

1

Work out

cube root of 512 : reciprocal of 0.4

Give your answer in the form $n : 1$

[3 marks]

$$\sqrt[3]{512} = 8 \quad , \quad \frac{1}{0.4} = \frac{10}{4} = 2.5$$

$$8 : 2.5$$

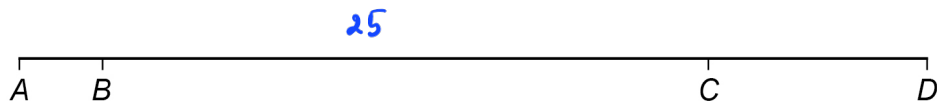
$$8 \div 2.5 = 3.2$$

Answer 3.2 : 1

2

A , B , C and D are junctions on a motorway.

Not drawn
accurately



distance $CD = 3 \times$ distance AB

distance $BC = 25$ miles

Salma drives from A to C .

She drives for 30 minutes at an average speed of 62 miles per hour.

Work out the distance AD .

[4 marks]

$$62 = \frac{25 + AB}{30 \div 60}$$

$$(0.5) \quad 62 = 25 + AB$$

①

①

$$31 = 25 + AB$$

$$AB = 6 \text{ miles}$$

$$CD = 3 \times 6 \quad \text{①}$$

$$= 18$$

$$AD = 6 + 25 + 18 = 49 \quad \text{①}$$

Answer 49 miles

3

$$d = 2f$$

$$\frac{e-f}{d-e} = \frac{1}{4}$$

Work out the ratio $e:f$

[3 marks]

$$\frac{e-f}{2f-e} = \frac{1}{4}$$

$$4e - 4f = 2f - e \quad (1)$$

$$5e = 6f \quad (1)$$

$$\frac{e}{f} = \frac{6}{5}$$

Answer $\frac{6}{5}$: $\frac{1}{1}$

4

 A is half of B .Work out the ratio $A : B$

Circle your answer.

$$A = \frac{1}{2} B$$

$$\frac{A}{B} = \frac{1}{2}$$

$$A : B = 1 : 2$$

[1 mark]

1 : 2

1

2 : 1

1 : 3

3 : 1

- 5 Jeff and Kaz share £270 in the ratio Jeff : Kaz = 2.6 : 1
How much **more** than Kaz does Jeff get?

[3 marks]

$$\text{Total ratio : } 2.6 + 1 = 3.6$$

$$270 \div 3.6 = 75 \quad (1)$$

$$\text{Difference in ratio : } 2.6 - 1 = 1.6$$

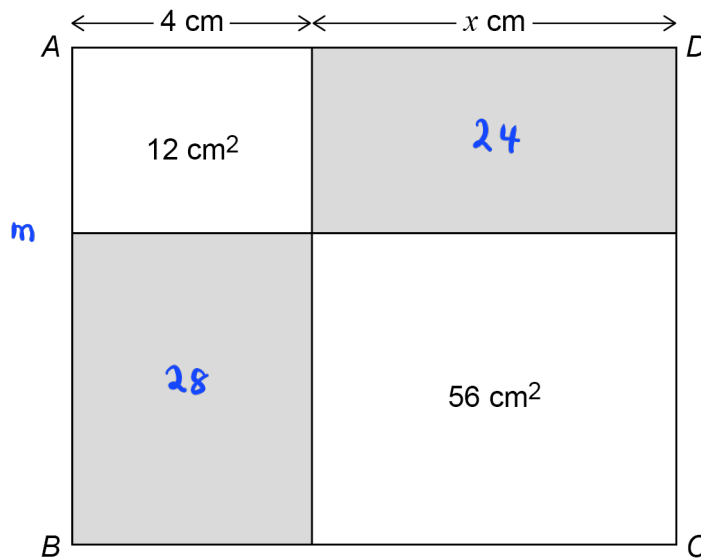
$$75 \times 1.6 = 120$$

(1)

Answer £ 120

(1)

- 6 Rectangle $ABCD$ is split into four smaller rectangles.
Two of the smaller rectangles are shaded.



Not drawn
accurately

$$4 : x = 1 : 2$$

For rectangle $ABCD$, work out the ratio shaded area : unshaded area
Give your answer in its simplest form.

