1 The diagram shows a right-angled triangle.

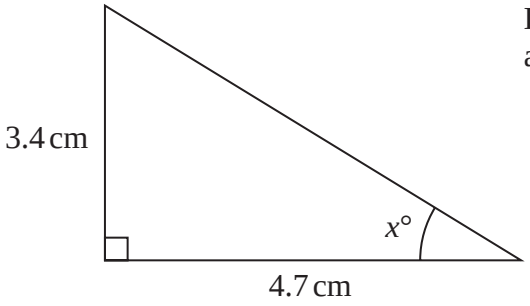


Diagram **NOT** accurately drawn

Calculate the value of x.
Give your answer correct to one decimal place.

$\tan x^\circ = \frac{3.4 \text{ cm}}{4.7 \text{ cm}}$ (1)

$x^\circ = \tan^{-1} \frac{3.4}{4.7}$ (1)

$= 35.9^\circ$ (1)

$x =$ 35.9

(Total for Question 1 is 3 marks)

2 The diagram shows cuboid *ABCDEFGH*.

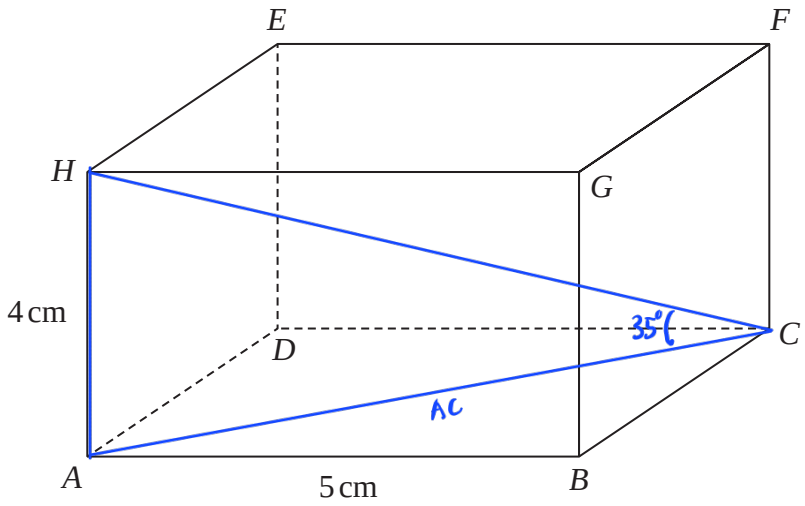


Diagram **NOT** accurately drawn

AB = 5 cm
AH = 4 cm
The size of the angle between *CH* and the plane *ABCD* is 35°

Calculate the volume of the cuboid.
Give your answer correct to 3 significant figures.

① Find length BC

② Volume = $4 \times 5 \times BC$

$\tan 35^\circ = \frac{4\text{ cm}}{AC}$ (1)

$AC = \frac{4\text{ cm}}{\tan 35^\circ}$

$= 5.71\text{ cm}$ (1)

$AC^2 = AB^2 + BC^2$

$BC^2 = AC^2 - AB^2$

$BC^2 = 5.71^2 - 5^2$

$BC = \sqrt{5.71^2 - 5^2}$ (1)

$= 2.76\ldots$

Volume of cuboid : $4 \times 5 \times 2.76$ (1)

$= 55.3$ (1)

55.3 ..... cm^3

(Total for Question 2 is 5 marks)

