

Important Concepts . . .

Preview Review



Mathematics Grade 4 *TEACHER KEY*

W3 - Lesson 1: Measurement 1

Important Concepts of Grade 4 Mathematics

W1 - Lesson 1	Number Concepts
W1 - Lesson 2	Addition and Subtraction
W1 - Lesson 3	Patterns
W1 - Lesson 4	Fractions and Decimals
W1 - Lesson 5	Data Management
W1 - Quiz	
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W2 - Lesson 2	Multiplication 2
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W3 - Lesson 1	Measurement 1
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W3 - Lesson 5	Problem Solving
W3 - Quiz	

Materials Required

Mathematics Grade 4

Version 5

Preview/Review W3 - Lesson 1 TEACHER KEY

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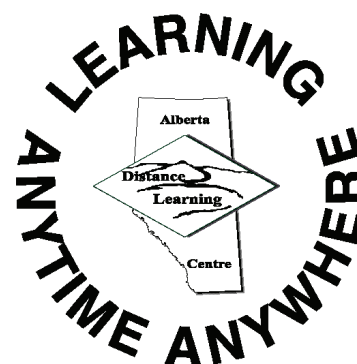
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Introductory Information for Teachers

Preview/Review courses are designed to be used in a classroom setting under the supervision of a teacher. They are aimed mainly at students who have already worked on the concepts in the regular course, but who need to review these concepts again before beginning the next grade. Some students may find Preview/Review courses useful in preparing for a course they will be taking in a new grade. No Preview/Review course is intended to replace the regular course because Preview/Review courses cover only some of the important concepts from the Program of Studies for each grade.

The Preview/Review course for Mathematics 4 contains fifteen lessons in three sections. Each section has five lessons. Some of the lessons have homework assignments. A short quiz is provided at the end of each section to test the student's mastery of the material covered. The course is designed to be covered over a three week period. No textbook is required.

Teachers are encouraged to use the Preview/Review materials in a way that meets the needs of each student. Different students have different needs depending on their strengths in mathematics. For example, a student who has already mastered *addition with regrouping* may not need to do all the questions provided in Week 1 – Lesson 2. On the other hand, students who need extra practice with *long division with remainders* should be assigned most of the questions in Week 2 – Lesson 4, including the homework assignment at the end of the booklet.

Similarly, students who work at a slower pace likely will not be able to master as many new concepts or complete as many questions in the allotted time as students who work more quickly. The expectations for each student must vary depending on the student's ability and how fast the student can work through the material. Therefore, the teacher must monitor all students and assign a reasonable amount of work for each student to complete in the allotted time. Most of the booklets have an abundance of questions from which to choose. Not all students should do all questions.

Preview/Review Concepts for Grade Four Mathematics

TEACHER KEY



***W3 - Lesson 1:
Measurement 1***

OBJECTIVES

By the end of this lesson, you should

- distinguish among distance, capacity, and mass
- explain the meaning of distance (including length, width, and height)
- use the standard units for measuring distance
 - millimetres (mm)
 - centimetres (cm)
 - decimetres (dm)
 - metres (m)
 - kilometres (km)
- choose appropriate units when measuring length of specific objects or distances
- draw straight lines accurately (the correct length) using a metric ruler
- measure the length of objects accurately using a metric ruler
- change units of measure to equivalent smaller or larger units
 - cm to mm - mm to cm - dm to cm - cm to dm
 - m to cm - cm to m - m to dm - dm to m
 - km to m - m to km

GLOSSARY

capacity - the amount a container can hold

distance - the amount of space between objects or places

height - the distance from the bottom to the top of an object

length - the distance from one end to the other on the longer side of an object

mass - the amount of matter in an object measured in grams or kilograms

rectangle - a four-sided shape: opposite sides are equal and the corners are square

width - the distance from side to side, usually on the shorter side of an object

W3 - Lesson 1: Measurement 1

A. Introduction

Knowing how to measure and use measuring tools are two very important skills we use every day. Many of our daily activities require some kind of measurement:

- weighing objects (including yourself)
- measuring the height of anything (including yourself)
- using recipes to prepare a meal
- measuring the length and width of anything
- building something
- telling time
- driving a car

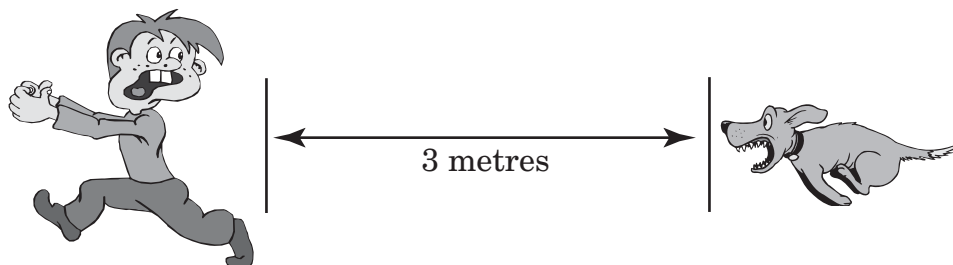
1. What other activities can **you** think of that require measurement skills? List as many as you can. *Answers will vary.*

