A Complete Guide to ...

Measurement

Utilising the objectives as written in

MATHEMATICS in the New Zealand CURRICULUM

for

Level 3

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
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AWS Teacher Resources

L3MM

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First Published March 1998

Formatting and publishing by
Andrew Stark

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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 3.

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 3.***	**Resource Code: L3MN**
A Complete Guide to Measurement** written utilising the objectives as stated in ***Mathematics in the New Zealand Curriculum for Level 3.	**Resource Code: L3MM**
A Complete Guide to Geometry written utilising the objectives as stated in ***Mathematics in the New Zealand Curriculum for Level 3.***	**Resource Code: L3MG**
A Complete Guide to Algebra written utilising the objectives as stated in ***Mathematics in the New Zealand Curriculum for Level 3.***	**Resource Code: L3MA**
A Complete Guide to Statistics written utilising the objectives as stated in ***Mathematics in the New Zealand Curriculum for Level 3.***	**Resource Code: L3MS**

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 3**, as written in the **MATHEMATICS** *in the New Zealand Curriculum* document, first published 1992. ***[REFER PAGE 66]***

Estimating and measuring

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

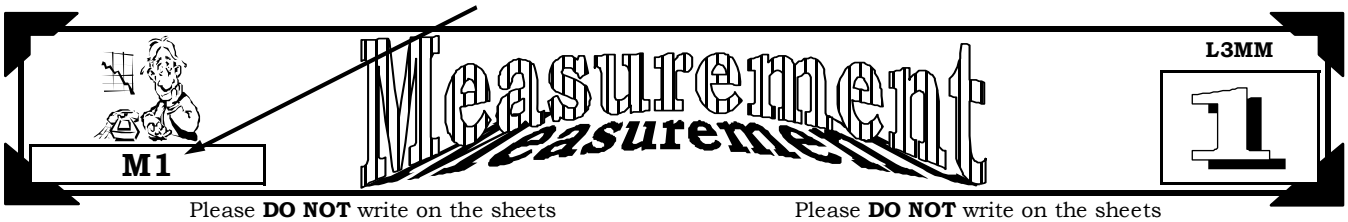
- **M1** demonstrate knowledge of the basic units of length, mass, area, volume (capacity), and temperature by making reasonable estimates;
- **M2** perform measuring tasks, using a range of units and scales.

Developing concepts of time, rate, and change

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

- **M3** read and interpret everyday statements involving time;
- **M4** show analogue time as digital time, and vice versa.

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.



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 3**.

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;
- **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;
- **MP14** use words and symbols to describe and continue patterns.

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

- **MP15** use their own language and mathematical language and diagrams to explain mathematical ideas;
- **MP16** devise and follow a set of instructions to carry out a mathematical activity;
- **MP18** record, in an organised way, and talk about the results of mathematical exploration.

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 3**. ***[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	M1	M2	M3	M4	MP 1	MP 2	MP 3	MP 6	MP 8	MP 9	MP 14	MP 15	MP 16	MP 18
1	✖						✖						✖	
2	✖						✖			✖				
3	✖						✖			✖				
4	✖						✖			✖				
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6	✖						✖			✖				
7	✖						✖			✖				
8		✖					✖			✖				
9		✖					✖	✖					✖	
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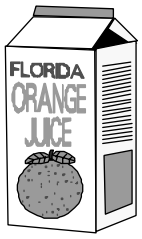
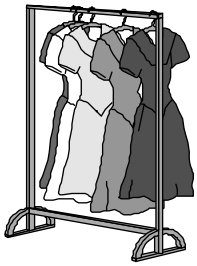
18		✖	✖				✖	✖		✖		✖		
19		✖	✖				✖	✖		✖		✖	✖	

Table of Contents for the 'In-class' Worksheet Masters for Measurement, Level 3

Introduction to 'Measurement':



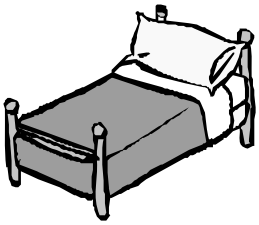
Mrs Stevens is making a new dress. She needs 1.2 metres of material.



Candice bought a 1.5 litre container of fruit juice.

Mr Williams caught a fish that weighed 5.4 kilograms.

The above examples illustrate some of the standard measurement **'units'** involved in the **metric system** of measurement. Various measuring instruments are used to measure these items, but what if we did not have any of these instruments?



Consider this problem. David has a new bed, but he is not sure if it will fit along the wall of his bedroom. He does not have a tape measure or ruler.

How can he work out if it will fit or not?

Answer: He could use his own feet to work out the distance needed for the bed.

Can you come up with different ways of solving this problem?

Task 1

Being able to measure exactly how long something is, is an important skill. In order to be able to do this, you might need a ruler.

Let's **make a ruler** using a strip of card or paper. **Follow these steps ...**

Step 1: Place your thumb and index finger along the edge of the card and stretch.
Step 2: Mark this distance you can stretch.
Step 3: Divide this distance up into smaller 'units' using the width of your thumb.
(Try to make it a whole number of thumb widths.)
Step 4: Repeat the steps above to make your ruler twice as long.
(To make an even longer ruler, repeat the steps.)
Step 5: Name the 'units' on your ruler.

1. How many thumb widths make up one thumb to index finger stretch?

Using your 'home-made' ruler measure the following items.

2. The length of a pencil.
3. The length of your longest finger.
4. The longest side of your desk.
5. The height of your desktop from the floor.
6. Compare your measurements with 2 or 3 classmates' results. Comment on your findings.
7. What are some of the difficulties created when using your 'rulers'?
8. Make a **list** of other ways you can use various parts of your body to measure short or long distances.
9. What are some of the difficulties experienced when using parts of the body for measuring?

Task 2

Homework / research topic.

In New Zealand we use the **metric system** for measuring length, volume (capacity) and mass. Find out about different systems used in other countries, now and in the past. *Example:* The Imperial system.

Exploring length; how long is that?

Using feet to measure 'length' can cause problems as people's feet are different sizes.
To avoid this problem, we can use the **metric system** for measuring how long something is.

The basic unit of the metric system for measuring **length** is the **metre**.

What other units can be used to measure the **length** of something?

Answer: millimetres, centimetres & kilometres

Task 3

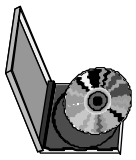
What are the abbreviations for the following metric units for length?

1. millimetre 2. centimetre 3. metre 4. kilometre

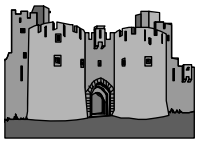
What is the relationship between these commonly used metric measurement units?

5. 1 kilometre = ... metres
6. 1 metre = ... centimetres
7. 1 metre = ... millimetres
8. 1 centimetre = ... millimetres

Which of the four units for **length** would you use to measure ...



9. the length of the classroom?
10. the length of a pencil?
11. the thickness of a match?
12. the distance between two cities?
13. the length of a rugby field?
14. the distance around a running track?
15. the thickness of 10 sheets of cardboard?
16. the thickness of 20 exercise books?
17. the height of a 4 storey building?
18. the distance across Cook Strait?
19 the height of a mountain?
20. the thickness of 5 C.D.'s?



21. Give three more examples of what you could measure, for each of the 4 units of length.

Converting between units.

Example: 25 millimetres = 2.5 centimetres

22. Convert 2 metres to centimetres
23. Convert 25 centimetres to millimetres
24. Convert 7000 metres to kilometres
25. Convert 6 kilometres to metres
26. Convert 3000 millimetres to metres
27. Convert 850 millimetres to centimetres
28. Convert 460 centimetres to metres
29. Convert 6.3 kilometres to metres
30. Convert 1.5 metres to millimetres
31. Convert 48 millimetres to centimetres

Word problems.

32. Jack bought 4 lengths of timber. If the lengths were 2.4m, 1.8m, 2.1m and 3.6m long, what was the total length of timber that Jack bought?

33. A 2.4m piece of ribbon is to be divided into three equal lengths to go around some presents. How long (m) will each piece of ribbon be? Convert your answer to cm.

34. Mr Davidson drives his car at a steady 85km per hour. If he kept the same speed for 3 hours, how far would he have travelled? Convert your answer to metres.

Word problems involving length measurements:

Example: George is making a bookshelf. If one shelf is 1.2m long, a second is 1.5m long and the third is 1.8m long, how much wood does George need?

Answer: 1.2m + 1.5m + 1.8m = 4.5m George needs 4.5m of wood.

Some problems involving length measurements may contain different units. When adding or subtracting length measurements, the measurements need to be in the same 'units'.

Example: Karen bought two pieces of material. One piece is 1.3m long and the other is 85cm long. How much material does Karen have?

Answer: To answer this question, both material lengths need to be either in metres or in centimetres.
As 1.3m = 130cm, the total material would be 130cm + 85cm = 215cm
or As 85cm = 0.85m, the total material would be 1.3m + 0.85m = 2.15m

Task 4

Work out these word problems involving length measurements.

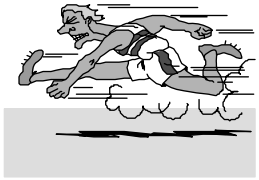
1. A pile of 7 books is 56cm high. If all books are the same thickness, how thick is each book?

2. During a round of golf, Mike had three putts on one hole. Each putt was closer to the hole and in a straight line. If the putts were 230cm, 155cm and 25cm, how far was Mike away from the hole, before he started putting?
3. Convert your answer to metres.

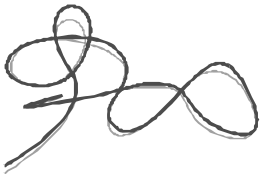
4. On the first 6 days of their one week holiday, the Harding family travelled the following distances: 125km, 250km, 76km, 327km, 145 and 67km. What is the total distance they have travelled so far?
5. On the 7th day they arrived home, having travelled a grand total of 1125km. How far did they travel on the last day?

Work out these problems involving length measurements.
Remember that for these questions you will need to convert length measurement to the **same units**.

6. 4000m + 2.3km = ? (answer in metres)
7. 5.6m + 3500mm = ? (answer in metres)
8. 450mm – 23cm = ? (answer in millimetres)
9. 460cm – 1.6m = ? (answer in centimetres)
10. 7.2km + 3200m = ? (answer in kilometres)
11. 56cm – 265mm = ? (answer in millimetres)



12. Rangi has been training for the school sports. Last week he ran 3.5km, 4.3km, and 2.7km. He also ran a 3000m race. How far did he run last week in km's?



13. Gail has a 25m length of rope. If she cuts off 85cm, 450cm and 8.2m, how much rope does she have left? Give your answer in metres.

14. Up until last weekend, there had been 12.5cm of rain this year. Three days this week there were 12mm, 15mm and 9mm of rain. What is the new rainfall total? Give your answer in mm.

Exploring capacity; how much will it hold?

How much something, such as a container, will hold is called its **capacity** or **volume**.
Example: A carton of milk holds 1 litre or 600 millilitres. A watering can holds 10 litres.

The basic unit of the metric system for measuring **capacity** or **volume** is the **litre**.

What other units can be used to measure the **capacity** or **volume** of something?

Answer: millilitres & kilolitres. (Note: kilolitres are not used very often)

Task 5

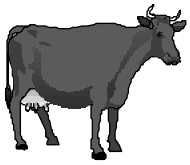
What are the abbreviations for the following metric units for volume?

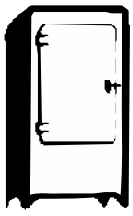
1. millilitres 2. litres 3. kilolitres

What is the relationship between these commonly used metric measurement units?

4. 1 kilolitre = ... litres 5. 1 litre = ... millilitres

Which of the three units for **volume** would you use to measure ...





6. the amount of water used for a bath?
7. the volume of medicine on a teaspoon?
8. the quantity of water in an ocean?
9. the volume of rain water collected in a bucket?
10. the amount of soft drink in a bottle?
11. the quantity of water in a school swimming pool?
12. the quantity of water in a gold fish bowl?
13. the amount of water to put out a large forest fire?
14. the quantity of milk produced by a cow each day?
15. the amount of ink in a ball point pen?
16 the capacity of a fridge?

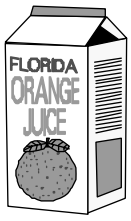
17. Give two more examples of what you could measure using millilitres and litres.

Converting between units.

Example: 5000 millilitres = 5 litres

18. Convert 3 litres to millilitres
19. Convert 6000 litres to kilolitres
20. Convert 9 kilolitres to litres
21. Convert 5000 millilitres to litres
22. Convert 1.2 litres to millilitres
23. Convert 1900 millilitres to litres
24. Convert 3.6 kilolitres to litres
25. Convert 6500 litres to kilolitres

Word problems.



26. Jenny bought a 2000 millilitre container of fruit juice. If this is divided equally amongst 5 people, how much does each person get to drink?
27. Twice a day Danny has 5 millilitres of medicine. For how many days does he take this medicine, if he was given 60 millilitres?

28. Each week, for five weeks, Mr Brown recorded how many litres of petrol he used. His recordings were 5.6, 4.8, 7.4, 6.1 and 6.7 litres. What was the total quantity of petrol he used?

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Exploring mass; how heavy is that?

How heavy something is, is called its **mass** or **weight**.
Example: A can of baked beans contains 425 grams of beans.

The basic unit of the metric system for measuring **mass** or **weight** is the **gram**.

What other units can be used to measure the **mass** or **weight** of something?

Answer: milligram, kilogram & tonne

Task 6

What are the abbreviations for the following metric units for mass?

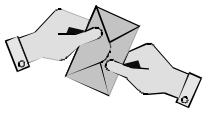
1. milligram 2. gram 3. kilogram 4. tonne

What is the relationship between these commonly used metric measurement units?

5. 1 kilogram = ... grams 6. 1 gram = ... milligrams 7. 1 tonne = ... kilograms

Which of the four units for **mass** would you use to measure ...

