1 The diagram shows two cylinders, **A** and **B**.

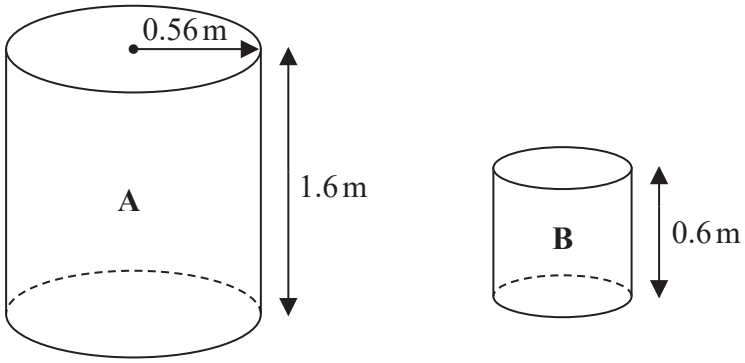


Diagram **NOT** accurately drawn

Cylinder **A** has height 1.6 m and radius 0.56 m.

(a) Work out the curved surface area of cylinder **A**.
Give your answer in m^2 correct to 3 significant figures.

..... m^2

(2)

Cylinder **B** is mathematically similar to cylinder **A**.
The height of cylinder **B** is 0.6 m.

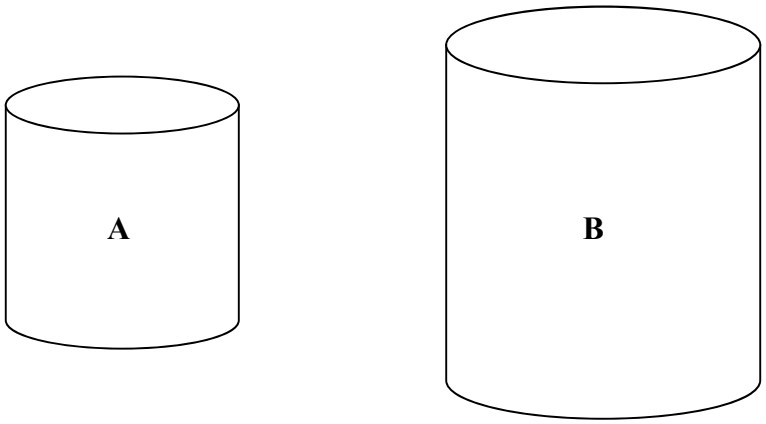
(b) Work out the radius of cylinder **B**.

..... m

(2)

(Total for Question 1 is 4 marks)

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



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

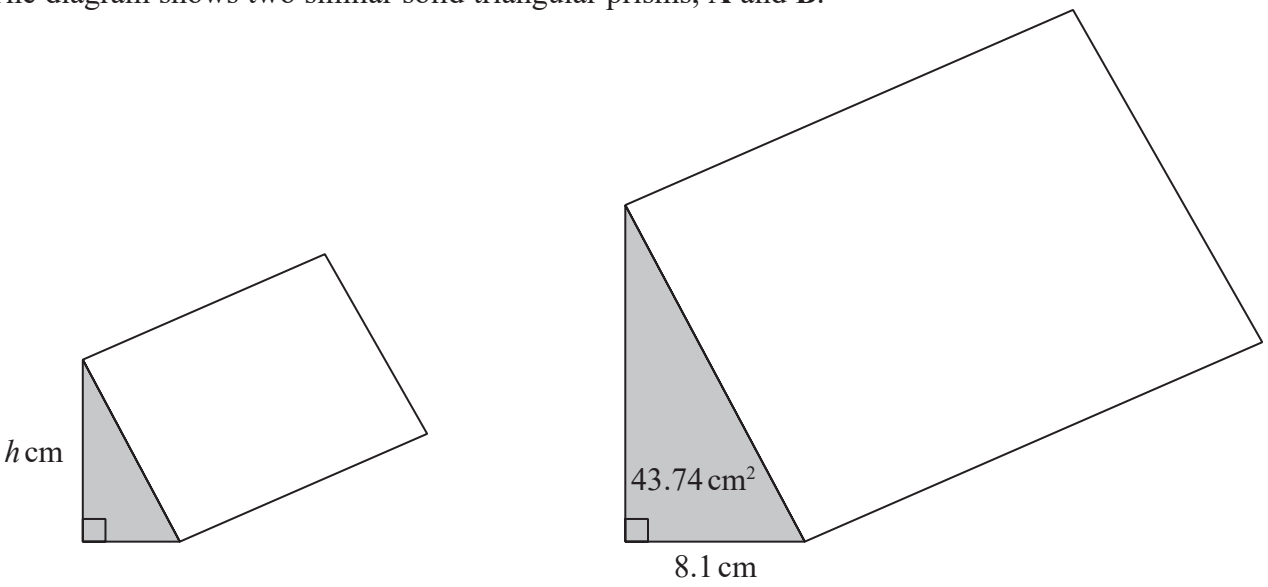
Tyler fills container **A** with water.
She then pours all the water into container **B**.
Tyler repeats this and stops when container **B** is full of water.

