A Complete Guide to ...

Measurement

Utilising the objectives as written in

MATHEMATICS in the New Zealand CURRICULUM

for

Level 4

This resource contains:

- ☑ Table of contents
- ☑ Teaching notes
- ☑ In class activity sheets involving
  - ▫ worked examples
  - ▫ basic skills
  - ▫ word problems
  - ▫ problem solving
  - ▫ group work
- ☑ Homework / Assessment activity sheets
- ☑ Answers

These resources are supplied as PHOTOCOPY MASTERS

Author: A. W. Stark

AWS Publications Ltd
Formerly *AWS* Teacher Resources

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L4MM

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Note from the author:

This resource ...

*A Complete Guide to Measurement

is one of a series of **FIVE** resources written utilising the objectives as stated in

Mathematics in the New Zealand Curriculum for Level 4.

With my experiences as a specialist mathematics teacher, I enjoyed mathematics as a subject, but I am aware that not all teachers feel the same way about mathematics. It can be a difficult subject to teach, especially if you are unsure of the content or curriculum and if resources are limited.

This series of resources has been written with you in mind. I am sure you will find this resource easy to use and of benefit to you and your class.

Resources in this series:

A Complete Guide to Number written utilising the objectives as stated in ***Mathematics in the New Zealand Curriculum for Level 4***	**Resource Code: L4MN**
A Complete Guide to Measurement** written utilising the objectives as stated in ***Mathematics in the New Zealand Curriculum for Level 4.	**Resource Code: L4MM**
A Complete Guide to Geometry written utilising the objectives as stated in ***Mathematics in the New Zealand Curriculum for Level 4.***	**Resource Code: L4MG**
A Complete Guide to Algebra written utilising the objectives as stated in ***Mathematics in the New Zealand Curriculum for Level 4.***	**Resource Code: L4MA**
A Complete Guide to Statistics written utilising the objectives as stated in ***Mathematics in the New Zealand Curriculum for Level 4.***	**Resource Code: L4MSt**

For more information about these and other resources, please contact ...

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Acknowledgement:

I would like to thank the staff and pupils of **Mairehau Primary School, Christchurch** for their assistance in making these resources possible.

This resource has been divided into EIGHT sections as listed below.

Although there are no page numbers, the sections follow in sequential order as listed.

Note: **'In-class' Worksheets Masters** are lesson by lesson reuseable worksheets that can be photocopied or copied on to an OHP.

Homework / **Assessment Worksheets Masters** can be used as homework to reinforce work covered in class or they can be used for pupil assessment.

1 Measurement

The following are the objectives for **Measurement**, **Level 4**, as written in the **MATHEMATICS** *in the New Zealand Curriculum* document, first published 1992. ***[REFER PAGE 70]***

Estimating and measuring

Within a range of meaningful contexts, students should be able to:

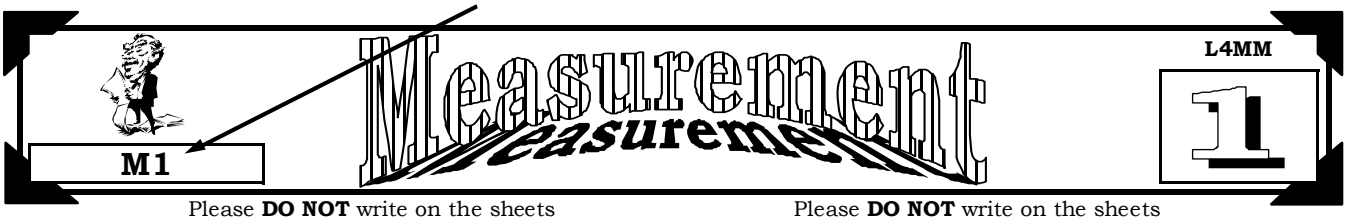
- **M1** carry out measuring tasks involving reading scales to the nearest graduation;
- **M2** calculate perimeters of circles, rectangles, and triangles, areas of rectangles and volumes of cuboids from measurements of length;
- **M3** read and construct a variety of scales, timetables; and charts;
- **M4** design and use a simple scale to measure qualitative data.

Developing concepts of time, rate and change

Within a range of meaningful contexts, students should be able to:

- **M5** perform calculations with time, including 24-hour clock times.

At the top of each **'In-class' worksheet** and **Homework / Assessment worksheet**, the Measurement objective (s) being covered has been indicated. *EXAMPLE:* **M1** means objective 1, **M2** means objective 2, etc.



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The **Mathematical Processes Skills:** **Problem Solving**, **Developing Logic & Reasoning,** **Communicating Mathematical Ideas,** are learned and assessed within the context of the more specific knowledge and skills of number, measurement, geometry, algebra and statistics. The following are the **Mathematical Processes Objectives** for **Level 4**.

Problem Solving Achievement Objectives ***[Refer page 24]***

- **MP1** pose questions for mathematical exploration;
- **MP2** effectively plan mathematical exploration;
- **MP3** devise and use problem-solving strategies to explore situations mathematically;
- **MP4** find, and use with justification, a mathematical model as a problem-solving strategy;
- **MP6** use equipment appropriately when exploring mathematical ideas.

Developing Logic and Reasoning Achievement Objectives ***[Refer page 26]***

- **MP8** classify objects, numbers and ideas;
- **MP9** interpret information and results in context;
- **MP10** make conjectures in a mathematical context;
- **MP15** use words and symbols to describe and generalise patterns.

Communicating Mathematical Ideas Achievement Objectives ***[Refer page 28]***

- **MP16** use their own language and mathematical language and diagrams to explain mathematical ideas;
- **MP17** devise and follow a set of instructions to carry out a mathematical activity;
- **MP20** record information in ways that are helpful for drawing conclusions and making generalisations;
- **MP21** report the results of mathematical explorations concisely and coherently.

Note:
The codes **MP1**, **MP2**, etc. have been created by numbering the **Mathematical Processes Achievement Objectives** in order as listed in the **MATHEMATICS** *in the New Zealand Curriculum* document. The numbering gaps occur as not all objectives are covered at **Level 4**. ***[REFER TO PAGES 23 - 29 OF THE CURRICULUM DOCUMENT]***

‘In-class’ Measurement Worksheets
Table of Worksheet Number / Objectives Covered

See the opposite page for details of each objective.

	Measurement Objectives					Mathematical Processes Objectives											
Worksheet Number	M 1	M 2	M 3	M 4	M 5	MP 1	MP 2	MP 3	MP 4	MP 6	MP 8	MP 9	MP 10	MP 15	MP 16	MP 17	MP 20	MP 21
1	✖						✖	✖		✖		✖	✖				✖	
2	✖							✖				✖						
3	✖									✖		✖					✖	✖
4	✖							✖				✖						
5	✖					✖		✖				✖						
6	✖							✖				✖						
7	✖					✖		✖				✖						
8	✖							✖				✖						
9	✖					✖		✖				✖						
10	✖						✖	✖		✖		✖					✖	
11		✖				✖		✖		✖		✖			✖			
12		✖				✖		✖				✖			✖			
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17		✖				✖		✖				✖				✖		
18			✖			✖		✖				✖						
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20				✖				✖				✖			✖			
21					✖			✖				✖						
22					✖			✖				✖					✖	
23					✖			✖				✖					✖	

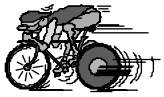
Table of Contents for the 'In-class' Worksheet Masters for Measurement, Level 4

Measurement instruments:

What is the distance between two trees?

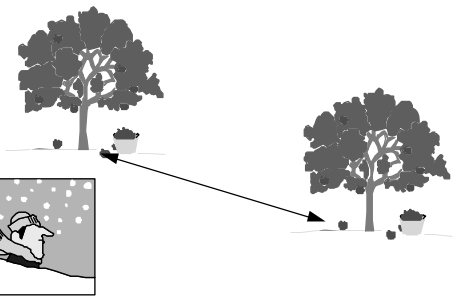
How much water is needed to fill this jug?

How much weight has Mr Williamson put on this year?



What was the highest temperature today?

In what direction is the wind blowing?



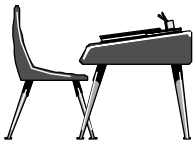
All these questions involve 'measuring' something. There are many instruments designed to accurately measure. Most measuring devices have a scale or use standard units to measure objects.

Discuss what instruments could be used to measure the items listed above.

Task 1

All measuring instruments have a scale and are based on a standard unit. The standard units vary depending on what you are trying to measure. The ability to use measuring instruments correctly is an important skill.

1. Using some cardboard, a stick or some string, **design** and **create** a measuring device capable of measuring short or long distances.
   Remember to divide the length of your measuring instrument into smaller equal parts, that is, to **create a scale**.



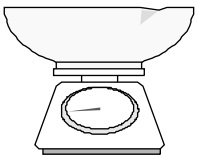
2. **Use** your instrument to **measure** such things as …
   the height of your desk,
   the distance between two things in the classroom,
   the perimeter of a tennis court,
   the length of a pencil,
   the circumference (perimeter) of a round rubbish tin, etc.

3. **Discuss** the difficulties (if any) that you experienced when using your measuring device.

Task 2

1. See if you can **design** and **create** a simple measuring instrument that can be used to measure the weight or **mass** of something. What constant unit are you going to use for your weighing device?

2. **Use** your instrument **to measure** such things as ....
   the weight of a pencil,
   the weight of a book,
   the weight of an apple, etc.



3. **Discuss** the difficulties (if any) that you experienced when using your measuring device.

Task 3

1. See if you can **design** and **create** a simple measuring instrument that can be used to measure how much something will hold - its **capacity** or **volume**. What constant unit are you going to use?

2. **Use** your instrument **to measure** such things as ....
   the volume of water a cup will hold,
   the volume of water a jug will hold,
   the volume of sand a box will hold, etc.

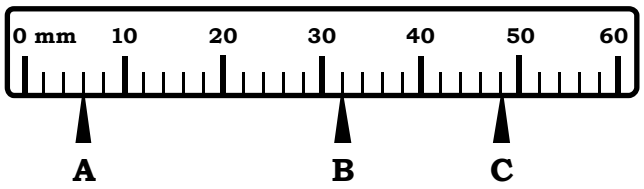
3. **Discuss** the difficulties (if any) that you experienced when using your measuring device.

Please **DO NOT** write on the sheets Please **DO NOT** write on the sheets

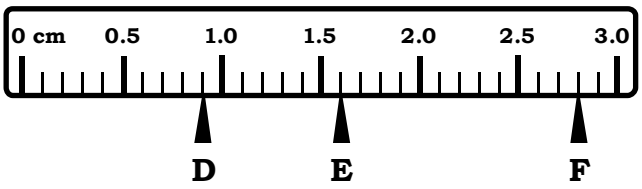
Reading scales:

When **reading a scale** it is important to note the **units** and what each **division** on the scale represents.
Example: Look at these rulers.

Ruler A



Ruler B



What are the units on the rulers? What does each division on these rulers represent?
List the readings indicated by the pointers.

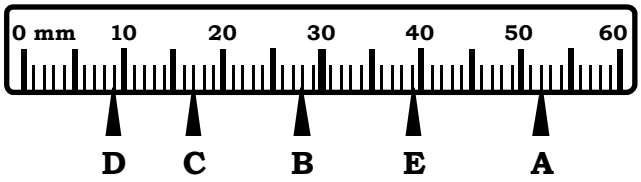
Answers: Ruler A: units are millimetres, each division = 2mm. A = 6mm, B = 32mm, C = 48mm.
Ruler B: units are centimetres, each division = 0.1cm. D = 0.9cm, E = 1.6cm, F = 2.8cm.

Task 4

Below are some diagrams of some measurement scales.
For each diagram ...

state the **unit** of measurement,
state what each **division** on the scale represents,
give the **measurements** indicated by the pointers.

1.



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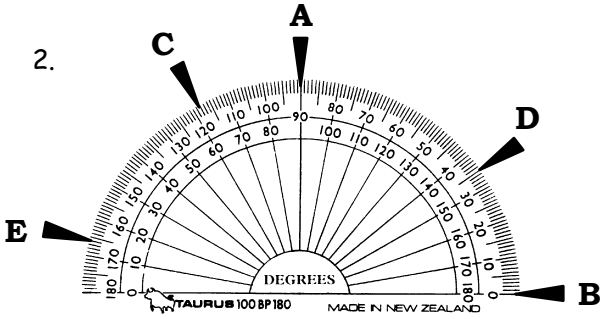

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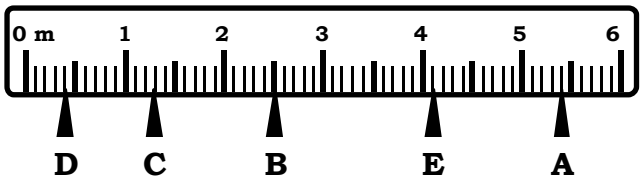

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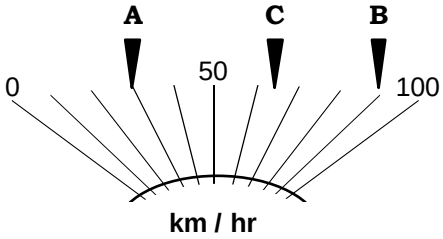

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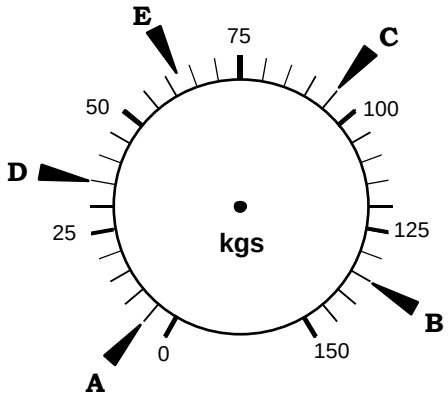

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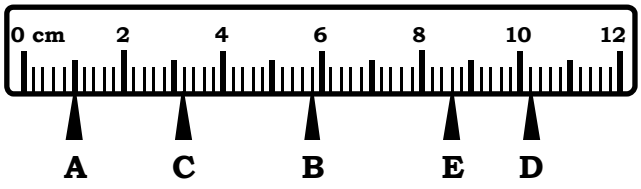


7. **Mark** each point on the various scales as indicated, using the '**Marking Scales**' master.

M1

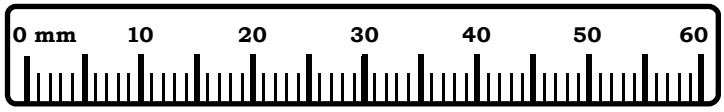
Measurement
Marking scales

Worksheet 2

Name: **Class:**

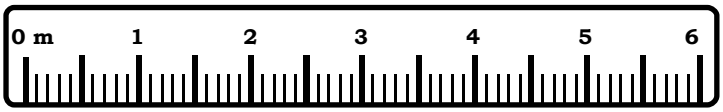
Use this sheet for Question 7, Task 4.

Ruler A

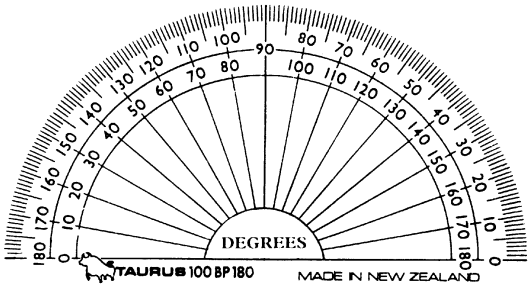


1. **Mark** these points on ruler A.
   A = 13mm, B = 29mm,
   C = 54mm, D = 3.4cm

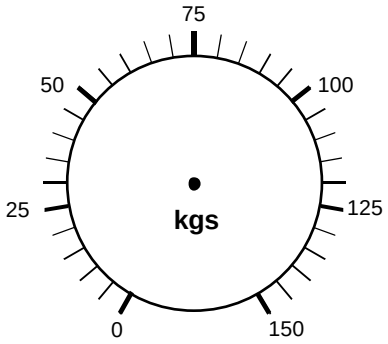
Ruler B



2. **Mark** these points on ruler B.
   A = 1.7m, B = 5.2m,
   C = 3.4m, D = 290cm

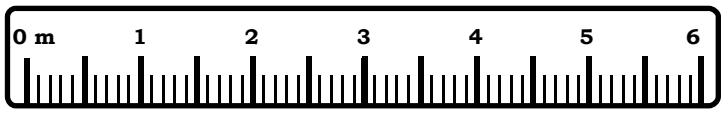


3. On this protractor, **mark** the following angles.
   A = 60°, B = 25°, C = 132°, D = 168°



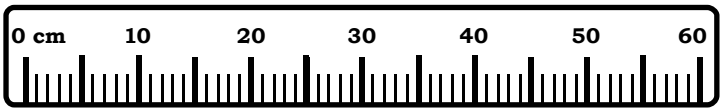
4. **Mark** these points on the dial above.
   A = 15kg, B = 80kg, C = 62.5kg, D = 137.5kg

Ruler C



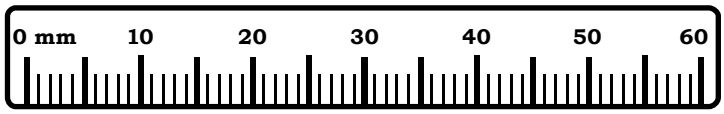
5. **Mark** these points on ruler C.
   A = 0.9m, B = 5.4m,
   C = 250cm, D = 3700mm

Ruler D



6. **Mark** these points on ruler D.
   A = 47cm, B = 33cm,
   C = 0.15m, D = 220mm

Ruler E

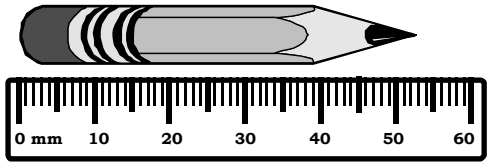


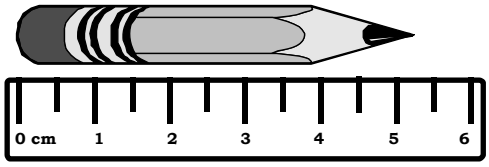
7. **Mark** these points on ruler E.
   A = 27mm, B = 52mm,
   C = 1.7cm, D = 0.035m

Accuracy of measurement :

The **degree of accuracy** of a measurement depends on the measuring device being used and the scale that is on the instrument, plus the ability of the user to read the scale accurately.

Example: Jamie measured the length of this pencil using two different rulers.





How long is this pencil? Answer: About 53 millimetres and about $5\frac{1}{2}$ centimetres.

When a scale has small divisions, the length could be recorded as follows .... 53mm ± 1mm,
where the symbol ± means 'plus or minus' and 1mm is the smallest division on the ruler.

From this, we can say that the pencil is no shorter than 52mm, but is no longer than 54mm.

If the weight of a sack of corn meal was recorded as 50kg ± 1kg, what is the lightest or heaviest weight this sack could be? Answer: 49kg & 51kg.

