

Important Concepts . . .

Preview Review



Mathematics

Grade 4

W3 - Lesson 1: Measurement 1

Important Concepts of Grade 4 Mathematics

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Materials Required

Mathematics Grade 4

Version 5

Preview/Review W3 - Lesson 1

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Preview/Review Concepts for Grade Four Mathematics



***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

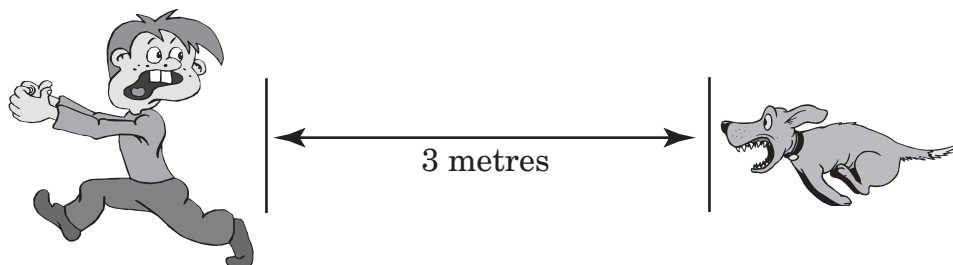
1. What other activities can **you** think of that require measurement skills? List as many as you can.

- a. _____ b. _____
- c. _____ d. _____
- e. _____ f. _____

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

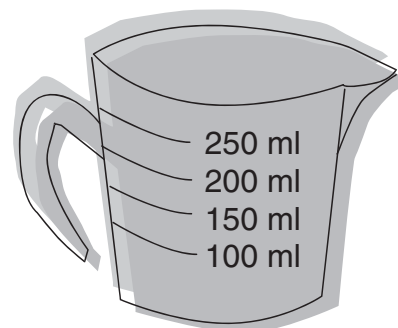
Distance is the measurement of space between two objects or places.



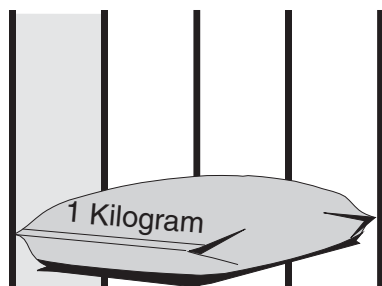
Example:

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.



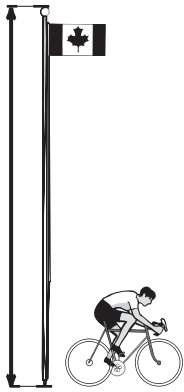
Capacity is a measure of the amount of liquid that a container can hold. We measure capacity in units such as millilitres and litres.



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

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. _____



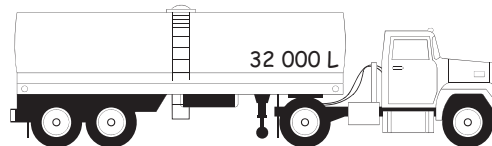
b. _____



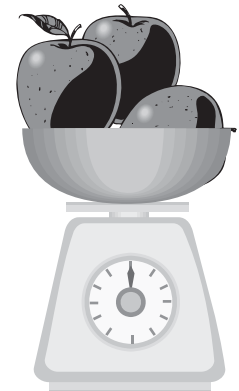
c. _____



d. _____



e. _____



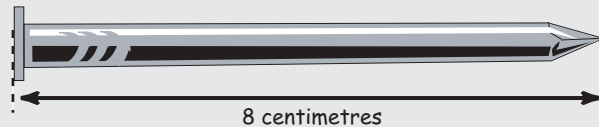
f. _____

B. Length, Width, and Height

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

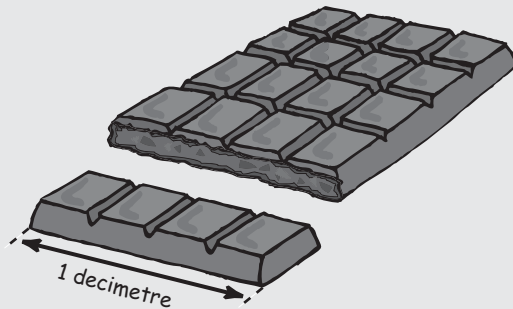
Length is the distance from one end of something to the other end.

