Name _____ Date_____

Right Triangles
The Pythagorean Theorem
Independent Practice

1. Tony wants his white picket fence row to have ivy grow in a certain direction. He decides to run a metal wire diagonally from the ground level at one end to the top of the other side of the fence row. The section of the fence in the front of his house is 10 feet long and has a height of 27 inches.

   Determine the length of the wire.

2. Alice leaves her house and walks to school. She walks 45 meters south and 336 meters east. How far is Alice from her house?

3. The walls of square storage room in a warehouse are 300 feet long. What is the distance from one corner to the other corner of the storage room?

4. Alejandro has three ladders that are 15, 10, and 12 feet in length. If he is trying to reach a window that is 8 feet from the ground, then…

   Part A: How far does the bottom of the ladder need to be for the 15-foot ladder?

   Part B: How far does the bottom of the ladder need to be for the 10-foot ladder?

   Part C: How far does the bottom of the ladder need to be for the 12-foot ladder?

5. If the hypotenuse of a right triangle is 125 units long and the short leg adjacent to the right angle is 32 units long, then determine the length of the long leg of the triangle.

Name _____ Date_____

Right Triangles
The Converse of the Pythagorean Theorem
Independent Practice

1. Prove that each example below is a Pythagorean triple.

   Part A: $77, 420, 427$

   Part B: $279, 440, 521$

   Part C: $39, 760, 761$

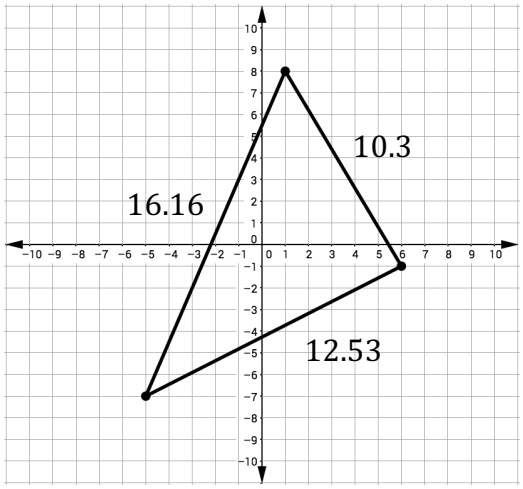
2. Determine if the triples below are right triangles.

   Part A: $290, 696, 750$

   Part B: $514, 684, 855$

   Part C: $450, 1080, 1170$

3. Consider the following figure.



Determine if the triangle on the coordinate plane is a right triangle by using the converse of the Pythagorean theorem.

4. If a triangle has side lengths of $56, 90$, and 106, then determine which number correlates to the legs and hypotenuse.

56 is a _____ 90 is a _____ 106 is a _____

5. How can you determine which of the three numbers is the hypotenuse? Once the hypotenuse is identified, then does it matter which length you substitute for the a and b in $a^2 + b^2 = c^2$? Justify your answer.

6. For any triangle with side lengths a, b, and c, if $a^2 + b^2 = c^2$, then the triangle is a right triangle; if $a^2 + b^2 > c^2$, then the triangle is an acute triangle; and if $a^2 + b^2 < c^2$, then the triangle is an obtuse triangle.

   Determine if the following lengths of a given triangle is an acute, right, or obtuse triangle.

   Part A: $30, 40, 50$ is a(n) _____ triangle.

   Part B: $0.3, 0.4, 0.6$ is a(n) _____ triangle.

   Part C: $11, 12, 15$ is a(n) _____ triangle.

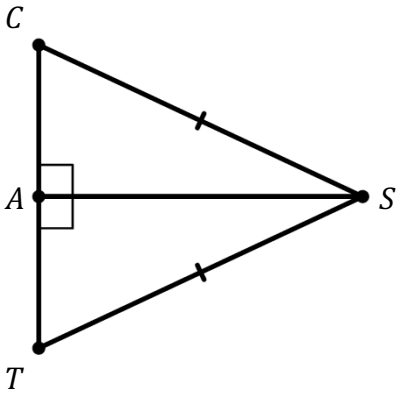
7. Determine which of the following triples is not a right triangle. Select all that apply.