3 Here is a right-angled triangle.

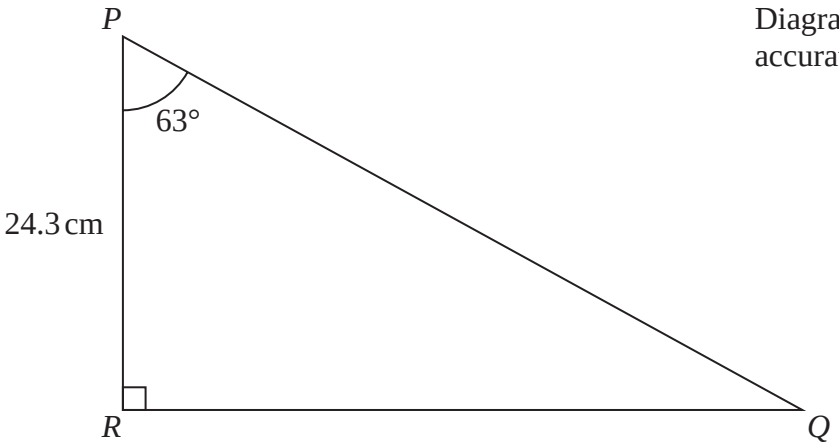


Diagram **NOT** accurately drawn

Calculate the length of PQ.
Give your answer correct to 3 significant figures.

$\cos 63^\circ = \frac{PR}{PQ}$

$\cos 63^\circ = \frac{24.3}{PQ}$ (1)

$PQ = \frac{24.3}{\cos 63^\circ}$ (1)

$= 53.5$ cm (1)

53.5 ..... cm

(Total for Question 3 is 3 marks)

4 The diagram shows two hot air balloons.
A is a point on the base of one of the balloons and *B* is a point on the base of the other balloon.

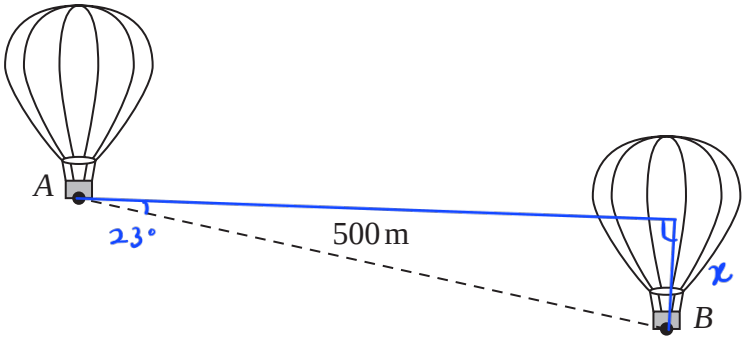
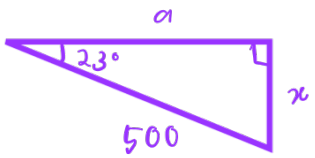


Diagram **NOT** accurately drawn

The distance between *A* and *B* is 500 metres.
The angle of depression of *B* from *A* is 23°

Calculate the vertical height of *A* above *B*.
Give your answer correct to one decimal place.



$\sin\theta = \frac{o}{h}$

$\sin 23^\circ = \frac{x}{500}$ (1)

$x = 500 \sin 23^\circ$ (1)

$= 195.4$ (1dp) (1)

195.4 ..... metres

(Total for Question 4 is 3 marks)

5 Here is isosceles triangle *ABC*.

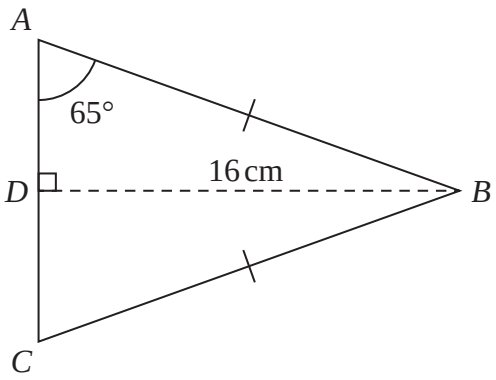


Diagram **NOT** accurately drawn

D is the midpoint of *AC* and *DB* = 16 cm.

Angle *DAB* = 65°

Work out the perimeter of triangle *ABC*.
Give your answer correct to one decimal place.

