Trigonometry – Unit 5

Tentative TEST date_____

Reflect – previous TEST mark _____, Overall mark now_____.
Looking back, what can you improve upon?

Learning Goals/Success Criteria

Use the following checklist to help you determine what you know well and where you need additional review.

DAYS & Pages	Can you…	No, I cannot. I need to learn this.	I kind of get it. I don't get the right answers very often.	I get it. I could work on being more consistent.	Yes, I can. I have perfected this!
Day 1&2 Pg 2-4	Find sides using the primary trig ratios?	☐	☐	☐	☐
	Find angles using the primary trig ratios?	☐	☐	☐	☐
Day 3 Pg 5-6	Find sides using the sine law?	☐	☐	☐	☐
	Find angles using the sine law?	☐	☐	☐	☐
Day 4 Pg 7-8	Find sides using the cosine law?	☐	☐	☐	☐
	Find angles using the cosine law?	☐	☐	☐	☐
Day 5 Pg 9-11	Draw an appropriate diagram for any trigonometry problem accurately?	☐	☐	☐	☐
	Determine the appropriate trigonometry formula to use for a given problem?	☐	☐	☐	☐
Day 6 Pg 12-17	REVIEW				

DAY 1&2 – Primary Trig Ratios

1. Label the sides of the triangle as *opposite*, *adjacent* and *hypotenuse*.

a.

b.

c.

2. Evaluate. Round answers to 4 decimal places.

a.
sin 30°

b.
cos 45°

c.
tan 60°

3. Find the measure of each angle to the nearest degree. Record solution properly.

a.
sin A = 0.2345

b.
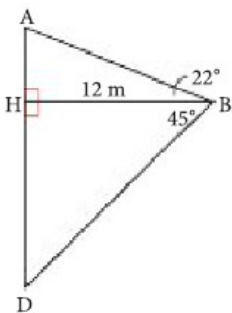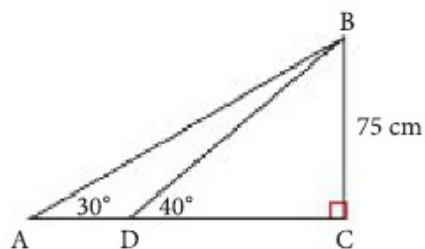cos B = 0.8765

c.
tanC = 1.2345

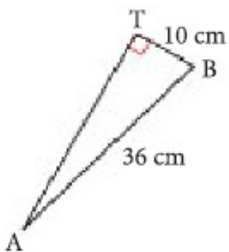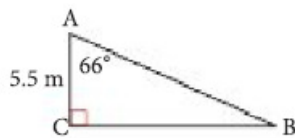4. Find the measure AD in each of the following triangles.

a.

b.

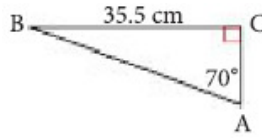5. Solve each triangle (find all missing angles and sides).

a.
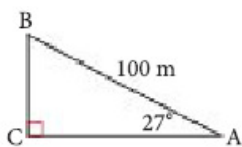

b.
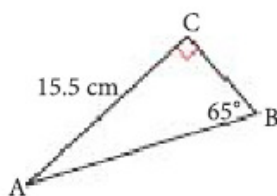

c.

d.

e.

6. A monument casts a shadow 13 m long. The sun's rays form an angle of 63° with the ground. Calculate the height of the monument to on decimal place.

7. A ladder leans against a wall forming a 25° angle with the wall. If the ladder reaches 2.8 m up the wall, how long is the ladder?

8. Jasmine is planning to climb up a cliff face. She sill be attached to a rope anchored to the top of the cliff. To find out how much rope she will need, she uses a clinometer to check the height of the cliff. She stands 500 m from the base of the cliff and measures a 73° angle to the top. How high is the cliff?

9. A carpenter leans a 4 m ladder against a wall. It reaches 3.5 m up the wall. What is the angle the ladder makes with the wall?

