2026

GENERAL MATHEMATICS

Level 2

TEACHER EDITION

MEASUREMENT

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General Mathematics: Level 2

GM2 - MEASUREMENT

By Jess Bertram

With sincere thanks to John Short and Rick Smith

ICON:	MEANING:
	Worked example
	Complete with your teacher
	Try it yourself
	Tips / shortcuts
	Investigation

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Teachers Edition.

This Teacher's Edition includes features not included in the student workbooks.
Anything not in the student workbooks is printed in **red**.

UNIT PLANNER - MEASUREMENT

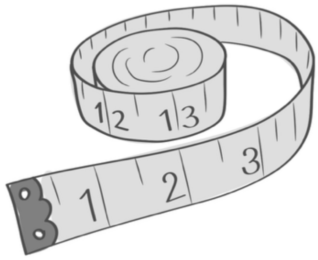
Use the planner below to schedule lessons or track progress.

Use the order of the book or make your own. It's up to you.

Date	Content	Notes
	Intro to measurement Pages: 1	
	Perimeter Pages: 2, 3, 4, 5	
	Area Pages: 6 → 13	
	Total surface area Pages: 14, 15, 16, 17, 18	
	Volume Pages: 18 → 24	
	Intro to ratios Pages: 25, 26	
	Capture - recapture Pages: 27, 28	

Part 1 MEASUREMENT

INTRODUCTION TO MEASUREMENT



Measurement is how we describe and compare the size of things in the real world. We use measurement every day - from checking our height, to filling up a petrol tank, to building houses and designing controversial AFL stadiums.

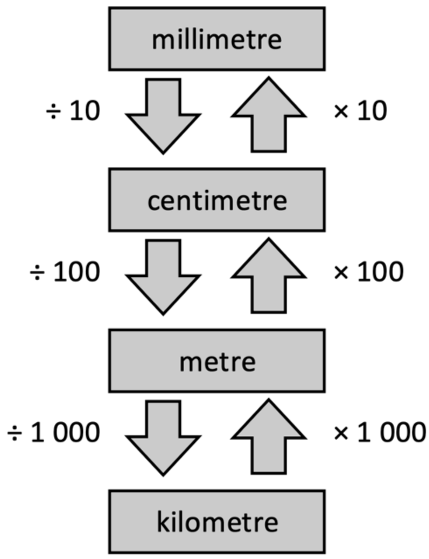
In mathematics, measurement allows us to connect numbers to real objects by using units such as centimetres, metres, and litres.

When solving problems, it's important to **use the same units** for all parts of the question. If measurements are given in different units, convert them first.

Complete with your teacher.

1. Convert the following measurements.

Original	Convert to
100mm	10 cm
3,506mm	350.6 cm
200cm	2 m
1,346cm	13.46 m
2,000m	2 km
3,506mm	3.506 m
210km	210,000 m
35m	3,500 cm
22.5cm	225 mm
2.5km	2,500,000 mm



2. Add together the following: 125mm + 35.6cm +1050mm + 1.5m + 27.4cm

Need to change all to same units. You can choose any unit, each is listed below.

125mm + 356mm + 1050mm + 1,500mm + 274mm = **3,305mm**

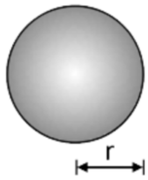
12.5cm + 35.6cm + 105cm + 150cm + 27.4cm = **330.5cm**

0.125m + 0.356m + 1.05m + 1.5m + 0.274m = **3.305m**

0.000125km + 0.000356km + 0.00105km + 0.0015km + 0.000274km = **0.003305km**

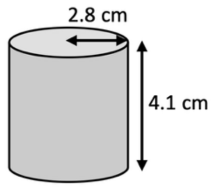
Worked examples.

1. Calculate the total surface area of a sphere with a 5cm radius.



$$TSA = 4\pi r^2$$
$$TSA = 4 \times \pi \times 5^2$$
$$TSA = 314.16cm^2$$

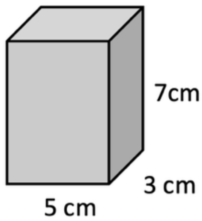
2. Find the TSA of a cylinder with a radius of 2.8cm and a height of 4.1cm.



$$TSA = 2\pi rh + 2\pi r^2$$
$$TSA = 2 \times \pi \times 2.8 \times 4.1 + 2 \times \pi \times 2.8^2$$
$$TSA = 121.39cm^2$$

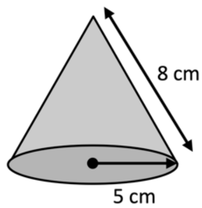
With your teacher.

