplane.
Give your ratio in the form 1 : *n*

1 : .....

(3)

(Total for Question 1 is 5 marks)

Do NOT write in this space.

2 $A = 2x^2 + kx$

(a) $x = -3$
$k = 4$

Work out the value of A.

$A =$ .....

(2)

(b) $A = 38$
$x = 4$

Work out the value of k.

$k =$ .....

(3)

(Total for Question 2 is 5 marks)

Do NOT write in this space.

3 (a) Write $2^3 \times 2^6$ as a single power of 2

.....

(1)

(b) Write $\frac{3^9}{3^4}$ as a single power of 3

.....

(1)

(c) $\frac{5^n}{5^4 \times 5^6} = 5^3$

Find the value of n.

$n =$ .....

(2)

(Total for Question 3 is 4 marks)

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4

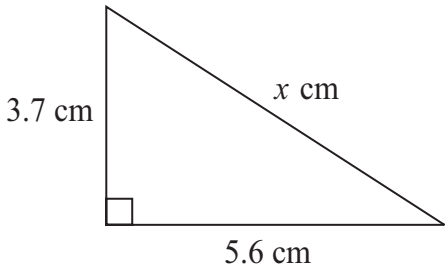


Diagram **NOT** accurately drawn

Work out the value of x.
Give your answer correct to 3 significant figures.

$x =$ .....

(Total for Question 4 is 3 marks)

5 Three positive whole numbers have a mean of 4 and a range of 7

Find the three positive whole numbers.

....

(Total for Question 5 is 2 marks)

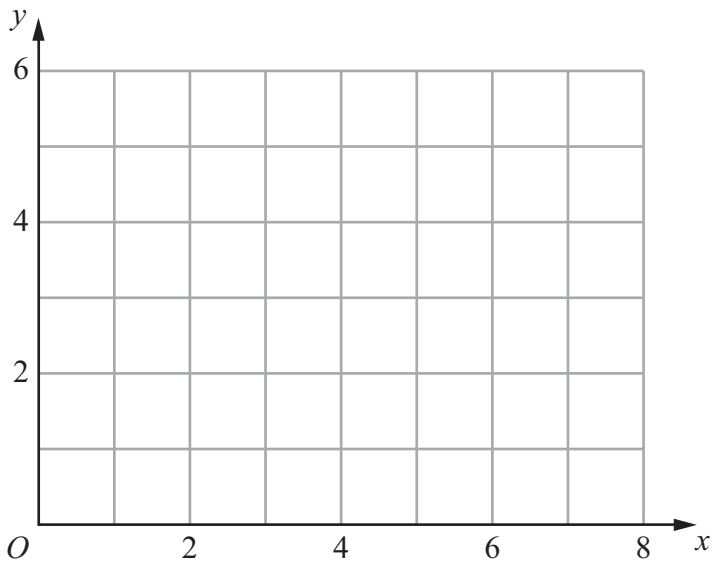
6 Show, by shading on the grid, the region defined by all three of the inequalities

$x \leqslant 5$

$y \geqslant 3$

$y \leqslant x$

Label your region **R**.



(Total for Question 6 is 3 marks)

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7

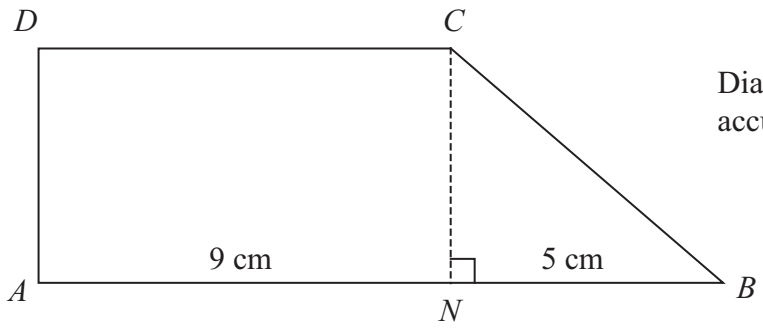


Diagram **NOT** accurately drawn

The shape *ABCD* is made from a rectangle *ANCD* and the right-angled triangle *NBC*.
ANB is a straight line.
AN = 9 cm.
NB = 5 cm.
The area of rectangle *ANCD* is 36 cm^2

Work out the area of shape *ABCD*.

..... cm^2

(Total for Question 7 is 4 marks)

Do NOT write in this space.

