Name: SOLUTIONS

GCSE (1 - 9) Similar Shapes (Area and Volume)	Solutions:

These questions represent all of the times that this topic has appeared in unlocked Pearson Edexcel GCSE maths papers as of July 2023.
More questions can be found at examq.co.uk

Question	Where the question appeared
1	Edexcel, GCSE, Autumn 2021, Paper 2H, Q19
2	Edexcel, GCSE, Autumn 2020, Paper 3H, Q19
3	Edexcel, GCSE, Autumn 2019, Paper 1H, Q17
4	Edexcel, GCSE, Summer 2019, Paper 2H, Q9
5	Edexcel, GCSE, Autumn 2018, Paper 1H, Q15
6	Edexcel, GCSE, Summer 2018, Paper 3H, Q13
7	Edexcel, GCSE, Autumn 2017, Paper 3H, Q14

1

A, **B** and **C** are three spheres.

The volume of sphere **A** is $125\,cm^3$
The volume of sphere **B** is $27\,cm^3$

The ratio of the radius of sphere **B** to the radius of sphere **C** is 1 : 2

Work out the ratio of the surface area of sphere **A** to the surface area of sphere **C**.

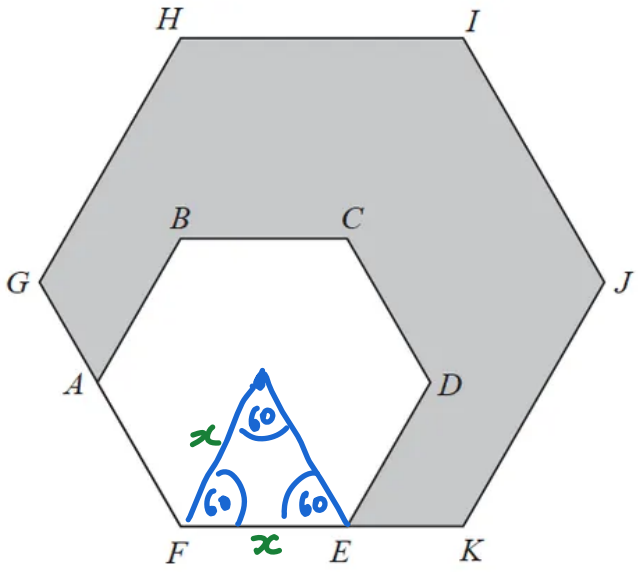
	A	B	C
Volume	125	27	
Length	5	3	
Length		1	2
Length	5	3	6
Area	25	9	36

25 : 36

(Total for Question 19 is 3 marks)

[Edexcel, GCSE, Autumn 2021, Paper 2H, Q19]

2



ABCDEF is a regular hexagon with sides of length x.
This hexagon is enlarged, centre F, by scale factor p to give hexagon *FGHIJK*.

Show that the area of the shaded region in the diagram is given by $\frac{3\sqrt{3}}{2}(p^2 - 1)x^2$

Area of triangle $= \frac{1}{2}(x)(x)\sin 60 = \frac{1}{2}x^2\left(\frac{\sqrt{3}}{2}\right) = \frac{\sqrt{3}x^2}{4}$

Area of small hexagon $= 6 \times \frac{\sqrt{3}x^2}{4} = \frac{6\sqrt{3}(x)^2}{4} = \frac{3\sqrt{3}(x)^2}{2}$

Area of Large hexagon $= \frac{3\sqrt{3}(px)^2}{2}$

Shaded Area $= \frac{3\sqrt{3}(px)^2}{2} - \frac{3\sqrt{3}(x)^2}{2} = \frac{3\sqrt{3}(px)^2 - 3\sqrt{3}(x)^2}{2}$

