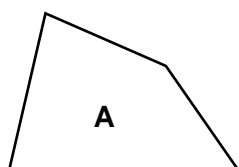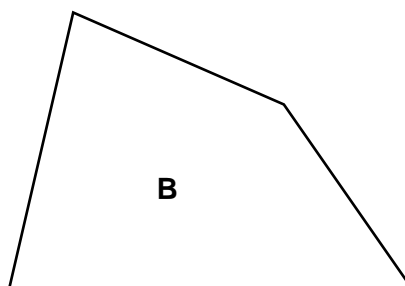REVISE THIS TOPIC

1 Quadrilaterals **A** and **B** are similar.

area = 32 cm²

A

8 cm

B

16 cm

The area of quadrilateral **A** is 32 cm²

Work out the area of quadrilateral **B**. **[3 marks]**

A → B Length scale factor = 16 ÷ 8

= 2

Area scale factor = 2²
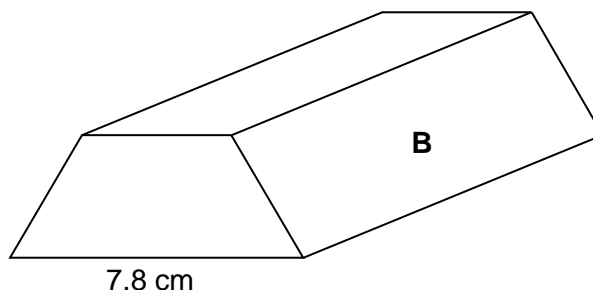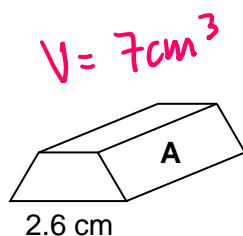
= 4

32 × 4 = 128

Answer _____ 128 _____ cm²

$\dfrac{}{3}$

2 Prisms **A** and **B** are similar.

$V = 7cm^3$

A

2.6 cm

B

7.8 cm

The volume of prism **A** is 7 cm³

Work out the volume of prism **B**. **[3 marks]**

Length scale factor = 7·8 ÷ 2·6

= 3

Volume scale factor = 3^3

= 27

7 × 27 = 189

Answer _____189_____ cm³

3 Solids **P** and **Q** are similar.

P has a height of 10 cm and **Q** has a height of 8 cm.
The volume of **P** is 800 cm³

Work out the volume of **Q**. **[3 marks]**

P→Q Length scale factor = 8 ÷ 10

= 0.8

Volume scale factor = 0.8^3

= 0.512

800 × 0.512 = 409.6

Answer _____409.6_____ cm³

4 Solids **M** and **N** are similar.

Height of **M** : Height of **N** = 2 : 3

The surface area of **N** is 360 cm^2

Work out the surface area of **M**. **[3 marks]**

N→M

M N   M N

Length   2 : 3   Area   4 : 9   } ×40

×40 { 160 : 360 } ×40

Answer _____ 160 _____ cm^2

5 Solids **X** and **Y** are similar.

X has a volume of 24 cm^3 and **Y** has a volume of 81000 cm^3.
The height of **X** is 4 cm

Work out the height of **Y**. **[3 marks]**

X→Y

Volume scale factor = 81000 ÷ 24

= 3375

Length scale factor = $\sqrt[3]{3375}$

= 15

4 × 15 = 60

60

Answer _____ 60 _____ cm

12

Turn over ▶

6   Here is some information about similar solids **X**, **Y** and **Z**.

	X	Y	Z
Height	6 cm	15 cm	18
Volume	240 cm³	3750	6480 cm³

6 (a)   Complete the table.   **[5 marks]**

X → Y   Length scale factor = 15 ÷ 6
$$= 2.5$$
Volume scale factor = 2.5^3
$$= 15.625$$
$$240 \times 15.625 = 3750 \, cm^3$$

Y → Z   Volume scale factor = 6480 ÷ 3750
$$= 1.728$$
Length scale factor = $\sqrt[3]{1.728}$
$$= 1.2$$
$$15 \times 1.2 = 18 \, cm$$

6 (b)   Work out   **[2 marks]**

surface area of **X** : surface area of **Y** : surface area of **Z**
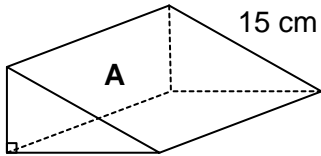
Give your answer in its simplest form.