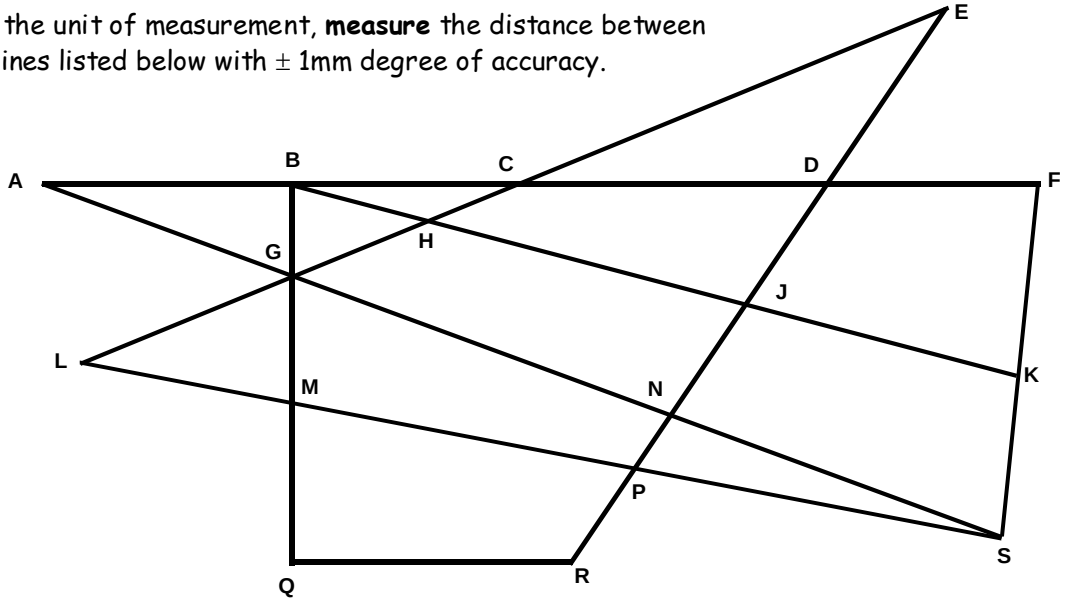
Task 5

State the **minimum** and **maximum** measurement for each measurement given below.

1.	23mm ± 1mm	2.	57cm ± 1cm	3.	1500m ± 1m	4.	236mm ± 3mm
5.	86mL ± 2mL	6.	74g ± 3g	7.	560km ± 2km	8.	31mg ± 4mg
9.	5.6m ± 0.1m	10.	9.4kg ± 0.2kg	11.	124.50m ± 0.05m	12.	8.95L ± 0.05L
13.	4.658m ± 0.005m	14.	1.380g ± 0.025g	15.	2.367L ± 0.150L	16.	1.342mg ± 0.250mg

Using millimetres as the unit of measurement, **measure** the distance between the points on these lines listed below with ± 1mm degree of accuracy.

17. points AF
18. points LE
19. points GS
20. points RE
21. points AB
22. points BK
23. points MP
24. points LC
25. points QB
26. points PD



Task 6

Use measurement devices, such as bathroom scales, kitchen scales and measuring jugs for this task. **Measure** up to 10 items with each device.

1. **Name** the measuring device and **state** the **degree of accuracy** it can measure.
2. Using each device, **measure** at **least 10 items**. **List** the items measured and the weights / capacities.
3. Have a classmate **measure** the same items and **compare** your results.

Units / conversions associated with length:

In New Zealand, the **Metric system** is the measuring system we use.
The **basic unit** for **measuring length** is the **metre**.

The other most common units of length measurement are listed in this table. Depending on what you are measuring, one unit will be more suitable than another.

Example: What units would you use to measure the distance between two cities, the thickness of a match or the height of a door? Answers: km, mm and m.

kilometre	1000 times longer than a metre
metre	standard unit for length
centimetre	100 times shorter than a metre
millimetre	1000 times shorter than a metre

Task 7

Which unit of measurement, **kilometre**, **centimetre**, **metre** or **millimetre** would be best to measure ...

1. the thickness of a text book?
2. the width of a rugby field?
3. the distance between two towns?
4. the height of a lamp post?
5. your height?
6. the length of the classroom?
7. the distance of a running race?
8. the length of your shortest finger?
9. the thickness of a pen?
10. the height of a tree?

11. For each of the metric length units above, **list** 3 more items suitable to be measured by that unit.

The ability to convert between units is an important skill.
Copy each question and replace the ◆ with a number as you **convert** the following ...

12.	1cm = ◆ mm	13.	10mm = ◆ cm	14.	8cm = ◆ mm	15.	20mm = ◆ cm
16.	30mm = ◆ cm	17.	55mm = ◆ cm	18.	178mm = ◆ cm	19.	254mm = ◆ cm
20.	2.3cm = ◆ mm	21.	9.7cm = ◆ mm	22.	12.3cm = ◆ mm	23.	34.8cm = ◆ mm
24.	253mm = ◆ cm	25.	15.6cm = ◆ mm	26.	2534mm = ◆ cm	27.	58.7cm = ◆ mm

Copy each question and replace the ◆ with a number as you **convert** between the following ...

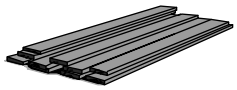
28.	1m = ◆ mm	29.	1m = ◆ cm	30.	4m = ◆ cm	31.	6m = ◆ mm
32.	150cm = ◆ m	33.	265cm = ◆ m	34.	985cm = ◆ m	35.	562cm = ◆ m
36.	1500mm = ◆ m	37.	6523mm = ◆ m	38.	7854mm = ◆ m	39.	6720mm = ◆ m
40.	3.65m = ◆ mm	41.	5.67m = ◆ cm	42.	4.63m = ◆ mm	43.	9.84m = ◆ cm

Copy each question and replace the ◆ with a number as you **convert** between the following ...

44.	1km = ◆ m	45.	1000m = ◆ km	46.	1.9km = ◆ m	47.	2700m = ◆ km
48.	3.25km = ◆ m	49.	9650m = ◆ km	50.	9.74km = ◆ m	51.	4200m = ◆ km
52.	56.3km = ◆ m	53.	5684m = ◆ km	54.	5.63km = ◆ m	55.	9680m = ◆ km
56.	0.235km = ◆ m	57.	985m = ◆ km	58.	0.562km = ◆ m	59.	862m = ◆ km

60. **Create** 10 conversion questions as above. **Exchange** questions with a classmate and complete the conversions.

Calculations involving mixed length units:



Example: Shane has two pieces of wood. One is 85cm long the other is 2.1m.
What is the total length of wood that Shane has?

Is the answer as simple as adding 85 and 2.1 together?

To be able to add these two length measurements, the units must be the same.
One of the measurement values must be converted, so that both units are the same.

Example: We can answer in metres, ... 85cm = 0.85m, therefore 0.85m + 2.1m = 2.95m,
or we can answer in centimetres, ... 2.1m = 210cm, therefore 85cm + 210cm = 295cm.

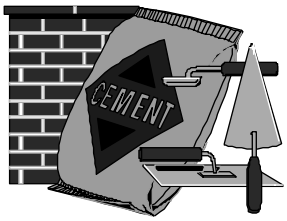
Answer: Shane has 2.95m or 295cm of wood.

Task 8

Copy each question. **Answer** in the unit indicated in the brackets. **All** measurement units must be in the same unit before adding or subtracting.

1.	45mm + 6.3cm = ◆ (cm)	2.	7.8cm – 54mm = ◆ (mm)	3.	2.8m + 175cm = ◆ (m)
4.	5.2km – 2470m = ◆ (km)	5.	1.2m + 3750mm = ◆ (m)	6.	86mm – 5.9cm = ◆ (cm)
7.	579cm + 4.35m = ◆ (m)	8.	8650m – 4.9km = ◆ (km)	9.	5.6m + 257cm = ◆ (m)
10.	865mm – 5.3cm = ◆ (mm)	11.	9.2km + 1645m = ◆ (m)	12.	96cm – 0.35m = ◆ (cm)
13.	685m + 8.4km = ◆ (m)	14.	125mm – 9.4cm = ◆ (cm)	15.	3.25m + 1865mm = ◆ (mm)

Mr Jones is building a brick fence using bricks that are 25cm long.



16. If the length of the fence is 30m, how many bricks are needed for each layer of the fence?
17. How many bricks are needed to build a fence made up of 6 layers?
18. If the bricks cost 40 cents each, how much will all the bricks cost? Give your answer in dollars.

Mrs Proctor is going to recover a chair. She has worked out that she needs pieces of material that measure 1.7m, 80cm, 80cm and 1.40m in length.

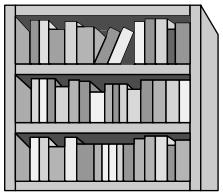
19. **Calculate** the total length of material she needs. Give your answer in metres.
20. If the material costs $14.90 per metre, what is the total cost of the material?

Jim runs laps around a local park each morning. The distance of each lap is 800m.

21. How many metres would Jim run, if he ran 3 laps? Convert your answer to kilometres.
22. How many laps will he need to run to complete a distance of 4km?

Last week he ran 4 laps, 6 laps, 4 laps, 6 laps, 10 laps, 3 laps and 8 laps during his morning runs.

23. How many laps did he run last week?
24. **Calculate** the total distance of his runs, stating your answer in both metres and kilometres.



Rangi is going to build a new book shelf. The book shelf is 85cm high and each shelf is 1.2m long. This diagram shows what the book shelf will look like when finished.

25. **Calculate** the total length of wood needed to build the book shelf. Answer in metres.
26. If the wood costs $4.20 per metre, what is the cost of buying the wood?

27. **Make up** some similar word questions as above that you can exchange with a classmate.

Units / conversions associated with mass (weight):

The **basic unit** for **measuring mass** is the **gram**. The mass of an object is often referred to as its weight.

The other most common units of mass measurement are listed in this table. Depending on what you are measuring, one unit will be more suitable than another.

Example: What units would you use to measure the weight of a piece of paper, the mass of a car and the weight of a person? Answers: mg, t and kg.

tonne	1000 times heavier than a kilogram
kilogram	1000 times heavier than a gram
gram	standard unit for mass
milligram	1000 times lighter than a gram

Task 9

Which unit of measurement, **tonne**, **kilogram**, **gram** or **milligram** would be best to measure ...

1. the weight of a truck?
2. the weight of a feather?
3. the weight of a dog?
4. the weight of a building?
5. your weight?
6. the weight of a packet of biscuits?
7. the weight of a potato chip?
8. the weight of a pen?
9. the weight of apples on a tree?
10. the weight of a piece of tissue paper?

11. For each of the metric mass units above, **list** 3 more items suitable to be measured by that unit.

The ability to convert between units is an important skill.
Copy each question and replace the ◆ with a number as you **convert** the following ...

12. 1g = ◆ mg	13. 1000mg = ◆ g	14. 5g = ◆ mg	15. 4000mg = ◆ g
16. 9.5g = ◆ mg	17. 6400mg = ◆ g	18. 1.78g = ◆ mg	19. 2.54g = ◆ mg
20. 1500mg = ◆ g	21. 9.7g = ◆ mg	22. 2455mg = ◆ g	23. 35.6g = ◆ mg
24. 755mg = ◆ g	25. 865mg = ◆ g	26. 0.534g = ◆ mg	27. 0.752g = ◆ mg

Copy each question and replace the ◆ with a number as you **convert** between the following ...

28. 1kg = ◆ g	29. 1000g = ◆ kg	30. 4kg = ◆ g	31. 2500g = ◆ kg
32. 2.7kg = ◆ g	33. 5600g = ◆ kg	34. 9.85kg = ◆ g	35. 5.875kg = ◆ g
36. 1500g = ◆ kg	37. 3.25kg = ◆ g	38. 7.34kg = ◆ g	39. 6720g = ◆ kg
40. 3.56kg = ◆ g	41. 6250g = ◆ kg	42. 0.565kg = ◆ g	43. 856g = ◆ kg

Copy each question and replace the ◆ with a number as you **convert** between the following ...

44. 1t = ◆ kg	45. 1000kg = ◆ t	46. 1.9t = ◆ kg	47. 3200kg = ◆ t
48. 4.25t = ◆ kg	49. 6450kg = ◆ t	50. 9.74t = ◆ kg	51. 6530kg = ◆ t
52. 2575kg = ◆ t	53. 6.35t = ◆ kg	54. 8624kg = ◆ t	55. 9.655t = ◆ kg
56. 0.325t = ◆ kg	57. 895kg = ◆ t	58. 0.542t = ◆ kg	59. 732kg = ◆ t

60. **Create** 10 conversion questions as above. **Exchange** questions with a classmate and work out the conversions.

Calculations involving mixed mass units:

Example: Tracy has two bags of rice. One weighs 750g and the other weighs 1.2kg.
What is the total weight of rice that Tracy has?

Is the answer as simple as adding 750 and 1.2 together?

To be able to add these two mass (weight) measurements, the units must be the same. One of the measurement values must be converted, so that both units are the same.

Example: We can answer in grams, … 1.2kg = 1200g, therefore 750 + 1200 = 1950g,
or we can answer in kilograms, … 750g = 0.75kg, therefore 0.75 + 1.2 = 1.95kg.

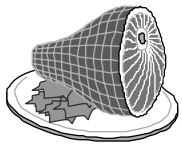
Answer: Tracy has 1950g or 1.95kg of rice.

Task 10

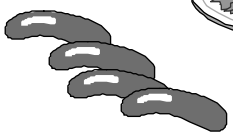
Copy each question. **Convert** all measurements to the same unit before adding or subtracting.
Answer in the units indicated in the brackets.

1.	5.3g + 1200mg = ◆ (mg)	2.	7.8kg – 5400g = ◆ (kg)	3.	5.3t + 2540kg = ◆ (t)
4.	7.2kg – 5600g = ◆ (g)	5.	1.7t + 6250kg = ◆ (kg)	6.	2530mg – 1.7g = ◆ (g)
7.	6.85g + 7620mg = ◆ (g)	8.	7535kg – 6.3t = ◆ (t)	9.	8.3kg + 7624g = ◆ (kg)
10.	8652mg – 3.85g = ◆ (mg)	11.	8.7t + 1649kg = ◆ (kg)	12.	7450kg – 5.6t = ◆ (t)
13.	864kg + 4.3t = ◆ (t)	14.	6320mg – 3.4g = ◆ (mg)	15.	6.25g + 2365mg = ◆ (g)

A local butcher shop sells Christmas hams of various sizes.

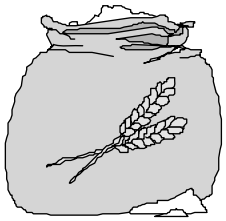


16. Today 5 hams were sold that weighed 910g, 1.85kg, 840g, 1.75kg and 1.65kg.
What was the total weight of hams sold today? Answer in kilograms.



The butcher buys sausages in bulk and packs the sausages in 250g packs.

17. How many 250g packets can be made from 50kg of sausages?



A bakery buys flour in 60kg sacks.

18. **Calculate** the weight of flour a bakery goes through if it buys 30 sacks of flour in six months. Answer in tonnes.
19. If a 60kg sack costs $25.00, how much has the bakery spent on flour?
20. If a small bread bun uses 300g of flour, how many small buns can be made from a 60kg sack of flour?

A small truck has been used to move large rocks and can carry a maximum load of 1.5 tonnes per load.

21. During the week, loads of rocks weighing 450kg, 1.2t, 1.35t, 684kg and 1.12t were transported on the truck. **Calculate** the total of these loads. Answer in kgs.
22. How many maximum loads would it take if this truck is used to move 7500kg of materials?

Julie made a batch of 25 biscuits that required 200g of butter and 150g of sugar.

23. Julie baked a batch of biscuits every week for 12 weeks.
Calculate the weight of butter and sugar she used. Answer in kilograms.
24. How many batches of biscuits could she bake if she had 5kg of butter?
25. How many batches of biscuits could she bake if she had 6kg of sugar?

26. **Make up** some similar word questions as above that you can exchange with a classmate.

Units / conversions associated with capacity (volume):

The **basic unit** for **measuring capacity** is the **litre**. The capacity that an object will hold is also called its **volume**.

The other most common units of capacity measurement are listed in this table. Depending on what you are measuring, one unit will be more suitable than another.

kilolitre	1000 times greater capacity than a litre
litre	standard unit for capacity
millilitre	1000 times smaller capacity than a litre

Example: What units could be used to measure the volume of a small bottle, the capacity of a swimming pool and the volume of water in an ocean? Answers: mL, L and kL.

Task 11

Which unit of measurement, **kilolitre**, **litre** or **millilitre** would be best to measure ...

1. the volume of water in a cup?
2. the capacity of a hot water bottle?
3. the volume of air in a room?
4. the capacity of a teapot?
5. the capacity of a teaspoon?
6. the volume of juice in a lemon?
7. the volume of paint needed to paint a wall?
8. the volume of milk in a cow's udder?
9. the capacity of a large petrol storage tank?
10. the capacity of an ice-cream container?

11. For each of the metric capacity units above, **list** 3 more items that can be measured by that unit.

The ability to convert between units is an important skill.
Copy each question and replace the ◆ with a number as you **convert** the following ...

12.	1L = ◆ mL	13.	1000mL = ◆ L	14.	7L = ◆ mL	15.	3000mL = ◆ L
16.	7.5L = ◆ mL	17.	5900mL = ◆ L	18.	1.68L = ◆ mL	19.	2.64L = ◆ mL
20.	1400mL = ◆ L	21.	8.7L = ◆ mL	22.	3155mL = ◆ L	23.	16.6L = ◆ mL
24.	685mL = ◆ L	25.	775mL = ◆ L	26.	0.134L = ◆ mL	27.	0.952L = ◆ mL

Copy each question and replace the ◆ with a number as you **convert** between the following ...

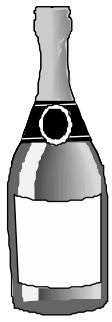
28.	1kL = ◆ L	29.	1000L = ◆ kL	30.	4kL = ◆ L	31.	2000L = ◆ kL
32.	4.7kL = ◆ L	33.	7600L = ◆ kL	34.	8.85kL = ◆ L	35.	6.845kL = ◆ L
36.	1800L = ◆ kL	37.	4.15kL = ◆ L	38.	6.34kL = ◆ L	39.	6720L = ◆ kL
40.	2.96kL = ◆ L	41.	7150L = ◆ kL	42.	0.465kL = ◆ L	43.	756L = ◆ kL

Copy each question and replace the ◆ with a number as you **convert** between the following ...

44.	4.505L = ◆ mL	45.	9685L = ◆ kL	46.	4625mL = ◆ L	47.	0.856kL = ◆ L
48.	865mL = ◆ L	49.	6.450kL = ◆ L	50.	8.742 = ◆ mL	51.	6530mL = ◆ L
52.	3254L = ◆ kL	53.	4.35L = ◆ mL	54.	3495mL = ◆ L	55.	9.655kL = ◆ L
56.	0.625L = ◆ mL	57.	875mL = ◆ L	58.	0.642kL = ◆ L	59.	732L = ◆ kL

60. **Create** 10 conversion questions as above. **Exchange** questions with a classmate and complete the conversions.

