EXAM PAPERS PRACTICE

Similarity

Question Paper

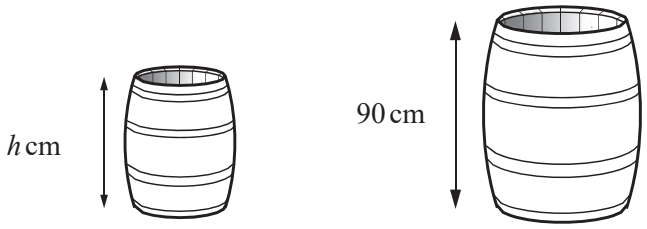
Question 1

The length of a backpack of capacity 30 litres is 53 cm.

Calculate the length of a mathematically similar backpack of capacity 20 litres. [3]

Question 2

The two barrels in the diagram are mathematically similar.

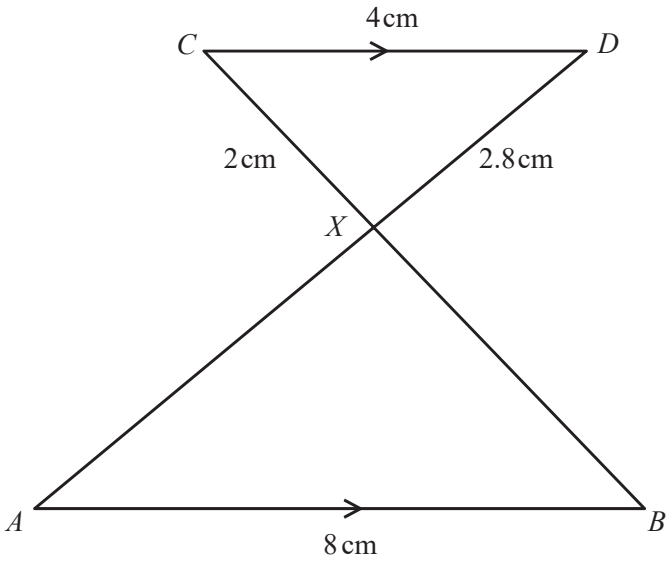


NOT TO SCALE

The smaller barrel has a height of h cm and a capacity of 100 litres.
The larger barrel has a height of 90 cm and a capacity of 160 litres.

Work out the value of h. [3]

Question 3



NOT TO SCALE

In the diagram, AB and CD are parallel.
AD and BC intersect at X.
$AB = 8$ cm, $CD = 4$ cm, $CX = 2$ cm and $DX = 2.8$ cm.

(a) Complete this mathematical statement. [1]

Triangle ABX is ..... to triangle DCX.

(b) Calculate AX. [2]

(c) The area of triangle ABX is y cm^2.

Find the area of triangle DCX in terms of y. [1]

Question 4

Two bottles and their labels are mathematically similar.
The smaller bottle contains 0.512 litres of water and has a label with area 96 cm^2.
The larger bottle contains 1 litre of water.

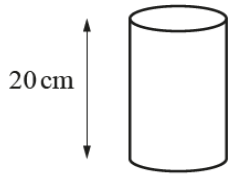
Calculate the area of the larger label. [3]

Question 5

Two cups are mathematically similar.
The larger cup has capacity 0.5 litres and height 8 cm.
The smaller cup has capacity 0.25 litres.

Find the height of the smaller cup. [3]

(a)

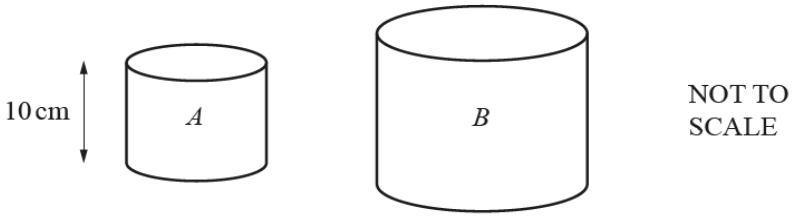


NOT TO SCALE

A cylinder has height 20 cm.
The area of the circular cross section is 74 cm^2.

Work out the volume of this cylinder. [1]

(b) Cylinder *A* is mathematically similar to cylinder *B*.

