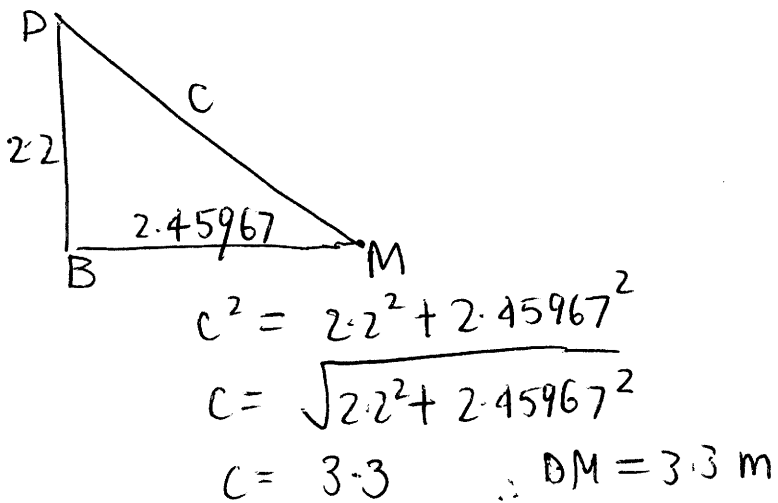
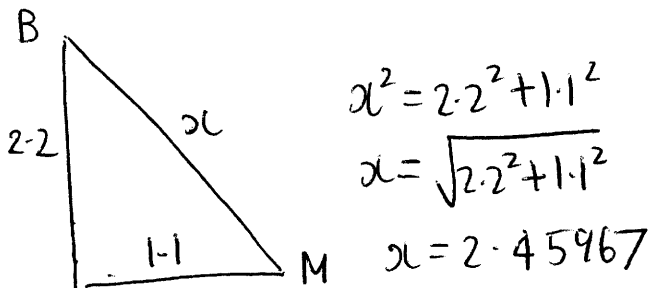


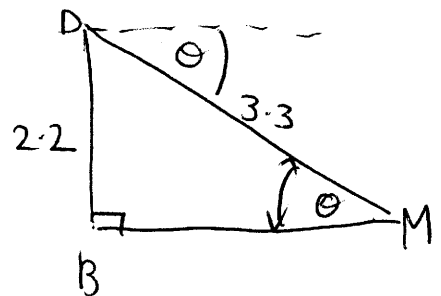
Q1: The diagram shows a cube of sidelength 2.2 m. The point M is the midpoint of side \overline{CA}

- Calculate the length of \overline{DM} . Give your answer correct to ~~two~~ one decimal place.
- Calculate the angle of depression from D to M . Give your answer correct to one decimal place.

(a)



(b)



$$\sin(\theta) = \frac{2.2}{3.3}$$

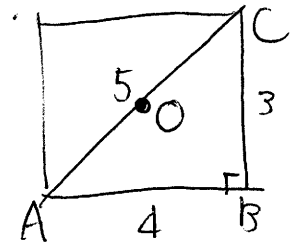
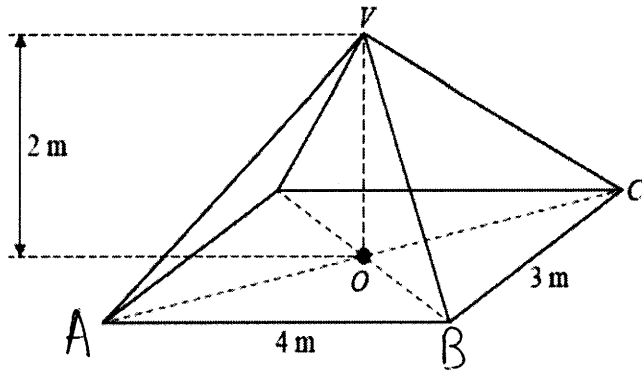
$$\therefore \theta = \sin^{-1}\left(\frac{2.2}{3.3}\right)$$

$$\theta = 41.81^\circ$$

$$\therefore \theta = 41.8^\circ$$

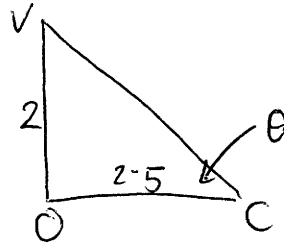
Question 2

A right pyramid, shown below, has a rectangular base with length 4 m and width 3 m. The height of the pyramid is 2 m.