   ☐ $90, 215, 243$
   ☐ $60, 144, 156$
   ☐ $40, 75, 85$
   ☐ $20, 22, 29$
   ☐ $33, 56, 65$

Name _____ Date_____

Right Triangles
Proving Right Triangles Congruent
Independent Practice

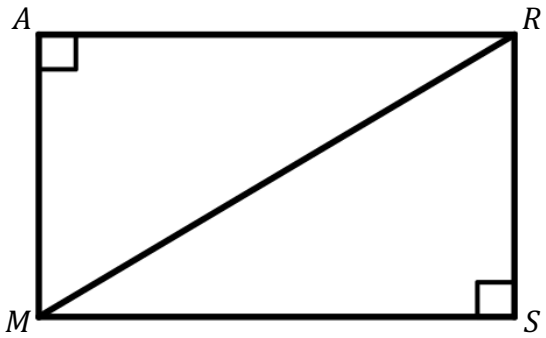
1. Use the diagram to prove that $\Delta CAS \cong TAS$.



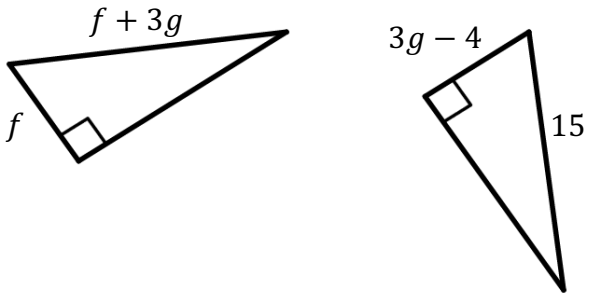
Given: $\overline{CS} \cong \overline{ST}$ and $m\angle CAS = m\angle TAS = 90°$
Prove: $\triangle CAS \cong \triangle TAS$

Statement	Reason
1.	**1.**
2.	**2.**
3.	**3.**
4.	**4.**
5.	**5.**
6.	**6.**

2. Determine the congruence information that is needed to show that the two triangles are congruent by the HL Theorem in two different ways.

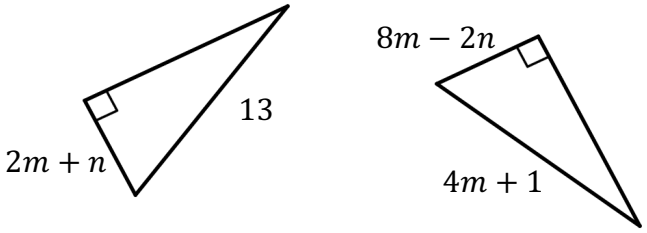


3. Consider the following diagram.



Find the values of f and g that prove the two triangles congruent by the HL Theorem.

4. Consider the following diagram.



Find the values of m and n that prove the two triangles congruent by the HL Theorem.

Name _____ Date_____

Right Triangles
Special Right Triangles: $45° - 45° - 90°$
Independent Practice

1. At the local baseball diamond, the distance from home base to second base is 100 feet.

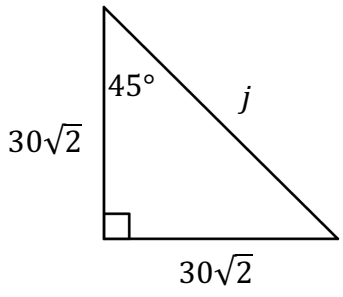
   Part A: Determine the distance from home base to first base.

   Part B: If Sammy hits a homerun, then what is the distance that she has to run around the bases?

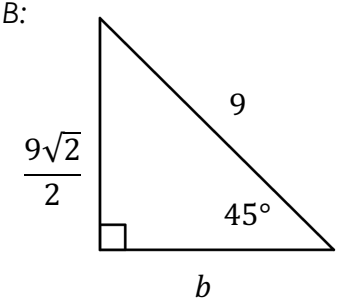
2. A decent-sized square plot of land in town is one acre (1 acre $= 43560$ sq.ft.). If Mr. Pearson wants to play football with his son Connor, then how far can they throw the football from corner to corner?

3. Use the Pythagorean Theorem or knowledge on special right triangles to find the missing variable in the following triangles.

   Part A:

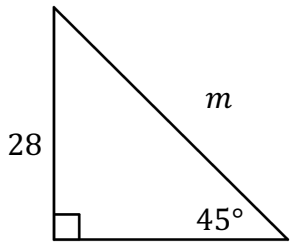


   Part B:

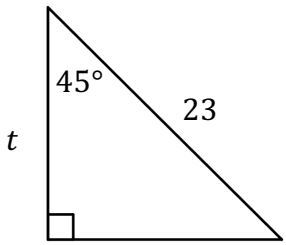


4. Use the Pythagorean Theorem or knowledge on special right triangles to find the missing variable in the following triangles.

