Date: _____

CHAPTER 1

Trigonometry

Get Set

Answer these questions to check your understanding of the Prerequisite Skills concepts on pages 4–5 of the *Foundations for College Mathematics 11* textbook.

Solve Equations

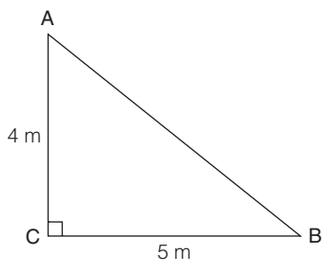
1. Solve for x.

a) $x^2 = 16$ **b)** $x^2 - 6 = 30$ **c)** $x^2 = 25 + 200$ **d)** $x^2 - 58 = 266$

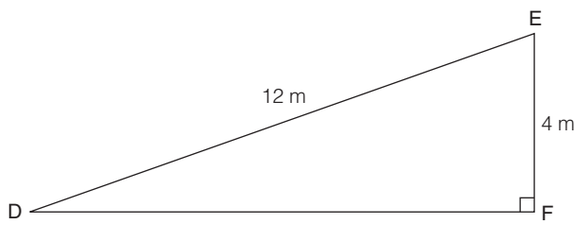
The Pythagorean Theorem and Rounding

2. Find the measure of the unknown side, to the nearest tenth of a metre.

a)



b)



Ratios and Proportions

3. Express each ratio in lowest terms.

a) 3:6 **b)** 25:45 **c)** 40:70 **d)** 560:180

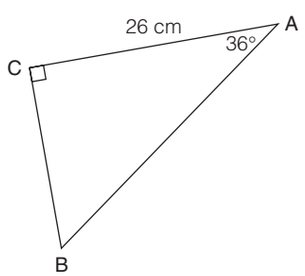
4. Solve for each unknown.

a) $\frac{x}{12} = \frac{4}{24}$ **b)** $\frac{15}{x} = \frac{6}{10}$ **c)** $4 = \frac{x}{7}$ **d)** $\frac{x}{3} = \frac{y}{5} = 6$

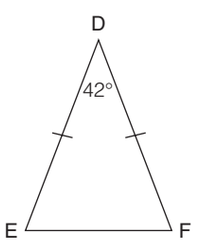
Angle Sum of a Triangle

5. Determine the measure of the unknown angles.

a)

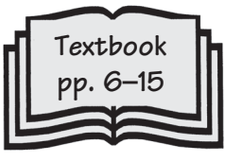


b)



Date: _____

1.1 Revisit the Primary Trigonometric Ratios



Warm-Up

1. Number Skills

Which sets of numbers could be the side lengths of a right triangle?

A 5, 12, 13
B 11, 13, 17
C 6, 9, 11
D 9, 12, 15

2. Algebra

Solve for each unknown.

a) $13 = \frac{x}{20}$

b) $0.75 = \frac{21}{y}$

c) $\frac{21}{7} = z$

3. Relations

Determine the value of x when $y = 5$ in the linear relation $y = 3x - 7$.

4. Geometry/Measurement

Classify each angle as either acute or obtuse.

a) 170°
b) 80°
c) 28°
d) 98°

5. Data/Probability

The lengths of ribbons found in a box are shown.

5 cm, 8 cm, 8 cm, 9 cm, 13 cm, 14 cm, 15 cm, 18 cm

a) Find the median length.

b) What is the mode length?

6. Problem Solving

Write the next three terms in each sequence.

a) 5, 7, 10, 14, 19, …

b) 101, 89, 77, 65, …

c) 4, 16, 36, 64, …

7. Math Literacy

a) Write an equation for this statement: *The square of the hypotenuse in a right triangle is equal to the sum of the squares of the other two sides.*

b) What is the statement describing?

8. Previous Section

The length of the hypotenuse of a triangle is 110 cm. The length of one of the other sides is 88 cm. How long is the third side of the triangle?