[4 marks]

$$x = 4 \times 2 = 8$$

$$\text{Area of top shaded rectangle : } 8 \times (12 \div 4)$$

$$= 8 \times 3 = 24 \text{ cm}^2$$

$$\text{Area of bottom shaded rectangle : } 4 \times (56 \div 8)$$

$$= 4 \times 7 = 28 \text{ cm}^2$$

$$\text{shaded : } 24 + 28 = 52 \quad \text{unshaded : } 12 + 56 = 68$$

$$\text{shaded : unshaded} = 52 : 68 \div 4$$

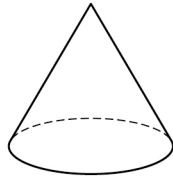
$$= 13 : 17$$

$$\text{Answer } 13 : 17$$

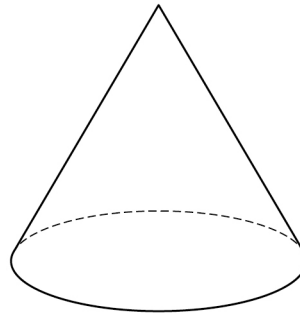
7

Here are two similar cones.

Cone A



Cone B

The surface area of cone A is 2 m^2 The surface area of cone B is 4.5 m^2

Work out the ratio radius of cone A : radius of cone B

Give your answer in the form $1 : n$

[3 marks]