Example:



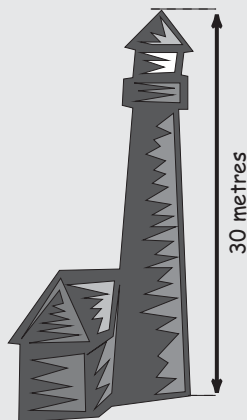
Width is the distance from one side to the other side.

Example:



Height is the distance from the top to the bottom.

Example:



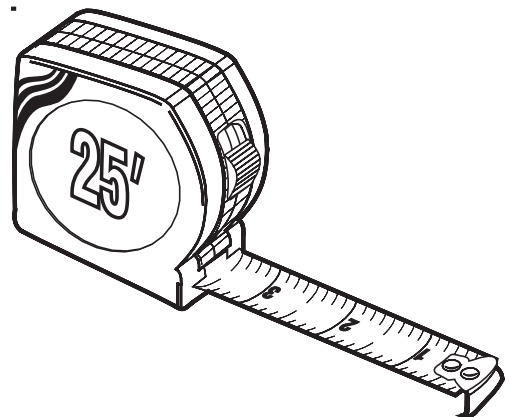
Distance**Length****Height****Width**

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

- a. _____ means how wide an object is.
- b. _____ means how long an object is.
- c. _____ means how far away an object is.
- d. _____ means how tall an object is.

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

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



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 = _____ b. 5 metres = _____

c. 43 centimetres = _____ d. 7 decimetres = _____

e. 68 millimetres = _____

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 _____
- b. the length of your room _____
- c. the distance across Edmonton _____
- d. the length of your pencil _____
- e. the height of your desk _____
- f. the width of a nickel _____
- g. the distance from Calgary to Red Deer _____
- h. the length and width of this paper _____
- i. the length of your fingernail _____

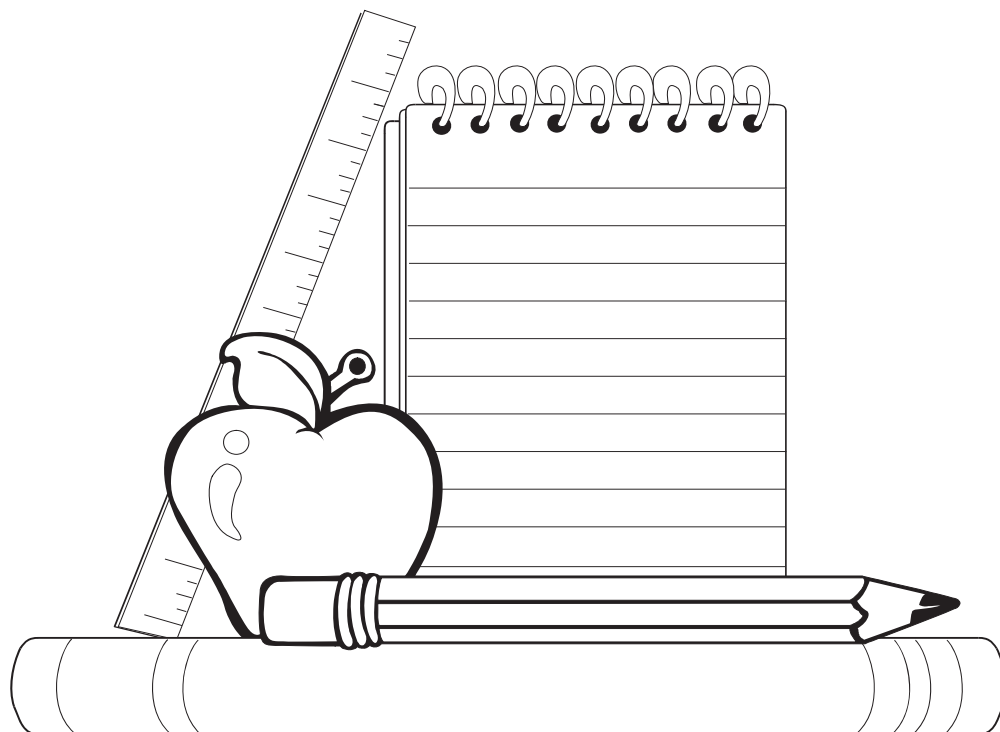
5. Use your ruler to draw a line for each of the following measurements:

a. 14 cm

b. 85 mm

c. 2 dm

d. 18 cm

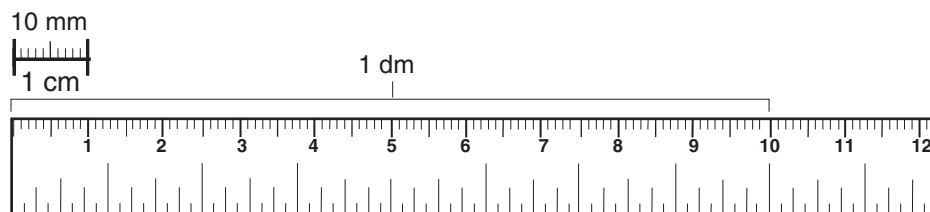


C. Comparing and Changing Metric Units

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**.