- | | |
|--|--|
| a. <u><i>Measuring a first down in football.</i></u> | b. <u><i>Checking you speedometer to see how fast you are going.</i></u> |
| c. <u><i>Weighing bulk-items in a grocery store.</i></u> | d. <u><i>Taking your temperature when you're sick.</i></u> |
| e. <u><i>Building a bird house or real house.</i></u> | f. <u><i>Timing how long it takes to run 100 metres.</i></u> |

The ability to use measurement skills is important in many jobs. Doctors, scientists, teachers and engineers all have jobs requiring a lot of measurement. Policemen and firemen, truck drivers and construction workers, sales clerks, and bank tellers all must have good measurement skills.

Measurement Words You Must Know

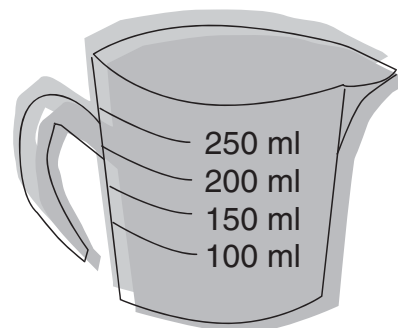
Distance is the measurement of space between two objects or places.



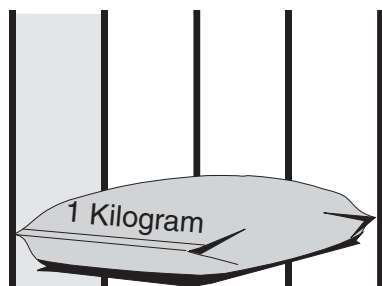
Example:

The distance between the dog and boy is 3 metres.

Measurements of distance include **length**, **width**, and **height**. Distance is measured in units such as millimetres, centimetres, metres, and kilometres.



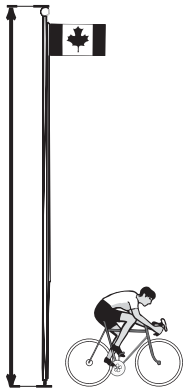
Capacity is a measure of the amount of liquid that a container can hold. We measure capacity in units such as millilitres and litres.



$$1 \text{ kg} = 1\,000 \text{ g}$$

Mass is a measure of how heavy an object is. Mass is measured in units such as grams and kilograms.

2. What is being measured in these pictures? Write **mass**, **capacity**, **distance**, or **height** on the blanks below each picture to tell what is being measured.



a. height



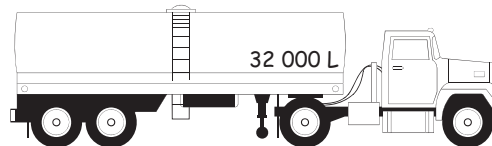
b. capacity



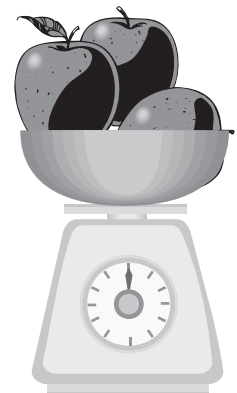
c. mass



d. distance



e. capacity



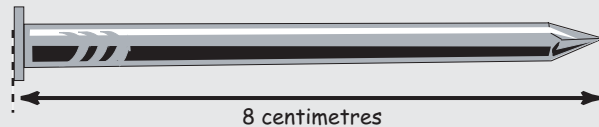
f. mass

B. Length, Width, and Height

Length, width, and height are all **straight-line** measurements.

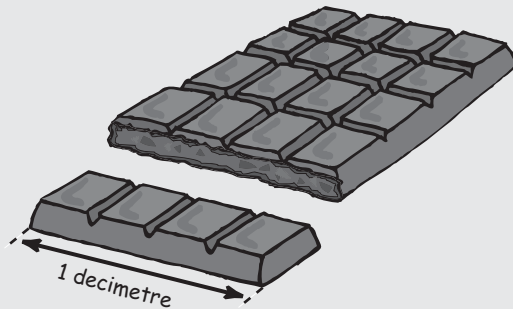
Length is the distance from one end of something to the other end.

Example:



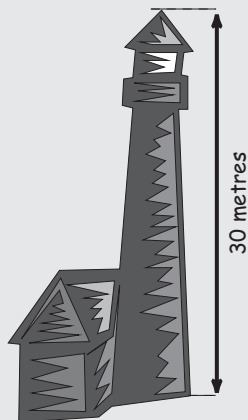
Width is the distance from one side to the other side.