8. the mass of a 10 cent coin?
9. the weight of a car?
10. the weight of a tomato?
11. the weight of a sack of onions?
12. the mass of a feather?
13. the weight of a letter?
14. the weight of a large box of washing powder?
15. the mass of the forwards of a rugby team?
16. the mass of a blue whale?
17. the weight of a block of cheese?
18. the mass of a petrol truck?
19. the weight of a piece of paper?



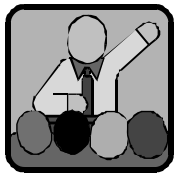
20. Give two more examples of what you could measure using milligrams, grams, kilograms and tonnes.

Converting between units.

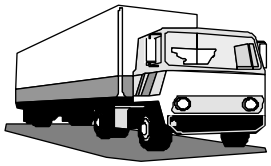
Example: 3000 milligrams = 3 grams

21. Convert 7 grams to milligrams
22. Convert 6000 kilograms to tonnes
23. Convert 4 kilograms to grams
24. Convert 5000 milligrams to grams
25. Convert 1.2 grams to milligrams
26. Convert 1.2 tonnes to kilograms
27. Convert 3.6 kilograms to grams
28. Convert 6500 grams to kilograms

Word problems.



29. Max has been growing a pumpkin to enter in a competition. His best pumpkins weigh 2.3, 3.5 and 4.1 kilograms. What is the total weight of these three pumpkins?
30. If 12 identical coins weigh 120 grams, what does each coin weigh?



31. A truck loaded with furniture has a mass of 11.6 tonnes. When it is empty, it has a mass of 5.9 tonnes. What was the weight of the furniture?
32. Convert your answer to kilograms.

Word problems involving capacity and mass:

Example: One cup of milk is about 200mL. If 7 children want a cup of milk, how much milk is needed? Convert your answer to litres.

Answer: 200mL × 7 = 1400mL. 1400mL = 1.4L

Like the problems involving length, some problems involving volume and weight measurements may contain different units. Remember that when adding or subtracting measurements, the measurements need to be in the same 'units'.

Example: Karen has two bottles she can fill with fresh water to take on a tramp. If one is 600mL and the other is 1.2L, how much water can she take? Answer in millilitres.

Answer: Convert 1.2L to mL, 1200mL. 600mL + 1200mL = 1800mL.

Task 7

Work out these word problems involving volume (capacity) and weight (mass) measurements.

1. Harry weighed 67.1kgs, but over the Christmas holidays he put on 1.2kgs. What is his new weight?
2. If he loses 3.6kgs over the next three months, what will his weight be then?

3. A can of soft drink holds 325mL. If you bought a 12 pack of cans, how much soft drink would you have? Convert your answer to litres.

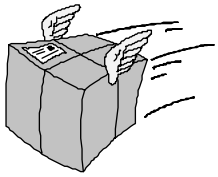
4. A jar was placed on the back lawn to collect rain water. The jar was emptied each day for a week and the volume of water recorded. These were the results: 8mL, 7mL, 11mL, 6mL, 15mL, 9mL & 11mL. How much rain fell during that week?

Work out these problems involving **volume** and **mass** measurements.
Remember that for these questions you will need to convert measurements to the **same units**.

5. 6000mL + 4.3L = ? (answer in millilitres)
6. 4.9g + 2000mg = ? (answer in grams)
7. 8000kg – 1.6 tonne = ? (answer in tonnes)
8. 6.3kg – 4500g = ? (answer in kilograms)
9. 5600L + 3.7kL = ? (answer in kilolitres)
10. 3.4L – 1600mL = ? (answer in millimetres)
11. 5600kg × 5 = ? (answer in tonnes)
12. 8400mL ÷ 4 = ? (answer in litres)

13. Shirley collected rocks when at the beach. She collected five rocks that weighed 500g, 1.2kg, 600g, 750g and 2.4kg. How heavy is her rock collection? Give your answer in both grams and kilograms.

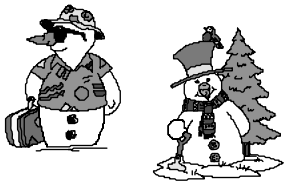
14. James has not been well and has been told to drink more water. For one week he records how much water he drinks during each day. These are his recordings, starting on Sunday; 900mL, 1.3L, 1.1L, 800mL, 950mL, 1.4L and 850mL.
What is the total volume of water that James drank during the week?
Give your answer in both litres and millilitres.

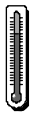


15. Tim sent three parcels that weighed 600g, 1.3kg and 1.1kg. What was the total weight of these parcels? Give your answer in both grams and kilograms.
16. If parcels over 1000g cost $4.50 and parcels under 1000g cost $3.00, what did the postage for Tim's three parcels cost him?

Exploring temperature; is that hot or cold?

When we talk about the temperature of something we are wanting to know how hot or cold it is.
Just as there are special units for length, mass (weight) and capacity (volume) there are also special units for temperature.





What are these units of temperature called?
What is the temperature of water when it freezes?
What is the temperature of water when it boils?

Answer: The basic unit of temperature is degrees centigrade or degrees Celsius. Written as ^{O}C.
Water freezes at $0^{O}C$ (zero) and boils at $100^{O}C$.

Every night on television the weather conditions around the country are given.
What does it mean when they say, *"There was a 3 degree frost last night."*?
What was the lowest temperature during the night?

Answer: The temperature dropped below the freezing point of water.
The temperature was – $3^{O}C$. (minus 3 degrees, which is 3 degrees below zero).
This was the lowest temperature during the night.

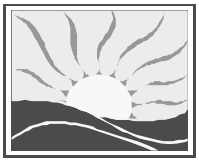
Task 8

1. What is the name of the instrument used to measure temperature?
2. What is the name of the liquid metal that is in this instrument?
3. What is 'normal' body temperature?

At the side of the page there is a temperature scale that you can use to help answer these questions.

4. What is the temperature reading?
5. If the temperature is $6^{O}C$ then rises $5^{O}C$, what is the new temperature?
6. If the temperature is $7^{O}C$ then rises $10^{O}C$, what is the new temperature?
7. If the temperature is $13^{O}C$ then drops $7^{O}C$, what is the new temperature?
8. If the temperature is $6^{O}C$ then drops $6^{O}C$, what is the new temperature?
9. If the temperature is $2^{O}C$ then drops $8^{O}C$, what is the new temperature?
10. If the temperature is – $3^{O}C$ then rises $5^{O}C$, what is the new temperature?

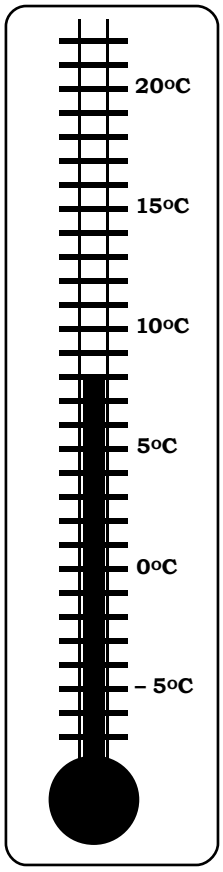
11. At 3 o'clock the temperature was $12^{O}C$, but by 10 o'clock that night it had dropped to $5^{O}C$.
Describe this change in temperature.



12. The highest temperature during the day was $23^{O}C$ and the lowest temperature was $10^{O}C$.
How big was the change in temperature?

13. The highest temperature during the day was $8^{O}C$ and the lowest temperature was – $3^{O}C$.
How big was the change in temperature?

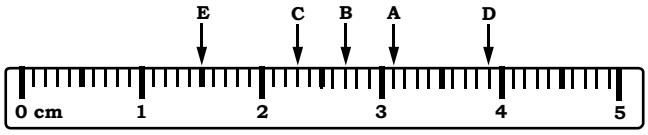
14. At 5 o'clock the temperature was $6^{O}C$, but by 11 o'clock that night it had dropped to – $4^{O}C$.
Describe this change in temperature.



Reading scales:

When measuring the length of a piece of wood, you have to be able to read and understand the scale on the ruler or measuring tape.

Example: Tom measured five leaves from a hebe bush. The arrow markers A to E show how long each leaf was. List the measurements for each leaf.

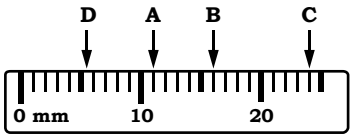


Answer: A = 3.1cm, B = 2.7cm, C = 2.3cm, D = 3.9cm E = 1.5cm

Task 9

Study each example of a measurement scale and state the measurements given by the pointers A to D. Remember to include the name of the units.

1.



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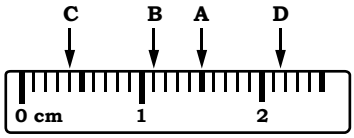

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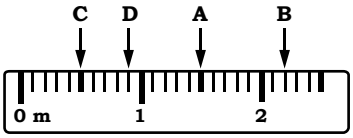
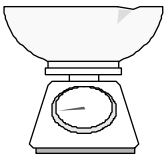
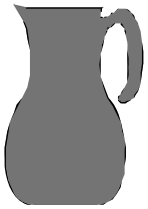


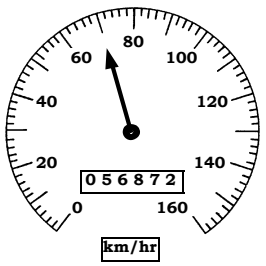


Wendy has some new electronic kitchen scales. The scales measure from 0 to 2000 grams.

4. Wendy placed an empty bowl on the scales and it read 50. How heavy was the bowl?
5. Wendy placed some butter in the bowl and the scales now showed 145. How much butter was in the bowl?
6. How much more butter does she have to add so that she has 120 grams?



7. If a measuring jug holds 500mL, how much milk is in it when it is half full?
8. How much more has to be added, so there is 450mL of milk in the jug?

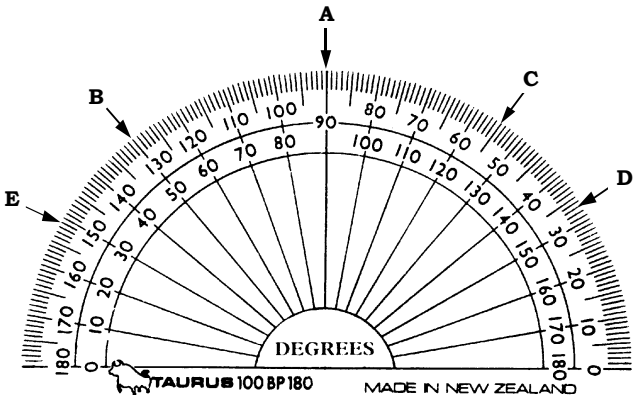


This is a diagram of the speedo of Mr Murray's car.

9. What does it measure?
10. What do the letters km/hr mean?
11. What speed is he going at the moment?
12. By how much will he have to increase speed so that his car is travelling at 100 km/hr?
13. How far has Mr Murray travelled in his car so far?

This is a diagram of an instrument used to measure angles.
It is called a **protractor**.

14. What are the 'units' for measuring angles?
15. How many scales are there on the protractor? Explain.
16. What are the **two** possible measurements for each angle, to the nearest degree, given by the pointers A, B, C, D and E?

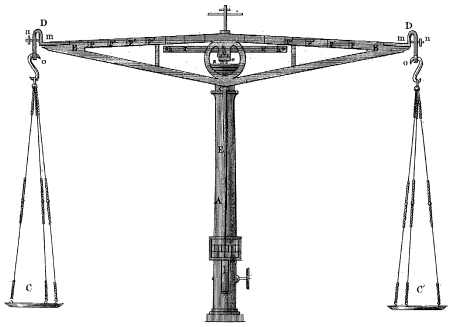


Estimating and measuring objects:

There are many different ways of measuring mass or weight.

Example: Jimmy has two apples, but which is the heavier? He holds one in each hand to compare their weights (mass).

How accurate is this method?



This is a diagram of an 'old-fashioned' weight balance.

How do you think they worked?

Answer: A known mass (weight), usually made of metal, was placed on one side. The 'item' to be weighed was placed on the other side. Known weights were added or taken away. When the balance 'arm' is level, the weight of the item would be equal to the known weights.

Task 10

1. **Draw** up a table with two headings, **Estimated Measurement** and **Actual Measurement**.

2. **Estimating** length, mass (weight) and volume (capacity) can be a challenge.
   For this you are to **work** in small **groups** of **2 or 3**, and it will be run like a quiz.

   Your teacher will provide you with various items to estimate, involving the three measurement areas of length, mass (weight) and capacity (volume).

   Example:
   - the length of a pencil
   - the length of a shoelace
   - the weight of an apple
   - the weight of potato chips in a bag
   - the volume of water in a bottle
   - the height of the door
   - the thickness of a book
   - the weight of soil in a bucket
   - the weight of a jar
   - the volume of water in a bucket

   List the items being estimated and in the **estimated measurement** column of your table, **write in your estimate**. Do not forget to include the name of the units.

   Instructions: You are allowed to pick up an object to feel how heavy it is, to help you to estimate, but there is to be only quiet talking between members of each group and no comparing of estimates between groups.

3. **Either** your teacher will provide you with the correct answers to the measurement tasks **or** using various measuring instruments, you are to accurately measure the items. Enter the **accurate measurements** in your table, including the name of the measurement units.

   The winning team is the one whose **estimated measurements** are closest to the **accurate measurements**.

Task 11

How difficult was it to use the 'balance' scales? In-class or homework project.

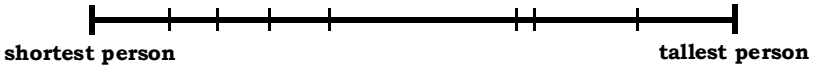
Using cardboard, string, sticks or wire make a **balanced hanging mobile** for the classroom. The hanging cards of the mobile are to have the following measurement units written on them.

mm cm m km mg g kg mL L kL

Measuring qualitative data:

If the heights of all people at your school were measured and recorded, there would be a range of measurements.