$AD = \dfrac{16}{\tan 65^\circ}$ (1)

$= 7.4609\ldots$ cm

$AB = \dfrac{16}{\sin 65^\circ}$

$= 17.654\ldots$ cm (1)

Perimeter $= 2(17.654\ldots) + 2(7.4609\ldots)$ (1)

$= 50.2$ cm (1dp) (1)

50.2 cm

(Total for Question 5 is 4 marks)

6 The diagram shows triangle *ABP* inside the regular hexagon *ABCDEF*

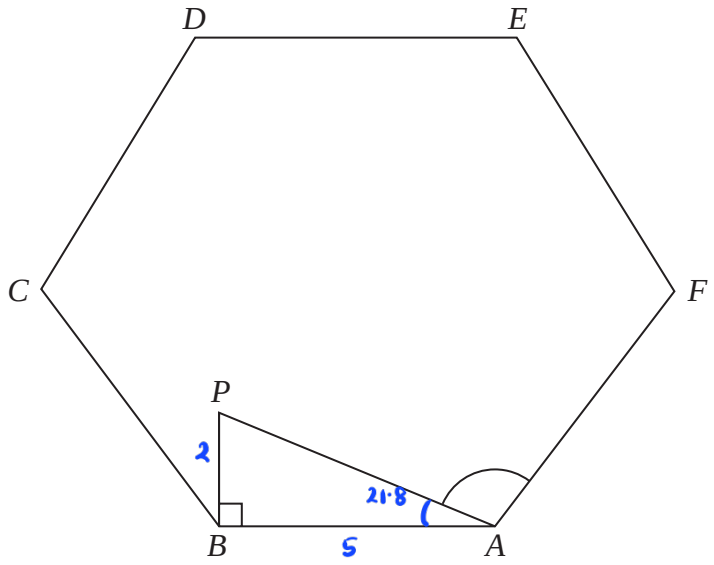


Diagram **NOT** accurately drawn

AB = 5 cm *BP* = 2 cm Angle *ABP* = 90°

Work out the size of angle *PAF*
Give your answer correct to 3 significant figures.

Internal angle of hexagon $= \frac{6-2}{6} \times 180^\circ$

$= \frac{4}{6} \times 180^\circ$

$= 120^\circ$ (1)

$\tan BAP = \frac{2}{5}$ (1)

$BAP = \tan^{-1} \frac{2}{5}$ (1)

$= 21.8^\circ$

angle $PAF = 120^\circ - 21.8^\circ$ (1)

$= 98.2^\circ$ (1)

98·2 °

(Total for Question 6 is 5 marks)

7 The diagram shows triangle PQR.

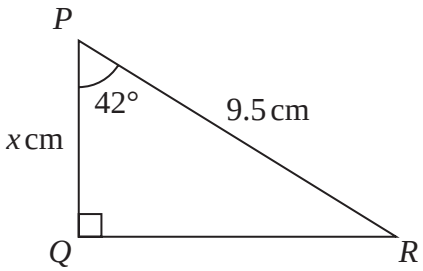


Diagram **NOT** accurately drawn

Work out the value of x
Give your answer correct to one decimal place.

$\cos 42^\circ = \frac{x}{9.5}$ (1)

$x = 9.5 \cos 42^\circ$ (1)

$= 7.1$ (1)

$x =$ 7.1

(Total for Question 7 is 3 marks)

