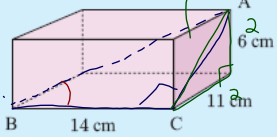
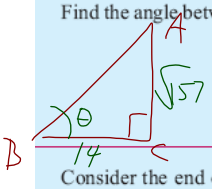
E 3-DIMENSIONAL PROBLEM SOLVING

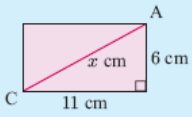
We can use Pythagoras' theorem and trigonometry to find unknown angles and lengths in 3-dimensional figures.

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.

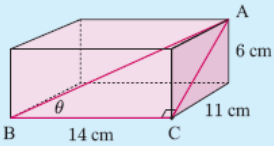


By Pythagoras, $x^2 = 6^2 + 11^2$

$\therefore\ x^2 = 157$

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

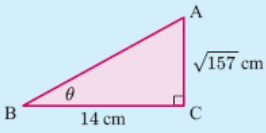
The points A, B, and C form a triangle which is right angled at $\widehat{BCA}$.



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

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

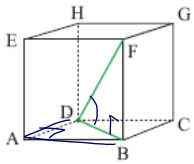
$$\therefore\ \theta \approx 41.8°$$



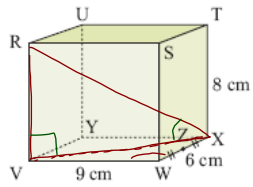
So, the required angle is 41.8°.

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.