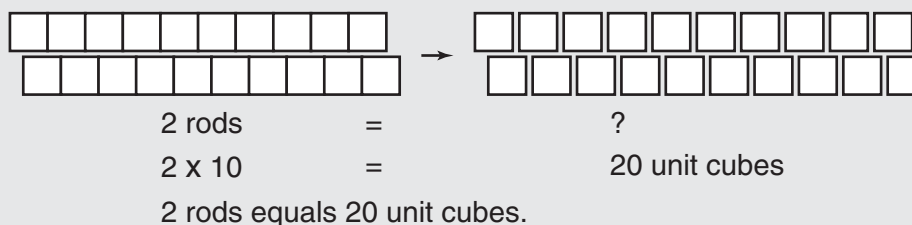
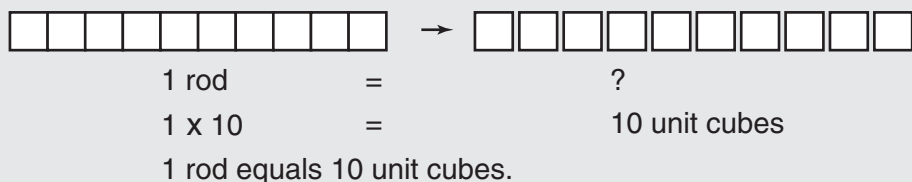
To change **smaller** units to **larger** units, you **divide**.



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

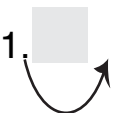
Each centimetre equals 10 millimetres. Therefore, to change centimetres to millimetres, the decimal point moves one place to the **right**. This is the same as multiplying by 10.

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. $5 \text{ cm} = \underline{\hspace{2cm}} \text{ mm}$

b. $9 \text{ cm} = \underline{\hspace{2cm}} \text{ mm}$

c. $8 \text{ cm} = \underline{\hspace{2cm}} \text{ mm}$

d. $12 \text{ cm} = \underline{\hspace{2cm}} \text{ mm}$

e. $10 \text{ cm} = \underline{\hspace{2cm}} \text{ mm}$

f. $2.6 \text{ cm} = \underline{\hspace{2cm}} \text{ mm}$

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.

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

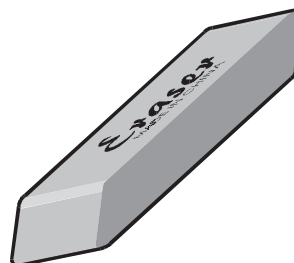
Move the decimal to the left one place.

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

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

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. $90 \text{ mm} = \underline{\hspace{2cm}} \text{ cm}$

b. $13 \text{ mm} = \underline{\hspace{2cm}} \text{ cm}$

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

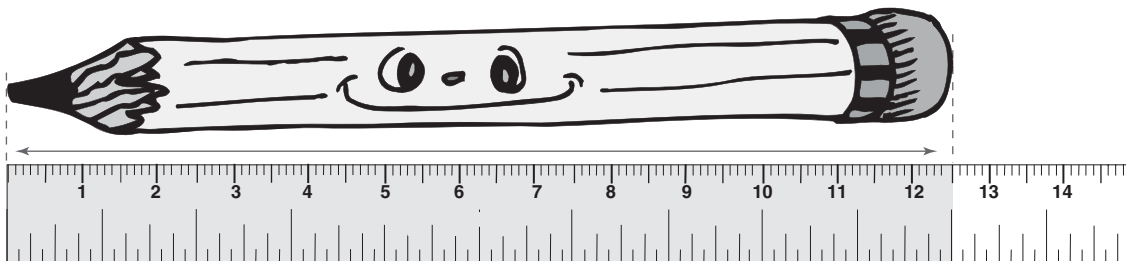
d. $62 \text{ mm} = \underline{\hspace{2cm}} \text{ cm}$

