Skills for Success Curriculum Resource Cover Page

College Sector Committee for Adult Upgrading (CSC)

Curriculum Resource

Refresher: Measuring Length
(A metric and imperial ruler or measuring tape are required)

In this activity learners will complete a quick review of the following concepts: converting fractions to decimals (and vice-versa), why units are important in measuring, and how to use and read a measuring tape or ruler to measure length. Then they will complete a short activity requiring them to convert fractions to decimals, decimals to fractions, and to measure and record length measurements with correct units.

OALCF Alignment

Competency	Task Group	Level
Competency A -Find and Use Information	A1. Read continuous text	2
Competency A -Find and Use Information	A2. Interpret documents	2
Competency C - Understand and Use Numbers	C3. Use measures	3

Goal Paths (check all that apply)

☒ Employment
☒ Apprenticeship
☒ Secondary School Credit

☒ Postsecondary
☒ Independence

Embedded Skills for Success (check all that apply)

☐ Adaptability
☐ Collaboration
☐ Communication
☐ Creativity and innovation
☐ Digital

☒ Numeracy
☒ Problem Solving
☒ Reading
☐ Writing

Measurement Skills – Length: A Refresher for Learners

Learning in this Activity

At the end of this activity, you should be able to:

- Explain why including units is important when recording a measurement
- Convert between fractions and decimals
- Identify and explain features of a measuring tape
- Measure length of an object, safely and accurately, using a measuring tape or ruler in metric and imperial units

Fraction and Decimal Conversions

It is very useful to be able to convert between fractions and decimals when taking measurements. This skill is important in cooking, construction, handling money, and more.

1. Convert a Fraction to a Decimal:

Step 1: Divide the top number (numerator) by the bottom number (denominator)

> **NOTE**: If there is a whole number part, add the whole number to the decimal resulting from dividing the numerator by the denominator.

Step 2: Round if necessary.

Example 1.1:

Convert the following fractions to decimals. Round to two decimal places if needed.

a) $\frac{7}{8} = 7 \div 8 = 0.88$

b) $3\frac{5}{7} = (5 \div 7) + 3 = (0.71) + 3 = 3.71$

2. Convert a Decimal to a Fraction

Step 1: Write the decimal as a fraction over 1 (denominator of 1).

It will look like this

$$\frac{\text{decimal number}}{1}$$

Step 2: Count the number of digits to the right of the decimal point.

The number of digits tells you how many times to multiply both top and bottom by 10.

Step 3: Multiply the top (numerator) and bottom (denominator) as determined in Step 2.

Step 4: Reduce to lowest terms.

Example 1.2:

Convert the following decimals to fractions.

a) 0.88

$$= \frac{0.88}{1}$$

There are 2 decimal places, so we need to multiply both top and bottom by 10 two times.

$$= \frac{0.88 \times 10 \times 10}{1 \times 10 \times 10}$$

$$= \frac{88}{100}$$

We can use this fraction or reduce it by dividing the top and bottom by the same number. We pick a number that will divide into both the top and bottom evenly.

(Please ask your instructor if you need help with reducing fractions.)

$$= \frac{88 \div 4}{100 \div 4}$$

$$= \frac{22}{25}$$

b) 2.655

$$= \frac{2.655}{1}$$

There are 3 decimal places, so we need to multiply both top and bottom by 10 three times.

$$= \frac{2.655 \times 10 \times 10 \times 10}{1 \times 10 \times 10 \times 10}$$

$$= \frac{2655}{1000}$$

We can use this fraction or reduce it by dividing the top and bottom by the same number. We pick a number that will divide into both the top and bottom evenly.

(Please ask your instructor if you need help with reducing fractions.)

$$= \frac{2655 \div 5}{1000 \div 5}$$

$$= \frac{531}{200}$$

Units – Why are they Important?

When measuring anything, it is very important to include units. Without units, your measurement has no meaning!

For example, if someone says, "I have five!" do you know what they mean? It could be five dogs, five dollars, or five million marbles. The units are needed to understand what they are talking about. If they say, "I have five oranges." you know what they mean right away.

When you are taking measurements of any kind,

always include the units!

Using a Measuring Tape and a Ruler

Measuring tapes are used to measure length.

They can measure smaller (millimetres) and longer lengths (metres). Measuring tapes range in lengths from 2 metres up to hundreds of metres.