8 On 9th May, 2009, there were 3440 people in the world with swine flu.
Of these people, 1639 were in the USA.

(a) Express 1639 as a percentage of 3440
Give your answer correct to 1 decimal place.

..... %

(2)

The 3440 people who had swine flu on 9th May was an increase of 37.6% on the number of people who had swine flu on 8th May.

(b) Calculate the number of people who had swine flu on 8th May.

.....

(3)

(Total for Question 8 is 5 marks)

Do NOT write in this space.

9 (a) Solve $3(2x - 1) = 6$

Show clear algebraic working.

$x =$ .....

(3)

(b) Solve $\frac{2y+1}{3} = \frac{y-2}{4}$

Show clear algebraic working.

$y =$ .....

(4)

(Total for Question 9 is 7 marks)

10 The table shows information about the number of peas in each of 25 pods.

Number of peas	1	2	3	4	5	6
Number of pods	3	6	5	8	2	1

(a) Work out the mean number of peas in the 25 pods.

.....

(3)

(b) Tariq puts the 25 pods in a bag.
He takes at random one of the pods.

Find the probability that he takes a pod with 3 peas or a pod with 4 peas.

.....

(2)

(c) Laila puts the 25 pods in a bag.
She takes at random two pods without replacement.

Calculate the probability that

(i) there are 3 peas in each of the two pods she takes,

.....

(ii) there is a total of 4 peas in the two pods she takes.

.....

(5)

(Total for Question 10 is 10 marks)

11

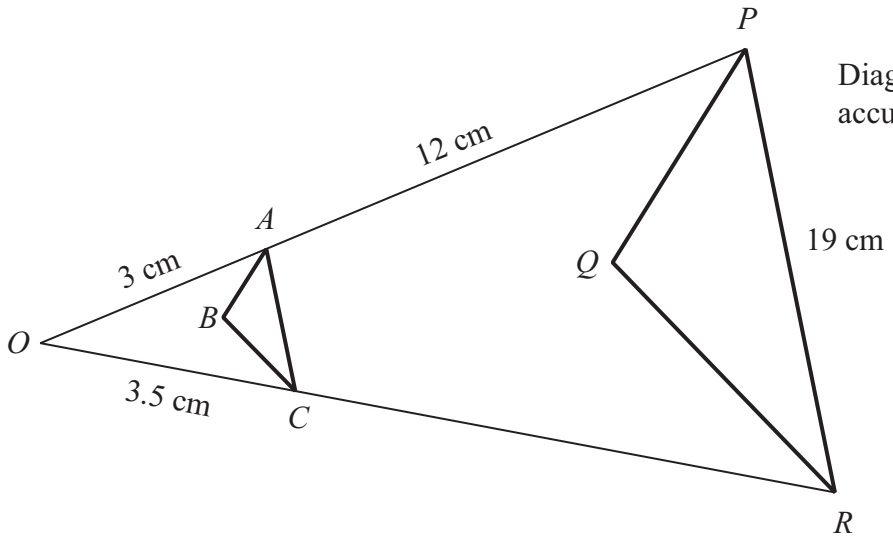


Diagram **NOT** accurately drawn

Triangle PQR is an enlargement, centre O, of triangle ABC.
OAP and OCR are straight lines.
$OA = 3$ cm.
$AP = 12$ cm.
$OC = 3.5$ cm.
$PR = 19$ cm.

(a) Work out the length of CR.

..... cm

(2)

(b) Work out the length of AC.

..... cm

(3)