Date: _____

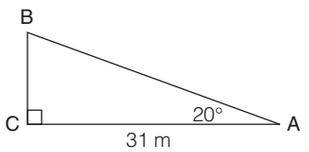
Practise

Section 1.1

1. Evaluate. Round your answers to four decimal places.
a) sin 60° **b)** cos 45° **c)** tan 30°

2. Find the measure of each angle to the nearest tenth of a degree.
a) sin A = 0.4735 **b)** cos B = 0.7293 **c)** tan C = 3.2158

3. Solve the right △ABC. Round side lengths to the nearest tenth of a metre.



$\angle B = 180° - \angle A - \angle C$

$= 180° - \_\_\_\_ - \_\_\_\_$

$= \_\_\_\_\_$

$\tan A = \dfrac{\text{opposite}}{\text{adjacent}}$

$\tan 20° = \dfrac{a}{31}$

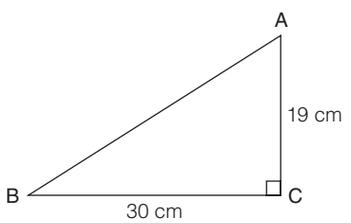
$a = \_\_\_\_\_$

$\cos A = \dfrac{\text{adjacent}}{\text{hypotenuse}}$

$\cos 20° = \dfrac{31}{c}$

$c = \_\_\_\_\_$

4. Solve △ABC where $\angle C = 90°$, $a = 30$ cm, and $b = 19$ cm. Round the side length to the nearest tenth of a centimetre.



$\tan B = \dfrac{\text{opposite}}{\text{adjacent}}$

$\tan B = \dfrac{19}{30}$

$\angle B = \_\_\_\_\_$

$\tan A = \dfrac{\text{opposite}}{\text{adjacent}}$

$\tan A = \dfrac{30}{19}$

$\angle A = \_\_\_\_\_$

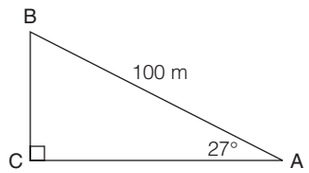
$c = \_\_\_\_\_$

Date: _____

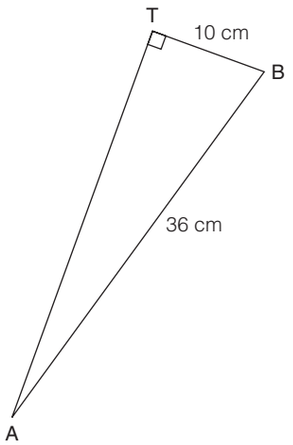
Section 1.1

5. Find the measure of the unknown sides and angles to one decimal place.

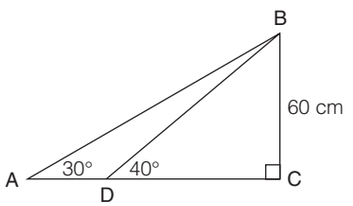
a)



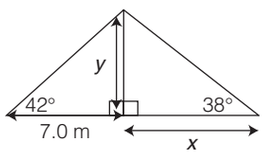
b)



6. Find the measure of side AD to the nearest tenth of a centimetre.



7. Find the length of x and y to the nearest tenth of a metre.



Date: _____

1.2 Solve Problems Using Trigonometric Ratios

Textbook pp. 16–23

Warm-Up

1. Number Skills

Simplify.

a) $\frac{50}{70}$

b) $\frac{63}{42}$

c) $\frac{35}{45}$

d) $\frac{11}{154}$

2. Algebra

Simplify each fraction, if $x = 6$.

a) $\frac{x}{30}$

b) $\frac{2}{x}$

c) $\frac{18}{4x}$

d) $\frac{3x}{100}$

3. Relations

Write the coordinates of three points with positive x- and y-coordinates for the linear relation $y = -3x + 14$.

4. Geometry/Measurement

a) Write a set of angles that could be the angles of an acute scalene triangle.

b) Write the only possible set of angles of a right isosceles triangle.

5. Data/Probability

a) What is the mean of this set of data?

2, 2, 4, 5, 7, 40

b) What is the mean size of an angle in a triangle?

6. Problem Solving

The hypotenuse of a triangle is 225 cm. The lengths of the other two sides of the triangle are $3x$ and $4x$. Solve for x.

