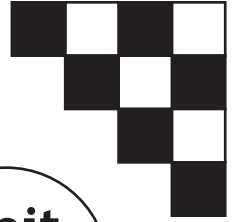
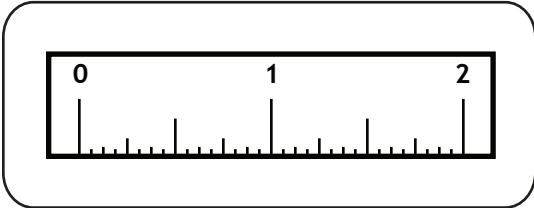


# Mathematics 10C

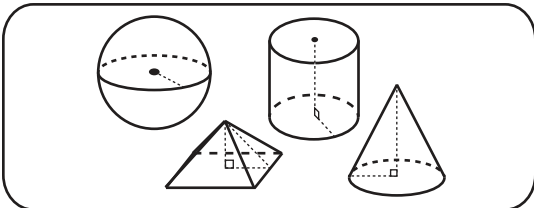


## Student Workbook

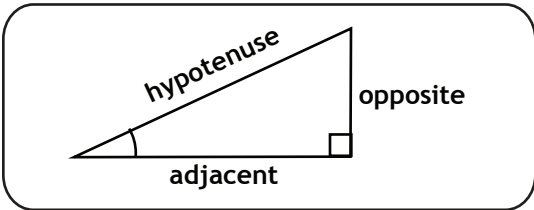
### Unit 1



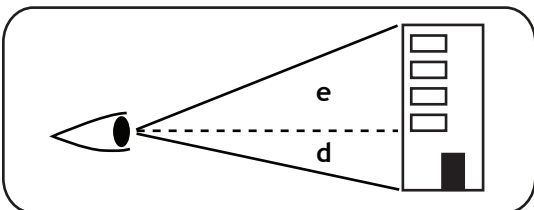
**Lesson 1: Metric and Imperial**  
Approximate Completion Time: 3 Days



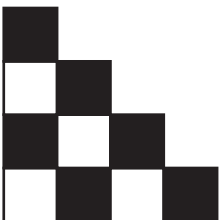
**Lesson 2: Surface Area and Volume**  
Approximate Completion Time: 2 Days



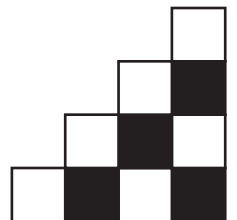
**Lesson 3: Trigonometry I**  
Approximate Completion Time: 2 Days

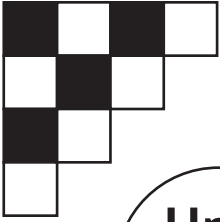


**Lesson 4: Trigonometry II**  
Approximate Completion Time: 2 Days

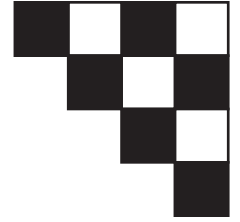


## UNIT ONE Measurement





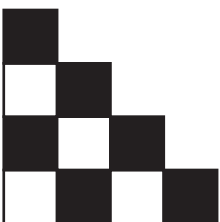
# Mathematics 10C



Unit  
**1**

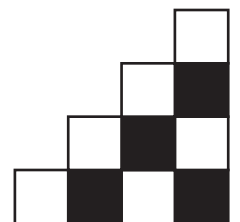
**Student Workbook**

Complete this workbook by watching the videos on [www.math10.ca](http://www.math10.ca).  
Work neatly and use proper mathematical form in your notes.



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**UNIT ONE**  
Measurement



# Mathematics 10C

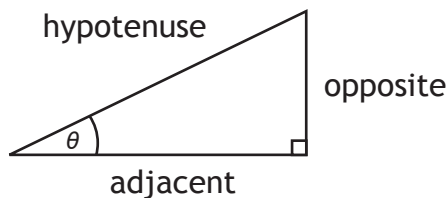
## Measurement

### Conversion Table

This table contains a list of equivalent measurements.

| Unit               | Imperial Conversions                                       | Metric Conversions                                       |
|--------------------|--|--|
| inch<br>(in. or ") |  | 1 in. = 2.54 cm  |
| foot<br>(ft. or')  | 1 ft. = 12 in.   | 1 ft. = 30.48 cm   |
| yard<br>(yd.)      | 1 yd. = 3 ft.<br>1 yd. = 36 in.                            | 1 yd. = 91.44 cm<br>1 yd. = 0.9144 m                     |
| mile<br>(mi.)      | 1 mi. = 1760 yd.<br>1 mi. = 5280 ft.<br>1 mi. = 63 360 in. | 1 mi. = 1.609 km<br>1 mi. = 1609 m<br>1 mi. = 160 900 cm |

## Trigonometry

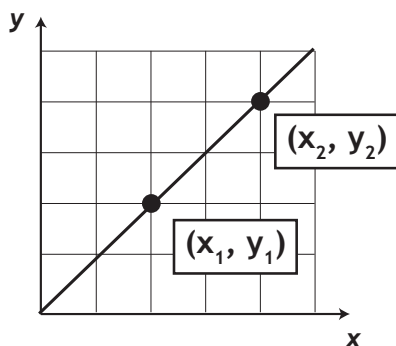


Pythagorean Theorem:  $a^2 + b^2 = c^2$  (right triangles only)

Trigonometric Ratios:

$$\sin\theta = \frac{\text{opposite}}{\text{hypotenuse}} \quad \cos\theta = \frac{\text{adjacent}}{\text{hypotenuse}} \quad \tan\theta = \frac{\text{opposite}}{\text{adjacent}}$$

## Linear Functions



Slope of a Line:

$$m = \frac{\text{rise}}{\text{run}}$$

or

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

Slope-Intercept Form:  $y = mx + b$

Slope-Point Form:  $y - y_1 = m(x - x_1)$

General Form:  $Ax + By + C = 0$

Parallel Lines:  $m_{\parallel} = m_{\text{original}}$

Perpendicular Lines:  $m_{\perp} = -\frac{1}{m_{\text{original}}}$

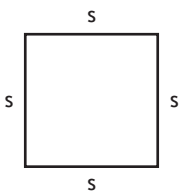
# Surface Area and Volume

## 2-D Shapes

### Square

$$P = 4s$$

$$A = s^2$$

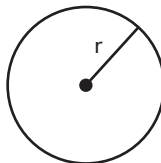


### Circle

$$C = 2\pi r$$

or  $C = \pi d$

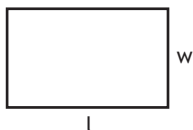
$$A = \pi r^2$$



### Rectangle

$$P = 2l + 2w$$

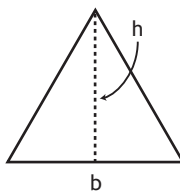
$$A = lw$$



### Triangle

$$P = s_1 + s_2 + s_3$$

$$A = \frac{1}{2}bh$$

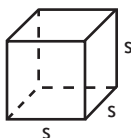


## 3-D Objects

### Cube

$$SA = 6s^2$$

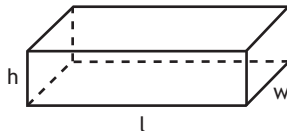
$$V = s^3$$



### Rectangular Prism

$$SA = 2lw + 2wh + 2lh$$

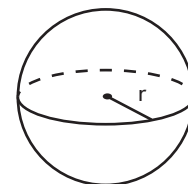
$$V = lwh$$



### Sphere

$$SA = 4\pi r^2$$

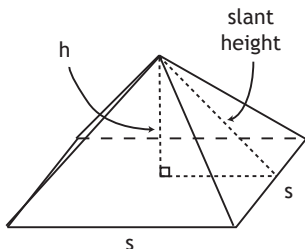
$$V = \frac{4}{3}\pi r^3$$



### Square Pyramid

$$SA = A_{\text{base}} + 4A_{\text{side}}$$

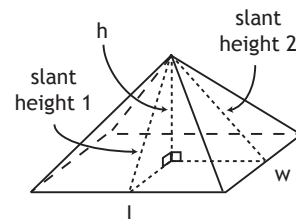
$$V = \frac{1}{3}lwh$$



### Rectangular Pyramid

$$SA = A_{\text{base}} + 2A_{\text{side 1}} + 2A_{\text{side 2}}$$

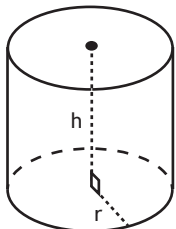
$$V = \frac{1}{3}lwh$$



### Right Cylinder

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

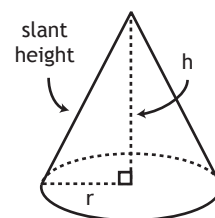
$$V = \pi r^2 h$$



### Right Cone

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

$$V = \frac{1}{3}\pi r^2 h$$



## Exponents & Radicals

$$a^m \times a^n = a^{m+n}$$

$$\frac{a^m}{a^n} = a^{m-n}$$

$$(a^m)^n = a^{mn}$$

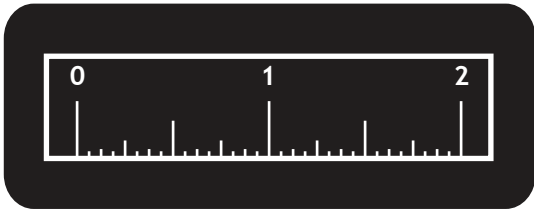
$$(a^m b^n)^p = a^{mp} b^{np}$$

$$\left(\frac{a^m}{b^n}\right)^p = \frac{a^{mp}}{b^{np}}$$

$$a^0 = 1$$

$$a^{-m} = \frac{1}{a^m}$$

$$a^{\frac{m}{n}} = \sqrt[n]{a^m} \text{ OR } (\sqrt[n]{a})^m$$



# Measurement

## LESSON ONE - *Metric and Imperial*

### Lesson Notes

#### Introduction

Introduction to Measurement

a) Complete the following table:

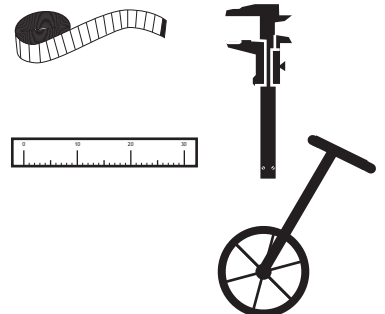
| Unit | Length ( <i>in metres</i> ) | Referent |
|------|-----------------------------|----------|
| mm   |                             |          |
| cm   |                             |          |
| dm   |                             |          |
| m    |                             |          |
| dam  |                             |          |
| hm   |                             |          |
| km   |                             |          |

b) Indicate which measuring tool is most appropriate for:

- the width of your textbook \_\_\_\_\_
- the perimeter of a park \_\_\_\_\_
- the circumference of a vase \_\_\_\_\_
- the diameter of a diamond ring with precision \_\_\_\_\_
- the distance from your house to a friend's house \_\_\_\_\_
- the thickness of a smartphone with precision \_\_\_\_\_
- the width of a kitchen window \_\_\_\_\_

#### Available Tools

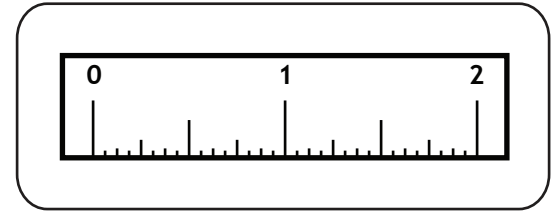
Tape Measure  
30 cm ruler  
Vernier Calipers  
Trundle Wheel



# Measurement

## LESSON ONE - *Metric and Imperial*

### Lesson Notes

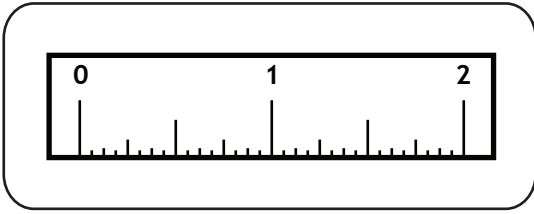


c) Complete the following table:

| Unit               | Imperial Conversions | Metric Conversions | Referent |
|--------------------|----------------------|--------------------|----------|
| inch<br>(in. or ") |                      |                    |          |
| foot<br>(ft. or ') |                      |                    |          |
| yard<br>(yd.)      |                      |                    |          |
| mile<br>(mi.)      |                      |                    |          |

d) What are some of the drawbacks to using imperial units as a form of measurement?

e) Why is it important to understand both imperial units and metric units?



# Measurement

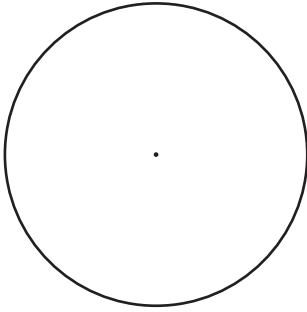
## LESSON ONE - *Metric and Imperial*

### Lesson Notes

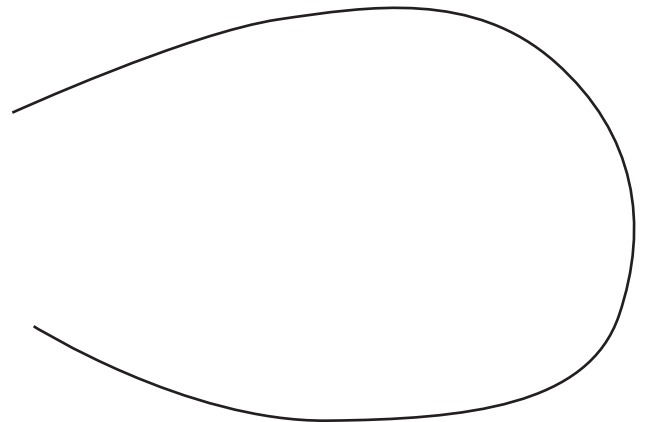
#### Example 1

Measure each of the following using an appropriate measuring tool.

a) The circumference of a circle.



b) The length of a curved line.



c) The actual distance between Grande Prairie and Medicine Hat.

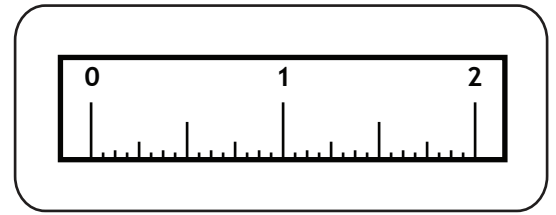


Map Scale: 1:18,300,000

# Measurement

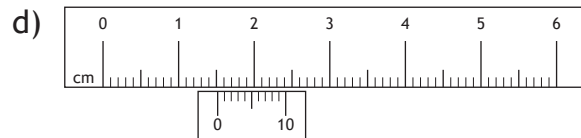
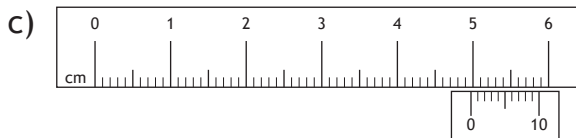
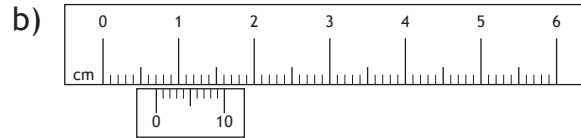
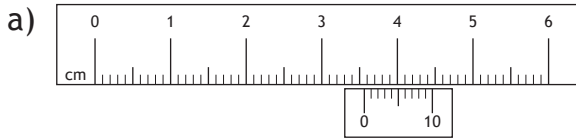
## LESSON ONE - *Metric and Imperial*

### Lesson Notes



#### Example 2

Write each metric caliper measurement as a decimal.



#### Example 3

Metric Conversions

a) Convert 7 m to kilometres.

b) Convert 12 cm to metres.

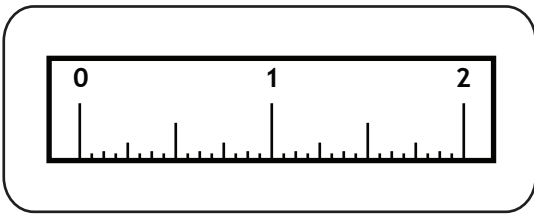
c) Convert 45.3 cm to kilometres.

d) Convert 3 km to metres.

e) Convert 8 m to centimetres.

f) Convert 0.7 km to centimetres.





# Measurement

## LESSON ONE - *Metric and Imperial*

### Lesson Notes

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#### Example 4

Each of the following objects have been measured with inappropriate units. Convert them to more suitable units.

- a) The thickness of a dime is 0.00122 m
  
  
  
  
  
  
  
  
  
  
  
- b) The height of a basketball player is 2100 mm
  
  
  
  
  
  
  
  
  
  
  
- c) The driving distance from Pincher Creek to Taber is 14 900 000 cm

#### Example 5

A trundle wheel can be used to measure the walking distance between two locations.

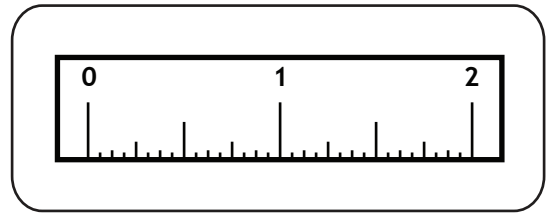
- a) If the diameter of a trundle wheel is 45 cm, how far will a person have walked when the wheel makes one full rotation?
  
  
  
  
  
  
  
  
  
  
  
  
  
  
  
  
  
  
  
  
  
  
  
- b) If a person walks for 0.7 km, how many times has the wheel rotated?



# Measurement

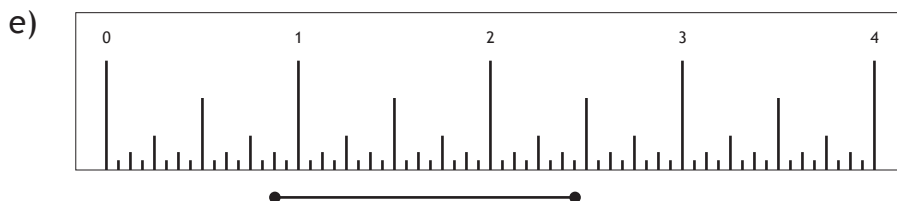
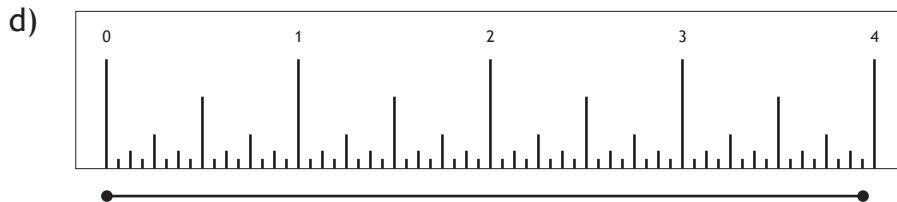
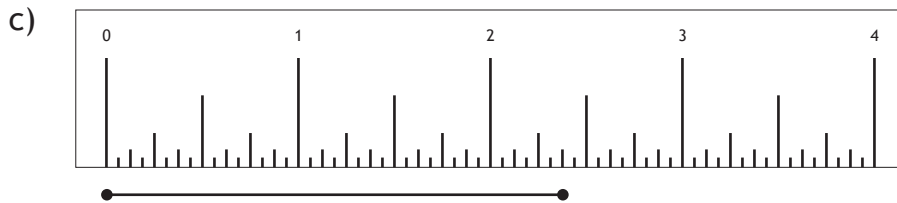
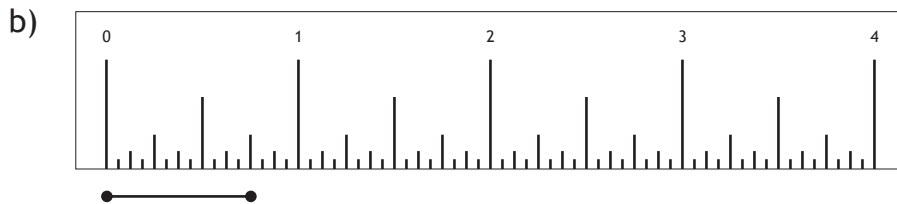
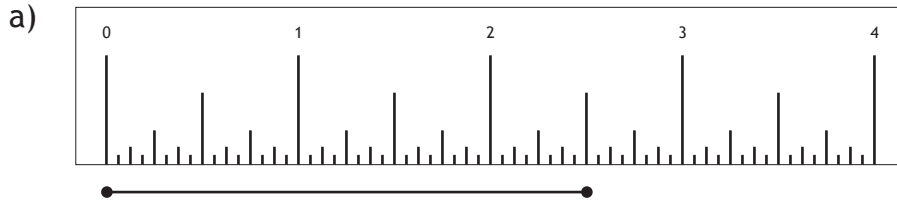
## LESSON ONE - *Metric and Imperial*

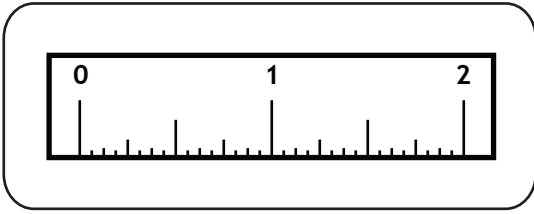
### Lesson Notes



#### Example 6

Write the length of each line segment using imperial units.





