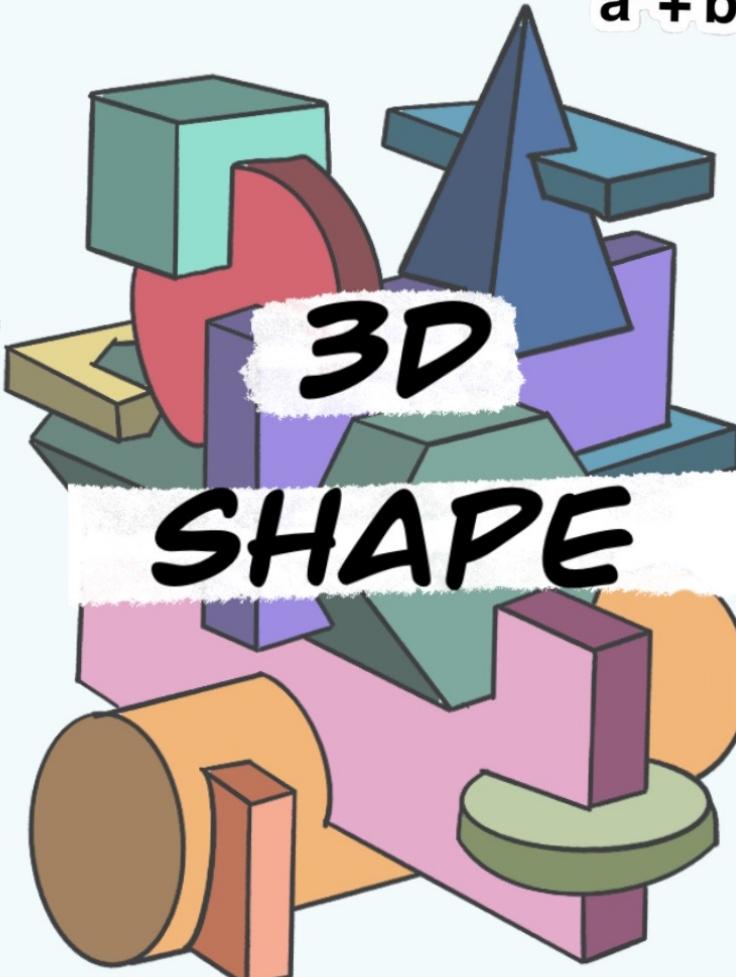
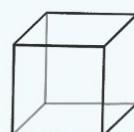
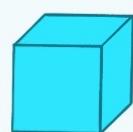
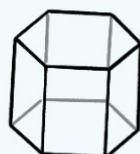
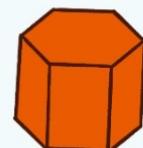
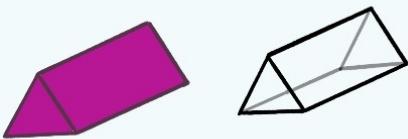
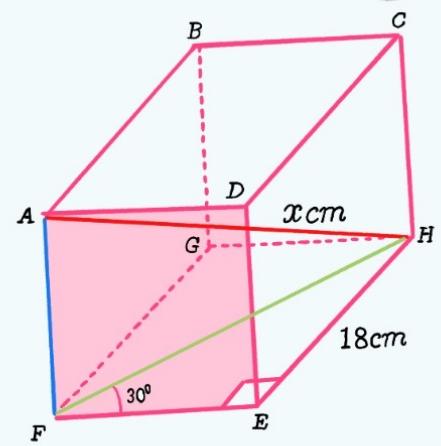


$$a^2 + b^2 = c^2$$



$$\begin{array}{r} 9 \\ + \\ 16 \\ \hline \end{array}$$

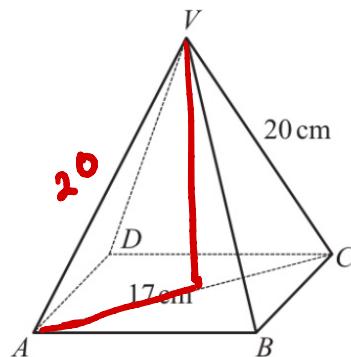
$$\begin{array}{r} 3^2 \\ + \\ 4^2 \\ = \\ 5^2 \\ 25 \end{array}$$



Question 1

The diagram shows a pyramid with a square base $ABCD$.