$$\text{scale factor of } \frac{B}{A} : \frac{4.5}{2} = 2.25$$

$$\text{scale factor in length} : \sqrt{2.25}$$

$$= 1.5$$

$$\text{radius of A : radius of B} = 1 : 1.5$$

Answer 1 : 1.5

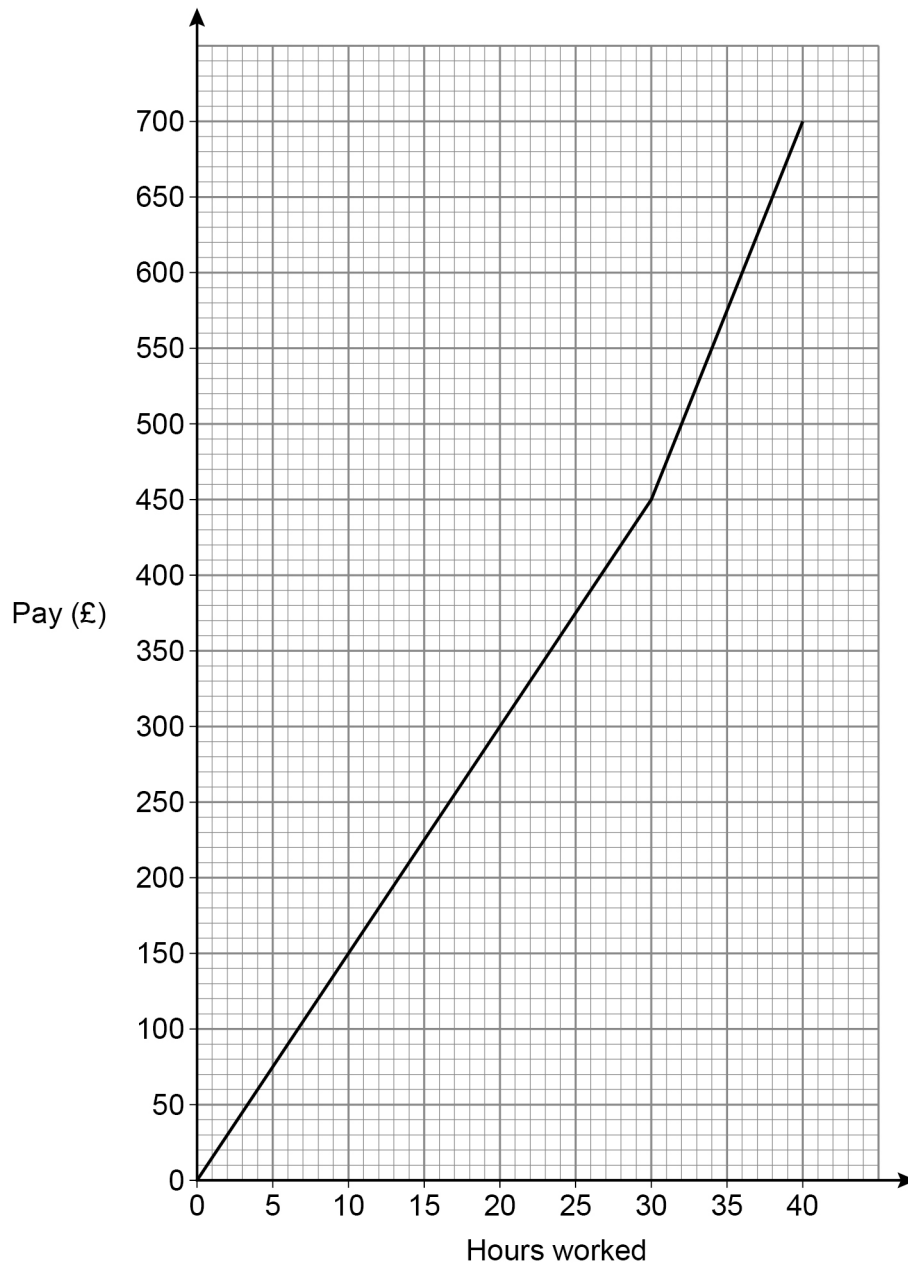
8

In a week, Samir is paid

a basic hourly rate for the first 30 hours worked

an overtime hourly rate for any extra hours worked.

The graph shows his pay for working up to 40 hours in a week.



Work out the ratio basic hourly rate : overtime hourly rate

Give your answer in its simplest form.

[3 marks]

$$\text{Basic hourly rate} = \frac{450}{30} = 15 \quad (1)$$

$$\text{Overtime hourly rate} = \frac{(700 - 450)}{40 - 30} = \frac{250}{10} = 25 \quad (1)$$

$$\begin{aligned} \text{ratio} &= 15 : 25 \\ &= 3 : 5 \quad \downarrow \div 5 \end{aligned}$$

$$\text{Answer } \underline{3} : \underline{5} \quad (1)$$

- 9 (a) Amol received £6660 from selling the 3000 sandwiches in June.

The numbers of sandwiches sold were in the ratio

$$\text{meat} : \text{cheese} : \text{vegan} = 9 : 4 : 7$$

The price of a meat sandwich is £2.39

The price of a cheese sandwich is £1.89

Work out the price of a vegan sandwich.

[4 marks]

$$\text{Total ratio} : 9 + 4 + 7 = 20$$

$$\text{Meat sold} : \frac{9}{20} \times 3000 = 1350$$

$$\text{cheese sold} : \frac{4}{20} \times 3000 = 600$$

$$\text{vegan sold} : \frac{7}{20} \times 3000 = 1050$$

$$\text{Sales from meat} = 1350 \times 2.39 = 3226.50$$

$$\text{Sales from cheese} = 600 \times 1.89 = 1134$$

$$\text{Sales from vegan} = 6660 - 3226.50 - 1134 = 2299.50$$

$$\text{Price of a vegan sandwich} = 2299.50 \div 1050$$

$$= 2.19$$

Answer £ 2.19

10

Two objects, J and K, are applying pressure to areas of ground.

$$\text{pressure} = \frac{\text{force}}{\text{area}}$$

For J, the force is 18.9 newtons and the area is 0.45m^2

$$\text{pressure for J : pressure for K} = 7 : 8$$

$$\text{area for J : area for K} = 9 : 5$$

Work out the force for K.

[4 marks]

$$\text{pressure of J : } \frac{18.9}{0.45} = 42 \quad (1)$$

$$\text{pressure of K : } \frac{42}{7} \times 8 = 48 \quad (1)$$

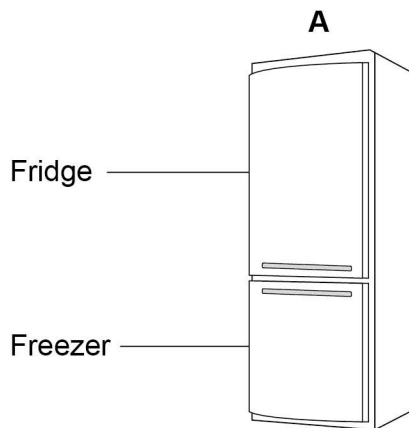
$$\text{Area of K : } \frac{0.45}{9} \times 5 = 0.25 \quad (1)$$

$$\text{Force of K : } 48 \times 0.25$$

$$= 12 \quad (1)$$

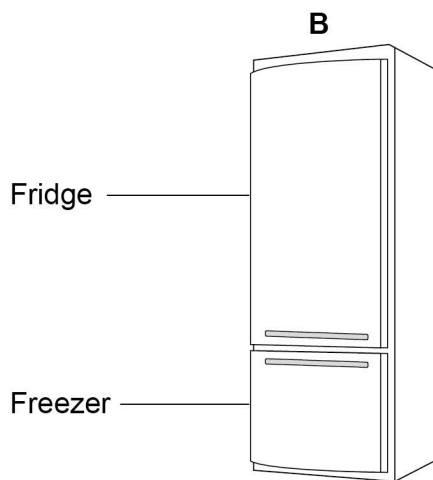
Answer 12 newtons

- 11 Information about two fridge-freezers, A and B, is shown.



