## Similar shapes



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The two triangles ABC and PQR are mathematically similar. Angle A = angle P. Angle B = angle Q. AB = 8 cm. AC = 26 cm. PQ = 12 cm. QR = 45 cm.

(a) Calculate the length of PR.

..... cm (2)

(b) Calculate the length of BC.





AB is parallel to DE. ACE and BCD are straight lines. AB = 6 cm, AC = 8 cm, CD = 13.5 cm, DE = 9 cm.

(a) Calculate the length of CE.

.....cm (2)

(b) Calculate the length of BC.



Diagram NOT accurately drawn

AB is parallel to XY. The lines AY and BX intersect at P. AB = 6 cm. XP = 12.5 cm. XY = 15 cm.

Work out the length of BP.



BE is parallel to CD. ABC and AED are straight lines. AB = 4 cm, BC = 6 cm, BE = 5 cm, AE = 4.8 cm.

(a) Calculate the length of CD.

3.

......cm (2)

(b) Calculate the length of ED.



Diagram NOT accurately drawn

BE is parallel to CD. AB = 9 cm, BC = 3 cm, CD = 7 cm, AE = 6 cm.

(a) Calculate the length of ED.

..... cm (2)

(b) Calculate the length of BE.

X and Y are two geometrically similar solid shapes.

The total surface area of shape X is  $450 \text{ cm}^{2}$ . The total surface area of shape Y is  $800 \text{ cm}^{2}$ .

The volume of shape X is  $1350 \text{ cm}^{3}$ .

Calculate the volume of shape Y.

.....  $cm^{3}$  (3)

5.



Two cones, P and Q, are mathematically similar.

The total surface area of cone P is 24 cm<sup>2</sup>. The total surface area of cone Q is 96 cm<sup>2</sup>.

The height of cone P is 4 cm.

(a) Work out the height of cone Q.

..... cm (3)

The volume of cone P is  $12 \text{cm}^3$ 

(b) Work out the volume of cone Q.

21 (a)



Triangles *CBA* and *CED* are similar. *AB* is parallel to *DE*. AB = 9 cm, BE = 4.8 cm, EC = 6 cm and ED = k cm.

Work out the value of *k*.



The diagram shows two mathematically similar vases. Vase A has height 20 cm and volume 1500 cm<sup>3</sup>. Vase B has volume 2592 cm<sup>3</sup>.

Calculate *h*, the height of vase B.

h = ..... cm [3]



9

The diagram shows two jugs that are mathematically similar.

Find the value of *x*.

 $Answer(a) x = \dots [2]$ 



The diagram shows two glasses that are mathematically similar. The height of the larger glass is 16 cm and its volume is  $375 \text{ cm}^3$ . The height of the smaller glass is *y* cm and its volume is  $192 \text{ cm}^3$ .

Find the value of *y*.

Answer(b)  $y = \dots$  [3]

**(b)** 

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 Two containers are mathematically similar. Their volumes are 54 cm<sup>3</sup> and 128 cm<sup>3</sup>. The height of the smaller container is 4.5 cm.

Calculate the height of the larger container.



The two containers are mathematically similar in shape. The larger container has a volume of  $3456 \,\mathrm{cm}^3$  and a surface area of  $1024 \,\mathrm{cm}^2$ . The smaller container has a volume of  $1458 \,\mathrm{cm}^3$ .

Calculate the surface area of the smaller container.

*Answer* ..... cm<sup>2</sup> [4]

18

0580/22/M/J/14

1 (a) *ABCD* is a trapezium.



(i) Calculate the length of *AD*.

 $Answer(a)(i) AD = \dots cm [2]$ 

(ii) Calculate the size of angle *BCD*.

Answer(a)(ii) Angle BCD = ..... [3]

(iii) Calculate the area of the trapezium ABCD.

*Answer(a)*(iii) ..... cm<sup>2</sup> [2]

(b) A similar trapezium has perpendicular height 9.4 cm.

Calculate the area of this trapezium.

*Answer(b)* ..... cm<sup>2</sup> [3]



The  $180\,000\,\text{cm}^3$  of water reaches the level *EF* as shown above. *EF* = *x* cm and the height of the water is *h* cm.

(i) Using the properties of similar triangles, show that h = 2(x - 50).

Answer(d)(i)

(d)

[2]

[1]

(ii)	Using $h = 2(x - 50)$ , show that the shaded area, in cm <sup>2</sup> , is $x^2 - 2500$ .
	Answer(d)(ii)

(iii) Find the value of x.

 $Answer(d)(iii) x = \dots [2]$ 

(iv) Find the value of *h*.

 $Answer(d)(iv) h = \dots [1]$ 

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6

A company sells cereals in boxes which measure 10 cm by 25 cm by 35 cm.

They make a special edition box which is mathematically similar to the original box.

The volume of the special edition box is  $15120 \text{ cm}^3$ .

Work out the dimensions of this box.

*Answer* ..... cm by ..... cm [3]



The diagram shows two similar figures. The areas of the figures are  $5 \text{ cm}^2$  and  $7.2 \text{ cm}^2$ . The lengths of the bases are *l* cm and 6.9 cm.

Calculate the value of *l*.

 $Answer(d) \ l = \dots [3]$ 

0580/41/M/J/13



The diagram represents a large cone of height 6 cm and base diameter 18 cm.

The large cone is made by placing a small cone A of height 2 cm and base diameter 6 cm on top of a frustum B.

Calculate the volume of the frustum B. Give your answer in terms of  $\prec$ .

3.





3

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