1.1/ 1.2 Converting Measurements Metric to Metric and Imperial to Imperial

Concept #10: 1.1/1.3 Correctly convert from imperial to SI or SI to imperial (linear measurements)

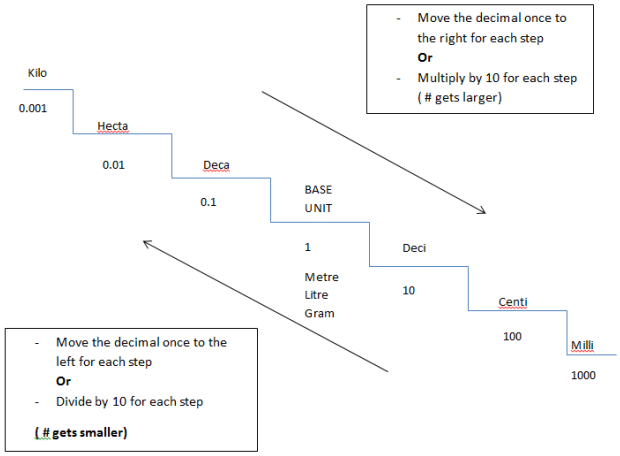
The **SI system of measures** is an abbreviation for Le Systeme International d'Unites. Since 1960, this form of metric system has been adopted by many countries. Canada adopted the measuring system in 1976. The metric system or SI system uses base units of meter, litre and gram. The SI system is a decimal system because it is built on multiples of 10.

Interesting Fact: Below are just some of the units in the SI system. 10^0= The base unit (Meter, Litre or Gram)

Factor	Prefix	Symbol	Factor	Prefix	Symbol
10^{15}	peta	P	10^{1}	deka	da
10^{12}	tera	T	10^{-1}	deci	d
10^{9}	giga	G	10^{-2}	centi	c
10^{6}	Mega	M	10^{-3}	milli	m
10^{3}	Kilo	K	10^{-6}	micro	η
10^{2}	Hecto	h	10^{-9}	nano	n

Part 1- The Metric System

1 m = 100 cm 1 m = 1000 mm
1 cm = 0.01 m 1 cm = 10 mm
1 mm = 0.001 m 1 mm = 0.1 cm



Example 1:Convert the following:

a) 34 cm = _____ m (Using Proportions)

b) 5 km = _____ cm (Using the Staircase)

c) 640ml = _____ L (Multiply by the conversion factor)

d) 55436g = _____ kg (Method of choice)

` 1

e)456 mm =_____m (Method of Choice)

f) 3.5km = _____mm (Method of Choice)

Part 2 – The Imperial System

The imperial system uses units such as inch, foot, yard etc. Even though Canada primarily uses the SI system, there are many instances where we continue to use the imperial system. Some examples include:

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-
-

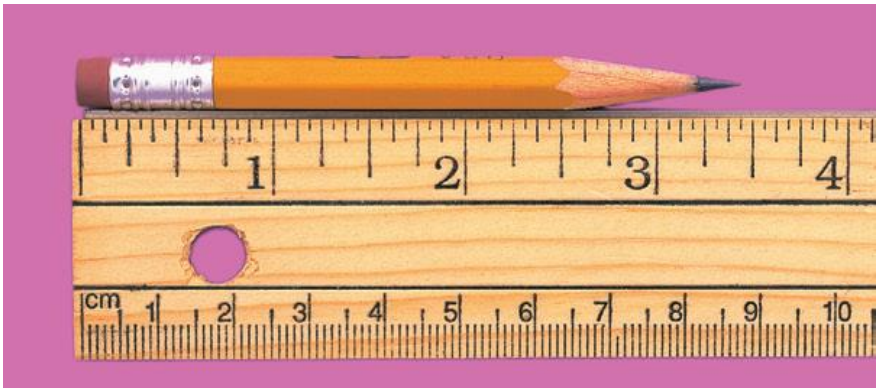
Many Units in the imperial system are based on measurements of the human body. These are now used as referents. (**Referent:** An object used to estimate a distance.)