# Measurement

## LESSON ONE - *Metric and Imperial*

### Lesson Notes

#### Example 7

Some of these conversions have an error. If there is an error, explain the nature of the error and complete the conversion correctly.

- a) Convert 23 cm to metres.

$$\text{conversion: } 23 \text{ cm} \times \frac{100 \text{ cm}}{1 \text{ m}}$$

error:

correct conversion:

- b) Convert 5 m to millimetres.

$$\text{conversion: } 5 \text{ m} \times \frac{1000 \text{ mm}}{5 \text{ m}}$$

error:

correct conversion:

- c) Convert 7 yd. to miles.

$$\text{conversion: } 7 \text{ yd.} \times \frac{1760 \text{ mi.}}{1 \text{ yd.}}$$

error:

correct conversion:

- d) Convert 31 ft. to inches.

$$\text{conversion: } 31 \text{ ft.} \times \frac{12 \text{ in.}}{1 \text{ ft.}}$$

error:

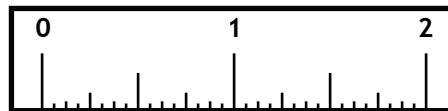
correct conversion:

# Measurement

## LESSON ONE - *Metric and Imperial*

### Lesson Notes

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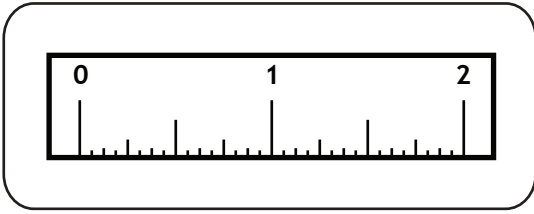


### **Example 8**

Imperial Conversions

large unit → small unit

- a) Convert 5 yards to feet.
- b) Convert 10 miles to yards.
- c) Convert 20 feet to inches.
- d) Convert 5'7" to inches.
- e) Convert 4 yards to inches.
- f) Convert 2 miles to feet.



# Measurement

## LESSON ONE - *Metric and Imperial*

### Lesson Notes

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#### Example 9

Imperial Conversions

small unit → large unit

a) Convert 78 feet to yards.

b) Convert 110 yards to miles.

c) Convert 48 inches to feet.

d) Convert 58" to feet.

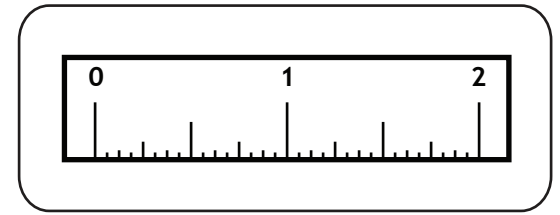
e) Convert 90 feet to yards.

f) Convert 12000 feet to miles.

# Measurement

## LESSON ONE - *Metric and Imperial*

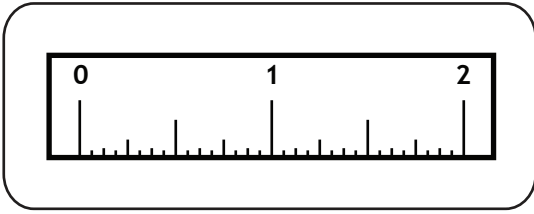
### Lesson Notes



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#### **Example 10** Imperial to Metric Conversions

- a) Convert 6 yards to metres.
- b) Convert 3 miles to kilometres.
- c) Convert 80 inches to metres.
- d) Convert 3.8 feet to metres.
- e) Convert 5'3" to metres.
- f) Convert 0.4 miles to metres.



# Measurement

## LESSON ONE - *Metric and Imperial*

### Lesson Notes

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#### **Example 11** Metric to Imperial Conversions

a) Convert 14 metres to yards.

b) Convert 7 kilometres to miles.

c) Convert 12 metres to inches.

d) Convert 2 kilometres to yards.

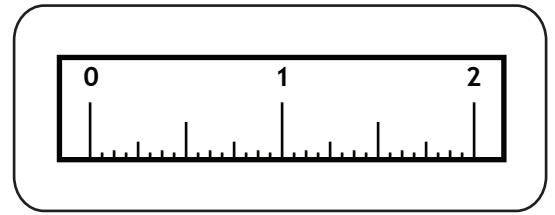
e) Convert 72 centimetres to feet.

f) Convert 400 metres to miles.

# Measurement

## LESSON ONE - *Metric and Imperial*

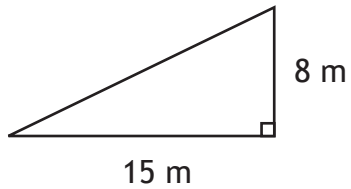
### Lesson Notes



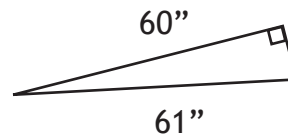
#### Example 12

Find the missing side of each right triangle using the Pythagorean Theorem

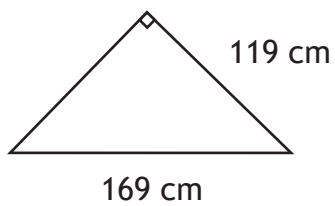
a)



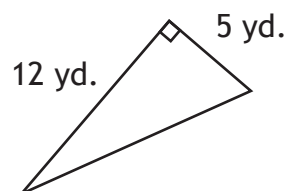
b)



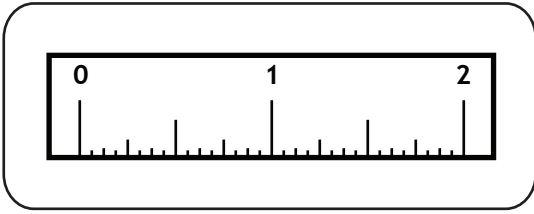
c)



d)







# Measurement

## LESSON ONE - *Metric and Imperial*

### Lesson Notes

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#### Example 13

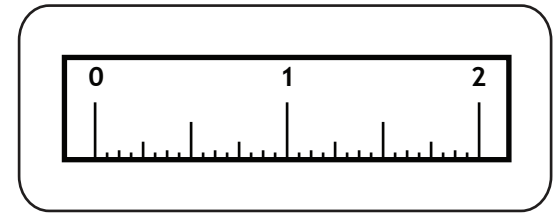
a) Five students measure their height using different units. Andrew is 176 cm, Brittney is 5'4", Calvin is 1.8 yards, Don is 54 inches, and Elisha is 1.6 metres. Arrange the students from shortest to tallest.

b) A truck driver is entering a parkade that says the maximum height of a vehicle is 8'6". If the height of the truck is 3 m, should the driver proceed into the parkade?

# Measurement

## LESSON ONE - *Metric and Imperial*

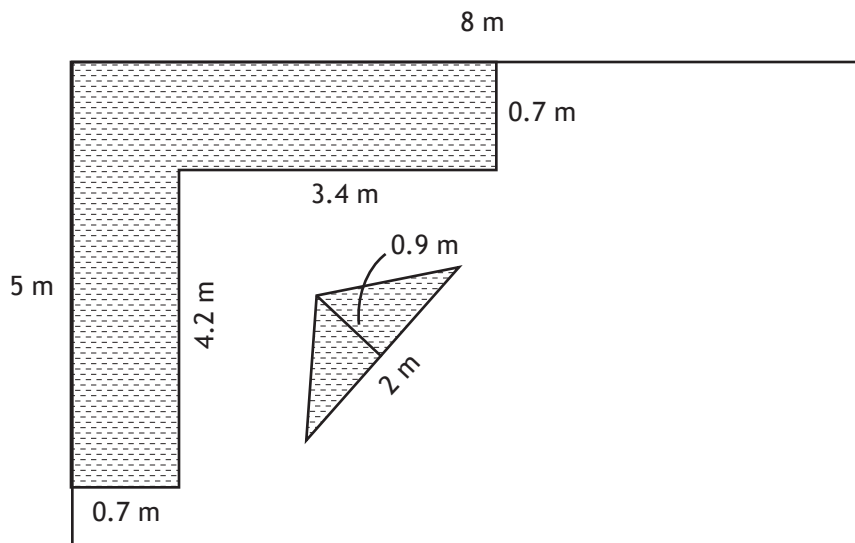
### Lesson Notes

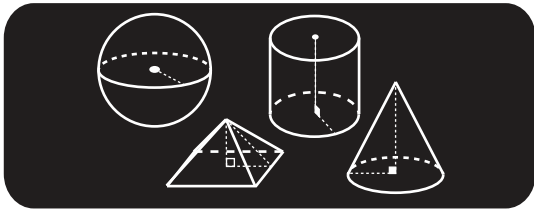


#### Example 14

a) A homeowner is laying sod in her lawn. The lawn is a rectangle with dimensions of  $28' \times 18'$ . If one piece of sod is a rectangle with dimensions of  $60 \text{ cm} \times 40 \text{ cm}$ , approximately how many pieces of sod should the homeowner order?

b) A homeowner wants to replace the linoleum in their kitchen. The floor plan for the kitchen is shown below. If linoleum costs  $\$6.50/\text{sq ft}$ , what is the total cost of the linoleum? The counter and kitchen island do not require linoleum.





# Measurement

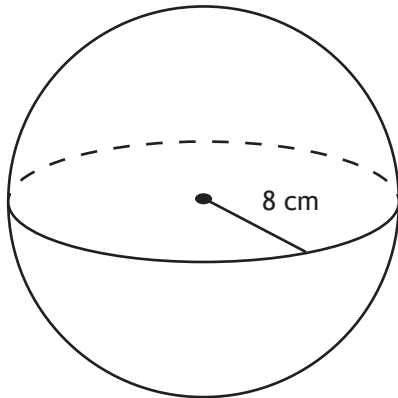
## LESSON TWO - *Surface Area and Volume*

### Lesson Notes

#### Introduction

Find the surface area and volume for each of the following 3-D objects.

