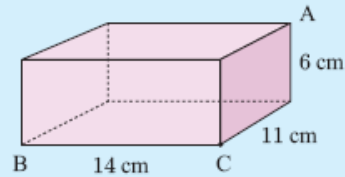We can use Pythagoras' theorem and trigonometry to find unknown angles and lengths in 3-dimensional figures.

A rectangular prism has the dimensions shown alongside. Find the angle between the diagonal AB and the edge BC.

Consider the end of the prism containing A and C.

Let AC be x cm.

By Pythagoras, $x^2 = 6^2 + 11^2$
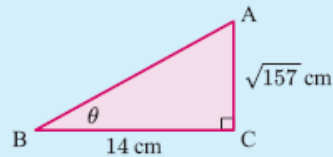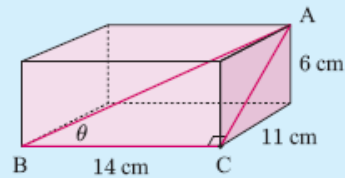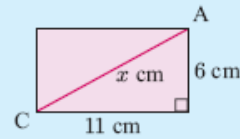
$\therefore\ x^2 = 157$

$\therefore\ x = \sqrt{157}$

The points A, B, and C form a triangle which is right angled at $B\widehat{C}A$.

$$\tan\theta = \frac{\text{OPP}}{\text{ADJ}} = \frac{\sqrt{157}}{14}$$

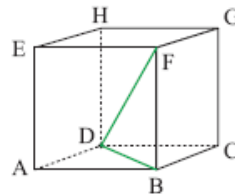$$\therefore\ \theta = \tan^{-1}\left(\frac{\sqrt{157}}{14}\right)$$

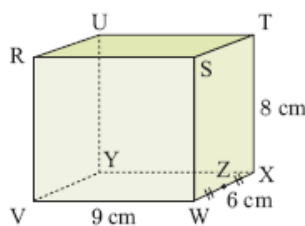$$\therefore\ \theta \approx 41.8°$$

So, the required angle is 41.8°.

1 The cube shown has sides of length 13 cm. Find:

  a BD   **b** the angle FDB.

2

In the rectangular prism shown, Z is the midpoint of XW. Find:

  a VX   **b** the angle RXV

  c YZ   **d** the angle YZU.