Calculations involving mixed capacity units:



Example: Richard bought a 1.5L and a 750mL bottle of juice.
What is the total volume of juice that Richard bought?

Is the answer as simple as adding 1.5 and 750 together?

To be able to add these two capacity (volume) measurements, the units must be the same. One of the measurement values must be converted, so that both units are the same.

Example: We can answer in millilitres, … 1.5L = 1500mL, therefore 1500 + 750 = 2250mL, or we can answer in litres, … 750mL = 0.75L, therefore 1.5 + 0.75 = 2.25L.

Answer: Richard bought 2250mL or 2.25L of juice.

Task 12

Copy each question. **Answer** in the unit indicated in the brackets. **All** measurement units must be in the same unit before adding or subtracting.

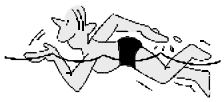
1.	4.7L + 1500mL = ◆ (mL)	2.	9.8kL – 6300L = ◆ (kL)	3.	5.4L + 2240mL = ◆ (L)
4.	9.2kL – 6400L = ◆ (L)	5.	1.6kL + 5850mL = ◆ (L)	6.	2730L – 1.9kL = ◆ (kL)
7.	4.85L + 6420mL = ◆ (L)	8.	7195L – 5.3kL = ◆ (kL)	9.	8.1L + 6824mL = ◆ (mL)
10.	9252mL – 6.85L = ◆ (mL)	11.	8.7kL + 1549L = ◆ (L)	12.	6950mL – 6.6L = ◆ (L)
13.	856L + 6.2kL = ◆ (kL)	14.	6120mL – 4.4L = ◆ (mL)	15.	6.45kL + 2765L = ◆ (kL)

Jodie has a collection of several different shaped bottles.

16. If the capacity of five bottles was 750mL, 2.5L, 1.2L, 350mL and 1000mL, **calculate** the total volume of these bottles. Answer in millilitres.

Laura made 7.5L of jam in a big pot on the stove.

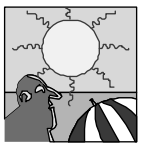
17. How many 250mL jars could she fill from this 7.5L of jam?



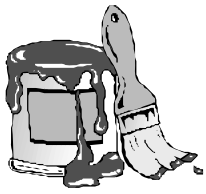
A local swimming pool holds 5000kL of water.

18. **Calculate** the time taken to fill the pool if a water pump can pump water into the pool at a rate of 200kL per hour.

During a very hot week, water had to be added to the pool each day to replace the water lost because of evaporation.



19. If 25L, 33L, 12L, 15L and 10L of water was added during this week, **calculate** the total volume of water added. Answer in kilolitres.



Mr Moore is repainting his house in various colours.

20. If he buys four 500mL tins, two 10L pails and three 4L tins, **calculate** the volume of paint he obtained. Answer in litres.
21. If the 500mL tins cost $15.50 each, the 10L pails cost $89.95 each and the 4L tins cost $64.95 each, **calculate** the total cost of buying this paint.

Mr Johnstone has been sick for a long time. Each day he takes 5mL of medicine, 4 times a day.

22. **Calculate** the volume of medicine he would take in four weeks. Answer in litres.
23. For how many days will a 250mL bottle of medicine last?
24. For how many days will a one litre bottle of medicine last?

25. **Make up** some similar word questions as above that you can exchange with a classmate.

Estimating and measuring with accuracy:

"How much water will fill this container?" asked Alf.

"What is the weight of this parcel?" asked Pam.

"What is the height of the classroom?" asked Jacqui.

Being able to estimate can be helpful, just as being able to use any measuring device accurately is an important skill.

Task 13

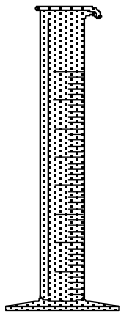
Working in small groups for this task, think of some sensible measurement activities that could be undertaken by the whole class, **or** your teacher with provide you with suitable items or activities for this measuring task.

Example: the height of the door
the volume of water in a bottle
the distance between two trees
the weight of a brick
the width of the classroom
etc...

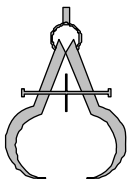
For this task you will need to prepare a table with the following headings

Item or activity	Estimated measurement	Measuring instrument used	Actual measurement
For example: weight of a book	100g	kitchen scales	110g

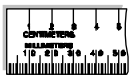
Working in **small groups**, you are to estimate the length, height, width of an object as requested or the distance between two points, or the mass (weight) of various objects or the capacity (volume) of various containers.

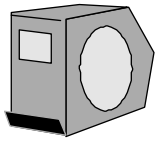


Instructions:



1. **List** the measurement activities in your table.
2. Consider the estimation activity and **record** your **estimate** in the table. You are allowed to pick up the items to help estimate their weight. Minimal talking is allowed, but there is to be no discussion between groups.
3. **Enter** in the table the type of **measuring instrument** you would use to complete each measurement task.
4. Either your teacher will provide you with the accurate measurements or using various measuring instruments, **complete** the **measurement task** as accurately as you can, recording your results in the table. Remember to include the name of the measurement units.

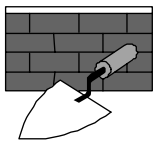




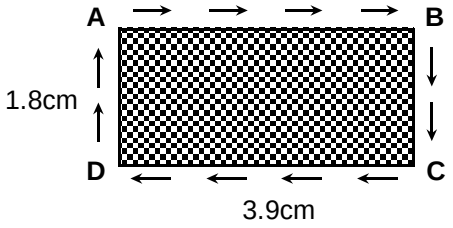
How did your group get on?

If this task was conducted as a competition, the winning group would be the one whose estimated measurements were closest to the actual measurements.

Finding the perimeter of a shape:



The distance around the outside (or inside) of a shape is known as its perimeter.
Example: Find the perimeter for this rectangle below.



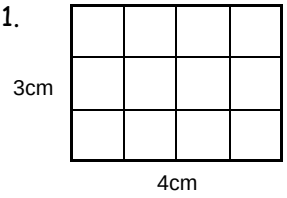
There are four sides …
side AB = 3.9cm, side BC = 1.8cm,
side CD = 3.9cm, side DA = 1.8cm.

Add the length of the four sides to find the perimeter.
Answer: Perimeter = 11.4cm

An easy way to remember perimeter is to imagine that you are walking around the outside of a shape, starting and stopping at the same point or corner, as shown by the arrows on the diagram above.

Task 14

Calculate the perimeter of these shapes. Diagrams are not drawn to scale.

1.


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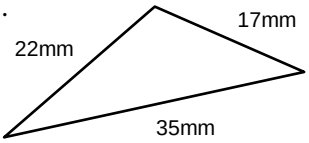

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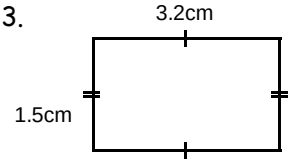
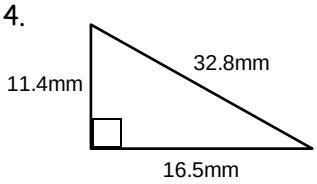


4.


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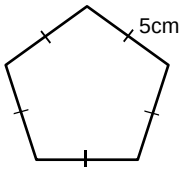

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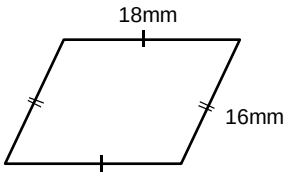

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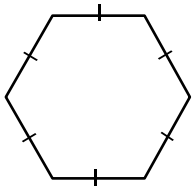

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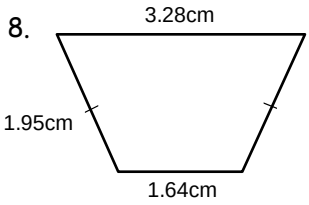
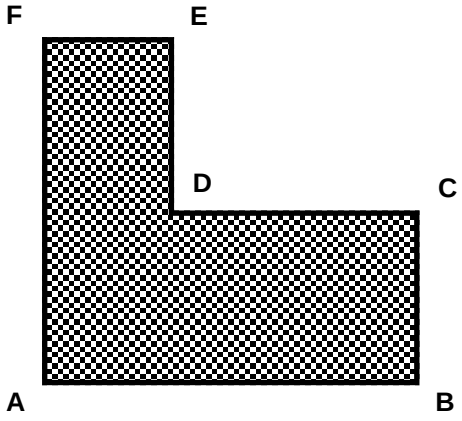


Measure the length of the sides of these shapes below, to the nearest millimetre.
Use this information to **calculate** the **perimeter** of each shape.

9.


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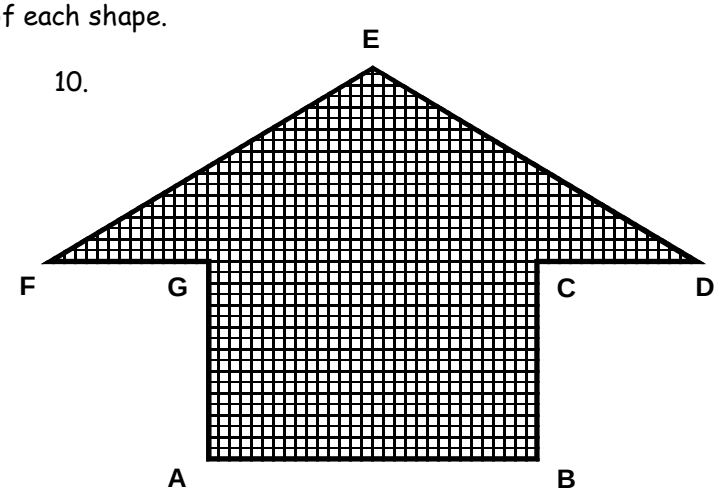


Task 15

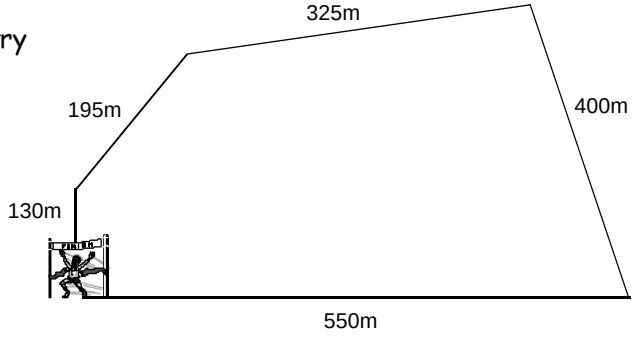
Look around your classroom or school playground for at least 10 items that you can find the perimeter of.
Example: a tennis court, your desk top, etc.

1. **List** the items, then **estimate** their perimeters.
2. Using rulers, tape measures or parts of your own body, such as your feet, **measure** the perimeter of your items.

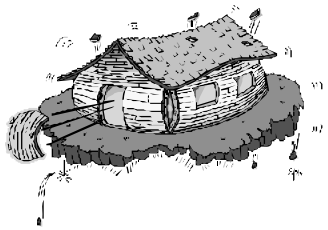
Word problems involving perimeter:

Task 16

This diagram shows the course for a school cross-country race that is to be run around a local park.



1. How far is one lap of this course?
2. Convert this distance to kilometres.
3. If the senior girls run 2 laps, how far is their race?
4. How many laps do the senior boys run if their race is 4.8km?



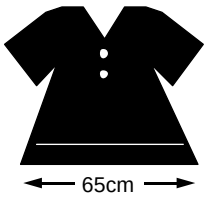
A new fence is to be built around a house.

5. The rectangular section is 65 metres long and 30 metres wide. **Calculate** the total length of the fence.
6. If the fence costs $15.00 per metre to build, **calculate** the cost of building this fence.

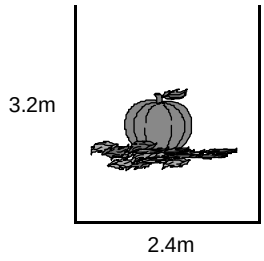
A 20 metre fence is to be built around a swimming pool.

7. If the shape around the pool is square, how long is each side?

Jenny is going to sew a ribbon around the bottom of a dress.
When the dress is lying flat it measures 65cm along the bottom edge.



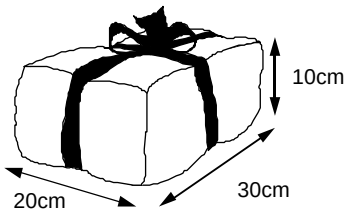
8. **Calculate** the length of ribbon that Jenny will need.
9. If the ribbon costs 25 cents per metre, what will it cost Jenny to do this?



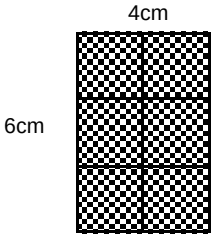
Mr Jones is going to put up shade cloth on three sides of his vegetable garden to protect the plants, as shown in this diagram.

10. **Calculate** the length of shade cloth required.
11. If Mr Jones paid $83.60 for the shade cloth, **calculate** the cost per metre of the shade cloth.

Miri is going to tie a ribbon around this parcel. The dimensions of the parcel are shown in the diagram.



12. **Calculate** the length of ribbon that is needed to go around the parcel, then add 60cm to allow for a bow to be tied.
13. If the ribbon costs 25 cents per metre, **calculate** the cost of the ribbon.



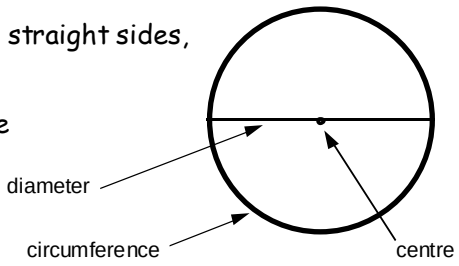
These 6 squares have been arranged to form a rectangle. Each square has sides that are 2cm long.

14. What is the perimeter of this shape?
15. **Rearrange** the smaller squares to form a shape that has a perimeter of 24 centimetres.
16. How would you rearrange these squares to form a shape with the maximum perimeter? **Draw** a diagram to show your arrangement.

Finding the circumference of a circle:

Perimeter refers to the distance around the outside of a shape with straight sides, but for a circle the same measurement is called the **circumference**.

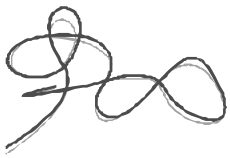
A line across a circle, from one side to the other passing through the **centre** is called the **diameter**.



Task 17

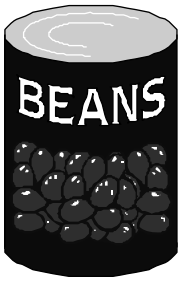
How is the circumference of a circle and the diameter of a circle related?

1. **Conduct** this experiment to find out, using a cylinder (can of baked beans), some string and a ruler.

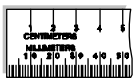


Step 1: **Wrap** some string around the circular part of the can once, **marking** the string where its joins.

Step 2: Unwrap the string and stretch it out straight.



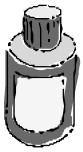
Step 3: **Measure** the length of the string between the marks. This represents the circumference of a circle. *Example:* 21.5cm



Step 4: **Measure** the distance across the centre of the circular end, passing through the centre. This represents the diameter of the circle. *Example:* 7cm

Step 5: **Divide** the circumference measurement by the diameter measurement. *Example:* 21.5 ÷ 7 = 3.07cm

2. **Create** a table with the following headings …



Object	Circumference (C) mm	Diameter (d) mm	C ÷ d
For example: 10c coin	71mm	23mm	3.09mm

Locate up to 10 circular objects within your classroom or use the objects supplied by your teacher.

Work out the circumference and **measure** the diameter of your objects, following the steps above.

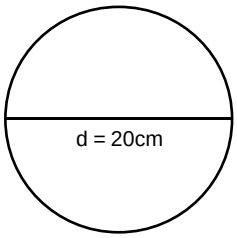
Enter your measurements in the table and **calculate** C ÷ d.

3. **Write** a **rule** for the relationship between the circumference of a circle and its diameter.

Example: **Circumference = ♦ × diameter**

Use your **rule** to find the circumferences of these circles, given the diameters.

4.



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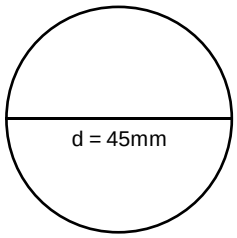

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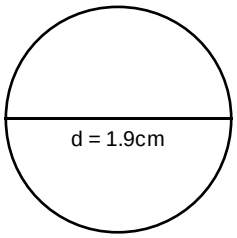

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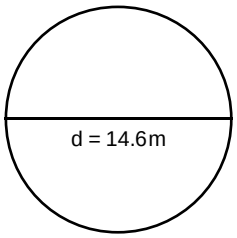


'If you can paint it, it has area':

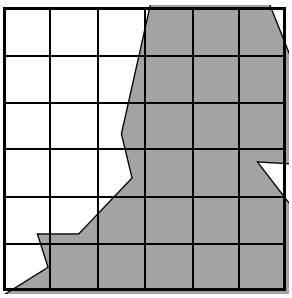
The amount of surface a shape takes up is called its **area**.

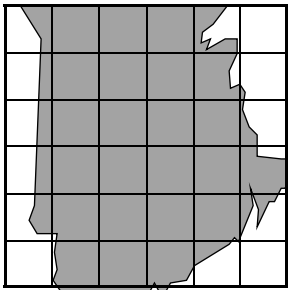
Example: A painter covered the floor with 10 square sheets of newspaper to protect the carpet while he was painting. The area of the floor could be described as 10 square sheets.

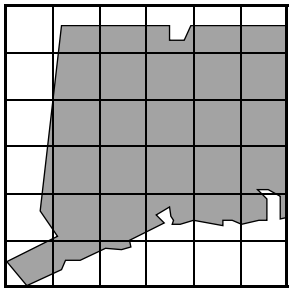
In the metric system, the most commonly used area units are **square millimetres**, **square centrimetres**, **square kilometres** or **hectares**. A hectare is a 100m × 100m = 10000 square metres. These area units can be written as abbreviations ... **mm²**, **cm²**, **m²** and **h**.

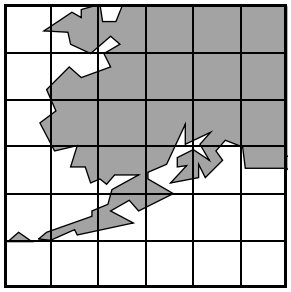
Task 13

Estimate the area of the shaded shapes by counting whole and part squares.

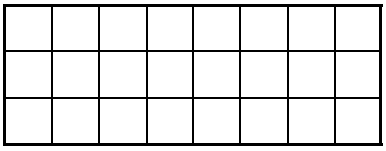
1. 

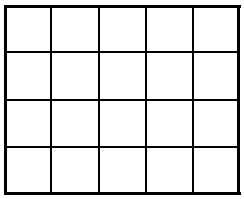
2. 

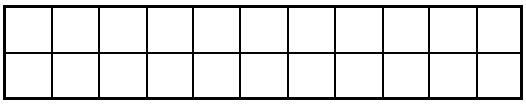
3. 

4. 

Calculate the area of these shapes by counting squares. Remember to write 'sq units' after your answer.