Rulers are like measuring tapes but are usually not flexible and are shorter. They usually range from 10 cm to 30 cm in length.

There are also fabric measuring tapes, which are flexible. They are used in clothing manufacturing and crafting.

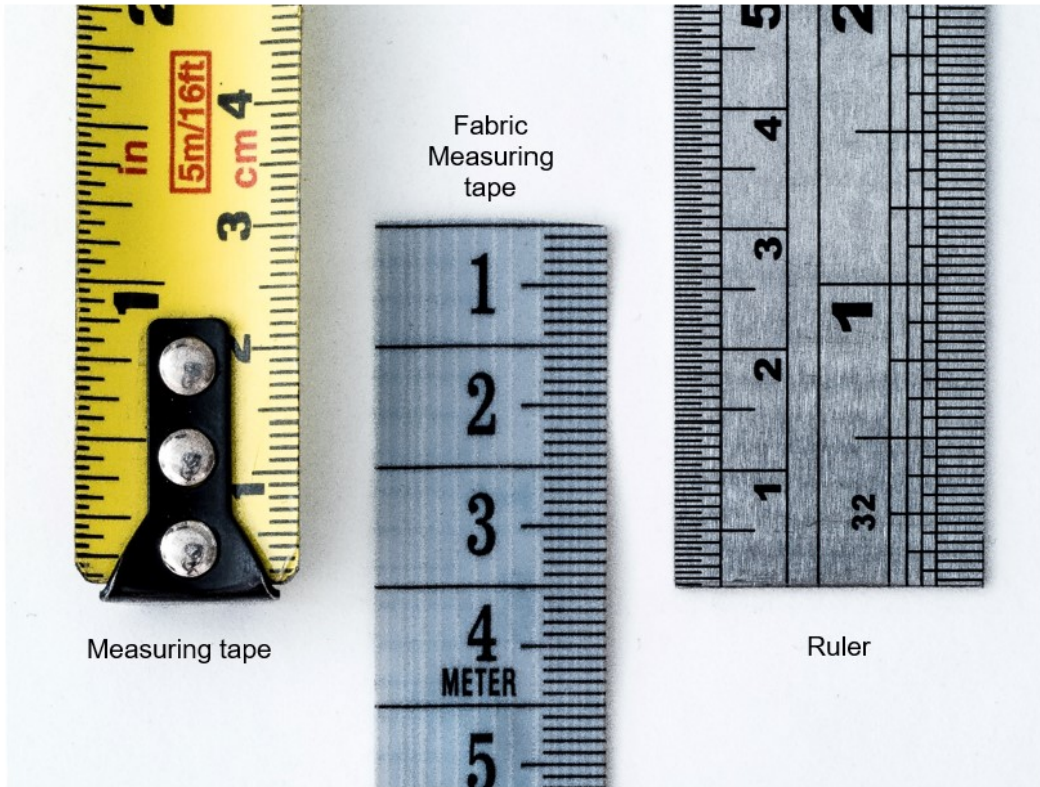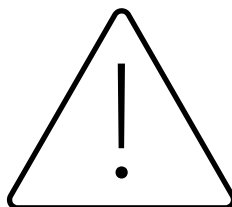Some different measuring tapes are shown on the next page

Photo by William Warby on Unsplash, Labels by L. Roque, Fleming College

Most rulers and measuring tapes in Canada show both Imperial (feet and inches) and Metric (centimetres and metres) units.

