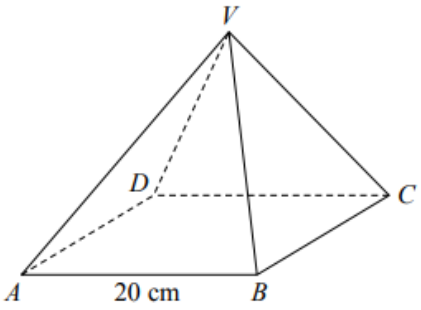
Edexcel GCSE maths sample question (Trigonometry, Pythagoras, area)

VABCD is a solid pyramid.



ABCD is a square of side 20 cm.

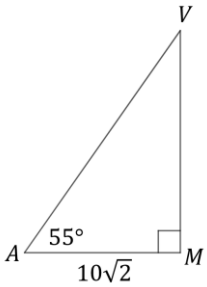
The angle between any sloping edge and the plane *ABCD* is 55°

Calculate the surface area of the pyramid.
Give your answer correct to 2 significant figures.

$AC^2 = 20^2 + 20^2 = 800$

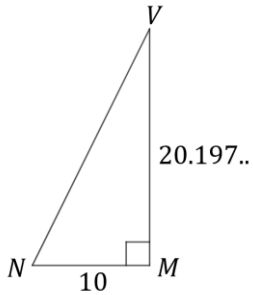
$AC = \sqrt{800} = 20\sqrt{2}$

Let the point vertically below V be M so that M is the midpoint of AC. AM is then $\frac{AC}{2} = 10\sqrt{2}$.



$\tan 55° = \frac{VM}{10\sqrt{2}}$
$VM = 10\sqrt{2}\tan 55°$
$VM = 20.197..$

Let the midpoint of AB be N and consider triangle VMN.



$VN^2 = 20.197..^2 + 10^2 = 507.921..$
$VN = \sqrt{507.921..} = 22.537..$

The area of each triangular face is $\frac{20 \times VN}{2} = 10 \times 22.537.. = 225.37..$

The total surface area is the area of four triangular face plus the area of the base.

Total surface area = $4 \times 225.37.. + 20 \times 20 = 1301.48..$

The total surface area, correct to two significant figures, is 1300 cm^2.