All the sloping edges of the pyramid are 20 cm long and $AC = 17$ cm.



NOT TO
SCALE

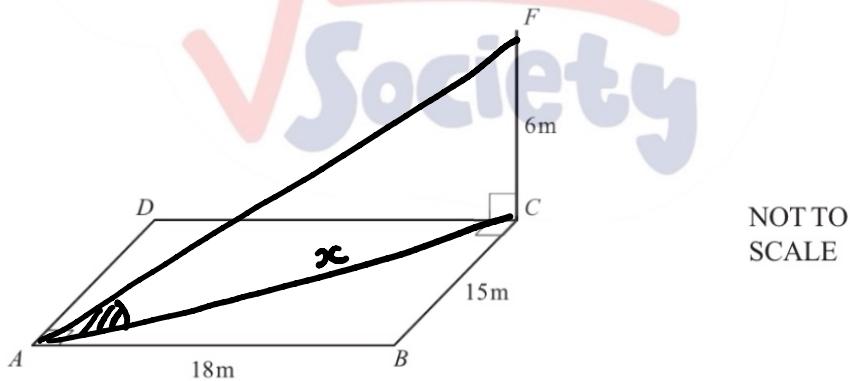
Calculate the height of the pyramid.

[3]

$$h = \sqrt{20^2 - 8.5^2}$$

$$= 18.1 \text{ cm}$$

Question 2



NOT TO
SCALE

The diagram shows a rectangular playground $ABCD$ on horizontal ground.
A vertical flagpole CF , 6 metres high, stands in corner C .
 $AB = 18$ m and $BC = 15$ m.

[4]

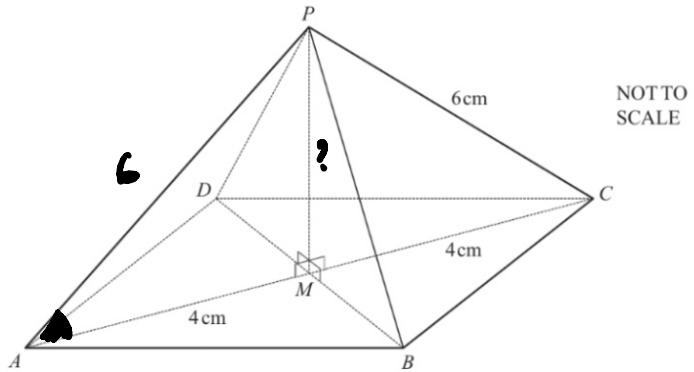
Calculate the angle of elevation of F from A .

$$x = \sqrt{15^2 + 18^2} = 23.4 \text{ m}$$

$$\tan \theta = \frac{6}{23.4}$$

$$\theta = 14.4^\circ$$

Question 3



The diagram shows a pyramid on a square base $ABCD$ with diagonals, AC and BD , of length 8cm. AC and BD meet at M and the vertex, P , of the pyramid is vertically above M . The sloping edges of the pyramid are of length 6cm.

