SCAN ME

REVISE THIS TOPIC

1 Here is a cube.

BF = 9 cm

9 cm
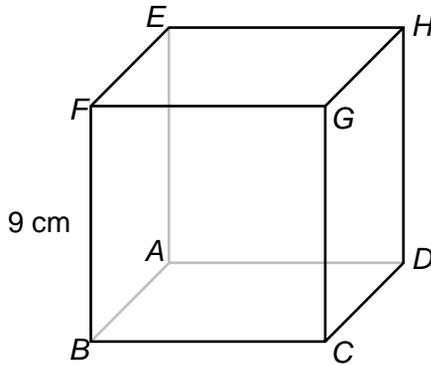
1 **(a)** Work out the length of *AC* giving your answer to 1 decimal place. **[2 marks]**

$$AC^2 = AB^2 + BC^2$$
$$AC^2 = 9^2 + 9^2 \qquad AC = \sqrt{162}$$
$$AC^2 = 162 \qquad AC = 12.7279\ldots$$

Answer _____ 12.7 _____ cm

1 **(b)** Work out the length of *CE* giving your answer to 1 decimal place. **[2 marks]**

$$CE^2 = AC^2 + CE^2$$
$$CE^2 = (\sqrt{162})^2 + 9^2 \qquad CE = \sqrt{243}$$
$$CE^2 = 243 \qquad CE = 15.5884\ldots$$

Answer _____ 15.6 _____ cm

4

2   Here is a cuboid.

BC = 24 cm CD = 10 cm DH = 9 cm

OPP (written)

hyp (written)

adj (written)

x (written)

E   H
F   G   9 cm
A   D
B   24 cm   C   10 cm
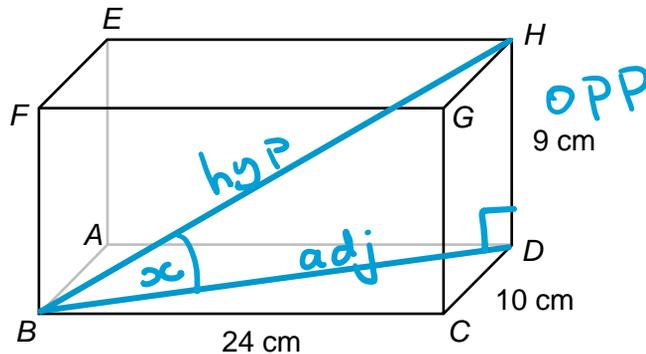
2 (a)   Work out the length of *BD*.   **[2 marks]**

$$BD^2 = BC^2 + CD^2$$
$$BD^2 = 24^2 + 10^2$$ $BD = \sqrt{676}$
$$BD^2 = 676$$

Answer _____ **26** _____ cm

2 (b)   Work out the length of *BH* giving your answer to 1 decimal place.   **[2 marks]**

$$BH^2 = BD^2 + DH^2$$
$$BH^2 = 26^2 + 9^2$$ $BH = \sqrt{757}$
$$BH^2 = 757$$ $BH = 27.5136\ldots$

27.5

Answer _____ **27.5** _____ cm

2 (c)   Work out the size of angle *DBH* giving your answer to 1 decimal place.   **[2 marks]**

$$\tan(x) = \frac{9}{27.5\ldots}$$ $x = \tan^{-1}\left(\frac{9}{27.5\ldots}\right)$

$$x = 18.1134\ldots$$

18.1

Answer _____ **18.1** _____ °

1st

3   Here is a cube.
The surface area of the cube is 3456 cm²

E   H

F   G   **24cm**

A   D
24cm
B   C
24cm
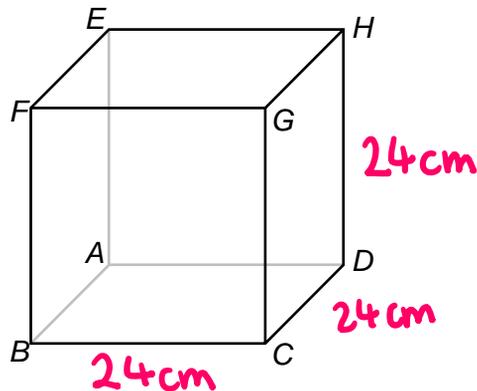
Work out the length of *EC* giving your answer to 1 decimal place.   **[5 marks]**