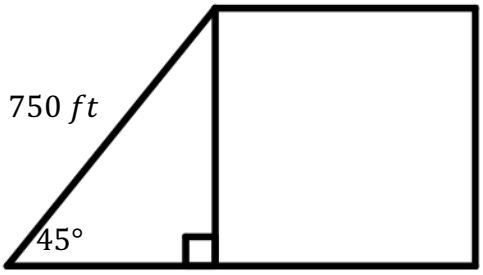
Part A:



Part B:



5. Consider the image below of a pasture at McDonald's Farm.



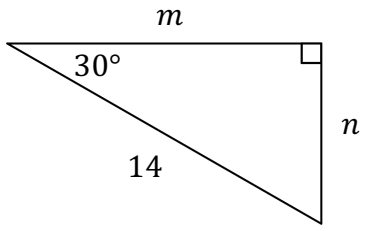
Part A: If Ol' McDonald wants to fence in the square pasture and barbed fence costs $\$1.15/ft.$, then determine the cost to fence in the pasture.

Part B: If Ol' McDonald wants to cover the square pasture in fertilizer, then he needs to determine the area of the pasture. What is the area of the pasture to the nearest hundredth?

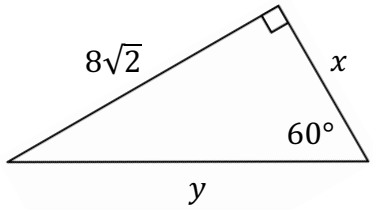
Name _____ Date_____

Right Triangles
Special Right Triangles: $30° - 60° - 90°$
Independent Practice

1. Determine the value of the missing sides for the following triangle.

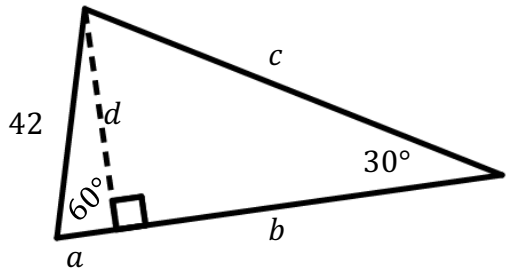


2. Determine the value of the missing sides for the following triangle.



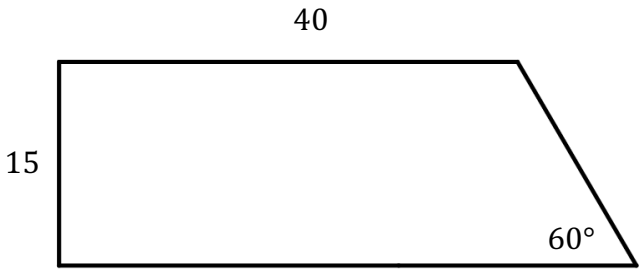
3. The length of the side opposite the $30°$ angle of a $30 - 60 - 90$ is $323\ ft$. Determine the lengths of the other two sides.

4. Determine the value of each variable in the figure below. Keep answers in simplest radical form.



5. An equilateral triangle has a height of $52\ cm$. Determine the length of each side to the nearest hundredth of a centimeter.

6. Consider the following figure.



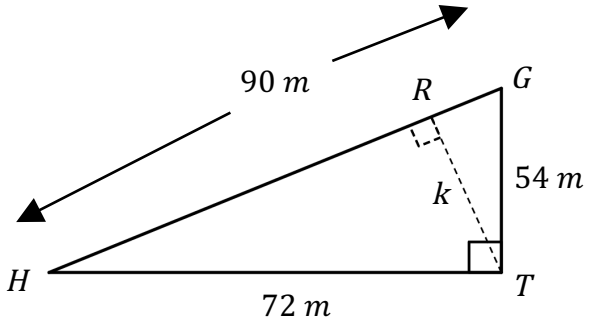
Part A: Determine the perimeter of the figure above.

Part B: Determine the area of the figure above.

Name _____ Date_____

Right Triangles
Right Triangle Similarity – Part 1
Independent Practice

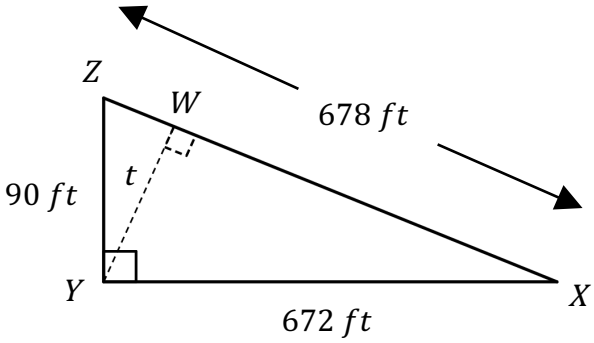
1. Consider the following diagram.



