G196 Similar shapes

Q1.

Ali has two solid cones made from the same type of metal.

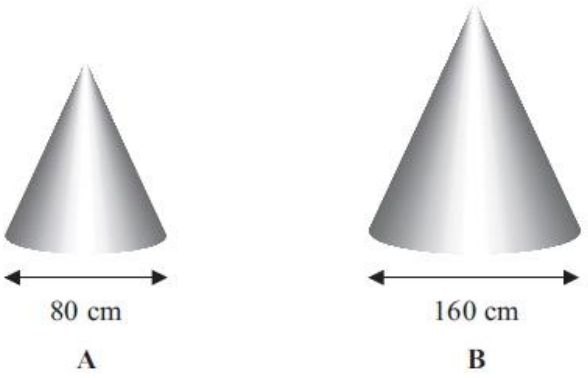


Diagram **NOT** accurately drawn

The two solid cones are mathematically similar.
The base of cone **A** is a circle with diameter 80 cm.
The base of cone **B** is a circle with diameter 160 cm.

Ali uses 80 m*l* of paint to paint cone **A**.
Ali is going to paint cone **B**.

(a) Work out how much paint, in m*l*, he will need.

. . . . . m*l*

(2)

The volume of cone **A** is 171 700 cm^3.

(b) Work out the volume of cone **B**.

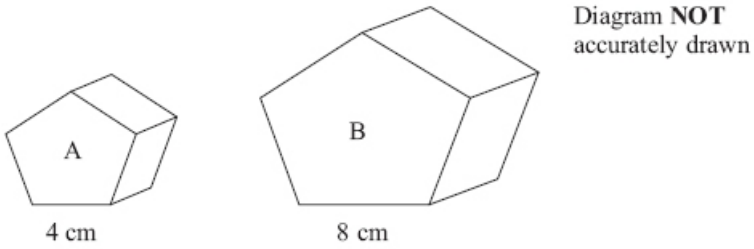
. . . . . cm^3

(3)

(Total for Question is 5 marks)

Q2.

The diagram shows two similar solids, A and B.



Solid A has a volume of 80 cm^3.

(a) Work out the volume of solid B.

.....cm^3

(2)

Solid B has a total surface area of 160 cm^2.

(b) Work out the total surface area of solid A.

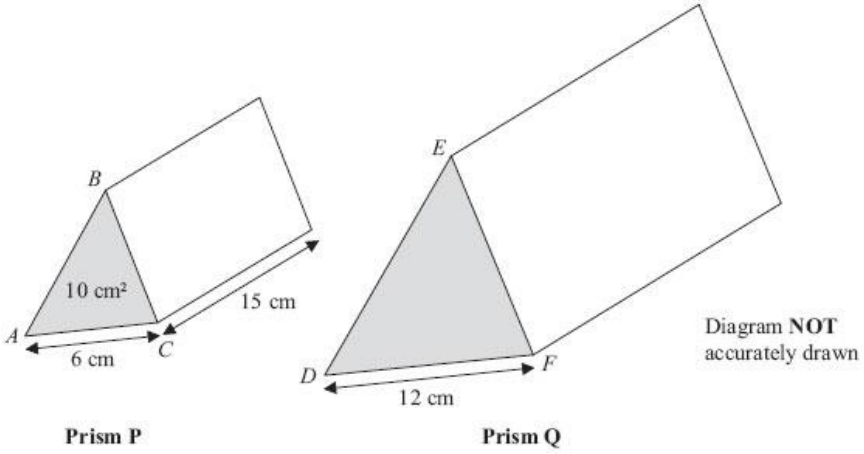
.....cm^2

(2)

(Total for Question is 4 marks)

Q3.

P and **Q** are two triangular prisms that are mathematically similar.



Prism **P** has triangle *ABC* as its cross section.
Prism **Q** has triangle *DEF* as its cross section.

AC = 6 cm
DF = 12 cm

The area of the cross section of prism **P** is 10 cm^2.
The length of prism **P** is 15 cm.