10. A rocket is launched at an angle of 80° to the ground and travels in a straight line. What is the rocket's altitude when it has traveled for 15 km?
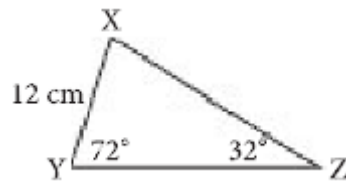
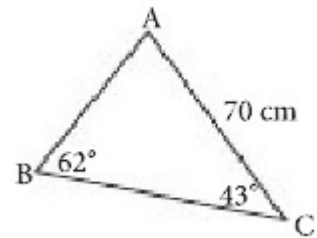## DAY 3 – The Sine Law

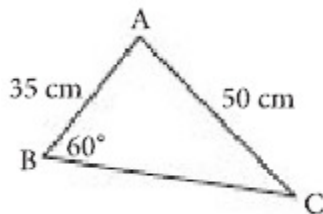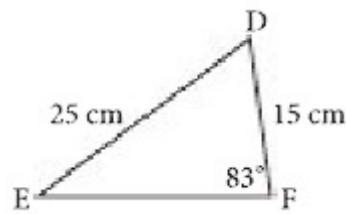1. Find the measure of the unknown side.

a.
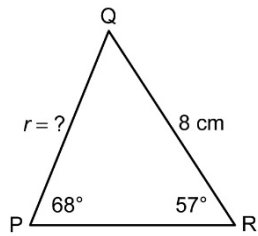
b. Find x

c. Find a

2. Find the measure of the unknown angle indicated.

a. Find ∠C

b. Find ∠E

c. Find ∠Y
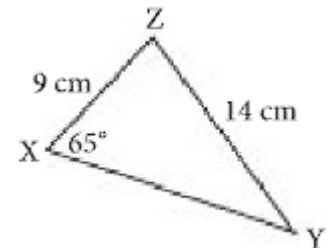
3. A communication tower is built on the slope of a hill. A surveyor, 50 m uphill from the base of the tower, measures an angle of 50° between the ground and the top of the tower. The angle from the top of the tower to the surveyor is 60°. Calculate the height of the tower to the nearest metre.
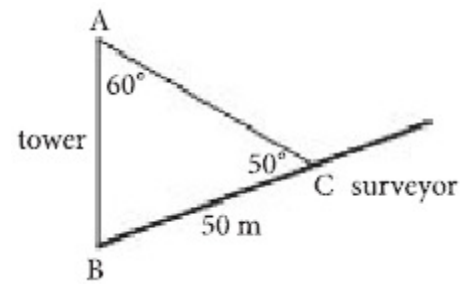
4. A shed is 8 ft wide. One rafter makes an angle of 30° with the horizontal on one side of the roof. A rafter on the other side makes an angle of 70° with the horizontal. Calculate the length of the shorter rafter to the nearest foot.

5. Three islands - Fogo, Twillingate and Moreton's Harbour - form a triangular pattern in the ocean. Fogo and Twillingate are 15 nautical miles apart. The angle between Twillingate and Moreton's Harbour from Fogo is 45°. The angle between Moreton's Harbour and Fogo from Twillingate is 65°. How far is Moreton's Harbour from the other two islands to the nearest nautical mile?
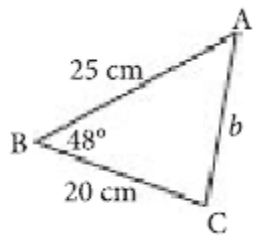
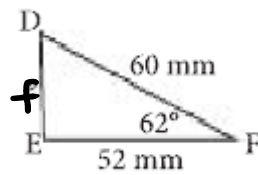## DAY 4 – The Cosine Law

1. Find the measure of the unknown side.

a.

25 cm, B 48°, 20 cm, A, b, C
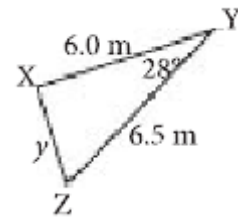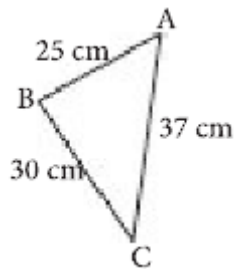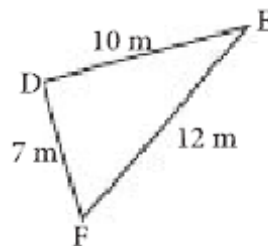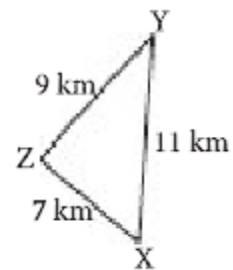
b.