$3456 \div 6 = 576 \text{cm}^2 \text{(area of one face)}$

$\sqrt{576} = 24 \text{cm (length of one edge)}$

$AC^2 = AB^2 + BC^2$ $EC^2 = AC^2 + AE^2$
$AC^2 = 24^2 + 24^2$ $EC^2 = (\sqrt{1152})^2 + 24^2$
$AC^2 = 1152$ $EC^2 = 1728$
$AC = \sqrt{1152}$ $EC = \sqrt{1728}$
$AC = 33.94...$ $EC = 41.5692...$

41.6

Answer _____ cm

11

Turn over ▶

4   Here is a cuboid.

CD = 6 cm DH = 5 cm   Angle BDC = 60°
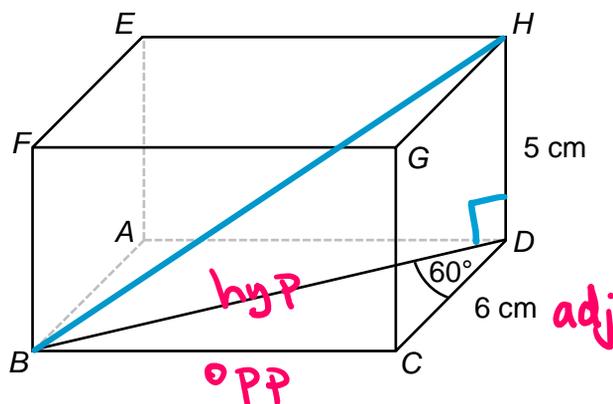
Work out the perimeter of triangle *BDH.*   **[4 marks]**

$$\cos(60) = \frac{6}{BD}$$

$$BD = \frac{6}{\cos(60)}$$

$$BD = \frac{6}{0.5}$$

$$BD = 12\,cm$$

$$BH^2 = BD^2 + DH^2$$

$$BH^2 = 12^2 + 5^2$$

$$BH^2 = 169$$

$$BH = \sqrt{169}$$

$$BH = 13\,cm$$

$$Perimeter = 5 + 12 + 13$$

Answer _____ 30 cm _____ cm

5   Here is a cuboid.
   M is the midpoint of line EH.
   $BC = 30$ cm $CD = 12$ cm $DH = 19$ cm
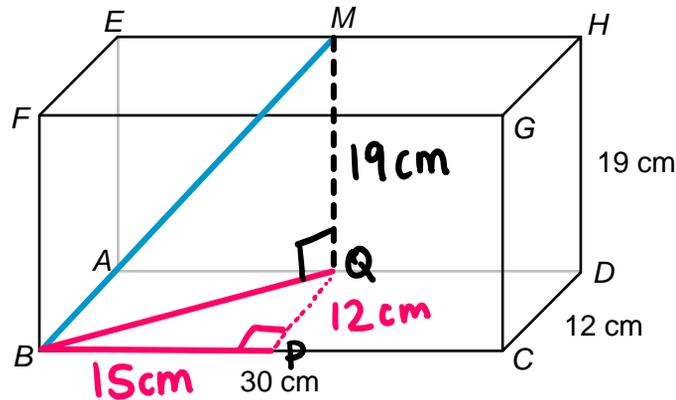
Work out the length of BM giving your answer to 1 decimal place.   **[4 marks]**

$$BQ^2 = BP^2 + PQ^2$$
$$BQ^2 = 15^2 + 12^2$$
$$BQ^2 = 369$$
$$BQ = \sqrt{369}$$
$$BQ = 19.209\ldots$$

$$BM^2 = BQ^2 + QM^2$$
$$BM^2 = (\sqrt{369})^2 + 19^2$$
$$BM^2 = 730$$
$$BM = \sqrt{730}$$
$$BM = 27.0185\ldots$$

