OCR Additional Maths Exam Questions - Binomial Expansion

2 Expand $(1-x)^{12}$ in ascending powers of x up to the term in x^3, and simplify your answer. **[3]**

13 **(i)** Find the coefficients a, b and c in the expansion

$$(2+h)^3 = 8 + ah + bh^2 + ch^3 .$$ **[3]**

(ii) The graph of the equation $y = x^3$ passes through the points P and Q which have x-coordinates 2 and $2 + h$ respectively.

Show that the gradient of the chord PQ is $\dfrac{(2+h)^3 - 8}{h}$. **[3]**

(iii) Express $\dfrac{(2+h)^3 - 8}{h}$ as a quadratic function of h. **[2]**

(iv) As the value of h decreases, the point Q gets closer and closer to the point P on the curve. As h gets closer to 0 the chord PQ gets closer to being the tangent to the curve at P.

Deduce the value of the gradient of the tangent at P. **[1]**

(v) Kareen uses the same method to deduce the value of the gradient of the tangent at the point (2, 16) on the curve $y = x^4$.

The first three lines of her working are given below and in the answer booklet.

Take P to be the point (2, 16)

Take Q to be the point (2 + h, (2 + h)⁴)

The gradient of the chord PQ is given by $\dfrac{(2+h)^4 - 16}{h} =$

Complete Kareen's working. **[3]**

6 **(i)** Expand $\left(x - \dfrac{1}{x}\right)^4$ using the binomial expansion. Show all your working. **[4]**

(ii) Explain why the substitution $x = 1$ will help to justify your answer. **[1]**