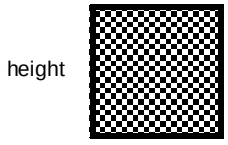
5. 

6. 

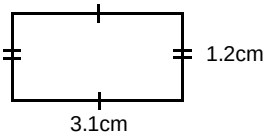
7. 

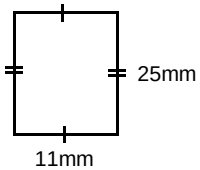
8. **Copy** and **complete** the following **rule** calculating the area of squares and rectangles.

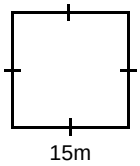
Area = ... × ....

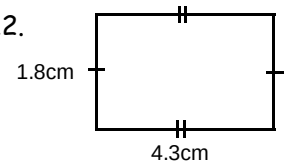


Use your area rule to **calculate** the area of these shapes below.
Remember to include the name of the unit in your answers.

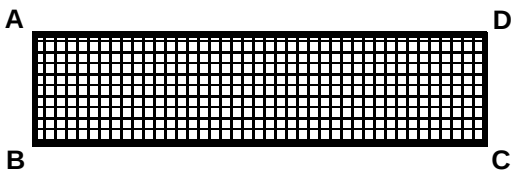
9. 

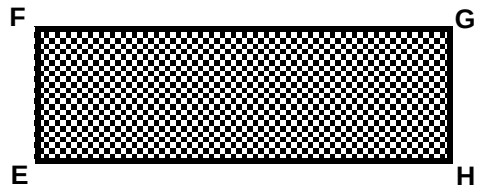
10. 

11. 

12. 

Measure the length of the base and height for each shape, then **calculate** its area, in mm².

13. 

14. 

15. If the area of a rectangle is 28cm² and one side is 7cm, how long is the other side?

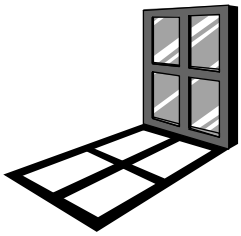
16. If the area of a square is 81mm², what is the length of each side?

Word problems involving area:

Task 19

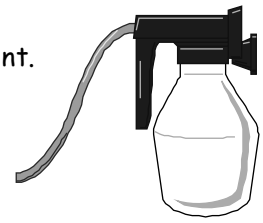
A soccer field measures 110m long and 50m wide.

1. **Calculate** the total playing area.



There are four small windows making up this large window.
The small windows measure 30cm across and 40cm high.

2. **Calculate** the total area of glass in this window.



A fence that is 50m long and 1.8m high is to be spray painted with two coats of paint.

3. **Calculate** the total area that is to be painted. Give your answer in m^2.
4. If 1 litre of paint covers $15m^2$ of the fence, how many litres of paint will be needed?
5. If the paint costs $64.95 for a 4L can, how much will the paint cost?

At a local school, 6 new bench tops are required for the wood technology room.
Each bench top is 800mm by 1200mm.

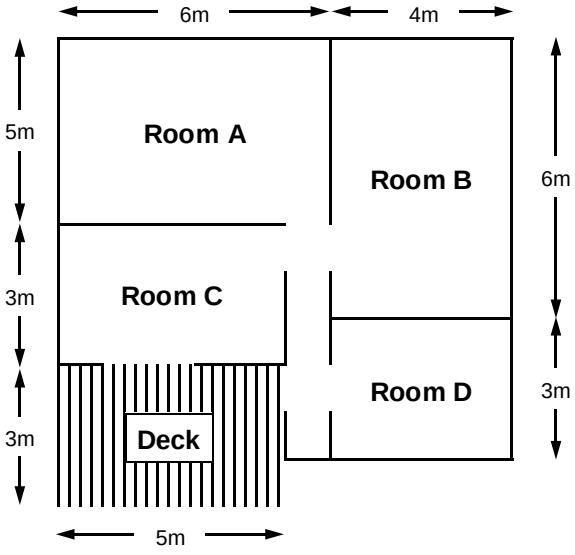
6. **Convert** the bench top measurements to metres.
7. **Calculate** the area of one bench top and give your answer in m^2.
8. **Calculate** the total area of wood needed to replace all bench tops.
9. If the material for the bench tops costs $19.50 per square metre, what will it cost to replace these bench tops?

A dress for a school uniform requires a piece of material that is 160cm long and 100cm wide.

10. **Calculate** the area of the piece of material and give your answer in square metres.
11. How much material would be needed to make 9 dresses, all the same size?
12. If the material costs $12.50 per metre, what will the material cost to make these 9 dresses?

This diagram shows the floor plan of a new house.

13. **Calculate** the area of Room A.
14. What room has an area of $24m^2$?
15. **Calculate** the area of Room C.
16. **Calculate** the area of Room D.
17. What is the total area of these four rooms?
18. If the four rooms are to have new carpet laid that costs $109 per m^2, how much will the carpet cost?
19. A wooden deck is to be built on the side of the house. **Calculate** the area of the deck.
20. If a deck costs $25 / square metre to build, **calculate** the cost of this deck.



21. **Create** some word problems of your own that can be exchanged with a classmate to work out.

'If you can fill it, it has volume':

Example: Karen used a 250mL cup to fill a bottle with water. If the bottle required 5 cups to fill it, what is the volume of the bottle? Answer: 5 × 250mL = 1250mL or 1.25L

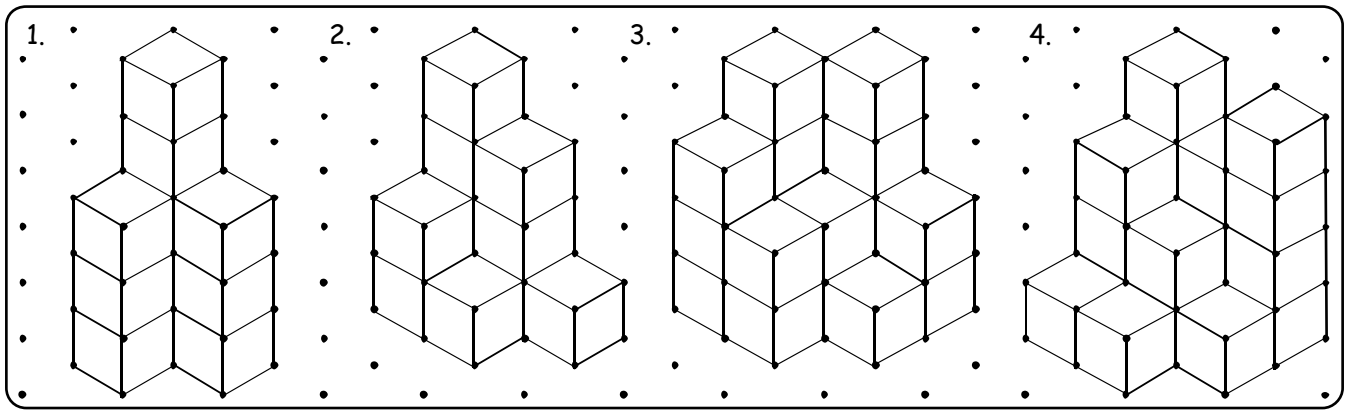
The **volume** or **capacity** of an object is the **amount of liquid** (or air) **it holds**.

Example: Craig likes building with bricks that are the shape of cubes. If he neatly stacks 40 cubes in a pile, what is the volume of the stack?
Answer: As we do not know the size of the cubes, we can say the volume of this pile is 40 cubes.

The volume or capacity of a 3D shape is the **amount of space it takes up**.

Task 20

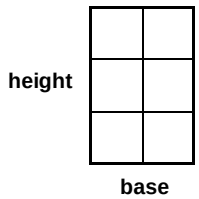
Work out the volume of each pile of cubes. Remember to include cubes you cannot see.



Draw shapes on some isometric paper that have the following volumes ...

5. 4 cubes 6. 9 cubes 7. 16 cubes 8. 25 cubes

Rangi stacked a pile of cubes. The diagram below shows the **'end'** view of the cubes.



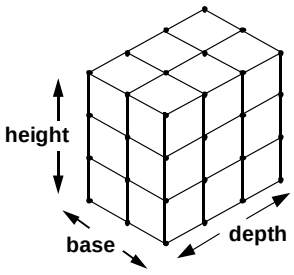
9. **Calculate** the area of the **'end'** 2D shape, using the rule ...

Area = base × height

The **'end' view** for a 3D object is also known as the **cross-section** of the 3D object.

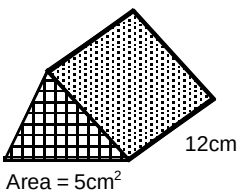
If you know the area of the **cross-section** of a 3D object, the volume can be calculated using the rule ...

Volume = Area of cross-section × depth

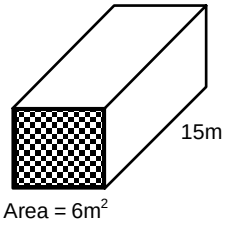


Calculate the volume of these objects, given the area of the cross section and the depth. The volume units are written as ... **mm³**, **cm³** and **m³**.

10.



11.



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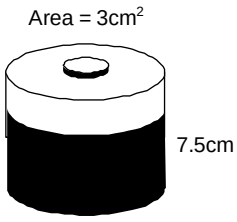

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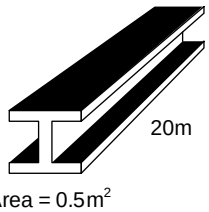


L4MM

Worksheet 16

M2

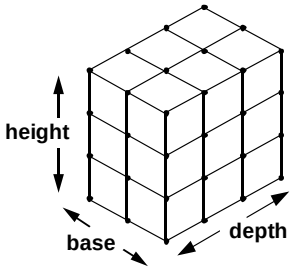
Isometric paper Master Sheet

Name: **Class:**

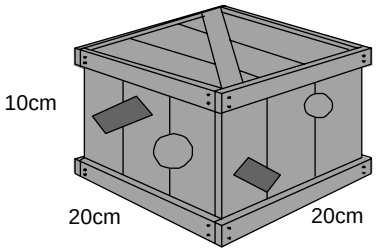
Finding the volume of an object:

Following on from **Task 20**, the volume of an object can be found using the following rule ...

Volume = base × height × depth



Example: **Calculate** the volume of this box.



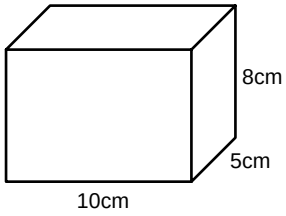
Volume = 20 × 10 × 20 = 4000cm^3

In the metric system, the most common units of volume are cubic millimetres, cubic centimetres and cubic metres. These volume units can be written as abbreviations ... **mm^3**, **cm^3** and **m^3**.

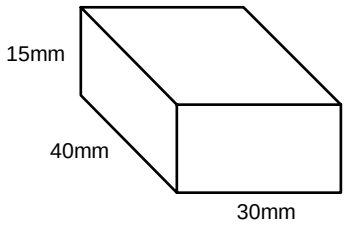
Task 21

Calculate the volume of these objects.

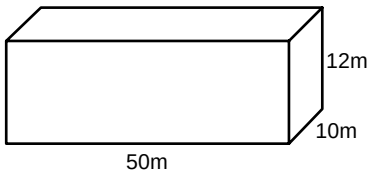
1.



2.

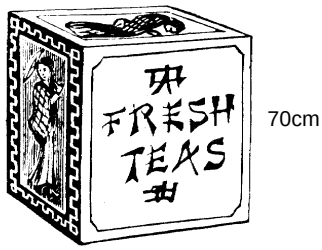


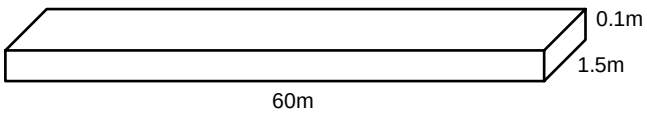
3.

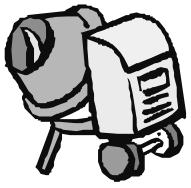


In the olden days, tea was shipped around the world in wooden boxes called tea chests.

4. **Calculate** the volume of this tea chest.

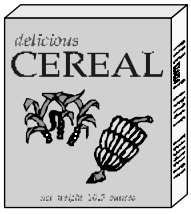






Mr Brown is making a new concrete path that is 60 metres long, 1.5 metres wide and 0.1 metres deep.

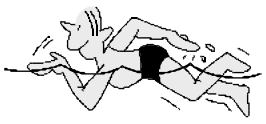
5. **Calculate** the volume of concrete he will need for this path.



A cereal box is 30cm high, 15cm wide and 7cm deep.

6. **Calculate** the volume of the cereal box.
7. How much cereal would be in this box when it is half full?

The dimensions of a swimming pool are shown in the diagram.
The swimming pool is to be filled with water, 10 centimetres from the top.



8. **Calculate** the volume of water needed to fill the pool.
9. If the pool fills at a rate of 20m^3 of water per hour, how long will it take to fill the pool with water?

Reading tables and charts:

One way to display information is in the form of a table or a chart.
A good table or chart presents the data clearly and is easy to read.
Example: A calendar is a simple, but effective chart.

Task 22

This table shows some of the standard measures used in cooking.
If you do not have metric measuring containers, cups, tablespoons, dessertspoons and teaspoons can be used.

Liquids	Sugar
1 cup = 250mL	2 cups = 500g
1 tablespoon = 15mL	1 cup = 250g
1 dessertspoon = 10mL	1 tablespoon = 15g
1 teaspoon = 5mL	1 dessertspoon = 10g
	1 teaspoon = 5g

1. How many tablespoons of milk would you need to add 60mL of milk to a recipe?
2. 1500 grams of sugar is the same as how many cups?
3. Five dessertspoons of water is the same as how many mL?
4. **Describe** how you could add 25g of sugar to a recipe using various sized spoons?

	E	D	C	B	A
A	4.1	0.9	2.3	1.2	
B	1.6	2.4	3.7		
C	2.9	3.4			
D	0.8				
E					

Measured in km

Shelley prepared a chart to shows the distances, measured in kilometres, between her house and those of her friends. The letters B to E represent her friend's houses. Shelley lives at house A.

5. If Shelley walks to house D, how far has she walked?
6. Which two houses are 3.4km apart?
7. How far is it from house B to house E?
8. **Calculate** the distance travelled from houses A to D, then D to C, then C to E, then E to B and then back to house A.

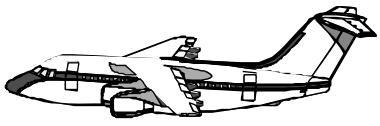
This table shows the results for four teams in a soccer competition, after each team has played 3 games. Teams score 4 points for a win, 1 point for a loss and 2 points for a draw.

Team	Won	Drawn	Lost
A	2	0	1
B	1	0	2
C	2	1	0
D	2	0	1

9. **Calculate** the points scored by Team A.
10. Which team has scored 6 points?
11. Which team is leading the competition? Explain your answer.

In the fourth game, Team A won against Team D and Teams B & C had a draw.

12. **Redraw** the table showing this information and **recalculate** the points each team now has.



Christchurch to Wellington				
Day	Depart	Arrive	Flight	Plane
Tues	0645	0740	CW01	JS31
Tues	0755	0850	CW02	JS31
Tues	1425	1310	CW07	JS50
Tues	1615	1700	CW09	JS50

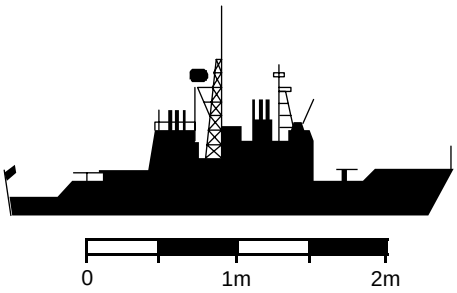
The table shows information about some flights between Christchurch and Wellington.

13. When does flight CW07 depart Christchurch?
14. When does flight CW09 arrive in Wellington?
15. How long is flight CW02?
16. How many different planes are on this service?
17. Which plane is the faster?
18. If a JS31 plane departed Christchurch at 1840, at what time would it arrive in Wellington?

19. **Collect** tables / charts from the newspaper or a magazine. **Create** questions from the information contained in the tables / charts and exchange with a classmate, for them to answer.

Understanding and using scale diagrams:

This is a **scale** diagram of a model battleship has been drawn using the scale below the diagram.



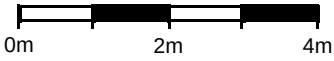
For this scale, 1cm on paper represents an actual length of 0.5m. If the diagram is 6cm long, what is the actual length of the model battleship? Answer: 3 metres

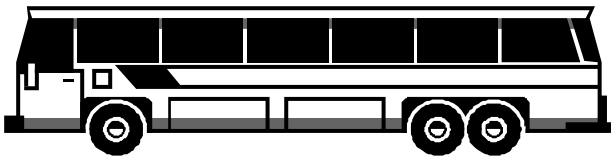
Similar scales are used for maps and plans, such as house plans.

Task 23

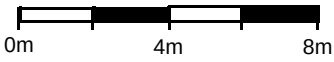
For each scale diagram, **use** the **scale** that has been given to calculate the actual length.

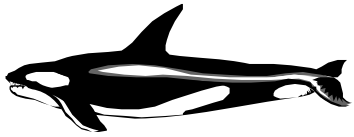
1. **Measure** the length of the bus in this diagram.
2. **Use** the **scale** below to work out the actual length.



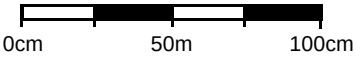


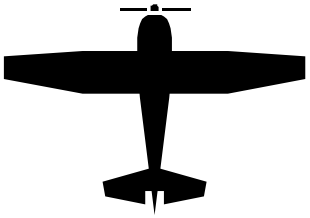
3. **Measure** the length of the killer whale in this diagram.
4. **Use** the **scale** to work out the actual length.





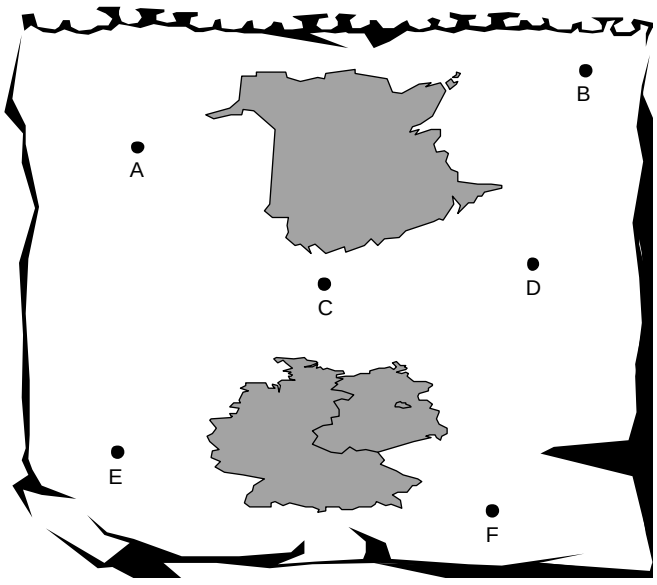
5. **Measure** the wing span of a model plane in this diagram.
6. **Use** the **scale** to work out the actual length.