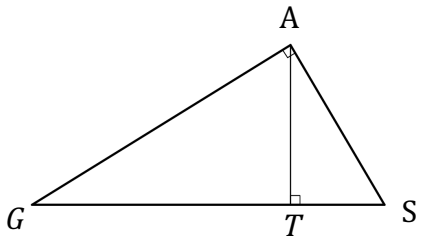
Part A: Identify the similar triangles in the above diagram.

Part B: Find the value of k in the above diagram.

2. Determine the value of the variable in the figure below.

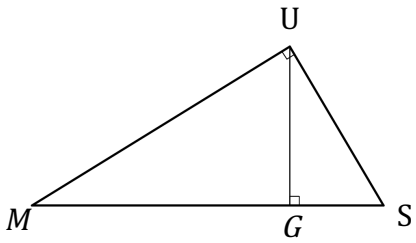


3. Complete the following blanks to complete the criteria for the Geometric Mean Theorem: Altitude Rule.



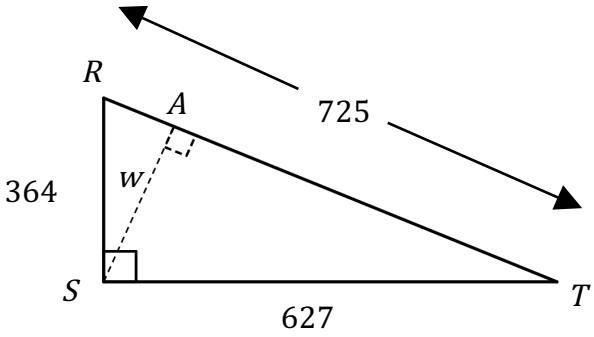
$$\frac{GT}{\square} = \frac{\square}{TS}$$

4. Complete the following blanks to complete the criteria for the Geometric Mean Theorem: Leg Rule.



$$\frac{MS}{\square} = \frac{\square}{GS} \quad \text{or} \quad \frac{MS}{\square} = \frac{\square}{MG}$$

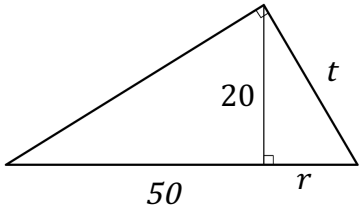
5. Determine the value of the variable in the figure below.



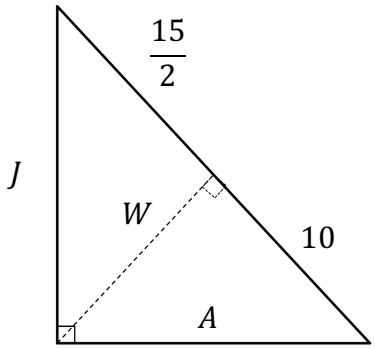
Name _____ Date_____

Right Triangles
Right Triangle Similarity – Part 2
Independent Practice

1. Determine the variables in the figure below.

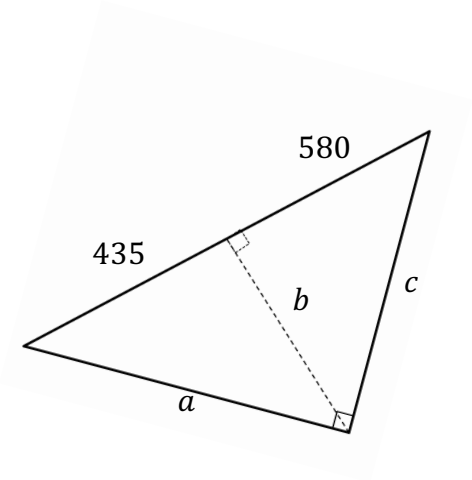


2. Consider the figure below.



Find the values of J, W, and A.

3. Consider the diagram below.



Determine the values of a, b, and c.

4. A school, hospital, and a supermarket are located at the vertices of a right triangle formed by three highways. The school and hospital are 14.7 miles apart. The distance between the school and the supermarket is 8.82 miles, and the distance between the hospital and the supermarket is 11.76 miles.