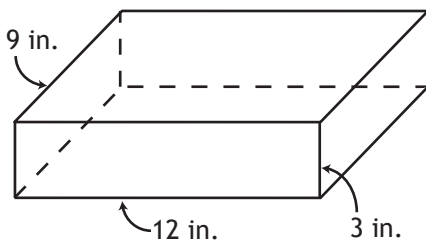
a) sphere



Surface Area Formula

Volume Formula

b) rectangular prism



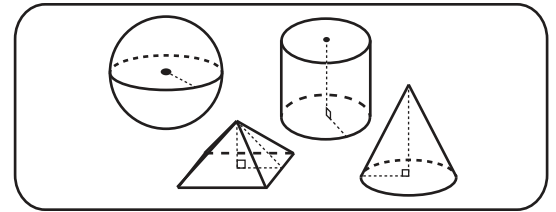
Surface Area Formula

Volume Formula

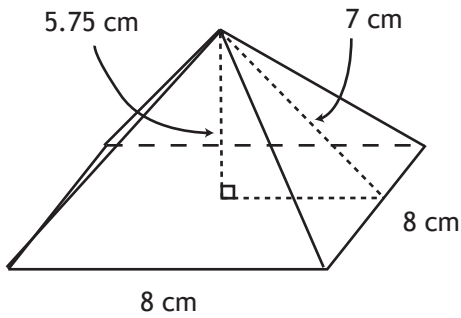
# Measurement

## LESSON TWO - *Surface Area and Volume*

### Lesson Notes



c) square pyramid



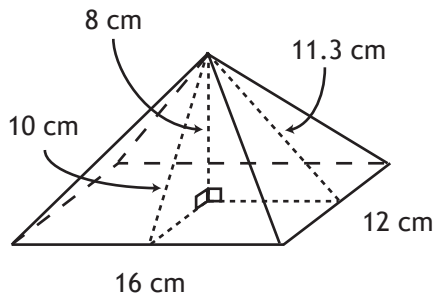
**Surface Area Formula**

|  |
|--|
|  |
|--|

**Volume Formula**

|  |
|--|
|  |
|--|

d) rectangular pyramid

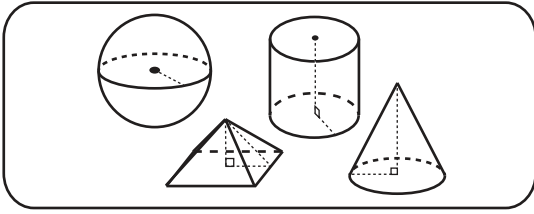


**Surface Area Formula**

|  |
|--|
|  |
|--|

**Volume Formula**

|  |
|--|
|  |
|--|

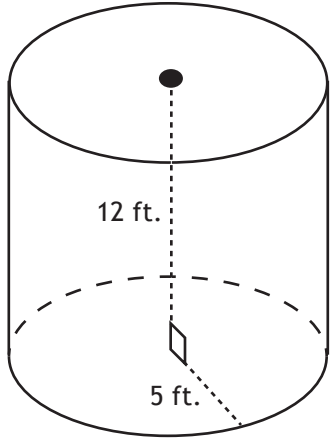


# Measurement

## LESSON TWO - *Surface Area and Volume*

### Lesson Notes

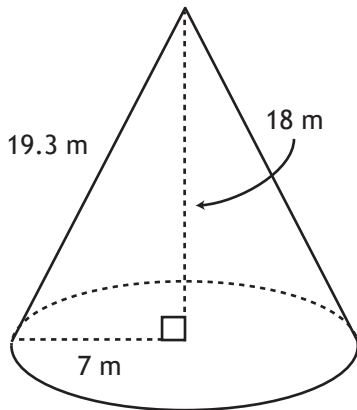
e) right cylinder



**Surface Area Formula**

**Volume Formula**

f) right cone



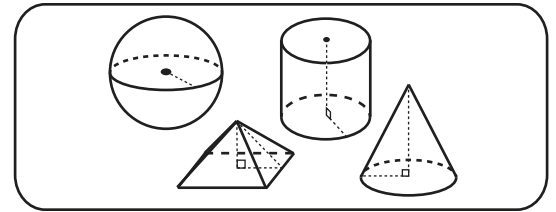
**Surface Area Formula**

**Volume Formula**

# Measurement

## LESSON TWO - *Surface Area and Volume*

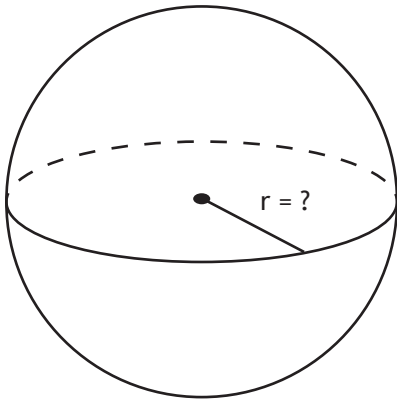
### Lesson Notes



#### Example 1

Find the unknown measurement in each of the following:

a) a sphere

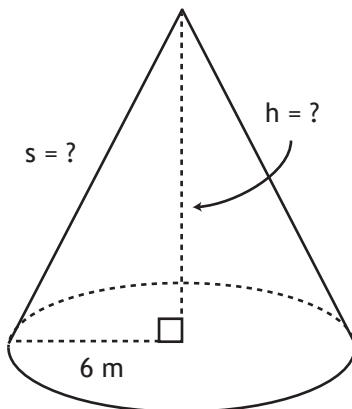


$$SA = 4536.46 \text{ cm}^2$$
$$V = 28731 \text{ cm}^3$$

i) Use the surface area formula to solve for the radius.

ii) Use the volume formula to solve for the radius.

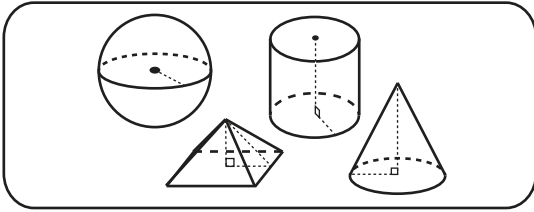
b) right cone



$$SA = 320.44 \text{ m}^2$$
$$V = 347.57 \text{ m}^3$$

i) Use the surface area formula to solve for the slant height.

ii) Use the volume formula to solve for the height.



# Measurement

## LESSON TWO - *Surface Area and Volume*

### Lesson Notes

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#### **Example 2**

Sketch each shape and determine the indicated quantity.

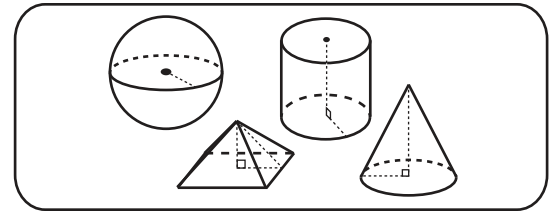
a) A square pyramid has a base measuring 5 ft. by 5 ft. The height of the pyramid, from the centre of the base to the apex is 7 ft. Calculate the surface area of the pyramid.

b) A cylindrical water tank with an open top has a volume of  $5702 \text{ m}^3$  and a radius of 11 m. Calculate the height of the tank.

# Measurement

## LESSON TWO - *Surface Area and Volume*

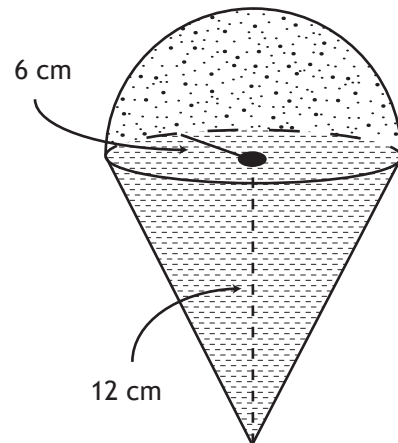
### Lesson Notes



#### Example 3

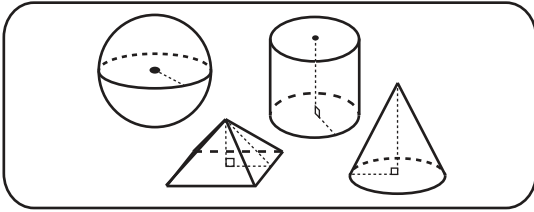
Find the surface area and volume of this 3-D object.

a) surface area



b) volume





# Measurement

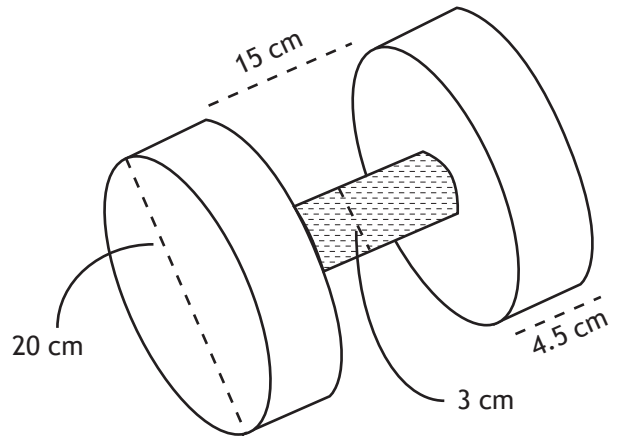
## LESSON TWO - *Surface Area and Volume*

### Lesson Notes

#### Example 4

Find the surface area and volume of this 3-D object.