Example:



Height is the distance from the top to the bottom.

Example:



Distance**Length****Height****Width**

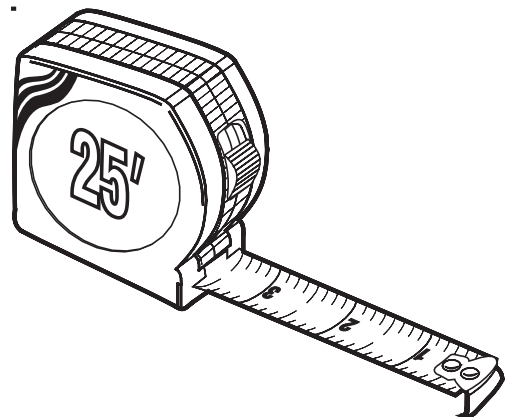
1. Match one of the words from the box to complete the following sentences:

- a. **Width** means how wide an object is.
- b. **Length** means how long an object is.
- c. **Distance** means how far away an object is.
- d. **Height** means how tall an object is.

2. Name three measuring tools that can be used to measure length, width, height, or distance.

Answers will vary. Some examples are given.

- a. **ruler, tape measure**
- b. **metre stick,**
odometer
- c. **trundle wheel,**
pedometer



Units of Measurement

The units of measurement used to measure length, width, height, and distance are millimetres, centimetres, decimetres, metres, and kilometres.

Millimetres are used to measure very small or thin objects such as the width of a fingernail, the thickness of a coin, or the length of an ant.

Centimetres are used to measure objects that are about the size of something you could hold in your hands. For example, the length of a finger, the width of a piece of paper, the thickness of a large book, or the height of a doll or toy.

Decimetres are used to measure larger objects such as the height of a wall, the length of a small rug, the width of a window.

Metres are used to measure larger objects such as the height of a tree or a building, the length of a driveway, or the width of a road.

Kilometres are used to measure long distances such as the distance from one town to the next or the length of a highway or a river.

To help you decide which units to use when you are measuring something, remember this chart.

SIZE OF OBJECT	UNITS
Fingernail	millimetres
Finger or Hand	centimetres
Arm	decimetres
You!	metres

The short form for these units is usually used when measuring length, width, height, and distance.

UNIT	SHORT FORM
millimetres	mm
centimetres	cm
decimetres	dm
metres	m
kilometres	km

3. Rewrite the following measurements by using their shortened form. An example is done for you.

Example: 30 centimetres = 30 cm

a. 12 kilometres = 12 km b. 5 metres = 5 m

c. 43 centimetres = 43 cm d. 7 decimetres = 7 dm

e. 68 millimetres = 68 mm

Note: No period is used after metric abbreviations.

4. Which unit of measurement would you use to measure the following things? Use the units listed in the box. You can use each unit more than once.

millimetre decimetre metre kilometre centimetre

- a. the height of your house *metres*
- b. the length of your room *metres*
- c. the distance across Edmonton *kilometres*
- d. the length of your pencil *centimetres*
- e. the height of your desk *centimetres or decimetres*
- f. the width of a nickel *millimetres*
- g. the distance from Calgary to Red Deer *kilometres*
- h. the length and width of this paper *centimetres or decimetres*
- i. the length of your fingernail *millimetres*