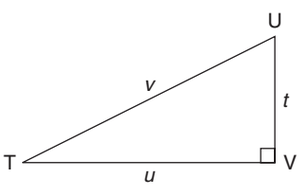
7. Math Literacy

Rearrange the letters to spell the term for the ratio of the opposite side of a right triangle to the adjacent side.

GNAT TEN

8. Previous Section

Write the primary trigonometric ratios for this triangle.



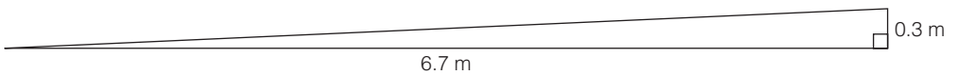
Date: _____

Practise

Section 1.2

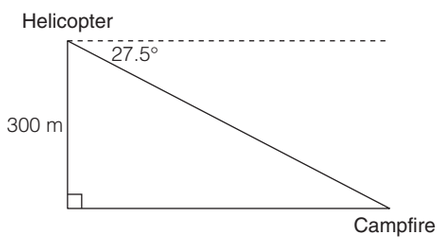
1. The CN Tower is 553.33 m high. Ellen looks up at the top of the tower at a 15° angle of elevation. What is the distance between Ellen and the base of the tower to the nearest metre?

2. A ramp is needed at the entrance of a supermarket. The ramp is to be 6.7 m long and have a rise of 0.3 m. Calculate the angle of inclination of the ramp to the nearest tenth of a degree.

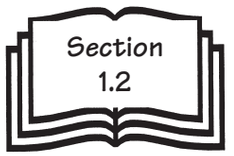


3. Boris walks 10 km south, turns east, and then walks another 7 km. At what angle, east of south, did Boris stop to the nearest metre?

4. A search and rescue helicopter is flying at an altitude of 300 m. A campfire is spotted from the helicopter at an angle of depression of 27.5°. If the helicopter lands directly below the point where it is when it spots the fire, how far does the crew have to travel to reach the campfire to the nearest metre?

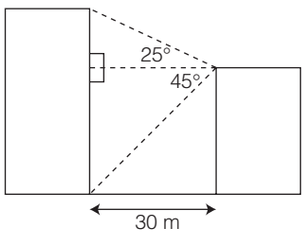


Date: _____



5. Ricky is flying his kite with 48 m of string. The wind takes his kite to a point where the angle of elevation to the kite is 36°. Find the altitude of the kite to the nearest metre.

6. Two buildings are 30 m apart. The angle from the top of the shorter building to the top of the taller building is 25°. The angle from the top of the shorter building to the base of the taller building is 45°. What is the height of the taller building to the nearest metre?



7. An expedition team decided to have a practice run prior to their North Pole trek. One team member started to walk due north. The other three travelled 70° east of north at a speed of 4 km/h. How far off the first team member's course were they after 3 h to the nearest tenth of a kilometre?

8. From a point 30.0 m from the base of a building, a surveyor measures the angle of elevation to the top of the building to be 28°. The transit is 1.85 m off of the ground. Determine the height of the building to the nearest tenth of a metre.

Date: _____

1.3 The Sine Law

Textbook pp. 24–33

Warm-Up

1. Number Skills

Match each fraction with its equivalent decimal number.

a) 0.8 **A** $\frac{60}{80}$

b) 0.25 **B** $\frac{14}{56}$

c) 0.75 **C** $\frac{28}{40}$

d) 0.7 **D** $\frac{16}{20}$

2. Algebra

Solve for each unknown.

a) $\frac{x}{20} = \frac{6}{5}$

b) $\frac{10}{24} = \frac{25}{y}$

c) $\frac{21}{70} = \frac{z}{100}$

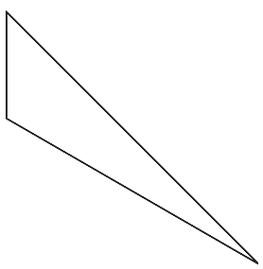
3. Relations

Solve the linear system.
$y = 5x - 15$
$y = 2x + 15$

4. Geometry/Measurement

Circle all the words that apply to this triangle.

right
isosceles
obtuse
equilateral
scalene
acute



5. Data/Probability

If the names of the three sides of a right triangle are placed in a hat, what is the probability of selecting the hypotenuse?