a) surface area

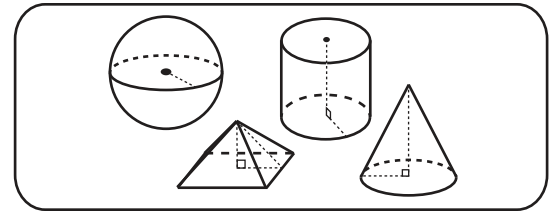


b) volume

# Measurement

## LESSON TWO - *Surface Area and Volume*

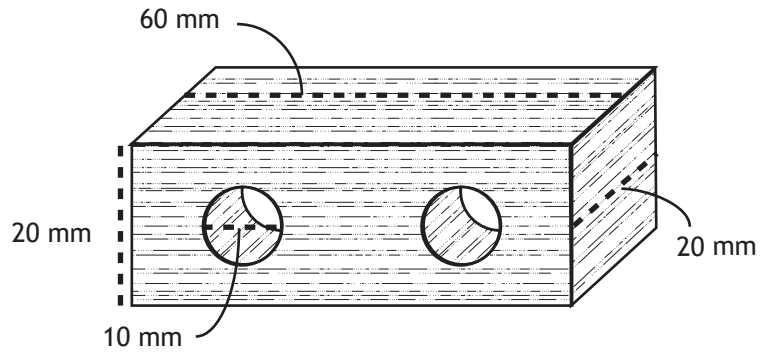
### Lesson Notes



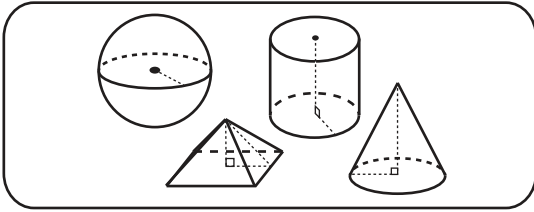
#### Example 5

Find the surface area and volume of this 3-D object.

a) surface area



b) volume



# Measurement

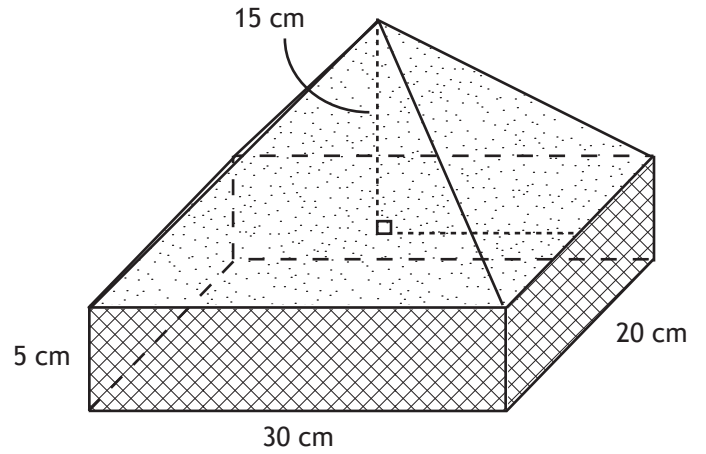
## LESSON TWO - *Surface Area and Volume*

### Lesson Notes

#### Example 6

Find the surface area and volume of this 3-D object.

a) surface area

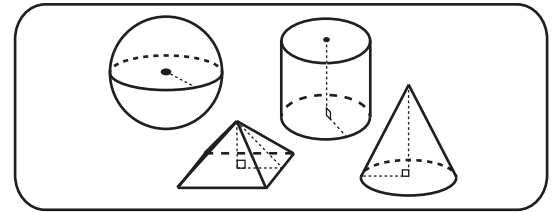


b) volume

# Measurement

## LESSON TWO - *Surface Area and Volume*

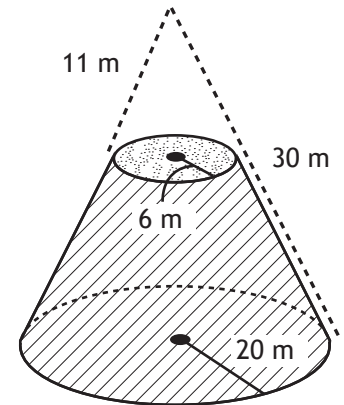
### Lesson Notes



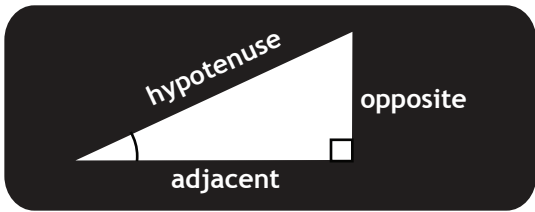
#### Example 7

Find the surface area and volume of this 3-D object.

a) surface area



b) volume



# Measurement

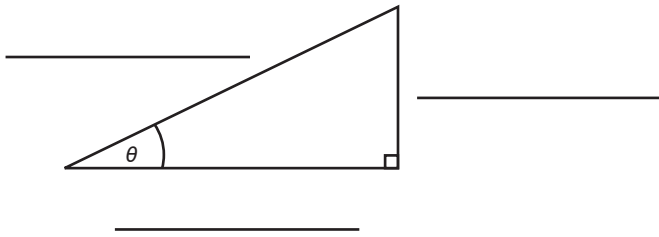
## LESSON THREE - *Trigonometry I*

### Lesson Notes

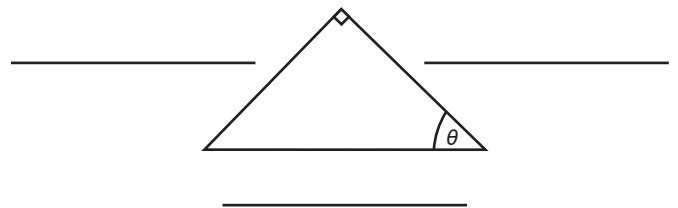
#### Introduction Trigonometry I

a) Label the sides of each triangle, relative to the given angle.

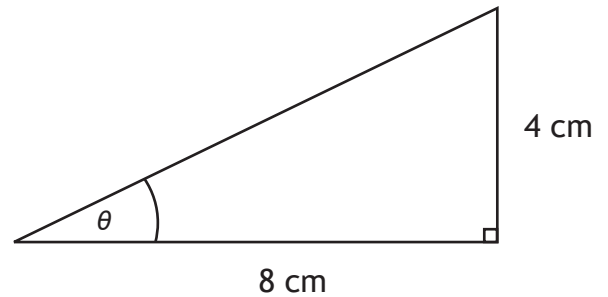
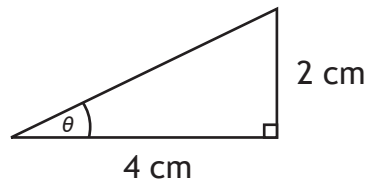
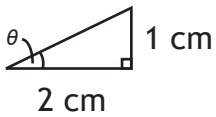
i)



ii)



b) Calculate the ratio of the opposite side to the adjacent side for each similar triangle.

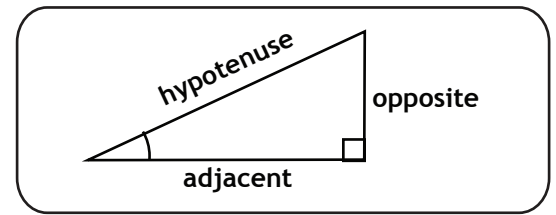


c) Define the tangent ratio.

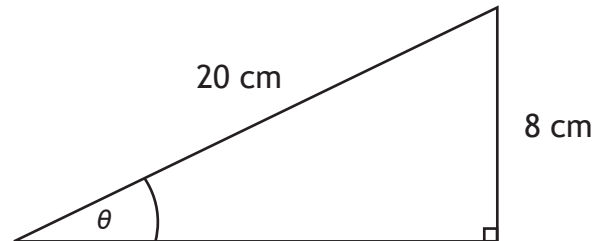
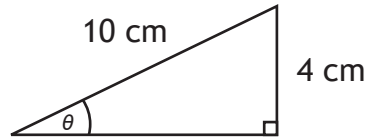
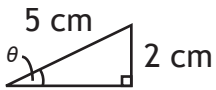
# Measurement

## LESSON THREE - *Trigonometry I*

### Lesson Notes

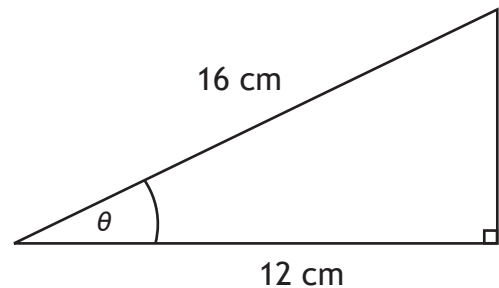
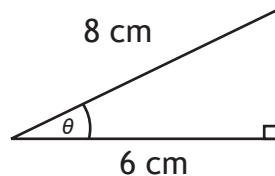
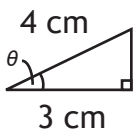


d) Calculate the ratio of the opposite side to the hypotenuse for each similar triangle.



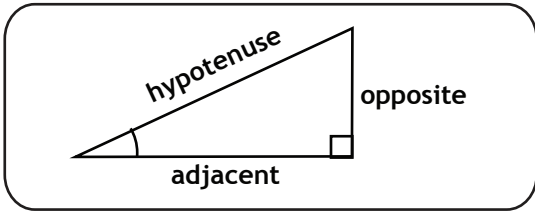
e) Define the sine ratio.

f) Calculate the ratio of the adjacent side to the hypotenuse for each similar triangle.



g) Define the cosine ratio.

h) What is a useful memorization tool to remember the trigonometric ratios?



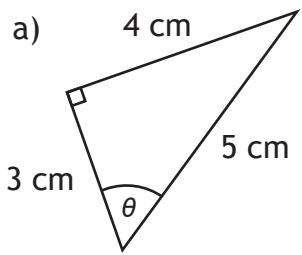
# Measurement

## LESSON THREE - Trigonometry I

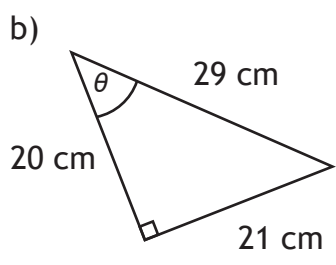
### Lesson Notes

### Example 1

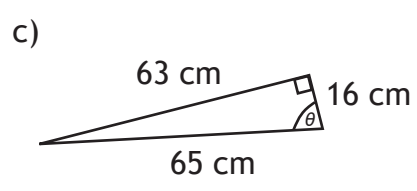
For each triangle, calculate each trigonometric ratio.



