

2026

GENERAL MATHEMATICS

Level 2

MEASUREMENT

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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GENERAL MATHEMATICS - LEVEL 2

GM2 - MEASUREMENT

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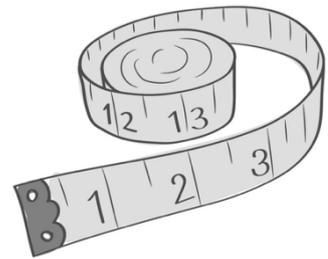
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Part
1

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.

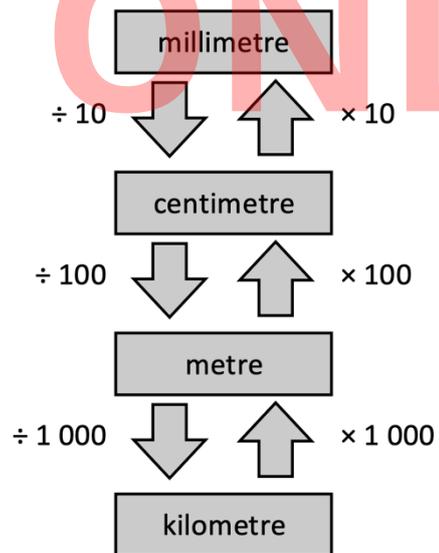
When solving problems, it's important to **use the same units** for all parts of the question. If measurements are given in different units, convert them first.



Complete with your teacher.

1. Convert the following measurements.

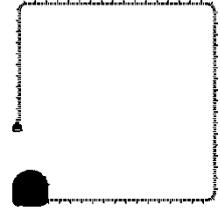
Original	Convert to
100mm	cm
3,506mm	cm
200cm	m
1,346cm	m
2,000m	km
3,506mm	m
210km	m
35m	cm
22.5cm	mm
2.5km	mm



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

PERIMETER

Perimeter is the distance around the outside of a two-dimensional shape. It is a linear measurement, usually measured in millimetres (mm), centimetres (cm), metres (m) or kilometres (km).



To calculate perimeter, we add together the lengths of all the sides of the shape.

In this section we will cover how to find the perimeter of the following shapes:

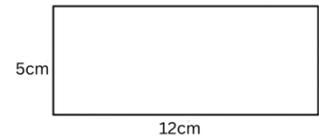
- Rectangles
- Triangles
- Parallelograms
- Circles (including sectors)



Worked Examples. (rectangles, triangles & parallelograms)

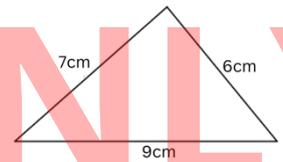
1. A rectangle has a length of 12 cm and a width of 5 cm.

$$\text{Perimeter} = 5 + 5 + 12 + 12 = \mathbf{34 \text{ cm.}}$$



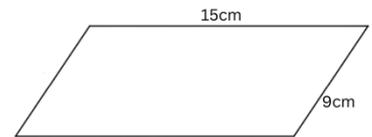
2. A triangle has sides of 6 cm, 7 cm, and 9 cm.

$$\text{Perimeter} = 6 + 7 + 9 = \mathbf{22 \text{ cm.}}$$



3. A parallelogram has a base of 15 cm and a side length of 9 cm.

$$\text{Perimeter} = 15 + 9 + 15 + 9 = \mathbf{48 \text{ cm.}}$$



With your teacher. Find the perimeter of the following shapes.

1. Rectangle with length 8 cm and width 3 cm.

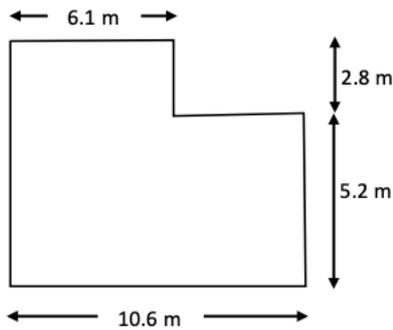
2. Triangle with side lengths 5 cm, 12 cm, and 13 cm.



With your teacher.

