

## 6.2 Law of Cosines and Area.notebook

### 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

1. The distance from an island to a boat is 10 miles. The distance from the island to a lighthouse is 12 miles. The distance from the boat to the lighthouse is 15 miles. Find the angle between the line of sight from the island to the boat and the line of sight from the island to the lighthouse.
2. A boat is 10 miles from an island. The distance from the island to a lighthouse is 12 miles. The distance from the boat to the lighthouse is 15 miles. Find the angle between the line of sight from the boat to the island and the line of sight from the boat to the lighthouse.
3. The distance from the island to the boat is 10 miles. The distance from the island to the lighthouse is 12 miles. The distance from the boat to the lighthouse is 15 miles. Find the angle between the line of sight from the island to the boat and the line of sight from the island to the lighthouse.
4. A boat is 10 miles from an island. The distance from the island to a lighthouse is 12 miles. The distance from the boat to the lighthouse is 15 miles. Find the angle between the line of sight from the boat to the island and the line of sight from the boat to the lighthouse.
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10. The distance from the island to the boat is 10 miles. The distance from the island to the lighthouse is 12 miles. The distance from the boat to the lighthouse is 15 miles. Find the angle between the line of sight from the island to the boat and the line of sight from the island to the lighthouse.

Use the Triangle. These triangles can be formed from each of the triangles in the diagram. Find the value of the angle  $\theta$ .

1.  $\theta = 30^\circ$ ,  $a = 12$ ,  $b = 15$
2.  $\theta = 30^\circ$ ,  $a = 12$ ,  $b = 15$
3.  $\theta = 30^\circ$ ,  $a = 12$ ,  $b = 15$
4.  $\theta = 30^\circ$ ,  $a = 12$ ,  $b = 15$
5.  $\theta = 30^\circ$ ,  $a = 12$ ,  $b = 15$
6.  $\theta = 30^\circ$ ,  $a = 12$ ,  $b = 15$

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## 6.2 Law of Cosines and Area.notebook

### 6.2 Law of Cosines

Solving Triangles

Finding Area

Heron's Formula

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

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

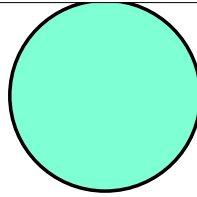
$$\underline{c^2} = \underline{a^2} + \underline{b^2} - \underline{2ab \cos C}$$

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## 6.2 Law of Cosines and Area.notebook

Example 1  $A = 44.49$   $a = 19$   
 $B = 62^\circ$   $b = 23.94$   
 $C = 73.52$   $c = 26$

SAS



1) find side b 186.41

$$b^2 = 19^2 + 26^2 - 2(19)(26)\cos 62$$

$$b = \sqrt{19^2 + 26^2 - 2(19)(26)\cos 62}$$

$$b = 23.94$$

2) find angle A using Law of Cosines

$$19^2 = 26^2 + 23.94^2 - 2(26)(23.94)\cos A$$

coefficient of  $\cos A$   
divide by coefficient

$$\cos^{-1}\left(\frac{19^2 - 26^2 - 23.94^2}{2(26)(23.94)}\right) = \cos A$$

$$44.49 = A$$

3) find angle C

$$26^2 = 19^2 + 23.94^2 - 2(19)(23.94)\cos C$$

$$\frac{26^2 - 19^2 - 23.94^2}{-2(19)(23.94)} = \cos C$$

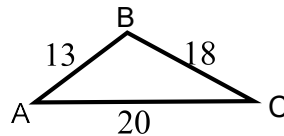
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Example 2 SSS

$$A = 61.89 \quad a = 18$$

$$B = 78.54 \quad b = 20$$

$$C = 39.57 \quad c = 13$$



$$A: \frac{18^2 - 20^2 - 13^2}{-2(20)(13)} = \cos A$$

$$B: \frac{20^2 - 18^2 - 13^2}{-2(20)(13)} = \cos B$$

$$C: \frac{13^2 - 20^2 - 18^2}{-2(20)(18)} = \cos C$$

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### Example 3

$$\begin{array}{ll} A = 10^\circ & a = \\ B = & b = 15 \\ C = & c = 8 \end{array}$$

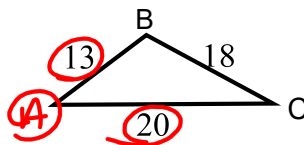
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### Area when no angles are given

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

From Example #2:

$$\begin{array}{ll} A = 61.9^\circ & a = 18 \\ B = 78.5^\circ & b = 20 \\ C = 39.6^\circ & c = 13 \end{array}$$



1. Find one angle using LOC
2. use  $K = \frac{1}{2}ab \sin C$  with SAS

$$\begin{aligned} K &= \frac{1}{2}(20)(13) \sin 61.9 \\ &= 114.67 \text{ units}^2 \end{aligned}$$

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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 #2:

$$a = 18$$

$$b = 20$$

$$c = 13$$

$$s = \frac{18+20+13}{2}$$

$$s = 25.5$$

$$K = \sqrt{25.5(25.5-18)(25.5-20)(25.5-13)}$$
$$= 114.67 \text{ units}^2$$

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## HOMework



p421

3, 7, 9, 11, 23, 39-45 odd

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