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

.....

(Total for Question 2 is 4 marks)

3 The diagram shows two similar solid triangular prisms, **A** and **B**.



Prism **A**

Prism **B**

The volume of prism **A** is 58.806 cm^3
The volume of prism **B** is 1587.762 cm^3

The cross section of each prism is a right-angled triangle.

For prism **B**
the length of the base of the triangle is 8.1 cm
the area of the triangle is 43.74 cm^2

The height of the triangle for prism **A** is h cm.

Work out the value of h.

h = ...

(Total for Question 3 is 4 marks)

4 Here are two similar solid shapes.

A

B

surface area of shape **A** : surface area of shape **B** = 3 : 4

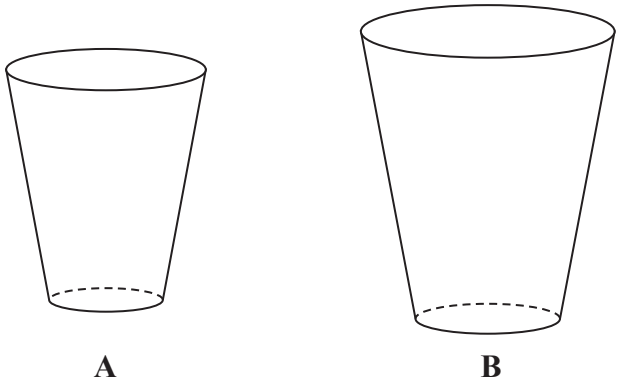
The volume of shape **B** is 10 cm^3

Work out the volume of shape **A**.
Give your answer correct to 3 significant figures.

..... cm^3

(Total for Question 4 is 3 marks)

5 The diagram shows two mathematically similar vases, **A** and **B**.



A **B**

Diagram **NOT** accurately drawn

A has a volume of 405 cm^3
B has a volume of 960 cm^3

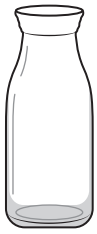
B has a surface area of 928 cm^2

Work out the surface area of **A**.

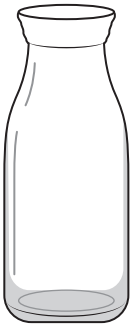
cm^2

(Total for Question 5 is 3 marks)

6 The diagram shows two similar bottles, **A** and **B**.



A



B

Diagram **NOT** accurately drawn

Bottle **A** has surface area 240 cm^2
Bottle **B** has surface area 540 cm^2 and volume 2025 cm^3

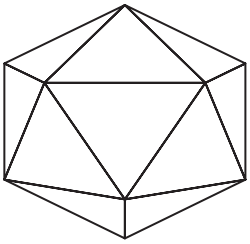
Work out the volume of bottle **A**.

..... cm^3

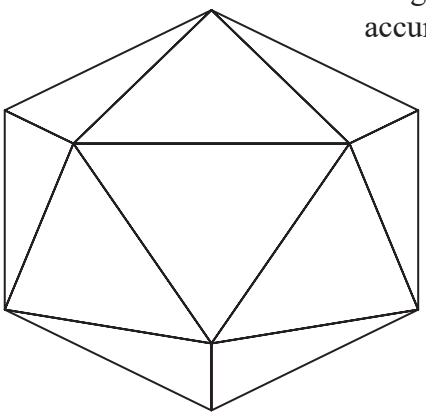
(Total for Question 6 is 3 marks)

7 **A** and **B** are two similar solids.

