



# Math Virtual Learning

## Precalculus

### Determining if Measurements Form a Triangle

April 10, 2020



## Precalculus

Lesson: April 10th, 2020

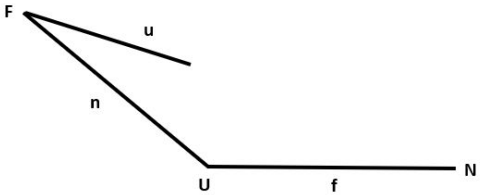
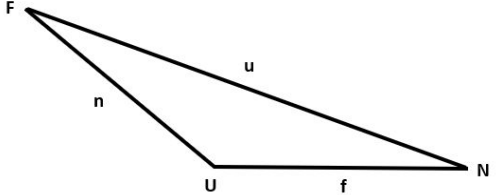
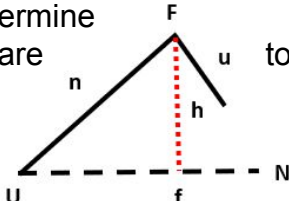
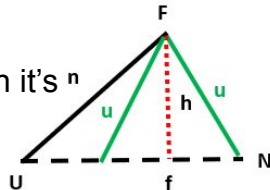
### **Objective/Learning Target:**

Students will determine if the given information creates 1 triangle, 2 possible triangles (ambiguous case), or no triangle.

## Let's Get Started:

Watch Video - [Determining if a Triangle Exists](#)

# Number of Triangles

	Not a Triangle	Is a Triangle
Obtuse	<p>The side across from the obtuse angle is shorter than another side.</p>  <p>A diagram showing an obtuse triangle with vertices F (top), U (bottom left), and N (bottom right). Side n is between F and U, side u is between F and a point on the extension of side UN, and side f is between U and N. The angle at F is obtuse. Side u is shorter than side n.</p>	<p>The side across from the obtuse angle is longer than the other given side.</p>  <p>A diagram showing an obtuse triangle with vertices F (top), U (bottom left), and N (bottom right). Side n is between F and U, side u is between F and N, and side f is between U and N. The angle at F is obtuse. Side u is longer than side n.</p>
Acute	<p>The side across from the acute angle is shorter than the height.</p> <p>Note: You need to determine the height then compare the side across from your angle.</p>  <p>A diagram showing an acute triangle with vertices F (top), U (bottom left), and N (bottom right). Side n is between F and U, side u is between F and a point on the extension of side UN, and side f is between U and N. A dashed red line represents the height h from F to the line UN. Side u is shorter than the height h.</p>	<p>The side across from the acute angle is longer than the height, but shorter than side n results in the ambiguous case (2 possible triangles).</p> <p>If its longer than n, then it's still a triangle and it's unique.</p>  <p>A diagram showing an acute triangle with vertices F (top), U (bottom left), and N (bottom right). Side n is between F and U, side u is between F and a point on the extension of side UN, and side f is between U and N. A dashed red line represents the height h from F to the line UN. Side u is longer than the height h but shorter than side n. Two possible triangles are shown: one with side u in green and one with side u in black.</p>

## Practice

Now practice determining if a triangle exists with the given information. If so, how many triangles can be created?

Hint: Draw and label the given information first.

1)  $m\angle A = 110^\circ$ ,  $c = 19$  cm,  $a = 32$  cm

2)  $m\angle A = 131^\circ$ ,  $a = 25$  yd,  $c = 8$  yd

3)  $m\angle B = 100^\circ$ ,  $a = 33$  km,  $b = 29$  km

4)  $m\angle B = 61^\circ$ ,  $a = 35$  mi,  $b = 32$  mi

5)  $m\angle A = 68^\circ$ ,  $c = 34$  yd,  $a = 9$  yd

6)  $m\angle A = 57^\circ$ ,  $c = 27$  m,  $a = 25$  m

## Practice Answers

Now practice determining if a triangle exists with the given information. If so, how many triangles can be created?

Hint: Draw and label the given information first.

1)  $m\angle A = 110^\circ$ ,  $c = 19$  cm,  $a = 32$  cm

One triangle  $a > c$

A is obtuse and the side across from the obtuse angle (a) is longer than side (c).

2)  $m\angle A = 131^\circ$ ,  $a = 25$  yd,  $c = 8$  yd

One triangle  $a > c$

A is obtuse and the side across from the obtuse angle (a) is longer than side (c).

3)  $m\angle B = 100^\circ$ ,  $a = 33$  km,  $b = 29$  km

None  $b > a$

B is obtuse and the side across from the obtuse angle (b) is shorter than side (a).

4)  $m\angle B = 61^\circ$ ,  $a = 35$  mi,  $b = 32$  mi

Two triangles  $a > b > h$

B is acute and the side across from the acute angle (b) is longer than the height (h) and shorter than the given side (a).

$$\begin{aligned}h/35 &= \sin(61) \\h &= 35 \sin(61) \\h &= 30.61\end{aligned}$$

5)  $m\angle A = 68^\circ$ ,  $c = 34$  yd,  $a = 9$  yd

None  $a < h$

A is acute and the side across from the acute angle (a) is shorter than the height (h).

$$\begin{aligned}h/34 &= \sin(68) \\h &= 34 \sin(68) \\h &= 31.52\end{aligned}$$

6)  $m\angle A = 57^\circ$ ,  $c = 27$  m,  $a = 25$  m

Two triangles  $c > a > h$

A is acute and the side across from the acute angle (A) is longer than the height (h) and shorter than the given side (c).

$$\begin{aligned}h/27 &= \sin(57) \\h &= 27 \sin(57) \\h &= 22.64\end{aligned}$$

## Additional Resources:

Click on the links below to get additional helpful videos as well as additional practice to check your understanding.

### Additional Practice & Answer Key

[Ambiguous Triangles](#)

[Possible Triangles With Side-Side-Angle](#)

### Helpful Videos

[Determine if ambiguous case is 1 or 2 or no triangle](#)

[How to determine when you have two solutions for an oblique triangle](#)

Helpful Website to Check Your Answers of Practice Problems

[Online Triangle Calculator](#)