Answer _____ **27.0** _____ cm

8

Turn over ▶

6   Here is a cuboid.
P is the point on the line AD so that $AP : PD = 1 : 2$
$CD = 6$cm $DH = 7$ cm $PC = 10$ cm

OPP

adj

E   H

F   G

7 cm

A   4   P   8

10 cm   D

6 cm

B   C
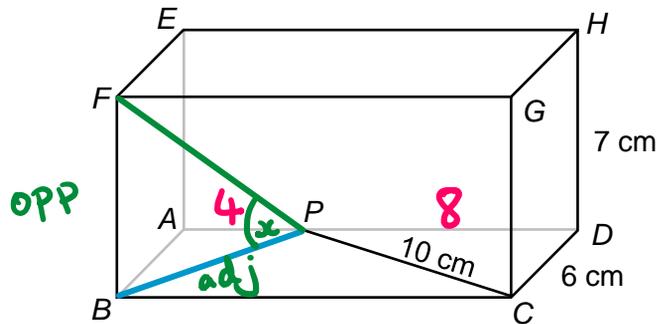
6 (a)   Work out the length of BC giving your answer to 1 decimal place.   **[3 marks]**

$$PD^2 = PC^2 - CD^2 \qquad AP = 8 \div 2 = 4$$
$$PD = \sqrt{10^2 - 6^2} \qquad BC = 4 + 8$$
$$PD = 8$$

Answer _____ 12 _____ cm

6 (b)   Work out the length of BP giving your answer to 1 decimal place.   **[2 marks]**

$$BP^2 = BA^2 + AP^2 \qquad BP = \sqrt{52}$$
$$BP^2 = 6^2 + 4^2 \qquad BP = 7.211...$$
$$BP^2 = 52$$

Answer _____ 7.2 _____ cm

6 (c)   Work out the size of angle BPF giving your answer to 1 decimal place.   **[2 marks]**

$$\tan(x) = \frac{7}{7.21...} \qquad x = \tan^{-1}\left(\frac{7}{7.21...}\right)$$
$$x = 44.148...$$

Answer _____ 44.1 _____ °

7   Here is a cube.
BG = 6 cm
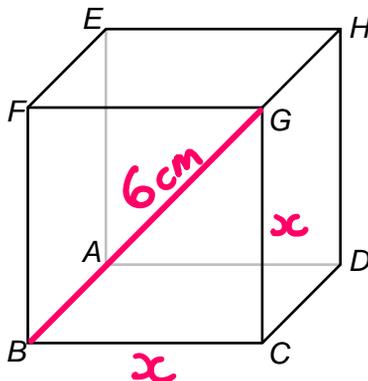
Work out the volume of the cube giving your answer to 1 decimal place. **[4 marks]**

$$BG^2 = BC^2 + CG^2$$
$$6^2 = x^2 + x^2$$
$$\div 2 \left[\; \begin{array}{c} 36 = 2x^2 \\ 18 = x^2 \end{array} \;\right] \div 2$$
$$x = \sqrt{18}$$

$$Volume = \sqrt{18} \times \sqrt{18} \times \sqrt{18}$$
$$= 76.367...$$

Answer   76.4   cm³

11

Turn over ▶

8 *ABCDE* is a square-based pyramid.
M is the midpoint of the line *AC* and *AC* is perpendicular to *ME*.