   A service road will be constructed from the main entrance of the supermarket to the highway that connects the school and hospital. What is the shortest possible length for the service road? Round your answer to the nearest tenth.

5. A huge forest has the fence row in shape of a right triangle with sides measuring $850\sqrt{3}\ miles, 850\ miles$, and $1700\ miles$. During the winter season, the forest rangers open up another road to bypass the snow that could accumulate. The road will connect the right angle of the forest to the hypotenuse.

   Determine the the shortest possible length for the bypass road.

Name _____ Date_____

Right Triangles
Introduction to Trigonometry – Part 1
Independent Practice

1. Match the correct trigonometric value to the correct ratio.

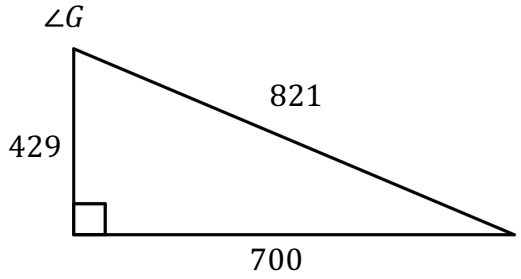
cot	tan	csc
sec	sin	cos

$$\_\_\_\_\_ = \frac{leg\ opposite\ to\ the\ angle}{hypotenuse}$$

$$\_\_\_\_\_ = \frac{leg\ adjacent\ to\ the\ angle}{hypotenuse}$$

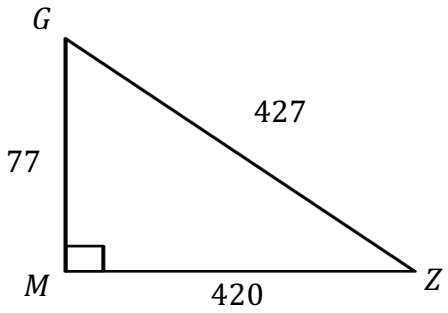
$$\_\_\_\_\_ = \frac{leg\ opposite\ to\ the\ angle}{leg\ adjacent\ to\ the\ angle}$$

2. Consider the figure below and determine the value of sine, cosine, and tangent of $\angle G$.



$\sin(G) =$_____ $\cos(G) =$_____ $\tan(G) =$_____

3. Consider the figure below.



Part A: Determine $\sin(G)$.

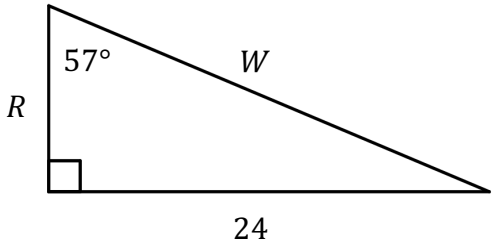
Part B: Determine $\tan(Z)$.

Part C: Determine $\cos(Z)$.

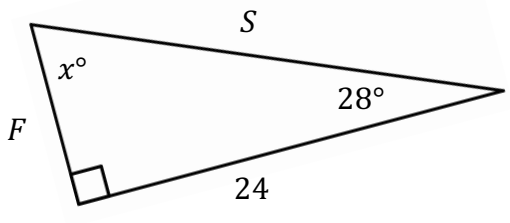
Part D: Determine $\sin(M)$.

Part E: Make a conjecture about the sine value of **any** right angle.

4. Determine the unknown values, R and W, in the figure below.



5. Determine all the unknown values of the figure below.



6. Match the sides to the correct trigonometry function. Each word can be used more than once.

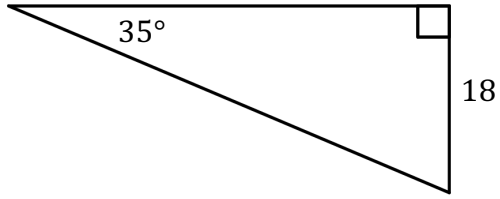
opposite adjacent hypotenuse

cos =_____ tan = _____ sin = _____

Name _____ Date_____

Right Triangles
Introduction to Trigonometry – Part 2
Independent Practice

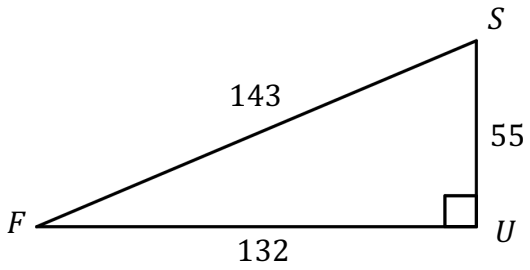
1. Consider the triangle below.