1. Find the TSA of a rectangular prism with sides of 7cm(L), 3cm (W) and 5cm(H)



$$\mathrm{TSA} = 2\mathrm{LW} + 2\mathrm{LH} + 2\mathrm{WH}$$
$$\mathrm{TSA} = 2(7)(3) + 2(7)(5) + 2(3)(5)$$
$$\mathbf{TSA = 142cm^2}$$

2. Find the TSA of a cone with a radius of 5cm and a slant height of 8cm.



$$\mathrm{TSA} = \pi rs + \pi r^2$$
$$\mathrm{TSA} = \pi(5)(8) + \pi(5)^2$$
$$\mathbf{TSA = 204.20cm^2}$$

Finding Total Surface Area (TSA) without a formula

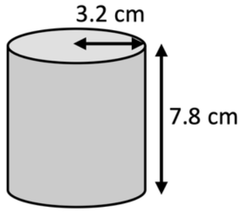
Not all 3D shapes have a specific formula for finding TSA.

Shapes such as pyramids, prisms, and most composite shapes require a different approach.

1. Break each surface up into small, standard shapes (called 'faces')
2. Calculate the area of each face
3. Add all the faces together

Worked example.

Find the volume of a cylinder with a radius of 3.2cm and a height of 7.8cm



$V = Ah$ ← "A" represents the area of the base shape.

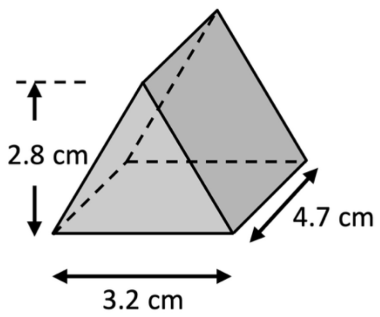
$V = (\pi r^2) \times h$ ← Replace the "A" with the formula for area of a circle.

$V = (\pi \times 3.2^2) \times 7.8$

$V = 250.93cm^3$

With your teacher.

1. Find the volume of the triangular prism in the diagram.



$V = Ah$

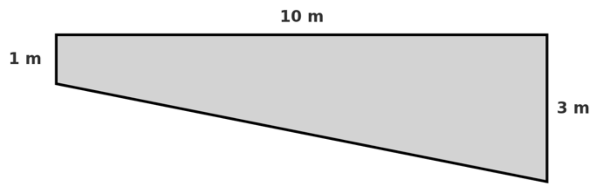
$V = \frac{1}{2} \times b \times H \times h$

$V = \frac{1}{2} \times 3.2 \times 2.8 \times 4.7$

$\mathbf{V = 21.06cm^3}$

2. Ariarne Titmus has used her Olympic prize money to install a pool in her backyard. The pool is 10 metres long and 4 metres wide. The deep end is 3m deep, and the shallow end is 1m deep.

Calculate the volume of water needed to fill the swimming pool $(1\text{m}^3 = 1{,}000\text{L})$



$V = Ah$

$V = [\text{Area rectangle} + \text{area triangle}] \times h$

$V = [(L \times W) + \left(\frac{1}{2}bh\right)] \times h$

$V = [(1 \times 10) + \left(\frac{1}{2} \times 10 \times 2\right)] \times 4$

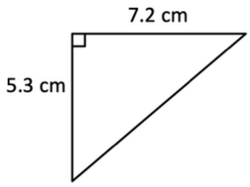
$V = 80m^2$

$80 \times 1{,}000 = 80{,}000L$

You would need 80,000 litres of water to fill the swimming pool.

Worked examples.

Find the missing length in these right-angled triangles.

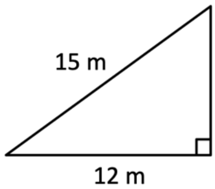


a = 5.3, b = 7.2, c = ?

$5.3^2 + 7.2^2 = c^2$

$c = \sqrt{5.3^2 + 7.2^2}$

$c = 8.94cm$



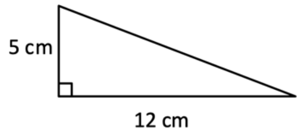
c = 15m, b = 12m, a = ?