Example:



The two **extremes** for this simple scale are the 'shortest' and 'tallest' people. Every person measured fits between the two extremes. What do you think the marks between the extremes indicate?

Answer: How tall someone was.

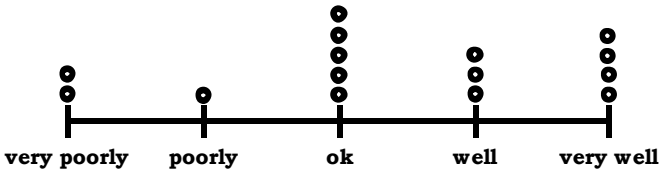
Feelings and opinions can also be measured using simple scales.
Example: Pupils were asked how hard they thought a recent maths homework sheet was. The results could be shown on this scale.

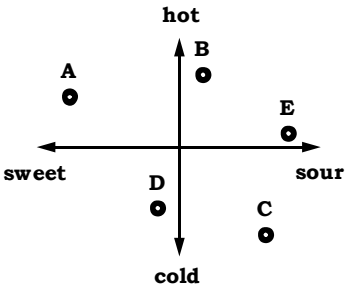
Where would you put your mark, for your last homework sheet?

Task 12

After a recent maths assessment, pupils were asked their opinion on how well they did in the test. They were given 5 choices as shown on the scale below. David recorded the results by placing dots above the words of the scale.

1. How many pupils felt they did 'well' in the test?
2. Five pupils had the same opinion about their results. What was it?





At a food-fair there were many different types of food that could be tried. Some food was hot or cold, sweet or sour.
Example: ice-cream is both sweet and cold.

3. Which food is the hottest?
4. Which food is the sweetest?
5. Using this simple scale describe the foods shown by each of the letters A to E.

6. Think of **five questions** of your own that you could ask people, so they could tell you about their **feelings** or their **opinions** on some important issues or events.
   Example: Do you think the All Blacks are the best rugby team in the world?
   How do you feel when you see pictures of sick children on T.V.?
7. **Create** a **simple scale** for each question.
8. **Ask** 5 to 10 people your questions and **record** their feelings or opinions on your simple scales.

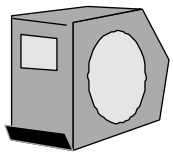
Estimating and measuring accurately:

Depending on what you are measuring, you can use millimetres, centimetres, metres or kilometres.
Sometimes a rough measurement or estimate is ok, but other times an accurate measurement is required.

Example:

Estimate the length of this line.

Measure this line to the nearest centimetre.



Answer: This line is longer than 7cm, but less than 8cm, but the line is closest to 8cm long.

If a more accurate measurement is required, the line could be measured in millimetres.
Now measure this line to the nearest millimetre.

Answer: 78 mm, however the length of this line could be between 77mm and 79mm, depending on the accuracy of your measuring.

Task 13

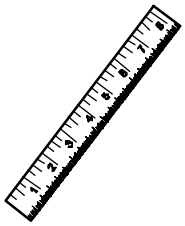
Estimate the length of each line below., to the nearest centimetre.

1.

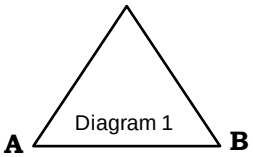
2.

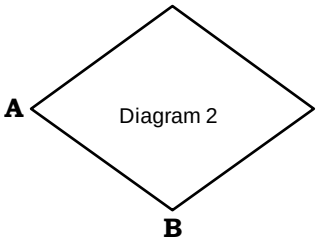
3.

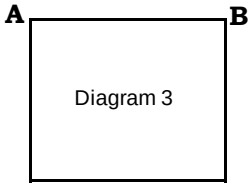
4.

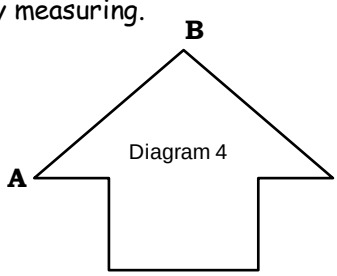


5. **Measure** each line to the nearest centimetre.
6. **Measure** each line to the nearest millimetre.
7. **Draw** lines of the following lengths. 34mm, 5.6cm, 85 mm and 7.2cm.
8. Which of the lengths marked **AB** do you think is the shortest? Check by measuring.









Task 14

Work in small groups to help solve this **practical problem**.
Use either a **tape measure** or your **own feet**.

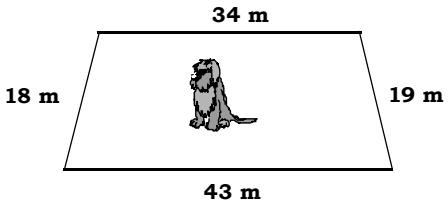
Task: What is the length of tape needed to mark out a tennis or netball court?

1. Look at a tennis or netball court, **Estimate** the length of tape needed to mark out the court, before you start measuring.
2. **Draw** a diagram of the tennis or netball court.
3. **Measure** the lines of the court using a tape measure or your own feet. (write your measurements on your diagram.)
4. Using your measurement figures, **calculate** the length of tape needed to mark out the court. How good was your estimate?

Distance around the outside:

Imagine you are at one corner of a soccer field. You start walking along the lines marking each of the four sides, until you are back where you started.

The distance around the outside of any shape is called the **perimeter.**
Example: This is a diagram of Graham's back yard.



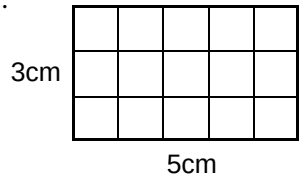
What is the **perimeter** of Graham's backyard?

Answer: Add the length of ALL sides together,
34 + 18 + 43 + 19 = 114 metres

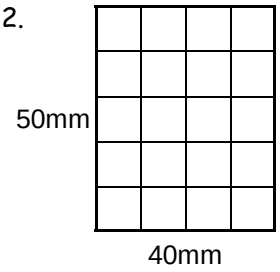
Task 15

Calculate the **perimeter** for each diagram. The diagrams are not drawn to scale.

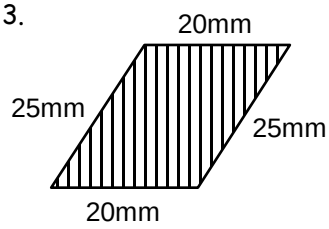
1.



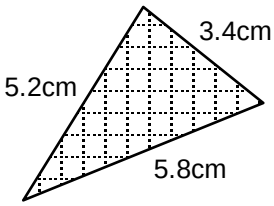
2.



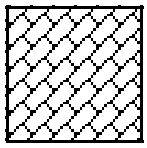
3.

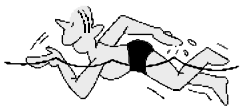


4.



5. All the sides of a square are the same length.
If the perimeter of a square is 40 metres, how long is each side?

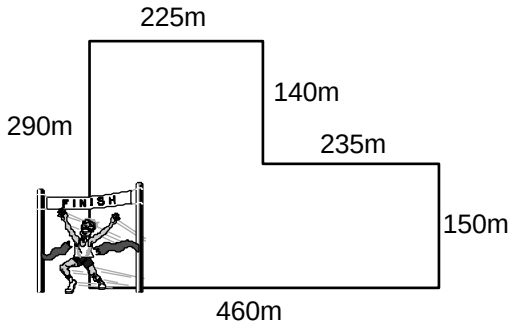




6. A new fence, in the shape of a rectangle, has to be built around a swimming pool. One side of the fence is 35 metres long and the other side is 20 metres long. What is the perimeter of the fence around the pool?

The school cross-country is around the school grounds, as shown in the diagram.

7. How far is it once around the course?
8. Convert your answer above to kilometres.
9. If a race is 3km long, how many laps will you have to run?
10. If Rangi runs around 3 times, how far has he run?

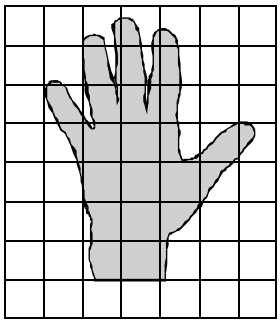


Task 16

Estimate the perimeter for the items listed below, then **measure** the **perimeter** of each item ...

1. your desk top (to the nearest cm)
2. an A4 sheet of paper (to the nearest mm)
3. a text book (to the nearest mm)
4. a different book (to the nearest cm)
5. How close were your estimate perimeters to the actual perimeters?

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



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

Example: Jodie placed her hand on a piece of maths paper. She then drew around the outside of her hand.

What is the area of this maths page, if each square is a centimetre across?

How could she work out the area that her hand covered on the page?

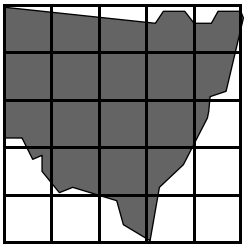
Answer: 56 square centimetres. By counting the whole squares and estimating the number of 'whole' squares taken up by the part squares her hand covered.

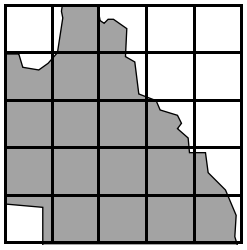
Note: Units for area are always square 'somethings'.

Example: square millimetres, square centimetres, square metres, etc.

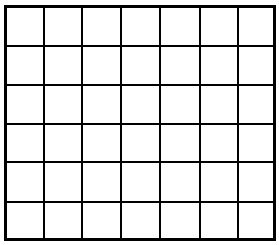
Task 17

Estimate the **area** for these shapes by counting whole and part squares.

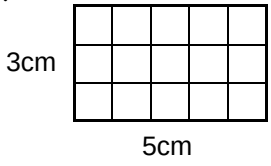
1. 

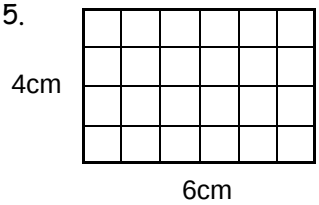
2. 

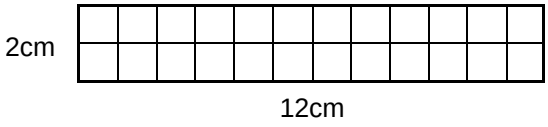
3. Count the squares to find the area of this rectangle.



Calculate the **area** of the shapes. These diagrams are not drawn to scale, but imagine that each square is 1 square centimetre. The units for your answers with be 'square cm'. (Could be written as 'sq cm')

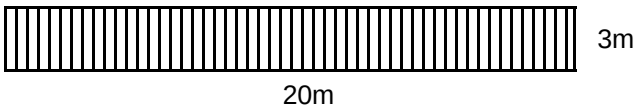
4. 

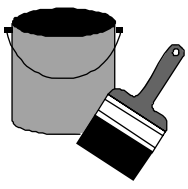
5. 

6. 

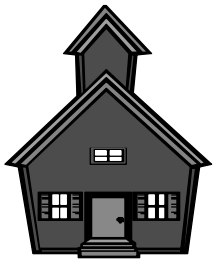
7. How can you work out the area of these shapes above **without** having to count the squares?

8. **Calculate** the **area** of this rectangle.





9. Billy has a fence to paint. If the fence is 35 metres long and 2 metres high, what is the area that has to be painted?



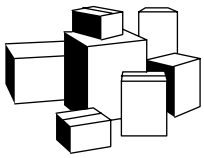
10. A classroom that is 15 metres long and 20 metres wide is to have new carpet put down. What is the area of the classroom floor?

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

Consider these two examples.
Kerry uses a 1 litre jug to fill a bucket, right to the top.
If it takes 5 full jugs of water to fill the bucket, what is the volume or capacity of the bucket?

Answer: The volume of this bucket is 5 litres.

The **volume** or **capacity** of a 3D shape is the **amount of liquid it holds**.



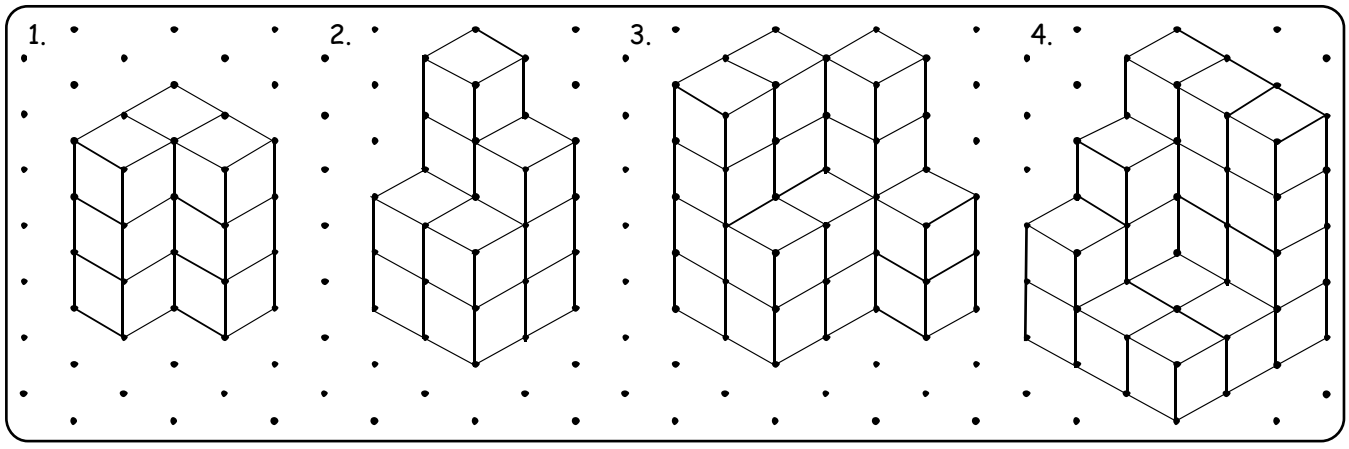
Heather likes building with blocks. She has 20 small cubes, all the same size, which she stacks into a neat pile. What is the volume of her pile?

Answer: As we do not know the size of each cube, we can say the volume of her pile is 20 cubes.