The area of triangle ABC is 2 cm^2

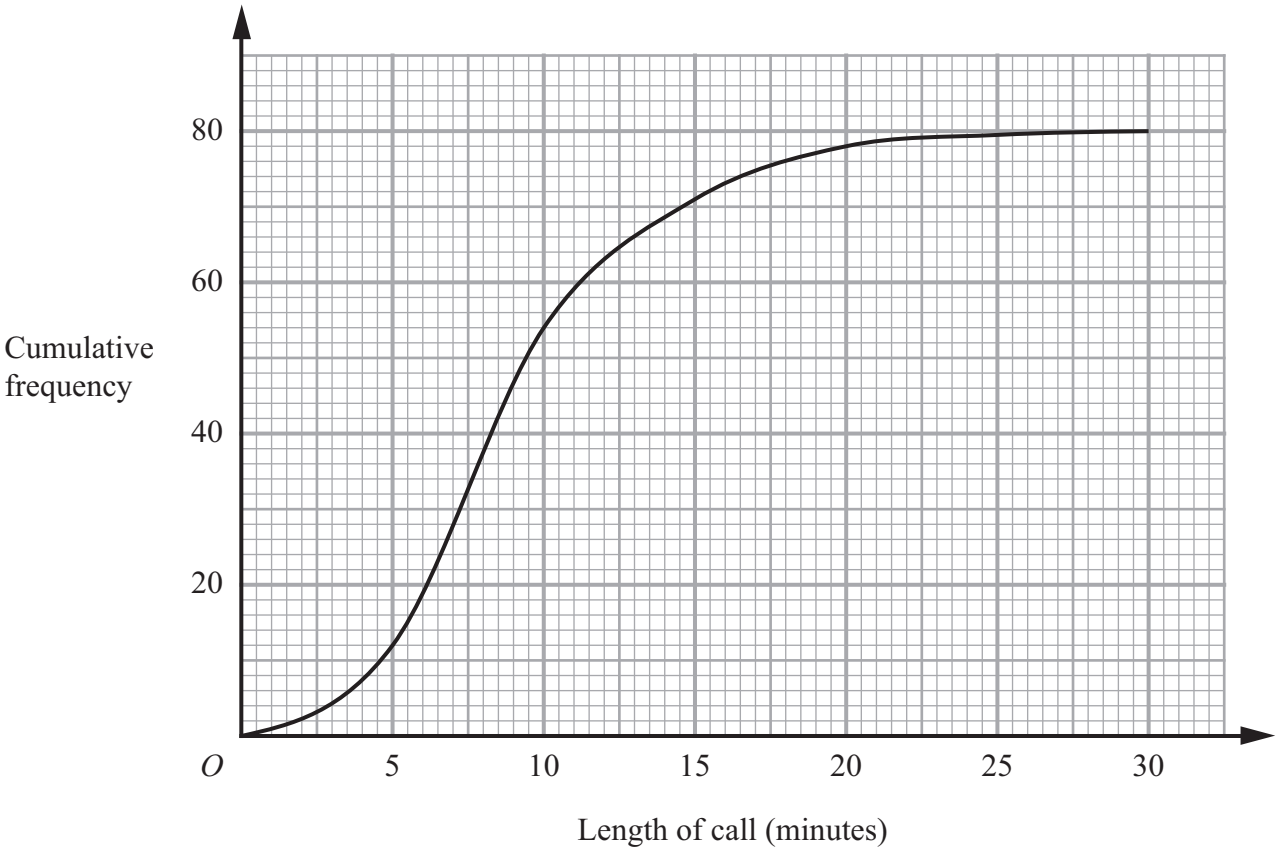
(c) Work out the area of triangle PQR.

..... cm^2

(2)

(Total for Question 11 is 7 marks)

12 The cumulative frequency graph gives information about the lengths, in minutes, of 80 telephone calls.



(a) Find an estimate for the number of calls which were longer than 15 minutes.

.....

(2)

(b) Find an estimate for the interquartile range of the lengths of the 80 calls.

..... minutes

(2)

(Total for Question 12 is 4 marks)

Do NOT write in this space.

13

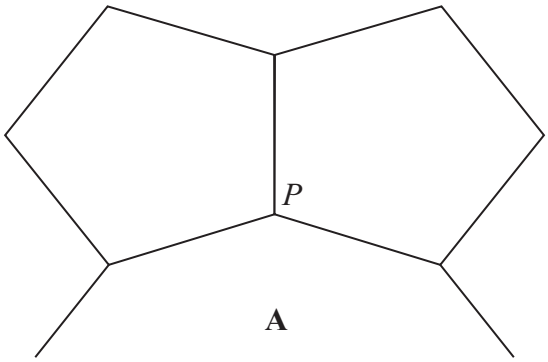


Diagram **NOT** accurately drawn

The diagram shows two congruent regular pentagons and part of a regular n-sided polygon **A**.
Two sides of each of the regular pentagons and two sides of **A** meet at the point P.

Calculate the value of n.
Show your working clearly.

$n =$ .....

(Total for Question 13 is 5 marks)

14 (a) The equation of a line **L** is $2x - 3y = 6$
Find the gradient of **L**.

.....

(3)

(b) Find the equation of the line which is parallel to **L** and passes through the point (6, 9).

.....