8 The diagram shows two vertical phone masts, *AB* and *CD*, on horizontal ground.

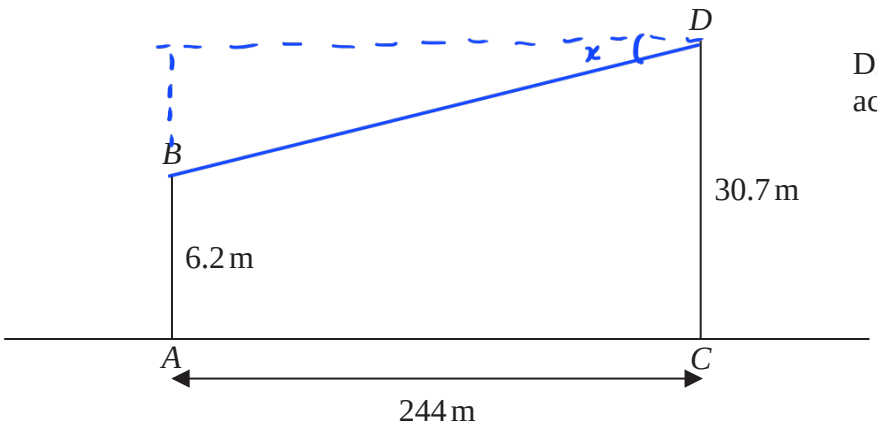


Diagram **NOT** accurately drawn

AB = 6.2 m *AC* = 244 m *CD* = 30.7 m

Work out the size of the angle of depression of *B* from *D*
Give your answer correct to one decimal place.

$\tan x = \frac{30.7 - 6.2}{244}$ (1)

$x = \tan^{-1} \frac{24.5}{244}$ (1)

$= 5.7$ (1)

5.7 °

(Total for Question 8 is 3 marks)

9 A zip wire is shown as the dashed line *AC* in the diagram.

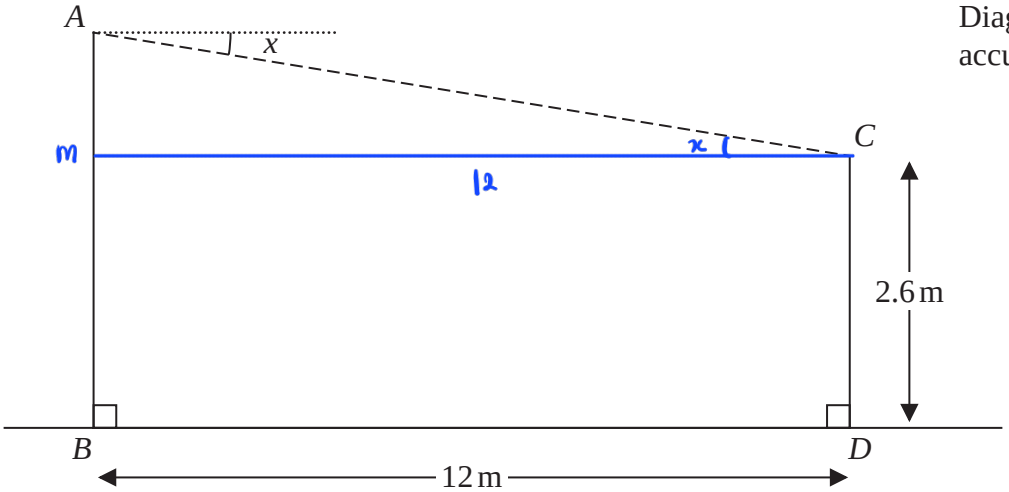


Diagram **NOT** accurately drawn

The zip wire is supported by two vertical posts *AB* and *CD* standing on horizontal ground.

$CD = 2.6\,\text{m}$ $BD = 12\,\text{m}$

The zip wire makes an angle x with the horizontal, as shown in the diagram.
The design of the zip wire requires the angle x to be at least 5°

Work out the least possible height of the post *AB*
Give your answer correct to 3 significant figures.

$\tan 5 = \frac{Am}{12}$

$Am = 12 \tan 5$ (1)

$= 1.05$

$AB = 2.6 + 1.05$ (1)

$= 3.65$ (1)

3.65 ..... m

(Total for Question 9 is 3 marks)

10 *R* and *T* are points on a circle, centre *O*

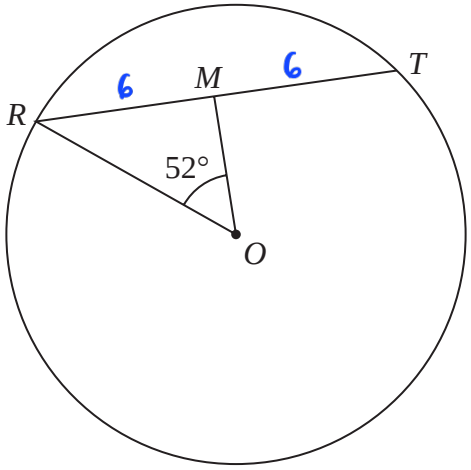


Diagram **NOT** accurately drawn

RT = 12 cm
M is the midpoint of *RT*
Angle *ROM* = 52°

Work out the area of the circle.
Give your answer correct to 3 significant figures.

