Math Virtual Learning

Precalculus
Determining if Measurements Form a Triangle
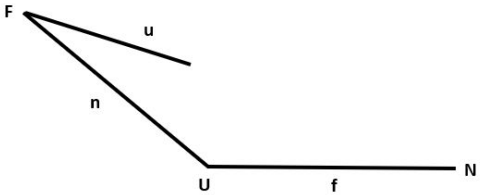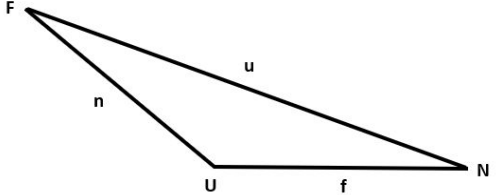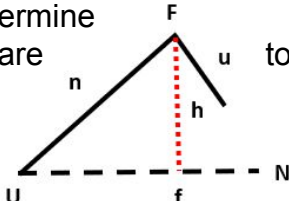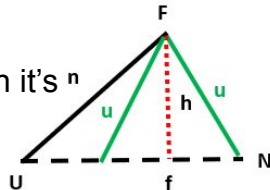
April 10, 2020

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	The side across from the obtuse angle is shorter than another side.	The side across from the obtuse angle is the longer than the other given side.
Acute	The side across from the acute angle is shorter than the height. Note: You need to determine the height then compare the side across from your angle.	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). If its longer than n, then it's still a triangle and it's unique.

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) $m\angle A = 110°$, $c = 19$ cm, $a = 32$ cm

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

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

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

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

6) $m\angle A = 57°$, $c = 27$ 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) $m\angle A = 110°, c = 19$ cm, $a = 32$ cm

One triangle   **a > c**

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

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

One triangle   **a > c**

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

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

None   **b > a**

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

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

Two triangles   **a > b > h**

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

h/35 = sin(61)
h = 35 sin(61)
h = 30.61

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

None   **a < h**

h/34 = sin(68)
h = 34 sin(68)
h = 31.52

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

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

Two triangles   **c > a > h**

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

h/27 = sin(57)
h = 27 sin(57)
h = 22.64

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](#)