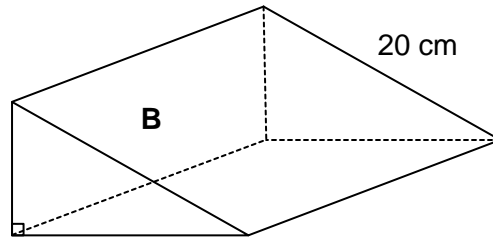Lengths   6 : 15 : 18 = 2 : 5 : 6
Areas $2^2 : 5^2 : 6^2$ = 4 : 25 : 36

Answer ___4___ : ___25___ : ___36___

7 Here are triangle prisms **A** and **B**.

15 cm

A

20 cm

B

Surface area = 960 cm^2

Surface area = 1500 cm^2

Show that prisms **A** and **B** are **not** similar. **[3 marks]**

A → B   Length scale factor = 20 ÷ 15

$= 1.\dot{3}$

Area scale factor = 1500 ÷ 960

$= 1.5625$

$\sqrt{1.5625} = 1.25$ $1.25 \neq 1.\dot{3}$

8 Solids **G** and **H** are similar.

G has a surface area of 3430 cm^2 and **H** has a surface area of 280 cm^2.
The height of **G** is 84 cm

Work out the height of **H**. **[3 marks]**

G → H   Area scale factor = 280 ÷ 3430

$= \frac{4}{49}$

Length scale factor = $\sqrt{\frac{4}{49}}$

$= \frac{2}{7}$

$84 \times \frac{2}{7} = 24$

Answer _____ 24 _____ cm

13

Turn over ▶

9 Solids **C** and **D** are similar.

C has a volume of 40 cm^3 and **D** has a volume of 1080 cm^3.
The surface area of **C** is 100 cm^2

Work out the surface area of **D**. **[3 marks]**

$C \rightarrow D$

Volume scale factor = $1080 \div 40$
$= 27$

Length scale factor = $\sqrt[3]{27} = 3$

Area scale factor = $3^2 = 9$

$100 \times 9 = 900$

Answer _____ 900 _____ cm^2

10 Solids **U** and **V** are similar.

U has a surface area of 375 cm^2 and **V** has a surface area of 540 cm^2.
The volume of **V** is 432 cm^3

Work out the volume of **U**. **[3 marks]**

$V \rightarrow U$

Area scale factor = $375 \div 540$
$= \frac{25}{36}$

Length scale factor = $\sqrt{\frac{25}{36}} = \frac{5}{6}$

Volume scale factor = $\left(\frac{5}{6}\right)^3 = \frac{125}{216}$

$432 \times \frac{125}{216} = 250$

Answer _____ 250 _____ cm^3

11 Solids **M** and **N** are similar.

volume of **M** : volume of **N** = 1000 : 1

The surface area of **M** is 80 cm^2

Work out the surface area of **N**. **[3 marks]**

M : N

Volume   1000 : 1

Length   10 : 1

Area   x08 (100 : 1   ) x0.8
              80 : 0.8

Answer _____ 0.8 _____ cm^2

12 Solids **A, B** and **C** are similar.

surface area of Solid **A** : surface area of Solid **B** = 4 : 25

volume of Solid **A** : volume of solid **C** = 64 : 729

height of Solid **A** : height of Solid **B** : height of Solid **C** = $p : q : r$

where p, q and r are integers in their simplest form.
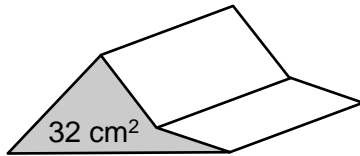
Work out the values of p, q and r. **[3 marks]**

A : B   A : C

Area   4 : 25   Volume   64 : 729

Length 2 : 5   Length   4 : 9

A : B = 2 : 5   A : C = 4 : 9
      = 4 : 10   A : B : C = 4 : 10 : 9

$p =$ _4_ $q =$ _10_ $r =$ _9_

12

Turn over ▶

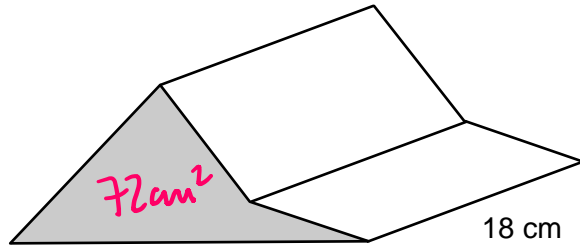**13**   Prisms **A** and **B** are similar.
          The cross sections are shaded.

Prism **A**   Prism **B**

32 cm²   72 cm²   18 cm

The area of the cross section of prism **A** is 32 cm²
The length of prism **B** is 18 cm.

volume of prism **A** : volume of prism **B** = 8 : 27

Work out the volume of prism **B**.   **[4 marks]**

A : B

Volume   8 : 27

Length   2 : 3

Area   4 : 9
      ×8 (32 : 72) ×8

Cross section of B = 72 cm²

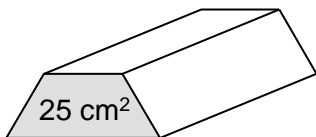Volume of prism = area of cross section × length
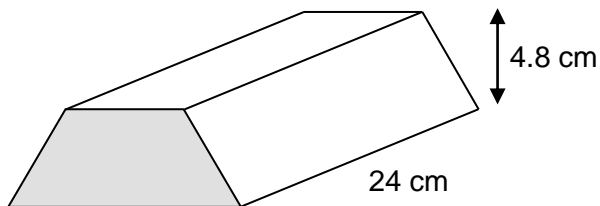   = 72 × 18

Answer _____ 1296 _____ cm³

14   Prisms **A** and **B** are similar.
The cross sections are shaded.

Prism **A**

Prism **B**
Volume = 1536 cm^3

4.8 cm

25 cm^2

24 cm

Here is some information about the prisms.