Part A: Determine the perimeter of the triangle to the nearest hundredth.

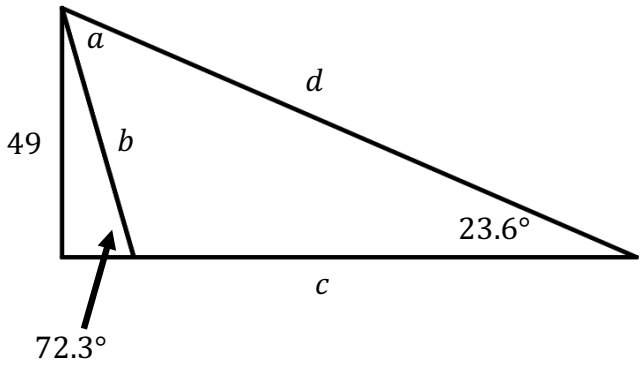
Part B: Determine the area of the triangle to the nearest hundredth.

2. Consider the triangle ΔFSU below.

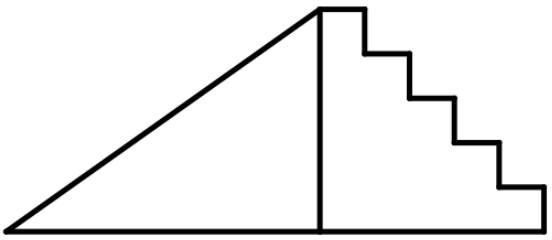


Using 'trig,' determine the angle measure of $\angle S$ and $\angle F$.

3. Consider the right triangle in the figure below and determine the value of a, b, c, and d.



4. At the Joseph Jacobs Exhibit at the museum, there is a *Jack in the Beanstalk* play place with stairs and slide Jack's journey up the giant's lair. At the top of the stairs, there is a slide to get down. Consider the diagram of the stairs and slide below.



If each step is two feet long and three feet high, then determine the angle of elevation from the ground to the top of the stairs to the nearest tenth of a degree.

5. A ladder is leaning against a wall and makes an $82°$ angle of elevation with the ground.

   Part A: If the base of the ladder is 4 feet from the wall, then how long is the ladder? Round to the nearest tenth.

   Part B: Determine how high up the wall does the ladder reach.

6. A right triangle has a hypotenuse of length 59 and one leg of length 23.

   Part A: Determine the angle measure of the other two acute angles in the triangle. Round to the nearest hundredth.

   Part B: Determine the side length of the other leg.

Name _____ Date_____

Right Triangles
Angles of Elevation and Depression
Independent Practice

1. Mary's kite is flying above the beach at the end of a $\mathbf{75}$ –meter string. If the angle of elevation to the kite measures $\mathbf{68}°$ and Mary is holding the kite $\mathbf{1.2}$ meters off the ground, then determine the height of Mary's kite in flight.

2. A weather balloon is launched from the ground at a spot $\mathbf{250}$ yards from a $\mathbf{65}$ foot royal palm tree. What is the minimal angle of elevation at which the balloon must take off in order to avoid hitting the tree? Assume that the balloon flies in a straight line and the angle of elevation stays constant.

3. Juliet stands at the window of her apartment so that her eyes are $\mathbf{38.4}$ feet above the ground. Juliet spots her boyfriend down the street a few blocks away. She knows, based off the number of city blocks, that her boyfriend is at a distance of $\mathbf{156.45}$ feet away from the building. Determine the angle of depression of Juliet's site to her boyfriend on the ground.

4. A straight road to the top of a mountain is $\mathbf{25,525}$ feet long and makes a $\mathbf{44}°$ angle of elevation from sea level. Determine the height of the mountain.

5. Airplanes use Distance Measuring Equipment (DME) to measure the distance from the plane to nearest radar station. If the distance from a plane to a radar station is 160 miles and the angle of depression is $34°$, find the number of ground miles from a point directly below the plane to the radar station.

6. A traffic camera sits on top of a tower that has a height of $50\ ft.$, the angles of depression of two cars on a straight road at the same level as that of the base of the spire and on the same side of it are $25°$ and $40°$. Calculate the the distance between the two cars.

7. A man on the deck of a ship is $14\ ft.$ above water level. He observes that the angle of elevation of the top of a cliff is $40°$ and the angle of depression of the base is $20°$. Find the distance of the cliff from the ship and the height of the cliff if the base of the cliff is at sea level.