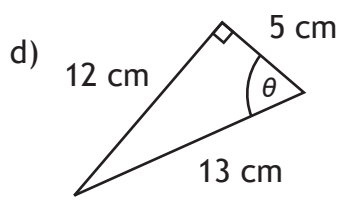
| $\sin \theta$ | $\cos \theta$ | $\tan \theta$ |
|---------------|---------------|---------------|
|               |               |               |



| $\sin \theta$ | $\cos \theta$ | $\tan \theta$ |
|---------------|---------------|---------------|
|               |               |               |



| $\sin \theta$ | $\cos \theta$ | $\tan \theta$ |
|---------------|---------------|---------------|
|               |               |               |

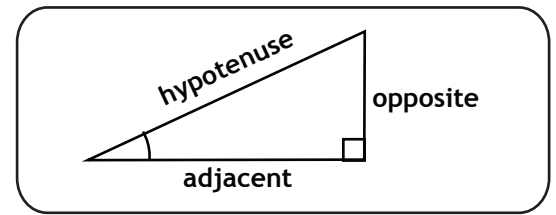


| $\sin \theta$ | $\cos \theta$ | $\tan \theta$ |
|---------------|---------------|---------------|
|               |               |               |

# Measurement

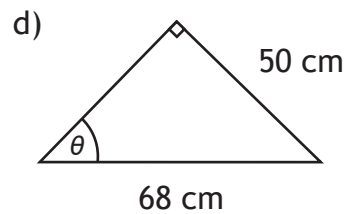
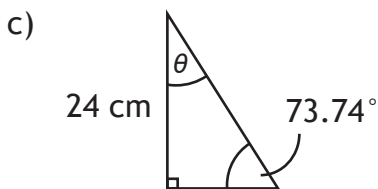
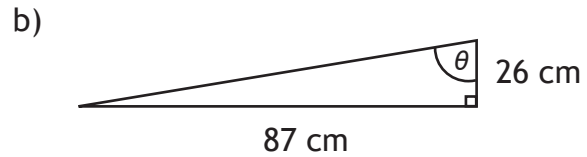
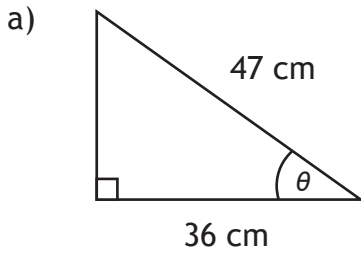
## LESSON THREE - *Trigonometry I*

### Lesson Notes



#### Example 2

Calculate the angle  $\theta$  in each triangle.

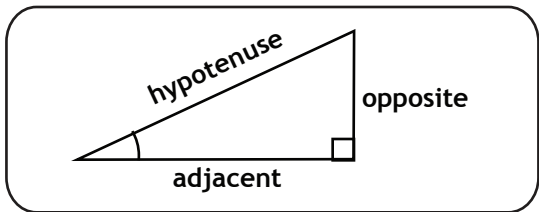




# Measurement

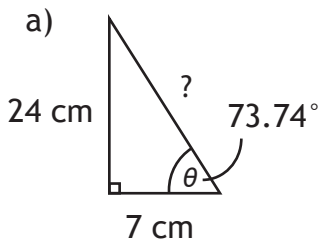
## LESSON THREE - *Trigonometry I*

### Lesson Notes

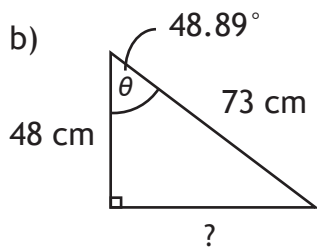


### Example 3

Calculate the missing side of each triangle using two methods.



| Pythagorean Theorem | Trigonometric Ratio |
|---------------------|---------------------|
|                     |                     |

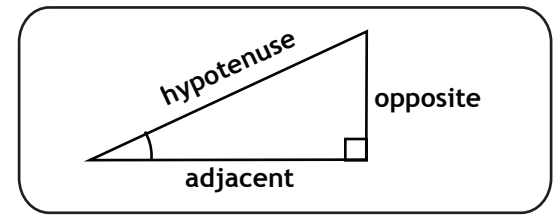


| Pythagorean Theorem | Trigonometric Ratio |
|---------------------|---------------------|
|                     |                     |

# Measurement

## LESSON THREE - *Trigonometry I*

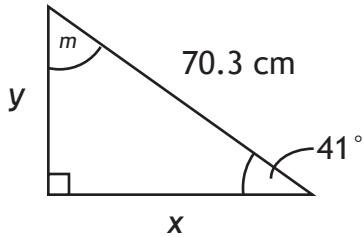
### Lesson Notes



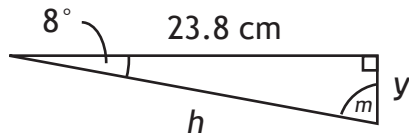
#### Example 4

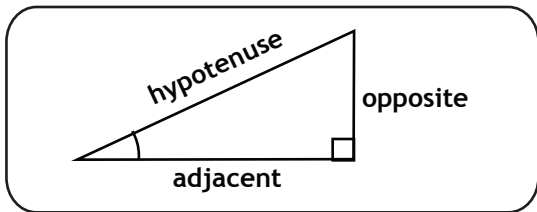
Solve each triangle.

a)



b)





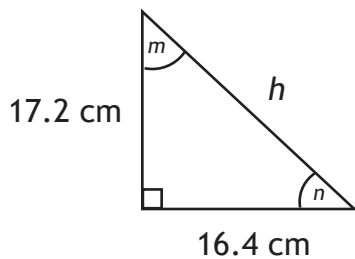
# Measurement

## LESSON THREE - *Trigonometry I*

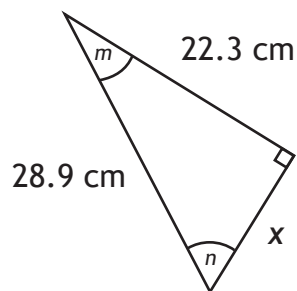
### Lesson Notes

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c)



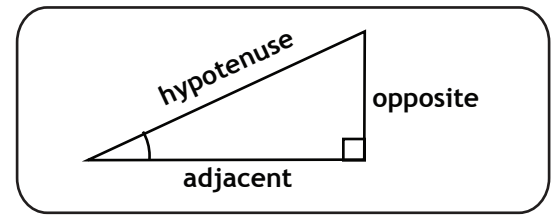
d)



# Measurement

## LESSON THREE - *Trigonometry I*

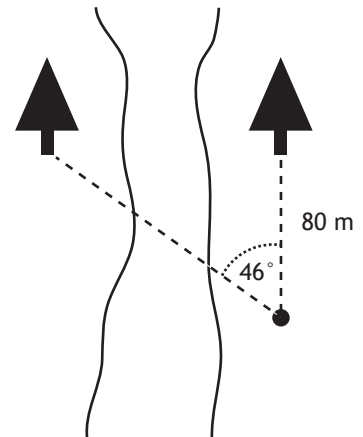
### Lesson Notes



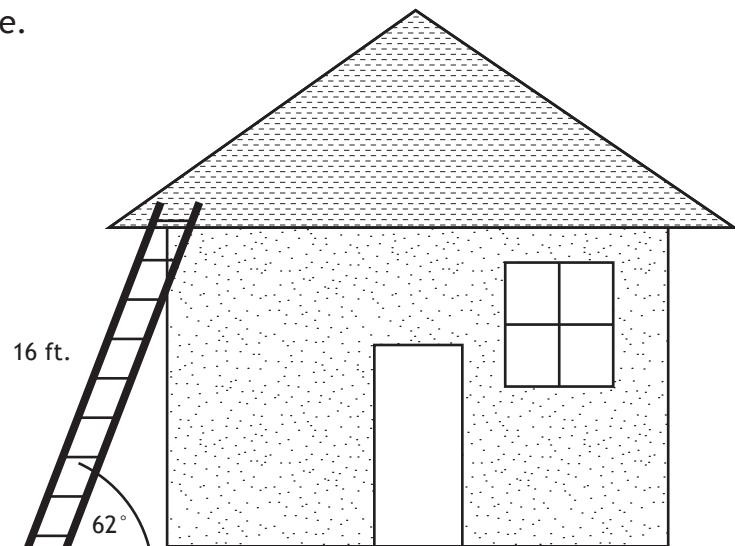
#### Example 5

Solve each of the following problems.

a) The sketch on the right was drawn by a surveyor who is trying to determine the distance between two trees across a river. Using the information in the sketch, calculate the distance between the trees.



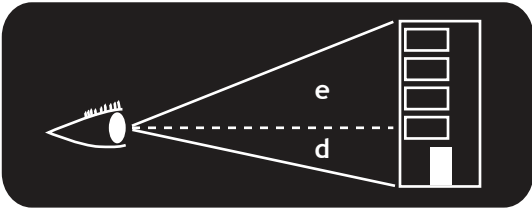
b) A 16 ft. ladder is leaning against the roof of a house. The angle between the ladder and the ground is  $62^\circ$ . How high above the ground is the base of the roof?



# Measurement

## LESSON FOUR - *Trigonometry II*

### Lesson Notes

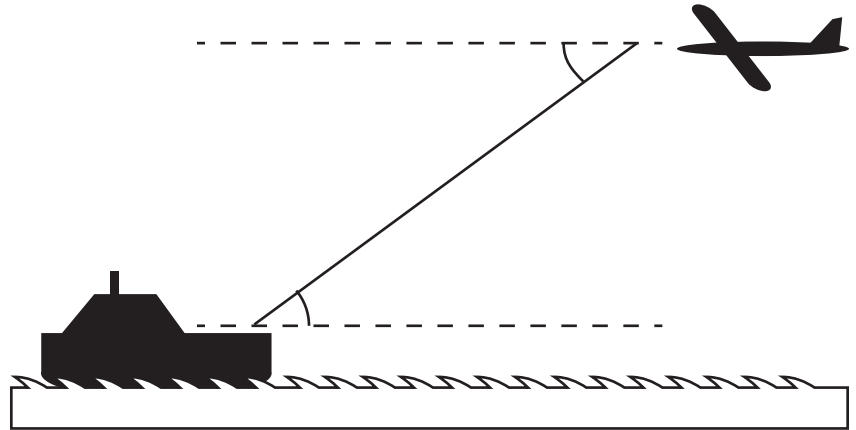


#### Introduction

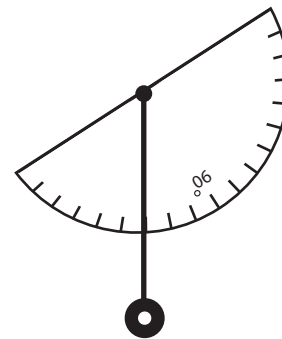
Trigonometry II

a) A sailor on the deck of a ship observes an airplane in the sky. Label the diagram using the following terms:

- horizontal line
- line of sight
- angle of elevation
- angle of depression



b) The sailor uses a simple clinometer to measure the angle of elevation. A diagram of the clinometer is shown to the right. What is the angle of elevation?