5. Use your ruler to draw a line for each of the following measurements:

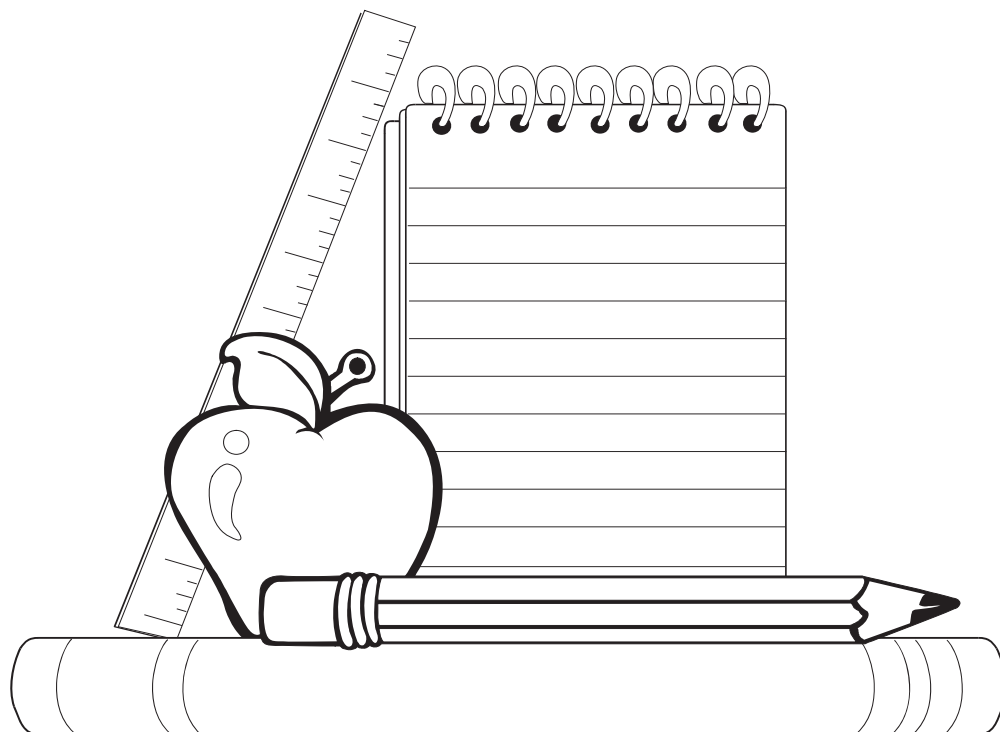
a. 14 cm

***Note: Four lines should be drawn
the indicated lengths. Accuracy
should be + or - 1 mm.***

b. 85 mm

c. 2 dm

d. 18 cm

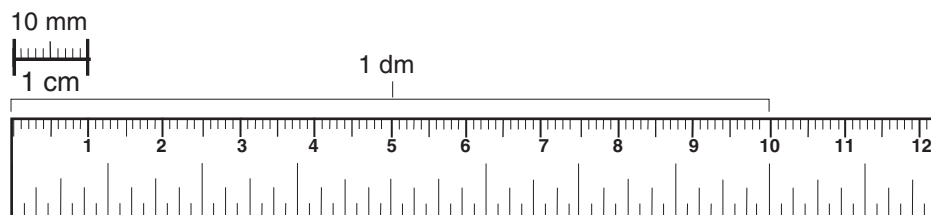


C. Comparing and Changing Metric Units

Metric units of measurement can be easily changed from one unit to another. To change units, all you do is multiply or divide by 10, 100, 1000 and so on.

To change **larger** units to **smaller** units, you **multiply**.

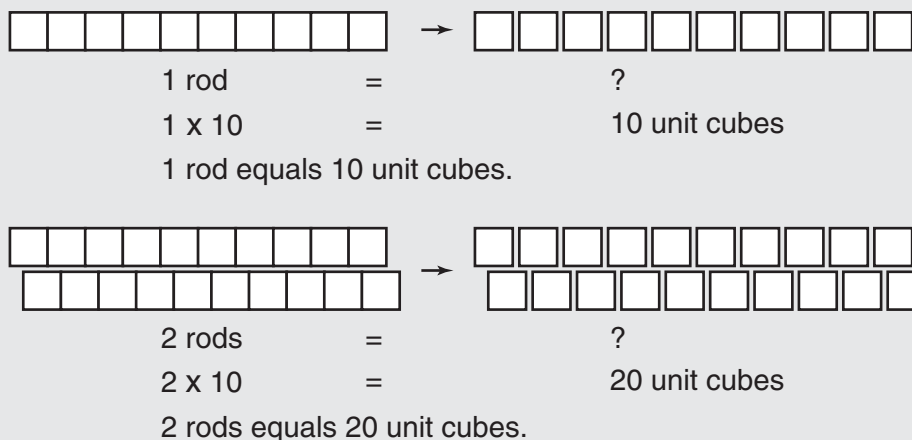
To change **smaller** units to **larger** units, you **divide**.



Notice in the centimetre ruler above that

- 1 centimetre is the same as 10 millimetres
- 10 centimetres is the same as 1 decimetre

Using base ten blocks can help you understand how we compare metric units:



Or, we can write 1 centimetre = 10 millimetres

2 centimetres = 20 millimetres

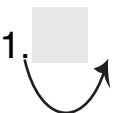
Each centimetre equals 10 millimetres. Therefore, to change centimetres to millimetres, the decimal point moves one place to the **right**. This is the same as multiplying by 10.

Remember: A decimal is present at the end of all whole numbers even if it is not shown. Moving the decimal one place to the right is the same as multiplying by 10.


$$1 \text{ cm} \times 10 = 10 \text{ mm}$$

$$3.7 \text{ cm} \times 10 = 37 \text{ mm}$$

To move the decimal to the right one place, you need to insert 0 as a placeholder.

$$1.\text{ } \square \text{ cm} \rightarrow 10.\text{ mm}$$


Move the decimal to the right one place.

$$3.7 \text{ mm} \rightarrow 37.\text{ mm}$$


Your Turn!