3. Safety Precautions – Measuring Tape
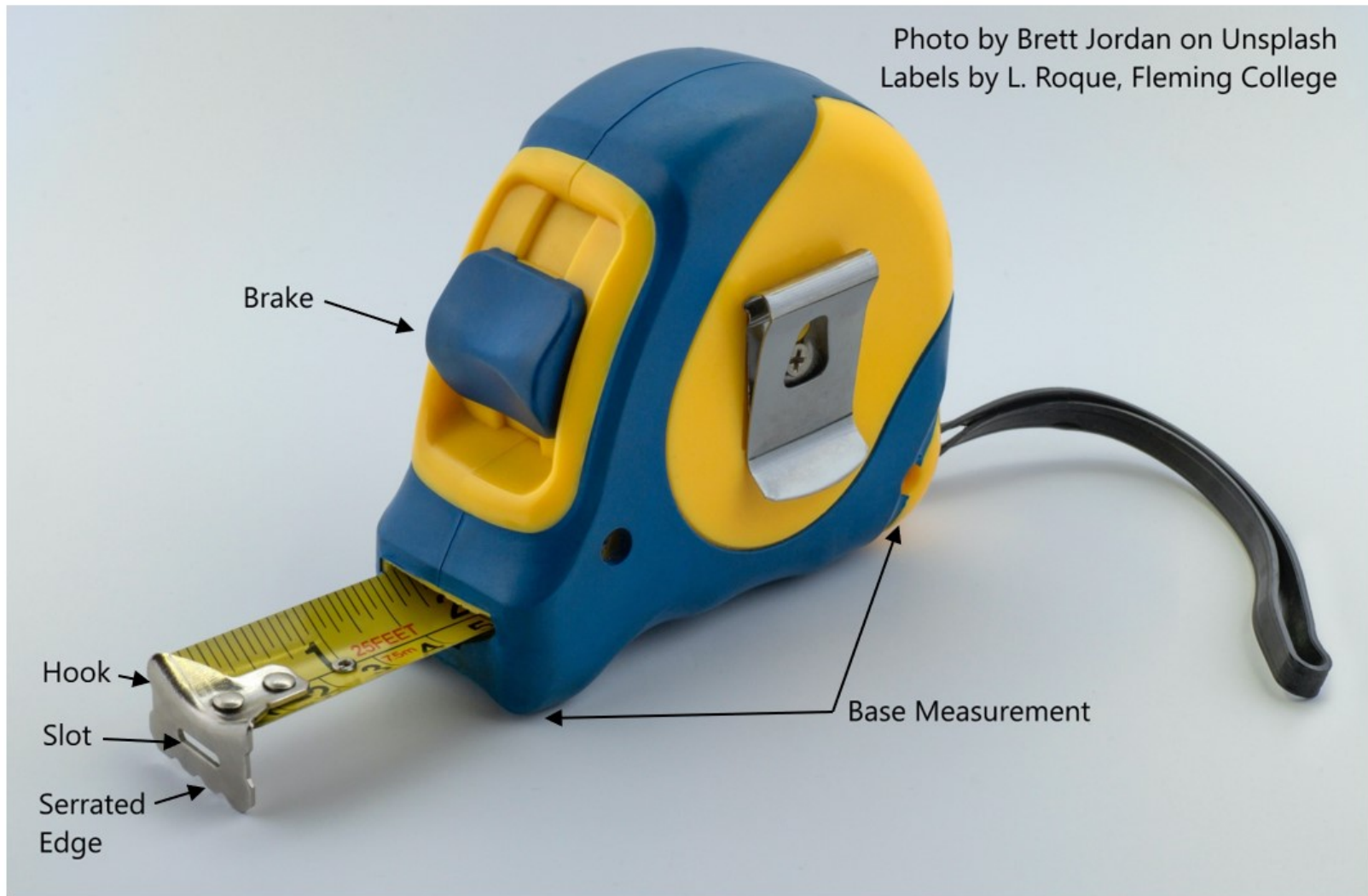
- The measuring tape is very sharp! It can cut you, handle with care.

- The tape retracts on its own, it can pinch your fingers.

- The tape can bend safely

  o Try not to kink the tape by folding it tight

4. Features of Measuring Tapes

Photo by Brett Jordan on Unsplash
Labels by L. Roque, Fleming College

Brake

Hook

Slot

Serrated Edge

Base Measurement

25 FEET

There are many useful features of a measuring tape. Most features are listed in the table below.

Feature	Location	Description/Uses
Hook	End of tape measure	• Loose piece of metal • Adjusts to accommodate pulling/ pushing measurements • Measures $\frac{1}{16}$ of an inch
Slot	Hole in the middle of hook	• Nail/Screw grab • Secure the tape so you can measure
Serrated (Jagged) Edge	Bottom of the hook	• Use to mark the material • Make the mark by scraping back and forth
Base Measurement	Number on back of the tape (inches and millimetres)	• This is the length of the case and can be added to the tape length to get an accurate reading • Useful when there is a bend in the tape (inside measurements)
Brake	Plastic piece on the top of the tape	• Push down to stop the tape from retracting • Useful when making repeated measurements

5. Markings on a Measuring Tape

Most measuring tapes have a metric side and an imperial side for measurements.

