

Maths

Level 1

Type of Pack: Taster/Introduction



Name:



**Prison
Education**

 HM Prison &
Probation Service

INTRODUCTION

Hello...

We hope you find this **Taster/Introduction Pack** easy to follow and interesting whilst in Lockdown.

This pack contains a variety of activities that you may see when starting on the course.

These activities should be easy to follow but where there are questions, we would encourage you to have a go without looking at the answers to see how you get on.

CONTENTS – A Introduction Maths Level 1

- Revision
- Area & Perimeter
- Volume
- Scale Drawings
- Maps
- Mean and Range
- Probability
- Answers

Functional Skills Maths Level 1
Exam: 1.5 hours
**Number
(25 marks)**

Fractions
Decimals
Percentages
Ratio
Drawing a Table
Reverse calculation

**Shape Space and Measure
(25 marks)**

Drawing to Scale
Convert metric measurements
Area
Perimeter
Volume
Calculation Check

**Handling Data
(25 marks)**

Mean, Median, Mode
Range
Percentage/Probability
Drawing and reading a bar or Line graph
Reverse calculation

Creating a table

Reminder - you can use wording in the question for your heading.

A table looks like this do not draw a bar graph.

Name	Amount made
Ross	£200
Tom	£300
Sarah	£100
Neve	£50

A table will be drawn on blank paper NOT on graph paper

FRACTIONS, DECIMALS, AND PERCENTAGES
 $\frac{1}{5}$

$1 \div 5$

 0.20

0.2×100

 20%
Finding a fraction of an amount

Divide by the bottom
Times by the top

$$\frac{2}{5} \text{ of } 500 \quad 500 \div 5 = 100$$

$$100 \times 2 = 200$$

Alternative method

Divide the numerator by the denominator and times by the whole number
 $2 \div 5 \times 500 = 200$

Finding a percentage of an amount

Divide by 100 to find 1%

Times by the percentage needed
35% of 500
 $500 \div 100 \times 35 = 175$

Finding a ratio of an amount

Convert to a fraction then calculate as a fraction of amount.

Share 300 into the ratio 2:1

$$\frac{2}{3} \text{ of } 300 \text{ and } \frac{1}{3} \text{ of } 300$$

Check you calculations

Original calculation = $25 \times 3 = 125$

Reverse calculation = $125 \div 3 = 25$

Check your scale (task 2)

The scale was 2 boxes = 1m.

So line A is 4 boxes = 2m

Check the range on task 3

Original calculation = $12 - 1 = 11$

Reverse calculation = $11 + 1 = 12$

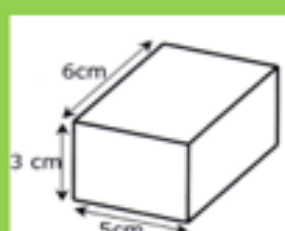
Area and Perimeter


Area is the space inside the shape.

$$L \times W = 4 \times 4 = 16\text{cm}^2$$

Perimeter is the length around the edge

$$L + L + W + W = 4 + 4 + 4 + 4 = 16\text{cm}$$

Volume


To find the volume:

Work out the area of one face and then multiply the answer by the remaining measurement.

$$L \times W = 3 \times 5 = 15\text{ cm}$$

$$15 \times 6 = 90\text{cm}^3$$

Metric Conversions

Convert all your units so they are the same.

cm	→	m	÷ 100
m	→	cm	× 100
m	→	km	÷ 1000
km	→	m	× 1000
mm	→	m	÷ 1000
m	→	mm	× 1000
mm	→	cm	÷ 10
cm	→	mm	× 10

Area and Perimeter

The perimeter is the length of the outline of a shape.

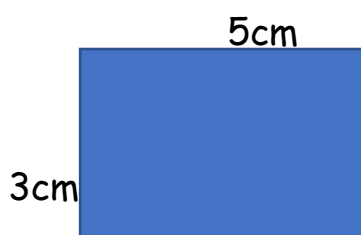
To find the perimeter of a rectangle or square you have to add the lengths of all the four sides.



$$4 + 7 + 4 + 7 = 22 \text{ cm}$$

The area is a measurement of the surface of a shape.

To find the area of a rectangle or a square you need to multiply the length by the width.



$$5 \times 3 = 15\text{cm}^2$$

Notice that for area you use the ² after the units.

Don't expect the question to tell you to calculate area or perimeter you need to think about it realistically.