$\sin 52^\circ = \frac{6}{r}$ (1)

$r = \frac{6}{\sin 52^\circ}$ (1)

$= 7.614$

Area $= \pi \times 7.614^2$ (1)

$= 182$ (1)

182 ..... cm^2

(Total for Question 10 is 4 marks)

11 The diagram shows a rectangular sheet of metal *ABCD*

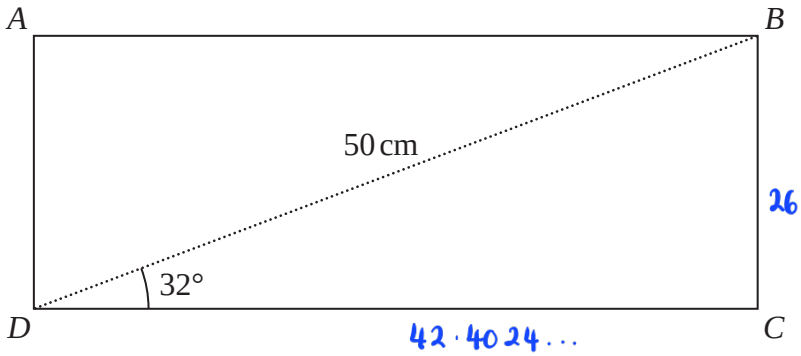


Diagram **NOT** accurately drawn

26.4959...

42.4024...

BD = 50 cm and angle *BDC* = 32°

Nasser joins side *AD* to side *BC* to form a cylinder.

BC is the height of the cylinder.
DC is the circumference of the cross section of the cylinder.

Work out the volume, in cm^3, of the cylinder.
Give your answer correct to 3 significant figures.

$\sin 32^\circ = \frac{BC}{50}$ (1)

$BC = 50 \sin 32^\circ = 26.4959...$ (1)

$\cos 32^\circ = \frac{CD}{50}$ (1)

$CD = 50 \cos 32^\circ = 42.4024...$

$42.4024... = 2\pi r$

$r = \frac{42.4024...}{2\pi} = 6.74855...$ (1)

Volume $= \pi \times 6.74855...^2 \times 26.4959...$ (1)

$= 3790$ (1)

3790

..... cm^3

(Total for Question 11 is 6 marks)

12 The diagram shows right-angled triangle *ABD*

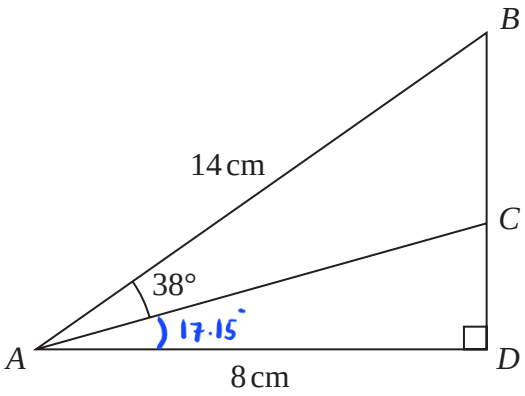


Diagram **NOT** accurately drawn

AB = 14 cm *AD* = 8 cm

C is the point on *BD* such that angle *BAC* = 38°

Work out the length of *CD*
Give your answer correct to 3 significant figures.

$\cos BAD = \frac{8}{14}$ (1)

$BAD = \cos^{-1}\frac{8}{14} = 55.15^\circ\ldots$ (1)

$CAD = 55.15^\circ - 38 = 17.15^\circ$

$\tan 17.15 = \frac{CD}{8}$ (1)

$CD = 8 \tan 17.15$

$= 2.47$ (1)

2.47 cm

(Total for Question 12 is 4 marks)