EC = 53 cm
EM = 45 cm

E

53 cm

45 cm

B

28

C

x

M

x

A x D
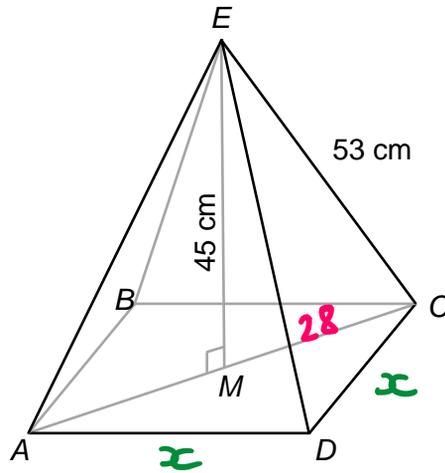
$$\text{Volume of pyramid} = \frac{1}{3} \times \text{area of base} \times \text{perpendicular height}$$

Work out the volume of the pyramid.   **[6 marks]**

$$MC^2 = EC^2 - ME^2$$
$$MC^2 = 53^2 - 45^2 \qquad AC^2 = x^2 + x^2$$
$$MC^2 = 784 \qquad\qquad 56^2 = x^2 + x^2$$
$$MC = \sqrt{784} \qquad \div 2 \left[\begin{array}{l} 3136 = 2x^2 \\ 1568 = x^2 \end{array} \right] \div 2$$
$$MC = 28\text{cm}$$
$$AC = 2 \times MC \qquad\qquad x = \sqrt{1568}$$
$$= 56\text{cm}$$

$$Volume = \frac{1}{3} \times \sqrt{1568} \times \sqrt{1568} \times 45$$

Answer _____ 23520 _____ cm³

9　Here is a triangular prism.

AB = 18 cm BC = 22 cm   Angle BFC = 70°
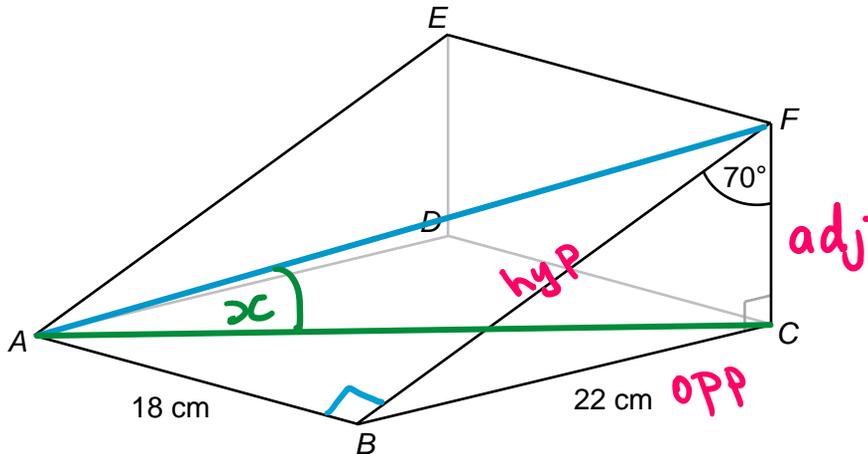
9 (a)　Work out the length of AF giving your answer to 1 decimal place.　**[4 marks]**

$$\sin(70) = \frac{22}{BF}$$

$$BF = \frac{22}{\sin(70)}$$

$$BF = 23.411\ldots$$

$$AF^2 = AB^2 + BF^2$$

$$AF^2 = 18^2 + 23.4\ldots^2$$

$$AF^2 = 872.11757\ldots$$

$$AF = \sqrt{872.11757\ldots}$$

$$AF = 29.5316\ldots$$

29.5

Answer _____ **29.5** _____ cm

9 (b)　Work out the size of angle FAC giving your answer to 1 decimal place.　**[4 marks]**

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

$$AC^2 = 18^2 + 22^2$$

$$AC^2 = 808$$

$$AC = \sqrt{808}$$

$$\cos(x) = \frac{\sqrt{808}}{29.53\ldots}$$

$$\cos(x) = 0.9625\ldots$$

$$x = \cos^{-1}(0.9625\ldots)$$

15.7

Answer _____ **15.7** _____ °

12

Turn over ▶

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10   Here is a cuboid.

