What's Going On?

Checking In

Minds on The Sine Law

Action! Bird Watching

Consolidation A Few Examples

Learning Goal - I will be able to use The Sine Law to solve problems and I will understand 'The Ambiguous Case'

L.G.L.

Prove the identity below.

$$\frac{\sin^2 \phi}{1 - \cos \phi} = 1 + \cos \phi$$

L.S.

$$\frac{\sin^2\theta}{1-\cos\theta}$$

$$= \frac{1-\cos^2\theta}{1-\cos\theta}$$ by Pythagorean Identity

$$= \frac{(1+\cos\theta)\cancel{(1-\cos\theta)}}{\cancel{1-\cos\theta}}$$

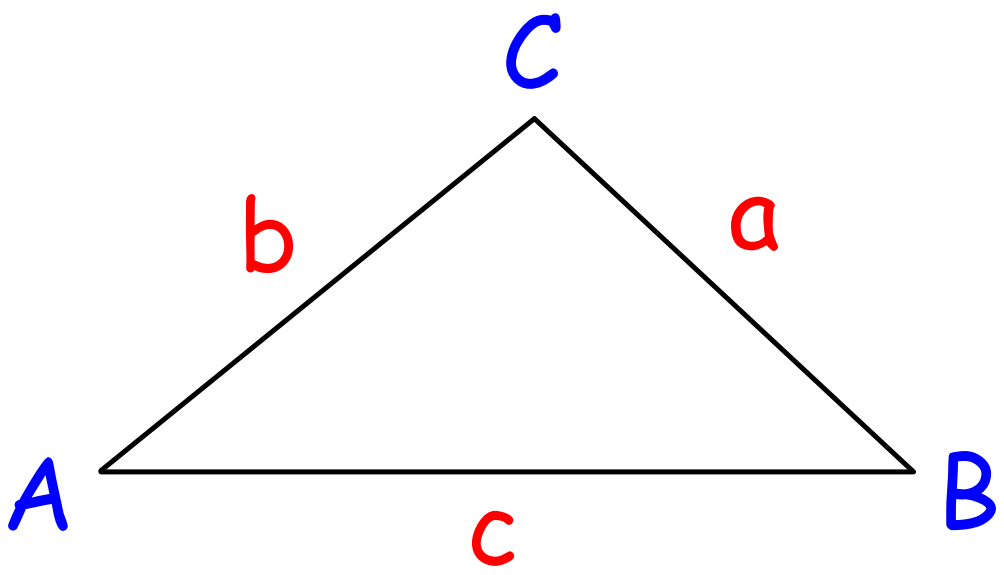
$$= 1+\cos\theta$$

R.S.

$$1+\cos\theta$$

Minds on

The Sine Law



$$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$

$$\frac{\sin A}{a} = \frac{\sin B}{b} = \frac{\sin C}{c}$$

Minds on

The Sine Law

Used for NON-right triangles when we know

- two sides and an angle
- two angles and a side

***You must have one complete ratio.**

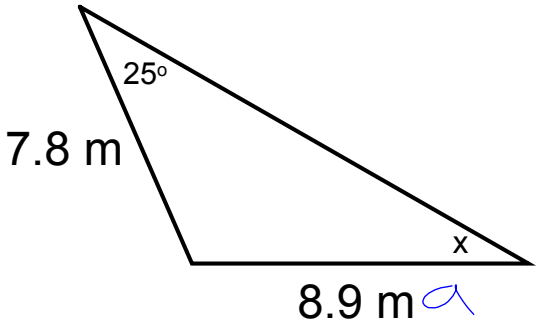
$$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$

$$\frac{\sin A}{a} = \frac{\sin B}{b} = \frac{\sin C}{c}$$

Minds on

The Sine Law

Determine the measure of angle x.



$$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$

$$\frac{8.9}{\sin 25^\circ} = \frac{7.8}{\sin X}$$

$$7.8 \cdot \frac{\sin 25}{8.9} = \frac{\sin X}{7.8} \times 7.8$$

$$\sin X = \frac{7.8 \times \sin 25}{8.9}$$

$$X = \sin^{-1}\left(\frac{7.8 \times \sin 25}{8.9}\right)$$

$$\sin X = 0.3704$$

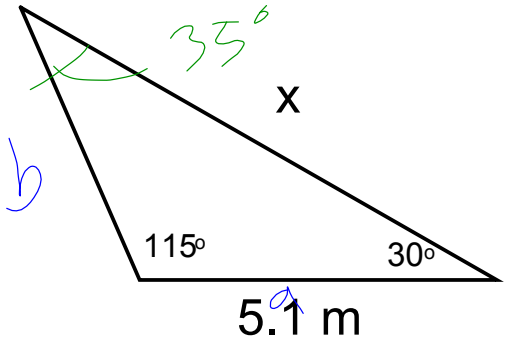
$$X = \sin^{-1}(0.3704)$$

$$X = 22^\circ$$

Minds on

The Sine Law

Determine the measure of side x.