A question about fencing will be a perimeter question, where as a question about wallpaper would be about area.

Tip: make sure that you change any units in the question first.

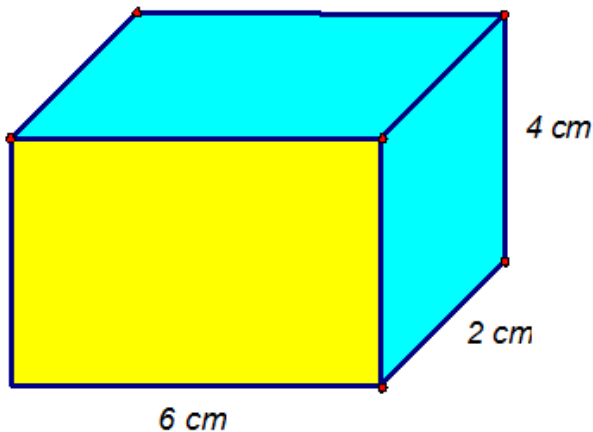
Area and Perimeter practical problems

1. A square-shaped room measures 6ft on one side. What is the area of this room?
2. A rectangular field measures 10ft by 3.5ft. What is the area of this field?
3. Mary wants new carpeting for her dining room. Her dining room is an 8yd by 7.25yd rectangle. How much carpeting does she need to buy to cover her entire dining room?
4. Isabella is making a display board for the school council elections. The display board is a 4.25ft by 6ft rectangle. She needs to add a ribbon border around the entire display board. What is the length of ribbon that she needs?
5. Danny has a rectangular rose garden that measures 800cm by 12.5m. One bag of fertilizer can cover 16m^2 . How many bags will he need to cover the entire garden?
6. Sarah is tiling a wall in her bathroom the wall measure 6m by 4m. The tiles she has chosen measure 50 cm by 30 cm. How many tiles does she need?
7. Jo needs to paint the spare bedroom. The room measure 8m by 2m and each tin on paint covers 2m^2 . How many tins are required?

Volume

Volume is the amount of space a shape inside a 3d shape.

Example



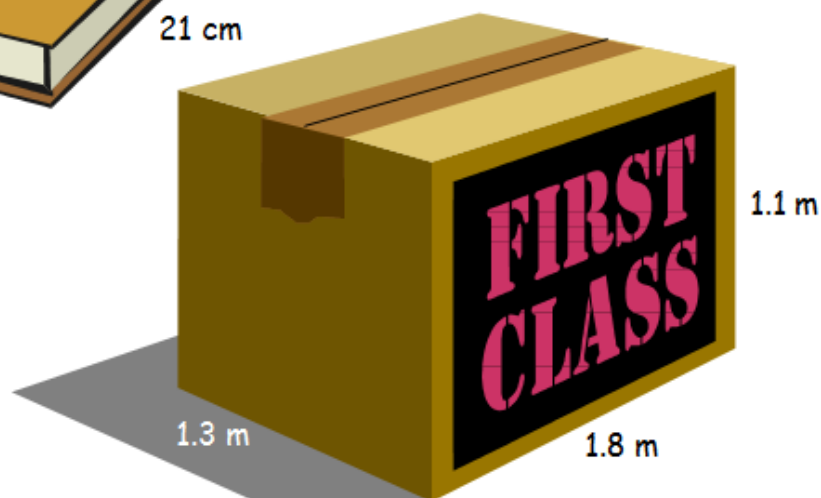
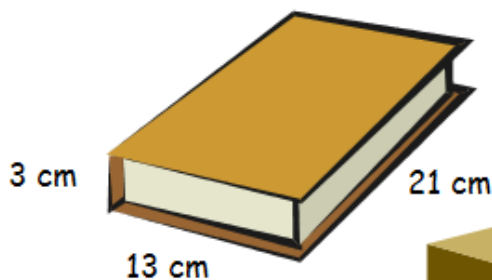
To work out the volume of this cuboid you need to multiply the length by the width by the height.