1. A rectangle has a perimeter of 50 cm and a width of 10 cm. What is its length?

2. Find the perimeter of the following shape:



Try it yourself (PERIMETER): *Answers page 56*

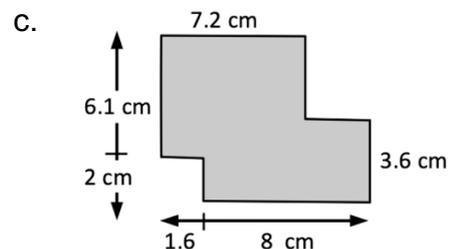
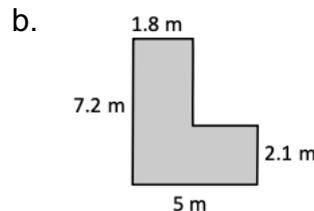
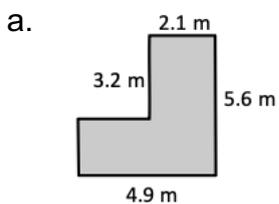
1. Change the followings units. Round to 2 decimal places (2dp) if needed.

- | | | | |
|----------------|----------------|-----------------|----------------|
| a. 5m in cm | b. 4.63m in cm | c. 5.4m in mm | d. 5.28m in mm |
| e. 5276m in km | f. 756m in km | g. 1235mm in cm | h. 135mm in cm |
| i. 5682mm in m | j. 3682mm in m | k. 39cm in mm | l. 820cm in mm |
| m. 350cm in m | n. 1274cm in m | o. 3.5km in m | p. 0.85km in m |

2. Arrange each of the following in ascending order (smallest to biggest):

1m, 3.5cm, 1cm, 450mm, 25mm, 2370mm, 320cm, 2.2m, 5mm

3. Find the perimeter of the following shapes.



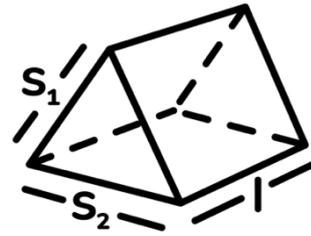
4. A triangle has two equal sides of 8cm and a base of 6cm. Find its perimeter.

5. A builder is constructing a deck that is 3.2m wide. How many decking boards will be used if each decking board is 70mm wide and a 6mm gap is to be left between each board? Assume no gap at the end.

6. A carpet costs \$140 per metre length and is cut from a roll that is 4m wide. Find the lowest cost of carpeting a hall which measures 11500mm x 8400mm.

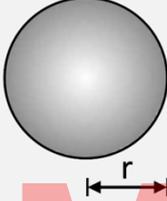
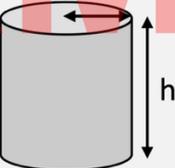
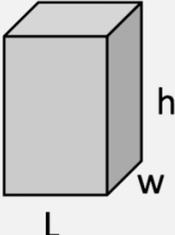
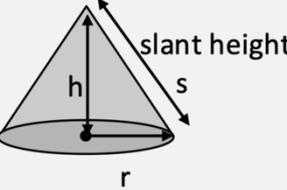
TOTAL SURFACE AREA (TSA)

Total surface area is the total area of all the outside surfaces of a 3D object.



Imagine you were painting a garden shed. The total surface area of the shed would be the area of the roof + all the areas of all the external walls. Finding the total surface area would help you work out how much paint you would need.

Surface area is always measured in square units (such as cm^2 or m^2)

Total surface area (TSA) formula		
	Sphere	$TSA = 4\pi r^2$
	Cylinder	$TSA = 2\pi r h + 2\pi r^2$
	Rectangular prism	$TSA = 2LW + 2LH + 2WH$
	Cone	$TSA = \pi r s + \pi r^2$



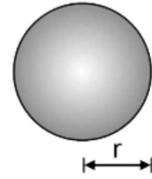
Worked examples.

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

$$TSA = 4\pi r^2$$

$$TSA = 4 \times \pi \times 5^2$$

$$TSA = 314.16\text{cm}^2$$

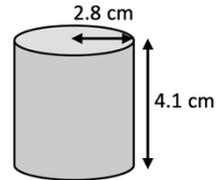


2. Find the TSA of a cylinder with a radius of 2.8cm and a height of 4.1cm.

$$TSA = 2\pi rh + 2\pi r^2$$

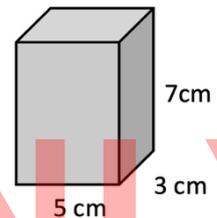
$$TSA = 2 \times \pi \times 2.8 \times 4.1 + 2 \times \pi \times 2.8^2$$

$$TSA = 121.39\text{cm}^2$$

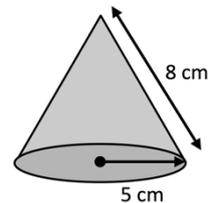


With your teacher.