$CD = 3.5$ cm $DH = 4.5$ cm   Angle $HAD = 38°$

E, F, G, H, A, B, C, D cuboid diagram with annotations: x, adj, hyp, opp, 38°, 4.5 cm, 3.5 cm
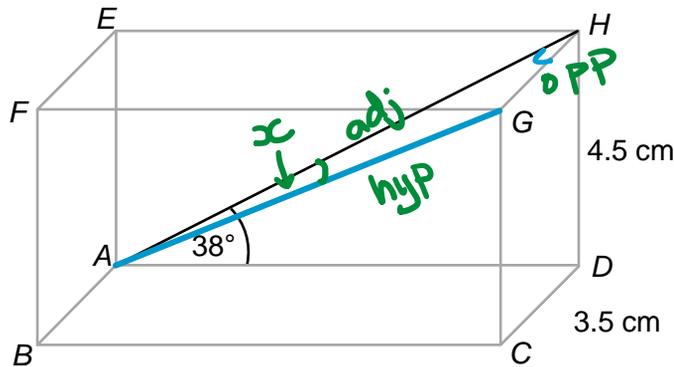
10 (a)   Work out the length of *AG* giving your answer to 1 decimal place.   **[4 marks]**

$$\sin(38) = \frac{4.5}{AH}$$

$$AH = \frac{4.5}{\sin(38)}$$

$$= 7.309...$$

$$AG^2 = AH^2 + HG^2$$

$$AG^2 = 7.309...^2 + 3.5^2$$

$$AG^2 = 65.674...$$

$$AG = \sqrt{65.674...}$$

$$AG = 8.1039...$$

Answer _____ 8.1 _____ cm

10 (b)   Work out the size of angle *HAG* giving your answer to 1 decimal place. **[2 marks]**

$$\sin(x) = \frac{3.5}{8.10...}$$

$$\sin(x) = 0.43188...$$

$$x = \sin^{-1}(0.43188...)$$

$$x = 25.5873...$$

Answer _____ 25.6 _____ °

11   Here is a triangular prism.

BF = 15 cm   Angle CED = 33°
$BF : BC$ = 5 : 12
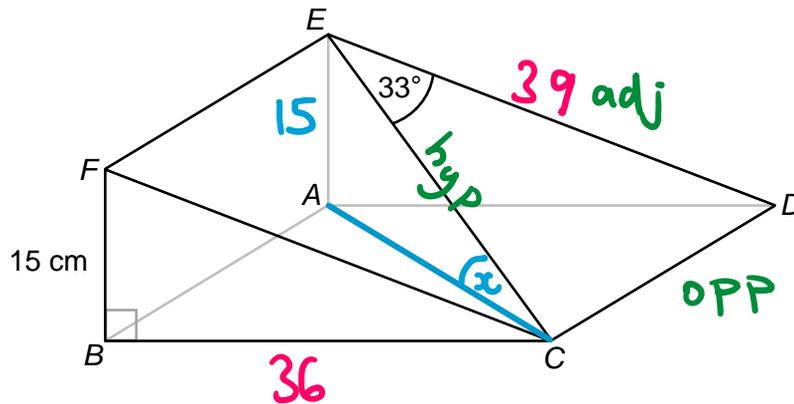
Work out the size of angle ACE giving your answer to 1 decimal place.   **[6 marks]**

$BC = \dfrac{15}{5} \times 12$

$= 36$ cm

$FC^2 = 15^2 + 36^2$

$FC^2 = 1521$

$FC = \sqrt{1521}$

$FC = 39$

$FC = ED = 39$

$\cos(33) = \dfrac{39}{EC}$

$EC = \dfrac{39}{\cos(33)}$

$EC = 46.502\ldots$

$\sin(x) = \dfrac{15}{46.502\ldots}$

$\sin(x) = 0.3225\ldots$

$x = \sin^{-1}(0.322\ldots)$

$x = 18.81815\ldots$

Answer   18.8   °

12

Turn over ▶

12   *ABCDE* is a square-based pyramid placed on top of cube *BCDEFGHI*
M is the midpoint of the line *FH* with *FH* perpendicular to *MA*.