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

Task 18

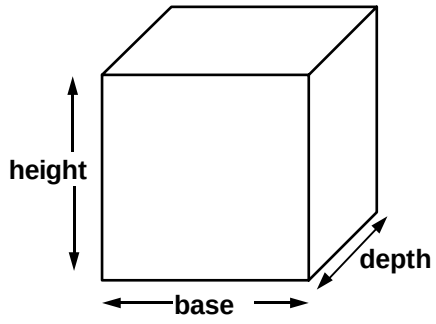
Calculate the **volume** for each diagram by counting the cubes. Give your answers in 'cubes'.
Remember to include the cubes you cannot fully see.



Using the isometric paper provided **draw three different shapes** that have the following volumes ...

5. 8 cubes 6. 10 cubes 7. 12 cubes 8. 20 cubes

For a 3D shape, the volume can be worked out if we know three measurements ...
the **base**, the **height** and the **depth**.



Challenge:

9. Work out the number of blocks needed to make a pile of blocks that has ...
   a base of 4 blocks
   a height of 3 blocks
   and a depth of 2 blocks.

M2

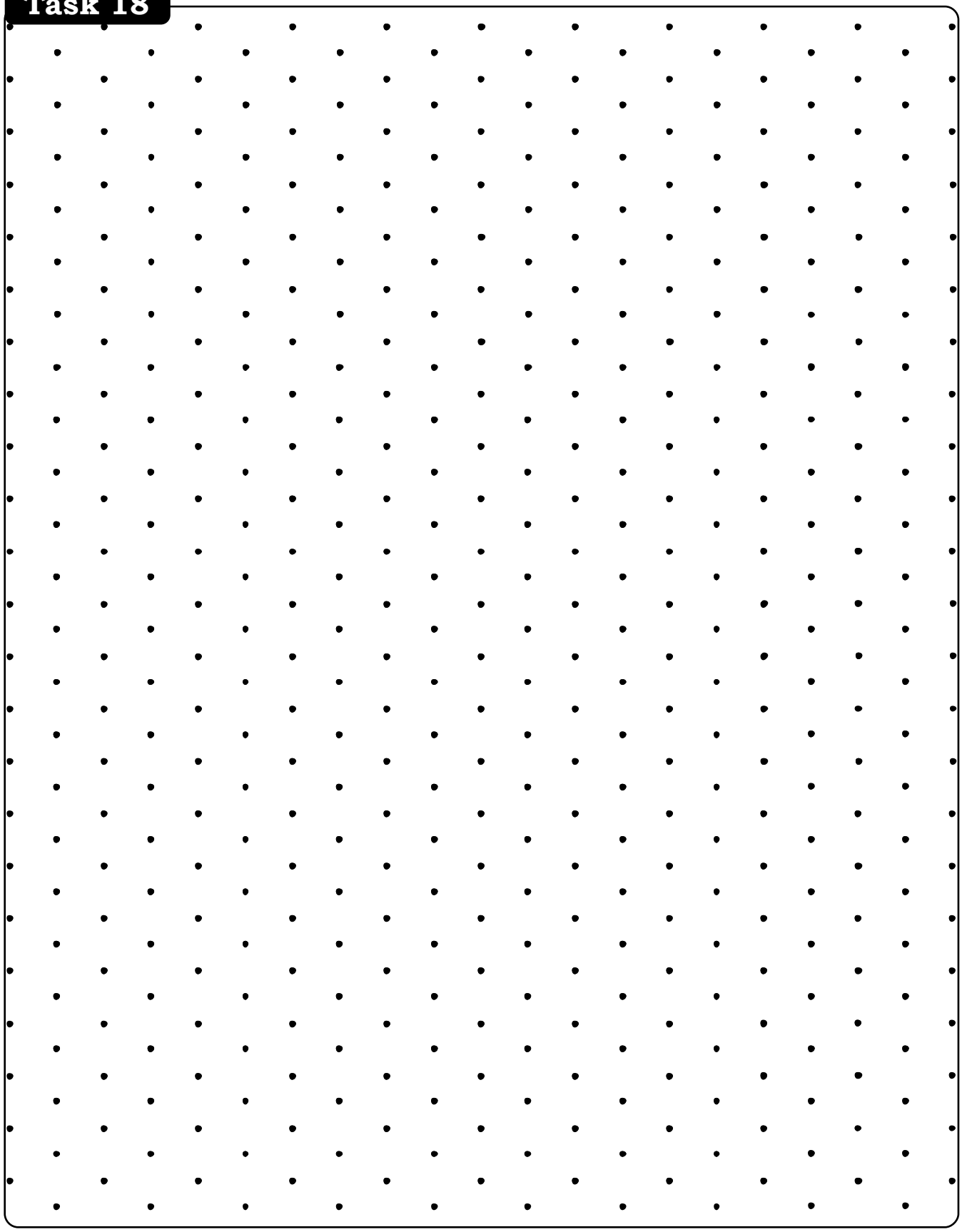
Measurement

Isometric Paper

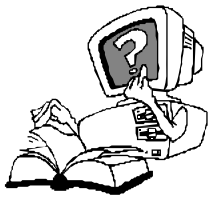
Worksheet 14

Name: **Class:**

Task 18



Understanding time 'units':



Sharon worked for 14 days on a homework project. Bill worked on his project for 2 weeks. Who took the longer time?

Answer: Both worked the same time on their projects.

Heather completed a run in 90 minutes and Jack finished in $1\frac{1}{2}$ hours.

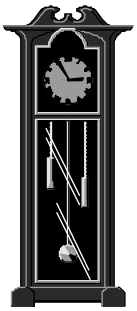
Who took the shorter time?

Answer: Both ran for the same time.

These examples illustrate that time can be expressed in different ways, and mean the same 'time'.

Task 19

1. How many minutes in 120 seconds?
2. How many minutes in 360 seconds?
3. How many minutes in 270 seconds?
4. How many seconds in 9 minutes?
5. How many seconds in 25 minutes?
6. How many seconds in $8\frac{1}{2}$ minutes?



7. How many minutes in 5 hours?
8. How many minutes in $8\frac{1}{2}$ hours?
9. How many minutes in $6\frac{1}{4}$ hours?
10. How many hours in 5 days?
11. How many hours in $2\frac{1}{2}$ days?
12. How many hours in 1 week?

13. How many days in 15 weeks?
14. How many days in $10\frac{1}{2}$ weeks?
15. How many weeks in 84 days?
16. How many weeks in $52\frac{1}{2}$ days?
17. How many days in August?
18. How many days in January?
19. How many weeks in $\frac{1}{2}$ a year?
20. How many years in a decade?

21. John cannot play sport for 4 weeks due to an injury. If he has already had 13 days rest, how many more days before he can start playing?

22. A movie is $2\frac{1}{2}$ hours long. If it has already been going for 35 minutes, how many more minutes before the movie is finished?

23. Peter is baking a cake that must cook for $4\frac{1}{2}$ minutes on high in a microwave. If it has already been cooking for 140 seconds, how long before it is cooked?

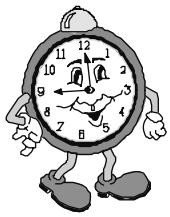
24. During March, April, May and June, the sports team is going overseas on tour. How many days will they be away on tour?

Task 20

In-class or homework investigation.

Why does time have such unusual 'units'?
Example: a day is 24 hrs, a year is 365 days and a leap year is 366 days.
Investigate this and other time 'units'.

Understanding time; What is the time?

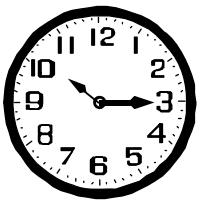


Being able to tell the time is an important skill.

Example: Karen's cricket game starts at a quarter past ten in the morning.

Draw a clock face to show where the hands would be to show this time.

Answer:



What is another way of describing this time?

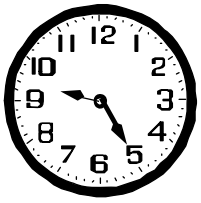
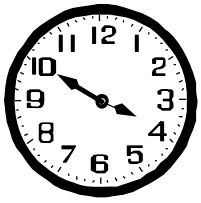
Answer: 10:15 a.m. or digital time. **10:15**

Task 21

A clock with hands shows **analogue time** and if time is shown as numbers it is called **digital time**.
Draw clock faces to show these digital times as **analogue times**.

1. **11:30** 2. **08:15** 3. **04:50** 4. **09:35** 5. **10:25**

What is the time shown on these clock faces? Write your answers as **digital time**.

6. 
7. 
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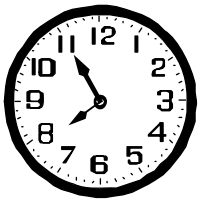
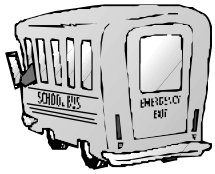
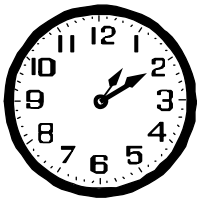


This clock shows the time that Rangi catches the school bus.

11. What time does Rangi catch the bus?
12. If the bus takes 35 minutes to arrive at school, what will the time be when he arrives at school?
13. **Draw** a clock to show this time.



14. Mary played a round of golf in $3\frac{1}{2}$ hours. The clock shows the time she finished playing, which was in the afternoon. What time did she finish playing?
15. What time did she start the game of golf?



08:45

16. This clock shows the time that Jason arrived at school. At quarter past ten, the class is going on a field trip. How long before the class goes on the field trip?
17. If the field trip takes 2 hours 20 minutes, at what time will they return to school?

18. In a rugby match, each half is 40 minutes and the half-time break is 10 minutes. How long will the game take, including the break? (Answer in hours and minutes)
19. If the game started at 2:35 p.m., what time will it finish?

02:35

20. Jim ran twice around the rugby field. At the end of the first lap, his time was 4 minutes and 20 seconds. At the end of his second lap, his time was 9 minutes 35 seconds. How long did Jim take to run the second lap?

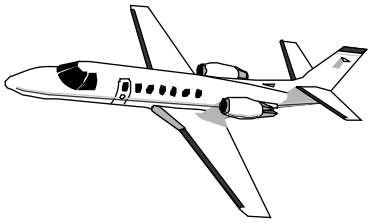
Reading and understanding tables involving time:

The small airline has flights from Christchurch to Greymouth. Part of the timetable is shown below.

CHRISTCHURCH - GREYMOUTH				
Day	**Depart**	**Arrive**	**Flight**	**Plane**
Monday	10:20 a.m.	11:10 a.m.	CG20	HS7
Monday	3:15 p.m.	4:05 p.m.	CG25	HS7

At what time did the afternoon flight leave Christchurch?

Answer: 3:15 p.m.



How long is the morning flight from Christchurch to Greymouth?

Answer: The difference between 10:20 a.m. and 11:10 a.m. is 50 minutes.

What other information is shown in this table?

Task 22

This table shows the times high tides occurred and how high the tide was, at Lyttelton Harbour during one week.

Lyttelton Harbour: Time and Height of High Tides				
Day	**a.m.**	**Height**	**p.m.**	**Height**
Fri 1st	4:27	1.9m	4:59	2.4m
Sat 2nd	5:26	2.1m	5:59	2.2m
Sun 3rd	6:29	2.0m	6:01	2.3m
Mon 4th	7:32	2.2m	8:02	2.4m
Tue 5th	8:33	1.9m	9:00	2.3m
Wed 6th	9:31	2.1m	9:56	2.2m
Thu 7th	10:27	2.2m	10:52	2.3m

1. On Friday 1st, one high tide was at 4:27 a.m. When was the other high tide?
2. On Monday 4th, one high tide was 2.2 metres. How high was the other high tide?
3. On what day and time was there a 2.0 metre high tide?
4. On what day was there a high tide at 9:56 p.m. and how high was the tide?
5. How long between the high tides on Tuesday 5th?

Stop Number	Time
1	7:30
2	7:41
3	7:49
4	7:55
5	7:58
6	8:05
7	8:17
School	8:30

On a country school bus route, there are seven stops before the bus reaches the school at 8:30 a.m.

6. If Keith is at stop 4, what time will he be picked up?
7. If Jenny is picked up at 7:49, what stop was she at?
8. Andrew rides on the bus for 32 minutes before he reaches school. At what stop was he picked up from?
9. Gail is picked up from stop 2. How long is her bus ride to school?
10. The bus leaves school at 3:10 p.m.
    Draw up a table showing the times that the bus will reach the 7 stops, as it drops off the pupils.

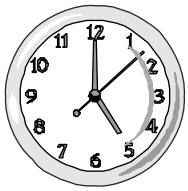
Task 23

During a school day you do lots of different activities.

Example: Maths,
English,
Science,
Art, Social Studies, playing sport, playtime, lunchtime, etc.

Your task is to **draw up a timetable** for one **school day**, showing what you did and at what time.

Measuring time:



For some activites, measuring how long it takes is important.

Example: Jenny has a 'sweep' hand on her analogue watch that goes once around in 60 seconds or 1 minute.

How many times does it go around to measure $2\frac{1}{2}$ minutes?

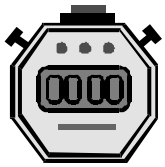
Answer: The 'sweep' hand goes around $2\frac{1}{2}$ times.

11:3020

Many digital watches also display the seconds.
On this display, the number of seconds is 20.

What will the display be if 75 seconds is added to this time?

Answer: **11:31**35



Task 24

1. What is the name of the time measuring instrument used to measure time accurately, such as for running races?

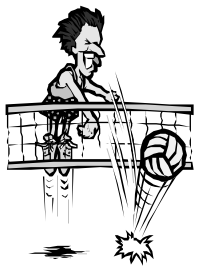
This table shows the time taken for runners in a 200 metre race.

Lane	Time (sec)
1	32.5
2	29.4
3	31.6
4	33.0
5	29.1
6	31.9
7	35.1
8	33.6

2. What was the fastest time for the race?
3. What was the slowest time for the race?
4. Write these times in order of the fastest to the slowest.