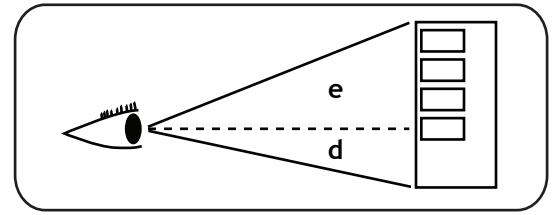


c) If the sailor tilts her head  $30^\circ$  upwards to see the plane, and the plane is flying at an altitude of 3000 m, what is the horizontal distance from the boat to the plane?

# Measurement

## LESSON FOUR - Trigonometry II

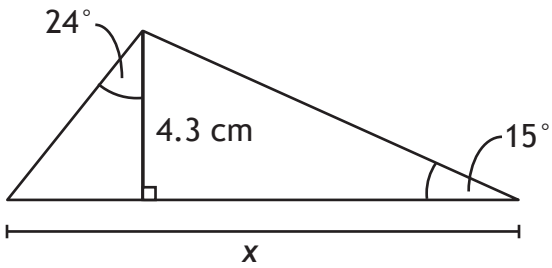
### Lesson Notes



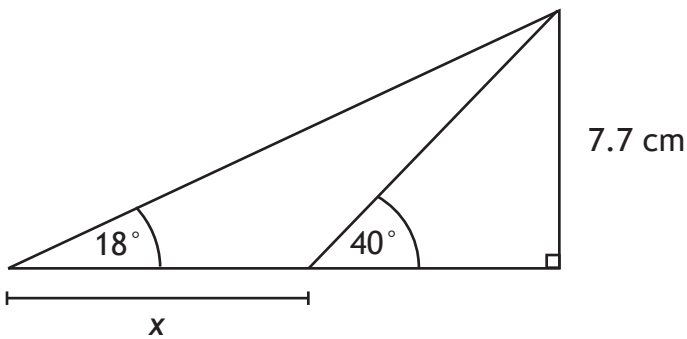
#### Example 1

Solve for the unknown length.

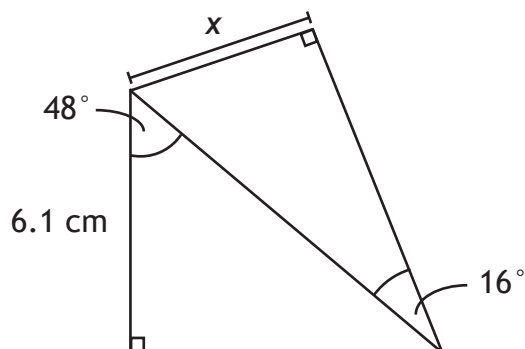
a)



b)



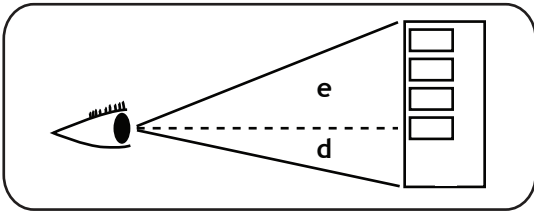
c)



# Measurement

## LESSON FOUR - *Trigonometry II*

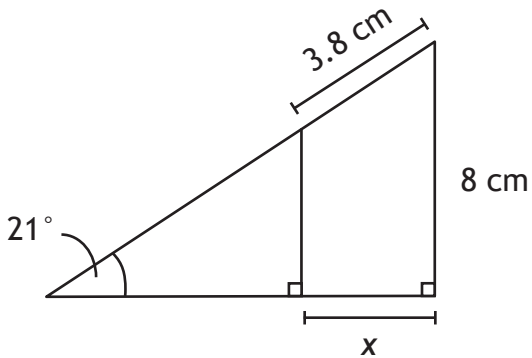
### Lesson Notes



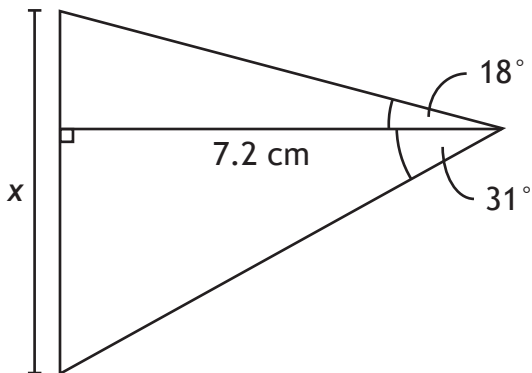
#### Example 2

Solve for the unknown length.

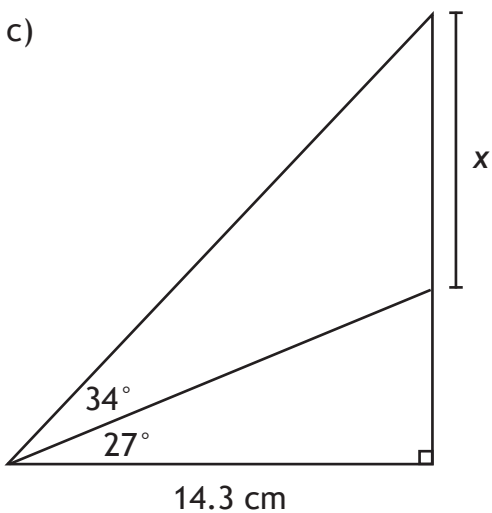
a)



b)



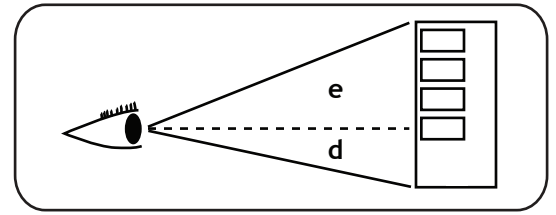
c)



# Measurement

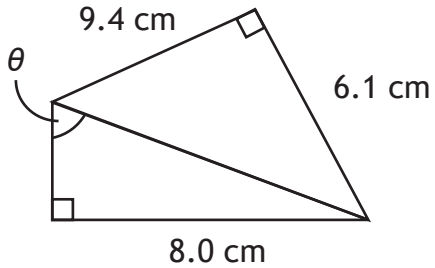
## LESSON FOUR - *Trigonometry II*

### Lesson Notes

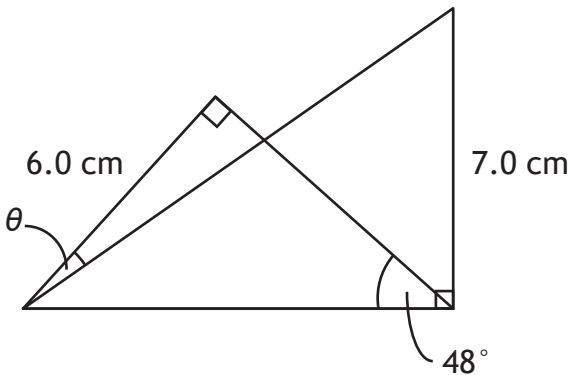


**Example 3** Solve for the unknown angle.

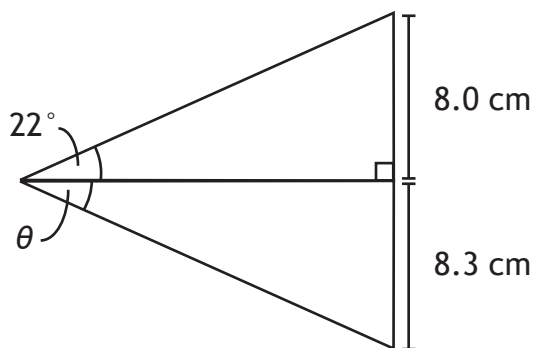
a)



b)



c)

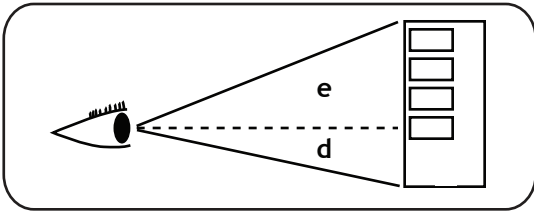




# Measurement

## LESSON FOUR - *Trigonometry II*

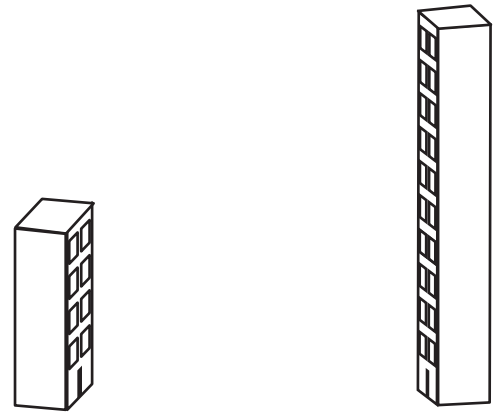
### Lesson Notes



#### Example 4

Janis lives on the 4<sup>th</sup> floor of her apartment building. From her window, she has to tilt her head  $52^\circ$  upwards to see the top of the neighbouring building. She has to look down  $35^\circ$  to see the base of the neighbouring building. The distance between the buildings is 80 m.

a) Calculate the height of the neighbouring building.



b) What measuring tools could Janis use to obtain the angles and distance between the buildings?

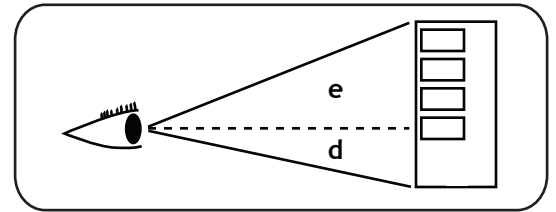
c) Which quantities in this question were direct measurements? Which were indirect measurements?