1. Fill in each blank. Move the decimal to the right.

a. $5 \text{ cm} = \underline{50} \text{ mm}$

b. $9 \text{ cm} = \underline{90} \text{ mm}$

c. $8 \text{ cm} = \underline{80} \text{ mm}$

d. $12 \text{ cm} = \underline{120} \text{ mm}$

e. $10 \text{ cm} = \underline{100} \text{ mm}$

f. $2.6 \text{ cm} = \underline{26} \text{ mm}$

It takes 10 millimetres to make 1 centimetre. Therefore, to change millimetres to centimetres, move the decimal one place to the **left**. This is the same as dividing by 10.

$$10 \text{ mm} \div 10 = 1 \text{ cm}$$

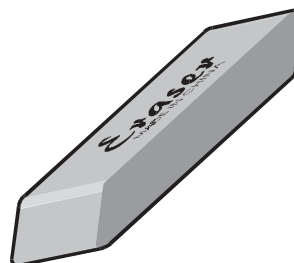
Move the decimal to the left one place.

$$10. \text{ mm} \rightarrow 1.0 \text{ cm}$$

$$35 \text{ mm} \div 10 = 3.5 \text{ cm}$$

Move the decimal to the left one place.

$$35. \text{ mm} \rightarrow 3.5 \text{ cm}$$



Your Turn!

2. Fill in each blank. Move the decimal to the left.

a. $90 \text{ mm} = \underline{9} \text{ cm}$

b. $13 \text{ mm} = \underline{1.3} \text{ cm}$

c. $20 \text{ mm} = \underline{2} \text{ cm}$

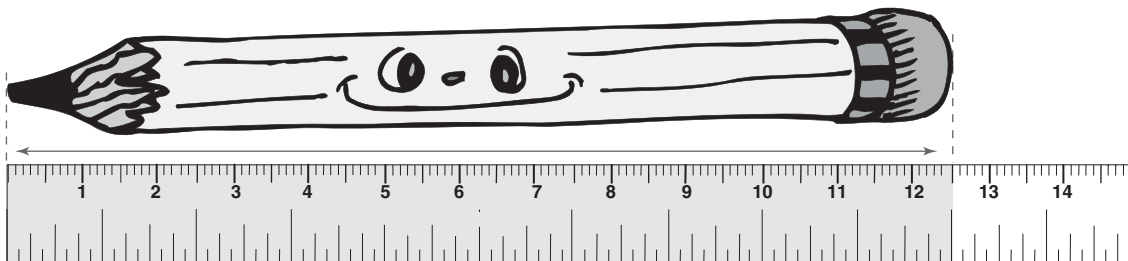
d. $62 \text{ mm} = \underline{6.2} \text{ cm}$

e. $75 \text{ mm} = \underline{7.5} \text{ cm}$

f. $195 \text{ mm} = \underline{19.5} \text{ cm}$

3. Use the ruler shown to measure each object in centimetres. Then rewrite the length in millimetres.

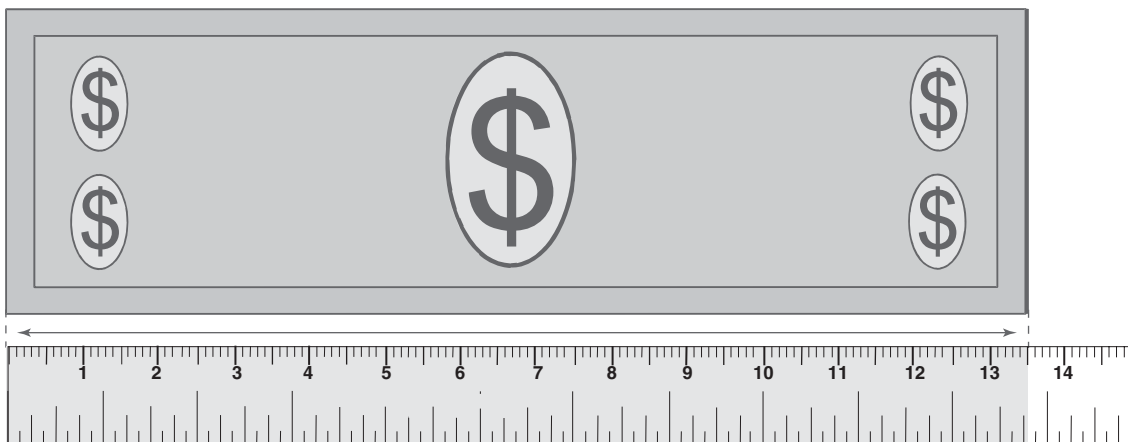
a.



Length in cm: 12.5 cm

Length in mm: 125 mm

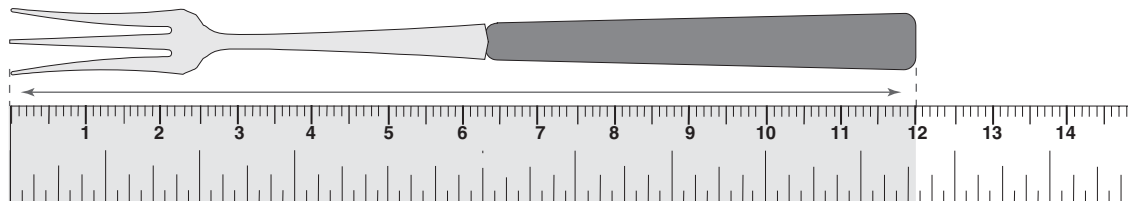
b.