It does not matter which order you do this in.

$$2 \times 6 \times 4 = 48\text{cm}^3$$

The unit we use to show volume is the ³ (cubed)

Work out the volume of the objects below



Scale Drawings

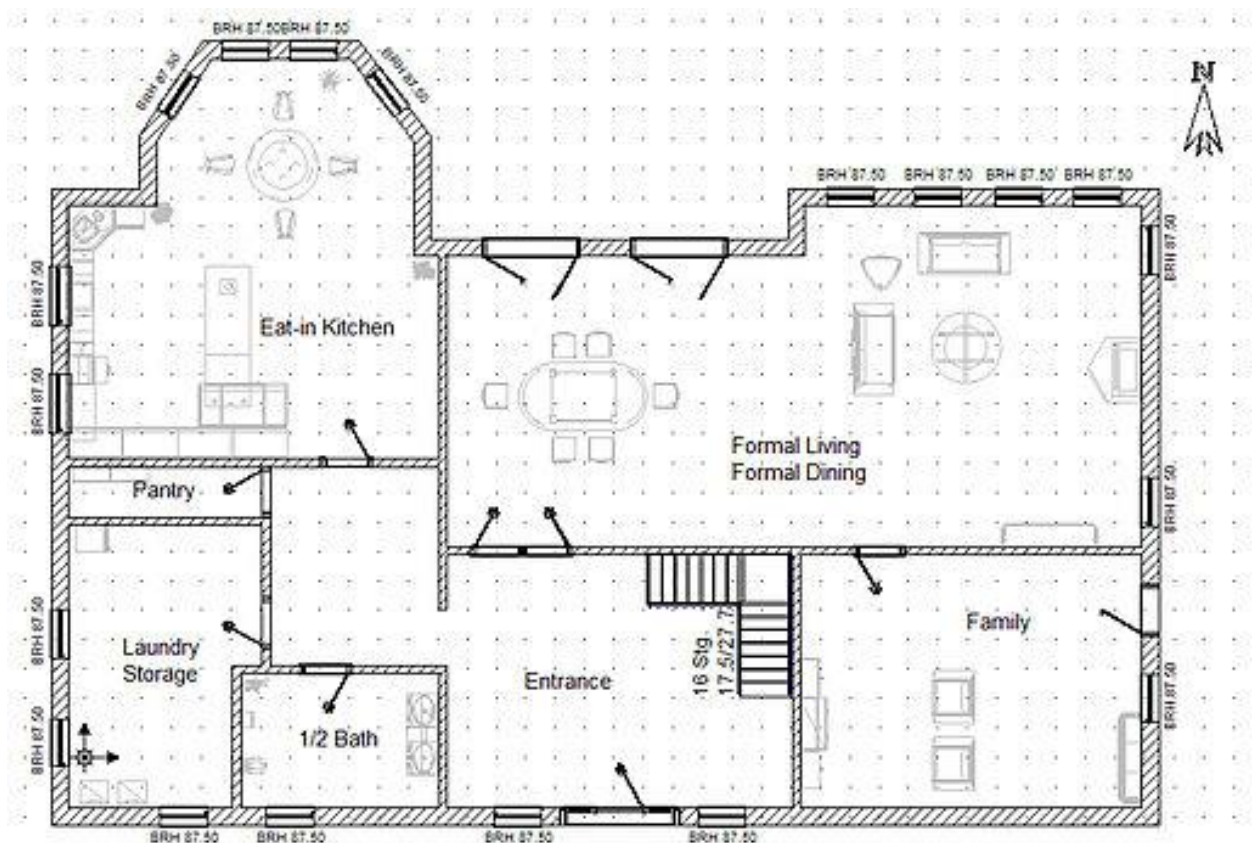
When plans are drawn to scale they have a scale on them that can be used to convert the measurements on the drawing to real life measurements.

This is called the scale factor.

You may need to work with scale in your exam.

Here is a real life plan. It might have a scale of 1:125 this just means that every 1cm we measure on the plan is equal to 125 cm in real life.

All the real measurements are multiply or divided from the scale factor. If you are going from the plan you will multiply and if you are scaling down the measurements going from real life to a drawing you will divide.



Scale Plan questions

A house measure 25m high in real life. You need to draw a scale plan using the scale $1\text{cm} = 2.5\text{m}$. How many cm high is the house on the plan?

A car measure 6m length in real life. On a plan with a scale or $1\text{cm} = 2\text{m}$ how many cm will the car be?

A man is 6ft high in real life. On a plan where $1\text{cm} = 1.5\text{ft}$ how many cm's high will he be?

There is a church which measures 10.5m by 7.5 in real life. What size will this be on a plan using $2\text{cm} = 5\text{m}$?

The Khan academy website has some good interactive practice constructing scale drawings.

