

# 6.1 Law of Cosines

We're taking notes today!! You need a calculator!!! Turn in the MAZE page from Friday WITH WORK (no work, no credit, no kidding)

## Warm-Up Monday

1.

$$\tan \theta = \frac{O}{A}$$

$$3 \cdot \tan 42^\circ = \frac{x}{3} \cdot 3$$

$$x = 2.7$$

Find the indicated side or angle.

2.

$$\sin \theta = \frac{O}{H}$$

$$\sin \theta = \frac{5}{7.2}$$

$$\theta = \sin^{-1} \left( \frac{5}{7.2} \right)$$

$$44^\circ$$

## About Me

1. If you made a new year's resolution, what was it?
2. What new year's resolution in the past did you stick with the longest?

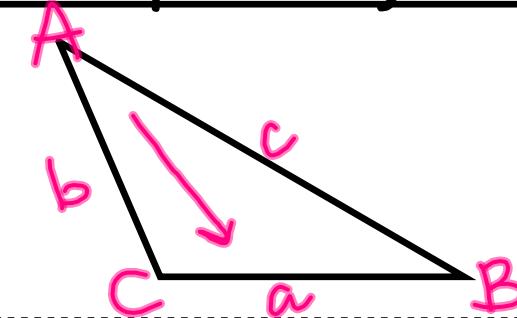
# 6.1 Law of Cosines

EQ: How does the law of cosines help me solve oblique triangles?

~~Oblique Triangle:~~

non-right  $\triangle$   
(no  $90^\circ$ )

capital  $\Rightarrow$  angles  
lowercase  $\Rightarrow$  sides  
letters



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

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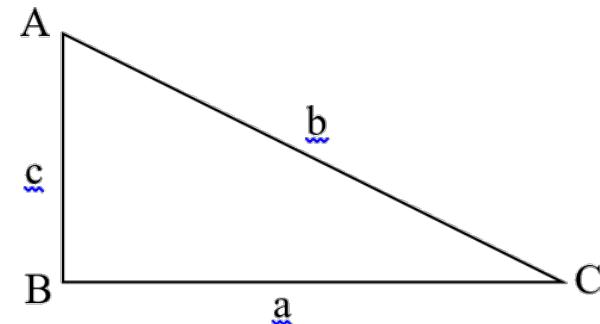
## Law of Cosines

In  $\triangle ABC$ ,

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

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

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

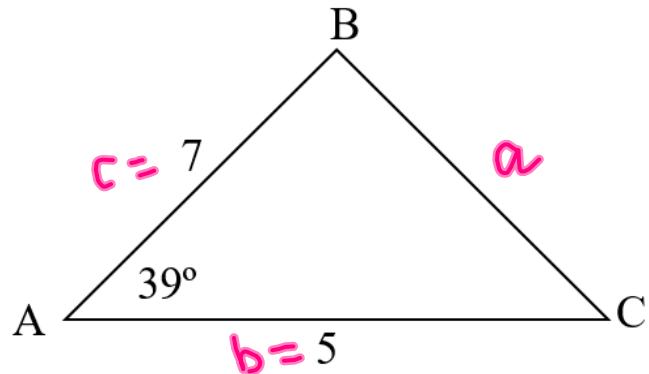


Note: What happens in the first equation if angle A is a right angle?

# 6.1 Law of Cosines

EQ: How does the law of cosines help me solve oblique triangles?

Example 1 - Find a.



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

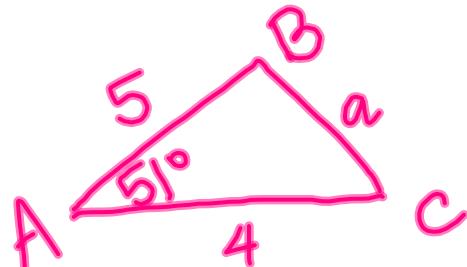
$$a^2 = 5^2 + 7^2 - 2(5)(7) \cos 39^\circ$$
$$\sqrt{a^2} = \sqrt{9.6}$$

$$a = 4.43$$

# 6.1 Law of Cosines

**EQ:** How does the law of cosines help me solve oblique triangles?

**Example 2** - In  $\triangle ABC$ ,  $b = 4$ ,  $c = 5$ ,  $m\angle A = 51^\circ$ . Find the side opposite the given angle.