Length in cm: 13.5 cm

Length in mm: 135 mm

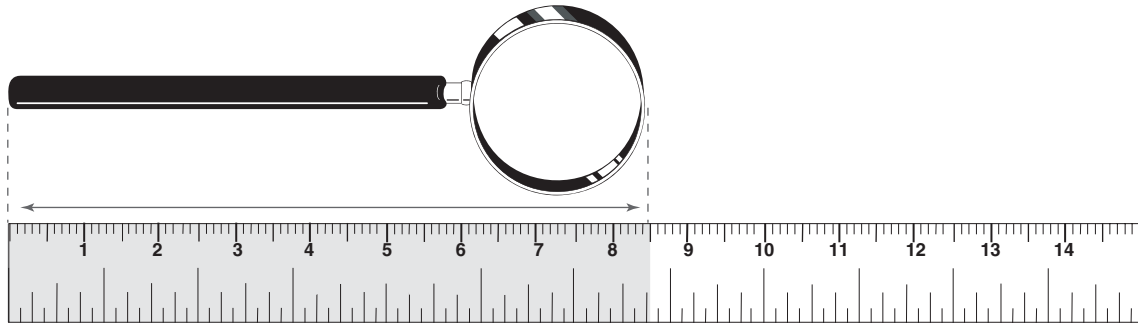
c.



Length in cm: 12 cm

Length in mm: 120 mm

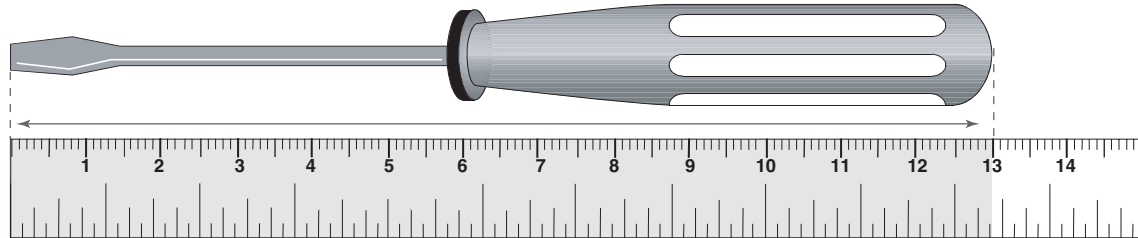
d.



Length in cm: 8.5 cm

Length in mm: 85 mm

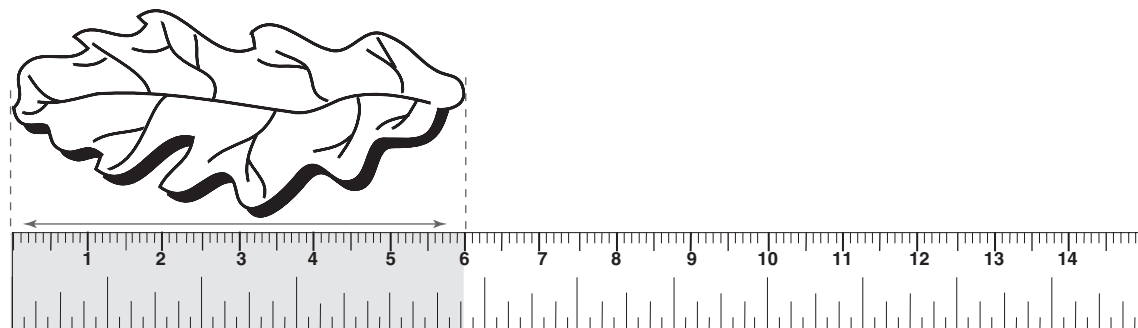
e.



Length in cm: 13 cm

Length in mm: 130 mm

f.



Length in cm: 6 cm

Length in mm: 60 mm

Study the chart below. It shows the relationship between the measurements of length.

10 mm	=	1 cm
10 cm	=	1 dm
10 dm	=	1 m
1 000 m	=	1 km

Use the information in the chart to answer Questions 4 and 5.

4. Fill in the blanks to make correct statements.

a. 1 m = **10** dm

b. 1 cm = **10** mm

c. 1 km = **1 000** m

d. 1 dm = **10** cm

5. Fill in the boxes in the tables below. The first row in each table has been done for you.

mm	cm
53	5.3
35	3.5
50	5.0
78	7.8
120	12.0
165	16.5

dm	cm
3.6	36
1.1	11
7.4	74
4	40
74	740
28.9	289

When comparing two measurements that do not have the same units, you must change the units of one measure so they are the same as the other.