Maps

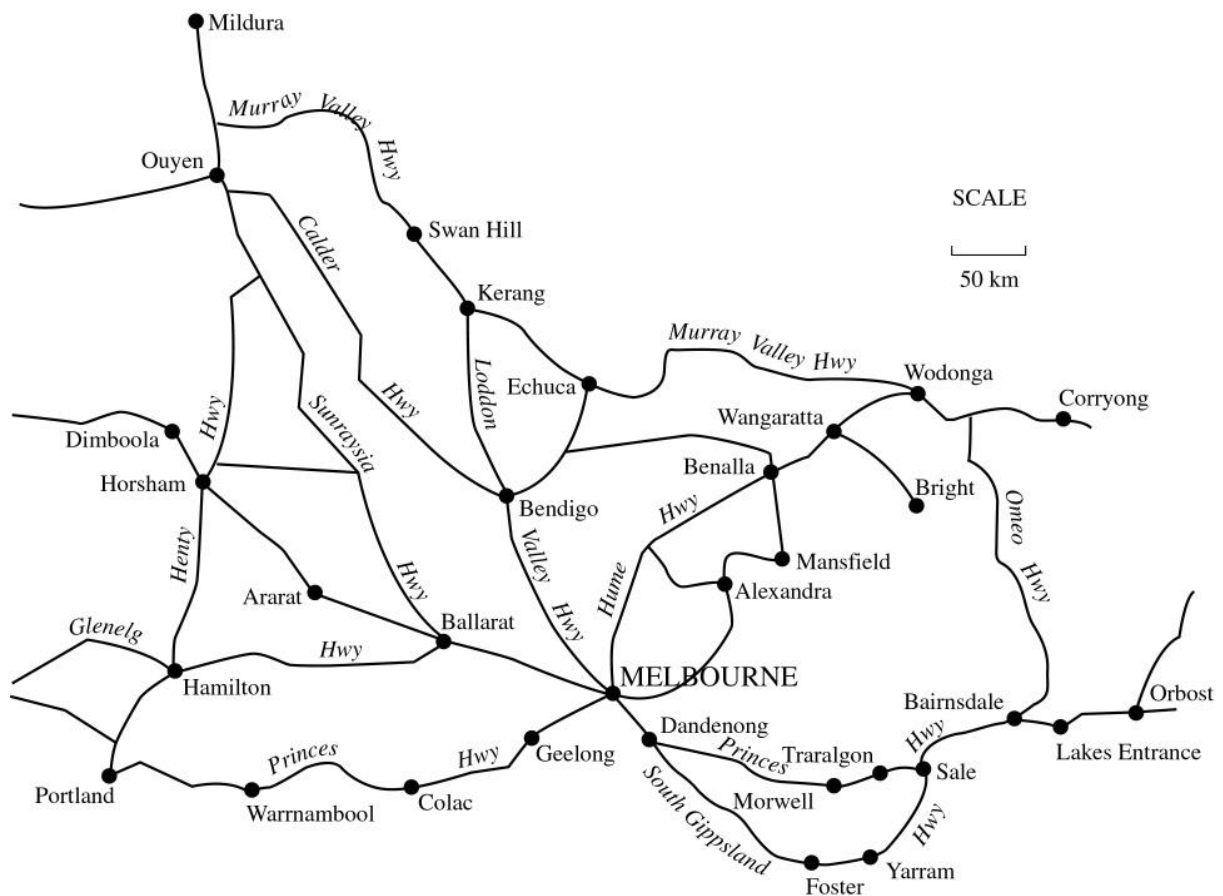
Scale tells us how 'zoomed out' a map is. It tells us what the distance on a map means in real life, so for example 1:25000 means 1cm on a map = 25 000 cm in real life, so 1 cm = 250m or 0.25 km. This is a ratio scale. So for every 1cm you measure on the map you multiply it by the ratio. This map of Europe has the scale 1:25000



Measure the distances and say how far that is in real life. (not accurate to real distances)

	Distance on the map	Actual distance in real life
London to Paris		
Madrid to Paris		
Warsaw to Bucharest		
Andorra to Rome		
Naples to London		

Other types of map scales



Use a ruler to measure the scale and then calculate the following distances

- Bendigo to Melbourne
- Ouyen to Bright
- Hamilton to Wangaratta
- Corryong to Lakes Entrance

****Remember that a higher range is less consistent and more variable****

Mean and Range

How to Find the Mean

The mean is the most commonly used **average**.

It is easy to calculate: **add up** all the numbers, then **divide by how many** numbers there are.

In other words it is the **sum/total of the numbers** divided by the **count/amount of numbers**.