6. Problem Solving

The hypotenuse of $\triangle LMN$ is three times as long as the side adjacent to $\angle L$. Write the cosine ratio for $\angle L$.

7. Math Literacy

Which two sides of a right triangle are used in the sine ratio?

A opposite and adjacent
B opposite and hypotenuse
C adjacent and hypotenuse

8. Previous Section

What is the angle of elevation to the top of 24-m tall building 10 m away, if your eye is 2 m above the ground? Round your answer to the nearest tenth of a degree.

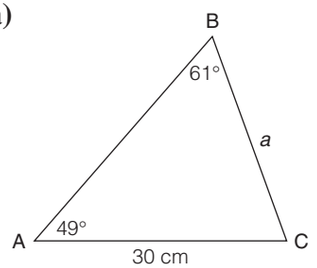
Date: _____

Practise

Section 1.3

1. Find the measure of the indicated side, to one decimal place.

a)

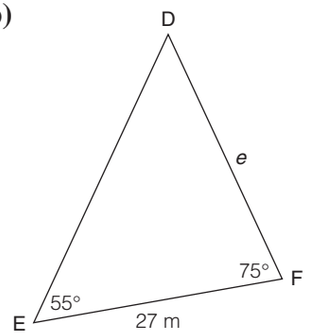


$$\frac{a}{\sin A} = \frac{b}{\sin B}$$

$$\frac{a}{\sin 49°} = \frac{30}{\sin 61°}$$

$a =$ _____

b)

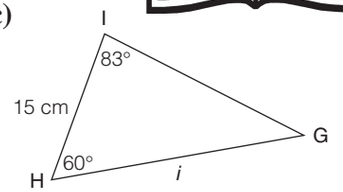


$$\frac{e}{\sin E} = \frac{d}{\sin D}$$

$$\frac{e}{\sin \_\_\_} = \frac{\_\_\_\_\_}{\sin \_\_\_}$$

$e =$ _____

c)



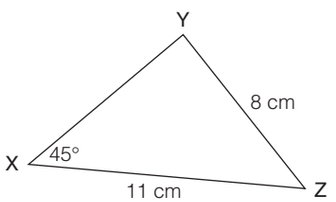
$$\frac{i}{\sin I} = \frac{g}{\sin G}$$

$$\frac{i}{\sin \_\_\_} = \frac{\_\_\_\_\_}{\sin \_\_\_}$$

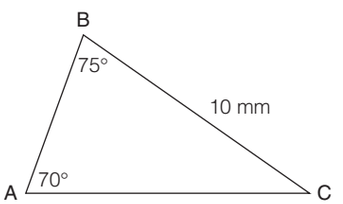
$i =$ _____

2. Solve each triangle. Round your answers to the nearest unit of measurement.

a)



b)

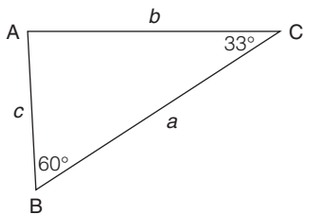


3. A shed is 15 ft wide. One rafter makes an angle of 30° with the horizontal on one side of the roof. A rafter on the other side makes an angle of 80° with the horizontal. Calculate the length of the shorter rafter to the nearest foot.

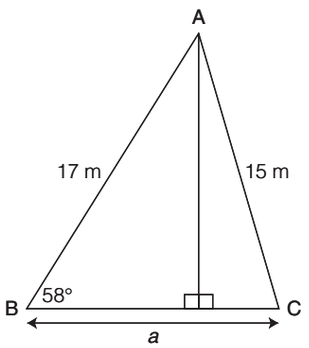
Date: _____

Section 1.3

4. The longest side of a triangle is 33 ft. The measures of two angles in the triangle are 33° and 60° as indicated in the triangle. Find the lengths of the other two sides to the nearest foot.