$15^2 - 12^2 = a^2$

$a = \sqrt{15^2 - 12^2}$

$a = 9m$

With your teacher:

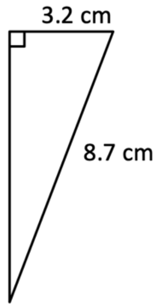


$\mathrm{a = 5, b = 12, c = ?}$

$5^2 + 12^2 = c^2$

$c = \sqrt{5^2 + 12^2}$

$c = 13\text{cm}$



$\mathrm{c = 8.7m, b = 3.2m, a = ?}$

$8.7^2 - 3.2^2 = a^2$

$a = \sqrt{8.7^2 - 3.2^2}$

$a = 8.09\text{m}$

a. A triangle has sides of 3cm, 4cm, and 5cm. Prove whether it is right-angled.

If the triangle is right-angled, Pythagoras' theorem should hold true.

$a^2 + b^2 = c^2 \rightarrow 3^2 + 4^2 = 5^2 \rightarrow$ **25 = 25 the triangle is right-angled.**

b. A ladder is leaning up against a wall. The bottom of the ladder is 2m away from the wall. The top of the ladder meets the wall at a point 5m off the ground. How long is the ladder?

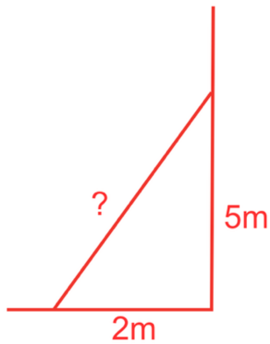
$\mathrm{a = 2, b = 5, c = ?}$

$2^2 + 5^2 = c^2$

$c = \sqrt{2^2 + 5^2}$

$c = 5.39\text{m}$

The ladder is 5.39 metres long.



Key points:

- The hypotenuse is always the longest side (opposite the right angle).
- You **add** the shorter side squares to find the hypotenuse
- You **subtract** from the hypotenuse to find a shorter side.

Worked example.

A woman standing at position A finds that the angle of elevation to the top of a 220m high tower is 37°. Upon walking to position B, which is closer to the tower, she finds that the angle has become 59°. Find the distance that the woman walked between making the observations.

Big triangle (A)

$$\tan 37 = \frac{200}{A}$$

$$A = \frac{200}{\tan 37}$$

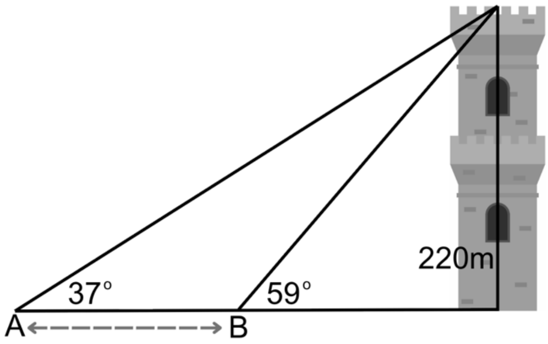
$$A = 265.41m$$

Small triangle (B)

$$\tan 59 = \frac{200}{B}$$

$$B = \frac{200}{\tan 59}$$

$$B = 120.17m$$

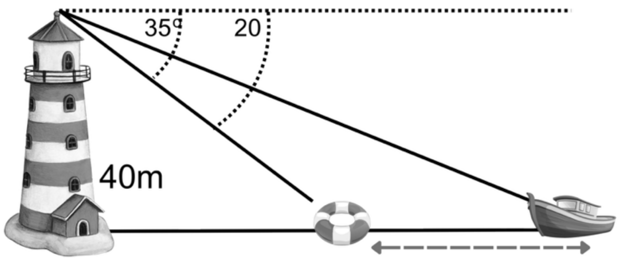


Distance between = 265.41 – 120.17 = 145.24

The woman walked 145.24 metres between observations.

With your teacher.

From the top of a lighthouse, 40m high, a lookout sees a small boat and a buoy in the same straight line out to sea. The angle of depression to the buoy is 35°. The angle of depression to the boat is 20°. Find how far apart the boat and the buoy are.



Big triangle (boat)

$90 - 20 = 70$

$$\tan(70) = \frac{x}{40}$$

$$x = 40 \times \tan(70)$$

$$x = 109.90m$$

Small triangle (buoy)

$90 - 35 = 55$

$$\tan(55) = \frac{y}{40}$$

$$y = 40 \times \tan(55)$$

$$y = 57.13m$$

Distance between boat and buoy $= x - y$

$109.90m - 57.13m = \mathbf{52.77m}$

The distance between the boat and the buoy is 57.22 metres.