Example 1: What is the Mean of these numbers? 6, 11, 7

- Add the numbers: $6 + 11 + 7 = 24$
- Divide by *how many* numbers (there are 3 numbers): $24 / 3 = 8$

The Mean is 8

Example 2: Look at these numbers: 3, 7, 5, 13, 20, 23, 39, 23, 40, 23, 14, 12, 56, 23, 29

The sum of these numbers is 330 . There are fifteen numbers.

The mean is equal to $330 / 15 = 22$

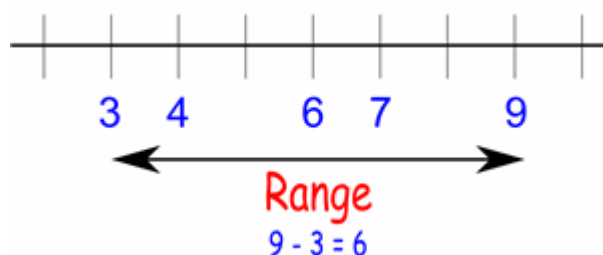
The mean of the above numbers is 22

The Range (Statistics)

The Range is the difference between the lowest and highest values.

Example: In {4, 6, 9, 3, 7} the lowest value is 3, and the highest is 9.

So the range is $9 - 3 = 6$.



Reminder: 0 is always a valid number so include it in your calculations. But if there is a gap or - or anything else it is not included in the number to divide by. See examples below:

One member of a club keeps a record of the time he spends swimming each day in one week.

Mon	Tues	Wed	Thurs	Fri	Sat	Sun
41	0	38	45	42	40	41

What is the average (mean) amount of time he spends swimming each day to the nearest min?

In maths we always treat 0 as a valid number.

So we need to include it in our calculations.

$$41 + 0 + 38 + 45 + 42 + 40 + 41 = 247$$

$$247/7 = 35.26 = 36$$

The table shows the mileage for company car use over 5 days

Mileage	
Mon	29
Tues	38
Wed	44
Thurs	Car in garage
Fri	56

What is the average (mean) daily mileage over these 5 days?

Because one day doesn't have a number in the grid we ignore it.

$$29+38+44+56 = 167 \quad 167/4 = 41.75$$

The table shows the daily temperature at 12 noon for one week.

Day	Temperature in °C
Monday	11
Tuesday	13
Wednesday	0
Thursday	18
Friday	17
Saturday	15
Sunday	14

What is the range of temperatures? $18 - 0 = 18$ (0 always counts)

Mean and Range questions

1. In six games a cricketer scored the following number of runs. What is the mean number of runs?

59	30	21	41	70	19
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2. The table shows the prices of a bag of cement at four different suppliers.

Pete's	Charlie's	Cement R us	Cement market
£3.10	£3.80	£3.70	£3.40

What is the (mean) price per bag?

3. A holidaymaker checks the prices of seven flights to Spain. The prices are as follows: What is the range?

£219	£198	£229	£210	£204.50	£228	£280
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4. A keen gardener kept a check of the lowest night-time temperatures during one week in late autumn. What is the average (mean) night-time temperature?

Monday	Tuesday	Wed.	Thursday	Friday	Saturday	Sunday
2°C	4°C	2°C	1°C	2°C	1°C	2°C

5. Some children attend a nursery school for a term. What is the range of attendance.

13	5	0	6	9	2
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Probability

Example question:

The table shows a delivery drivers predicted schedule for parcels posted the previous week.

Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
Doesn't Work	Not much chance	Maybe	Should be there	Likely to be delivered	Delivery guaranteed	Doesn't work

What are the chances of getting a delivery on the Sunday or Monday?

Certain	
Likely	
50/50 chance	
Unlikely	
No chance	

Explanation

Answers

Area and Perimeter practical problems

1. A square-shaped room measures 6ft on one side. What is the area of this room? $6 \times 6 = \mathbf{36\text{FT}^2}$

2. A rectangular field measures 10ft by 3.5ft. What is the area of this field? $10 \times 3.5 = \mathbf{35\text{ft}^2}$

3. Mary wants new carpeting for her dining room. Her dining room is an 8yd by 7.25yd rectangle. How much carpeting does she need to buy to cover her entire dining room? $8 \times 7.25 = \mathbf{58\text{yd}^2}$

4. Isabella is making a display board for the school council elections. The display board is a 4.25ft by 6ft rectangle. She needs to add a ribbon border around the entire display board. What is the length of ribbon that she needs?

a. $6 + 6 + 4.25 + 4.25 = \mathbf{20.5\text{ft}}$

5. Danny has a rectangular rose garden that measures 800cm by 12.5m. One bag of fertilizer can cover 16m^2 . How many bags will he need to cover the entire garden?