e. $75 \text{ mm} = \underline{\hspace{2cm}} \text{ cm}$

f. $195 \text{ mm} = \underline{\hspace{2cm}} \text{ cm}$

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

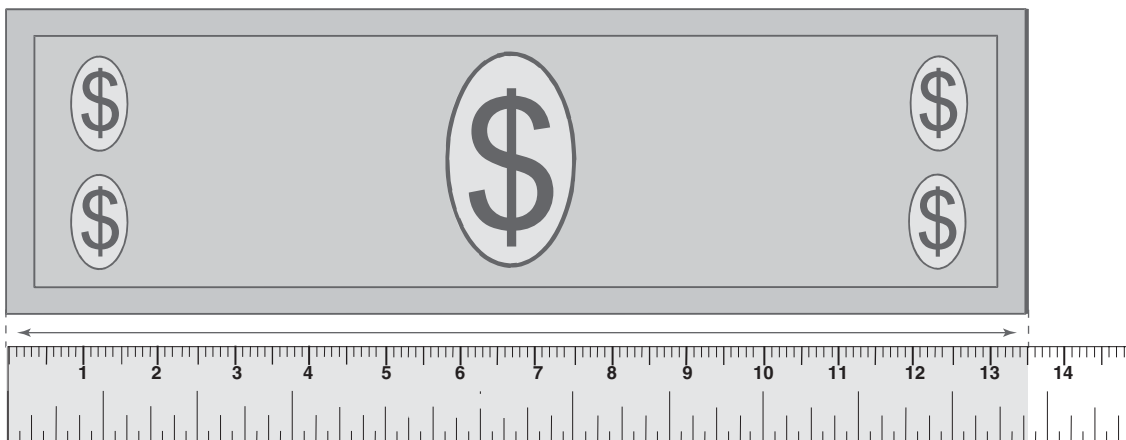
a.



Length in cm: _____

Length in mm: _____

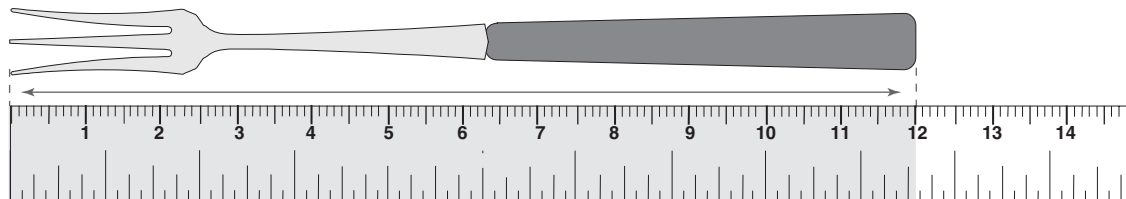
b.



Length in cm: _____

Length in mm: _____

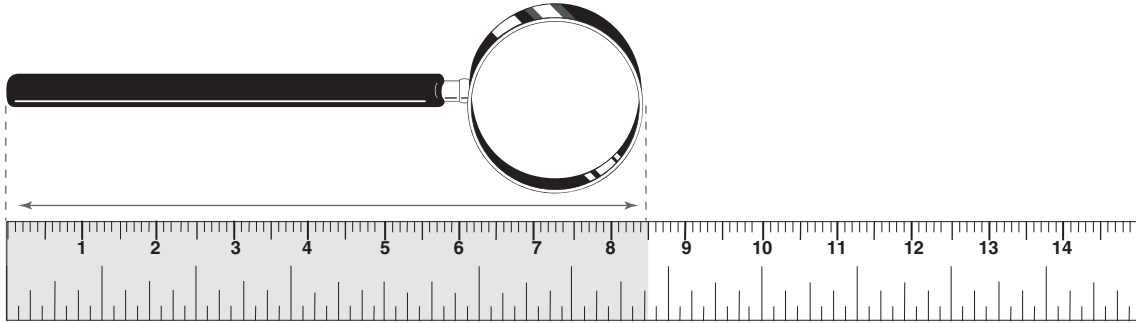
c.