Diagram **NOT** accurately drawn



A



B

A has a volume of 1836 cm^3
B has a volume of 4352 cm^3

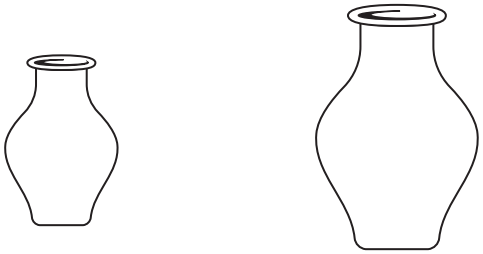
B has a total surface area of 1120 cm^2

Work out the total surface area of **A**.

..... cm^2

(Total for Question 7 is 3 marks)

8 **A** and **B** are two similar vases.



A **B**

Diagram **NOT** accurately drawn

Vase **A** has height 24 cm.
Vase **B** has height 36 cm.

Vase **A** has a surface area of 960 cm^2

(a) Work out the surface area of vase **B**.

..... cm^2

(2)

Vase **B** has a volume of $V cm^3$

(b) Find in terms of V, an expression for the volume, in cm^3, of vase **A**.

..... cm^3

(2)

(Total for Question 8 is 4 marks)

9 The diagram shows two similar vases, **A** and **B**.

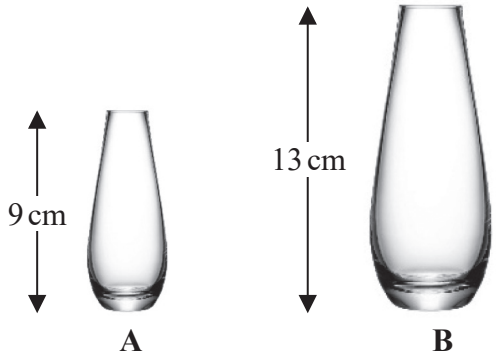


Diagram **NOT** accurately drawn

The height of vase **A** is 9 cm and the height of vase **B** is 13 cm.

Given that

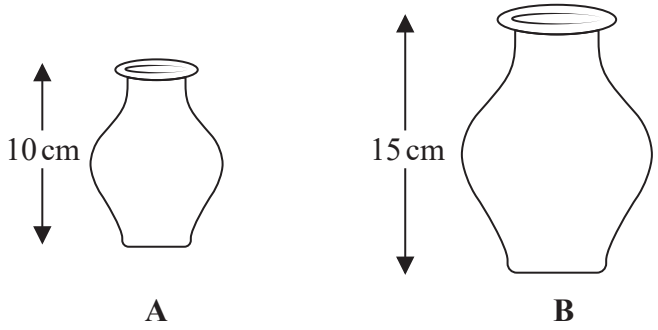
surface area of vase **A** + surface area of vase **B** = 1800 cm^2

calculate the surface area of vase **A**.

..... cm^2

(Total for Question 9 is 4 marks)

10 **A** and **B** are two similar vases.



A **B**

Diagram **NOT** accurately drawn

Vase **A** has height 10 cm.
Vase **B** has height 15 cm.

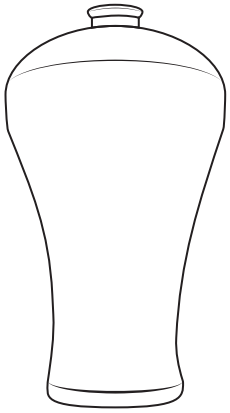
The difference between the volume of vase **A** and the volume of vase **B** is 1197 cm^3

Calculate the volume of vase **A**

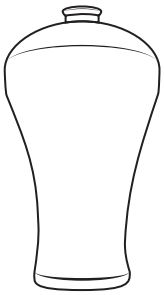
..... cm^3

(Total for Question 10 is 4 marks)

11 **A** and **B** are two similar vases.



A



B

Diagram **NOT** accurately drawn

The vases are such that

$$\text{surface area of vase } \mathbf{B} = \frac{25}{64} \times \text{surface area of vase } \mathbf{A}$$

and that

$$\text{volume of vase } \mathbf{A} - \text{volume of vase } \mathbf{B} = 541.8\,\text{cm}^3$$

Calculate the volume of vase **B**

..... cm^3

(Total for Question 11 is 4 marks)

12 The diagram shows two similar metal statues.

Diagram **NOT** accurately drawn

A

B

The volume of statue **B** is 20% less than the volume of statue **A**

The surface area of statue **B** is k% less than the surface area of statue **A**

Work out the value of k
Give your answer correct to 3 significant figures.

k = ...

(Total for Question 12 is 4 marks)

13 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 13 is 3 marks)

14 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 405 cm^3.