Calculate

- (a) the perpendicular height, PM , of the pyramid,

[3]

$$PM = \sqrt{36 - 16} = 4.47 \text{ cm}$$

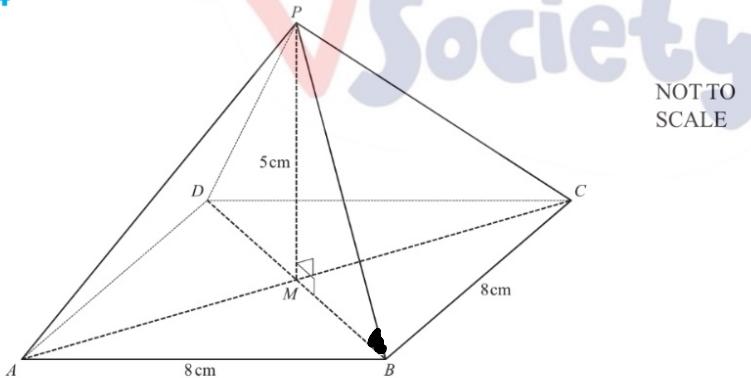
- (b) the angle between a sloping edge and the base of the pyramid.

[3]

$$\cos \theta = \frac{4}{6}$$

$$\theta = 48.2^\circ$$

Question 4



The diagram shows a pyramid on a square base $ABCD$.

The diagonals of the base, AC and BD , intersect at M .

The sides of the square are 8 cm and the vertical height of the pyramid, PM , is 5cm.

Calculate

- (a) the length of the edge PB ,

[3]

$$PB = \sqrt{8^2 + 8^2} = 11.3 \text{ cm}$$

$$MB = 5.657 \text{ cm}$$

$$PB = \sqrt{5^2 + 5.657^2} = 7.55 \text{ cm}$$

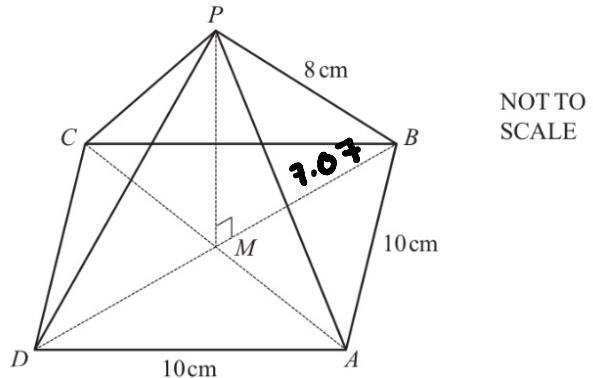
- (b) the angle between PB and the base $ABCD$.

[3]

$$\tan \theta = \frac{5}{5.657} \quad | \quad \theta = 41.5^\circ$$

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Question 5



The diagram represents a pyramid with a square base of side 10 cm.

The diagonals AC and BD meet at M . P is vertically above M and $PB = 8\text{cm}$.

(a) Calculate the length of BD .

[2]

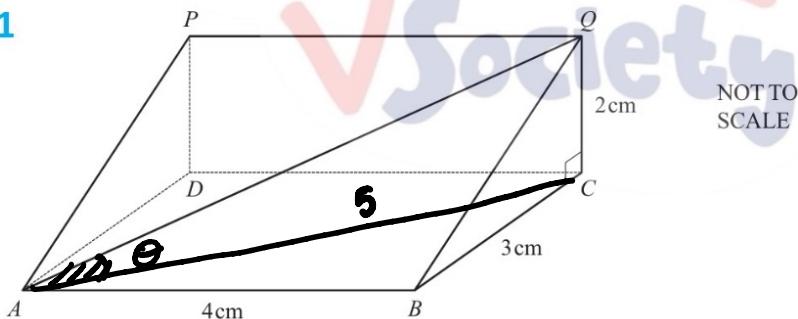
$$BD = 14.1 \text{ cm}$$

(b) Calculate MP , the height of the pyramid.

[3]

$$\begin{aligned} PM^2 &= 8^2 - 7.07^2 \\ PM &= 3.74 \text{ cm} \end{aligned}$$

Question 1



The diagram shows a prism of length 4 cm.

The cross section is a right-angled triangle.

$BC = 3\text{ cm}$ and $CQ = 2\text{ cm}$.