F = 12 cm   *AD* = 19 cm

A

19 cm

C   D

P
×

B   E

G   H

x
M
F   12 cm   I
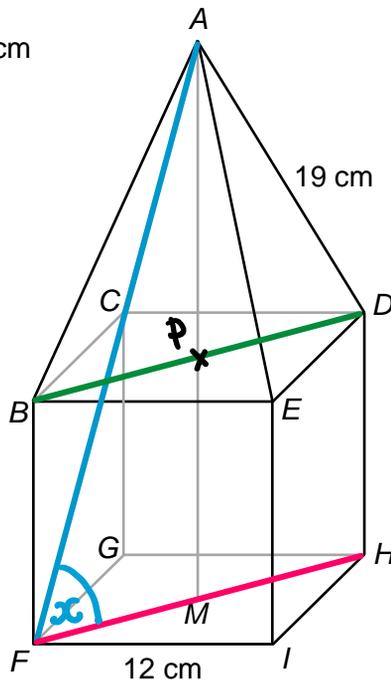
Work out the size of angle *AFM* giving your answer to 1 decimal place. **[6 marks]**

$FH^2 = 12^2 + 12^2$

$FH^2 = 288$

$FH = \sqrt{288}$

$MH = \sqrt{288} \div 2$

$MH = 8.485\ldots$

$PA^2 = 8.485\ldots^2 + 19^2$

$PA^2 = 433$

$PA = \sqrt{433}$

$PA = 20.80865205$

$MA = 20.8\ldots + 12$

$MA = 32.808\ldots$

$\tan(x) = \dfrac{32.808\ldots}{\sqrt{288} \div 2}$

$\tan(x) = 3.86653\ldots$

$x = \tan^{-1}(3.866\ldots)$

$x = 75.499366$

75.5   °

Answer _____

**13** Here is a cuboid.

$CG : CD : CB = 1 : 2 : 3$
$BG = k$ cm
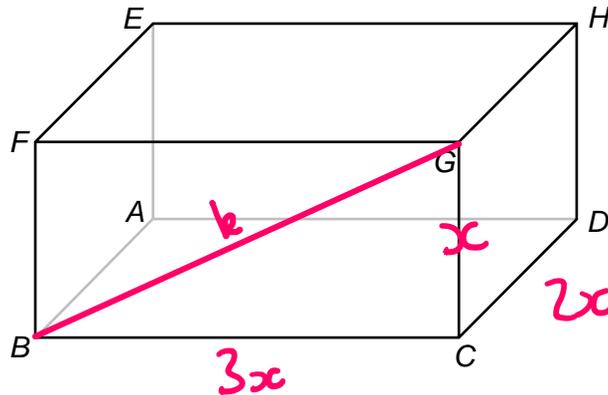
Show that the volume of the cuboid can be written in the form $\dfrac{3\sqrt{a}}{b}k^3$
where a and b are integers.

[6 marks]

$$x^2 + (3x)^2 = k^2 \qquad\qquad x = \dfrac{k}{\sqrt{10}}$$

$$x^2 + 9x^2 = k^2$$

$$10x^2 = k^2$$

$$x^2 = \dfrac{k^2}{10} \qquad\qquad x = \dfrac{k\sqrt{10}}{10}$$

Volume $= x \times 2x \times 3x \qquad V = \dfrac{60\sqrt{10}\,k^3}{1000}$

$$= 6x^3$$

$$= 6 \times \left(\dfrac{k\sqrt{10}}{10}\right)^3 \qquad V = \dfrac{3\sqrt{10}}{50}k^3$$

$$= 6 \times \dfrac{k^3 \times 10\sqrt{10}}{1000}$$

$\boxed{12}$