$8 \times 12.5 = 100\text{m}^2$ $100/16 = 6.25$ $6.25 \times 16 = 100\text{m}^2$ $100/16 = 6.25$ so **need 7 bags**

6. Sarah is tiling a wall in her bathroom the wall measure 6m by 4m. The tiles she has chosen measure 50 cm by 30 cm. How many tiles does she need? Convert cm to m first. $50 / 100 = 0.5\text{m}$ $30/100 = 0.3\text{m}$ $0.5 \times 0.3 = 0.15$ $6 \times 4 = 24\text{m}^2$ $24 / 0.15 = \mathbf{160 \text{ tiles}}$

7. Jo needs to paint the spare bedroom. The room measure 8m by 2m and each tin of paint covers 2m^2 . How many tins are required? $8 \times 2 = 16\text{m}^2$

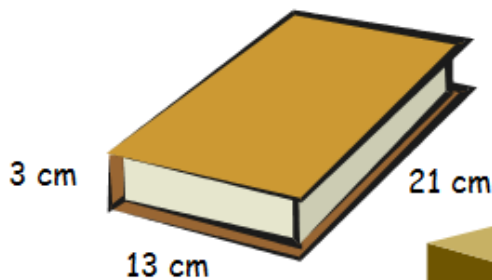
So 8 tins needed

8. Jo wants to add a new skirting board. How many does she need? $8 + 2 + 8 + 2 = 20\text{m}$

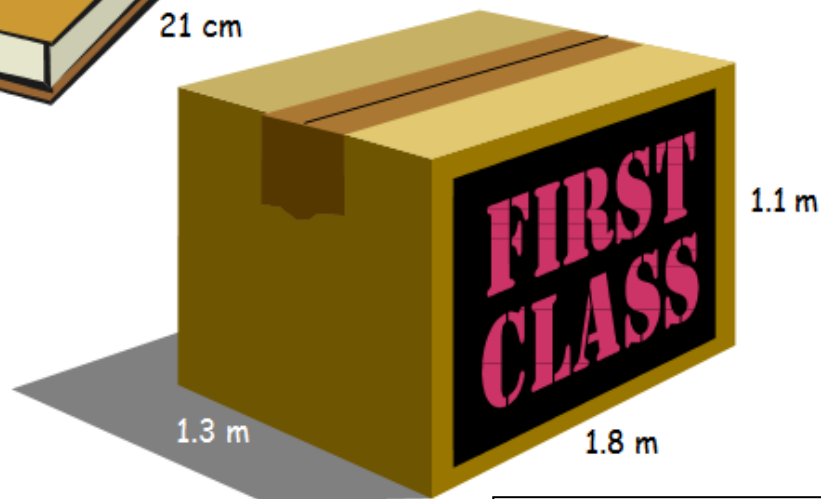
Volume

Work out the volume of the objects below

$$3 \times 13 \times 21 = 819\text{cm}^3$$



$$6 \times 6 \times 6 = 216\text{cm}^3$$



$$1.1 \times 1.8 \times 1.3 = 2.573 \text{ m}^3$$

Scale Plan questions

A house measure 25m high in real life. You need to draw a scale plan using the scale $1\text{cm} = 2.5\text{m}$. How many cm high is the house on the plan? $25 / 2.5 = 10\text{cm}$

A car measure 6m length in real life. On a plan with a scale or $1\text{cm} = 2\text{m}$ how many cm will the car be?

$$6 / 2 = 3\text{cm}$$

A man is 6ft high in real life. On a plan where 1cm = 1.5ft how many cm's high will he be?