Example:

Which is larger? 1 centimetre or 9 millimetres

Answer: **1 cm is the same as 10 mm.**
10 mm is larger than 9 mm.
So, 1 centimetre is larger.

6. Circle the larger of the two measurements in each question below.

Hint: Change the units of one measurement in each pair so it has the same units as the other. Then, compare to see which is larger.

a. 36 cm or 36 mm
360 mm **36 mm**

b. 4 cm or 24 mm
40 mm **24 mm**

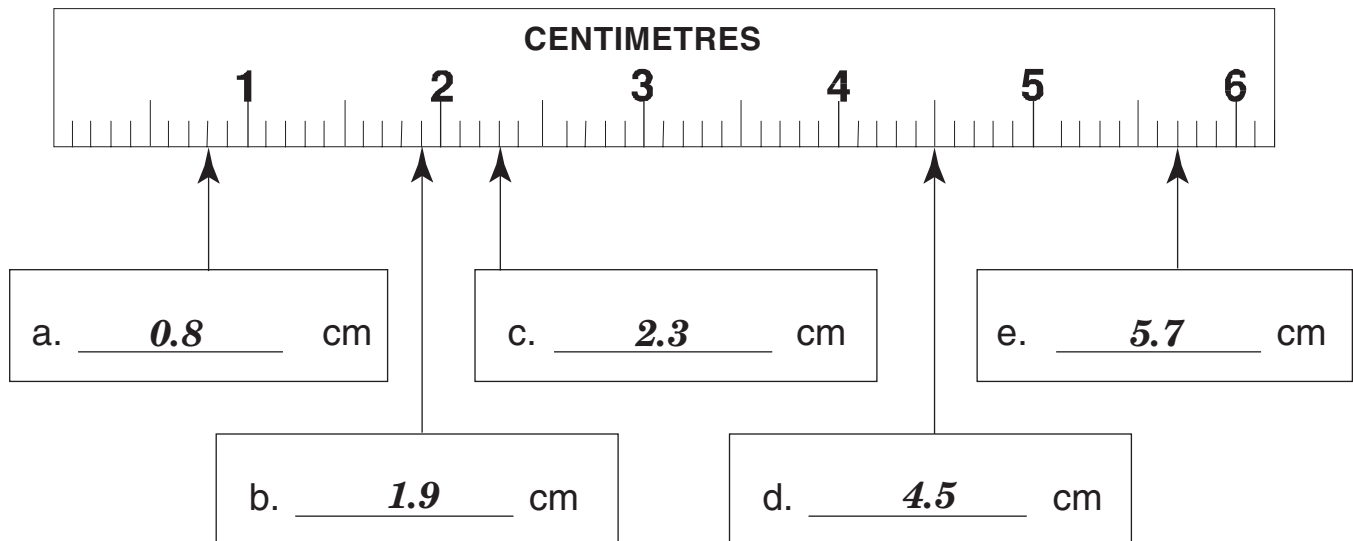
c. 21 mm or 2.2 cm
21 mm **22 mm**

d. 19 mm or 2 cm
1.9 cm **2 cm**

e. 1.8 cm or 20 mm
18 mm **20 mm**

f. 32 mm or 3 cm
32 mm **30 mm**

7. Look at the ruler below. Give the decimal measurement shown at each arrow.



8. Measure the lines below. First measure them in centimetres. Then change the measurements to millimetres.

- a. _____
- b. _____
- c. _____
- d. _____

<u>8</u>	cm	<u>80</u>	mm
<u>6.5</u>	cm	<u>65</u>	mm
<u>5</u>	cm	<u>50</u>	mm
<u>2.2</u>	cm	<u>22</u>	mm

So far, you have practised measuring lengths in millimetres and centimetres. Then, you changed or **converted** them from one unit to the other. Now, let's move on to metres and kilometres.

10 cm	=	1 dm
10 dm	=	1 m
100 cm	=	1 m
1 000 mm	=	1 m
1 000 m	=	1 km

9. Use the information in the table above to fill in the blanks.

a. 1 m = 10 dm

b. 1 m = 100 cm

c. 1 m = 1 000 mm

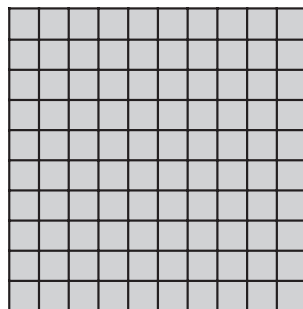
d. 1 km = 1 000 m

To change centimetres to metres, you are changing from a smaller unit to a larger unit. There will be a smaller number of metres because metre is the larger unit.