Work out the volume of prism **Q**.

(Total for Question is 4 marks)

Q4.

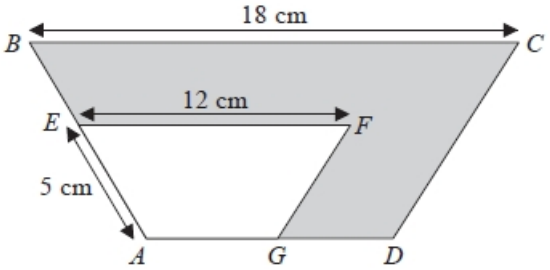


Diagram **NOT** accurately drawn

ABCD and *AEFG* are mathematically similar trapeziums.
AE = 5 cm
EF = 12 cm
BC = 18 cm

(a) Work out the length of *AB*.

..... cm

(2)

Trapezium *AEFG* has an area of 36 cm^2.

(b) Work out the area of the shaded region.

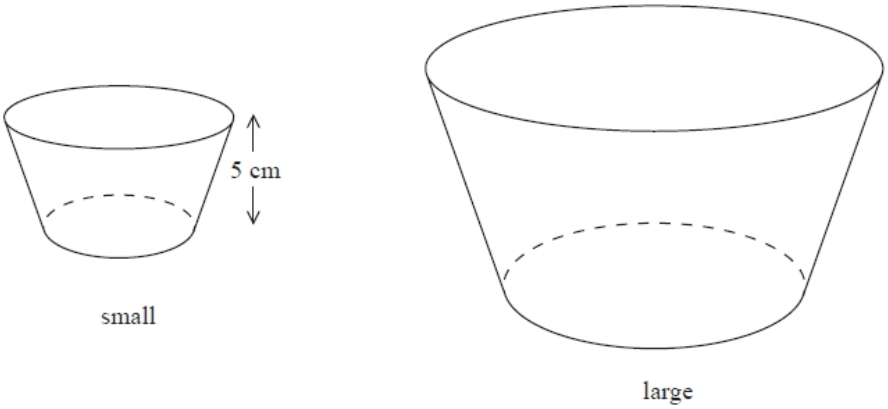
..... cm^2

(3)

(Total for Question is 5 marks)

Q5.

A factory makes ice cream tubs in two sizes, small and large.



The tubs are similar in shape. The height of the small tub is 5 cm

The volume of the small tub is 150 cm^3
The volume of the large tub is 500 cm^3

Work out the height of the large tub.

(Total for question = 2 marks)

Q6.

Solid **A** and solid **B** are mathematically similar.
The ratio of the surface area of solid **A** to the surface area of solid **B** is 4:9

The volume of solid **B** is 405cm^3.

Show that the volume of solid **A** is 120cm^3.

(Total for question = 3 marks)

Q7.

Two solid cones are mathematically similar.

Cone **A** has a volume of 120 cm^3
Cone **B** has a volume of 960 cm^3

Work out the ratio of the surface area of cone **A** to the surface area of cone **B**.

(Total for question = 3 marks)

Q8.

Cone **A** and cone **B** are mathematically similar.
The ratio of the volume of cone **A** to the volume of cone **B** is 27 : 8

The surface area of cone **A** is 297 cm^2

Show that the surface area of cone **B** is 132 cm^2

(Total for question = 3 marks)

Q9.

Three solid shapes **A**, **B** and **C** are similar.

The surface area of shape **A** is 4 cm^2
The surface area of shape **B** is 25 cm^2

The ratio of the volume of shape **B** to the volume of shape **C** is 27 : 64

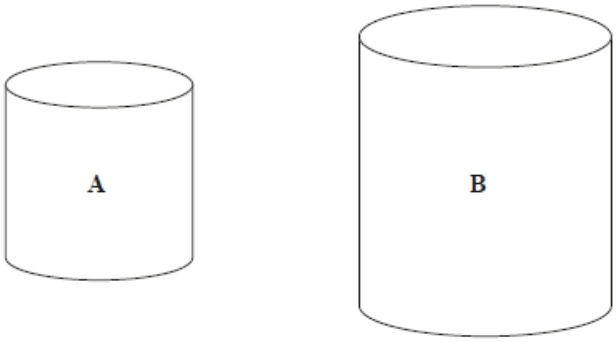
Work out the ratio of the height of shape **A** to the height of shape **C**.
Give your answer in its simplest form.