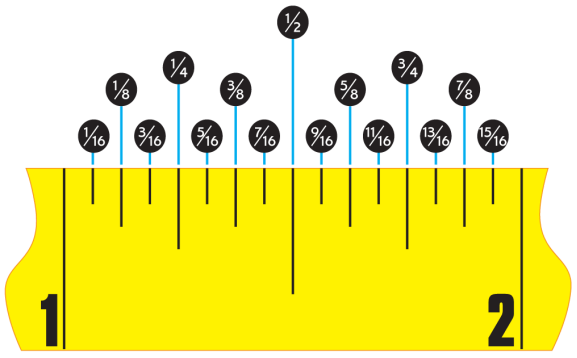
Imperial Unit	Abbreviation	Referent	Relationship between Units
Inch	in.	Thumb length	
Foot	ft.	Foot length	1 ft. = 12 in.
Yard	yd.	Arm span	1 yd. = 3 ft. 1 yd. = 36 in.
Mile	mi.	Distance walked in 20 min	1 mi. = 1760 yd. 1 mi. = 5280 ft.

Note: Another common abbreviation for 1 foot is 1' and 1 inch is 1''.

Measuring using Imperial system:

To measure the length of an object, you must first determine the smallest indicated unit by counting the number of divisions between two adjacent inch marks. The ruler below has 16 divisions between two adjacent inch marks, so the smallest indicated unit is $\frac{1}{16}$ an inch.





Standard Tape Measure Showing Inch Breakdown

HOW LONG IS THE PENCIL? _____

Example 2: Convert: a) 5 yd to feet

Relationship between Units
1 ft. = 12 in.
1 yd. = 3 ft. 1 yd. = 36 in.
1 mi. = 1760 yd. 1 mi. = 5280 ft.

Method 1 (Multiply by the conversion factor)

Method 2 (Solve by Proportions)

b) 5 yd to inches

c) 51 in to feet and inches

d) 51 in to yards , ft and in.

Example 3: Anne is framing a picture. The perimeter of the framed picture will be 136in. a) what will be the perimeter of the framed picture in feet and inches? B) The framing material is sold by the foot. It costs $1.89/ft/ What will be the cost of the material before taxes?

Example 4: A map of Alaska has a scale of 1 : 4 750 000. The distance on the map between Paxson and the Canadian border is $3\frac{11}{16}$ in. What is this distance to the nearest mile?

1.1 Assignment Pg 11 #7,8,10b,11a,12 , 16 , choose one: (extension questions 14 or 15)

1.3 Relating SI and Imperial Units

Concept #10: 1.1/1.3 Correctly convert from imperial to SI or SI to imperial (linear measurements)

Each measurement in the imperial system relates to a corresponding measurement in the SI system. This table shows some approximate values:

SI to Imperial	Imperial to SI
1mm ≈ 0.0394 in	1 in = 25.4 mm
1 cm ≈ 0.394 in	1 in = 2.54 cm
1 m ≈ 3.2808 ft	1 ft ≈ 0.3048 m
1 m ≈ 1.0936 yd	1 yd = 0.9144 m
1 km ≈ 0.6214 mi	1 mi ≈ 1.6093 km
	1yd = 91.44cm

Never round until you've reached your final answer. Always round final answers to the nearest thousandth (3 decimal places) unless specified otherwise.

Example1: A bowling lane is 19m long, what is the length to the nearest thousandth of a foot(3 decimal places)?

Example 2: After a wedding in Minot, North Dakota Mrs. Sundeen drove 99km north and her cousin, Brad, drove 62mi south. Who drove farther? And how much farther?

Example 3: Tommy is 6 ft and 2 in tall. He needs this converted to cm for his drivers license. What is his height in cm?(round to the nearest cm)

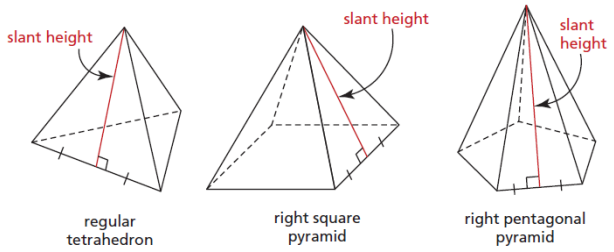
1.3 Assignment : pg 22 #4,5,6 ,9, 13ab, 15

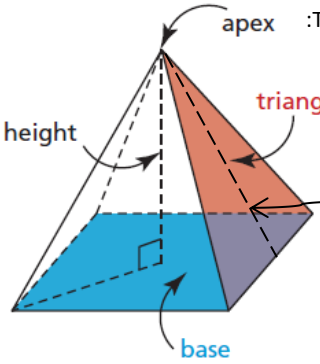
1.4 Surface Area of Right Pyramids and Right Cones

Concept #11: 1.4 / 1.7Determine the surface area of 3D objects (right cones, cylinders, prisms, pyramids & sphere's)

Right Pyramid: a 3 dimensional object with triangular faces and a polygon base. The shape of the base determines the name of the pyramid.