157 centimetres is the same as 1 m + 57 cm = 1.57m

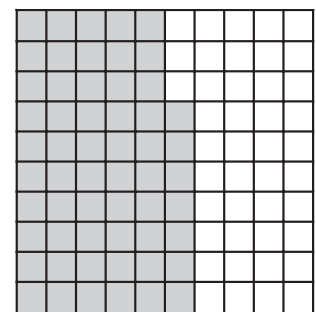
We can use base ten blocks to show these measurements.

This hundreds block stands for 1 metre. There are 100 cm in 1 metre.



1 metre

This shows 57 cm out of 100 cm are shaded.



+

0.57m or $\frac{57}{100}$ m

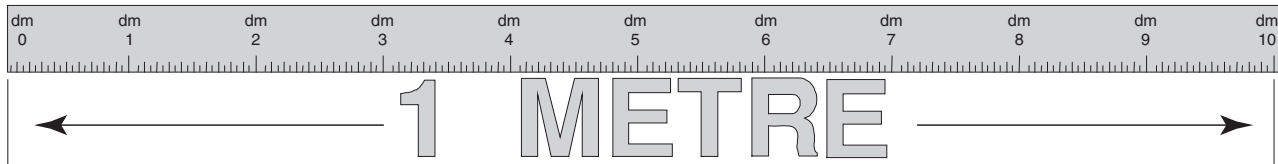
To change **centimetres** to **metres**, move the decimal **two** places to the left.

157. cm \longrightarrow 1.57 m

The same is true when you change decimetres to metres. You are changing from a smaller unit to a larger unit. There will be a smaller number of metres because **metre** is the **larger** unit.

To change decimetres to metres, you must remember that there are

10 decimetres in one metre



To change **decimetres** to **metres**, move the decimal **one** place to the left.

$$18.5 \text{ decimetres} \rightarrow 1.85 \text{ m}$$

10. Fill in the blanks. You are changing from smaller units to larger units, so you will move the decimal to the left.

a. 200 cm = 2 m

b. 200 dm = 20 m

c. 138 cm = 1.38 m

d. 38 dm = 3.8 m

e. 80 cm = 0.8 m

f. 76 dm = 7.6 m

Remember: 1 metre = 100 centimetres

To change **metres** to **centimetres**, move the decimal two places to the right.

Remember: 1 metre = 10 decimetres

To change **metres** to **decimetres**, move the decimal one place to the right.

To change kilometres to metres, you are also changing from a larger unit to a smaller unit. There will be a larger number of metres because **metre** is the **smaller** unit.

$$1 \text{ kilometre} = 1\,000 \text{ m}$$

To change **kilometres** to **metres**, move the decimal **three places** to the right.

8 kilometres \longrightarrow ? metres

8.  \longrightarrow 8000. metres



11. Fill in the blanks. You are changing from larger units to smaller units, so you will have more.

a. 4 km = 4 000 m

b. 6.5 km = 6 500 m

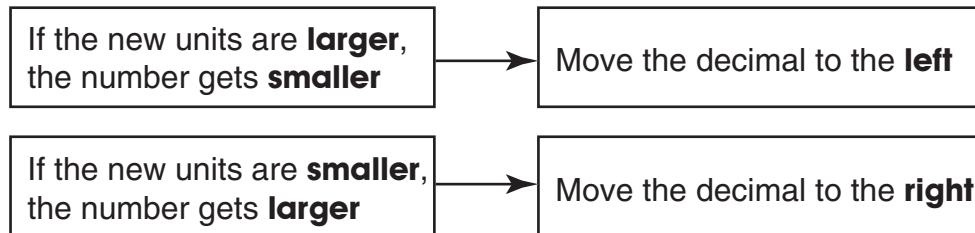
c. 18 m = 1 800 cm

d. 3.6 m = 360 cm

e. 12 km = 12 000 m

Homework

1. Rewrite each measurement using the new units. First, ask yourself if the new units are larger or smaller. Remember:



a. 5.3 cm = 53 mm

b. 200 dm = 20 m

c. 4 km = 4 000 m

d. 120 mm = 12 cm

e. 5 m = 500 cm

f. 1500 m = 1.5 km

2. Circle the smaller measurement in each question below.

a. 52 mm or 5 cm
52 mm **50 mm**

b. 18 mm or 1.7 cm
18 mm **17 mm**

c. 2 cm or 22 mm
20 mm **22 mm**

d. 62 mm or 6.4 cm
62 mm **64 mm**

e. 8.4 cm or 80 mm
84 mm **80 mm**

f. 19 cm or 185 mm
190 mm **185 mm**

3. Use the ruler to measure the lines. First, measure in centimetres. Then, change the measurements to millimetres. Write both measurements beside the line.

a. _____ ***3.5 cm or 35 mm***

b. _____ ***10.5 cm or 105 mm***

c. _____ ***6 cm or 60 mm***