.....

(Total for question = 4 marks)

Q10.

A and **B** are two similar cylindrical containers.



the surface area of container **A** : the surface area of container **B** = 4 : 9

Tyler fills container **A** with water.
She then pours all the water into container **B**.
Tyler repeats this and stops when container **B** is full of water.

Work out the number of times that Tyler fills container **A** with water.
You must show all your working.

.....

(Total for question = 4 marks)

Q11.

Mark has made a clay model.
He will now make a clay statue that is mathematically similar to the clay model.

The model has a base area of $6cm^2$
The statue will have a base area of $253.5cm^2$

Mark used 2kg of clay to make the model.

Clay is sold in 10kg bags.
Mark has to buy all the clay he needs to make the statue.

How many bags of clay will Mark need to buy?

.....

(Total for question is 3 marks)

Q12.

The circumference of circle **B** is 90% of the circumference of circle **A**.

(a) Find the ratio of the area of circle **A** to the area of circle **B**.

.....

(2)

Square **E** has sides of length *e* cm.
Square **F** has sides of length *f* cm.

The area of square **E** is 44% greater than the area of square **F**.

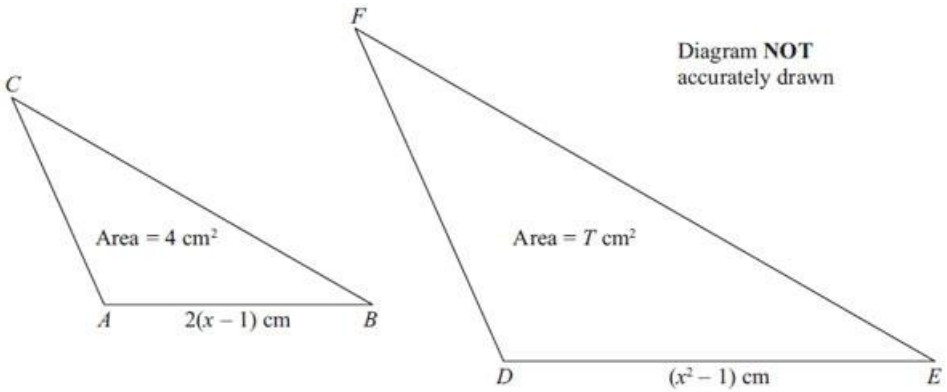
(b) Work out the ratio *e* : *f*

.....

(2)

(Total for question = 4 marks)

Q13.



Triangles *ABC* and *DEF* are mathematically similar.

The base, *AB*, of triangle *ABC* has length $2(x – 1)$ cm
The base, *DE*, of triangle *DEF* has length $(x^2 – 1)$ cm

The area of triangle *ABC* is 4 cm^2
The area of triangle *DEF* is T cm^2

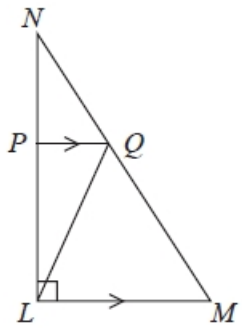
Prove that

$T = x^2 + 2x + 1$

(Total for Question is 4 marks)

Q14.

LMN is a right–angled triangle.



Angle *NLM* = 90º
PQ is parallel to *LM*.

The area of triangle *PNQ* is 8 cm^2
The area of triangle *LPQ* is 16 cm^2

Work out the area of triangle *LQM*.

..... cm^2

(Total for question = 4 marks)