# Measurement

## LESSON FOUR - *Trigonometry II*

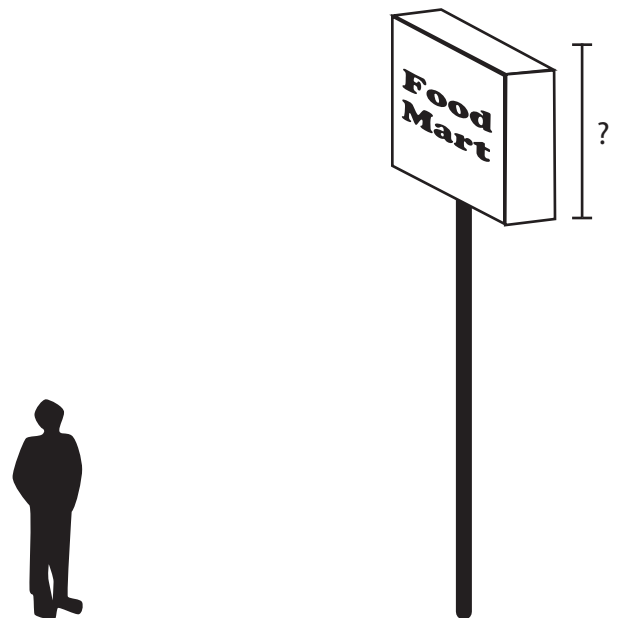
### Lesson Notes

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#### Example 5

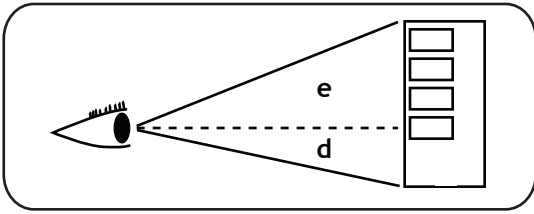
The sign for a restaurant is mounted on a pole. From a position 5 m from the base of the pole, Mike has to look up  $42^\circ$  to see the bottom of the sign, and  $52^\circ$  to see the top of the sign. How tall is the sign?



# Measurement

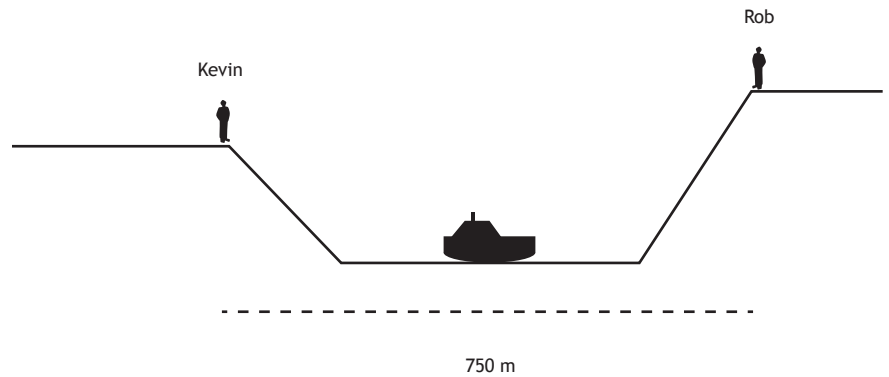
## LESSON FOUR - *Trigonometry II*

### Lesson Notes



### Example 6

Kevin and Rob are standing on opposite sides of Edmonton's River Valley. In order to see a boat on the river, Kevin has to look down  $32^\circ$ , and Rob has to look down  $38^\circ$ . The width of the valley is 750 m, and the boat is exactly halfway between Kevin and Rob. How much higher is Rob than Kevin?



# Answer Key

## Measurement Lesson One: Metric and Imperial

### Introduction

| Unit | Length   | Referent             |
|------|----------|----------------------|
| mm   | 1/1000 m | thickness of a dime  |
| cm   | 1/100 m  | width of a paperclip |
| dm   | 1/10 m   | length of a crayon   |
| m    | 1 m      | floor to doorknob    |
| dam  | 10 m     | width of a house     |
| hm   | 100 m    | football field       |
| km   | 1000 m   | walking 15 minutes   |

- b) i. 30 cm ruler, ii. Trundle Wheel, iii. Tape Measure iv. Vernier Calipers, v. Trundle Wheel, vi. Vernier Calipers, vii. Tape Measure

| Unit | Imp. to Imp.     | Imp. to Metric           | Referent                               |
|------|------------------|--------------------------|--|
| inch | -----            | 1 in. $\approx$ 2.54 cm  | middle thumb joint to tip of thumb.    |
| foot | 1 ft. = 12"      | 1 ft. $\approx$ 30.48 cm | about the same as a 30 cm ruler.       |
| yard | 1 yd. = 3 ft.    | 1 yd. $\approx$ 0.9144 m | a little bit shorter than a 1 m ruler. |
| mile | 1 mi. = 1760 yd. | 1 mi. $\approx$ 1.609 km | distance walked in 20 minutes.         |

- d) Requires conversion table, ineffective for small measurements, and mixing measurement systems can lead to accidents.  
e) America is Canada's largest trading partner, so imperial units are often encountered in the workplace (*and consumer goods*).

Example 1: a) 12.57 cm b) 19 cm c) 787 km

● Example 2: a) 3.56 cm b) 0.70 cm c) 4.98 cm d) 1.52 cm

Example 3: a) 0.007 km b) 0.12 m c) 0.000453 km d) 3000 m e) 800 cm f) 70 000 cm

Example 4: a) 1.22 mm b) 2.1 m c) 149 km

● Example 5: a) 141.37 cm, b) 495.15 rotations

Example 6: a) 2 1/2 in. b) 3/4 in. c) 2 3/8 in. d) 3 15/16 in. e) 1 9/16 in. ● Example 7: a) 0.23 m b) 5000 mm c) 0.00398 mi. d) 372 in.

Example 8: a) 15 ft. b) 17 600 yd. c) 240 in. d) 67 in. e) 144 in. f) 10 560 ft.

Example 9: a) 26 yd. b) 0.0625 mi. c) 4 ft. d) 4.83' e) 30 yd. f) 2.27 mi.

Example 10: a) 5.49 m b) 4.83 km c) 2.03 m d) 1.16 m e) 1.60 m f) 643.60 m

Example 11: a) 15.31 yd. b) 4.35 mi. c) 472.44 in. d) 2188 yd. e) 2.36 ft. f) 0.25 mi. ● Example 12: a) 17 m, b) 11" c) 120 cm d) 13 yd.

Example 13: a) Don 1.37 m, Elisha 1.6 m, Brittney 1.63 m, Calvin 1.65 m, Andrew 1.76 m b) No. The maximum height is 2.59 m.

Example 14: a) 195 pieces of sod are required to cover the lawn b) The cost of the linoleum is \$2329.21.

## Measurement Lesson Two: Surface Area and Volume

Introduction: a) SA = 804 cm<sup>2</sup>, V = 2145 cm<sup>3</sup> b) SA = 342 in<sup>2</sup>, V = 324 in<sup>3</sup> c) SA = 176 cm<sup>2</sup>, 123 cm<sup>3</sup>

d) SA = 488 cm<sup>2</sup>, V = 512 cm<sup>3</sup> e) SA = 534 ft<sup>2</sup>, V = 942 ft<sup>3</sup> f) SA = 578 m<sup>2</sup>, V = 924 m<sup>3</sup>

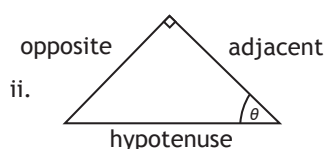
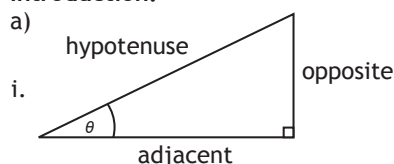
Example 1: a) i. r = 19 cm, ii. r = 19 cm b) i. s = 11 m, ii. h = 9 m ● Example 2: a) SA = 99 ft<sup>2</sup> b) h = 15 m

Example 3: SA = 479 cm<sup>2</sup>, V = 905 cm<sup>3</sup> ● Example 4: SA = 1949 cm<sup>2</sup>, V = 2933 cm<sup>3</sup> ● Example 5: SA = 6542 mm<sup>2</sup>, V = 20 858 mm<sup>3</sup>

Example 6: SA = 2065 cm<sup>2</sup>, V = 6000 cm<sup>3</sup> ● Example 7: SA = 3047 m<sup>2</sup>, V = 9019 m<sup>3</sup>

## Measurement Lesson Three: Trigonometry I

### Introduction:



b) Each ratio is 0.5

c)  $\tan \theta = \text{opposite/adjacent}$

d) Each ratio is 0.4

e)  $\sin \theta = \text{opposite/hypotenuse}$

f) Each ratio is 0.75

g)  $\cos \theta = \text{adjacent/hypotenuse}$

h) SOH CAH TOA

Example 1: a)  $\sin \theta = 0.8$   $\cos \theta = 0.6$   $\tan \theta = 1.3$  b)  $\sin \theta = 0.7241$   $\cos \theta = 0.6897$   $\tan \theta = 1.05$

c)  $\sin \theta = 0.9692$   $\cos \theta = 0.2462$   $\tan \theta = 3.9375$  d)  $\sin \theta = 0.9231$   $\cos \theta = 0.3846$   $\tan \theta = 2.4$

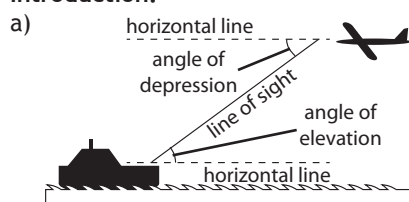
Example 2: a)  $\theta = 40^\circ$  b)  $\theta = 73^\circ$  c)  $\theta = 16.26^\circ$  d)  $\theta = 47^\circ$  ● Example 3: a) hypotenuse = 25 cm b) opposite = 55 cm

Example 4: a) x = 53 cm, y = 46 cm, m = 49° b) y = 3 cm, h = 24 cm, m = 82°

c) h = 24 cm, m = 44°, n = 46° d) x = 18 cm, m = 39.5°, n = 50.5° ● Example 5: a) 83 m b) 14 ft.

## Measurement Lesson Four: Trigonometry II

### Introduction:



Example 1: a) 17.9 cm b) 14.5 cm c) 2.5 cm

Example 2: a) 3.5 cm b) 6.6 cm c) 18.5 cm

Example 3: a) 45.6° b) 1.2° c) 22.7°

Example 4: a) 158.4 m

b) clinometer for angles, trundle wheel for distance

c) direct measurements are obtained using an instrument, while indirect measurements are found with math.

The angles of elevation and depression, and the distance between the buildings are direct measurements.

The height of the building is an indirect measurement.

Example 5: 1.9 m

Example 6: 59 m

b) 30° c) 5196 m