Total capacity is 330 litres

fridge capacity : freezer capacity = 3 : 2



Fridge capacity is 294 litres

fridge capacity : freezer capacity = 7 : 3

Grace buys one of these fridge-freezers.

She buys the one with the greater **freezer** capacity.

Which one does she buy?

You **must** show your working.

[4 marks]

$$A : \frac{2}{3+2} \times 330 = \frac{2}{5} \times 330 = 132 \quad (1)$$

$$B : \frac{294}{7} \times 3 = 126 \quad (1)$$

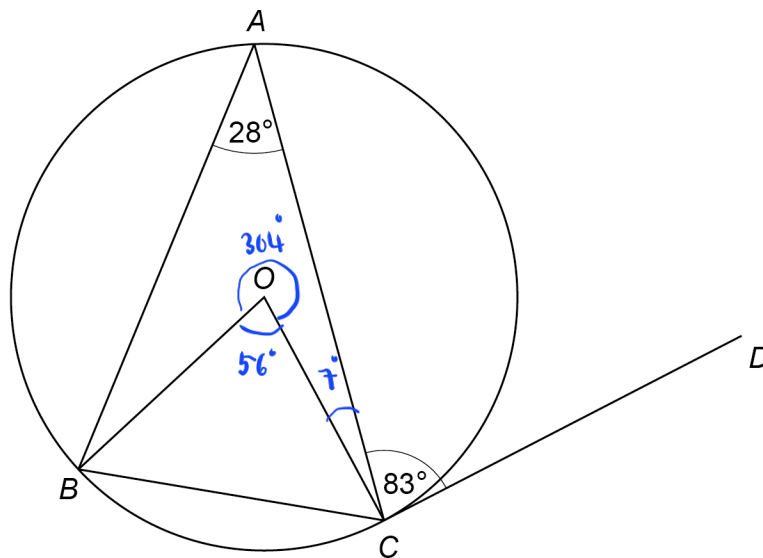
Grace buys A. (1)

Answer A

12

A , B and C are points on a circle, centre O .

DC is a tangent to the circle.



Not drawn
accurately

Show that angle ABO : angle ACO = 3 : 1

[5 marks]

$$ACO = 90 - 83 = 7^\circ \quad (1)$$

$$BOC \text{ (small)} = 2 \times 28^\circ = 56^\circ \quad (1)$$

$$BOC \text{ (large)} = 360^\circ - 56^\circ - 304^\circ \quad (1)$$

$$ABO = 360^\circ - 304^\circ - 7^\circ - 28^\circ$$

$$= 21^\circ \quad (1)$$

$$ABO : ACO = 21 : 7 \quad \downarrow \div 7$$

$$3 : 1 \quad (1)$$

13 Andrew and Bruce share some money in the ratio 5 : 6

Bruce gets £96

Andrew gives $\frac{1}{4}$ of his share to Carl.

Bruce gives $\frac{2}{3}$ of his share to Carl.

How much money does Carl receive?

[4 marks]

$$\text{Andrew : } \frac{96}{6} \times 5 = 80 \quad (1)$$

$$\text{Andrew gives : } \frac{1}{4} \times 80 = 20 \quad (1)$$

$$\text{Bruce gives : } \frac{2}{3} \times 96 = 64 \quad (1)$$

$$\text{Carl : } 20 + 64 = 84 \quad (1)$$

Answer £ 84

14 Write $30 : 12$ in the form $n : 1$

[1 mark]

$$\frac{30}{12} = 2.5$$

Answer $\frac{2.5}{1} : 1$

15

Jess saves 2p, 5p and 10p coins.

She has

- 45 10p coins
- 8 times as many 2p coins as **10p coins**
- £17.70 in total.

Work out total **value** of 2p coins : total **value** of 5p coins

Give your answer in its simplest form.

