

GO COUGARS!

p 436 **Homework Questions**

In Exercises 1-18, use the Law of Sines to solve the triangle. Round your answers to two decimal places.

5. $A = 30^\circ$, $a = 8$, $b = 5$
 6. $A = 67^\circ$, $a = 9$, $c = 10$
 11. $B = 17^\circ 30'$, $a = 4.5$, $b = 6.8$
 15. $A = 110^\circ 15'$, $a = 48$, $b = 16$

In Exercises 19-24, use the Law of Sines to solve (if possible) the triangle. If two solutions exist, find both. Round your answers to two decimal places.

23. $A = 87^\circ$, $a = 15.6$, $b = 22.0$

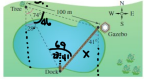
In Exercises 25-28, find values for b such that the triangle has (a) one solution, (b) two solutions, and (c) no solution.

25. $A = 50^\circ$, $a = 2$
 26. $A = 67^\circ$, $a = 10$
 27. $A = 87^\circ$, $a = 108.8$
 28. $A = 88^\circ$, $a = 315.6$

In Exercises 29-34, find the area of the triangle having the indicated angle and sides.


31. $A = 47^\circ 45'$, $b = 57$, $c = 85$

Bridge Designer A bridge is to be built across a small lake from a point on a bank to a point in the lake. The bearing from the point on the bank to the point in the lake is $S 44^\circ W$. From a point 100 meters from the point on the bank in the same direction the bearing to the point in the lake is $70^\circ E$ and $S 29^\circ E$, respectively. Find the distance from the point on the bank.



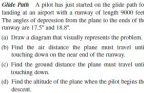
Waterfall Park Design The circular arc of a railroad curve has a chord of length 3000 feet and a central angle of 67° .

(a) Draw a diagram that visually represents the problem. Show the known quantities on the diagram and use the variables r and s to represent the radius of the arc and the length of the arc, respectively.
 (b) Find the radius r of the circular arc.
 (c) Find the length s of the circular arc.

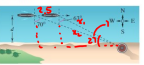


Glider Path A glider has just started on the glide path for landing at an airport with a runway of length 1800 feet. The angles of depression from the glider to the ends of the runway are 17° and 18° .

(a) Draw a diagram that visually represents the problem.
 (b) Find the air distance the plane must travel until reaching down to the end of the runway.
 (c) Find the ground distance the plane must travel until reaching down.
 (d) Find the altitude of the plane when the glider begins the descent.



Distance A boat is sailing due east parallel to the shoreline at a speed of 10 miles per hour. At a given time, the bearing to the lighthouse is $S 50^\circ E$ and 10 minutes later the bearing is $S 70^\circ E$. Use Figure 1. The lighthouse is located at the shoreline. What is the distance from the boat to the shoreline?



Handwritten Notes:

Triangle with side 5, angle 36, height $h = b \sin 36$, $h = 6 \sin 36 \approx 7.5$.
 $\frac{5}{\sin 36} > 6 > 5$, $b \approx \frac{5}{\sin 36}$

Circle with radius r , angle 70 , $\frac{\sin 60}{3000} = \frac{\sin 70}{r}$, $r = \text{radius} \cdot \text{radians} \rightarrow r = 40.76$

Triangle with side 2.5, angle 153, $\frac{\sin 7}{2.5} = \frac{\sin 153}{x_2}$, $x_2 = \frac{2.5 \sin 153}{\sin 7} = 9.31$, $\cos 70 = \frac{d}{9.31}$, $d = 3.19$

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6.2 Law of Cosines

Solving Triangles (SAS, SSS)

Finding Area

Heron's Formula

Mar 20-9:19 AM

6.2.notebook

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

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

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

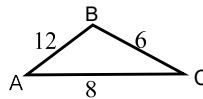
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Example 1

$$A = 26.38 \quad a = 6$$

$$B = 36.34 \quad b = 8$$

$$C = \frac{117.28}{180} \quad c = 12$$



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

$$6^2 = 8^2 + 12^2 - 2(8)(12) \cos A$$

$$\frac{6^2 - 8^2 - 12^2}{-2(8)(12)} = \frac{-2(8)(12) \cos A}{-2(8)(12)} \cos A$$

$$\cos^{-1} \left(\frac{6^2 - 8^2 - 12^2}{-2(8)(12)} \right)$$

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

$$8^2 = 6^2 + 12^2 - 2(6)(12) \cos B$$

$$\cos^{-1} \left(\frac{8^2 - 6^2 - 12^2}{-2(6)(12)} \right) = 36.34$$

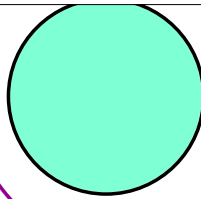
$$c^2 = a^2 + b^2 - 2ab \cos C$$

$$\cos^{-1} \left(\frac{12^2 - 6^2 - 8^2}{-2(6)(8)} \right) = 117.28$$

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6.2.notebook

Example 2 $A = 80^\circ$ $a = 18.26$
 $B =$ $b = 16$
 $C =$ $c = 12$



1) find side a

$$a^2 = 16^2 + 12^2 - 2(16)(12) \cos 80$$

$$a = \sqrt{16^2 + 12^2 - 2(16)(12) \cos 80}$$

Do not round when you use this in the rest of the problem!