$$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$

$$\frac{5.1}{\sin 35} = \frac{b}{\sin 30} = \frac{x}{\sin 115}$$

$$\frac{x}{\sin 115} = \frac{5.1}{\sin 35}$$

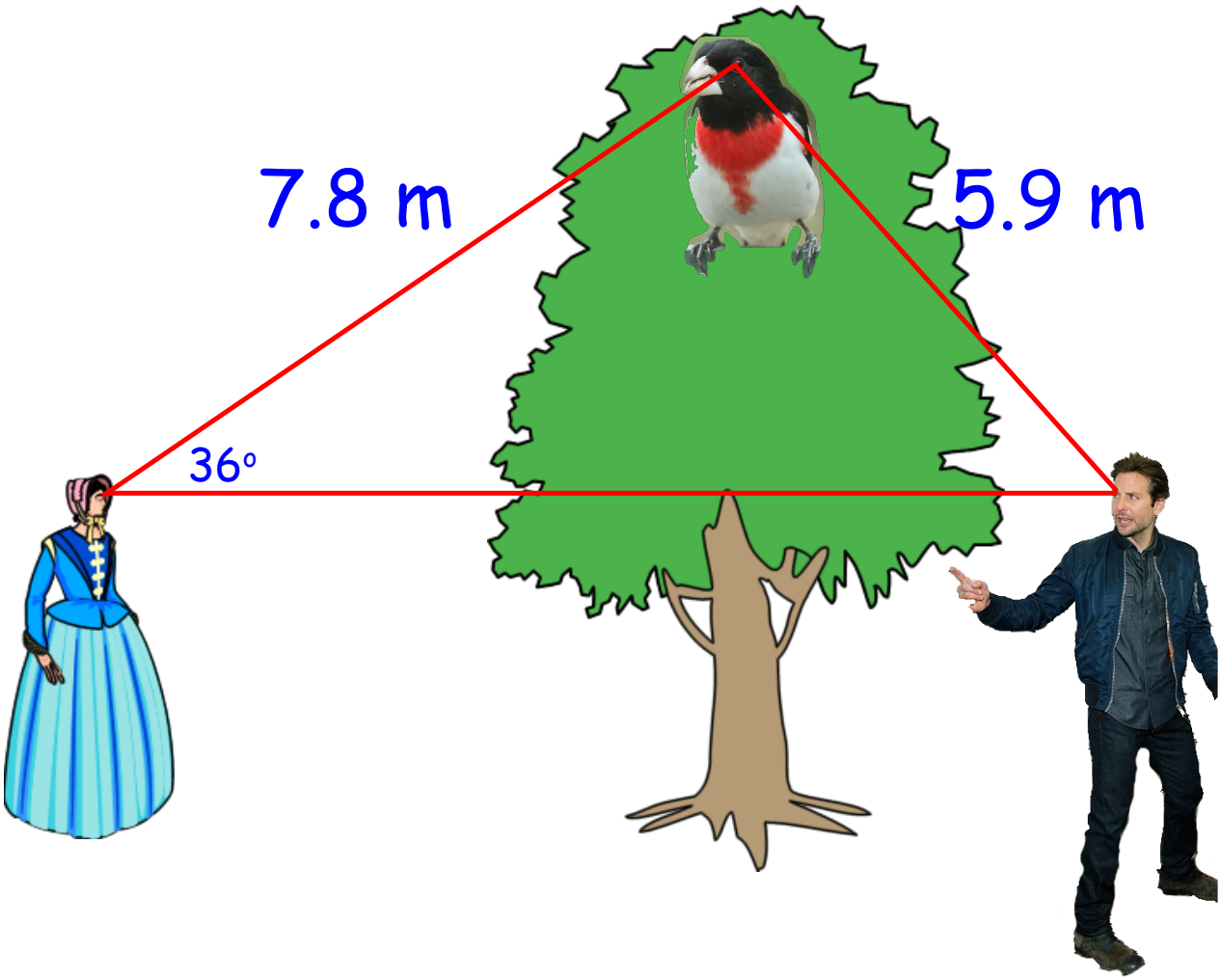
$$x = 6.1 \text{ m}$$

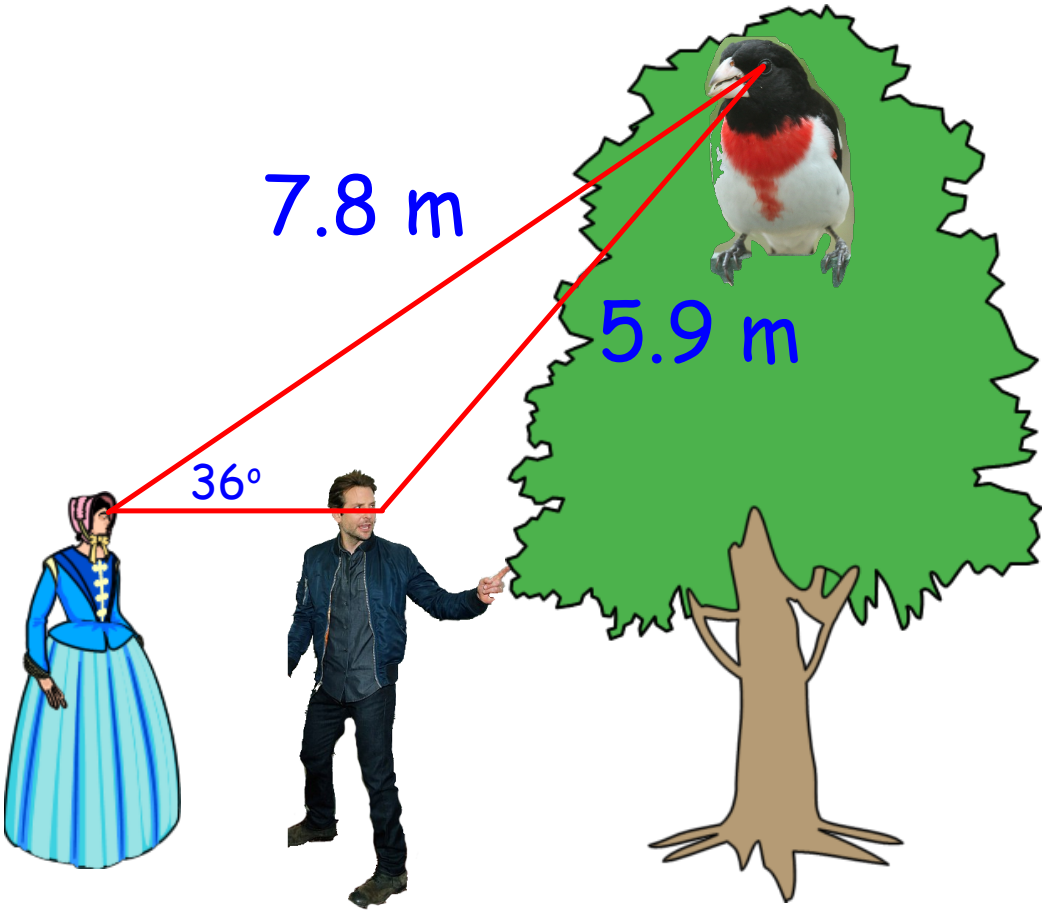
Action!

Bird Watching

Miss. Humphries and Mr. Gilbert have spotted a Rose-breasted Grosbeak up in a tree.

The distance from Miss. Humphries to the bird is 7.8 m and the distance from Mr. Gilbert to the bird is 5.9 m. If the angle of elevation from Miss. Humphries to the bird is 36°, what is the distance between Miss. Humphries and Mr. Gilbert?