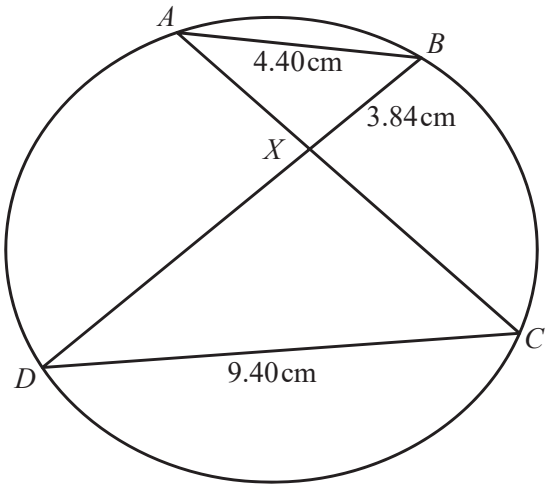


NOT TO SCALE

The height of cylinder *A* is 10 cm and its surface area is 440 cm^2.
The surface area of cylinder *B* is 3960 cm^2.

Calculate the height of cylinder *B*. [3]

Question 7



NOT TO SCALE

A, B, C and D lie on a circle.
AC and BD intersect at X.

(a) Give a reason why angle BAX is equal to angle CDX. [1]

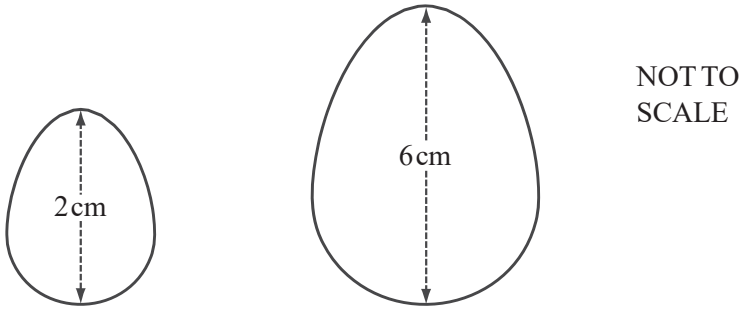
(b) $AB = 4.40$ cm, $CD = 9.40$ cm and $BX = 3.84$ cm.

(i) Calculate the length of CX. [2]

(ii) The area of triangle ABX is 5.41 cm^2.

Calculate the area of triangle CDX. [2]

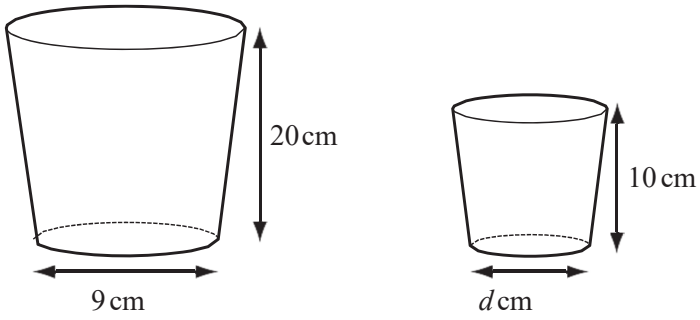
Question 8



NOT TO SCALE

A company makes solid chocolate eggs and their shapes are mathematically similar.
The diagram shows eggs of height 2 cm and 6 cm.
The mass of the small egg is 4 g.

Calculate the mass of the large egg. [2]



NOT TO SCALE

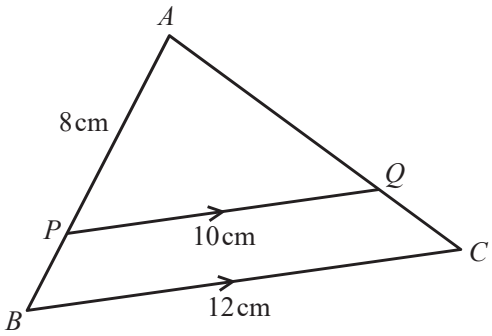
The diagrams show two mathematically similar containers.
The larger container has a base with diameter 9 cm and a height 20 cm.
The smaller container has a base with diameter d cm and a height 10 cm.