7. **Measure** various objects in the classroom. Using an appropriate scale, draw scale diagrams of your objects.

This old map has been drawn using the scale below. The dots / letters represent towns.

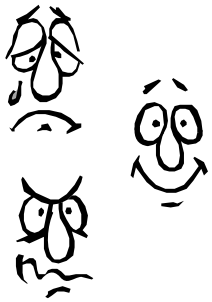


Measure, to the nearest millimetre, the shortest distances between these towns. **Convert** your measurements to actual distances using the scale above …

8. Town A and Town C.
9. Town B and Town F.
10. Town A and Town D.
11. Town C and Town E.
12. Town E and Town F.
13. Town B and Town E.

14. **Create** your own map, with a suitable scale. Exchange your map with a classmate and have her / him **work out** the **distances** between various points on your map.

Measuring qualitative data:



Collecting data, such as the number of pupils in your class is easy. But **collecting** and **measuring qualitative data**, such as attitudes, feelings, opinions, and behaviours on simple scales can be difficult.

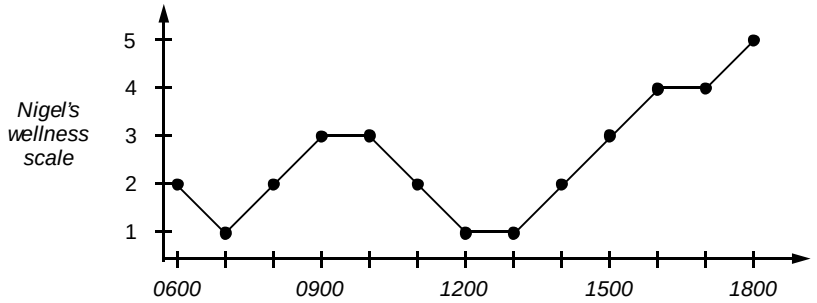
Example: On a school report, a rating for ***Effort*** is determined by the scale ....
Outstanding, Very satisfactory, Adequate, Inadequate.

What rating a pupils gets, is based on a teacher's opinion. What rating would you get?

Task 24

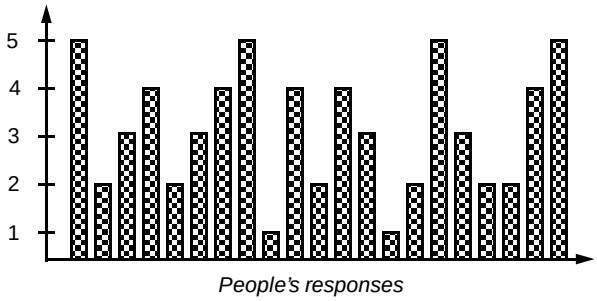
Nigel has not been feeling very well. He recorded how he was feeling using the scale below.

5 = Great
4 = Very well
3 = Quite well
2 = Ok
1 = Terrible



Study Nigel's graph.

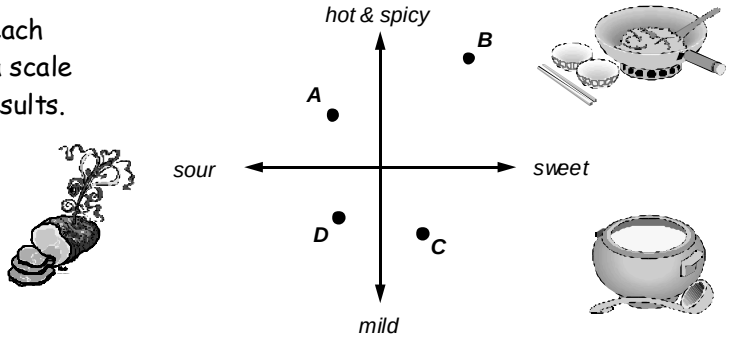
1. How was Nigel feeling at 0600?
2. Convert 1500 24hr time to a.m or p.m. time.
3. How was Nigel feeling at 5:00 p.m.?
4. At what times of the day was he feeling *'terrible'*?
5. What was the most common feeling that Nigel had?
6. At what times of the day was Nigel feeling *'very well'*?



Joanne surveyed people coming out of the movies. She asked each person, ... *"On a scale of 1 to 5, where 5 means excellent and 1 means disappointing, how would you rate this movie?"* She graphed her results.

7. How many people rate the movie a 5?
8. What rating did only two people choose?
9. Suggest possible words for the ratings 2, 3 and 4.
10. How many people did Joanne survey?

David was tasting various foods (A to D), rating each food on a scale from sour to sweet as well as on a scale from hot & spicy to mild. The graph shows his results.

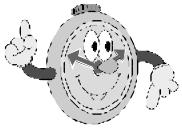


11. How would you describe food A?
12. Which was the mildest food?
13. How would you describe food D?
14. Which food was hot & spicy and sweet?

Think of an issue that is important to you. *Example:* 'Is it sensible to smoke cigarettes?'

15. **Create** a scale (1 to 5) that could be used to measure people's opinions on your issue.
Collect data from your classmates, using your scale.
16. **Create** other scales to record moods, feelings or attitudes.
Use your scale to **collect** more data from your classmates.

Understanding time units / Analogue & digital time:



Being able to tell the time and convert between time units is an important skill.

Example: Is 4:15 p.m. in the morning or afternoon?
Are there 150 seconds in $2\frac{1}{2}$ minutes?
If a TV programme starts at 2:15 p.m. and runs for 50 minutes, when will it end?

Answers: p.m. is in the afternoon, 150 seconds = $2\frac{1}{2}$ minutes and the programme would end at 3:05 p.m.

Discuss how you think we would get on if there was no way of telling the time.

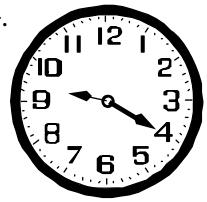
Task 25

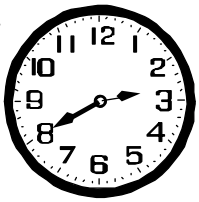
Time yourself as you answer these questions involving **basic time units** and replace the ◆ as you **convert between time units**.

1. How many seconds in 4 minutes?
2. How many minutes in 7 hours?
3. How many hours in $3\frac{1}{2}$ days?
4. How many days in 11 weeks?
5. How many weeks in $\frac{1}{2}$ a year?
6. How many days in a leap year?
7. 450 seconds = ◆ minutes
8. $9\frac{1}{2}$ minutes = ◆ seconds
9. 150 minutes = ◆ hours
10. 84 hours = ◆ days
11. $38\frac{1}{2}$ days = ◆ weeks
12. $9\frac{1}{2}$ weeks = ◆ days

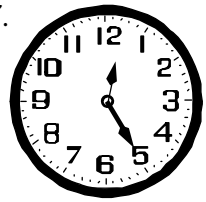
13. How long did it take you to answer the above questions?

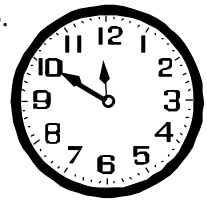
A clock with hands shows **analogue time**. When telling the time from an analogue clock we use expressions such as, *20 past 3* or *$\frac{1}{4}$ to 4*. What would you say, as you read the time on these clocks?

14. 

15. 

16. 

17. 

18. 

Draw clock faces to show these **analogue times**.

19. $\frac{1}{4}$ past 5
20. 10 to 7
21. 25 past 11
22. 5 to 2
23. 10 past 10

Some clocks do not have hands, but display the time as numbers. This is known as **digital time**.

Example: **02:15** means $\frac{1}{4}$ past 2 **05:40** means 20 to 6

24. **Write** the **analogue times** in questions 14 to 23 above as the time would appear on **digital clocks**.

Add and **subtract** these mixed time units. Give your answer in the time unit in the brackets.

25. 50 sec + 3 min = ◆ (sec)
26. 100 sec – $1\frac{1}{2}$ min = ◆ (sec)
27. 120sec + 4min = ◆ (min)
28. 3 min – 90 sec = ◆ (min)
29. 150 min + 4 hrs = ◆ (min)
30. 5hrs – 240min = ◆ (hrs)
31. $3\frac{1}{2}$ hrs + 270 min = ◆ (hrs)
32. 450 min – $2\frac{1}{4}$ hrs = ◆ (min)
33. 2 days + 15hrs = ◆ (hrs)
34. 48 hrs – $1\frac{1}{2}$ days = ◆ (hrs)
35. 36 hrs + $4\frac{1}{2}$ days = ◆ (days)
36. 6 days – 60hrs = ◆ (days)
37. 2 wks + 14 days = ◆ (wks)
38. 56 days – $3\frac{1}{2}$ wks = ◆ (days)
39. $24\frac{1}{2}$ days + 2 wks = ◆ (wks)

Converting between a.m. / p.m. and 24hr time:

To avoid confusion between time in the morning (a.m.) and time inthe afternoon (p.m.), time can be expressed as 24 hour time. Many electrical items use this format of time.

Example: To convert 3:45 p.m. to 24hr time, add 12. Therefore the time would be **1545**.

It may be written as 15:45 and you say the time is fifteen forty-five. The time 0000 is 12:00 a.m.

Any time expressed as a number greater than 12 indicates a p.m. time.

Task 26

Convert these a.m. and p.m. times to 24hr time.

1.	5:17 a.m.	2.	4:23 p.m.	3.	8:15 a.m.	4.	9:36 p.m.
5.	8:47 p.m.	6.	9:53 a.m	7.	10:32 p.m.	8.	3:41 a.m
9.	11:32 a.m	10.	1:17 a.m.	11.	2:57 p.m	12.	10:27 a.m.
13.	12:27 a.m.	14.	6:42 p.m.	15.	7:09 a.m.	16.	12:04 p.m.

Convert these 24hr times to a.m or p.m. time.

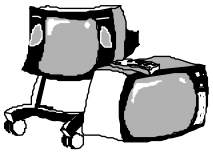
17.	0526	18.	1214	19.	0759	20.	2040
21.	2312	22.	0849	23.	2139	24.	1053
25.	1542	26.	1924	27.	0036	28.	0708
29.	0916	30.	1336	31.	0153	32.	2130

On Monday, John started a game of golf at 1320 and played for 3 hrs 50 min.

33. At what time did John finish playing golf? Give your answer in a.m. / p.m. time.

On Saturday, John started playing golf at 9:30 a.m. and finished playing at 1:10 p.m.

34. For how long did John play golf on Saturday?



Kate has a 3 hour video tape and would like to tape all three programmes on one tape. The starting and finishing times of the programmes are shown in this table.

	Start time	Finish time
Programme 1	9:30 a.m.	10:30 a.m.
Programme 2	2:15 p.m.	3:45 p.m.
Programme 3	11:20 p.m.	12:10 a.m.

35. How long is each programme?
36. Can Kate video all three programmes on one 3 hour tape?
37. **Convert** the start and finish time for each programme to 24hr time.

This timetable shows when buses depart from the city and arrive at the airport.

38. How long does the bus trip take?
39. **Complete** the last two arrival times, that would appear in the table.
40. **Redraw** this timetable showing all times as a.m. / p.m. time.

Depart	Arrive
0850	0925
0920	0955
1140	1215
1820	?
1950	?

41. During the school day you do lots of different activities, plus you do things after school.
Example: Maths, Science, English, Social Studies, playing sport, playtime, lunch break, homework etc.
Draw up your own **timetable** for a day, showing what you do and when you do it.

Measuring time:

To accurately measure time, a stop watch can be used, or an analogue watch with a minute sweep hand.

Example: If a stop watch showed these numbers, what time is it?

01:09:30$_{25}$ Answer: 1 hour, 9 minutes, 30.25 seconds.

Task 27

1. Working in small groups, think of an activity that can be timed using a stop watch.
   Example: The time taken to run a race.
   The time taken to complete a maths quiz.
   The time a paper dart stays afloat.
   The time taken to fill different sized containers.
   The time taken to walk to school. etc

2. Having decided on your activity, perform the activity and time how long it takes.
3. **Compare** your result with other classmates who performed the same activity.

Changes over time / calculating rates:

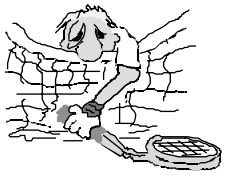
As time goes by, things change and they can change at various **rates**.

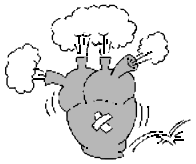
Example: A worker is paid $8.50 / hr, a plant grows at a rate of 7mm per day, the temperature dropped 3°C in 1 hour, water flows at 120 cubic metres per minute, etc.

Task 28

Sally works in a shop and earns $8.40 per hour.

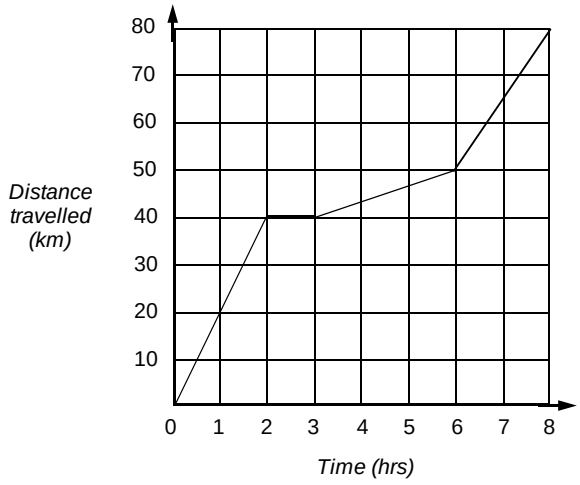
1. How much would she earn in 12 hours?
2. If Sally earned $42.00, how many hours did she work?





Richard's pulse rate averages 70 beats per minute.

3. How many times would Richard's heart beat in 1 hour?
4. How many times would his heart beat in 1 day?
5. **Measure** your own heart rate and **repeat** the two **calculations** above.



This distance / time graph shows the distance Jodie travelled on a bicycle ride during an eight hour trip.

6. During the first two hours, how far did she travel?
7. What was her average speed during this time? Answer in km /hr.
8. Why is the line horizontal during the 3rd hour?
9. What was her average speed for the next 3 hours?
10. How far did she travel in the last 2 hours?
11. What was Jodie's average speed for the 8 hour bicycle journey?

12. **Perform** a task that changes over time and can be repeated several times. **Graph** your results.
    Example: The temperature in the classroom , measured every 30 minutes. **Comment** on your results.

'In-class' Worksheet

Teaching Notes & Answers

How to use this section:
Teaching notes are enclosed in a box with a 'push-pin' at the top left corner. The teaching notes precede the answers for each worksheet / task. The teaching notes have been included to provide assistance and background information about each topic or unit of work.

Introduction:

The topic of Measurement is concerned with gaining an understanding of the importance of having standard units of measure for length, mass and capacity. This is achieved by first designing measuring devices and then by investigating the units used in the Metric System. The ability to estimate and measure accurately using various devices is an important skill. The concepts of perimeter / circumference, area and volume are explored through practical activities. The use of scales and scale diagrams for plans and maps are investigated, leading to the creating and displaying of qualitative data using scales and graphs. Analogue, digital and 24 hour time is also explored.

Worksheet 1

Measurement instruments:

In **Tasks 1, 2 & 3**, pupils are to design various measuring instruments to measure length, mass and capacity. The purpose of these tasks is to highlight the importance of having a **standard unit** of measure for length, mass and capacity. Without such a standard, comparisons between measurements are meaningless. These tasks provide pupils with an opportunity to investigate the many different measuring instruments that were used in 'olden' days in New Zealand and in other culturals.

No model answers are given for these tasks.

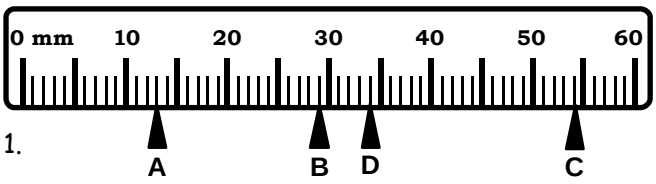
Worksheet 2

Reading scales:

In **Task 4**, pupils are to list the position of pointers on various diagrams of scales. Pupils are to state the units of measurement and the smallest division for each scale. A **'Marking Scales'** master sheet has been provided so that pupils can mark given points on various scales. The most important measurement instruments that pupils must be confident in using are rulers and protractors.

Task 4

1. units are millimetres, smallest division is 1mm, A = 52mm, B = 28mm, C 17mm, D = 9mm, E = 39mm
2. units are degrees, smallest division is 1°, A = 90°, B = 0° or 180°, C 60° or 120°, D = 35° or 145°, E = 15° or 165°, (note: there are two scales on a protractor, hence the two answers, except for 90°
3. units are metres, smallest 0.1m or 10cm, A = 5.4m, B = 2.5m, C 1.3m, D = 0.4m, E = 4.1m
4. units are kilometres / hour, smallest division is 10 km/hr, A = 30 km/hr, B = 90 km/hr, C = 65 km/hr
5. units are kilograms, smallest division 5kgs, A = 5kgs, B = 135kgs, C = 95kgs, D = 35kgs, E = 62.5kgs
6. units are centimetres, smallest division 0.2cm, A = 1.0cm, B = 5.8cm, C = 3.2cm, D = 10.2cm, E = 8.6cm
7. **Marking scales master sheet**



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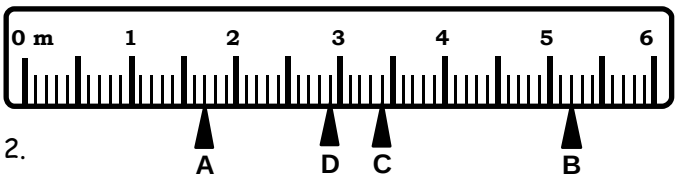

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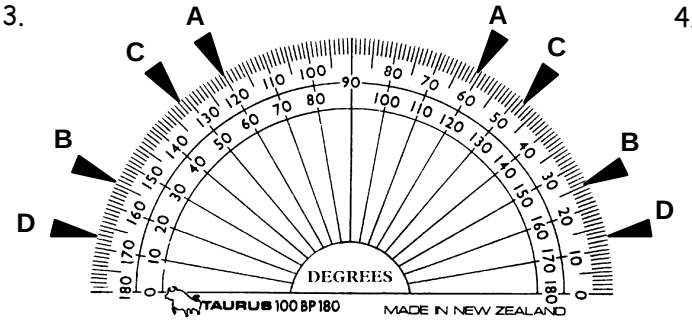

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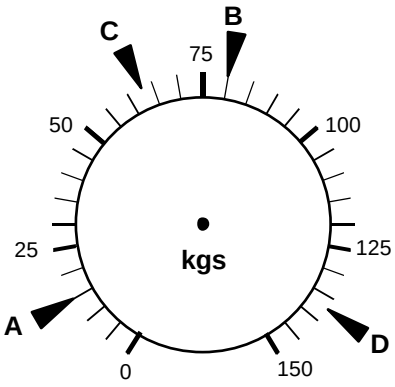

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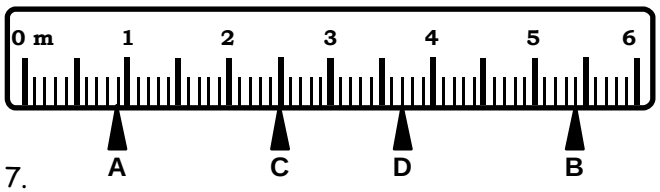

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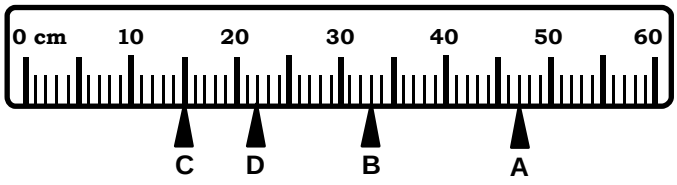

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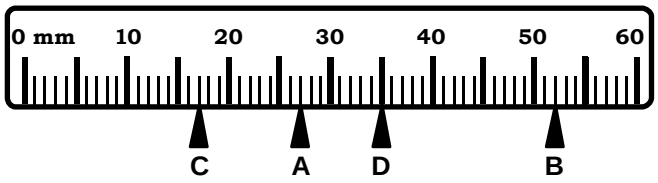


Worksheets 3 to 5

Accuracy of measurement:
Units / conversions associated with length:
Calculations involving mixed length units:

The accuracy of a measurement will depend on the smallest division of the scale on the measuring device and what is being measured.