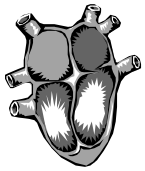
Below are some time measuring activities that could be attempted or you may come up with one of your own. Use a stop watch, the sweep hand of an analogue watch or the seconds of a digital watch.

5. Record the time it takes pupils in your class to run the same distance, such as 50 metres across the field.



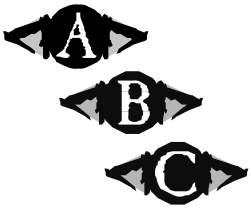
6. How long does it take you to bounce a ball 20 times?

   Working in a small group or as a class, record the time taken to bounce a ball 20 times.



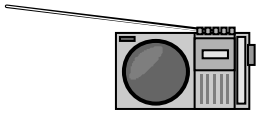
7. What is your heart beat per minute? (your pulse)

8. Make a paper dart. Record the time of its flight. Repeat several times.

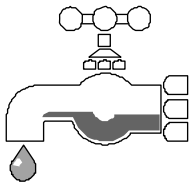


9. How long does it take you to recite the alphabet?

10. As a homework activity, record the length of your favourite songs on the radio.



Changes over time:

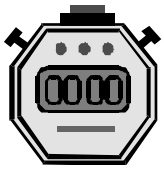


As time goes by, many things change. The grass grows, the tides go up and down, etc.

Example: A cold tap was left dripping. Each hour 2 litres of water drips from the tap.

How much water would drip from the tap in 3 hours?
How long before 10 litres of water had dripped from the tap?

Answer: Water drips at 2 litres per hour, therefore 6 litres would drip in 3 hours.
It would take 5 hours for 10 litres to drip from the tap.



Task 25

When you exercise, your heart rate will go up. To take your pulse or heart rate, means to count the number of heart beats for a given period of time. *Example:* 70 beats per minute.

Time	Heart beats in 15 seconds
Stopped running	30 beats
After 1 minutes rest	27 beats
After 2 minutes rest	21 beats
After 3 minutes rest	18 beats
After 4 minutes rest	16 beats
After 5 minutes rest	15 beats

Karen ran around the school playgrounds and when she stopped she started recording her heart beat by counting her pulse for 15 seconds at a time. Each minute, for 5 minutes, she counted her pulse again. Her results are shown in this table.

1. How long did Karen count her heart beats for?
2. What would you multiply her heart rate numbers by so that her heart rates were in beats per minute?
3. **Draw** a new **table** with the same column for **'time'**, but a new column for **'Heart beats in 1 minute'**.
4. What was Karen's heart rate when she stopped and after 5 minutes rest?
5. What was the change in heart rate during this time?

Task 26

In-class or homework activity.

Measuring task involving time.

Leaving a tap dripping wastes water. Imagine how much water you could waste if a tap was left running for some time or even when you are cleaning your teeth.

Find a container that will fit under a tap. *Example:* A 2 litre ice cream container.

Follow these steps:

1. Place the container under the tap to catch the water.
2. Turn the tap on slightly for 10 seconds. Do not have the tap on very hard.
3. Estimate the volume of water you have collected or work out the volume accurately using a measuring jug. Answer in millilitres or litres.
4. Multiply your volume of water (mL) by 6, to change your answer to millimetres per minute.
   Example: If you collected 60mL in 10 seconds, 60 × 6 = 360mL.
   This means that 360mL of water would be lost in 1 minute.
5. Using your information, how much water would be wasted if the tap was left running for **10 minutes, 1 hour, 1 day** and **1 week**?
   If your answers become big, can you convert them to litres?

Remember to save water by turning off taps.

'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.

Worksheet 1

Introduction:

The topic of Measurement is concerned with estimating, measuring and demonstrating knowledge of the basic units of length, mass, area, capacity and temperature. Developing concepts of time through everyday situations and demonstrating the ability to convert between analogue and digital time, and vice versa.

Introduction to 'Measurement':

Have you ever considered what it would be like without 'standard' measurement 'units'? In New Zealand the metric system is the most common measure system in use. Every day pupils perform measurement tasks without giving it a thought. *Example:* They might have 250mL of milk at breakfast, but they just think of it as a cup full.

Task 1 allows pupils to create there own ruler, using parts of their hand. Before there was a 'standard' system, people would have created such measuring instruments. This task is designed to highlight the difficulties of creating a system for measuring length, where there is no consistency between units. It also gives an opportunity to explore other parts of the body that can be used for measuring length.

Task 2. is concerned with measurement systems other than the metric system, especially measurement systems used in other cultures. The Imperial system is one such system.

Task 1

1 to 5, no answers given.

6. Answers will vary because of different hand sizes.
7. As the rulers are different sizes, answers will vary. If you had to recreate a measurement, it would not be possible unless you used the same ruler each time.
8. For short distances you could use parts of your hands / fingers, the distance from you elbow to your finger tips, an out-stretched arm, your feet, the length of your body etc. For longer distances you could use your feet or take long strides etc.
9. The major difficulty with using parts of the body is that there is no consistency between the length of body parts, therefore only approximate answers can be given. *Example:* The classroom is 21 feet long using Jason's feet, but is 23 feet long using Jackie's feet.

Task 2

Before the Metric system was adopted in New Zealand, the Imperial system was used. The Imperial system was appointed by statute to be used throughout the United Kingdom in 1838.
Some of the units for this measurment system include ....

Length: inches, feet, yard, chain, furlong, mile, league.
Weight: ounces, pound, stone, hundred weight, ton
Volume: fluid ounces, gill, pint, quart, gallon

The relationship between the various Imperial units is not as simple as those for the Metric system

Example:

12 inches = 1 foot	3 feet = 1 yard	22 yards = 1 chain
220 yards = 1 furlong	8 furlongs = 1 mile	1760 yards = 1 mile
5280 feet = 1 mile	3 miles = 1 league	
16 ounces = 1 pound	14 pound = 1 stone	
4 fluid ounces = 1 gill	4 gills = 1 pint	2 pints = 1 quart
4 quarts = 1 gallon		

There are many other units, but these were perhaps some of the most common. The Imperial system is still used in many countries.

Worksheet 2

Exploring length; how long is that?

Having completed task 1 whereby pupils made there own ruler, this worksheet introduces the metric units used for measuring length. The basic unit is the **metre**. All other length units are based around the metre. The prefix indicates the size of the measurement unit.

Example:

millimetre	(1000 × smaller than 1 metre),	**mm**
centimetre	(100 × smaller than 1 metre)	**cm**
decimetre	(10 × smaller than 1 metre)	**dm**
metre		**m**
decametre	(10 × larger than 1 metre)	**Dm or dam**
hectometre	(100 × larger than 1 metre)	**hm**
kilometre	(1000 × larger than 1 metre)	**km**

The most commonly used length units are **mm**, **cm**, **m** and **km**.

The prefixes highlighted above are common to all metric units, for length, mass and capacity.

Task 3 is designed to help identify the length units and their abbreviations. Having learnt these units, pupils are then required to choose which unit would be best to use, if measuring the length of various items.

Being able to convert between units is an important skill. As the metric system is based on 10, 100 or 1000, conversion can be completed by either multiplying or dividing by these numbers. As pupils become more confident with the metric system, conversion can be made by moving the decimal point, without actually having to do the multiplication or division required. Word problem combine the skills with practical problems.

Task 3

1. mm 2. cm 3. m 4. km 5. 1000m 6. 100cm 7. 1000mm 8. 10mm
9. m 10. cm or mm 11. mm 12. km 13. m 14. m 15. mm 16. cm or mm 17. m 18. km
19. m 20. mm 21. - 22. 200cm 23. 250mm 24. 7km 25. 6000m 26. 3m 27. 85cm
28. 4.6m 29. 6300m 30. 1500mm 31. 4.8cm 32. 9.9m 33. 0.8m, 80cm
34. 255km, 255000m

Worksheet 3

Word problems involving length measurements:

Adding or subtracting length measurements can only be done if the units are the same.

Example: 60mm + 5 cm can only be added once the length units are converted to the same units.
This question could be done two ways.
Either 60mm + 5 cm becomes 6cm + 5cm or 60mm + 50mm.
The answer would be 11cm or 110mm.

Task 4 is designed to give pupils practice at solving simple word problems and word problems that require the units to be converted to a single unit, before the problem can be solved.

Task 4

1. 8cm 2. 410cm 3. 4.1m 4. 990km 5. 135km 6. 4000m + 2300m = 6300m
7. 5.6m + 3.5m = 9.1m 8. 450mm – 230mm = 220mm 9. 460cm – 160cm = 300cm
10. 7.2km + 3.2km = 10.4km 11. 560mm – 265mm = 295mm 12. 13.5km 13. 11.45m 14. 161mm

Worksheet 4

Exploring capacity; how much will it hold?

How much something will hold is called its **capacity** or **volume**.

The basic unit for capacity (volume) is the **litre**.

As with the units for length, the same prefixes are used to describe other units for capacity that are smaller, **millilitre**, or larger, **kilolitre**, than the basic unit. Millilitre and litre are the two most common units; however kilolitre has been included to provide pupils with more opportunities to convert between these units. The abbreviation for litre is a capital 'L'. Other abbreviations would therefore be mL or kL. A small letter 'l' can be confused with the number one, hence the use of the capital letter.

Task 5 is designed to help identify the capacity units and their abbreviations. Having learnt these units, pupils are then required to choose which unit would be best to use, if measuring the capacity of various items. Converting between units and simple word problems are also included.

Task 5

1. mL 2. L 3. kL 4. 1000L 5. 1000mL 6. L 7. mL 8. kL 9. mL or L 10. mL
11. L or kL 12. L 13. L or kL 14. L 15. mL 16. L 17 - 18. 3000mL 19. 6kL
20. 9000L 21. 5L 22. 1200mL 23. 1.9L 24. 3600L 25. 6.5kL 26. 400mL 27. 6 days
28. 30.6L

Worksheet 5

Exploring mass; how heavy is that?

How heavy something is, is called its **mass** or **weight**.

The basic unit for mass (weight) is the **gram**.

As with the units for length and capacity, the same prefixes are used to describe other units for mass that are smaller, **milligram**, or larger, **kilogram**, than the basic unit. An additional unit, the **tonne** is used for very heavy weights. A metric tonne could also be called a megagram as it is 1000000g or 1000kg.

Task 6 is designed to help identify the mass units and their abbreviations. Having learnt these units, pupils are then required to choose which unit would be best to use, if measuring the mass of various items. Converting between units and simple word problems are also included.

Task 6

1. mg 2. g 3. kg 4. t 5. 1000g 6. 1000mg 7. 1000kg 8. mg 9. tonne 10. g
11. kg 12. mg 13. g 14. kg 15. kg 16. tonne 17. g or kg 18. tonne 19. mg 20. -
21. 7000mg 22. 6t 23. 4000g 24. 5g 25. 1200mg 26. 1200kg 27. 3600g 28. 6.5kg
29. 9.9kg 30. 10g 31. 5.7t 32. 5700kg

Worksheet 6

Word problems involving capacity and mass:

As with length problems involving different units, adding or subtracting capacity or mass units can only be done if the 'units' are the same.

Task 7 is designed to give pupils practice at simple capacity and mass problems as well as practice at converting between various units before completing a practical word problem.

Task 7

1. 68.3kg 2. 64.7kg 3. 3900mL, 3.9L 4. 67mL 5. 6000mL + 4300mL = 10300mL
6. 4.9g + 2g = 6.9g 7. 8t + 1.6t = 9.6t 8. 6.3kg – 4.5kg = 1.8kg 9. 5.6kL + 3.7kL = 9.3kL
10. 3400mL – 1600mL = 1800mL 11. 28000kg = 28t 12. 2100mL = 2.1L
13. 500 + 1200 + 600 + 750 + 2400 = 5450g, 0.5 + 1.2 + 0.6 + 0.75 + 2.4 = 5.45kg
14. 0.9 + 1.3 + 1.1 + 0.8 + 0.95 + 1.4 + 0.85 = 7.3L, 900 + 1300 + 1100 + 800 + 950 + 1400 + 850 = 7300mL
15. 600 + 1300 + 1100 = 3000g, 0.6 + 1.3 + 1.1 = 3kg 16. $4.50 + $4.50 + $3.00 = $12.00

Worksheet 7

Exploring temperature; is that hot or cold?

One of the earliest temperature scales was that devised by the German physicist Gabriel Daniel **Fahrenheit**. According to this scale, at standard atmospheric pressure, the freezing point (and melting point of ice) is 32° F, and the boiling point is 212° F. The **centigrade**, or **Celsius scale**, invented by the Swedish astronomer Anders Celsius, and used throughout most of the world, assigns a value of 0° C to the freezing point and 100° C to the boiling point. Hence the name centigrade, as there are 100 divisions between freezing and boiling temperature of water.

Task 8 is designed to give pupils practice at finding new temperatures given a change in temperature. A thermometer has been drawn to assist pupils. Temperature problems have answers above or below 0°C, therefore providing an opportunity to introduce negative numbers.

Task 8

1. therometer 2. mercury 3. 37° C (98.6° F) 4. 8°C 5. 11°C 6. 17°C 7. 6°C 8. 0°C
9. -6°C 10. 2°C 11. There was a temperature drop of 7°C which means it became colder.
12. 13°C in temperature 13. 11°C change in temperature
14. It was a temperature drop of 10°C, with a frost occurring that night.

Worksheet 8

Reading scales:

Being able to measure something is one skill, but knowing how to read the 'scale' on the measuring instrument is also very important. The accuracy of a measurement is dependant on how detailed a scale might be. The degree of accuracy required will depend on what you are measuring the item for. *Example:* A length of string to tie around a parcel does not have to be as accurately measured as a new pane of glass to replace a broken window.

Task 9 is designed to give pupils practice at reading various scales. Note that some of the pointers are half way between 'marks' on the scales. The protractor 'scales' have been introduced. As an extension activity, pupils could be given angles to measure and / or draw.