1. Find the TSA of a rectangular prism with sides of 7cm, 3cm and 5cm.



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



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 – TSA without a formula.

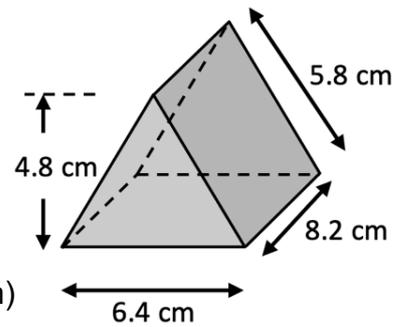
Break the 3D shape up into separate surfaces (faces).

This shape has 2 triangle faces and 3 rectangle faces.

$$A_1 = 2 \times \text{triangles (height of 4.8cm, base of 6.4cm)}$$

$$A_2 = \text{Base rectangle (length of 8.2cm, width of 6.4cm)}$$

$$A_3 = 2 \times \text{side rectangles (length of 8.2cm, width of 5.8cm)}$$



A_1 triangles

$$A_1 = \frac{1}{2}bh$$

$$A_1 = \frac{1}{2} \times 6.4 \times 4.8$$

$$A_1 = 15.36\text{cm}^2$$

A_2 base rectangle

$$A_2 = L \times W$$

$$A_2 = 8.2 \times 6.4$$

$$A_2 = 52.48\text{cm}^2$$

A_3 side rectangles

$$A_3 = L \times W$$

$$A_3 = 8.2 \times 5.8$$

$$A_3 = 47.56\text{cm}^2$$

The total surface area would be:

$$TSA = A_1 + A_1 + A_2 + A_3 + A_3$$

$$TSA = 15.36 + 15.36 + 52.48 + 47.56 + 47.56$$

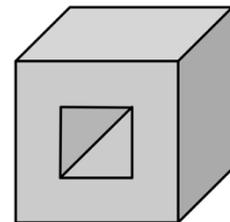
$$TSA = 178.32\text{cm}^2$$

SAMPLE ONLY



With your teacher.

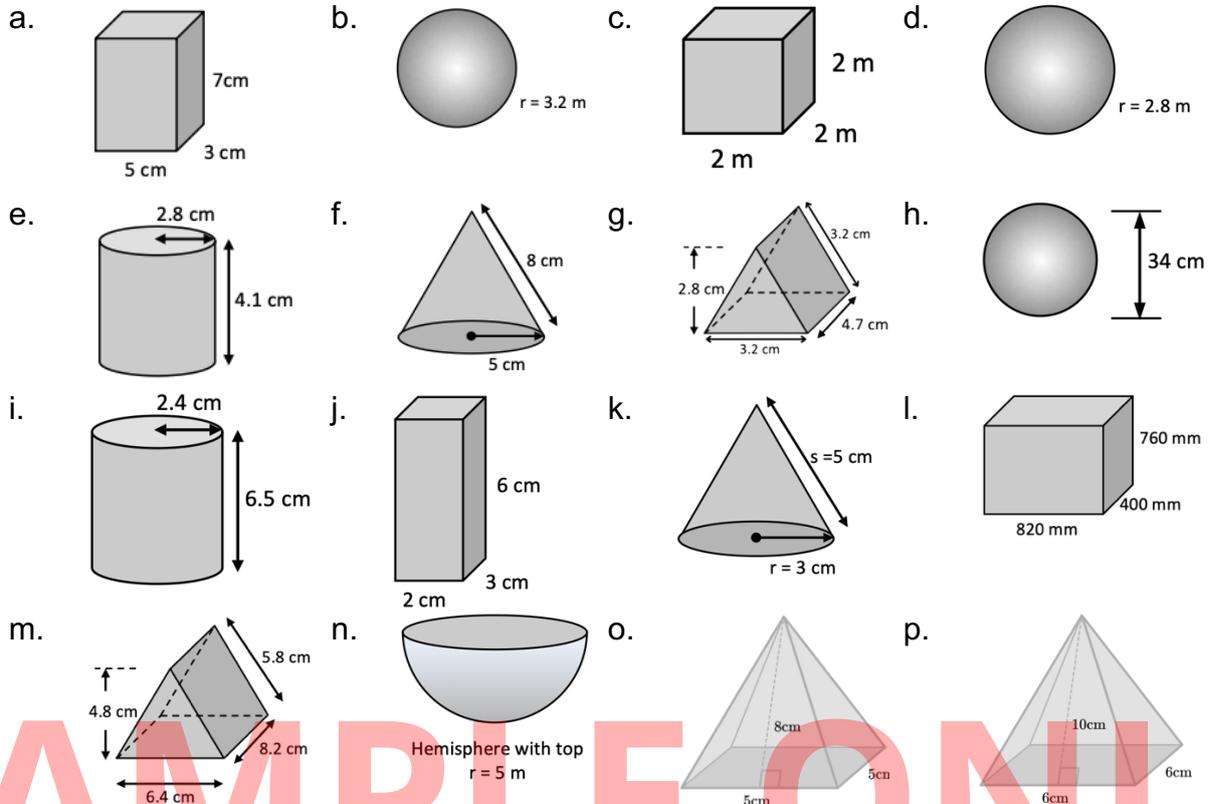
A cube with side lengths of 10cm has a square hole cut out of it. The square hole has sides of 5cm. Find the total surface area of the shape (including inside the hole!)





