3D Pythagoras

Most problems either involve finding the vertical height of a pyramid shape or the diagonal length of a 3D object. There are usually 2 steps to solving these problems, both usually involving pythagoras. It is best explained by following these examples.

Example 1

A right square-based pyramid has a perpendicular height of 12 cm.
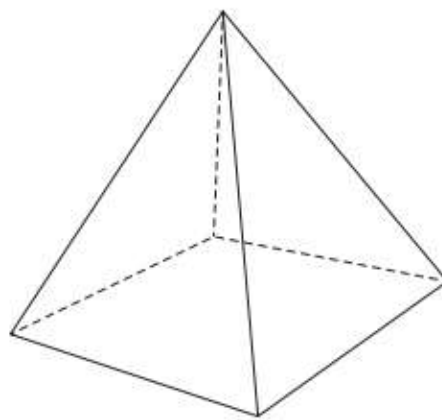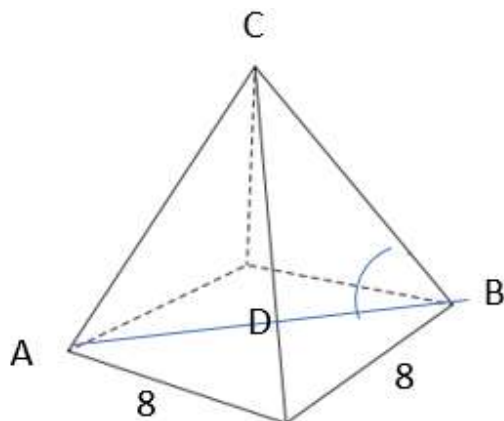The area of the square base of the pyramid is 64 cm².

Diagram not drawn to scale

Calculate the angle between the diagonal of the base and one of the sloping edges of the pyramid.
[7]

The base is a square area 64cm² so each side is 8cm. We also know the vertical height is 12cm. We have been asked to find angle ABC. We know the height DC so if we can find length DB we can work out the angle.
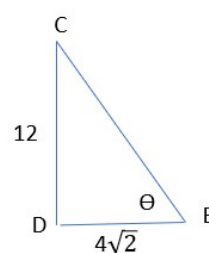Length DB is half of AB and from Pythagoras we know

$AB^2 = 8^2 + 8^2 = 128$

$AB = \sqrt{128} = 8\sqrt{2}$
Therefore $DB = 4\sqrt{2}$

$\tan\theta = \dfrac{12}{4\sqrt{2}}$

$\theta = \tan^{-1}\dfrac{3}{\sqrt{2}} = \mathbf{64.77°}$