Task 9

1. A = 11mm, B = 16mm, C = 24mm, D = 5.5mm 2. A = 1.5cm, B = 1.1cm, C = 0.4cm, D = 2.15cm
3. A = 1.5m, B = 2.2m, C = 0.5m, D = 0.9m 4. 50g 5. 145 – 50 = 95g 6. 25g 7. 250mL
8. 200mL 9. how fast the car is going, speed 10. kilometers per hour 11. 70km/hr 12. 30km/hr
13. 56872km 14. degrees 15. two, one going from left to right and the other going from right to left

Both scales measure angle sizes from 0 to 180 degrees

16. A = 90°, B = 50° or 130°, C = 55° or 125°, D = 33° or 147° E = 29° or 151°

Worksheet 9

Estimating and measuring objects:

Before modern measuring instruments were invented, 'balance' type scales were in use, starting with holding two different objects, one in each hand to determine which object was heavier. Being able to estimate the length, mass or capacity of an object can be helpful.
Example: Will this piece of wood be long enough to repair the fence? Will this board be able to support my weight? Will this container be able to hold all this liquid?

Task 10 is designed to give pupils practice at estimating the length, mass or capacity of given objects. Provide 'everyday' objects for this task. The objects could be placed at various positions around the classroom so that pupils can look at them and pick them up, to assist with their estimation. Once all pupils (groups) have completed their estimates, the objects can be accurately measured using an appropriate measuring instrument. Rulers, tape measures, bathroom scales, kitchen scales, measuring jugs or measuring cylinders can be used.

Task 11 is a fun activity whereby pupils create a hanging 'balanced' mobile for the classroom. The cards for the mobile have the most common metric units on them, to reinforce the abbreviations used. The art of balancing the various arms of the mobile will give pupils an idea of the difficulty with this method of weighing.

There are no model answers for **Tasks 10** & **11**.

Worksheet 10

Measuring qualitative data:

Simple scales can also be used to display feelings or opinions about many issues.

Task 12 is designed to give pupils practice understanding qualitative scales and creating their own qualitative scales. This illustrates that not all measurements need to be accurate, such as those obtained when using rulers etc.

Task 12

1. 3 pupils 2. ok 3. food B 4. food A

5. Food A is sweet and quite hot, Food B is hot and a little sour, Food C both sour and cold, Food D is cold and a little sweet, Food E is sour and warm

Worksheet 11

Estimating and measuring accurately:

The units used for measuring length will depend on what you are measuring and the accuracy required. Be able to estimate distances can be a valuable skill, such as when crossing a busy street.

Task 13 is designed to give pupils practice estimating the length of various lines to the nearest centimetre. The lines are then to be measured to the nearest centimetre and to the nearest millimetre. Pupils also gain practice at drawing lines, given their length.

Task 14 is a practical exercise involving estimation and measuring. The task is to estimate the length of tape required to mark out a tennis or netball court. Imagine this court is to be marked out inside a hall for a special game. If these courts are not at your school, any court will do. If long tape measures are not available, pupils can use their own feet. Pupils will employ 'problem solving' skills as they work out which lines they need to know the length of, so that they can calculate the total length of all lines. Drawing a diagram of the court will help.

To simplify this task, estimations and measurements could be restricted to the perimeter of the court.

No model answers are provided for Task 14.

Task 13

1. - 2. - 3. - 4. - 5. line lengths to the nearest cm: 1 = 5cm, 2 = 9cm, 3 = 16cm, 4= 10cm
6. line length to the nearest mm: 1 = 50mm, 2 = 92mm, 3 = 157mm, 4 = 103mm (all ± 1 mm)
7.. check lines 8. line AB on diagram 2

Worksheet 12

Distance around the outside:

The **perimeter** is the distance around the outside of a shape. The idea of starting at a corner and walking around a court or playing field until you are back where you started, is a good way to illustrate perimeter. Task 14 helps to introduce this idea.

Task 15 is designed to give pupils practice finding the perimeter of a shape by counting squares along each side, then by adding given side measurements. Word problems offer practical examples of perimeter questions.

Task 16 is a practical exercise involving estimation and measuring of the sides of shapes and using the data collected to calculate the perimeter.

Task 15

1. 16cm 2. 180mm 3. 90mm 4. 14.4cm 5. l0m 6. 110m 7. 1500m 8. 1.5km 9. 2 laps
10. 4500m or 4.5km

Task 16

1. - 2. A4 paper is 210mm by 297 mm, perimeter = 1014mm 3. - 4. - 5. -

Worksheet 13

'If you can paint it. it has AREA':

The **area** of a shape is the amount of **surface** it takes up. Area is given in square units. Using the metric system, the units could be square mm, cm, m or km. Square cm is written as cm^2. For large land areas, square hectares (1 hectare = 1000m x 1000m) are used.

Task 17 is designed to give pupils practice finding the area of an unusual shape by counting squares, followed by finding the area of regular shapes by also counting the squares. The relationship between the length of the sides and the shapes area is explored. **Area for squares and rectangles = base x height.** I encourage you to use the words 'base' and 'height'. Pupils are then given the opportunity to find areas without having to count all the squares, but by using this simple rule.

Task 17

1. approxiamtely 15 to 16 squares 2. approximately 15 to 16 squares 3. 6 x 7 = 42 squares
4. 15 sq cm 5. 24 sq cm 6. 24 sq cm 7. Area = base x height (for squares and rectangles)
8. 60 sq m 9. 70 sq m 10. 300 sq m

Worksheet 14

'If you can fill it. it has VOLUME':

The volume (capacity) of containers is the amount of liquid (air) that these containers can hold. Volume is also defined as the amount of space a 3D shape takes up. Using building blocks (cubes) is a good way to illustrate volume. 3D shapes can have the same volume, but be different shapes.

Task 18 is designed to give pupils practice finding the volume of unusual shapes by counting cubes, illustrated by diagrams on isometric paper. Using some isometric paper (MASTER provided), pupils are to draw 3D shapes with known volumes. The idea that volume = base x height x depth is introduced by way of a challenge.

Task 18

1. 9 cubes 2. 11 cubes 3. 18 cubes 4. 21 cubes 5. - 9. 24 blocks

Worksheet 15

Understanding time 'units':

The units for time are not as easy to remember as metric units as they are not based around the number 10. As with measurements for length, weight and volume, the same time can be expressed in different units.

Task 19 is designed to give pupils practice at converting time into an equivalent time, but utilising different units. *Example:* 1 minute = 60 seconds

Task 20 is an in-class or homework investigation about the orgin of time units.

Task 19

1. 3 minutes 2. 6 minutes 3. $4\frac{1}{2}$ minutes 4. 540 seconds 5. 1500 seconds 6. 510 seconds
7. 300 minutes 8. 510 minutes 9. 375 minutes 10. 120 hours 11. 60 hours 12. 168 hours
13. 105 days 14. $73\frac{1}{2}$ days 15. 12 weeks 16. $7\frac{1}{2}$ weeks 17. 31 days 18. 31 days
19. 26 weeks 20. 10 years 21. 15 days 22. 115 minutes 23. 130 seconds 24. 122 days

Task 20

Here is some information about time that may be of help.

Three methods of measuring time are in use at present. The first two methods are based on the daily rotation of the earth on its axis. These methods are determined by the apparent motion of the sun in the sky (solar time) and by the apparent motion of the stars in the sky (sidereal time). The third method of measuring time is based on the revolution of the earth around the sun (ephemeris time).

The basic time units are noted below.

The measurement of a **year** is based on one revolution of the earth around the sun and is called a seasonal, tropical, or solar year. A solar year contains 365 days, 5 hr, 48 min, and 45.5 sec. A standard year is 365 days, so every 4 years there is leap year to make up for the fact the a year is slightly more than the 365 days.

A **month** was originally calculated by ancient peoples as the time between two full moons, or the number of days required for the moon to circle the earth (29.5 days).

The **week** was derived from the Judeo-Christian tradition requiring rest from labour every seventh day. It is not based on a natural phenomenon. The Romans named the days of the week in honour of the sun, moon, and various planets.

A **day** is the average time required for one rotation of the earth on its axis.

A **minute** (Latin *minutus,* "small") is a unit of time equal to one-sixtieth of an hour, or 60 seconds.

Add your own information about time units in the space below.

Worksheet 16

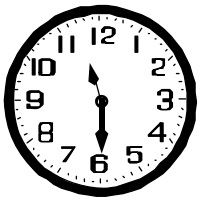
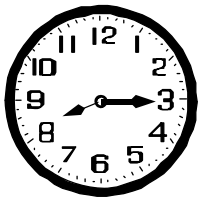
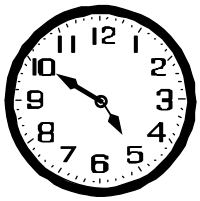
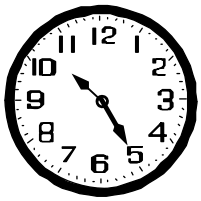
Understanding time; What is the time?

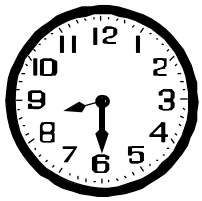
Being able to tell the time and convert between analogue and digital time is an important skill. Most employers will not be impressed with employees who are repeatedly late or who do not meet deadlines.

Task 21 is designed to give pupils practice at reading the time on analogue clock faces and digital time displays. Questions involve converting between the two forms of displaying time. Additional word problems involve adding or subtracting time from a given time. The time displayed on the clock faces and as digital time is not identified as a.m. or p.m. time. It is worth reminding pupils about the correct usage of a.m. and p.m. Also remind pupils that both forms of time could be stated in other ways such as 05:50 is the same as 10 to 6 etc.

Although not required at this level, digital time could be expressed as 24 hour time. *Example:* 4:25 p.m. could be expressed as 16:25.

Task 21

1. 
2. 
3. 
4. 
5. 

6. 09:25 7. 03:50 8. 10:05 9. 11:35 10. 12:20 11. 7:55 12. 08:30 13. 
14. 10 past 1 or 01:10 or 1:10 p.m. 15. 20 to 10 or 9:40 or 9:40 a.m.
16. 1½ hours 17. 12:35 or 25 to 1 or 12:35 p.m. 18. 1 hour 30 minutes
19. 04:05 or 4:05 p.m. or 5 past 4 20. 5 minutes 15 seconds

Worksheet 17

Reading and understanding tables involving time:

Many businesses use tables or charts to display information involving time. *Example:* bus timetables, flight timetables, high and low tide charts. The purpose of the table or chart is to display the information in such a way that it is easy to read and understand.

Task 22 is designed to give pupils practice at finding information in a table or chart, making time calculations as required. Pupils are also required to create a new table given the information.

Task 23 is designed to give pupils practice at creating their own 'ideal' timetable for a school day. There are no model answers for Task 23.

Task 22

1. 4:59 p.m. 2. 2.4m 3. Sunday 3rd at 6:29 a.m.
4. Wednesday 6th, 2.2m 5. 12 hours 27 minutes 6. 7:55 a.m.
7. stop 3 8. stop 5 9. 49 minutes 10.

Step Number	Time
School	3:10
7	3:23
6	3:35
5	3:42
4	3:45
3	3:51
2	3:59
1	4:10

Worksheet 18

Measuring time:

Many analogue watches have a 'sweep' hand that measures seconds. Digital watches often display the seconds as small numbers to the right of the display. Both of these features allow these watches to be used for measuring time accurately.

Task 24 is designed to give pupils practice at using either / or the 'sweep' hand of an analogue watch and / or the seconds displayed on a digital watch to record how long a given activity will last. Some ideas as to practical activities that can be conducted have been listed, but pupils may come up with ideas of their own.

Task 24

1. stop watch 2. 29.1 seconds 3. 35.1 seconds 4. 29.1, 29.4, 31.6, 31.9, 32.5, 33.0, 33.6, 35.1

Worksheet 19

Changes over time:

As time marches on, so too do things change. Pupils grow, flowers grow or die, the grass grows etc.

Task 25 is designed to give pupils practice at interpreting the changes in 'heart rate' of a person after they have stopped exercising. The data for this is displayed in a table, from which statements and calculations can be made.

Task 26 is one example of an activity that involves changes with respect to time. In this case it is about changes in the volume of water lost as a tap runs. Pupils are to measure the volume of water lost in a given time. From this information pupils can calculate the volume of water lost, if this situation continued. Avoid having the tap on for too long, so as not to waste too much water.

Other situation where examples of changes in time occur, that could be investigated include ...
measuring temperature changes as hot water cools,
germinating some wheat seeds and measuring their growth daily,
etc.

The results collected can be graphed as a time-series graph. See the resource L3MS for details if unsure about drawing this type of graph.

Task 25

1. 5 minutes 2. multiply by 4 3.
4. 120 beats / minute
   and 60 beats / minute
5. change of 60 beats / minute

Time	Heart beats in 15 seconds	Heart beats per minute
Stopped running	30 beats	120 beats
After 1 minutes rest	27 beats	108 beats
After 2 minutes rest	21 beats	84 beats
After 3 minutes rest	18 beats	72 beats
After 4 minutes rest	16 beats	64 beats
After 5 minutes rest	15 beats	60 beats

Table of Contents for the Homework / Assessment Worksheet Masters for Measurement, Level 3

Measurement

L3MM

M1

Homework / Assessment Worksheet

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

A: 10 'Quick Questions'

1. 15.3 + 18.9 = ...
2. 2000 – 1268 = ...
3. 156 × 9 = ...
4. 840 ÷ 12 = ...
5. List the factors of 20
   .....
6. $6.35 × 8 = ...
7. What is the time on this clock?
   
   .....
8. Find 50% of $9.70
   .....
9. How many litres in 2.7kL? .....
10. What would 9 books at $2.60 each cost?
    .....

B: Length measurement units

Write the abbreviation for each length measurement unit.

1. millimetre = ...
2. centimetre = ...
3. metre = ...
4. kilometre = ...