[4 marks]

$$2p : 45 \times 8 = 360 \text{ coins} \quad (1)$$

$$5p : 17.70 - (45 \times 0.10) - (360 \times 0.20)$$

$$: 17.70 - 4.50 - 7.20 \quad (1)$$

$$: 6.00 \quad (1)$$

$$2p : 7.20$$

$$2p : 5p = 7.20 : 6.00 \quad \downarrow \div 12$$

$$: 6 : 5 \quad (1)$$

Answer 6 : 5

16

Jing has £2450

She saves some and gives the rest to her four brothers.

money saved : money given to brothers = 2 : 5

She gives each of her **four** brothers the **same** amount.

Does each brother receive more than £430 ?

You **must** show your working.

[4 marks]

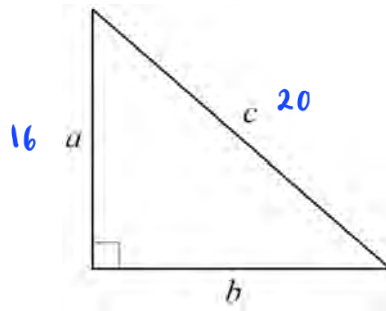
Total ratio : $2 + 5 = 7$

$$\text{money she gives : } \frac{5}{7} \times 2450 = 1750$$

$$\text{Each brother receive : } \frac{1750}{4} = 437.50$$

Yes. Each receive £437.50.

17

Not drawn
accurately

In this right-angled triangle,

$$a = 16 \text{ cm}$$

$$a : c = 4 : 5$$

Work out the area of the triangle.

[4 marks]

$$c = \frac{5}{4} \times 16 = 20 \quad (1)$$

$$b = \sqrt{20^2 - 16^2}$$

$$= \sqrt{144} \quad (1)$$

$$= 12 \quad (1)$$

$$\text{Area} = \frac{1}{2} \times 16 \times 12$$

$$= 96 \quad (1)$$

Answer 96 cm²

18 (a) G is directly proportional to the square root of H .

$$G : H = 3 : 2 \text{ when } H = 16$$

Work out $G : H$ when $H = 100$

[4 marks]

$$G = k H^{\frac{1}{2}} \quad (1)$$

$$\text{when } H = 16, \quad G = \frac{16}{2} \times 3 = 24$$

$$24 = k (16)^{\frac{1}{2}}$$

$$k = \frac{24}{4} = 6 \quad (1)$$

$$G = 6 H^{\frac{1}{2}}$$

$$\text{when } H = 100, \quad G = 6 (100)^{\frac{1}{2}}$$

$$= 6 \times 10 = 60 \quad (1)$$

$$\begin{aligned} G : H &= 60 : 100 \\ &= 3 : 5 \end{aligned} \quad \begin{array}{l} \downarrow \div 20 \\ (1) \end{array}$$

Answer 3 : 5

19 Divide 62 in the ratio 3 : 7

[3 marks]

$$\text{Total ratio} = 3 + 7 = 10 \quad (1)$$

$$62 \div 10 = 6.2$$

$$6.2 \times 3 = 18.6 \quad , \quad 6.2 \times 7 = 43.4$$

(1)

Answer 18.6 and 43.4 (1)

- 20 Write $(3^6 \times 3^5) : 3^7$ in the form $n : 1$ where n is an integer. [3 marks]

$$3^{6+5} : 3^7$$

$$= 3^{11} : 3^7$$

$$3^4 : 1$$

$$= 81 : 1$$

Answer 81 : 1

- 21 a is 10% more than b .
Circle the ratio $a : b$

[1 mark]

10 : 11

10 : 1

11 : 10

1 : 10

22

A road has three sections, D, E and F.

The lengths of D, E and F are in the ratios

$$D : E = 3 : 5 \quad E : F = 7 : 4$$

What fraction of the length of the road is section D?

[3 marks]

$$D : E : F$$

$$3 \times 7 : 5 \times 7 \quad (1)$$

$$7 \times 5 : 4 \times 5$$

$$21 : 35 : 20$$

(1)

$$\text{Total ratio : } 21 + 35 + 20 = 76$$

$$D = \frac{21}{76} \quad (1)$$

$$\text{Answer } \frac{21}{76}$$

23

Joe, Kim and Lisa each have an amount of money.

Joe has £72

Joe's amount : Kim's amount = 6 : 5

Lisa's amount is $1\frac{1}{2}$ times Joe's amount.