Example: The distance between two towns is described as 25.5km. T0 say that the towns are 25.487km apart is too accurate and most probably unnecessary, therefore the distance could be given as 25.5km ± 0.5km.

In **Task 5**, pupils give the mimimum and maximum measurements, given the degree of accuracy or variation. The symbol '±' means 'plus or minus'. Pupils are to measure lines to the nearest millimetre ± 1mm.

In **Task 6**, pupils are to look at various measurement devices and to determine the degree of accuracy for each device.

In **Task 7**, pupils are to investigate the metric units for length, converting between various units.

In **Task 8**, pupils are to add and subtract metric length units; however, this can only be done when both units are the same. Therefore pupils are to convert some units before the calculations can be done. Word problems involving length units are also included.

Task 5

1. 22mm, 24mm 2. 56cm, 58cm 3. 1499m, 1501m 4. 233mm, 239mm 5. 84mL, 88mL
6. 71g, 77g 7. 558km, 562km 8. 27mg, 35mg 9. 5.5m, 5.7m 10. 9.2kg, 9.6kg
11. 124.45m, 124.55m 12. 8.90L, 9.00L 13. 4.653m, 4.663m 14. 1.355g, 1.405g
15. 2.217L, 2.517L 16. 1.092mg, 1.592mg 17. 132mm ± 1mm 18. 124mm ± 1mm 19. 100mm ± 1mm
20. 89mm ± 1mm 21. 33mm ± 1mm 22. 100mm ± 1mm 23. 46mm ± 1mm 24. 63mm ± 1mm
25. 51mm ± 1mm 26. 46mm ± 1mm

Task 7

1. mm or cm 2. m 3. km 4. m 5. cm or m 6. m 7. m or km 8. mm or cm 9. mm
10. m 11. - 12. 10mm 13. 1cm 14. 80mm 15. 2cm 16. 3cm 17. 5.5cm 18. 17.8cm

19. 25.4cm 20. 23mm 21. 97mm 22. 123mm 23. 348mm 24. 25.3cm 25. 156mm
26. 253.4cm 27. 587mm 28. 1000mm 29. 100cm 30. 400cm 31. 6000mm 32. 1.5m
33. 2.65m 34. 9.85m 35. 5.62m 36. 1.5m 37. 6.523m 38. 7.854m 39. 6.72m
40. 3650mm 41. 567cm 42. 4630mm 43. 984cm 44. 1000m 45. 1km 46. 1900m
47. 2.7km 48. 3250m 49. 9.65km 50. 9740m 51. 4.2km 52. 56300m 53. 5.684km
54. 5630m 55. 9.68km 56. 235m 57. 0.985km 58. 562m 59. 0.862km

Task 8

1. 4.5 + 6.3 = 10.8cm 2. 78 - 54 = 24mm 3. 2.8 + 1.75 = 4.55m 4. 5.2 - 2.47 = 2.73km
5. 1.2 + 3.75 = 4.95m 6. 8.6 - 5.9 = 2.7cm 7. 5.79 + 4.35 = 10.14m 8. 8.65 - 4.9 = 3.75km
9. 5.6 + 2.57 = 8.17m 10. 865 - 53 = 812mm 11. 9200 + 1645 = 10845m 12. 96 - 35 = 61cm
13. 685 + 8400 = 9085m 14. 12.5 - 9.4 = 3.1cm 15. 3250 + 1865 = 5115mm
16. 120 bricks per layer 17. 720 bricks 18. $288 19. 4.7m of material 20. $70.03
21. 2400m or 2.4km 22. 5 laps 23. 41 laps 24. 32800m or 32.8km
25. 4 × 1.2 = 4.8m, 0.85 × 2 = 1.7m, Total = 6.5m of wood 26. $27.30

Worksheets 6 & 7

Units / conversions associated with mass (weight):
Calculations involving mixed mass units:

In **Task 9**, pupils are to investigate the metric units for mass (weight), converting between various units.

In **Task 10**, pupils are to add and subtract metric mass units. However this can only be done when both units are the same. Therefore pupils are to convert some units before the calculations can be completed. Word problems involving mass units are also included.

Task 9

1. t 2. mg 3. kg 4. t 5. kg 6. g 7. g 8. g 9. kg or t 10. mg or g 11. -
12. 1000mg 13. 1g 14. 5000mg 15. 4g 16. 9500mg 17. 6.4g 18. 1780mg 19. 2540mg
20. 1.5g 21. 9700mg 22. 2.455g 23. 35600mg 24. 0.755g 25. 0.865g 26. 534mg
27. 752mg 28. 1000g 29. 1kg 30. 4000g 31. 2.5kg 32. 2700g 33. 5.6kg 34. 9850g
35. 5875g 36. 1.5kg 37. 3250g 38. 7340g 39. 6.72kg 40. 3560g 41. 6.25kg
42. 565g 43. 0.856kg 44. 1000kg 45. 1t 46. 1900kg 47. 3.2t 48. 4250kg 49. 6.45t
50. 9740kg 51. 6.53t 52. 2.575t 53. 6350kg 54. 8.624t 55. 9655kg 56. 325kg
57. 0.895t 58. 542kg 59. 0.732t

Task 10

1. 5300 + 1200 = 6500mg 2. 7.8 - 5.4 = 2.4kg 3. 5.3 + 2.54 = 7.84t 4. 7200 - 5600 = 1600g
5. 1700 + 6250 = 7950kg 6. 2.53 - 1.7 = 0.83g 7. 6.85 + 7.62 = 14.47g 8. 7.535 - 6.3 = 1.235t
9. 8.3 + 7.624 = 15.924kg 10. 8652 - 3850 = 4802mg 11. 8700 + 1649 = 10349kg
12. 7.45 - 5.6 = 1.85t 13. 0.864 + 4.3 = 5.164t 14. 6320 - 3400 = 2920mg 15. 6.25 + 2.365 = 8.615g
16. 7kgs 17. 200 packs 18. 1.8t 19. $750 20. 200 buns 21. 4804kg 22. 5 loads
23. 2.4kg of butter, 1.8kg of sugar 24. 25 batches 25. 40 batches.

Worksheets 8 & 9

Units / conversions associated with capacity (volume):
Calculations involving mixed capacity units:

In **Task 11**, pupils are to investigate the metric units for capacity (volume), converting between various units.

In **Task 10**, pupils are to add and subtract metric capacity units. However this can only be done when both units are the same. Therefore pupils are to convert some units before the calculations can be completed. Word problems involving capacity units are also included.

Task 11

1. mL 2. L 3. L 4. mL or L 5. mL 6. mL 7. L 8. L 9. kL 10. L 11. -
12. 1000mL 13. 1L 14. 7000mL 15. 3L 16. 7500mL 17. 5.9L 18. 1680mL 19. 2640mL
20. 1.4L 21. 8700mL 22. 3.155L 23. 16600mL 24. 0.685L 25. 0.775L 26. 134mL
27. 952mL 28. 1000L 29. 1kL 30. 4000L 31. 2kL 32. 4700L 33. 7.6kL 34. 8850L
35. 6845L 36. 1.8kL 37. 4150L 38. 6340L 39. 6.72kL 40. 2960L 41. 7.15kL
42. 465L 43. 0.756kL 44. 4505mL 45. 9.685kL 46. 4.625L 47. 856L 48. 0.865L
49. 6450L 50. 8742mL 51. 6.53L 52. 3.254kL 53. 4350mL 54. 3.495L 55. 9655L
56. 625mL 57. 0.875L 58. 642L 59. 0.732kL

Task 12

1. 4700 + 1500 = 6200mL 2. 9.8 - 6.3 = 3.5kL 3. 5.4 + 2.24 = 7.64L 4. 9200 - 6400 = 2800L
5. 1600 + 5850 = 7450L 6. 2.73 - 1.9 = 0.83L 7. 4.85 + 6.42 = 11.27L 8. 7.195 - 5.3 = 1.895kL
9. 8100 + 6824 = 14924mL 10. 9252 - 6850 = 2402mL 11. 8700 + 1549 = 10249L
12. 6.95 - 6.6 = 0.35L 13. 0.856 + 6.2 = 7.056kL 14. 6120 - 4400 = 1720mL
15. 6.45 + 2.765 = 9.215L 16. 5800mL 17. 30 pots 18. 25 hours 19. 0.095kL 20. 34L of paint
21. 4 × $15.50 = $62.00, 2 × $89.95 = $179.90, 3 × $64.95 = $194.85, Total = $436.75 22. 0.56L
23. 12.5 days 24. 50 days

Worksheet 10

Estimating and measuring with accuracy:

In **Task 13**, pupils are to use different measuring instruments to measure a selection of objects or conduct a measurement activity. Either the pupils or the teacher are to decide on the activities.

Example: The distance between two trees, the weight of a brick, the volume of a jar, etc.

The measuring instruments could include rulers, a dress maker's tape measure, a builder's tape measure, a 50m measuring tape, bathroom and kitchen scales, old fashioned balance scales, various sized metric 'spoons', a measuring cylinder, baking utensils with scales, etc.

Pupils are to record an **estimated** length, weight or volume for each object or activity before completing the task by accurately performing the measurement task.

Worksheets 11 to 13

Finding the perimeter of a shape:
Word problems involving perimeter:
Finding the circumference of a circle:

In **Task 14**, pupils are to find the perimeter of various shapes, either by adding the sides given on a shape or by measuring the sides of a shape so that the perimeter can be calculated. A good way to describe perimeter is to imagine you are going to walk along the sides of a shape, until you are back where you started. The distance travelled would be the perimeter.

In **Task 15**, pupils are to find the perimeter of various items within the classroom or outside.
Example: The perimeter of a desk top or of a tennis / basketball / netball court. This task will involve measuring, but pupils could use their hands or feet as 'measuring, instruments, if ruler and tape measures are not available.

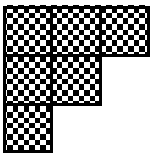
In **Task 16**, pupils are to answer word problems of practical situations that involve finding the perimeter of various shapes.

In **Task 17**, pupils are introduced to the circumference of a circle, an alternative name for perimeter. By using string and a ruler, pupils are to attempt to find the relationship between the length of the circumference of a circle and the diameter of the same circle. From this, pupils are to come up with a rule, C = approx. 3 × d, which can be used to find the circumference of a circle, given the diameter. If appropriate for your class, the concept of **'pi'** could be introduced.

Task 14

1. 14cm 2. 74mm 3. 9.4cm 4. 60.7mm 5. 25cm 6. 68mm 7. 75mm 8. 8.82cm
9. AB = 50mm, BC = 23mm, CD = 33cm, DE = 23cm, EF = 17cm, FA = 46cm: P = 192mm
10. AB = 44mm, BC = 26mm, CD = 22mm, DE = 51mm, EF = 51mm, FG = 22mm, GA = 26mm: P = 242mm

Task 16

1. 1600m 2. 1.6km 3. 3200m or 3.2km 4. 3 laps 5. 190m 6. $2850 7. 5m 8. 130cm
9. 33 cents 10. 8.8m 11. $9.50 12. 200cm or 2m 13. 50 cents 14. 20cm
15.  16. 

Task 17

3. Circumference = 3.1 × d 4. 62cm 5. 139.5mm 6. 5.89cm 7. 45.26m

Worksheets 14 & 15

'If you can paint it, it has area':
Word problems involving area:

In **Task 18**, pupils are introduced to area by way of an estimation activity. Area is defined as the amount of surface a shape takes up and the saying 'If you can paint it, it has area' is a good way to think of area. Having established a rule for finding the area of squares and rectangles, pupils are to calculate areas without having to count squares.

In **Task 19**, pupils are to answer practical problems associated with area.

Task 18

1. 24 squares 2. 23 squares 3. 23 squares 4. 16 squares 5. 24 sq units 6. 20 sq units
7. 22 sq units 8. Area = base × height 9. 3.72 cm^2 10. 275 mm^2 11. 225 m^2 12. 7.74 cm^2
13. AB = 15mm, BC = 60mm: A = 900mm^2 14. EF = 18mm, 55mm: A = 990mm^2 15. 4cm 16. 9mm

Task 19

1. 5500m^2 2. 4800cm^2 3. 180m^2 4. 12 litres 5. $194.85 6. 0.8m by 1.2m 7. 0.96m^2
8. 5.76m^2 9. $112.32 10. 1.6$m^2$ 11. 14.4 metres 12. $180 13. 30$m^2$ 14. Room B 15. 15m^2
16. 12m^2 17. 81m^2 18. $8829 19. 15$m^2$ 20 $375

Worksheets 15 & 16

'If you can fill it, it has volume':
Finding the volume of an object:

In **Task 20**, pupils are introduced to volume by way of counting the number of cubes in a pile.
Volume can be described as the amount of space a 3D object takes up, or the amount of liquid a 3D object will hold. In the previous task, area of a square or rectangle is defined as ... **A = bh**. If a 2D shape is extended in a third dimension, called depth, the volume of such a 3D object is defined as ... **V = bhd**.
In this task, pupils are to calculate the volume of an object, given the cross-sectional area of the end, and the depth.

In **Task 21**, pupils are to use the rule ... **Volume = base × height × depth**, to calculate the volume of simple 3D objects. Practical problems involving volume are also included.

Task 20

1. 11 cubes 2. 11 cubes 3. 18 cubes 4. 19 cubes 9. 6 sq units 10. $60cm^3$ 11. $90m^3$
12. $22.5cm^3$ 13. $10m^3$

Task 21

1. $400cm^3$ 2. $18000mm^3$ 3. $6000m^3$ 4. $140000cm^3$ 5. $9m^3$ 6. $3150cm^3$ 7. $1575cm^3$
8. $225m^3$ 9. 11.25 hours

Worksheet 18

Reading tables and charts:

In **Task 22**, pupils are to study information that has been presented in a table or a chart. An effective table or chart should display data in a clear and 'easy-to-read' way. Pupils are to collect tables and charts from the newspaper and make up questions relating to the information contained within the table or chart.

Task 22

1. 4 tablespoons 2. 6 cups 3. 50mL 4. 1 tablespoon & 1 dessertspoon 5. 0.9km 6. C & D
7. 1.6km 8. 10km 9. 9 points 10. Team B 11. Team C, as it has the most points, that is 10 points
12. Team A = 13pts, Team B = 8 pts, Team C = 12 pts, Team D = 10 pts

Team	Won	Drawn	Lost
A	3	0	1
B	1	1	2
C	2	2	0
D	2	0	2

13. 1425 or 2:25 p.m. 14. 1700 or 5:00 p.m. 15. 55 minutes
16 two planes 17. JS50 18. 1935 or 7:35 p.m.

Worksheet 19

Understanding and using scale diagrams:

In **Task 23**, pupils are to study scale diagrams. By measuring parts of the diagram and using the scale provided, the measured length can be converted to the actual length. Pupils are to create their own maps, with a scale, and exchange the maps with classmates so that he / she can work out distances between features on the map.

Task 23

1. 80mm 2. 8m 3. 45mm 4. 9m 5. 40mm 6. 100cm 7. - 8. 30mm, 7.5km
9. 60mm, 15km 10. 55mm, 13.75km 11. 35mm, 8.75km 12. 50mm, 12.5km 13. 80mm, 20km

Worksheet 20

Measuring qualitative data:

In **Task 24**, pupils are to study graphs of qualitative data. Any data that refers to people's opinions, feelings, moods and behaviour etc, is know as **qualitative data**. Qualitative data is not that easy to graph and relies on a simple scale being created. Pupils are to create their own simple scales so that they can collect qualitative data about issues that are important to them.

Task 24

1. ok 2. 3:00 p.m. 3. very well 4. 0700, 1200, 1300 5. ok 6. 1600 & 1700 7. 4 people
8. disappointing 9. 2 = ok, 3 = good, 4 = great 10. 21 people 11. sour and hot & spicy 12. Food C
13. sour and mild 14. Food B

Worksheets 21 to 23

Understanding time units / Analogue & digital time:
Converting between a.m / p.m. and 24hr time:
Measuring time:
Changes over time / calculating rates:

In **Task 25**, pupils are to revise the basic time units and convert between different time units. The ability to tell the time is an important skill, and pupils are to read and display time in analogue and digital form. This task is completed by pupils adding and subtracting mixed time units.

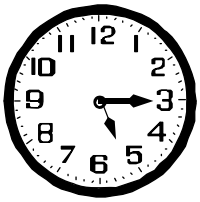
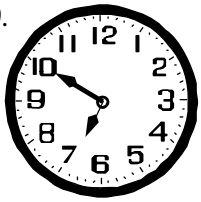
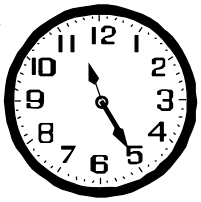
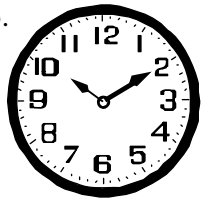
In **Task 26**, pupils are to convert between a.m. / p.m. time and 24hr time and attempt questions associated with time. A series of word problems are also included.

In **Task 27**, pupils are to attempt an activity that can be timed using a stop watch or swipe hand of an analogue watch.

In **Task 28**, pupils are to study graphs that have time on one axis Pupils are to attempt activities whereby something changes with time, such as temperature, growth of a plant etc. From the information collected, a graph is to be drawn.

Task 25

1. 240 sec 2. 420 min 3. 84 hrs 4. 77 days 5. 26 wks 6. 366 days 7. 7.5 min
8. 570 sec 9. 2.5 hrs 10. 12 days 11. 5.5 wks 12. 66.5 days 13. - 14. 20 past 9
15. 20 to 3 16. 5 to 2 17. 25 past 12 18. 10 to 12

19. 
20. 
21. 
22. 
23. 