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

(Total for Question 14 is 3 marks)

15 **R** and **S** are two similar solid shapes.

Shape **R** has surface area 108 cm^2 and volume 135 cm^3
Shape **S** has surface area 300 cm^2

Work out the volume of shape **S**.

..... cm^3

(Total for Question 15 is 3 marks)

16 A statue and a model of the statue are mathematically similar.

The statue has a total surface area of 3600 cm^2
The model has a total surface area of 625 cm^2

The volume of the model is 750 cm^3

Work out the volume of the statue.

..... cm^3

(Total for Question 16 is 3 marks)

17 Mathematically similar wooden blocks are made in a workshop.

There are small blocks and there are large blocks.

The volume of each small block is 300 cm^3

Given that

the surface area of each small block : the surface area of each large block = 25 : 36

work out the volume of each large block.

..... cm^3

(Total for Question 17 is 3 marks)

18 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 18 is 4 marks)

19 The three solids **A**, **B** and **C** are similar such that

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

and

the volume of **B** : the volume of **C** = 125 : 343

Work out the ratio

the height of **A** : the height of **C**

Give your ratio in its simplest form.

.....

(Total for Question 19 is 4 marks)

20 A frustum is made by removing a small cone from a large cone.
The cones are mathematically similar.

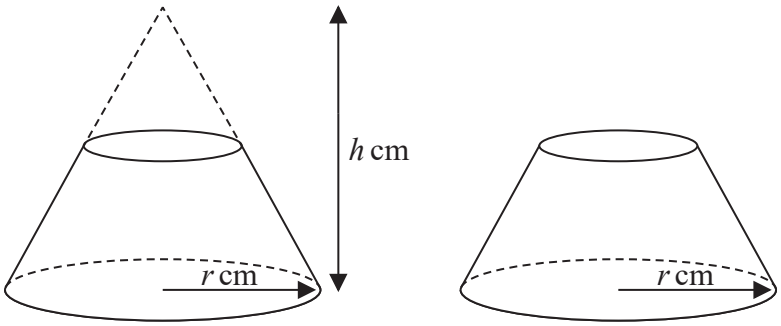


Diagram **NOT** accurately drawn

Frustum

The large cone has base radius r cm and height h cm.

Given that

$$\frac{\text{volume of frustum}}{\text{volume of large cone}} = \frac{98}{125}$$

find an expression, in terms of h, for the height of the frustum.

..... cm

(Total for Question 20 is 4 marks)

21 Solid **A** is similar to solid **B**

Here is some information about solid **A** and solid **B**

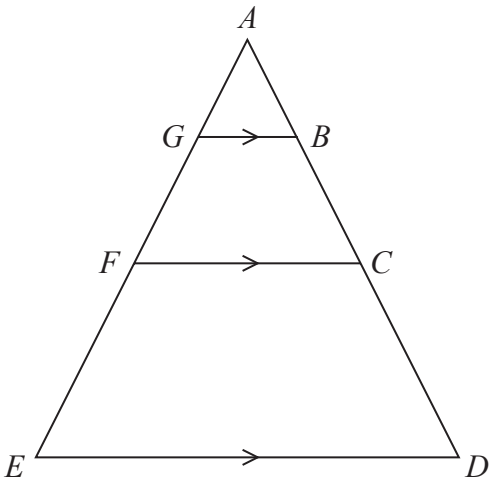
	solid **A**	solid **B**
Height (cm)	3^x	
Area (cm^2)	7776	486
Volume (cm^3)	8^x	2^{x+4}

Work out the height of solid **B**
Give your answer as a decimal.

..... cm

(Total for Question 21 is 5 marks)

22 Here are three similar triangles, *ABG*, *ACF* and *ADE*.



ABCD and *AGFE* are straight lines.

$AB : BC : CD = 1 : 2 : 3$

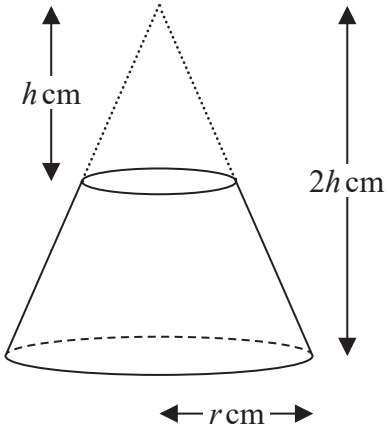
Show that

area of ABG : area of $BCFG$: area of $CDEF = 1 : 8 : 27$

(Total for Question 22 is 3 marks)

23 The diagram shows a frustum of a cone and a sphere.

The frustum is made by removing a small cone from a large cone.
The cones are similar.