D, 60 mm, f, E 52 mm F, 62°

c.

6.0 m, Y, 28°, X, y, 6.5 m, Z

2. Find the measure of the unknown angle indicated.

a. Find ∠A

25 cm, A, B, 37 cm, 30 cm, C

b. Find ∠D

10 m, E, D, 7 m, 12 m, F

c. Find ∠X

Y, 9 km, 11 km, Z, 7 km, X

3. A motocross ramp is to be built for an upcoming race. the measures for the sides of the ramp are as shown.
    Calculate the angle of inclination of the ramp to the nearest degree.

16.5 m   5.5 m

16.0 m
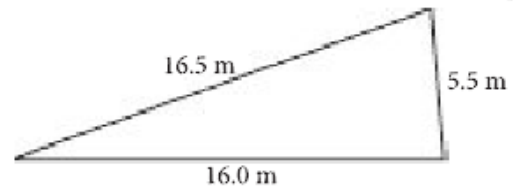
4. An intersection between two country roads makes an angle of 68°. Along one road, 5 km from the intersection, is a
    dairy farm. Along the other road, 7 km from the intersection, is a poultry farm. How far apart are the two farms?
    Round the answer to the nearest tenth of a kilometre.

5. A triangle is built using three poles with lengths 17 m, 15 m and 9 m. What is the measure of the largest angle in the
   triangle?

DAY 5 – Solve Word Problems

1. A triangular garden is to be enclosed by a fence. How much fencing will be required?
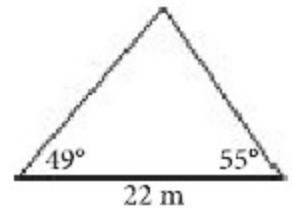
2. A 10 m ladder leans against a wall. The top of the ladder is 9 m above the ground. Safety standards call for the angle between the base of the ladder and the ground to be between 70° and 80°. Is the ladder safe to climb?

3. A golfer is faced with a shot that has to pass over some trees. The trees are 33 ft tall. The golfer finds himself 21 ft behind these trees, which obstruct him from the green. he decides to go for the green by using a 60° lob wedge. This club will allow the ball to travel at an angle of elevation of 60°. Did he make the right choice? Explain.

4. Three roads join Hometown, Mytown and Ourtown.

    a. What is the distance from Hometown to Ourtown?
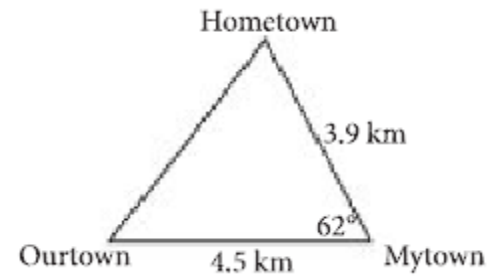
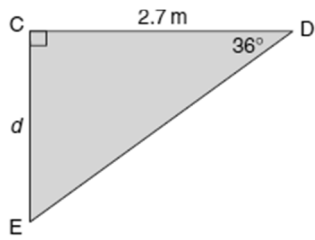   b. What angles to the roads make at Hometown and Ourtown?

5. Two tracking stations, 5 km apart, track a weather balloon floating between them. The tracking station to the west tracks the balloon at an angle of elevation of 52°, and the station to the east tracks the balloon at an angle of elevation of 60°. How far is the balloon from the closest tracking station?

