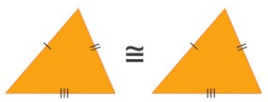
Maths – Year 10 Higher – Unit 6

Congruent Shapes

SSS *(Side – Side – Side)*



3 sides are respectively equal

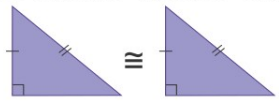
SAS *(Side – Angle – Side)*

2 sides and the included angle are respectively equal

ASA *(Angle – Side – Angle)*

2 angles and the included side are respectively equal

RHS *(Right angle – Hypotenuse – Side)*

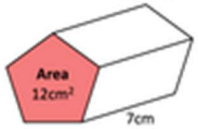


Hypotenuse and one side are respectively equal

Volume of a prism = Area of cross-section × length

Ex1 Find the volume of the pentagonal prism.

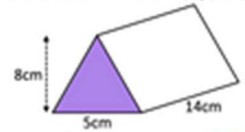
Solution



Volume = 12 × 7
= 84cm³

Ex2 Find the volume of the triangular prism.

Solution



Area of Δ = $\frac{5 \times 8}{2}$
= 20cm²

Volume = 20cm² × 14
= 280cm³

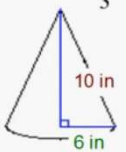
Working in terms of π

Write out each stage of the calculation.

Perform the needed calculations on the numbers (leave pi alone).

Simplify your calculations and always put pi at the end.

Volume = $\frac{1}{3} \cdot \pi \cdot r^2 \cdot h$



Step 1: Find the radius and height.

Step 2: Substitute.

Step 3: Evaluate.

Step 4: Write the units.

Volume = $\frac{1}{3} \cdot \pi \cdot 6^2 \cdot 10$

Volume = $\frac{1}{3} \cdot \pi \cdot (360)$

Step 3: Evaluate. (3.14 can be used for π)

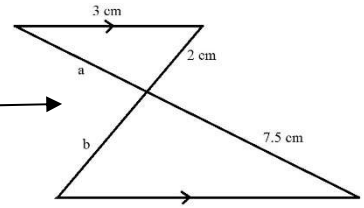
Volume = 120π or

Similar Shapes

Don't get caught out with shapes that are in a different position.

7.5cm belongs with a

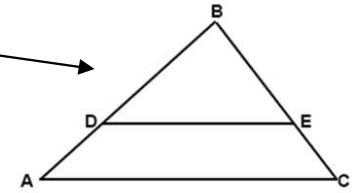
2cm belongs with b



DB belongs with AB

EB belongs with CB

Drawing them as two triangles next to each other makes it easier to spot.



When working with area and volume, don't forget to work out the length ratios first, then either square to find the area, or cube to find the volume:

These are similar shapes.
What is the volume of the larger shape?

Surface Area = 12 cm²
Volume = 20 cm³

Surface Area = 27 cm²

Length Ratio = 2 : 3 (square root)

Area Ratio = 12 : 27 = 4 : 9

Volume Ratio = 8 : 27 (cube)

8 : 27 — How much is one part worth?

20 : x — $(20 \div 8) \times 27 = 67.5$ cm³

These are similar shapes.
What is the volume of the larger shape?

Surface Area = 18 cm²
Volume = 50 cm³

Surface Area = 32 cm²

Length Ratio = 3 : 4 (square root)

Area Ratio = 18 : 32 = 9 : 16

Volume Ratio = 27 : 64 (cube)

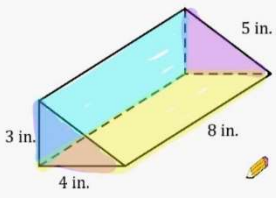
27 : 64 — How much is one part worth?

50 : x — $(50 \div 27) \times 64 = 118.5$ cm³

Surface Area

Work out the area of each face then add your answers together

What is the surface area of the triangular prism?



Δ one = (4 x 3) ÷ 2 = 6

Δ two = (4 x 3) ÷ 2 = 6

one = 4 x 8 = 32

two = 3 x 8 = 24

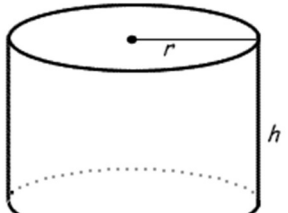
Cylinder

Surface Area

We will need to calculate the surface area of the top, base and sides.

Area of the top is πr^2
Area of the bottom is πr^2
Area of the side is $2\pi rh$

Therefore the Formula is: $A = 2\pi r^2 + 2\pi rh$



Volume $V = \pi r^2 h$