(a) Find the value of d. [1]

(b) The larger container has a capacity of 1600 ml. [2]

Calculate the capacity of the smaller container.

Question 10



NOT TO SCALE

APB and *AQC* are straight lines. *PQ* is parallel to *BC*.
AP = 8 cm, *PQ* = 10 cm and *BC* = 12 cm. [2]
Calculate the length of *AB*.

Question 11

A cylindrical glass has a radius of 3 centimetres and a height of 7 centimetres.
A large cylindrical jar full of water is a similar shape to the glass.
The glass can be filled with water from the jar exactly 216 times.
Work out the radius and height of the jar. [3]

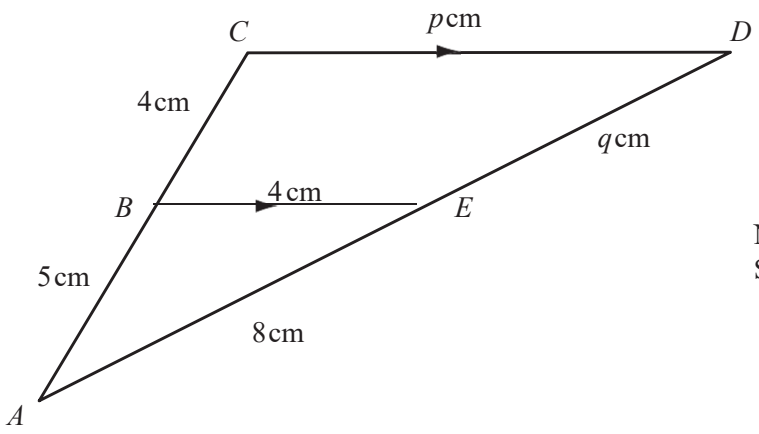
Question 12

A car manufacturer sells a similar, scale model of one of its real cars.

(a) The fuel tank of the real car has a volume of 64 litres and the fuel tank of the model has a volume of 0.125 litres.
Show that the length of the real car is 8 times the length of the model car. [2]

(b) The area of the front window of the model is $0.0175\ m^2$.
Find the area of the front window of the real car. [2]

(a)



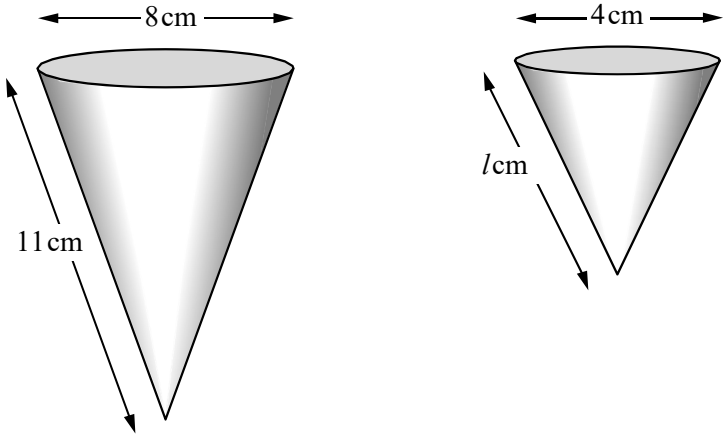
NOT TO SCALE

In the diagram triangles ABE and ACD are similar.
BE is parallel to CD.
$AB = 5$ cm, $BC = 4$ cm, $BE = 4$ cm, $AE = 8$ cm, $CD = p$ cm and $DE = q$ cm.
Work out the values of p and q.

[4]

(b) A spherical balloon of radius 3 metres has a volume of 36π cubic metres.
It is further inflated until its radius is 12 m.
Calculate its new volume, leaving your answer in terms of π.

[2]



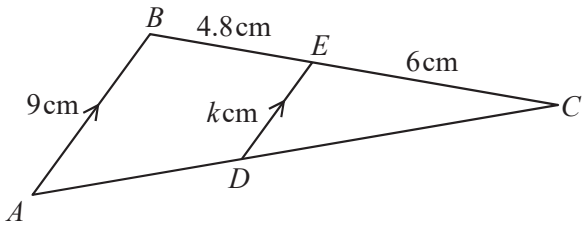
NOT TO SCALE

The two cones are similar.