The angle VCO that the sloping edge VC makes with the base of the pyramid, to the nearest degree, is

- A. 22°
- B. 27°
- C. 34°
- D. 39°
- E. 45°



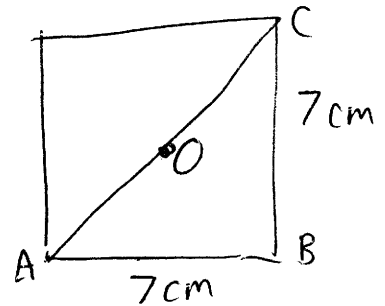
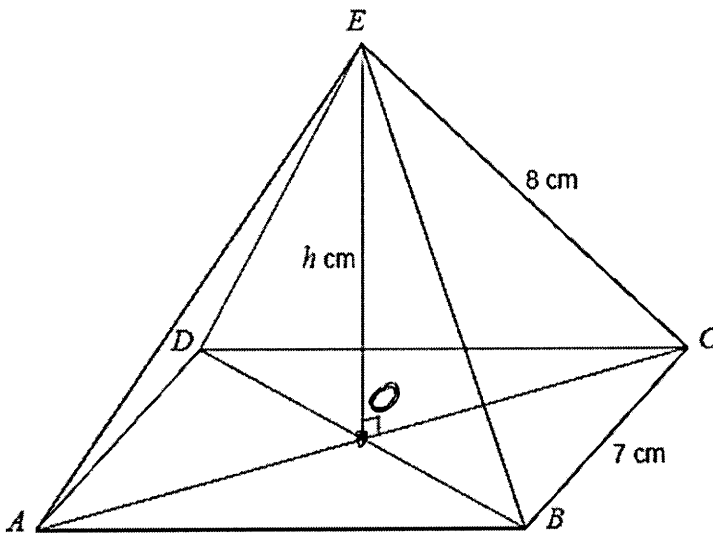
$$\tan(\theta) = \frac{2}{2.5}$$

$$\theta = \tan^{-1}\left(\frac{2}{2.5}\right)$$

$$\theta = 38.7^\circ$$

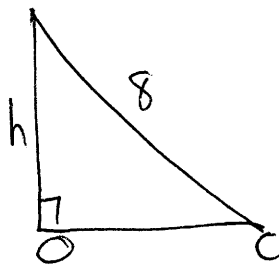
Question 3

For the square-based right pyramid, $ABCDE$, shown below, the sides of the base are 7 cm and the slant edges are 8 cm in length.



The vertical height, h cm, of this pyramid is closest to

- A. 3.9 cm
- B. 6.3 cm
- C. 7.2 cm
- D. 10.6 cm
- E. 12.7 cm



$$h^2 = 8^2 - (4.94975)^2$$

$$h^2 = 39.5 \quad \therefore h = \sqrt{39.5}$$

$$\overline{AC}^2 = 7^2 + 7^2$$

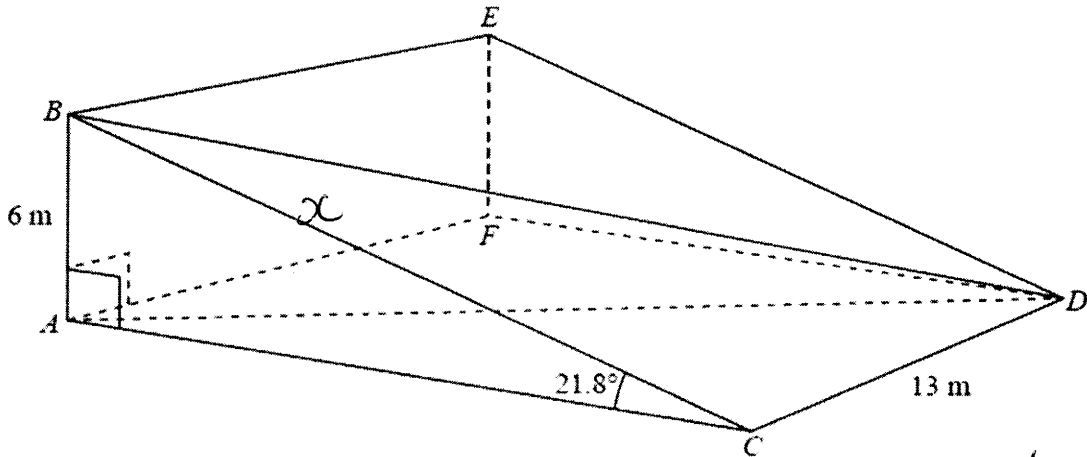
$$\overline{AC}^2 = 98$$

$$\overline{AC} = \sqrt{98}$$

$$\overline{OC} = \frac{\sqrt{98}}{2} \approx 4.94975$$

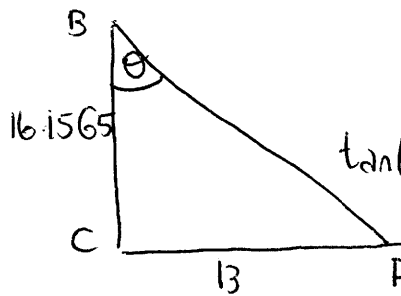
Question 4

The diagram below shows a right-triangular prism $ABCDEF$.
In this prism, $AB = 6$ m, angle $ACB = 21.8^\circ$ and $CD = 13$ m.