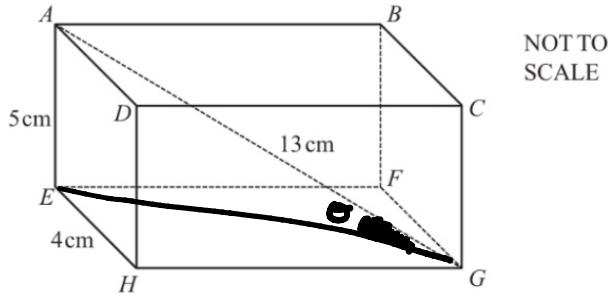
Calculate the angle between the line AQ and the base, $ABCD$, of the prism.

$$AC = \sqrt{4^2 + 3^2} = 5$$

$$\begin{aligned} \tan \theta &= \frac{2}{5} \\ \theta &= 21.8^\circ \end{aligned}$$

[4]

Question 2



The diagram shows a cuboid $ABCDEF GH$.

$AE = 5 \text{ cm}$, $EH = 4 \text{ cm}$ and $AG = 13 \text{ cm}$.

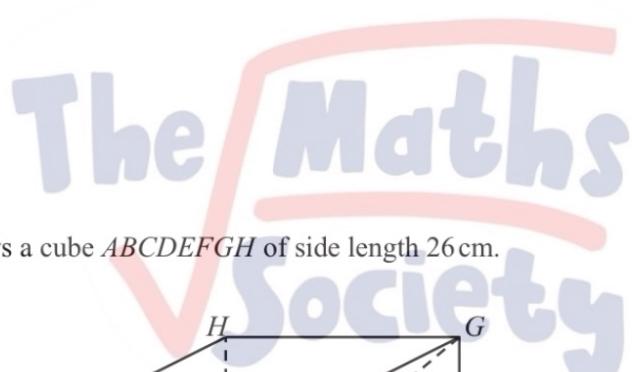
Calculate the angle between the line AG and the base $EFGH$ of the cuboid.

[3]

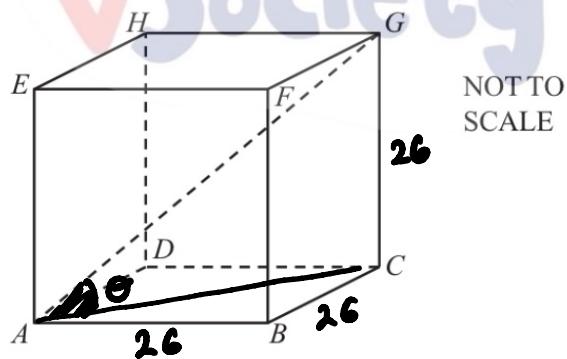
$$\sin \theta = \frac{5}{13}$$

$$\theta = 22.6^\circ$$

Question 3



The diagram shows a cube $ABCDEF GH$ of side length 26 cm.



Calculate the angle between AG and the base of the cube.

[4]

$$AC = \sqrt{26^2 + 26^2}$$

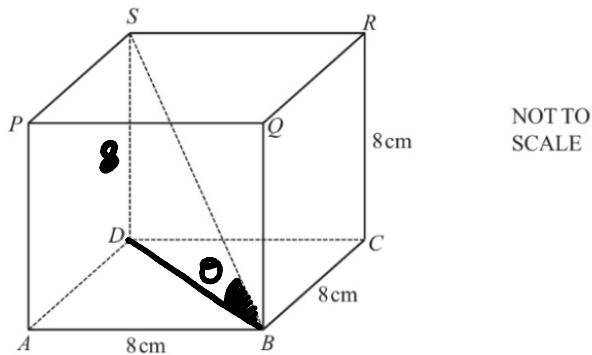
$$= 36.8 \text{ cm}$$

$$\tan \theta = \frac{26}{45.1}$$

$$\theta = 30^\circ$$

$$AG = \sqrt{36.8^2 + 26^2} = 45.1 \text{ cm}$$

Question 4



The diagram shows a cube of side length 8 cm.

