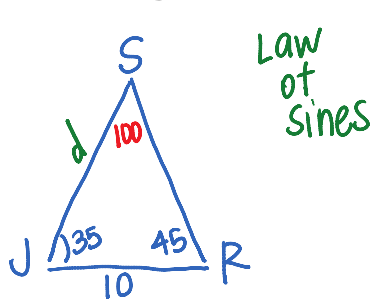


Advanced Algebra with Trig
13.5, 13.6 - Law of Sines and Cosines Word Problems

Name:
Period: *key*

1. Juan and Romella are standing at the seashore 10 miles apart. The coastline is a straight line between them. Both can see the same ship in the water. The angle between the coastline and the line between the ship and Juan is 35 degrees. The angle between the coastline and the line between the ship and Romella is 45 degrees. How far is the ship from Juan?

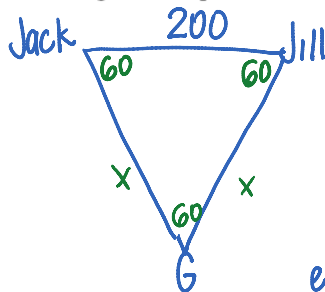


Law of Sines
 $S = 180 - (35 + 45)$
 $S = 100$

$$\frac{\sin 100}{10} = \frac{\sin 45}{d}$$

$$\frac{d \cdot \sin 100}{\sin 100} = \frac{10 \sin 45}{\sin 100} \Rightarrow d = \boxed{7.18 \text{ miles}}$$

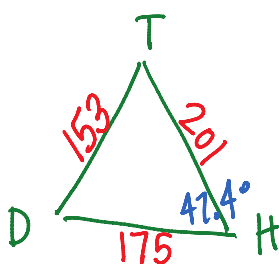
2. Jack is on one side of a 200-foot-wide canyon and Jill is on the other. Jack and Jill can both see the trail guide at an angle of depression of 60 degrees. How far are they from the trail guide?



200 ft

equilateral triangle

3. Tom, Dick, and Harry are camping in their tents. If the distance between Tom and Dick is 153 feet, the distance between Tom and Harry is 201 feet, and the distance between Dick and Harry is 175 feet, what are the angle measures between Dick, Harry, and Tom?



$$153^2 = 201^2 + 175^2 - 2(201)(175)\cos H$$

$$23409 = 71,026 - 70,350 \cos H$$

$$\frac{-47,617}{-70350} = \frac{-70,350 \cos H}{-70350} \Rightarrow \cos H = .677$$

$$H = 47.40^\circ$$

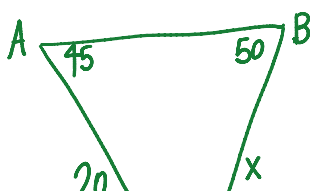
$$\frac{\sin 47.4}{153} = \frac{\sin T}{175}$$

$$T = 57.35^\circ$$

$$D = 180 - (47.40 + 57.35)$$

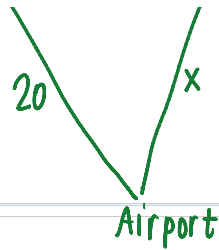
$$D = 75.25^\circ$$

4. Airplane A is flying directly toward the airport which is 20 miles away. The pilot notices airplane B 45 degrees to her right. Airplane B is also flying directly toward the airport. The pilot of airplane B calculates that airplane A is 50 degrees to his left. Based on that information, how far is airplane B from the airport?



$$\frac{\sin 45}{x} = \frac{\sin 50}{20}$$

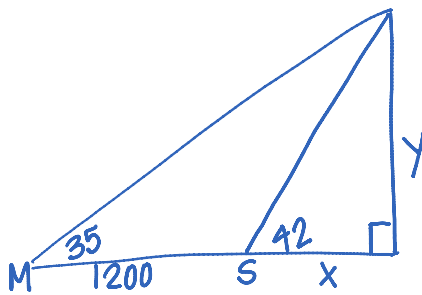
$$x = \frac{20 \sin 45}{\sin 50}$$



$$X = \frac{20 \sin 40}{\sin 50}$$

$$X = 18.46 \text{ miles}$$

5. Matt measures the angle of elevation of the peak of a mountain as 35° . Susie, who is 1200 feet closer on a straight level path, measures the angle of elevation as 42° . How high is the mountain?



$$\tan 35 = \frac{Y}{1200+x}$$

$$\tan 42 = \frac{Y}{x}$$

$$\tan 35(1200+x) = Y$$

$$x \tan 42 = Y$$

$$Y = 4201.25 \tan 42$$

$$Y = 3782.82 \text{ ft}$$

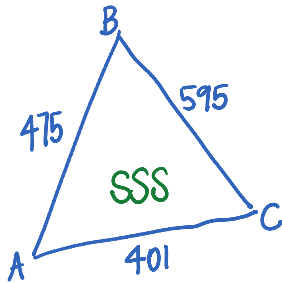
$$\tan 35(1200+x) = x \tan 42$$

$$840.25 + .70x = .90x$$

$$840.25 = .20x$$

$$x = 4201.25$$

6. A triangular playground has sides of lengths 475 feet, 595 feet, and 401 feet. What are the measures of the angles between the sides, to the nearest tenth of a degree?



$$401^2 = 475^2 + 595^2 - 2(475)(595)\cos B$$

$$B = 42.18^\circ$$

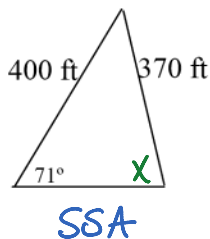
$$\frac{\sin 42.18}{401} = \frac{\sin C}{475}$$

$$C = 52.70^\circ$$

$$A = 180 - (42.18 + 52.70)$$

$$A = 85.12^\circ$$

7. A real estate agent has just taken a trigonometry class at the local community college. She is considering purchasing a piece of property and is waiting for the surveyor's report before closing the deal. If the surveyor submits a drawing as in the figure below, explain why the agent will reject the sale.



$$\frac{\sin 71}{370} = \frac{\sin X}{400}$$

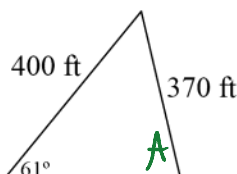
$$\sin X = 1.02$$

no \nexists X

no triangle!

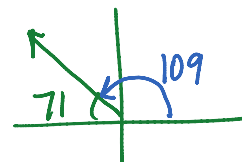
no piece of property can have these dimensions

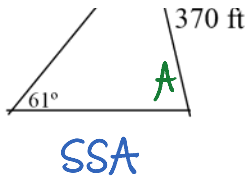
8. The surveyor admits to his mistake and revises his drawing as in the next figure. This time the real estate agent refuses to complete the deal until additional information is supplied. What additional information is the real estate agent looking for to complete her knowledge about the parcel of land?



$$\frac{\sin 61}{370} = \frac{\sin A}{400}$$

$$A = 71.00^\circ$$

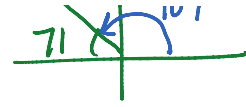




oiv

$$A = 71.00^\circ$$

the agent needs to know
which measurements (or Δ)
they are buying



$$109 + 61 = 170 < 180$$

2 triangles