$$6 / 1.5 = 4\text{cm}$$

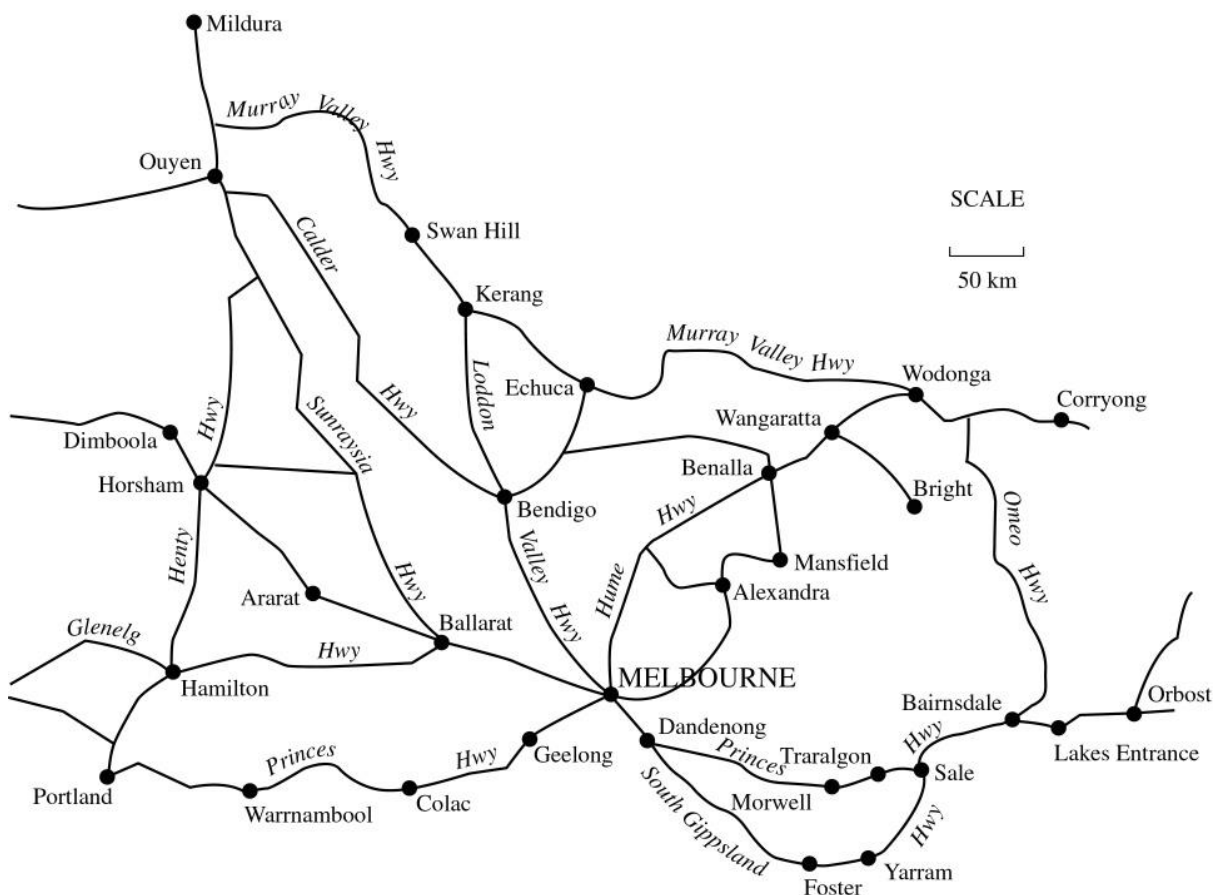
There is a church which measures 10.5m by 7.5 in real life. What size will this be on a plan using 2cm = 5m? change scale to 1cm = 2.5 m $10.5/2.5 = 4.2\text{cm}$ by $7.5/2.5 = 3\text{cm}$

Maps

ANSWERS MAY VARY DEPENDING ON MEASUREMENTS

Measure the distances and say how far that is in real life.

Other types of map scales



Use a ruler to measure the scale and then calculate the following distances - **ANSWERS MAY VARY DEPENDING ON MEASUREMENTS**

- a) Bendigo to Melbourne $3 \times 50 = 150\text{km}$
- b) Ouyen to Bright $10.5 \times 50 = 525\text{km}$
- c) Hamilton to Wangaratta $9.5 \times 50 = 475\text{km}$
- d) Corryong to Lakes Entrance $4 \times 50 = 200\text{km}$

Mean and Range questions

1. In six games a cricketer scored the following number of runs. What is the mean number of runs?

59	30	21	41	70	19
----	----	----	----	----	----

$$59 + 30 + 21 + 41 + 70 + 19 = 240 \quad 240 \div 6 = 40$$

2. The table shows the prices of a bag of cement at four different suppliers.

Pete's	Charlie's	Cement R us	Cement market
£3.10	£3.80	£3.70	£3.40

What is the (mean) price per bag?