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

$$a^2 = 4^2 + 5^2 - 2(4)(5) \cos 51^\circ$$

```

NORMAL FLOAT AUTO REAL DEGREE MP
5^2+7^2-2*5*7cos(39)
..... 43.98296313
..... 19.5997827
..... √19.5997827
..... 4.427164183
..... √4^2+5^2-2*4*5cos(51)
..... 3.978339397.

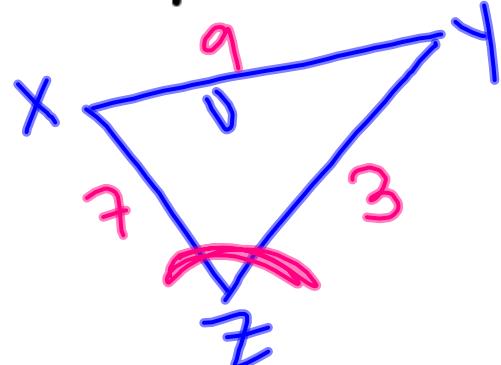
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$$a = 3.98$$

# 6.1 Law of Cosines

**EQ:** How does the law of cosines help me solve oblique triangles?

**Example 3** - In  $\triangle XYZ$ ,  $x=3$ ,  $y=7$ ,  $z=9$ . Find  $m\angle Z$ .



$$9^2 = 7^2 + 3^2 - 2(7)(3) \cos Z$$

$$\begin{array}{r} 81 \\ = 49 + 9 - 42 \cos Z \\ - 58 \quad - 58 \\ \hline 23 = - 42 \cos Z \end{array}$$

$$\frac{23}{-42} = \frac{-42 \cos Z}{-42}$$

$$-\frac{23}{42} = \cos Z$$

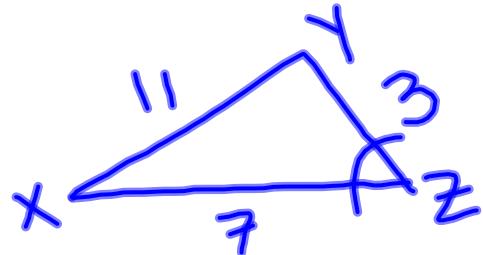
$$\cos^{-1}\left(-\frac{23}{42}\right) = Z$$

$$123^\circ$$

# 6.1 Law of Cosines

EQ: How does the law of cosines help me solve oblique triangles?

**Example 4-** In  $\triangle XYZ$ ,  $x=3$ ,  $y=7$ ,  $z=11$ . Find  $m\angle Z$ .



$$\begin{aligned}11^2 &= 3^2 + 7^2 - 2(3)(7)\cos Z \\-1.5 &= \cos Z\end{aligned}$$

NO SOLUTION

# 6.1 Law of Cosines

**EQ:** How does the law of cosines help me solve oblique triangles?

**Example 5 -** Solve the given triangle.

$$m\angle P = 83^\circ, r = 43, q = 51$$

# 6.1 Law of Cosines

**EQ:** How does the law of cosines help me solve oblique triangles?

~~CLOSING:~~

ON CLASSROOM

3rd - 587uey0

6th - p7b9rv

PreCalculus Unit 6 Law of Sines and Cosines  
**6.1 Law of Cosines**

Name \_\_\_\_\_

Solve for the length of the missing side of each triangle. Round your answer to the nearest tenth.

1.  $m\angle = 113^\circ$ ,  $a = 13$ ,  $b = 23$

2.  $m\angle A = 32^\circ$ ,  $b = 23$ ,  $c = 47$

Solve each triangle for the specified angle measure. Round your answer to the nearest degree.

3.  $a = 11$ ,  $b = 14$ ,  $c = 17$ ;  $m\angle A$

4.  $a = 17$ ,  $b = 17$ ,  $c = 24$ ;  $m\angle C$

Solve each  $\triangle PQR$ . Round lengths to the nearest tenth, and angles to the nearest degree.

5.  $m\angle P = 83^\circ$ ,  $r = 43$ ,  $q = 51$

6.  $p = 200$ ,  $q = 410$ ,  $r = 280$