24. 09:20, 02:40, 01:55, 12:25, 11:50, 05:15, 06:50, 11:25, 01:55, 10:10 25. 50 + 180 = 230 sec
26. 100 - 90 = 10 sec 27. 2 + 4 = 6 min 28. 180 - 90 = 90 min 29. $3 - 1\frac{1}{2} = 1\frac{1}{2}$ min
30. 5 - 4 = 1 hr 31. 3.5 + 4.5 = 8 hrs 32. 450 - 135 = 315 min 33. 48 + 15 = 63 hrs
34. 48 - 36 = 12 hrs 35. 1.5 + 4.5 = 6 days 36. 6 - 2.5 = 3.5 days 37. 2 + 2 = 4 wks
38. 56 - 24.5 = 31.5 days 39. 5.5 wks

Task 26

1. 05:17 2. 16:23 3. 08:15 4. 21:36 5. 20:47 6. 09:53 7. 22:32 8. 03:41 9. 11:32
10. 01:17 11. 14:57 12. 10:27 13. 00:27 14. 18:42 15. 07:09 16. 12:04 17. 5:26 a.m.
18. 12:14 p.m. 19. 7:59 a.m. 20. 8:40 p.m. 21. 11:12 p.m. 22. 8:49 a.m. 23. 9:39 p.m.
24. 10:53 a.m. 25. 3:42 p.m. 26. 7:24 p.m. 27. 12:36 a.m. 28. 7:08 a.m. 29. 9:16 a.m.
30. 1:36 p.m. 31. 1:53 a.m. 32. 9:30 p.m. 33. 5:10 p.m. 34. 3 hrs 40 min
35. 60 min, 90 min, 50 min 36. no, as the total time for the 3 programmes was 200 min
37. 09:30 - 10:30, 14:15 - 15:45, 23:20 - 00:10 38. 35 min 39. 18:55, 20:25
40.

Depart	Arrive
8:50 a.m.	9:25 a.m.
9:20 a.m.	9:55 a.m.
11:40 a.m.	12:15 p.m.
6:20 p.m.	6:55 p.m.
7:50 p.m.	8:25 p.m.

Task 28

1. $100.80 2. 5 hrs 3. 4200 times 4. 100800 times
5. - 6. 40 km 7. 20 km/hr 8. She did not ride during that hour 9. 3.33 km/hr 10. 30 km 11. 10 km/hr

Table of Contents for the Homework / Assessment Worksheet Masters for Measurement, Level 4

Measurement

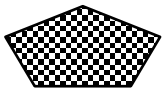
L4MM

M1

Homework / Assessment Worksheet

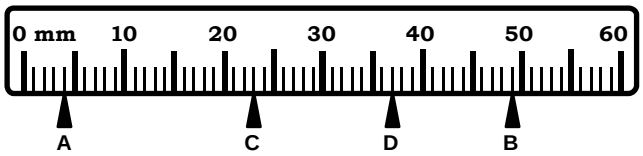
Name: **Class:** **Complete by:**

A: 10 'Quick Questions'

1. $28 \div 4 \times 3 - 10$ = ...
2. Convert 2535mL to L
   .....
3. Change 23:55 in 24hr time to a.m or p.m. time
   .....
4. Calculate $\sqrt{196}$ = ...
5. Name this shape 
   .....
6. Find 10% of $48.70
   .....
7. Estimate 198.4 ÷ 24.9 by rounding first
   ..... ÷ ..... = ...
8. List the first 5 multiples of 13 .....
9. 7.25 × 0.8 = ...
10. Solve the equation
    $9y + 21 = 48$
    y = ...

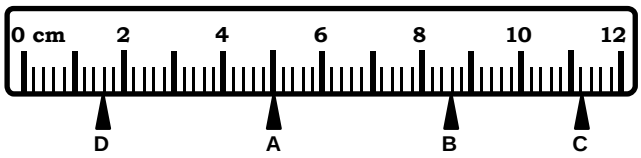
B: Reading scales

For each diagram ... **state** the **unit** of measurement,
state what each **division** on the scale represents,
state the **measurements** indicated by the pointers.



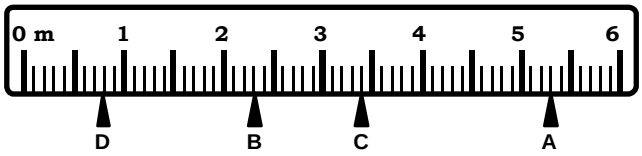
Pointers
A = ...
B = ...
C = ...
D = ...

1. unit = ... 1 division = ...



Pointers
A = ...
B = ...
C = ...
D = ...

2. unit = ... 1 division = ...



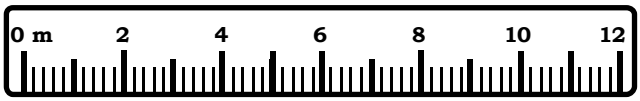
Pointers
A = ...
B = ...
C = ...
D = ...

3. unit = ... 1 division = ...

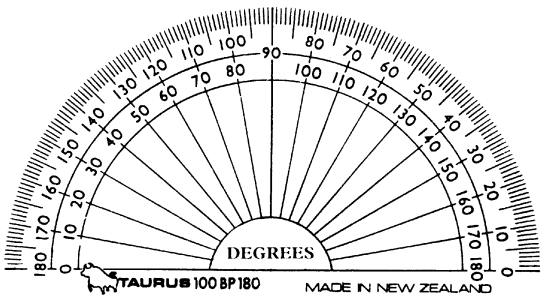
C: Marking points on a scale

Mark the following points on these scales.

1. A = 2.6m, B = 4.2m, C = 7.8m, D = 11.4m



2. A = 40°, B = 65°, C = 165°, D = 105°



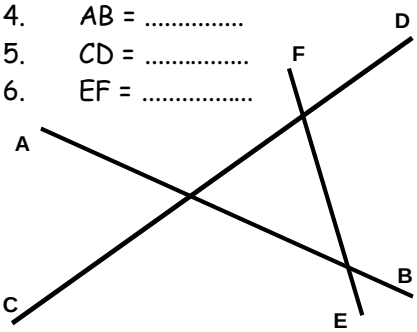
D: Accuracy of measurement

State the **minimum** and **maximum** measurements.

1. 25cm ± 2cm
   ....
2. 425mm ± 13mm
   ....
3. 1.254g ± 0.015g
   ....

Measure the length of these lines, to the nearest mm.

4. AB = ...
5. CD = ...
6. EF = ...



Comments: .....
.....
.....

Please sign:
Parent / Caregiver

AWS

Measurement

L4MM

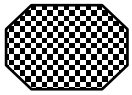
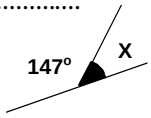
M1

Homework / Assessment Worksheet

2

Name: **Class:** **Complete by:**

A: 10 'Quick Questions'

1. 36 – 6 × 4 + 9 = ...
2. Convert 6524mg to g
   .....
3. Convert 8:17 p.m. to 24hr time .....
4. What would 9 books at $5.95 each cost?
   .....
5. Name this shape 
   .....
6. Find 20% of $48.70
   .....
7. Calculate ∠X 

   X = ...
8. List the factors of 18
   .....
9. 9.43 × 0.5 = ...
10. Solve the equation
    7y – 13 = 22
    y = ...

B: Metric conversions

Fill in the **missing number** or **unit** for these conversions.

1.	3cm = ... mm	2.	15mm = 1.5 .....
3.	2650mg = 2.65	4.	6.5kg = ... g
5.	7.8L = ... mL	6.	8754m = 8.754 .....
7.	895cm = 8.95	8.	763mL = ... L
9.	8.2t = ... kg	10.	6.3m = 6300 .....
11.	3585L = 3.585	12.	4272m = 4.272 .....

C: Adding and subtracting mixed units

Answer in the unit indicated in the brackets. Both measurement units must be the same unit before adding or subtracting.

1.	2.5m + 624cm = ◆ (cm) ..... + ... = ...	2.	3500mL – 2.9L = ◆ (L) ..... – ..... = ...
3.	5.6kg – 4250g = ◆ (g) ..... – ..... = ...	4.	89mm + 5.9cm = ◆ (mm) ..... + ... = ...
5.	5200L + 8.3kL = ◆ (kL) ..... + ... = ...	6.	4560mg – 2.75g = ◆ (g) ..... – ..... = ...
7.	8.5m – 624cm = ◆ (cm) ..... – ..... = ...	8.	2.5km + 6240m = ◆ (km) ..... + ... = ...

D: Word problems

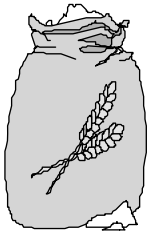
David is building a shelving unit that has 8 wooden shelves all 135cm long.

1. **Calculate** the total length of wood required. Give your answer in metres.
   .....

Jodie has a collection of several different shaped bottles.

2. If the capacity of five bottles was 9000mL, 4.5L, 1.5L, 330mL and 2000mL, **calculate** the total volume of these bottles. Give your answer in litres.
   .....

A bakery buys flour in 50kg sacks.



3. **Calculate** the weight of flour a bakery goes through if it buys 40 sacks of flour in six months. Answer in tonnes. .....
4. If a 50kg sack costs $30.00, how much has the bakery spent on flour? .....
5. If a small bread bun uses 400g of flour, how many small buns can be made from a 50kg sack of flour? .....

Jim runs laps around a local park each morning. The distance of each lap is 1200m.

6. How many metres would Jim run, if he ran 3 laps? Give your answer in kilometres.
   .....
7. How many laps will he need to run to complete a distance of 6km? .....

Comments: .....

Please sign:
Parent / Caregiver

.....

.....

AWS

Measurement

L4MM

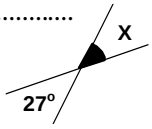
M1 / M2

Homework / Assessment Worksheet

3

Name: **Class:** **Complete by:**

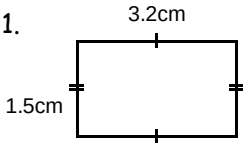
A: 10 'Quick Questions'

1. 29 – 5 × 4 + 11 = ...
2. Convert 7.525kL to L
   .....
3. Convert 7:49 a.m. to 24hr time .....
4. What would 11 books at $6.35 each cost?
   .....
5. Name this shape 
   .....
6. Find $\frac{1}{4}$ of $48.76
   .....
7. Calculate ∠X 

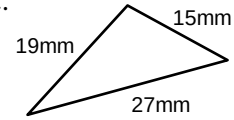
   X = ...
8. List the factors of 15
   .....
9. 8.64 × 0.5 = ...
10. Solve the equation
    4(y – 4) = 20
    y = ...

B: Finding the perimeter

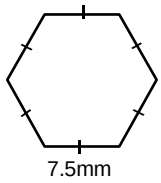
Calculate the perimeter of these shapes.

1. 

   .....

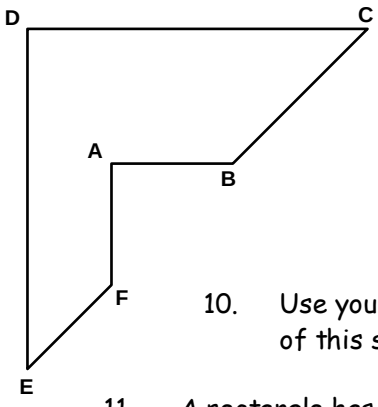
2. 

   .....

3. 

   .....

Measure the sides of this shape below, to the nearest millimetre.



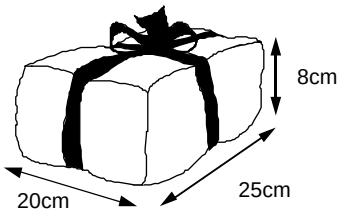
4. AB = ... mm
5. BC = ... mm
6. CD = ... mm
7. DE = ... mm
8. EF = ... mm
9. FA = ... mm
10. Use your answers to **calculate** the perimeter of this shape. .....
11. A rectangle has a perimeter of 36 cm. If one side is 11cm long, how long is the other side? .....

C: Word problems

A local park has sides of 450m, 530m, 460m and 660m.

1. **Calculate** the perimeter of the park. Answer in metres .....
2. **Convert** your answer above to km. .....
3. How far is 5 laps around this park? .....
4. If Jim ran 12.6km altogether, how many laps did he run? .....

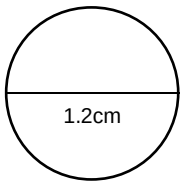
Miri is going to tie a ribbon around this parcel.
The dimensions of the parcel are shown in the diagram.



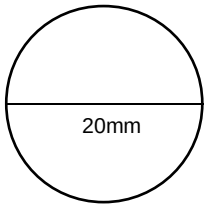
5. **Calculate** the length of ribbon that is needed to go around the parcel, then add 60cm to allow for a bow to be tied.
   .....

D: Finding the circumference

The **circumference** of a circle can be worked out using the rule ... **C = 3.1× d**

1. 

   C = ...

2. 

   C = ...

The diameter of a tin lid is 15cm.

3. **Calculate** the circumference of the tin lid. .....

The diameter of a plate is 25cm.

4. **Calculate** the circumference of the plate. .....

The diameter of a saucer is 160mm.

5. **Calculate** the circumference of the saucer. .....

Comments: .....
.....
.....

Please sign:
Parent / Caregiver

AWS

Measurement

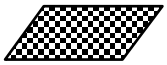
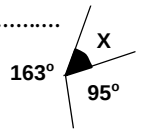
L4MM

M2

Homework / Assessment Worksheet

Name: **Class:** **Complete by:**

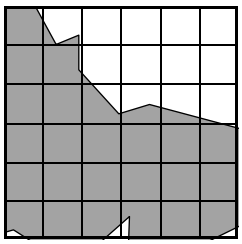
A: 10 'Quick Questions'

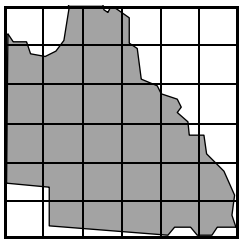
1. 30 – 28 ÷ 4 + 5 = ...
2. Convert 5625kg to tonnes .....
3. Convert 2315 to a.m. / p. m. time .....
4. What would 8 books at $12.15 each cost? .....
5. Name this shape  .....
6. Find $\frac{3}{4}$ of $48.80 .....
7. Calculate ∠X 

X = ...
8. List the first 5 multiples of 15 .....
9. 10.64 ÷ 0.2 = ...
10. Solve the equation
5(y + 3) = 60
y = ...

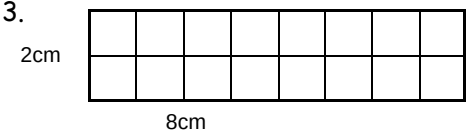
B: Finding the area

Estimate the area of the shaded shapes.

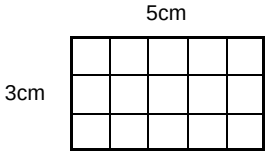
1.  .....

2.  .....

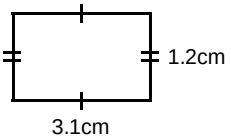
Calculate the area of these shapes below. Remember to include the name of the unit in your answers.

3. 

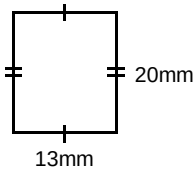
.....

4. 

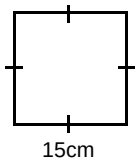
.....

5. 

.....

6. 

.....

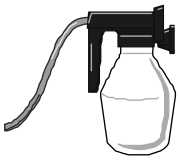
7. 

.....

C: Word problems

A rugby field measures 110m long and 50m wide.

1. **Calculate** the total playing area. .....



A fence that is 60m long and 1.8m high is to be spray painted with two coats of paint.

2. **Calculate** the total area that is to be painted. Give your answer in m^2. .....
3. If 1 litre of paint covers 12m^2 of the fence, how many litres of paint will be needed? .....

This diagram is of a small holiday house, which has two rooms and a deck.

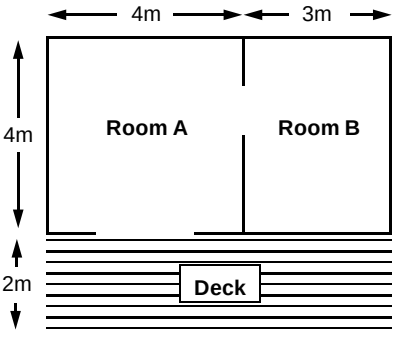
4. **Calculate** the area of Room A. .....
5. **Calculate** the area of Room B. .....

Both rooms are to have new carpet laid at a cost of $65 / m^2.

6. **Calculate** the cost of the carpet. .....
7. **Calculate** the area of the deck. .....

The deck is made up of 15 lengths of wood, each 8 metres long.

8. If each strip of wood costs $2.25 / metre, what is the total cost of the wood in the deck? .....



Comments: .....

.....

.....

Please sign:
Parent / Caregiver

.....

AWS

Measurement

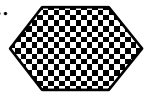
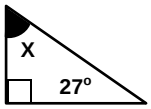
M2

Homework / Assessment Worksheet

5

Name: **Class:** **Complete by:**

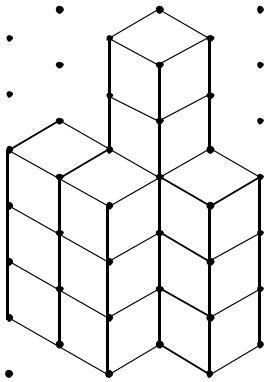
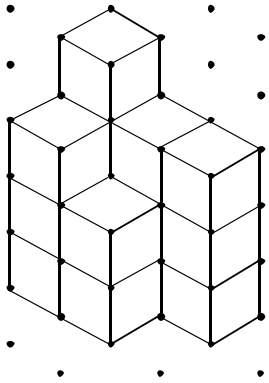
A: 10 'Quick Questions'

1. 31 – 7 × 4 + 14 = ...
2. Convert 6.585L to mL
   .....
3. Convert 3:45 p.m. to 24hr time .....
4. What would 11 books at $6.35 each cost?
   .....
5. Name this shape 
   .....
6. Find 50% of $52.50
   .....
7. Calculate ∠X 

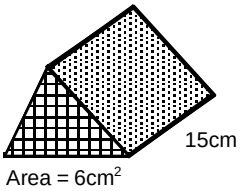
   X = ...
8. List the factors of 21
   .....
9. 12.68 × 0.5 = ...
10. Solve the equation
    6(y + 5) = 48
    y = ...

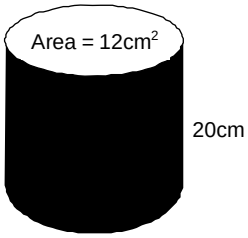
B: Finding the volume

Count the cubes to work out the volume of each pile.

1. 
   .....
2. 
   .....

Calculate the volume of these objects, given the area of the cross section.

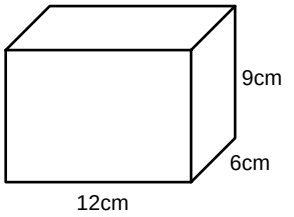
3. 