6. Three cell phone towers form a triangle. The distance between the first tower and the second tower is 16 km. The distance between the second tower and the third tower is 19 km. The distance between the first tower and the third tower is 19 km. Calculate the angles between the cell phone towers.
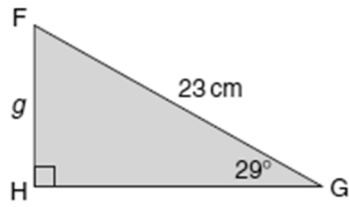
REVIEW

FORMULAS:

$$\sin\theta = \frac{opp}{hyp} \qquad \cos\theta = \frac{adj}{hyp} \qquad \tan\theta = \frac{opp}{adj} \qquad \frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C} \qquad c^2 = a^2 + b^2 - 2ab\cos C$$

1. Explain what information is required to solve a trigonometry problem when using
    a. the primary trigonometric ratios

    b. the sine law

    c. the cosine law

2. What is a contained angle?

3. What is the difference between angle of elevation and angle of depression?

4. For what calculations are the *sin*, *cos* and *tan* buttons used? When are *sin^{-1}*, *cos^{-1}* and *tan^{-1}* used?

5. Find the unknown sides/angles using the primary trigonometric ratios.

   a. Find d

   2.7 m, C, D, 36°, d, E

   b. Find g

   F, 23 cm, g, 29°, H, G

   c. Find m

   M, 49 in., K, 47°, m, N

   d. Find ∠ A

   B, 83 m, A, 120 m, C

   e. Find ∠ X

   Z, 4.1 cm, X, 7.8 cm, Y

   f. Find ∠ T

   T, 6 in., 3 in., R, S
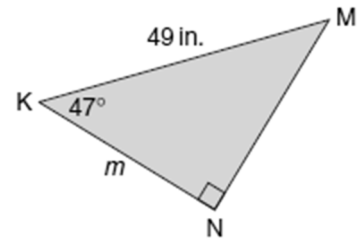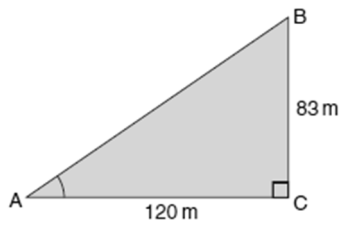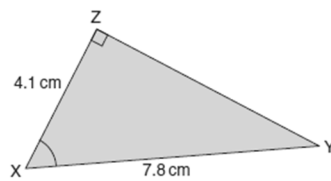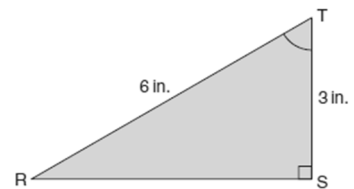
6. Use the sine law to find the missing sides/angles.

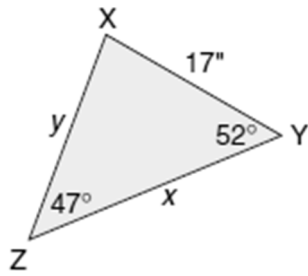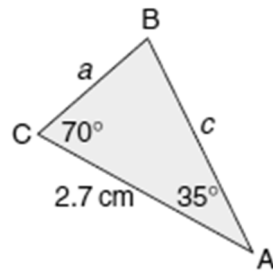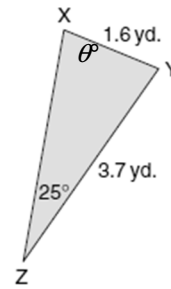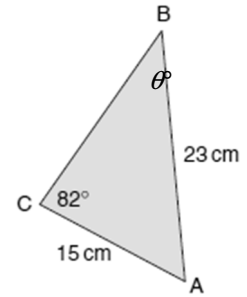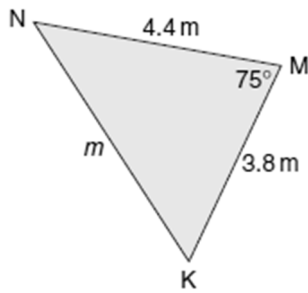   a. Find y   b. Find c   c. Find θ d. Find θ
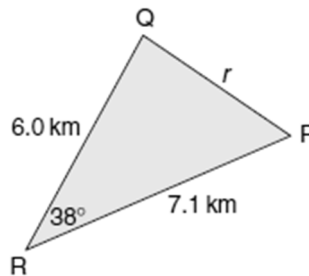

7. Use the cosine law to find the missing side/angle.

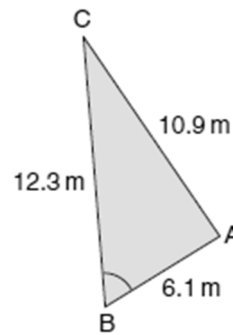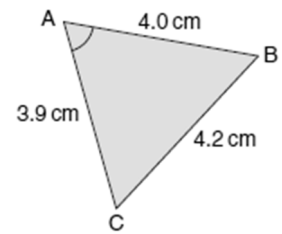   a. Find m   b. Find r   c. Find $\angle$ B   d. Find $\angle$ A

8. A land surveyor draws a diagram of a plot of land that is in the shape of a right triangle. The longest side is 4.7 km long. The angle between the longest side and one other side is 59°. How long are the two shorter sides?