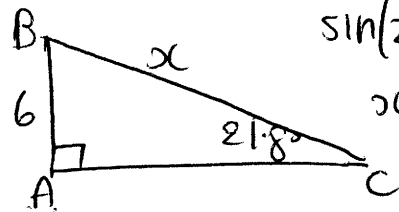
The size of the angle CBD is closest to

- A. 21.6°
- B. 26.7°
- C. 38.8°
- D. 40.9°
- E. 51.2°



$$\tan(\theta) = \frac{13}{16.1565}$$

$$\theta = \tan^{-1}\left(\frac{13}{16.1565}\right) \approx 38.8^\circ$$



$$\sin(21.8^\circ) = \frac{6}{\alpha}$$

$$\alpha = \frac{6}{\sin(21.8^\circ)}$$

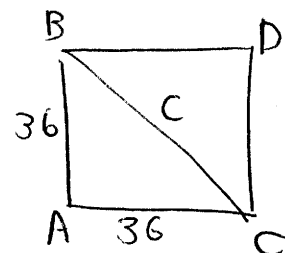
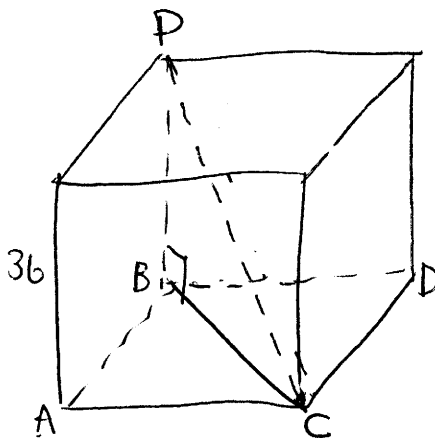
$$\alpha = 16.1565$$

Question 5

A closed cubic box of side length 36 cm is to contain a thin straight metal rod.

The maximum possible length of the rod is closest to

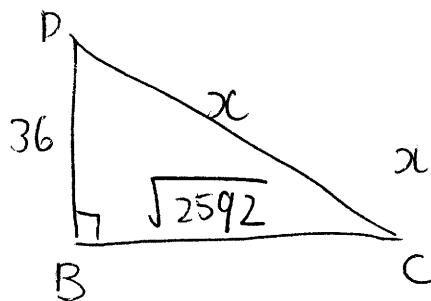
- A. 36 cm
- B. 51 cm
- C. 62 cm
- D. 108 cm
- E. 216 cm



$$C^2 = 36^2 + 36^2$$

$$C^2 = 2592$$

$$C = \sqrt{2592}$$



$$\alpha^2 = 36^2 + (\sqrt{2592})^2$$

$$\alpha^2 = 36^2 + 2592$$

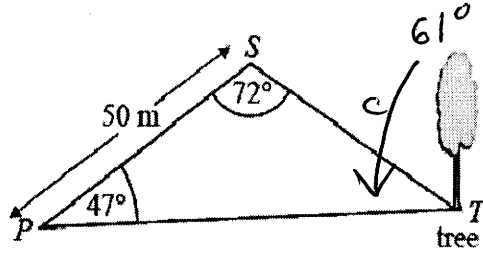
$$\alpha^2 = 3888$$

$$\alpha = \sqrt{3888} \approx 62.35$$

Question 6

A tree is growing near the block of land.

The base of the tree, T , is at the same level as the corners, P and S , of the block of land.



- a. Show that, correct to two decimal places, distance ST is 41.81 metres.

$$\frac{c}{\sin(47^\circ)} = \frac{50}{\sin(61^\circ)}$$

$$c = \frac{50 \sin(47^\circ)}{\sin(61^\circ)}$$

1 mark

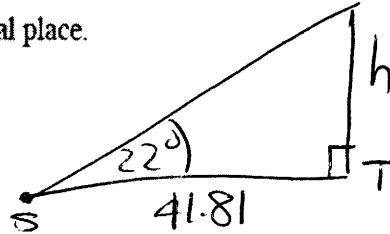
- b. From point S , the angle of elevation to the top of the tree is 22° . $\therefore c = 41.81$
Calculate the height of the tree.