- (a) Calculate the length of the diagonal BS .

$$\begin{aligned} DB &= \sqrt{64+64} \\ &= 8\sqrt{2} \end{aligned} \quad | \quad \begin{aligned} BS &= \sqrt{64+128} = 13.9 \text{ cm} \end{aligned}$$

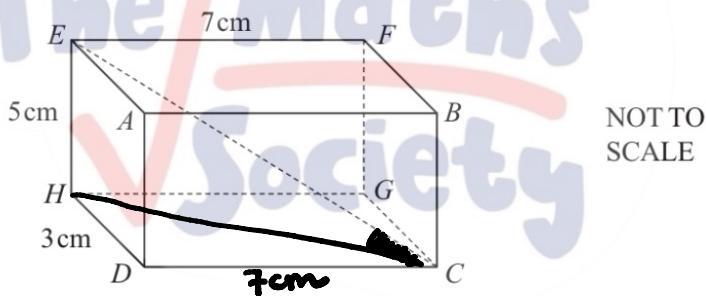
[3]

- (b) Calculate angle SBD .

$$\tan \theta = \frac{8}{13.9} \quad | \quad \theta = 29.9^\circ$$

[2]

Question 5



The diagram shows a cuboid.

$HD = 3 \text{ cm}$, $EH = 5 \text{ cm}$ and $EF = 7 \text{ cm}$.

Calculate

- (a) the length CE ,

$$\begin{aligned} HC &= \sqrt{9+49} = 7.62 \text{ cm} \\ CE &= \sqrt{25+7.62^2} \\ &= 9.11 \text{ cm} \end{aligned}$$

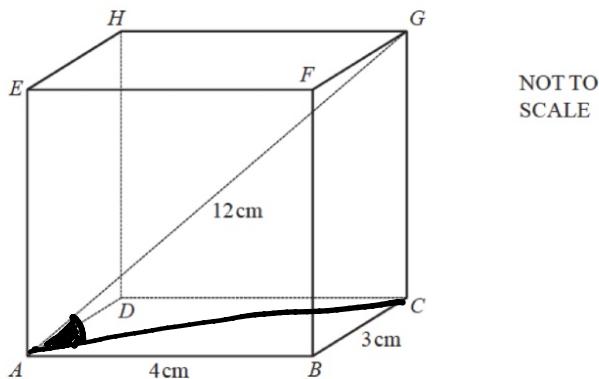
[4]

- (b) the angle between CE and the base $CDHG$.

$$\begin{aligned} \tan \theta &= \frac{5}{7.62} \\ \theta &= 33.3^\circ \end{aligned}$$

[3]

Question 1



$ABCDEFGH$ is a cuboid.

$AB = 4 \text{ cm}$, $BC = 3 \text{ cm}$ and $AG = 12 \text{ cm}$.

Calculate the angle that AG makes with the base $ABCD$.

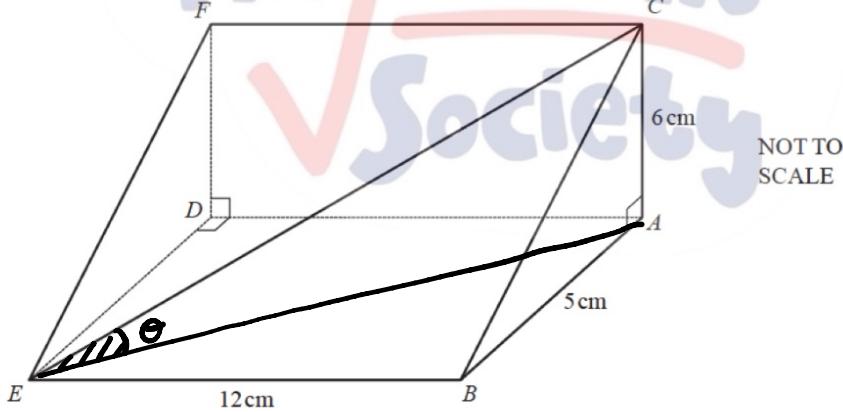
[4]

$$AC = \sqrt{16 + 9} = 5 \text{ cm}$$

$$\cos \theta = \frac{5}{12}$$

$$\theta = 65.4^\circ$$

Question 2



The diagram shows a triangular prism of length 12 cm.