Try it yourself (TOTAL SURFACE AREA): *Ans pg56*

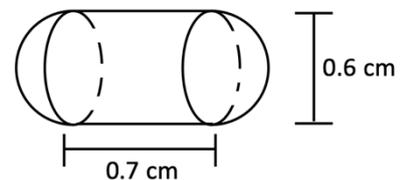
1. Find the total surface area (TSA) for the following shapes.



2. Find the area of land on Earth's surface given that the Earth has a radius of 6371km and 71% of its surface is ocean. (answer to the nearest million km²).

3. A cyclist is building a wood box so that he can transport his bicycle interstate via plane. The unassembled bike can fit into a box which measures 1.2m x 0.75m x 0.35m. The bike itself weighs 9.5kg and plywood weighs 2.65kg per m². Will the box be allowed if the airline has a limit of 20kg on all air freight?

4. Gelatine capsules are often used in the preparation of pharmaceuticals as they are easy to swallow and are tasteless. Find the surface area of the capsule in the diagram.



5. Rainwater tanks are constructed from galvanised iron. Thin sheets which cost \$6.75 per m² are needed for the top and the bottom of the tank. The sides need more substantial iron which costs \$12.40 per m². Find the cost of manufacturing a cylindrical tank with a radius of 1.2m and height of 1.8m.



Worked example.

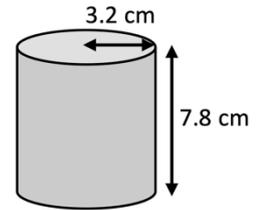
Find the volume of a cylinder with a radius of 3.2cm and a height of 7.8cm

$$V = Ah \quad \leftarrow \text{“A” represents the area of the base shape.}$$

$$V = (\pi r^2) \times h \quad \leftarrow \text{Replace the “A” with the formula for area of a circle.}$$

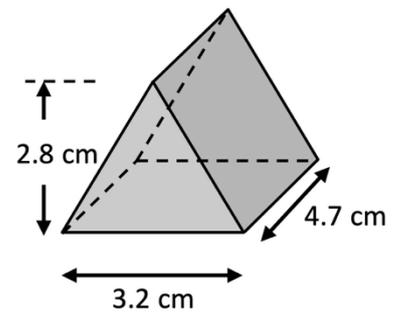
$$V = (\pi \times 3.2^2) \times 7.8$$

$$V = 250.93\text{cm}^3$$



With your teacher.

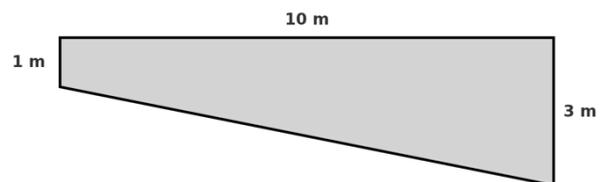
1. Find the volume of the triangular prism in the diagram.



SAMPLE ONLY

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 ($1\text{m}^3 = 1,000\text{L}$)





MEASUREMENT

2026 version
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