$$3.10 + 3.80 + 3.70 + 3.40 = £14.00 \quad £14.00 \div 4 = \text{£}3.50$$

3. A holidaymaker checks the prices of seven flights to Spain. The prices are as follows: What is the range? $280 - 198 = \text{£}82$

£219	£198	£229	£210	£204.50	£228	£280
------	------	------	------	---------	------	------

4. A keen gardener kept a check of the lowest night-time temperatures during one week in late autumn. What is the average (mean) night-time temperature? $2 + 4 + 2 + 1 + 2 + 1 + 2 = 14 \quad 14 \div 7 = 2$

Monday	Tuesday	Wed.	Thursday	Friday	Saturday	Sunday
2°C	4°C	2°C	1°C	2°C	1°C	2°C

5. Some children attend a nursery school for a term. What is the range of attendance.

13	5	0	6	9	2
----	---	---	---	---	---

$$13+5+0+6+9+2 = 35 \quad 35 \div 6 = \mathbf{5.83}$$

Probability

Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
Doesn't Work	Not much chance	Maybe	Should be there	Likely to be delivered	Delivery guaranteed	Doesn't work

What are the chances of getting a delivery on the Sunday or Monday?

No chance because the driver doesn't work on those days.

What are the chances of getting a delivery on the Sunday or Monday?

Certain	
Likely	
50/50 chance	
Unlikely	
No chance	X

5 people tried and rated blueberry and cherry muffins

Cherry	Blueberry	Rating (scale of 10- 1) <small>10 = loved it 1 = didn't like it</small>
✓	✓	10
✓	x	8
✓	✓	9
x	✓	8
✓	✓	0

Probability/Percentage

What is the probability that someone tried both muffins?

Likely = $\frac{3}{5} = 60\%$

What % of people gave a score of 9 or more?

$\frac{2}{5} \times 100 = 40\%$

What % of people tried a cherry muffin?

$\frac{4}{5} \times 100 = 80\%$

Mean and Range

Mean = find the total and divide by how many numbers there are

What is the mean rating?

$$10 + 8 + 9 + 8 + 0 = 32$$

$$32 \div 5 = 6.4$$

Range = Highest - Lowest

What is the range of ratings?

$$10 - 0 = 10$$

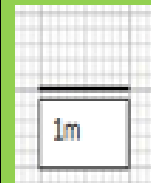
What does the range show?

High range shows a lot of variability in the scores

Interpreting scale

Try and remember to figure out what each small box is worth on the diagram.

Divide the whole number by how many tiny boxes there are:

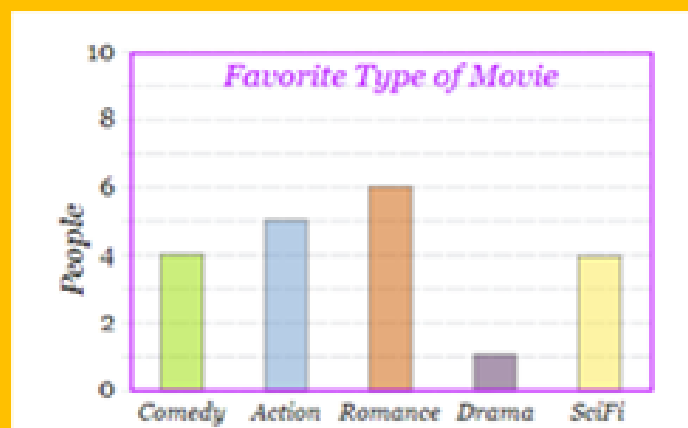


On occasion you may see the scale 1:10
If no units are given this means each number has the same unit. In this case it could be 1cm:10cm meaning 1 cm on the plan is the same as 10cm in real life.

Bar Chart

In task three you need to draw a bar chart.

Make sure you include the labels on both axis and draw the axis on the page.



In this example there are 10 small squares to 1 m.

$$1 \div 10 = 0.1 \text{ each small box is } 0.1\text{m}$$

Remember when you are asked to make a comment try and be comparative.

The average number of people who liked romance was higher than the number of people who liked drama.

Solving problems with shape

A wall measures 4m by 2.5m
How many pictures measuring 50cm by 75cm fit on the wall? = 25

Convert your units

Tiles measure 0.5m by 0.75m

Then divide

$$4 \div 0.75 = 5 \text{ (length by length)}$$

$$2.5 \div 0.5 = 5 \text{ (width by width)}$$

Then multiply $5 \times 5 = 25$