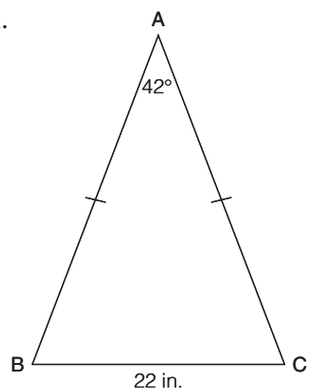
5. Two guy wires 17 m and 15 m in length are to be fastened to the top of a TV tower from two points B and C. The angle of elevation to the top of the tower from point B is 58°.



a) How far apart are the points B and C to the nearest tenth of a metre?

b) How tall is the tower to the nearest tenth of a metre?

6. Find the perimeter of isosceles $\triangle ABC$, to the nearest inch.



Date: _____

1.4 The Cosine Law

Textbook pp. 34–41

Warm-Up

1. Number Skills

Round each value to one decimal place.

a) 574.482

b) 23.057

c) 0.962

d) 161.048

2. Algebra

Solve for a if $b = 10$ and $c = 8$. Round your answer to one decimal place.

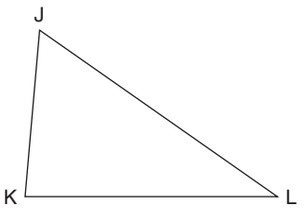
$$a^2 = b^2 + c^2 - 2bc \times 0.08$$

3. Relations

Determine the value of t when $v = 100$ in the quadratic relation $v = 0.1t^2 + 60$.

4. Geometry/Measurement

List the sides of the triangle from shortest to longest.



5. Data/Probability

a) What is the probability of selecting an obtuse angle when randomly selecting angles from an obtuse triangle?

b) What is the probability of selecting an obtuse angle when randomly selecting angles from an equilateral triangle?

6. Problem Solving

In $\triangle DEF$, $\angle D = 26°$ and $\angle E = 80°$. If DF is 5 mm longer than DE, how long is DE? Round your answer to the nearest millimetre.

7. Math Literacy

Which two sides of a right triangle are involved in the cosine ratio?

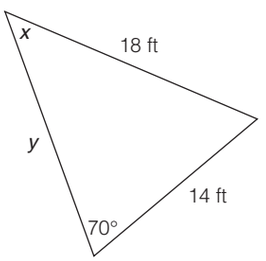
A opposite and adjacent

B opposite and hypotenuse

C adjacent and hypotenuse

8. Previous Section

Solve for x and y.
Round your answers to the nearest foot.



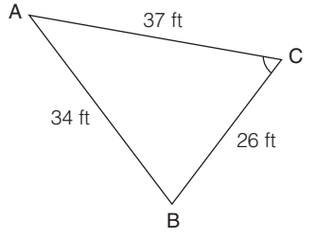
Date: _____

Practise

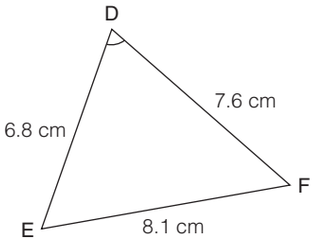
Section 1.4

1. Find the measure of each marked angle to the nearest degree.

a)



b)



$$\cos C = \frac{a^2 + b^2 - c^2}{2ab}$$

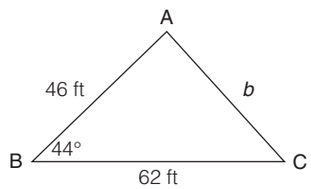
$$= \frac{(\quad)^2 + (\quad)^2 + (\quad)^2}{2(\quad)(\quad)}$$

$$= \_\_\_\_\_$$

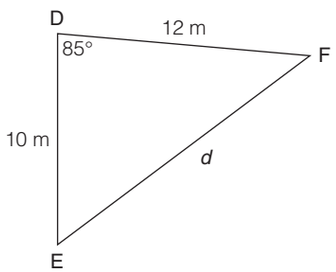
$$\angle C = \_\_\_\_\_$$

2. Find the measure of the unknown side to the nearest tenth of a unit.

a)



b)



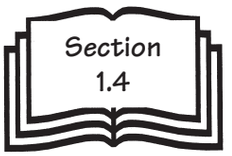
$$b^2 = a^2 + c^2 - 2ac \cos B$$

$$= \_\_\_\_\_$$

$$b = \_\_\_\_\_$$

3. Find the measures of the angles in $\triangle ABC$, given $a = 24$ m, $b = 18$ m, and $c = 29$ m. Round angles to the nearest degree.