Regular Tetrahedron: 4 congruent equilateral triangular faces

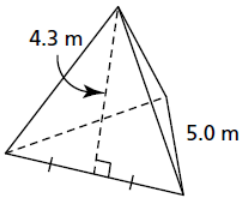




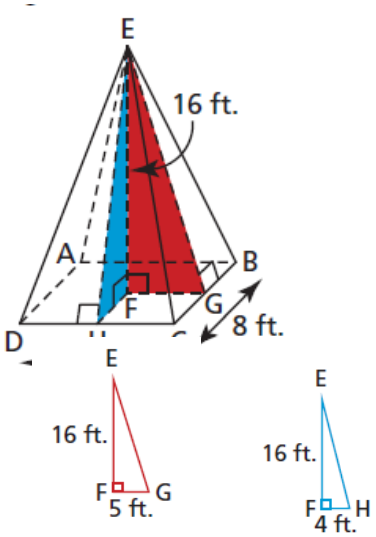
Never round until you've reached your final answer. Always round final answers to the nearest thousandth (3 decimal places) unless specified otherwise.

Surface Area of a Pyramid: The sum of the areas of the triangular faces and the base

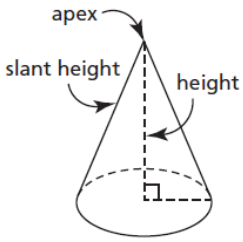
Example 1: What is the surface area of this regular tetrahedron to the nearest square centimetre?

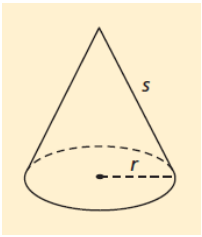


Example 2: A right rectangular pyramid has base dimensions 8ft by 10ft and a height of 16ft. Calculate the surface area of the pyramid to the nearest square foot.



Right Circular Cone: a 3 dimensional object that has a circular base and a curved surface. Usually called a right cone.





Surface Area of a cone:

S.A = lateral area + base area

$$SA = \pi rs + \pi r^2$$

r = radius s= slant height

Example 3: A right cone has a base radius of 2ft and a height of 7ft. Calculate the surface area of this cone to the nearest square foot.

Example 4: The Lateral area of a cone is 220cm^2. The diameter of the cones is 10cm. Determine the height of the cone to the nearest tenth of a centimtre.

1.4 Assignment Pg 34# 5, 8, 13, 16 Choose between 20 and 21

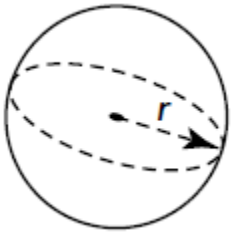
1.6 Surface Area and Volume of a Sphere

Concept #11: 1.4 / 1.7/1.6 Determine the surface area of 3D objects (right cones, cylinders, prisms, pyramids & sphere's)

Concept #12: 1.5/1.7 /1.6 Determine the volume of 3D objects (right cones, cylinders, prisms, pyramids & sphere's)

Surface Area of a Sphere

$$S.A = 4\pi r^2$$ r = radius

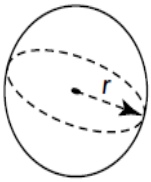


Example 1: The diameter of a baseball is approximately 3 in. Determine the surface area of a baseball to the nearest square inch.

Example 2: The surface area of a lacrosse ball is approximately 20 in^2. What is the diameter of the lacrosse ball to the nearest thousandth of an inch?

Volume of a Sphere (Watch video to derive formula)

V =



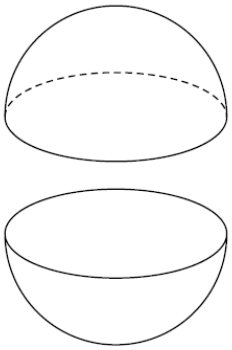
Example 3: The sun approximates a sphere with diameter 870 000 mi. What is the approximate volume of the sun? (Using calc. simulator to demonstrate)

Example 4: A hemisphere has radius 8.0cm.

a) What is the surface area of the hemisphere to the nearest thousandth of a square centimeter?

b) What is the volume of the hemisphere to the nearest thousandth of a cubic centimeter?

When a sphere is cut in half, two *hemispheres* are formed.



hemispheres

Example 5: A spherical globe has a circumference 158cm. The surface of the globe is to be painted with a high gloss varnish. What is the area to be painted to the nearest square centimeter?

