

Chapter 1: Measurement System

1.1 SI Measurement

Outcomes: 1. Solve problems that involve linear measurements, using:

- SI units of measure
- Estimation strategies
- Measurement strategies

2. Apply proportional reasoning to problems that involve conversions between SI and imperial units of measure

Definitions:

SI (Système International d'Unités): a system of measurement in which all units are based on multiples of ten

- The metre is the basic unit of length

Referent: an item that an individual uses as a measurement unit for estimating

Examples: the height of a doorknob above the floor is roughly 1 metre
the thickness of a dime is about 1 mm

Activity:

With a partner, measure the following body parts using only SI System of units:

- Length from your foot to your knee: _____
- Width of your thumb: _____
- Length of your wrist to your elbow: _____
- Your total height: _____

Linking the ideas: You can use different parts of your body as a **referent** to estimate the measurement of an object.

Example 1:

Estimate the height of the marker tray on a whiteboard using an appropriate referent. Then, measure this height.

Key Ideas

- Each unit in the SI measurement system is a multiple of 10.
- The kilometre is a large unit ($1 \text{ km} = 1000\text{m}$) and is suitable for measuring large distances
- The millimetre is a small unit ($1 \text{ mm} = \frac{1}{1000} \text{ m}$) and is suitable for measuring smaller distances
- A referent is a personal measurement unit that you can use to estimate measurements in standard units, such as SI units.

Textbook Questions: Pg. 16 #1, 3 - 13

1.2 Imperial Measurements

Outcomes: 1. Solve problems that involve linear measurements, using:

- Imperial units of measure
- Estimation strategies
- Measurement strategies

2. Apply proportional reasoning to problems that involve conversions between SI and imperial units of measure

Definitions:

Imperial System: a system of measurement based on British Units

Example: foot, inch, yard, etc.

Imperial Units Conversion		
Feet to Inch	Yard to Feet	Mile to Yard

Example 1:

Convert each measurement to a more appropriate imperial unit.

a) 36in to feet

b) 4.25 miles to yard

c) 90.23 feet to yards

Example 2:

The photograph of a muskox uses a scale of 1:30. Calculate the height of the muskox and the distance between the tips of its horns. State each answer in feet and inches.



Example 3:

A homeowner is laying sod in her lawn. The lawn is a rectangle with dimensions of $28' \times 18'$. What is the area of her lawn in inches?

Example 4:

A round Inuit drum needs to have its skin restretched and then lashed into place with sinew. For each inch of the frame, $3\frac{1}{2}$ inch, of sinew are needed. The diameter of the frame is $1\frac{1}{4}$ ft. What length of sinew is needed? Express your answer to the nearest inch.

Key Ideas

- In the imperial system, common units for linear measurement are the inch (in.), foot (ft.), yard (yd), and mile (mi). The imperial units for length are related according to the following conversions.
 - $1\text{ mi} = 1760\text{ yd}$
 - $1\text{ yd} = 3\text{ ft}$
 - $1\text{ ft} = 12\text{ in}$
- The imperial system of measurement is widely used in the United States for measuring distances
- Even though SI is Canada's official measurement system, some Canadian industries still use imperial units.

Textbook Questions: Pg. 29 # 2, 3, 5, 7, 8 - 11, 14

1.3 Converting Between SI and Imperial Systems

Outcomes: 1. Solve problems that involve linear measurements, using:

- SI and imperial units of measure
- Estimation strategies
- Measurement strategies

2. Apply proportional reasoning to problems that involve conversions between SI and imperial units of measure

Comparing SI and Imperial Measurements:

1. Pull a measuring tape out to its full extent (or look at a metre stick) and write the value of the largest unit in each of the two systems.

Metric:

Imperial:

Now fill in the actual Conversion Table

Metric to Imperial:	Imperial to Metric:
1 cm = _____ in	1 in = _____ cm
1 m = _____ yds	1 ft = _____ m
1 mi = _____ km	1 km = _____ mi

Example 1:

Identify the equivalent for each of the following :

a) 5m = _____ cm

b) 4.2 yards = _____ m

c) 5 miles = _____ km

d) 3 feet = _____ m

e) 7'11" = _____ cm

Example 2:

A traditional Inuit dogsled is called a komatik. A komatik uses teams of qimmiq or sled dogs on separate lines. The lines are tied directly to the komatik. Each dog has a harness with an average length of $3\frac{1}{2}$ ft. Suppose a dogsled team includes 13 dogs.

a. What is the approximate **total** length of rope needed to harness the team?

b. What is the total length needed in **SI units**?



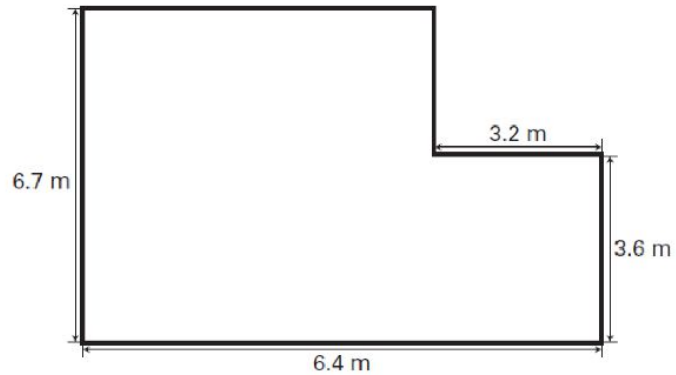
c. Explain why you chose the units you did.

Example 3:

A standard piece of paper in Canada and the United States is $8\frac{1}{2}$ " by 11". In Europe, however, the standard piece of paper is 210 mm by 297 mm. Which piece of paper has a larger area?

Example 4: Five students measure their height using different units. Andrew is 176 cm, Brittney is 5'4", Calvin is 1.8 yards, Don is 54 inches, and Elisha is 1.6 metres. Arrange the students from shortest to tallest

Example 5: Determine the perimeter of the following shape, in feet.



Key Ideas

- When solving problems involving measurement, it is crucial to work with the same units. You may need to convert units within one measurement system (for example, inches to feet) or between imperial and SI units.
- If an exact conversion between systems is required, use unit conversions between the required units.
- Sometimes you use approximate values, such as $1 \text{ in} \approx 2.5 \text{ cm}$ or $1.6 \text{ km} \approx 1 \text{ mile}$, when estimating between measurement systems.

Textbook Questions: Pg. 42 #1 - 12, 15