Date: _____

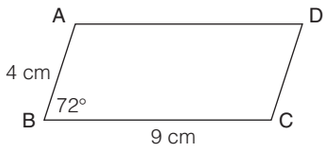


4. Find the measures of the unknown sides and angles in $\triangle XYZ$, given $\angle X = 54°$, $y = 48.5$ m, and $z = 52.5$ m. Round side lengths to the nearest tenth of a metre and angles to the nearest degree.

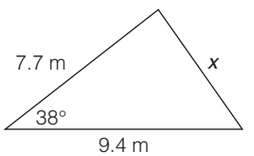
5. Two cyclists leave from the same location with an angle of 75° between their paths. Johal cycles at a speed of 30 km/h and Julio at a speed of 36 km/h. How far apart are they after 4 h to the nearest kilometre?

6. A flock of Canada geese are flying in a V-formation that forms an angle of 58°. The lead goose is 10.8 m from the last goose on the left and 12.5 m from the last goose on the right. Determine the distance between the last two geese in the V-formation to the nearest tenth of a metre.

7. In the parallelogram ABCD, the length of AB is 4 cm and BC is 9 cm. If $\angle B = 72°$, how long is the shorter diagonal, to the nearest tenth of a centimetre?



8. A roof truss is to span 9.4 m. One piece of the truss is 7.7 m in length and is set at an angle of 38°. How long is the third truss piece to the nearest tenth of a metre?



Date: _____

1.5 Make Decisions Using Trigonometry

Textbook pp. 42–51

Warm-Up

1. Number Skills

Estimate.

a) 180° – 90° – 29°

b) 180° – 8.1° – 109°

c) 180° – 22.4° – 86.8°

d) 180° – 61° – 57.5°

2. Algebra

Simplify if $a = 20$, $c = 5$, and $\cos A = 0.1$.

$$a^2 = b^2 + c^2 - 2bc \cos A$$

3. Relations

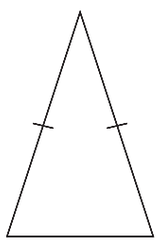
a) Write an equation for a line perpendicular to the line given by the linear relation $y = 2x - 3$.

b) At what point do the lines intersect?

4. Geometry/Measurement

Circle the name of this type of triangle.

isosceles
equilateral
scalene
right



5. Data/Probability

a) If there is no mode angle size for a triangle, what kind of triangle is it?

b) The mode size of an angle in △QRS is 60°. Describe the triangle.

6. Modelling

The hypotenuse of △JKL is 12 mm longer than the side opposite ∠J. Write the sine ratio for ∠J. Define any variable(s) you use.

7. Math Literacy

What do the letters in SOH-CAH-TOA stand for?

8. Previous Section

Find the measures of the angles in △MNO, if MN = 25 m, MO = 28 m, and NO = 23 m. Round your answers to the nearest tenth of a degree.

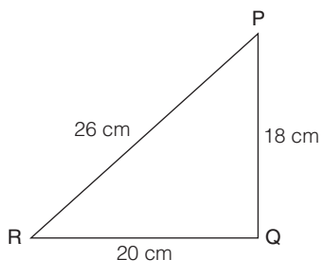
Date: _____

Practise

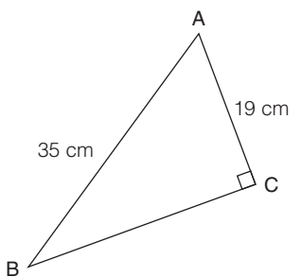
Section 1.5

1. For each, decide which formula to use and then solve the triangle.

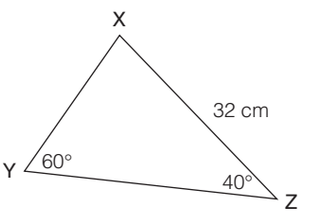
a)



b)



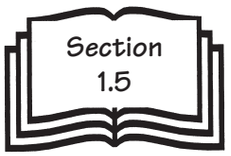
c)



2. Will a golfer using a 64° wedge (that would send the ball into the air at an angle of 64°) be able to hit his ball over a 32-ft tree if he is 6 yd in front of the tree? Explain how you know.