Show that, in total, they have **less** than £250

[3 marks]

$$\text{Kim's amount} : \frac{£72}{6} \times 5 = £60 \quad (1)$$

$$\text{Lisa's amount} : 1.5 \times £72 = £108 \quad (1)$$

$$\text{Total amount} : £72 + £60 + £108$$

$$= £240 \quad (1)$$

24

Here are the results after 250 spins of a coin.

Heads	128
Tails	122

The coin is spun an extra 50 times.

After all 300 spins, the relative frequency of Heads is 0.49

For the **extra 50 spins**, work out number of Heads : number of Tails**[3 marks]**

After 300 spins :

$$(Heads) \quad 0.49 \times 300 = 147 \quad (1)$$

$$(Tails) \quad 0.51 \times 300 = 153$$

$$\text{For extra 50 spins: } (Heads) : 147 - 128 = 19 \quad (1)$$

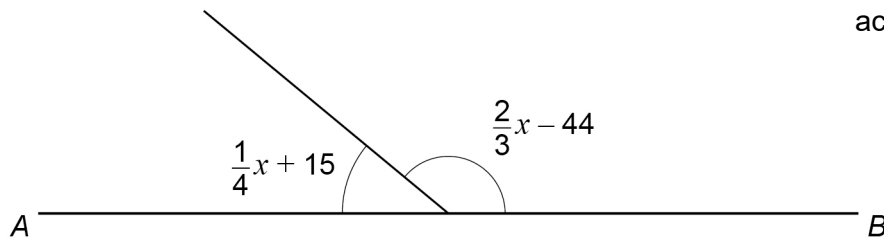
$$(Tails) : 153 - 122 = 31$$

Answer 19 (1) 31

25

 AB is a straight line.

Both angles are given in degrees.

Not drawn
accuratelyBy working out the value of x ,

work out the ratio smaller angle : larger angle

[4 marks]

$$\frac{1}{4}x + 15 + \frac{2}{3}x - 44 = 180 \quad \checkmark (1)$$

$$\frac{1}{4}x + \frac{2}{3}x = 180 - 15 + 44$$

$$\checkmark (1)$$

$$\frac{11}{12}x = 209 \quad \checkmark (1)$$

$$x = 228$$

$$\text{smaller angle} : \frac{1}{4}(228) + 15 = 72$$

$$\text{larger angle} : \frac{2}{3}(228) - 44 = 108$$

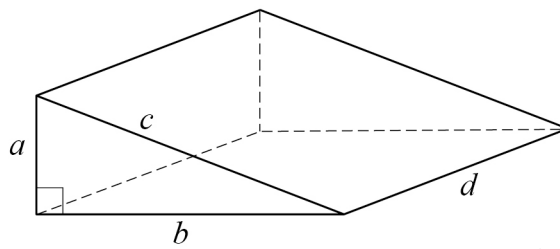
$$\begin{aligned} \text{smaller angle} : \text{larger angle} &= 72 : 108 \\ &= 2 : 3 \end{aligned}$$

$$\checkmark (1)$$

Answer 2 : 3

26

Here is a right-angled triangular prism.



Volume of prism :

$$\frac{1}{2} \times (a \times b) \times d$$

The ratio of the edges is $a : b : c : d = 3 : 4 : 5 : 12$ The **volume** of the prism is 1125 cm^3 Work out the total length of **all** of the edges of the prism.**[5 marks]**let length of edges is variable of x .

$$\text{Volume of prism} = \frac{1}{2} \times 3x \times 4x \times 12x = 1125$$

$$= 144x^3 = 2250 \quad \checkmark \textcircled{1}$$

$$x^3 = 15.625 \quad \checkmark \textcircled{1}$$

$$x = \sqrt[3]{15.625}$$

$$= 2.5 \quad \checkmark \textcircled{1}$$

$$a = 3 \times 2.5 = 7.5 \text{ cm}$$

$$b = 4 \times 2.5 = 10 \text{ cm}$$

$$c = 5 \times 2.5 = 12.5 \text{ cm}$$

$$d = 12 \times 2.5 = 30 \text{ cm}$$

$$\text{Total length of edges} = 2(7.5) + 2(10) +$$

$$\checkmark \textcircled{1} 2(12.5) + 3(30)$$

$$= 150 \text{ cm}$$

$$\checkmark \textcircled{1}$$
Answer 150 cm