(a) Write down the value of l. [1]

(b) When full, the larger cone contains 172 cm^3 of water.
How much water does the smaller cone contain when it is full? [2]

(a)



NOT TO SCALE

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. [2]

(b)

Vase A Vase B

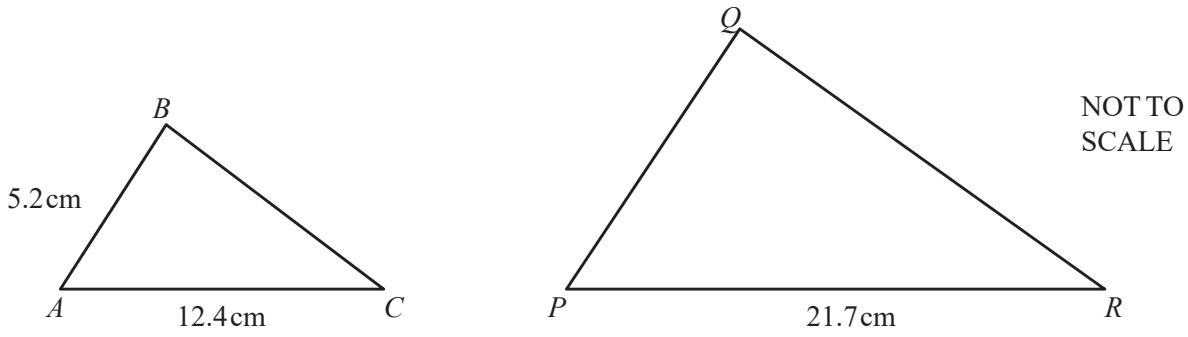
NOT TO SCALE

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

Calculate h, the height of vase B. [3]

Question 16

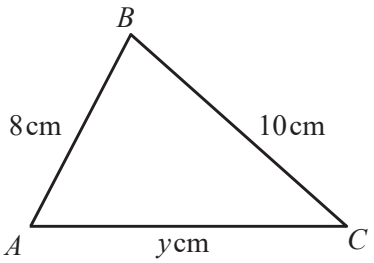
Triangle ABC is similar to triangle PQR.

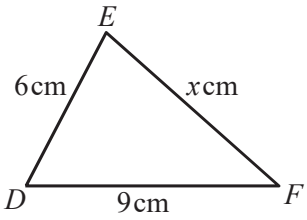


Find PQ.

[2]

Question 17





NOT TO SCALE

Triangle ABC is similar to triangle DEF.

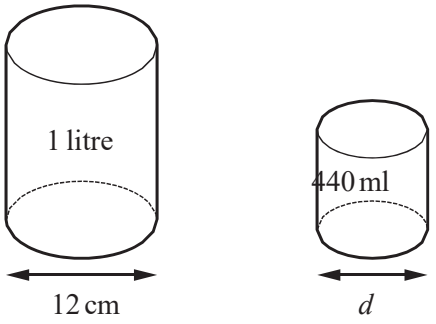
Calculate the value of

(a) x,

[2]

(b) y.

[2]

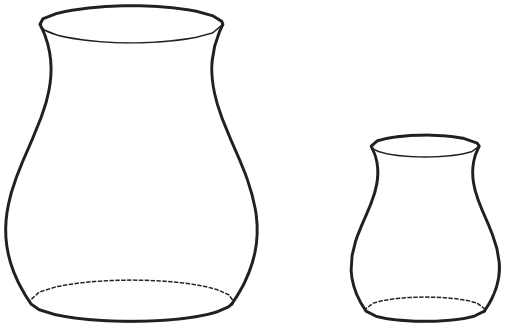


NOT TO SCALE

Two cylindrical cans are mathematically similar.
The larger can has a capacity of 1 litre and the smaller can has a capacity of 440ml.

Calculate the diameter, d, of the 440ml can. [3]

Question 19



NOT TO SCALE

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

Calculate the surface area of the smaller container. [4]

Question 20

The volumes of two similar cones are $36\pi\,\text{cm}^3$ and $288\pi\,\text{cm}^3$.
The base radius of the smaller cone is 3 cm.

Calculate the base radius of the larger cone. [3]

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 15 120 cm^3.

[3]

Work out the dimensions of this box.