Most also have similar markings on the tape, though the colours may be different.

The Metric Side	The Imperial Side
- Black numbers are centimetres - Red numbers are 10's - Slightly more challenging to read	- Black numbers are inches - Black boxes are feet (multiples of 12) - You can read that foot or replace with the proper number

Other useful features on the tape:

- Red boxes every 16 inches (common stud locations)

- Black diamonds, $19\frac{3}{16}$ inches (common rafter separation)

- Red numbers show the number of feet and number inches of a given length

  - 1F-1 means 1 foot and 1 inch

  - 2F-3 means 2 feet and 3 inches

- Black triangles show conversion between centimetres and inches

- Fractions of an inch are in lowest terms

Did You Know?!?!

You can use a measuring tape to draw a circle, find the circumference of a circle or find a 90° angle?

Check out these videos for some cool measuring tape hacks:

YouTube video - 5 Easy Tape Measure Tricks by izzy swan

YouTube video - 3 Measure Tape Tricks / Hacks steel measuring tape by Mistry MakeTool

6. Markings on a Ruler

Most rulers have a metric side and an imperial side for measurements.

Metric side
Small ticks are millimetres (mm), numbers are centimetres (cm)

Photo by William Warby on Unsplash,
Labels by L. Roque, Fleming College

Imperial side
Small ticks are $\frac{1}{32}$ of an inch, numbers are inches (")

7. How to take a measurement with a measuring tape

- Pull the hook out from the case of the measuring tape and hook it on the edge of the object to be measured.

- Pull the tape across the object, press the brake, and then look at where the tape meets the end of the object.

- The nearest line on the tape to the end of the object is the final measurement.

  - Read from left to right

  - Imperial units - look for the feet, then inches, and then fraction of an inch

  - Metric units - look for the metres, then centimetres, and then millimetres

Example 7.1

Photo by S. Hicks, Fleming College
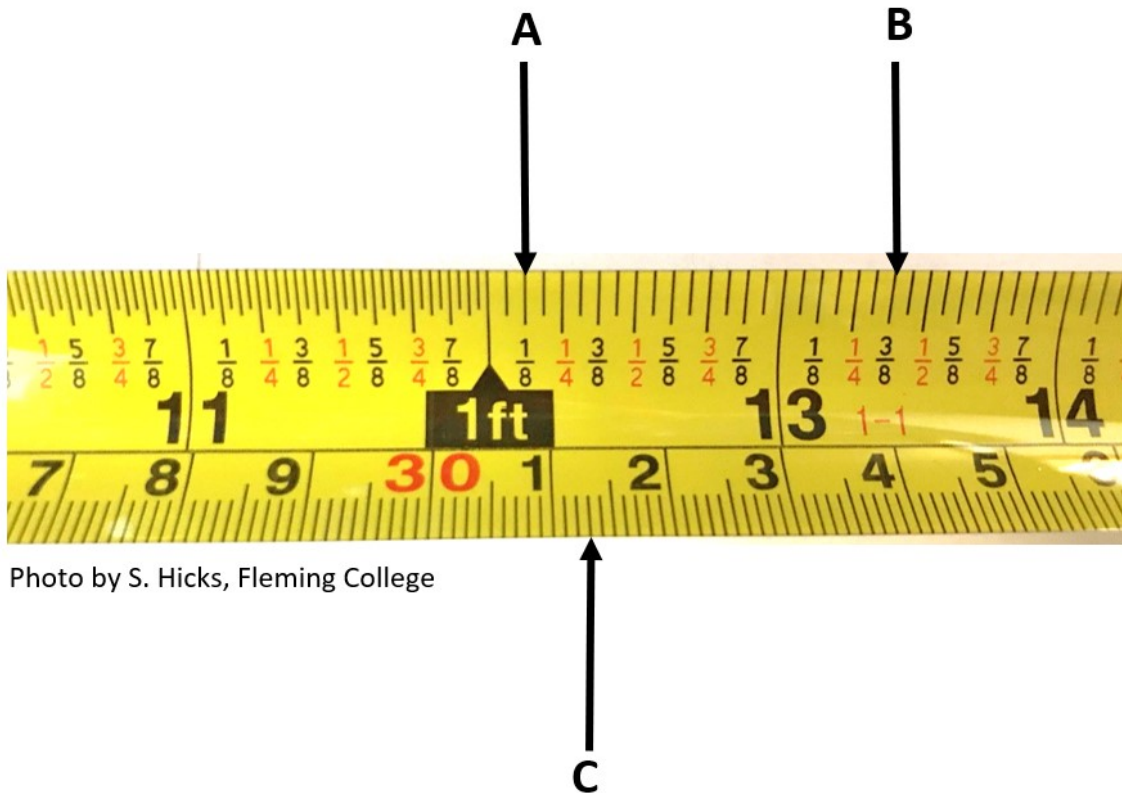
Measurement A:

- The arrow points to $\frac{1}{8}$

- The number to the left is 1 ft

    - **Tip: 1 ft equals 12 inches**

This measurement is 1 foot $\frac{1}{8}$ inch, also written as $12\frac{1}{8}$ ".

Measurement B:

- The arrow points to $\frac{3}{8}$

- The number to the left is 13

- You can see "1 FT" in black to the left of the arrow

    - **Tip: the "13" is 1 inch to the right of the 1 FT mark**

This measurement is 1 foot $1\frac{3}{8}$ inches, also written as $13\frac{3}{8}$ ".

Measurement C:

- The arrow points to 3 ticks marks to the right of the 1

    - Each tick mark is 1 mm, so that means 3 mm

- The number to the left of the arrow is 1

    - That means 1 cm

- You can see "30" in red just to the left of the 1

    - That means 30 cm

This measurement is 31.3 cm.

Please ask your instructor for help if you have any questions.

8. How to take a measurement with a ruler

- Line up the edge of the ruler that has the zero mark on the left side edge of the object you want to measure

- Align the ruler along the edge of the object you are measuring

- The left side of the line where the object ends will be its measurement.

- **Make sure you read the ruler from left to right.**
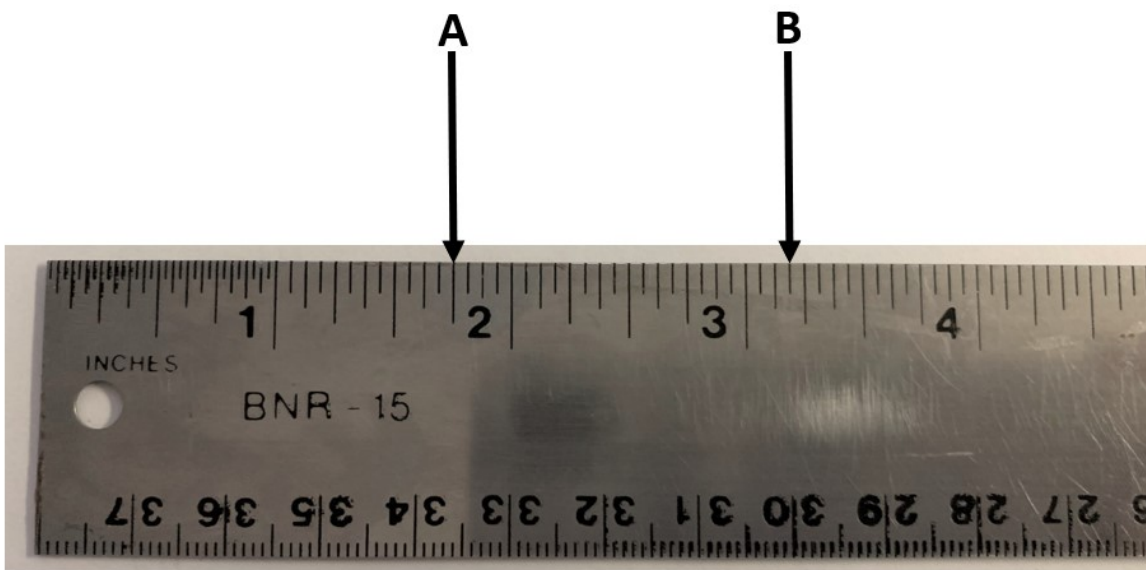
Example 8.1- Imperial units

Photo and labels by L. Roque, Fleming College

Measurement A:

- Start at the 1" mark and count to the right the number of tick marks to the arrow, this is your top number (numerator)

    o 12 tick marks

- Start at the 1" mark and count to the right the number of tick marks between 1 and 2, this is your bottom number (denominator)

    o 16 tick marks

- This makes the fraction part of our measurement $\frac{12}{16}$ inches

    o We can reduce this fraction

$$\frac{12}{16} = \frac{12 \div 4}{12 \div 4} = \frac{3}{4} \text{ inches}$$

- The number to the left is 1 inch

This measurement is $1\ \frac{3}{4}$ inches, also written as $1\ \frac{3}{4}$"

Measurement B:

- Start at the 3" mark and count to the right the number of tick marks to the arrow, this is your top number (numerator)

    o 3 tick marks

- Start at the 3" mark and count to the right the number of tick marks between 3 and 4, this is your bottom number (denominator)

    o 16 tick marks

    o **Tip: If you have used the ruler before and know the number of tick marks, you don't have to count again**

- o

- This makes the fraction part of our measurement $\frac{3}{16}$ inches

  - o We can't reduce this fraction, because there is no number that will divide both top and bottom evenly

- The number to the left is 3 inches

This measurement is $3 \frac{3}{16}$ inches, also written as $3 \frac{3}{16}$ "
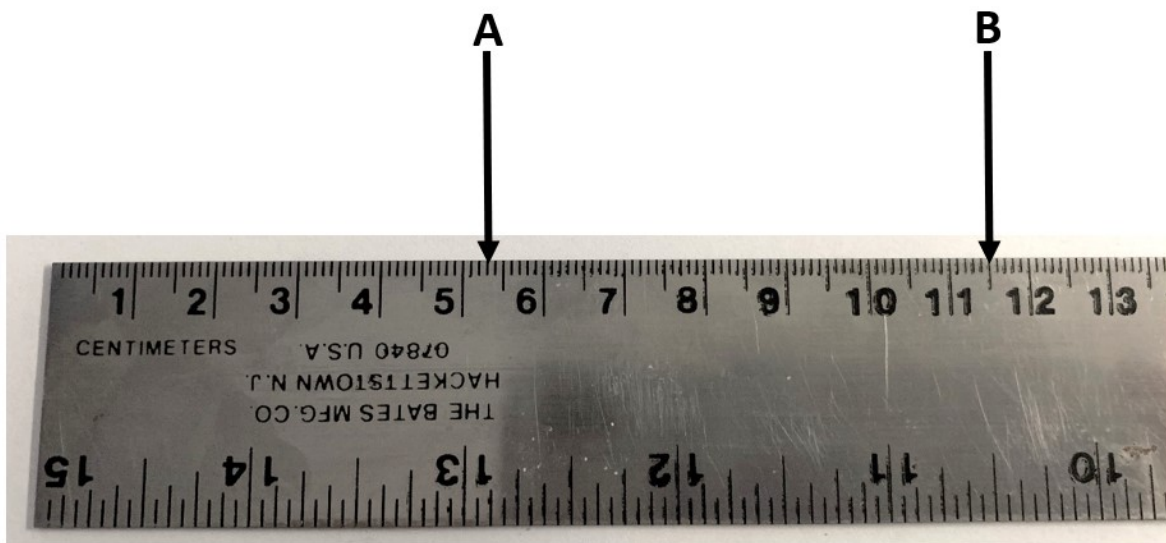
Example 8.2 – Metric Units

Photo and labels by L. Roque, Fleming College

Measurement A:

- The number to the left of the arrow is 5, which is the number of centimetres (cm)

    o 5 cm

- Start at the 5 cm mark and count to the right the number of tick marks to the arrow, this is the number of millimetres (mm)

    o 3 mm

    o This can also be written as 0.3 cm

This measurement is 5.3 cm, which can also be written as 53 mm.

Measurement B:

- The number to the left of the arrow is 11, which is the number of centimetres (cm)

    o 11 cm

- Start at the 11 cm mark and count to the right the number of tick marks to the arrow, this is the number of millimetres (mm)

    o 5 mm

    o This can also be written as 0.5 cm

This measurement is 11.5 cm, which can also be written as 115 mm.