Length in cm: _____

Length in mm: _____

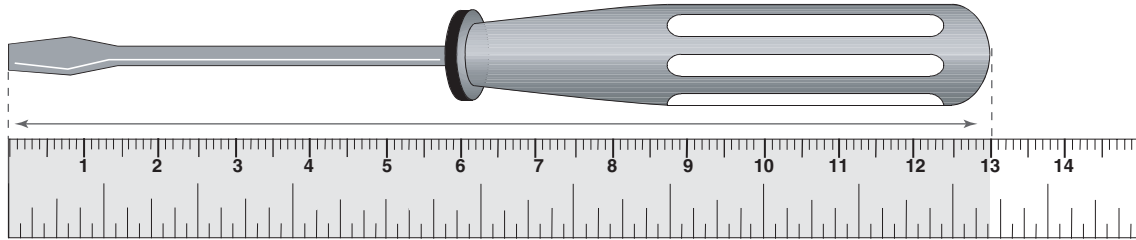
d.



Length in cm: _____

Length in mm: _____

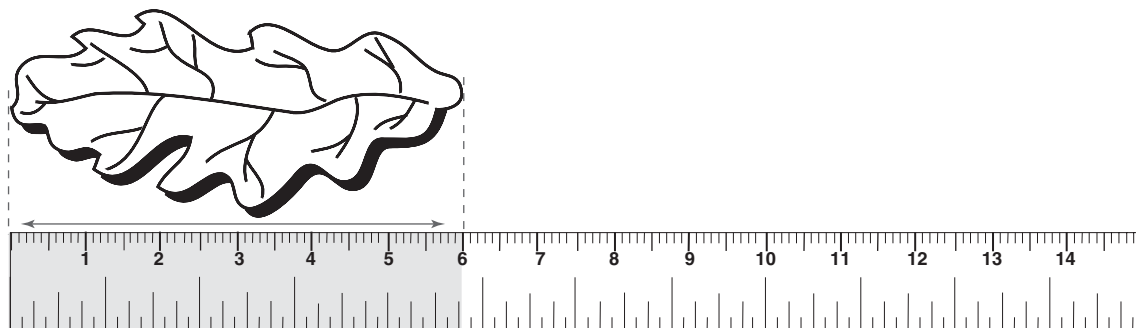
e.



Length in cm: _____

Length in mm: _____

f.



Length in cm: _____

Length in mm: _____

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

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

$$10 \text{ cm} = 1 \text{ dm}$$

$$10 \text{ dm} = 1 \text{ m}$$

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

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

4. Fill in the blanks to make correct statements.

a. $1 \text{ m} = \underline{\hspace{2cm}} \text{ dm}$

b. $1 \text{ cm} = \underline{\hspace{2cm}} \text{ mm}$

c. $1 \text{ km} = \underline{\hspace{2cm}} \text{ m}$

d. $1 \text{ dm} = \underline{\hspace{2cm}} \text{ cm}$

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	
	5.0
	7.8
120	
	16.5

dm	cm
3.6	36
1.1	
	74
4	
74	
	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