Write in the missing length measurement units for these statements.

5. 1 m = 1000 .....
6. 1 m = 100 .....
7. 1 cm = 10 .....
8. 1 km = 1000 .....
9. 1000 mm = 1 .....
10. 1000 m = 1 .....

C: Converting between units

Fill in the missing numbers to make each statement correct, as you convert between length measurement units.

1. 2 m = ... cm
2. 40mm = ... cm
3. 400 cm = ... m
4. 4 km = ... m
5. 8000 m = ... km
6. 5000 mm = ... m
7. 5.6 m = ... cm
8. 58 cm = ... mm
9. 5300 m = ... km
10. 6.3 km = ... m
11. 610 cm = ... m
12. 6400 mm = ... m
13. 62.5 cm = ... mm
14. 865 mm = ... cm
15. 1.2 m = ... mm
16. 9750 m = ... km
17. 95 cm = ... m
18. 0.78 m = ... cm
19. 0.850 km = ... m
20. 0.25 cm = ... mm

D: What unit would you use?

Which measurement unit, millimetre, centimetre, metre or kilometre would you use to measure the following ...

1. the length of a shoe lace?
   .....
2. the distance between two cities? .....
3. the height of a power pole? .....
4. the distance you can throw a cricket ball?
   .....
5. the thickness of 20 sheets of paper?
   .....
6. the length of your arm?
   .....
7. the distance of a cross - country race?
   .....

E: Word problems

1. Jeff is making a four shelf bookcase using timber shelves and bricks. If the shelves are 1.3m long, how much timber will he require? .....

2. The school cross-country is five laps around the school grounds. If the race is 4500m, how long is each lap? .....

3. Kelly is going to bike between two towns that are 145km apart. In the first hour he bikes 23 km. Then he bikes 18km, 21km and 17km in the next three hours. How much further does he have to go? .....

4. Katie competed in a run / bicycle / run race. The first run was 2000m, the bicycle ride was 6km and the final run was 1000m. How far was the race? Give two answers.
   ..... m or ..... km

Comments: .....

Please sign: Parent / Caregiver

.....

.....

AWS

Measurement

L3MM

M1

Homework / Assessment Worksheet

2

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

A: 10 'Quick Questions'

1. 0.48 + 4.62 = ...
2. 800 – 563 = ...
3. 348 × 12 = ...
4. 540 ÷ 60 = ...
5. What are the first 5 multiples of 20?
   .....
6. $6.30 × 8 = ...
7. Convert 8:36 p.m. to 24 hour time
   [:]
8. Find ½ of $8.90
   .....
9. How many kilometres in 4700m? .....
10. What would 5 books at $4.85 each cost?
    .....

B: Mass and capacity units

Write the abbreviation for each mass (weight) and capacity (volume) measurement unit.

1. milligram = ...
2. gram = ...
3. kilogram = ...
4. tonne = ...
5. millilitre = ...
6. litre = ...

Write in the missing measurement units for these statements.

7. 1 g = 1000 .....
8. 1000 g = 1 .....
9. 1000 kg = 1 .....
10. 1 kg = 1000 .....
11. 1 tonne = 1000 .....
12. 1000 mL = 1 .....
13. 1 L = 1000 .....
14. 1000 L = 1 .....

C: Converting between units

Fill in the missing numbers to make each statement correct, as you convert between mass and capacity measurement units.

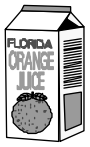
1. 4 g = ... mg
2. 6 L = ... mL
3. 5000 mL = ... L
4. 5 tonne = ... kg
5. 7000 g = ... kg
6. 9000 kg = ... t
7. 5.6 L = ... mL
8. 8600 mg = ... g
9. 4300 g = ... kg
10. 7300 g = ... kg
11. 0.850 kg = ... g
12. 3.6 t = ... kg
13. 0.7 L = ... mL
14. 8.6 g = ... mg

D: What unit would you use?

Which measurement unit, milligram, gram, kilogram, tonne, millilitre or litre would you use to measure the following ...

1. the volume of medicine on a spoon? .....
2. the weight of a packet of biscuits? .....
3. the capacity of a bucket?
   .....
4. the mass of a 3 storey building? .....
5. the weight of a feather?
   .....
6. the amount of milk added to a cup of milo?
   .....
7. the weight of 1000 grains of sand? .....
8. the volume of ink in a pen?
   .....

E: Word problems



1. A carton of fruit juice contains 740 mL. If Jeff buys 12 cartons of juice, how many millilitres of juice does he have? .....

2. A truck and its load weighed 13.4 tonnes. If the empty truck weighed 5.6 tonnes, how heavy was the load ? .....

Jenny measured the volume of water she used one day, as shown in this table.

washing	12.5L
cooking	3.4L
drinks	2.7L
shower	9.7L
garden	20.6L

3. How much more did she use on the garden than for cooking? .....
4. How many 300mL glasses of water did she drink? .....
5. How much water did she use that day? .....

6. Helen buys 1.2kg of meat for tea. If four people are to share this meat, how much meat does each person have to eat? Answer in grams. .....

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

Please sign:
Parent / Caregiver

AWS

Measurement

L3MM

M1 / M2

Homework / Assessment Worksheet

3

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

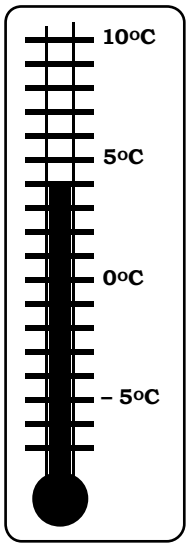
A: 10 'Quick Questions'

1. 65.3 + 56.8 = ...
2. 1000 – 752 = ...
3. 249 × 9 = ...
4. 360 ÷ 60 = ...
5. List the factors of 28 .....
6. $6.85 × 8 = ...
7. What is the time on this clock? .....

8. Find 50% of $7.90 .....
9. How many tonnes in 6500kg? .....
10. What would 9 books at $3.15 each cost? .....

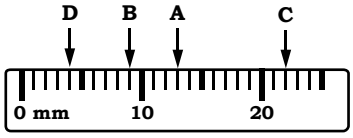
B: Temperature

1. The temperature given on television uses the symbol °C. What does °C stand mean? .....
2. What is the temperature on this diagram of a thermometer? .....
3. If the temperature is 2°C then rises 5°C, what is the new temperature? .....
4. If the temperature is 0°C then rises 8°C, what is the new temperature? .....
5. If the temperature is 8°C then falls 5°C, what is the new temperature? .....
6. If the temperature is 0°C then falls 7°C, what is the new temperature? .....
7. If the temperature is 2°C then falls 5°C, what is the new temperature? .....
8. If the temperature is –6°C then rises 8°C, what is the new temperature? .....

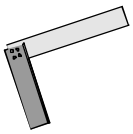


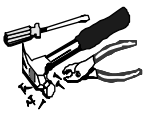
C: Reading scales

Study each example of a measurement scale and state the measurement given by the pointers A to D. Remember to include the units.

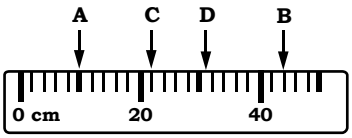


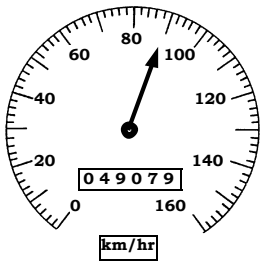
1. A = ...
2. B = ...
3. C = ...
4. D = ...





5. A = ...
6. B = ...
7. C = ...
8. D = ...





This is a diagram of the speedo of Mr Murray's car.

9. What does it measure? .....
10. What do the letters km/hr mean? .....
11. What speed is he going at the moment? .....
12. By how much will he have to decrease speed so that his car is travelling at 75 km/hr? .....
13. How far has Mr Murray travelled in his car so far? .....

D: Qualitative data

Pupils were asked to describe some food they were given.

1. Which food was described as hot and sour? .....
2. If Kelly does not like sour food, which foods can she eat? .....
3. Describe food C. .....
4. Describe food D. .....

Comments: .....

Please sign: Parent / Caregiver

AWS

Measurement

L3MM

M1 / M2

Homework / Assessment Worksheet

4

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

A: 10 'Quick Questions'

1. 0.85 + 1.39 = ...
2. 800 – 375 = ...
3. 508 × 11 = ...
4. 360 ÷ 120 = ...
5. What are the first 5 multiples of 30?
   .....
6. $8.65 × 8 = ...
7. Convert 5:48 a.m. to 24 hour time
   [:]
8. Find ½ of $14.50
   .....
9. How many millimetres in 2.8m? .....
10. What would 7 books at $6.85 each cost?
    .....

B: Drawing and measuring lines

Draw the following lines in the space provided.

1. line AB = 6cm
2. line CD = 45mm
3. line EF = 4.3cm
4. line GH = 68mm

Measure the following lines to the nearest centimetre.

5. line AB = ... cm
6. line CD = ... cm

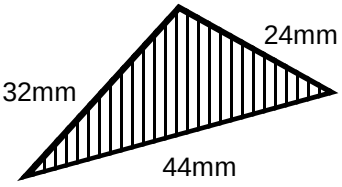
Measure the following lines to the nearest millimetre.

7. line EF = ... mm
8. line GH = ... mm

C: Perimeter of shapes

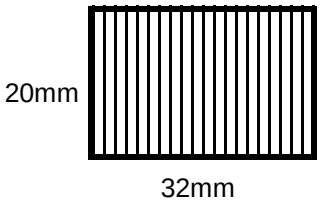
The distance around the outside of a shape is called the perimeter. Find the **perimeter** of these shapes.

1.



perimeter = ...

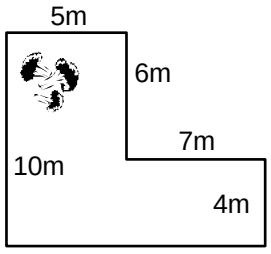
2.



perimeter = ...

D: Word problems

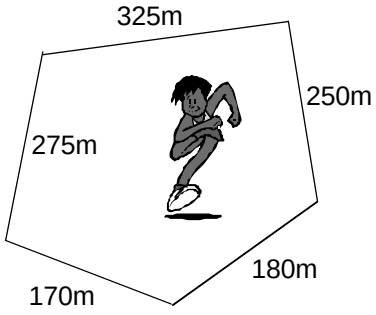
1. Mr Jones is building a fence on the sides and the back of his section. How long is the fence going to be?
   ..... + ... + ... = ...

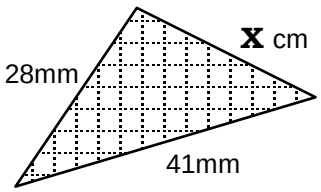


2. Mary wants to place a board around her garden. She drew a diagram and measured each side. Use her diagram to work out the perimeter of her garden.
   .....

The school cross-country race is 3 laps of the school grounds.

3. How far is one lap of the course? .....
4. How long is the 3 lap race?
   .....
5. Convert your answer to kilometres. .....





6. The perimeter of this shape is 94mm. How long is the side marked **X**?
   .....

Comments: .....

.....

.....

Please sign:
Parent / Caregiver

AWS

Measurement

L3MM

M1

Homework / Assessment Worksheet

5

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

A: 10 'Quick Questions'

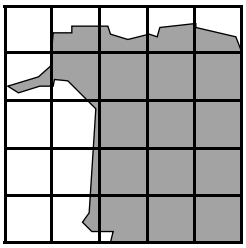
1. 1.59 + 12.98 = ...
2. 1000 – 845 = ...
3. 256 × 9 = ...
4. 840 ÷ 7 = ...
5. List the factors of 32
   .....
6. $7.25 × 9 = ...
7. What is the time on this clock?
   .....

8. Find 25% of $2.80
   .....
9. How many millimetres in 4.7cm? .....
10. What would 12 books at $2.65 each cost?
    .....

B: Calculating area

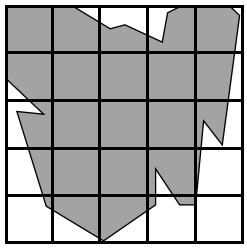
'If you can paint it, it has area', said Jane.
Estimate the area of these shaded shapes by counting the squares.

1.



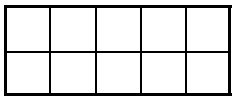
Estimated area = ... squares

2.

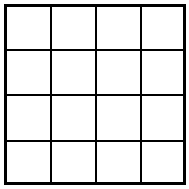


Estimated area = ... squares

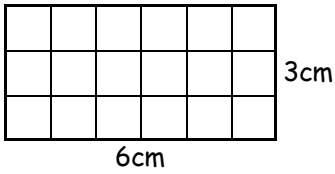
Calculate the area of these shapes.



3. ..... squares



4. ..... squares

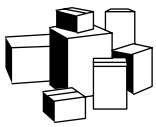


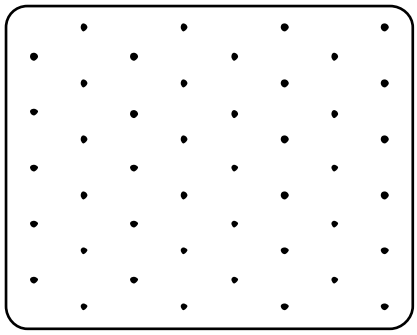
5. ..... sq cm

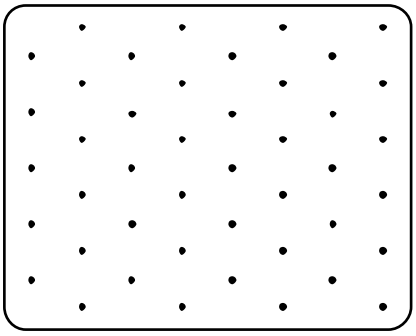
6. Mr Williamson is going to paint his fence.
   If the fence is 25 metres long and 2 metres high, what is the area to be painted?
   ..... square metres

C: Volume

Draw two different shapes that both have a volume of 5 cubes.