Triangle ABC is a cross section of the prism.

$\angle BAC = 90^\circ$, $AC = 6 \text{ cm}$ and $AB = 5 \text{ cm}$.

Calculate the angle between the line CE and the base $ABED$.

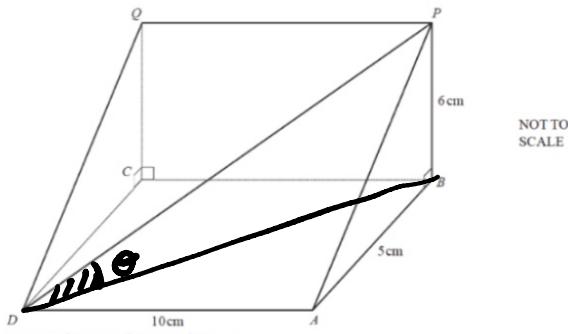
[4]

$$AE = \sqrt{144 + 25} = \sqrt{169} = 13 \text{ cm}$$

$$\tan \theta = \frac{6}{13}$$

$$\theta = 24.8^\circ$$

Question 3



The diagram shows a triangular prism.

$ABCD$ is a horizontal rectangle with $DA = 10 \text{ cm}$ and $AB = 5 \text{ cm}$.
 $BCQP$ is a vertical rectangle and $BP = 6 \text{ cm}$.

Calculate

(a) the length of DP ,

$$DP = \sqrt{100 + 25} = \sqrt{125} = 11.2 \text{ cm}$$

[3]

$$DP = \sqrt{36 + 11.2^2} = 12.7 \text{ cm}$$

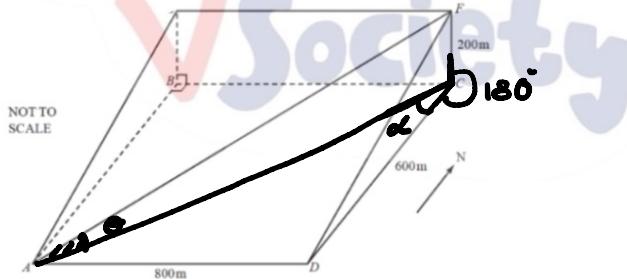
(b) the angle between DP and the horizontal rectangle $ABCD$.

$$\tan \theta = \frac{6}{11.2}$$

$$\theta = 28.2^\circ$$

[3]

Question 4



$ABCD$, $BEFC$ and $AEFD$ are all rectangles.

$ABCD$ is horizontal, $BEFC$ is vertical and $AEFD$ represents a hillside.

AF is a path on the hillside.

$AD = 800 \text{ m}$, $DC = 600 \text{ m}$ and $CF = 200 \text{ m}$.

(a) Calculate the angle that the path AF makes with $ABCD$.

$$\begin{aligned} AC &= \sqrt{800^2 + 600^2} \\ &= 1000 \text{ m} \\ \tan \theta &= \frac{200}{1000} \quad | \quad \theta = \tan^{-1} \left(\frac{1}{5} \right) \\ &= 11.3^\circ \end{aligned}$$

[5]

(b) In the diagram D is due south of C .

Jasmine walks down the path from F to A in bad weather. She cannot see the path ahead.

The compass bearing she must use is the bearing of A from C .

Calculate this bearing.

$$\begin{aligned} \tan \alpha &= \frac{8}{6} \\ \alpha &= 53.1^\circ \end{aligned}$$

$$\text{bearing} = 180 + 53.1 = 233.1^\circ$$

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[3]