b. 4 cm or 24 mm

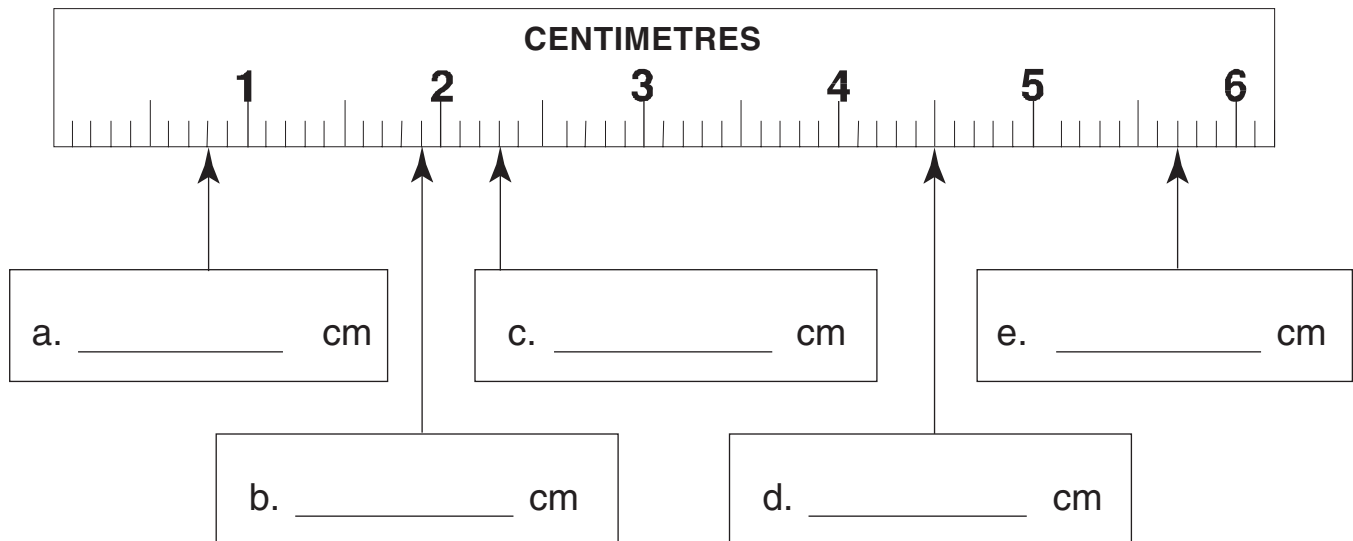
c. 21 mm or 2.2 cm

d. 19 mm or 2 cm

e. 1.8 cm or 20 mm

f. 32 mm or 3 cm

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. _____

_____	cm	_____	mm
_____	cm	_____	mm
_____	cm	_____	mm
_____	cm	_____	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 = _____ dm

b. 1 m = _____ cm

c. 1 m = _____ mm

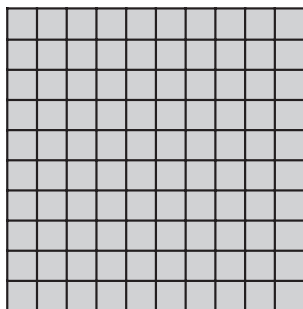
d. 1 km = _____ m

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 $1\text{ m} + 57\text{ cm} = 1.57\text{ m}$

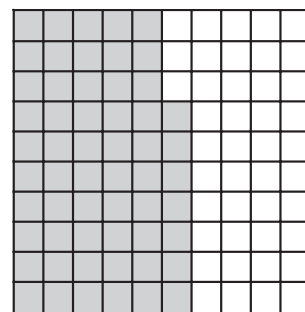
We can use base ten blocks to show these measurements.

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.



+

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

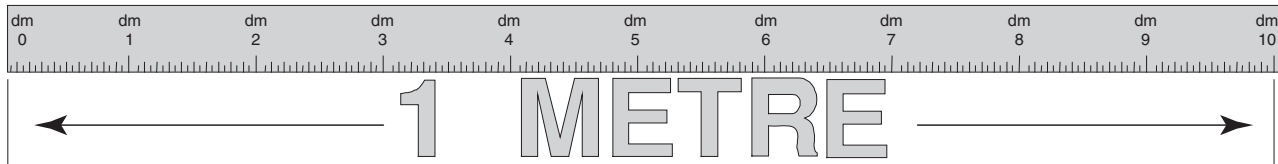
To change **centimetres** to **metres**, move the decimal **two** places to the left.

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.

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

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 = _____ m

b. 200 dm = _____ m

c. 138 cm = _____ m

d. 38 dm = _____ m

e. 80 cm = _____ m

f. 76 dm = _____ 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 = _____ m

b. 6.5 km = _____ m

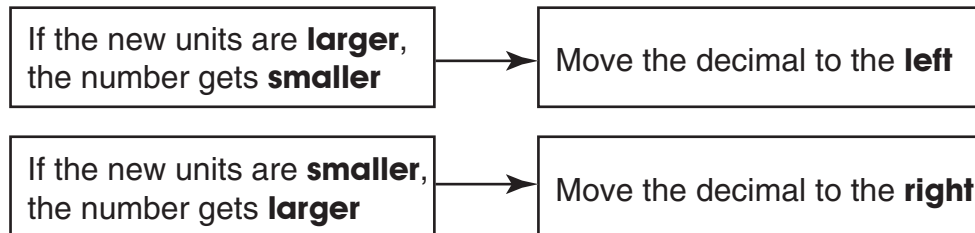
c. 18 m = _____ cm

d. 3.6 m = _____ cm

e. 12 km = _____ 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 = _____ mm

b. 200 dm = _____ m

c. 4 km = _____ m

d. 120 mm = _____ cm

e. 5 m = _____ cm

f. 1500 m = _____ km

2. Circle the smaller measurement in each question below.

a. 52 mm or 5 cm

b. 18 mm or 1.7 cm

c. 2 cm or 22 mm

d. 62 mm or 6.4 cm

e. 8.4 cm or 80 mm

f. 19 cm or 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. _____

b. _____

c. _____