9. The Royal Gorge Bridge Incline Railway in Colorado is the steepest railway in the world. The elevation increases 1096 ft. over the 1550 ft. incline. Calculate the angle of inclination of the track.
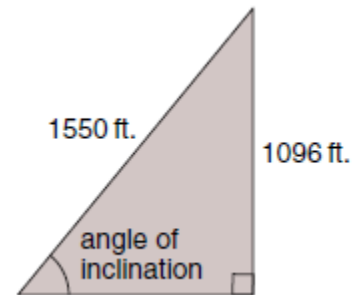
10. The vertical length of a ramp is 1.4 m. The horizontal length of the ramp is 18 m. What is the angle of elevation of the ramp, to the nearest degree?

11. What are the measures of the other two angles in this triangle, to the nearest degree?
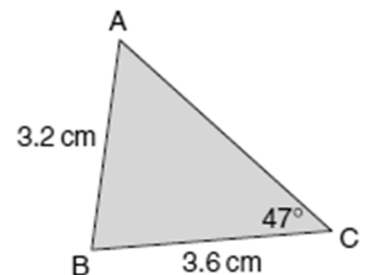
12. A surveyor has surveyed a triangular plot of land. One side of the plot lies along a county road. This side is 400 ft. long. An adjacent side makes an angle of 88° with the side along the road. The side opposite this angle is 550 ft long. Determine the length of the third side of the plot, to the nearest foot.
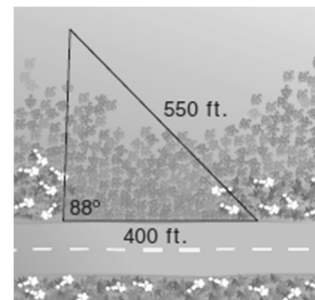
13. Ana is flying a kite in a flat, open field. She lets out 15 m of string. The angle of elevation of the kite from her position is 64°. Her friend Stephanie is also playing in the field, facing Ana. The angle of elevation of the kite from Stephanie's position is 35°. How far apart are the girls, to the nearest metre?

14. A hiker walked 4.9 km due north from her campsite. Then, she walked a further 5.8 km on a bearing of 110°. How far from the campsite is she now?
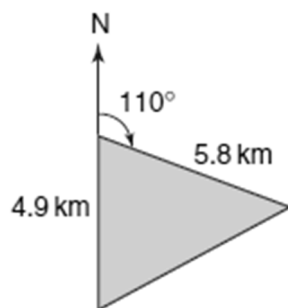

15. Max is designing a wooden plant stand with a triangular top. The side lengths of the triangle are 45 cm, 60 cm, and 70 cm. To make the triangle, Max needs to know the angle measures. Find each angle measure.

16. To measure the length of a glacier, a geographer stands at a point where she can see both ends of the glacier. The angle between the lines of sight from where she stands to the ends of the glacier is 62°. She measures the distance from where she stands to the ends to be 250 m and 215 m. How long is the glacier?

17. A gold mine has two ventilation shafts that start at the same work area below ground. The vents of the shafts at ground level are 3.2 km apart. One shaft is 2.1 km long and the other is 2.5 km long.
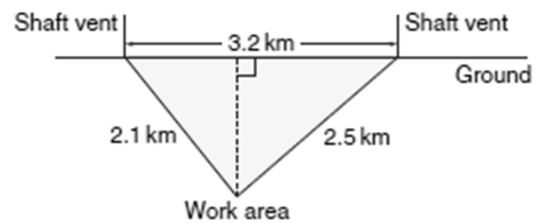
    a.   What is the angle of depression of each shaft?

    b.   How far below ground is the work area?