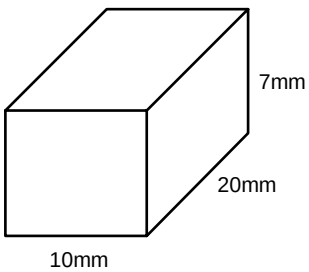
   .....
4. 

   .....

C: Volume calculations

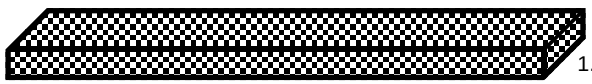
Calculate the volume of these objects.

1. 

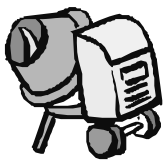
   .....
2. 

   .....

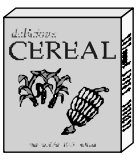
D: Word problems



Mr Brown is making a new concrete path that is 50 metres long, 1.2 metres wide and 0.1 metres deep.



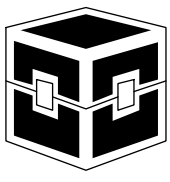
1. **Calculate** the volume of concrete he will need for this path. .....



A cereal box is 30cm high, 20cm wide and 8cm deep.

2. **Calculate** the volume of the cereal box.
   .....
3. How much cereal would be in this box when it is only a quarter full? .....

4. **Calculate** the volume of a cube that has sides of 8cm. .....
5. **Calculate** the volume of a cube that has sides of 20 mm. .....
6. If a cube has a volume of 1000cm^3, how long are the sides? .....



Comments: .....

Please sign:
Parent / Caregiver

.....

.....

AWS

Measurement

M3

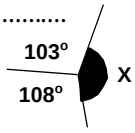
Homework / Assessment Worksheet

6

Name: **Class:** **Complete by:**

A: 10 'Quick Questions'

1. 28 – 7 × 3 + 9 = ...
2. Convert 56.2cm to mm .....
3. Convert 0036 to a.m. / p. m. time .....
4. What would 11 books at $14.95 each cost? .....
5. Name this shape .....
6. Find 75% of $96.00 .....
7. Calculate ∠X



X = ...
8. List the first 5 multiples of 20 .....
9. 13.76 ÷ 0.2 = ...
10. Solve the equation 1.2y = 60

y = ...

B: Reading tables & charts

This table shows the results for four teams in a netball competition.
Points are scored as follows …
Win = 4 pts, Draw = 2 pts, Loss = 1 pt

Team	Won	Drawn	Lost
A	6	0	4
B	5	1	4
C	4	1	5
D	4	2	4

1. **Calculate** the points scored by Team A. .....
2. Which team scored 23 points? .....
3. **Calculate** the points scored by Team D. .....
4. Rank the teams in order.

1st = ..., 2nd = ..., 3rd = ..., 4th = ...

Christchurch to Wellington			
Day	Depart	Arrive	Flight
Wed	0715	0800	CW01
Wed	0820	0905	CW02
Wed	1545	1630	CW07
Wed	1730	1815	CW09

This table shows the flight times for planes flying between two cities.

5. Name the two cities. .....
6. What time does the earliest flight depart? .....
7. What time does flight CW07 arrive in Wellington? .....
8. How long is flight CW02? .....
9. If a flight departed at 11:50 a.m., at what time would it arrive in Wellington? .....

C: More tables & charts

Jacqui prepared a chart to show the distances, measured in kilometres, between her house (A) and the houses of her friends. The letters B to E represent her friends' houses.

	E	D	C	B	A
A	4.1	1.2	2.1	1.9	
B	1.7	0.9	3.4		
C	2.8	3.6			
D	0.7				
E					

Measured in km

1. If Jacqui walks to house D, how far has she walked? .....
2. Which two houses are 3.6km apart? .....
3. How far is it from house B to house C? .....
4. How far is it from house E to house B? .....

5. Which two houses are the shortest distance apart? .....
6. Which two houses are the greatest distance apart? .....
7. **Calculate** the distance from houses A to D, then D to C, then C to E, then E to B and then back to house A.

.....

D: Creating a timetable

Create a daily timetable for yourself in the space below.

Time	Activity

Comments: .....

Please sign:
Parent / Caregiver

AWS

Measurement

M3 / M4

Homework / Assessment Worksheet

Name: **Class:** **Complete by:**

A: 10 'Quick Questions'

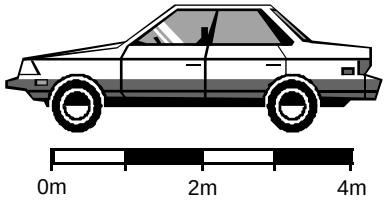
1. 12 + 5 × 6 – 17 = ...
2. Convert 5625m to km
   .....
3. Convert 12:15 a.m. to 24hr time .....
4. What would 15 books at $2.45 each cost?
   .....
5. Name this shape
   .....
6. Find ½ of $49.50
   .....
7. Calculate ∠X

   X = ...
8. List the factors of 24
   .....
9. 15.02 × 0.5 = ...
10. Solve the equation
    0.8y = 48
    y = ...

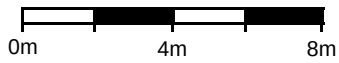
B: Using scales / scale diagrams

For each scale diagram, **use** the **scale** that has been given to calculate the actual length.

1. **Measured** length of the car .....mm
2. **Actual** length = ...

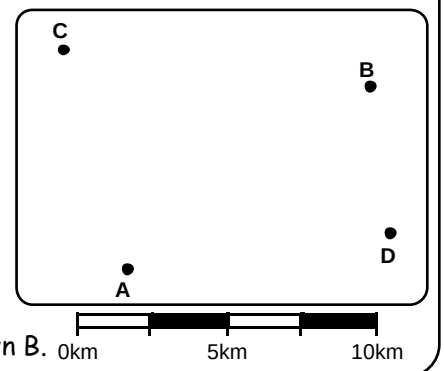


3. **Measured** height of the tree .....mm
4. **Actual** height = ...



These dots represent towns. Use the scale to work out the actual distances between ...

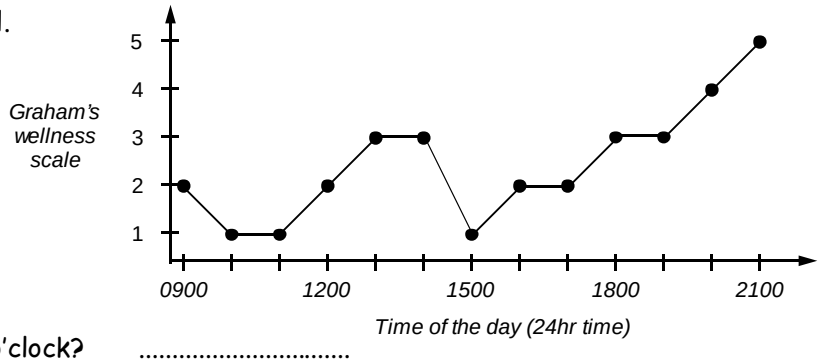
5. Towns A & B = ...
6. Towns A & C = ...
7. Towns C & D = ...
8. **Draw** a dot on the map for a town that is 7.5km from Town B.



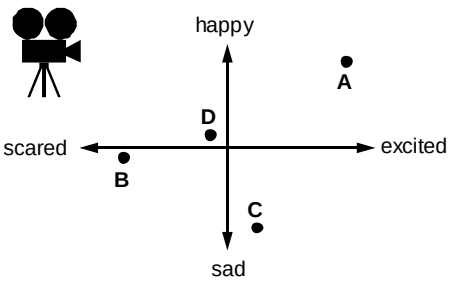
C: Qualitative data

Graham has not been feeling very well. He recorded how he was feeling using the scale below.

5 = Great
4 = Very well
3 = Quite well
2 = Ok
1 = Terrible



1. How was Graham feeling at 12 o'clock? .....
2. How many times during the day was he feeling *'Quite well'*? .....
3. At what times during the day was he feeling *'Terrible'*? .....



The points A, B, C and D represent how Jodie was feeling during a movie. **Describe** how she was feeling at ...

4. Point A: .....
5. Point B: .....
6. Point C: .....
7. Point D: .....

Comments: .....
.....
.....

Please sign: Parent / Caregiver

AWS

Measurement

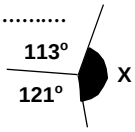
L4MM

M5

Homework / Assessment Worksheet

Name: **Class:** **Complete by:**

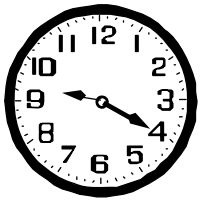
A: 10 'Quick Questions'

1. 51 – 9 × 5 + 12 = ...
2. Convert 86.9cm to m
   .....
3. Convert 1936 to a.m. / p. m. time .....
4. What would 12 books at $10.95 each cost?
   .....
5. Name this shape 
   .....
6. Find 60% of $54.20
   .....
7. Calculate ∠X 

   X = ...
8. List the first 5 multiples of 17 .....
9. 14.36 ÷ 0.2 = ...
10. Solve the equation
    0.9y = 72
    y = ...

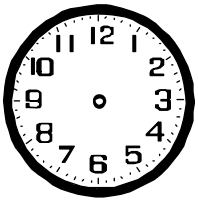
B: Analogue and digital time

Convert these analogue times to digital time.



1. This clock shows .....
2. 20 past 4 .....
3. ¼ to 11 .....
4. 10 past 7 .....
5. 20 to 9 .....

6. Draw **02:35** on this clock face.



How would you say these digital times?

7. **02:15** .....
8. **09:45** .....
9. **07:37** .....

C: 24 hour , a.m. & p.m. time

Convert these times to 24hr time or a.m. / p.m. time, as indicated.

1.	3:40 a.m. =	.....	2.	1107 =	.....
3.	1545 =	.....	4.	6:38 a.m. =	.....
5.	2:10 p.m. =	.....	6.	2040 =	.....
7.	0453 =	.....	8.	9:06 p.m. =	.....
9.	3:40 a.m. =	.....	10.	0037 =	.....

D: Mixed time units & word problems

Add and **subtract** these mixed time units.
Give your answer in the time unit given.

1. 50sec + 3min = ... sec
2. 3min – 90sec = ... min
3. 3½hrs + 270min = ... hrs
4. 48hrs – 1½days = ... days
5. 2wks + 14days = ... wks

On Monday, Geoff started a game of golf at 11:20 a.m. and played for 3 hrs 45 min.

6. At what time did Geoff finish playing golf? Give your answer in 24 hour time.
   .....

A weekly television programme starts at 1:25 p.m. and finishes at 2:10 p.m.

7. How long is this programme? .....
8. How many episodes of this programme could be taped on a 3 hour video tape? .....

E: Changes over time

A train travelling between two cities 240km apart takes 3 hours to make the journey.

1. What is the average speed of the train?
   ..... km / hour
2. If the train travels at 100 km/hr, how far would it go in 5½ hours? .....

A 10cm high plant, grows at a rate of 2cm / day.

3. How high would the plant be in 3 days time? .....
4. How high would the plant be in 2 weeks time? .....
5. For how many days must the plant be growing, to add 18cm to its height? .....

Jill works in a shop and is paid $8.50 / hr.

6. How much would she earn in 7 hours? .....
7. If she was paid $93.50, for how many hours did she work? .....

Comments: .....
.....
.....

Please sign:
Parent / Caregiver

AWS

Homework / Assessment Worksheet

Answers

Worksheet 1

A:

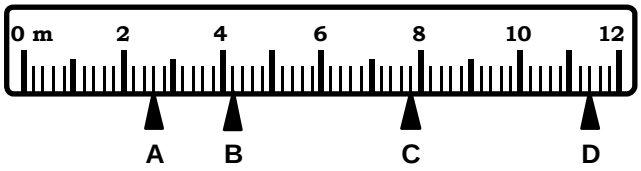
1. 11 2. 2.535L 3. 11:55 p.m. 4. 14 5. pentagon 6. $4.87 7. 200 ÷ 25 = 8
8. 13, 26, 39, 52, 65 9. 5.8 10. y = 3

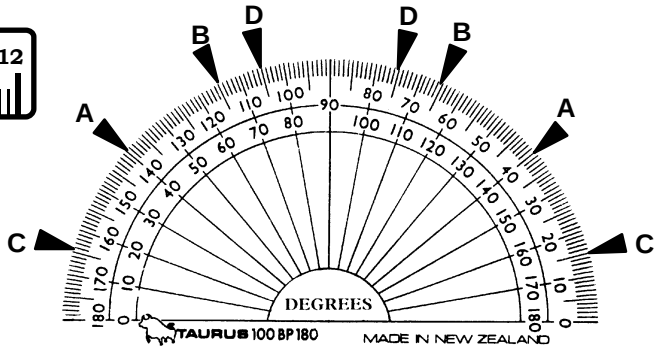
B:

1. units are millimetres, the smallest division is 1mm, A = 4mm, B = 49mm, C = 23mm, D = 37mm
2. units are centimetres, the smallest division is 0.2cm, A = 5.0cm, B = 8.6cm, C = 11.2cm, D = 1.6cm
3. units are metres, the smallest division is 0.1m, A = 5.3m, B = 2.3m, C = 3.4m, D = 0.8m

C:

1.





D:

1. 23cm, 27cm 2. 412mm, 438mm
3. 1.239g, 1.269g 4. AB = 54mm
5. CD = 65mm 6. 34mm

Worksheet 2

A:

1. 21 2. 6.524g 3. 2017 4. $53.55 5. octagon 6. $9.74 7. 33^{o} 8. 1, 2, 3, 6, 9, 18
9. 4.715 10. y = 5

B:

1. 30 2. cm 3. g 4. 6500 5. 7800 6. km 7. m 8. 0.763 9. 8200 10. mm 11. kL
12. km

C:

1. 250 + 624 = 874cm 2. 3.5 - 2.9 = 0.6L 3. 5600 - 4250 = 1350g 4. 89 + 59 = 148mm
5. 5.2 + 8.3 = 13.5kL 6. 4.56 - 2.75 = 1.81g 7. 850 - 624 = 226cm 8. 2.5 + 6.24 = 8.74km

D:

1. 10.8m 2. 17.33L 3. 2t 4. $1200 5. 125 buns 6. 3.6km 7. 5 laps

Worksheet 3

A:

1. 20 2. 7525L 3. 0749 4. $69.85 5. oval or ellipse 6. $12.19 7. 27^{o} 8. 1, 3, 5, 15
9. 4.32 10. y = 9

B:

1. 9.4cm 2. 61mm 3. 45mm 4. 17mm 5. 25mm 6. 45mm 7. 45mm 8. 15mm 9. 16mm
10. 163mm 11. 7cm

C:

1. 2100m 2. 2.1km 3. 10500m or 10.5km 4. 6 laps 5. 182cm

D:

1. 3.72cm 2. 62mm 3. 46.5cm 4. 77.5cm 5. 496mm

Worksheet 4

A:

1. 28 2. 5.625t 3. 11:15 p.m. 4. $97.20 5. parallelogram 6. $36.60 7. 102^o
8. 15, 30, 45, 60, 75 9. 53.2 10. y = 9

B:

1. 24 sqs 2. 23 sqs 3. $16cm^2$ 4. $15cm^2$ 5. $3.72cm^2$ 6. $260mm^2$ 7. $225cm^2$

C:

1. $5500m^2$ 2. $216m^2$ 3. 18L 4. $16m^2$ 5. $12m^2$ 6. $1820 7. $14m^2$ 8. 8 × $2.25 × 15 = $270

Worksheet 5

A:

1. 17 2. 6585mL 3. 1545 4. $69.85 5. hexagon 6. $26.25 7. 63^o 8. 1, 3, 7, 21 9. 6.34
10. y = 3

B:

1. 14 cubes 2. 15 cubes 3. $90cm^3$ 4. $240cm^3$

C:

1. $648cm^3$ 2. $1400mm^3$

D:

1. $6m^3$ 2. $4800cm^3$ 3. $1200cm^3$ 4. $512cm^3$ 5. $8000mm^3$ 6. 10cm

Worksheet 6

A:

1. 16 2. 562mm 3. 12:36 a.m. 4. $164.45 5. square 6. $72 7. 149^o 8. 20, 40, 60, 80, 100
9. 68.8 10. y = 50

B:

1. 28 points 2. Team C 3. 24 points 4. Team A, Team B, Team D, Team C
5. Christchurch and Wellington 6. 0715 or 7:15 a.m. 7. 1630 or 4:30 p.m. 8. 45 minutes 9. 12:35 p.m.

C:

1. 1.2km 2. houses C & D 3. 3.4km 4. 1.7km 5. houses D & E 6. houses A & E
7. 1.2 + 3.6 + 2.8 + 1.7 + 1.9 = 11.2km

Worksheet 7

A:

1. 25 2. 5.625km 3. 0015 4. $36.75 5. diamond or rhombus 6. $24.75 7. 67^o
8. 1, 2, 3, 4, 6, 8, 12, 24 9. 7.51 10. y = 60

B:

1. 50mm 2. 5m 3. 35mm 4. 7m 5. 10km 6. 7.5km 7. 12.5km

C:

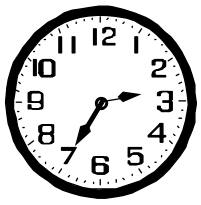
1. ok 2. 4 times 3. 1000, 1100, 1500 4. Jodie was feeling very excited and happy 5. Jodie was feeling very scared and a little bit sad 6. Jodie was feeling sad and a little bit excited 7. Jodie was neither sad nor happy, nor was she scared or excited

Worksheet 8

A:

1. 18 2. 0.869m 3. 7:36 p.m. 4. $131.40 5. right angled triangle 6. $32.52 7. 126^o
8. 17, 34, 51, 68, 85 9. 71.8 10. y = 80

B:

1. 09:20 2. 4:20 3. 10:45 4. 7:10 5. 8:40 6. 
7. quarter past 2 8. quarter to 10 9. twenty-three to 8

C:

1. 0340 2. 11:07 a.m. 3. 3:45 p.m. 4. 0638 5. 1410
6. 8:40 p.m. 7. 4:53 a.m. 8. 2106 9. 0340 10. 12:37 a.m.

D:

1. 230 sec 2. 1.5 min 3. 8 hrs 4. ½ day 5. 4 wks 6. 1505 7. 45 min 8. 4 episodes

E:

1. 80 km/hr 2. 550km 3. 16cm 4. 24cm 5. 9 days 6. $59.50 7. 11 hrs

Tracking Sheet: 'In-class' Activity Sheets

Worksheet	Objectives	Comments														
23	M5															
22	M5															
21	M5															
20	M4															
19	M3															
18	M3															
17	M2															
16	M2															
15	M2															
14	M2															
13	M2															
12	M2															
11	M2															
10	M1															
9	M1															
8	M1															
7	M1															
6	M1															
5	M1															
4	M1															
3	M1															
2	M1															
1	M1															
Measurement	Name															

Tracking Sheet: Homework / Assessment Worksheets

Measurement

Worksheet	Objectives	Name														Comments
8	M5															
7	M3 / M4															
6	M3															
5	M2															
4	M2															
3	M1 / M2															
2	M1															
1	M1															