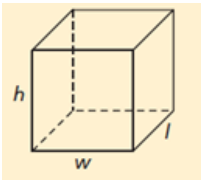
1.6 Assignment pg 51 #3,4,5,8,10,18

1.5 Volumes of Right Pyramids and Right Cones

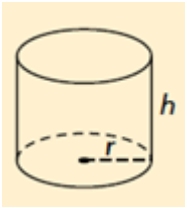
Concept #12: 1.5/1.7 Determine the volume of 3D objects (right cones, cylinders, prisms, pyramids & sphere's)

Volume: The amount of space an object occupies. It is measured in cubic units.

How do you find the volume of: a right rectangular prism? a right cylinder?



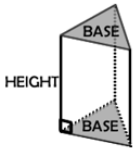
V=

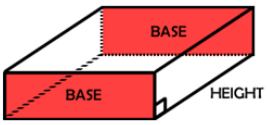


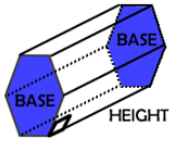
V=

Volumes of any Right Prism formula:

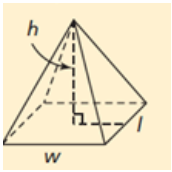
V=







Volume of a right rectangular pyramid



V=

Volume of a Right Cone

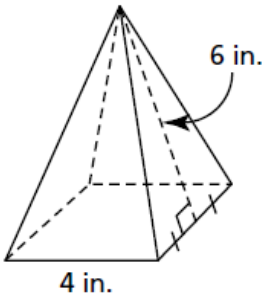
V=

Volume of any Right Pyramid or Cone formula:

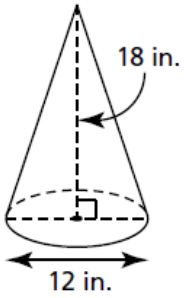
V=

Example 1: Determine the volume of the right rectangular pyramid with base dimensions 5.4cm by 3.2 cm and height 8.1cm. Answer the nearest thousandth of a cubic centimetre.

Example 2: Calculate the volume of this right square pyramid to the nearest thousandth cubic inch.



Example 3: Determine the volume of this cone to the nearest thousandth of a cubic inch.



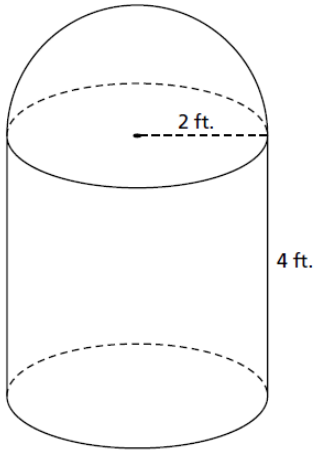
Example 4: Find the slant height of a cone whose volume is 272.3 m^3 and whose height is 480cm.

1.5 Assignments Pg 42 #4,6,8,9,11, 18

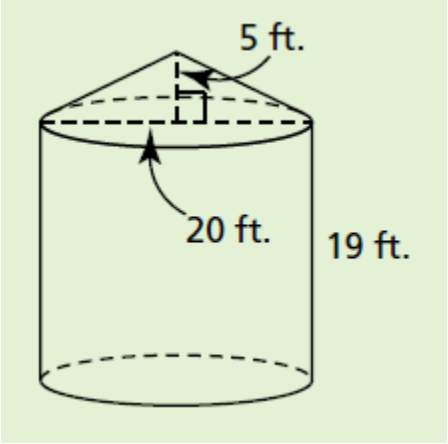
1.7 Composite Shapes

Concept #13: 1.7 Determine the surface area and volume of composite objects (C) (Skill & Problem Solving)

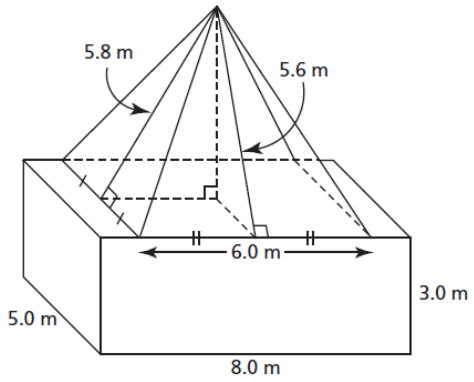
Example 1: Determine the surface area of this composite object to the nearest square foot



Example 2: The farmer's grain truck can hold 550 cubic feet of barley. How many truckloads are required to fill the bin?



Example 3: This composite object is a rectangular pyramid on the top of a rectangular prism. Determine the surface area and volume of the composite object to the nearest unit.



1.7 Assignment Pg 59 #3 , #5, #9