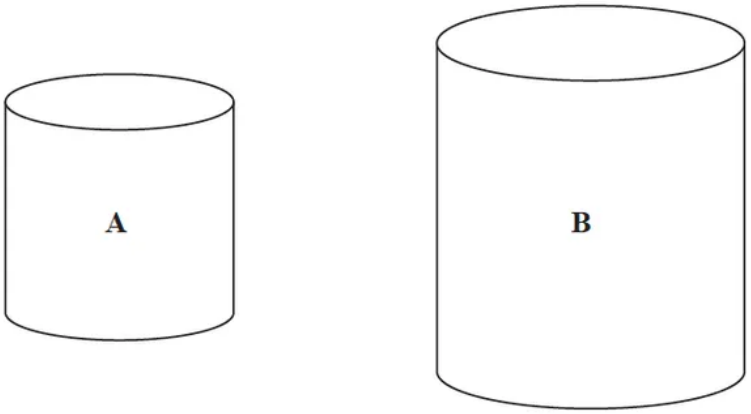
$= \frac{3\sqrt{3}}{2}(p^2 - 1)x^2$

(Total for Question 19 is 4 marks)

[Edexcel, GCSE, Autumn 2020, Paper 3H, Q19]

3

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.

Surface Area $4 : 9$

Lengths $\sqrt{4} : \sqrt{9} = 2 : 3$

Volumes $2^3 : 3^3 = 8 : 27$

$\frac{27}{8} = 3.375$

4

(Total for Question 17 is 4 marks)

[Edexcel, GCSE, Autumn 2019, Paper 1H, Q17]

4

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**.

Circumference: A = 100%, B = 90%

Area: A = 100%, B = $(90\%)^2 = 81\%$

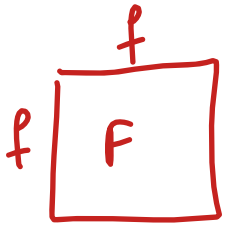
100 : 81

(2)

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

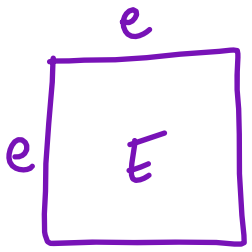
The area of square **E** is 44% greater than the area of square **F**.

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



Area = f^2

100%



Area = e^2

144%

Area 100 : 144

length $\sqrt{100}$: $\sqrt{144}$

length 10 : 12

6 : 5

(2)

(Total for Question 9 is 4 marks)

[Edexcel, GCSE, Summer 2019, Paper 2H, Q9]

5

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.

	A	B	C
Surface Area	4	25	
Length	$\sqrt{4} = 2$	$\sqrt{25} = 5$	
Volume		27	64
Length		$\sqrt[3]{27} = 3$	$\sqrt[3]{64} = 4$
Length	6	15	20

6 : 20 = 3 : 10

(Total for Question 15 is 4 marks)

[Edexcel, GCSE, Autumn 2018, Paper 1H, Q15]

6

Here are two similar solid shapes.

A **B**



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

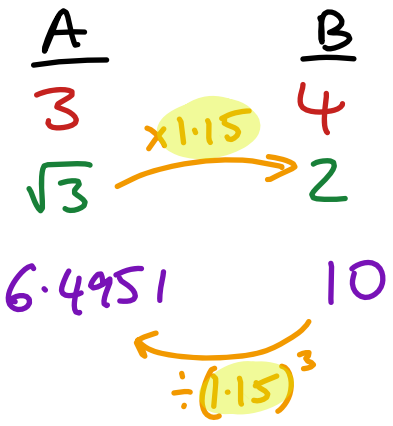
The volume of shape **B** is 10 cm³

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

Surface Area

Length

Volume



6·50 cm³

(Total for Question 13 is 3 marks)

[Edexcel, GCSE, Summer 2018, Paper 3H, Q13]

7

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

	A	B
Volume	27	8
Length	3	2
Area	9	4

$\frac{297}{9} \times 4 = 132$

(Total for Question 14 is 3 marks)

[Edexcel, GCSE, Autumn 2017, Paper 3H, Q14]