

Key

Laws of Sines and Cosines Review ProblemsLevel 2

1. Solve the triangles. If two triangles exist, solve for all parts of both triangles.

a.  $\angle B = 30^\circ$ ,  $\angle C = 43^\circ$  and  $a = 8$

$$\angle A = 107^\circ$$

$$b \approx 4.2$$

$$c \approx 5.7$$

b.  $a = 8$ ,  $b = 4$ ,  $c = 3$

Not Possible

c.  $a = 11$ ,  $b = 14$  and  $\angle A = 35^\circ$

Solution # 1

$$\angle B_1 = 47^\circ$$

$$\angle C_1 = 98^\circ$$

$$c_1 = 19.0$$

Solution # 2

$$\angle B_2 = 133^\circ$$

$$\angle C_2 = 12^\circ$$

$$c_2 \approx 4$$

d.  $c = 2$ ,  $b = 7$  and  $\angle A = 36^\circ$

$$a \approx 5.5$$

$$\angle C = 12^\circ$$

$$\angle B \approx 132^\circ$$

e.  $a = 15$ ,  $b = 14$ ,  $c = 17$

$$\angle C \approx 72^\circ$$

$$\angle B \approx 51^\circ$$

$$\angle A \approx 57^\circ$$

f.  $m\angle C = 73^\circ$ ,  $m\angle B = 44^\circ$ ,  $CB = 50$

$$\angle A = 63^\circ$$

$$b \approx 39.0$$

$$c \approx 53.7$$

g.  $a = 8.8$ ,  $b = 6.8$  and  $A = 27^\circ$

$$\angle B = 20.5^\circ$$

$$\angle C = 132.5^\circ$$

$$c \approx 14.3$$

### Level 3

2. An engineer needs to design a bridge for a road that must cross a canyon. From a helicopter, he measures the angle between the two sides of the canyon to be  $72^\circ$ . If the helicopter is 1500 feet from one edge of the canyon and 2300 feet from the other edge, how long must the bridge be to span the canyon?

$$d \approx 2325.5 \text{ ft}$$

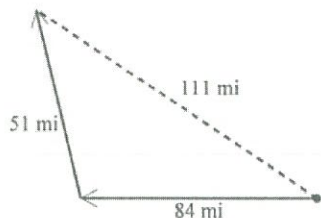
3. A ship at sea, the Intrepid, spots two other ships, the Ranger and the Lancer, and measures the angle between to be  $37^\circ$ . The distance between the Intrepid and the Ranger is 2190 meters. The Ranger measures an angle of  $47^\circ$  between the Intrepid and the Lancer. To the nearest meter, what is the distance between the Ranger and the Lancer

$$d \approx 1325.2 \text{ m}$$

4. A street sign is leaning at a  $4^\circ$  angle from the vertical. It casts a shadow that is 7 feet long when the sun's angle of elevation is  $40^\circ$ . What is the length of the street sign's post?  
(There are two possible answers!)

$$Q \quad 5.6 \text{ ft or } 6.5 \text{ ft}$$

5. A ship travels due west for 84 miles. It then travels in a northern direction for 51 miles and ends up 111 miles from its original position. How many degrees did it turn when it changes direction? Round your answer to the nearest tenth.



$$m \angle A \approx 59.2^\circ$$

6. A tree growing on a hillside casts a 102 foot shadow straight down the hill. Find the vertical height of the tree if, relative to the horizontal, the hill slopes  $15^\circ$  and the angle of elevation of the sun is  $62^\circ$



$$h \approx 166.7 \text{ ft}$$

7. An obelisk stands on a mountain that has a slope of  $19^\circ$  from the horizontal. From a point 1400 feet down the mountain the angle of elevation to the top of the obelisk is  $36^\circ$ . How tall is the obelisk?

$$h \approx 499 \text{ ft}$$

Level 4

8. How many triangles exist if:  $a = 42.2$ ,  $b = 37$  and  $A = 112^\circ$ ?

Obtuse  $a > b$  one triangle

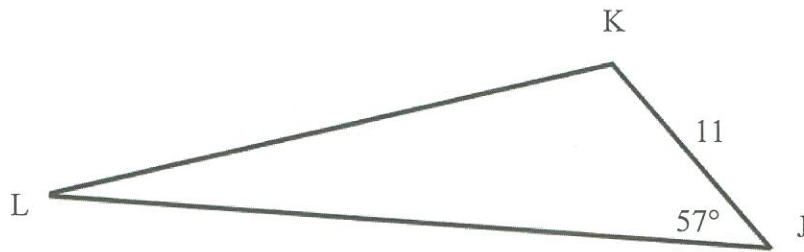
9. How many triangles exist if:  $b = 9.3$ ,  $c = 41$  and  $B = 18^\circ$ ?

$h = 12.67$   $b < h$  no  $\triangle$

10. How many triangles exist if:  $a = 95$ ,  $c = 125$  and  $A = 49^\circ$ ?

$h = 94.3$   $h < a < c$  2 triangles

11. For the given triangle JKL, determine a value for KL that would create the given number of triangles. Explain your reasoning for parts a through c below



- a. One Triangle  $f > 9.23$
- b. Two Triangles  $9.23 < f < 11$
- c. No Triangles  $f < 9.23$

Explanation

$$h = 9.23$$