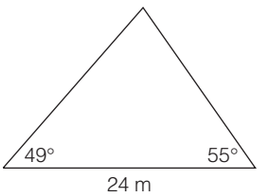
3. A 18-ft ladder leans against a wall. The top of the ladder is 16 ft above the ground. Safety standards call for the angle between the base of the ladder and the ground to be between 70° and 80°. Is the ladder safe to climb? Explain how you know.

Date: _____

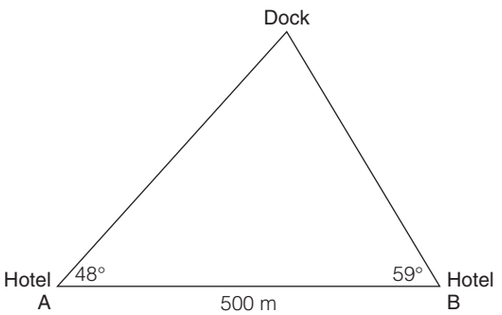


4. Three cell phone towers form a triangle. The distance between the first tower and the second tower is 20 km. The distance between the second tower and the third tower is 16 km. The distance between the first tower and the third tower is 19 km. Draw a diagram to show this situation. Calculate the measures of the angles in the triangle to the nearest degree.

5. A triangular garden is to be enclosed by a fence. Fencing is sold by the metre. How much fencing is required?



6. One dock is used to ferry guests to two hotels across a large lake. The hotels are located 500 m apart. The angle from one hotel to the dock is 48°, and the angle from the other hotel to the dock is 59°. How far is each hotel from the dock to the nearest metre?

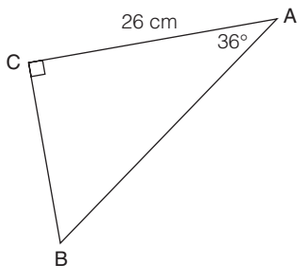


Date: _____

Chapter 1 Review

1.1 Revisit the Primary Trigonometric Ratios, textbook pages 6–15

1. Solve $\triangle ABC$. Round side lengths to the nearest tenth of a centimetre.



$\angle B =$ _____ $a =$ _____ $c =$ _____

2. Solve $\triangle ABC$ with $\angle C = 90°$, $\angle A = 40°$, and $b = 21$ cm. Round side lengths to the nearest tenth of a centimetre.

$\angle B =$ _____ $a =$ _____ $c =$ _____

1.2 Solve Problems Using Trigonometric Ratios, textbook pages 16–23

3. A person walks 6 km north, turns west, and then walks another 8 km. At what angle to the nearest degree, west of north relative to their starting point, did the person stop?

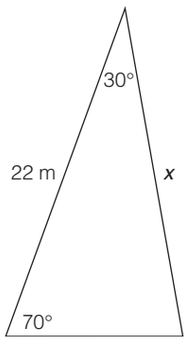
4. A boat is off course by 11° after travelling 27.8 km. How far off course is the boat to the nearest tenth of a kilometre?

Date: _____

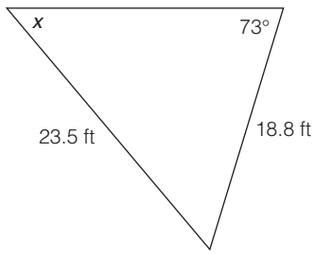
1.3 The Sine Law, textbook pages 24–33

5. Solve for x. Round your answers to the nearest unit of measurement.

a)



b)



1.4 The Cosine Law, textbook pages 34–41

6. Two sides of a triangle are 180 cm and 210 cm long. The angle between them is 70°. How long is the third side to the nearest centimetre?

7. In a triangle, the sides have lengths of 13 cm, 15 cm, and 16 cm. What are the angle measures in the triangle to the nearest degree?

1.5 Make Decisions Using Trigonometry, textbook pages 42–51

8. Find the perimeter of pentagon ABCDE, to the nearest tenth of a centimetre.

- Use trigonometric ratios to find BD and CD.
- Use sine law to find AB and AD.
- Use cosine law to find DE.
- What is the perimeter?