(2)

(Total for Question 14 is 5 marks)

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15

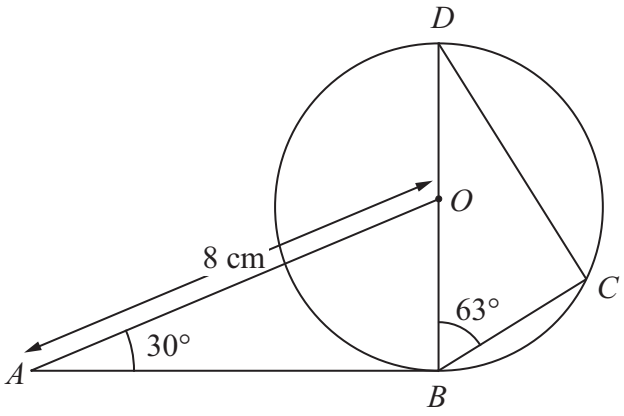

Diagram **NOT** accurately drawn

B, *C* and *D* are points on a circle, centre *O*.
BOD is a diameter of the circle.
AB is the tangent to the circle at *B*.
AO = 8 cm. Angle *BAO* = 30° Angle *CBD* = 63°

Calculate the length of *BC*.
Give your answer correct to 3 significant figures.

..... cm

(Total for Question 15 is 4 marks)

16 The population of India increased by 20% between 1989 and 1999.
The population of India increased by a further 17% between 1999 and 2009.

Calculate the percentage by which the population of India increased between 1989 and 2009.

..... %

(Total for Question 16 is 3 marks)

17 (a) Simplify $(3a^2b)^4$

.....

(2)

(b) Simplify $(9c^8)^{\frac{1}{2}}$

.....

(2)

(Total for Question 17 is 4 marks)

18

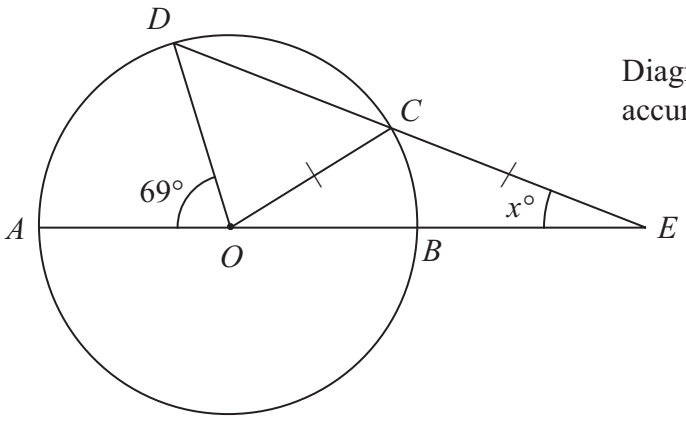

Diagram **NOT** accurately drawn

A, *B*, *C* and *D* are points on a circle, centre *O*.
AOBE and *DCE* are straight lines.
CO = *CE*.
Angle *AOD* = 69°
Angle *CEO* = *x*°

Calculate the value of *x*.
Show your working clearly.

x = ...

(Total for Question 18 is 6 marks)

19

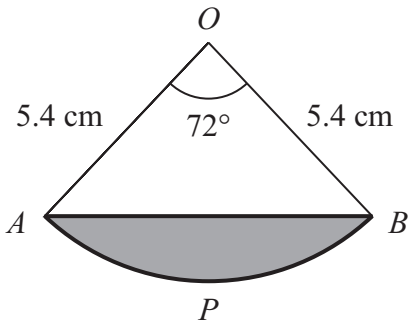

Diagram **NOT** accurately drawn

The diagram shows a sector $OAPB$ of a circle, centre O.
AB is a chord of the circle.
$OA = OB = 5.4$ cm.
Angle $AOB = 72°$

Calculate the area of the shaded segment APB.
Give your answer correct to 3 significant figures.

..... cm^2

(Total for Question 19 is 5 marks)

20 Correct to 2 decimal places, the volume of a solid cube is 42.88 cm^3

Calculate the lower bound for the surface area of the cube.

..... cm^2

(Total for Question 20 is 4 marks)

Do NOT write in this space.

21 Solve the simultaneous equations

$$y = 2x^2$$

$$y = 20 - 3x$$

Show clear algebraic working.

.....

(Total for Question 21 is 5 marks)

(TOTAL FOR PAPER IS 100 MARKS)

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