1. While working on a job, you collect the following measurements (in inches). Convert the decimals to fractions and the fractions to decimals. Round all decimals to 2 decimal places. (6 marks, 1 for each row)

Fraction (in inches)	Decimal (in inches)
$\dfrac{7}{20}$	
$\dfrac{8}{33}$	
$2\dfrac{3}{5}$	
	1.76
	0.005
	0.4

2. Record the values shown in the following images of the measuring tape.

(11 marks total, 1 mark for each measurement and 0.5 for units except (f) which is 0.75 for units)

- Record your answers as fractions in lowest terms measured in inches and feet (where applicable)
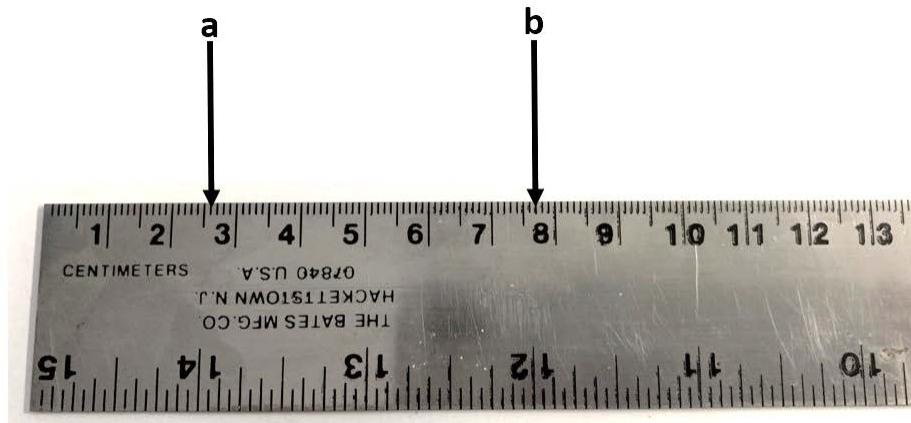- Include units (they are shown in the pictures)

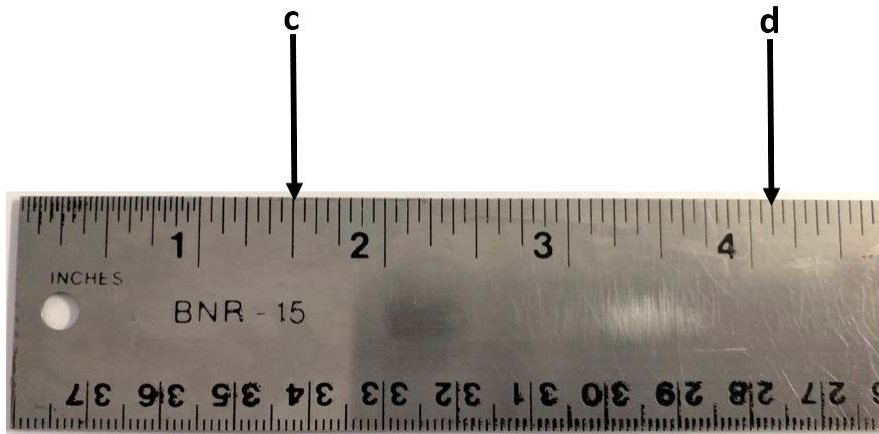Photo and labels by L. Roque, Fleming College

a)

b)

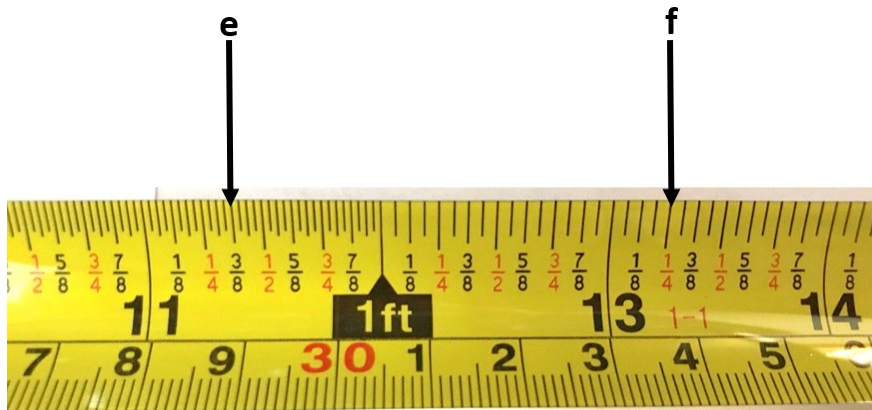Photo and labels by L. Roque, Fleming College

c)

d)