	Length	**Height**	**Cross Section Area**	**Volume**
Prism **A**			25 cm^2	
Prism **B**	24 cm	4.8 cm		1536 cm^3

Work out the height of prism **A**.   **[4 marks]**

Area of cross section of B = 1536 ÷ 24
                                              = 64 cm^2

B→A Area scale factor = $\frac{25}{64}$
       Length scale factor = $\frac{5}{8}$

       $4.8 \times \frac{5}{8} = 3$

Answer _____3_____ cm

8

Turn over ▶

15 Solids **X** and **Y** are similar.

X has a height of 14 cm and **Y** has a height of 21 cm.
The volume of **Y** is 950 cm³ greater than the volume of **X**.

Work out the volume of Solid **X**.

[4 marks]

Volume of X = x
Volume of Y = $x + 950$

$Y \to X$ Length scale factor = $14 \div 21$

$= \frac{2}{3}$

Volume scale factor = $\left(\frac{2}{3}\right)^3$

$= \frac{8}{27}$

also   volume scale factor = $\frac{x}{x+950}$

$\frac{x}{x+950} = \frac{8}{27}$

$27x = 8(x+950)$
$27x = 8x + 7600$
$19x = 7600$
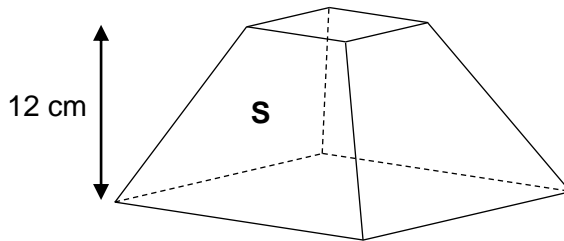$x = 7600 \div 19$

400

Answer _____ **400** _____ cm³

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16   Solid **S** is shown below.

12 cm   **S**

Two of the faces of Solid **S** are squares with areas of 36 cm² and 225 cm².
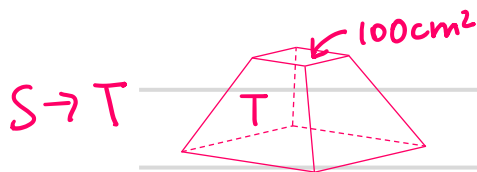Four of the faces of Solid **S** are trapeziums.

The vertical height of Solid **S** is 12 cm.

Solid **T** is similar to Solid **S**.
The area of one of the square faces of Solid **T** is 100 cm²

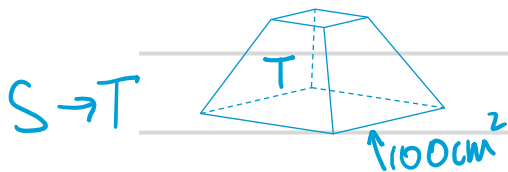Work out two possible values for the vertical height of Solid **T**.   **[4 marks]**

S → T   100cm²   T

Area scale factor = $\frac{100}{36}$

Length scale factor = $\frac{10}{6}$

$12 \times \frac{10}{6} = \underline{\underline{20 \text{ cm}}}$

S → T   T   100cm²

Area scale factor = $\frac{100}{225}$

Length scale factor = $\frac{10}{15}$

$12 \times \frac{10}{15} = \underline{\underline{8 \text{ cm}}}$

Answers ___20___ cm and ___8___ cm

4

Turn over ▶

17 Solids **X**, **Y** and **Z** are similar.

volume of **X** : volume of **Y** = 1 : 8

surface area of **Y** : surface area of **Z** = 9 : 20

height of **X** : height of **Y** : height of **Z** = $a : b : c\sqrt{5}$

where a, b and c are integers.

Work out the values of a, b and c.

[4 marks]

$$X : Y \qquad Y : Z$$

Volume 1 : 8   Area 9 : 20

Length 1 : 2   Length 3 : $\sqrt{20}$

$X : Y = 1 : 2$ $Y : Z = 3 : \sqrt{20}$

$\qquad = 3 : 6 \qquad\qquad = 6 : 2\sqrt{20}$

$X : Y : Z = 3 : 6 : 2\sqrt{20}$

$\qquad\qquad = 3 : 6 : 2 \times \sqrt{4} \times \sqrt{5}$

$\qquad\qquad = 3 : 6 : 4\sqrt{5}$

$a =$ __3__ $b =$ __6__ $c =$ __4__

4

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