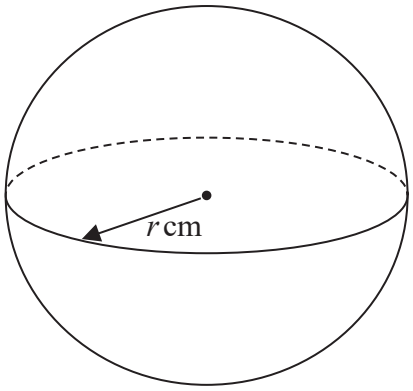


Diagram **NOT** accurately drawn

The height of the small cone is h cm.
The height of the large cone is $2h$ cm.
The radius of the base of the large cone is r cm.

The radius of the sphere is r cm.

Given that the volume of the frustum is equal to the volume of the sphere,

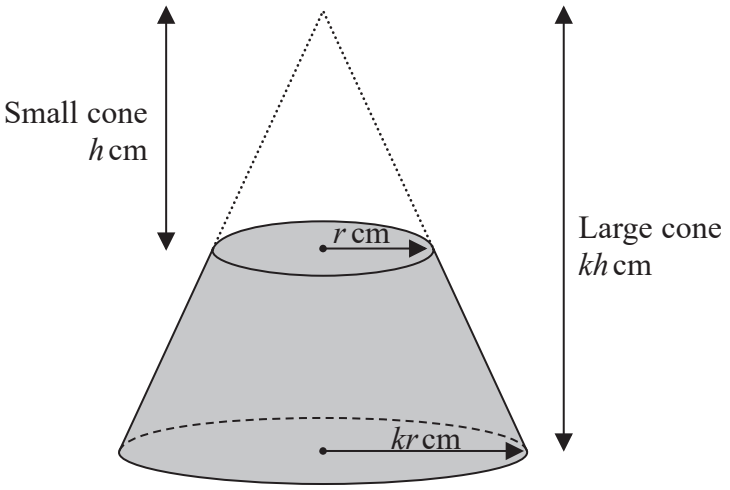
find an expression for r in terms of h.
Give your expression in its simplest form.

$r =$ .....

(Total for Question 23 is 5 marks)

24 The diagram shows a frustum of a cone, and a sphere.

The frustum, shown shaded in the diagram, is made by removing the small cone from the large cone.
The small cone and the large cone are similar.



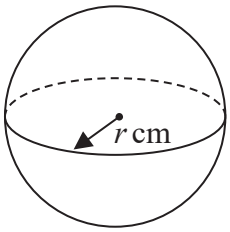


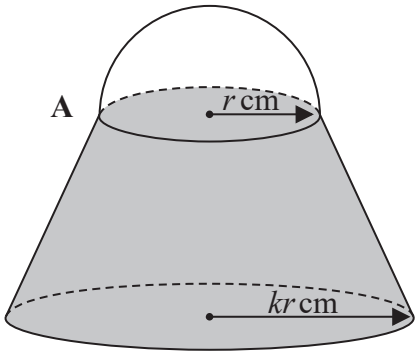
Diagram **NOT** accurately drawn

The height of the small cone is h cm and the radius of the base of the small cone is r cm.
The height of the large cone is kh cm and the radius of the base of the large cone is kr cm.
The radius of the sphere is r cm.

The sphere is divided into two hemispheres, each of radius r cm.

Solid **A** is formed by joining one of the hemispheres to the frustum.
The plane face of the hemisphere coincides with the upper plane face of the frustum, as shown in the diagram below.

Solid **B** is formed by joining the other hemisphere to the small cone that was removed from the large cone.
The plane face of the hemisphere coincides with the plane face of the base of the small cone, as shown in the diagram below.



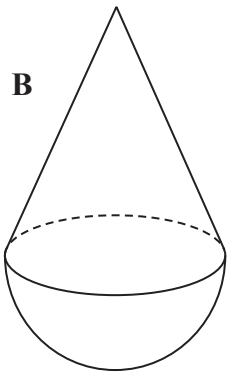


Diagram **NOT** accurately drawn

The volume of solid **A** is 6 times the volume of solid **B**.

Given that $k > \sqrt[3]{7}$

find an expression for h in terms of k and r

$h =$ .....

(Total for Question 24 is 6 marks)