2) find angle B using Law of Cosines

$$16^2 = 12^2 + 18.26...^2 - 2(12)(18.26...) \cos B$$

$$B = 59.66$$

3) find angle C using Law of Cosines

$$12^2 = 16^2 + 18.26...^2 - 2(16)(18.26) \cos C$$

$$C = 40.34$$

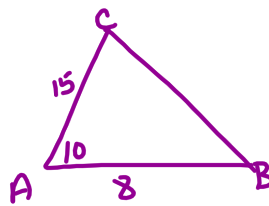
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Example 3

$$A = 10^\circ \quad a = 7.26$$

$$B = 158.96 \quad b = 15$$

$$C = 11.04 \quad c = 8$$



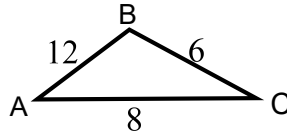
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Area when no angles are given

Method 1: $K = \frac{1}{2}ab \sin C$

From Example #1:

$$\begin{array}{ll} A = 26.38^\circ & a = 6 \\ B = 36.34^\circ & b = 8 \\ C = 117.28^\circ & c = 12 \end{array}$$



Find one angle of your choice

$$\begin{aligned} K &= \frac{1}{2}(12)(8) \sin 26.38 \\ &= 21.33 \text{ units}^2 \end{aligned}$$

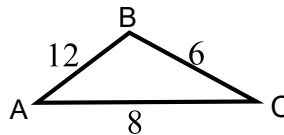
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Method 2: Heron's Formula (no angle needed!)

$$K = \sqrt{s(s-a)(s-b)(s-c)} \quad \text{given} \quad s = \frac{a+b+c}{2}$$

From Example #1:

$$\begin{array}{ll} A = 26.38^\circ & a = 6 \\ B = 36.34^\circ & b = 8 \\ C = 117.28^\circ & c = 12 \end{array}$$



$$s = 13$$

$$\begin{aligned} K &= \sqrt{13(13-6)(13-8)(13-12)} \\ &= 21.33 \end{aligned}$$

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HOMework



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5, 7, 9, 13, 19, 23, 25, 29,
33, 35, 37, 45

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LOS Word Problem Worksheet answers

1. ship to post A = 4.06 miles and ship to shore = 2.47 miles
2. AF = 8.06 miles, BF = 4.82 miles
3. height = 354.4 ft
4. 14,498.01 ft
5. 5.77 and 3.12
6. 108.6 ft
7. 61.7 ft
8. 158.9 ft
9. 108.8 ft
10. 1.64 miles
11. R = 7.76 mm, s = 13.4 mm
12. 39.73 ft

More LOS Practice Worksheet

1. no triangle
2. A = 38.6, B = 105.4, b = 26.2
A = 141.4, B = 2.6, b = 1.2
3. no triangle
4. A = 37.1, C = 60.9, a = 10.4
5. A = 99, a = 28.3, b = 19.1
6. A = 24.6, B = 80.4, a = 20.7
A = 5.4, B = 99.6, a = 4.7

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GO COUGARS!

Homework Questions

- The shaded area in the diagram below is a trapezoid. Find the area of the shaded region. Round your answer to the nearest square centimeter.
- A tree at a garden has been broken by a wind. It is now leaning at an angle of 30 degrees from the vertical. The top of the tree is now 10 feet above the ground. How tall was the tree before it was broken?
- The height of a building is 100 feet. From the top of the building, the angle of depression to the base of a tower is 30 degrees. How tall is the tower?
- A person is standing on a hill. The angle of elevation to the top of a tower is 30 degrees. The person is 100 feet from the base of the tower. How tall is the tower?
- The distance from the top of a mountain to the top of a tower is 100 feet. The angle of elevation from the top of the mountain to the top of the tower is 30 degrees. How tall is the tower?
- A tree is 100 feet tall. The angle of elevation from the ground to the top of the tree is 30 degrees. How far is the tree from the observer?
- A person is standing on a hill. The angle of elevation to the top of a tower is 30 degrees. The person is 100 feet from the base of the tower. How tall is the tower?
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- A person is standing on a hill. The angle of elevation to the top of a tower is 30 degrees. The person is 100 feet from the base of the tower. How tall is the tower?

How tall is the tower? (The triangles can be formed using their sides. If a triangle can be formed, use the sides, angles and/or the area of the triangle.)

- A. 100 ft, 100 ft, 100 ft
- C. 100 ft, 100 ft, 100 ft
- A. 100 ft, 100 ft, 100 ft
- B. 100 ft, 100 ft, 100 ft
- B. 100 ft, 100 ft, 100 ft
- C. 100 ft, 100 ft, 100 ft

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