Write your answer, in metres, correct to one decimal place.

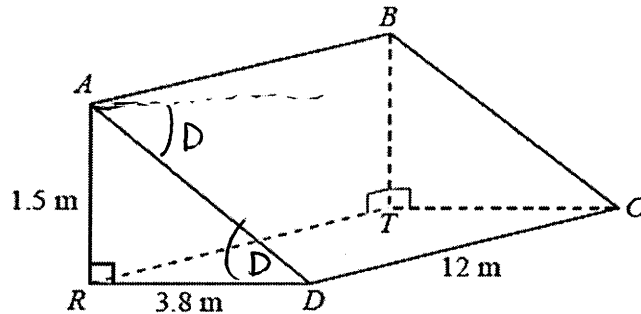
$$\tan(22^\circ) = \frac{h}{41.81}$$

$$h = 41.81 \tan 22^\circ$$

$$h = 16.9 \text{ m}$$



Question 7



$ABCD$ is a sloping rectangular roof above a horizontal rectangular ceiling, $TCDR$.

- $AB = DC = 12$ metres
- $RD = TC = 3.8$ metres
- $AR = BT = 1.5$ metres

Question 6

The angle of depression of D from A is closest to

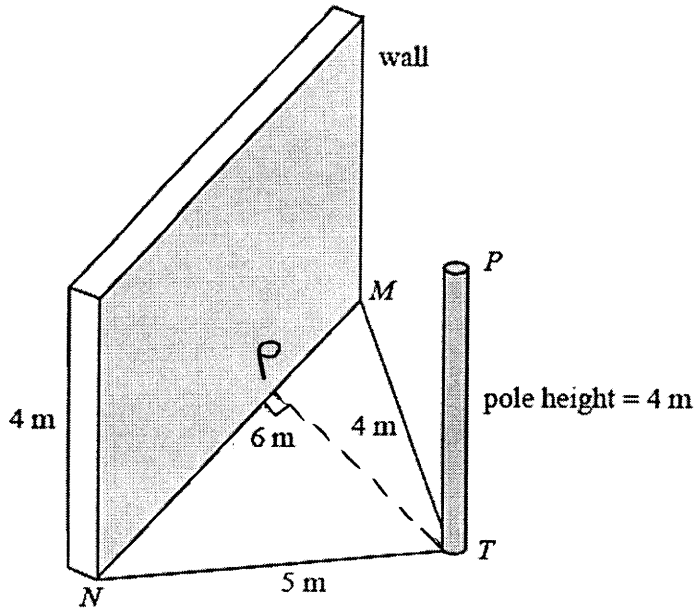
- A. 21.5°
- B. 23.3°
- C. 66.7°
- D. 68.5°
- E. 111.5°

$$\tan(D) = \frac{1.5}{3.8}$$

$$D = \tan^{-1}\left(\frac{1.5}{3.8}\right)$$

$$D = 21.54^\circ$$

Question 8



A vertical pole, TP , is 4 metres tall and stands on level ground near a vertical wall.

The wall is 6 metres long and 4 metres high.

The base of the pole, T , is 5 metres from one end of the wall at N and 4 metres from the other end of the wall at M .

The pole falls and hits the wall.

The maximum height above ground level at which the pole could hit the wall is closest to

- A. 0 m
- B. 1.5 m
- C. 2.3 m
- D. 2.7 m
- E. 3.3 m

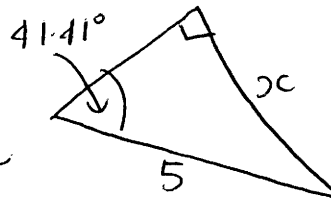


Find x , the height of the triangle.

$$\cos(\theta) = \frac{6^2 + 5^2 - 4^2}{2 \times 6 \times 5}$$

$$\theta = \cos^{-1}\left(\frac{6^2 + 5^2 - 4^2}{60}\right)$$

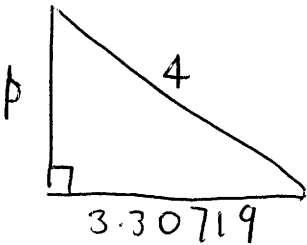
$$\theta = 41.41^\circ$$



$$\sin(41.41^\circ) = \frac{x}{5}$$

$$x = 5 \sin(41.41^\circ)$$

$$x = 3.30719$$



$$p^2 = 4^2 - 3.30719^2$$

$$p = \sqrt{4^2 - 3.30719^2}$$

$$p = 2.25$$