Photo and labels by S. Hicks, Fleming College

e)

f)   Please answer in inches **and** in feet and inches

3. Using a ruler or a tape measure, measure the horizontal and vertical sides of a light switch (see picture below) in your location. Make sure to include units with your answer. (6 marks, 1 for each measurement, 0.5 for units)

Photo by Isabella and Zsa Fischer on Unsplash
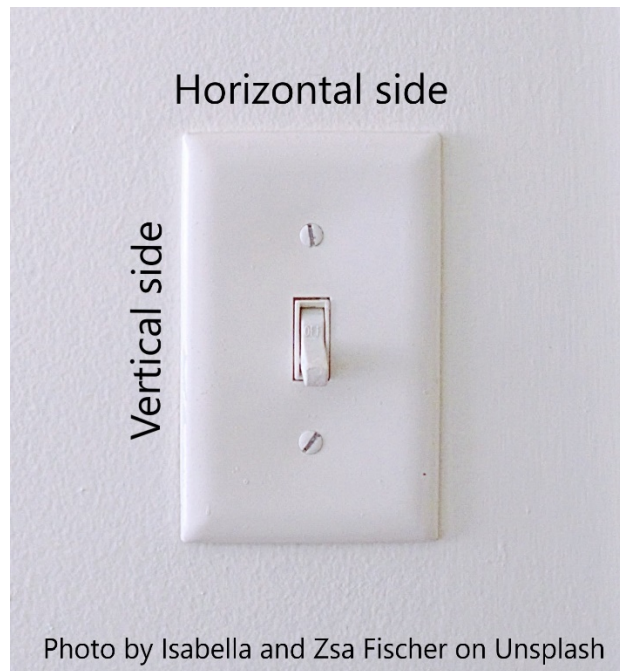
    a. Measure and record the horizontal side in inches

    b. Measure and record the vertical side in inches

    c. Measure and record the horizontal side in centimetres

    d. Measure and record the vertical side in centimetres

Bibliography

Fischer, I., & Fischer, Z. (2019). *White wall switch*. Unsplash.com. Unsplash. Retrieved January 12, 2023, from https://unsplash.com/photos/ynfmVbvunQU.

Jordan, B. (2019). *Blue and yellow measuring tape*. Unsplash.com. Unsplash. Retrieved January 11, 2023, from https://unsplash.com/photos/faOPbPmznfQ.

Labelled ruler in inches. (2023). photograph.

Labelled ruler in inches. (2023). photograph.

Measuring tape with arrows. (2023). photograph.

Warby, W. (2019). *Gray and yellow measures*. Unsplash.com. Unsplash. Retrieved January 12, 2023, from https://unsplash.com/photos/WahfNoqbYnM.

SOLUTIONS - Applying your Skills   /23 marks

1. (6 marks, 1 for each row)

Fraction (in inches)	Decimal (in inches)
$\dfrac{7}{20}$	0.35
$\dfrac{8}{33}$	0.24
$2\dfrac{3}{5}$	2.6
$1\dfrac{19}{25}$	1.76
$\dfrac{1}{200}$	0.005
$\dfrac{2}{5}$	0.4

2. (11 marks)

    a) 2.6 cm   (1 for measurement, 0.5 for units)

    b) 7.7 cm   (1 for measurement, 0.5 for units)

    c) $1\dfrac{1}{2}$"   (1 for measurement, 0.5 for units)

    d) $4\dfrac{1}{8}$"   (1 for measurement, 0.5 for units)

    e) $11\dfrac{3}{8}$"   (1 for measurement, 0.5 for units)

    f) $13\dfrac{1}{4}$" and $1'\ 1\dfrac{1}{4}$"   (1 for each measurement, 0.75 each for units)

3. (6 marks) Answers may vary slightly. Non-reduced fractions are acceptable.

    a) $2\dfrac{3}{4}$"   (1 for measurement, 0.5 for units)

    b) $4\dfrac{3}{8}$"   (1 for measurement, 0.5 for units)

    c) 7 cm   (1 for measurement, 0.5 for units)

    d) 11.1 cm   (1 for measurement, 0.5 for units)