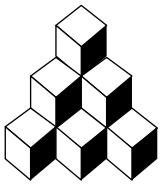


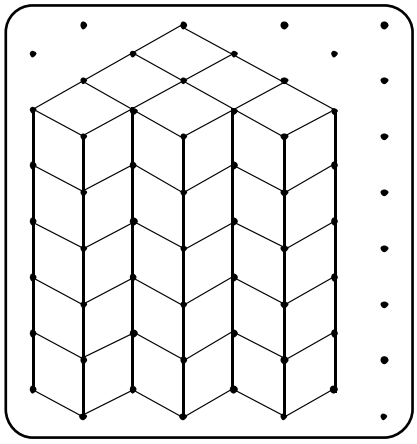




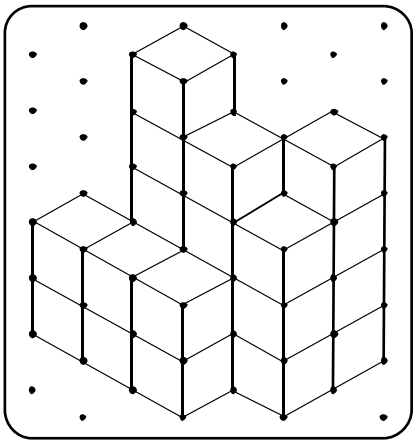
D: Calculating volume

"If you can fill it, it has volume', said Jack.
Calculate the **volume** for each diagram by counting the cubes. Give your answers in 'cubes'.
Remember to include the cubes you cannot fully see.





1. Volume = ... cubes



2. Volume = ... cubes

Comments: .....

.....

.....

Please sign:
Parent / Caregiver

AWS

Measurement

L3MM

M3

Homework / Assessment Worksheet

6

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

A: 10 'Quick Questions'

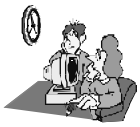
1. 0.32 + 15.90 = ...
2. 500 – 246 = ...
3. 219 × 12 = ...
4. 360 ÷ 90 = ...
5. What are the first 5 multiples of 7?
   .....
6. $2.50 × 8 = ...
7. Convert 2:45 p.m. to 24 hour time
   [:]
8. Find $\frac{1}{2}$ of $5.70
   .....
9. How many kilograms in 4700g? .....
10. What would 5 books at $2.25 each cost?
    .....

B: Understanding time

Fill in the missing numbers to make each statement correct, as you convert between time measurement units.

1. 60 seconds = ... minute
2. 90 seconds = ... minutes
3. 240 seconds = ... minutes
4. 6 minutes = ... seconds
5. $10\frac{1}{2}$ minutes = ... seconds
6. 120 minutes = ... hours
7. 300 minutes = ... hours
8. 7 hours = ... minutes
9. $9\frac{1}{2}$ hours = ... minutes
10. 1 hour = ... seconds
11. 24 hours = ... day
12. 60 hours = ... days
13. $3\frac{1}{2}$ days = ... hours
14. $2\frac{1}{4}$ days = ... hours
15. 14 days = ... weeks
16. $52\frac{1}{2}$ days = ... weeks
17. 9 weeks = ... days
18. $10\frac{1}{2}$ weeks = ... days
19. 1 year = ... weeks
20. 1 decade = ... years

C: Word problems



1. Linda has been working for 21 days on a school project. How many weeks is this? .....

2. Jack plays a computer game which takes him 150 minutes. Convert this time to hours and minutes.
   .....hrs .....minutes
3. Fire fighter took $3\frac{3}{4}$ hours to get a fire under control. Convert this time to minutes. .....

4. A plane flight takes 210 minutes. Convert this time to hours and minutes. .....hrs .....minutes

D: Calendar months

1. How many days in January? .....
2. How many days in June?
   .....
3. How many days in October? .....

4. Jocab was asked to look after a friend's pet while he was away on a 5 week holiday. If he started looking after the pet on Monday 12th of May, on what day will he return the pet to his friend?
   .....

E: Timetables

This timetable shows the departure times of a bus travelling from section 1 to the square.

Bus stop	Time (a.m.)
Section 1	7:25
Section 2	7:43
Section 3	7:52
Section 4	8:12
Section 5	8:24
Section 6	8:39
Section 7	8:51
Square	9:10

1. What time does the bus leave section 3? .....
2. Jodie takes 7 minutes to walk to the section 4 bus stop. At what time does she leave home to catch the bus? .....
3. Gail catches the bus at the section 5 bus stop, to travel to the square. How long is her bus ride? .....
4. Brent rides to the square each day. If his bus ride is 78 minutes long, at what section stop did he catch the bus? .....
5. Fred rides from section 2 to section 6. How long is his journey? .....
6. How long does it take from section 1 to the square? .....

Comments: .....

Please sign:
Parent / Caregiver

.....

.....

AWS

Measurement

L3MM

M4

Homework / Assessment Worksheet

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

A: 10 'Quick Questions'

1. 52.8 + 47.9 = ...
2. 1500 – 862 = ...
3. 98 × 12 = ...
4. 4800 ÷ 40 = ...
5. List the factors of 30
   .....
6. $7.63 × 9 = ...
7. Convert 8:27 a.m. to 24 hour time

   [:]
8. Find 75% of $2.80
   .....
9. How many litres in 8500mL? .....
10. What would 9 books at $7.65 each cost?
    .....

B: Analogue time

Draw the following times on these clock faces.

1. 25 past 7
2. 10 to 2
3. $\frac{1}{4}$ past 5
4. $\frac{1}{4}$ to 11
5. **05:25**
6. **09:35**
7. **11:07**
8. **12:50**

C: Digital time:

Write these analogue times as digital times.

1. [:]
2. [:]
3. [:]
4. [:]
5. Write each time above in words, such as *20 to 5* or *5 past 6*.
   clock 1 = ... clock 2 = ...
   clock 3 = ... clock 4 = ...

D: Word problem

1. Jason timed a fly as it was flying around the room. He stopped timing each time it landed. These are his results.

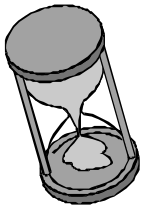
   1 minute 23 seconds,
   2 minutes 11 seconds,
   1 minute 50 seconds,
   2 minutes 17 secnds,
   1 minute 34 seconds,
   3 minutes 45 seconds

   1. Convert each time above to seconds.
      ..... , ...
      ..... , ...
      ..... , ...
   2. Add the total time in seconds. .....
   3. Convert your time to minutes. .....

E: More word problems

1. Mary's soccer game started at 9:40 a.m. on Saturday morning. By 10:55 a.m. the game was over. How long was the game of soccer? .....

2. Linda started playing tennis at 9:30 a.m. If she played for 53 minutes, at what time did she finish playing? .....



3. Ben used an egg-timer to time the cooking time for a boiled egg. The egg-timer runs out after 2 minutes 40 seconds. If a digital watch is showing **12:10**$_{30}$ as the egg starts cooking at what time will the egg be ready? .....

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

Please sign:
Parent / Caregiver

AWS

Homework / Assessment Worksheet

Answers

Worksheet 1

A:

1. 34.2 2. 732 3. 1404 4. 70 5. 1,2,4,5,10,20 6. $50.80 7. 20 past 11 8. $4.85
9. 2700L 10. $23.40

B:

1. mm 2. cm 3. m 4. km 5. mm 6. cm 7. mm 8. m 9. m 10. km

C:

1. 200cm 2. 4cm 3. 4m 4. 4000m 5. 8km 6. 5m 7. 560cm 8. 580mm 9. 5.3km
10. 6300m 11. 6.1m 12. 6.4m 13. 625mm 14. 86.5cm 15. 1200mm 16. 9.75km
17. 0.95m 18. 78cm 19. 850m 20. 2.5mm

D:

1. cm 2. km 3. m 4. m 5. mm 6. cm 7. m or km

E:

1. 5.2m 2. 900m 3. 66km 4. 9000m or 9km

Worksheet 2

A:

1. 5.1 2. 237 3. 4176 4. 9 5. 20,40,60,80,100 6. $50.40 7. 20:36 8. $4.45 9. 4.7km
10. $24.25

B:

1. mg 2. g 3. kg 4. t 5. mL 6. L 7. mg 8. kg 9. tonne 10. g 11. kg 12. L
13. mL 14. kL

C:

1. 4000mg 2. 6000mL 3. 5L 4. 5000kg 5. 7kg 6. 9t (tonne) 7. 5600mL 8. 8.6g 9. 4.3kg
10. 7.3kg 11. 850g 12. 3600kg 13. 700mL 14. 8600mg

D:

1. mL 2. g 3. L 4. t 5. mg 6. mL 7. mg 8. mL

E:

1. 8880mL 2. 7.8 tonne 3. 17.2L 4. 9 glasses 5. 48.9L 6. 300g

Worksheet 3

A:

1. 122.1 2. 248 3. 2241 4. 6 5. 1,2,4,7,14,28 6. $54.80 7. 5 to 4, 3:55 8. $3.95 9. 6.5t
10. $28.35

B:

1. degrees Celsius (Centigrade) 2. 4^oC 3. 7^oC 4. 8^oC 5. 3^oC 6. -7^oC 7. -3^oC 8. 2^oC

C:

1. A = 13mm 2. B = 9mm 3. C = 22mm 4. D = 4mm 5. A = 10cm 6. B = 44cm 7. C =22cm
8. 31cm 9. the speed of the car 10. kilometres per hour 11. 90 km / hr 12. 15 km / hr
13. 49079km

D:

1. A 2. B & C 3. cool and quite sweet 4. warm and slightly sour

Worksheet 4

A:

1. 2.24 2. 425 3. 5588 4. 3 5. 30,60,90,120,150 6. $69.20 7. 05:48 8. $7.25 9. 2800mm
10. $47.95

B:

5. 5cm 6. 4cm 7. 36mm 4. 42mm

C:

1. 100mm 2. 104mm

D:

1. 48 + 33 + 48 = 129m 2. 44m 3. 1200m 4. 3600m 5. 3.6km 6. 25mm

Worksheet 5

A:

1. 14.57 2. 155 3. 2304 4. 120 5. 1,2,4,8,16,32 6. $65.25 7. 8 minutes past 8 8. 70 cents
9. 47mm 10. $31.80

B:

1. 13 or 14 squares 2. 15 squares 3. 10 squares 4. 16 squares 5. 18 sq cm 6. 50 sq m

D:

1. 30 cubes 2. 22 cubes

Worksheet 6

A:

1. 16.22 2. 254 3. 2628 4. 4 5. 7,14,21,28,35 6. $20.00 7. 14:45 8. $2.85 9. 4.7kg
10. $11.25

B:

1. 1 min 2. 1½ min 3. 4 min 4. 360 sec 5. 630 sec 6. 2 hrs 7. 5 hrs 8. 420 min 9. 570 min
10. 3600 sec 11. 1 day 12. 2½ days 13. 84 hrs 14. 54 hrs 15. 2 wks 16. 7½ wks
17. 63 days 18. 73½ days 19. 52 wks 20. 10 yrs

C:

1. 3 wks 2. 2 hrs 30 min 3. 225 min 4. 3 hr 30 min

D:

1. 31 days 2. 30 days 3. 31 days 4. Monday 16th June

E:

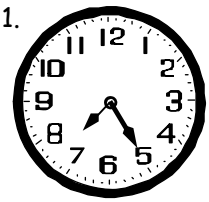
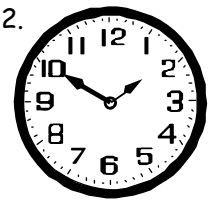
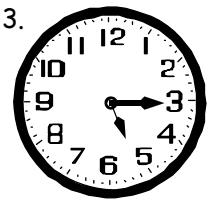
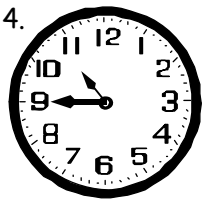
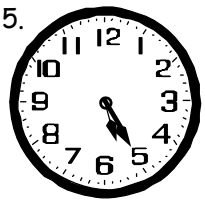
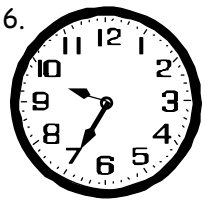
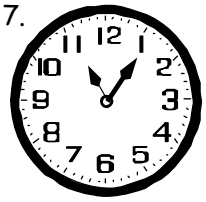
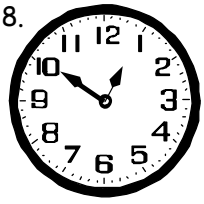
1. 7:52 a.m. 2. 8:05 a.m 3. 46 minutes 4. section 3 5. 56 minutes 6. 1 hr 45 minutes

Worksheet 7

A:

1. 100.7 2. 638 3. 1176 4. 120 5. 1,2,3,5,6,10,15,30 6. $68.67 7. 08:27 8. $2.10
9. 8.5L 10. $68.85

B:

1. 
2. 
3. 
4. 
5. 
6. 
7. 
8. 

C:

1. 03:50 2. 09:40 3. 08:15 4. 11:25
5. clock 1 = 10 minutes to 4, clock 2 = 20 minutes to 10, clock 3 = quarter past 8 or 15 minutes past 8
clock 4 = 25 past 11

D:

1. 83min, 131min, 110min, 137min, 94min, 225min 2. 780min 3. 13 minutes

E:

1. 75 minutes 2. 10:23 a.m. 3. **13:13**$_{10}$

Tracking Sheet: ‘In-class’ Activity Sheets

Mastermath

Worksheet	Objectives	Name														
		Comments														
19	M2 / M3															
18	M2 / M3															
17	M3															
16	M3 / M4															
15	M3															
14	M2															
13	M2															
12	M2															
11	M2															
10	M2															
9	M2															
8	M2															
7	M1															
6	M1															
5	M1															
4	M1															
3	M1															
2	M1															
1	M1															

Tracking Sheet: Homework / Assessment Worksheets

Measurement

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