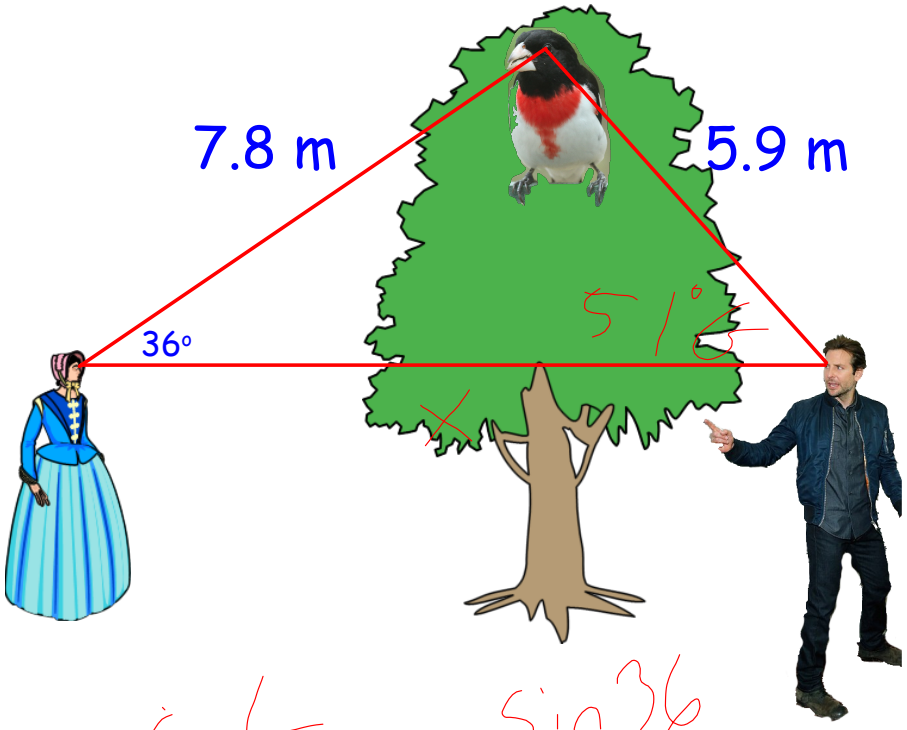

7.8 m
5.9 m
36°


7.8 m
5.9 m
36°

They are

2.6 m / 10.0 m

apart!...?



$$\frac{\sin G}{7.8} = \frac{\sin 36}{5.9}$$

$$G = \sin^{-1}\left(\frac{7.8 \times \sin 36}{5.9}\right)$$

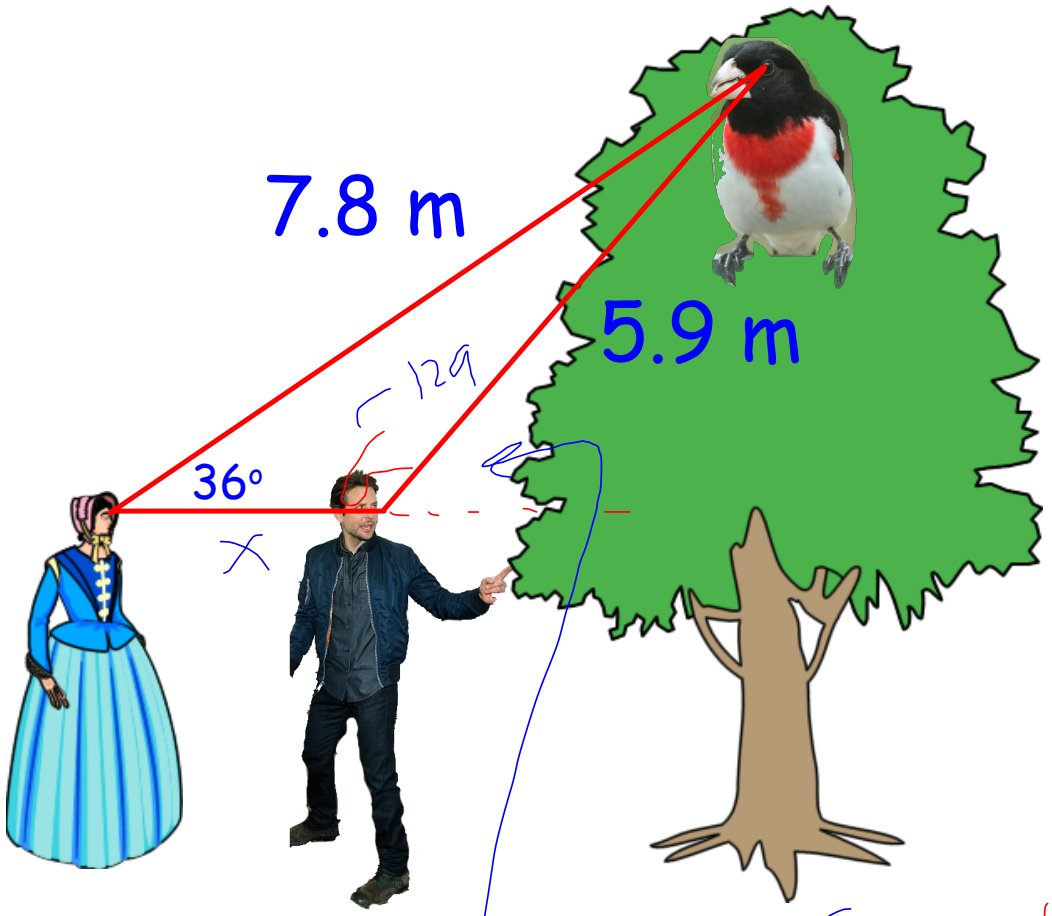
$$G = 51^\circ$$

$$\angle BAC = 180 - 36 - 51$$
$$= 93^\circ$$

$$\frac{x}{\sin 93^\circ} = \frac{5.1}{\sin 36}$$

$$x = \frac{5.1}{\sin 36} \times \sin 93$$

$$x = 10.0\text{m}$$



$$\frac{\sin G}{7.8} = \frac{\sin 36}{5.9}$$

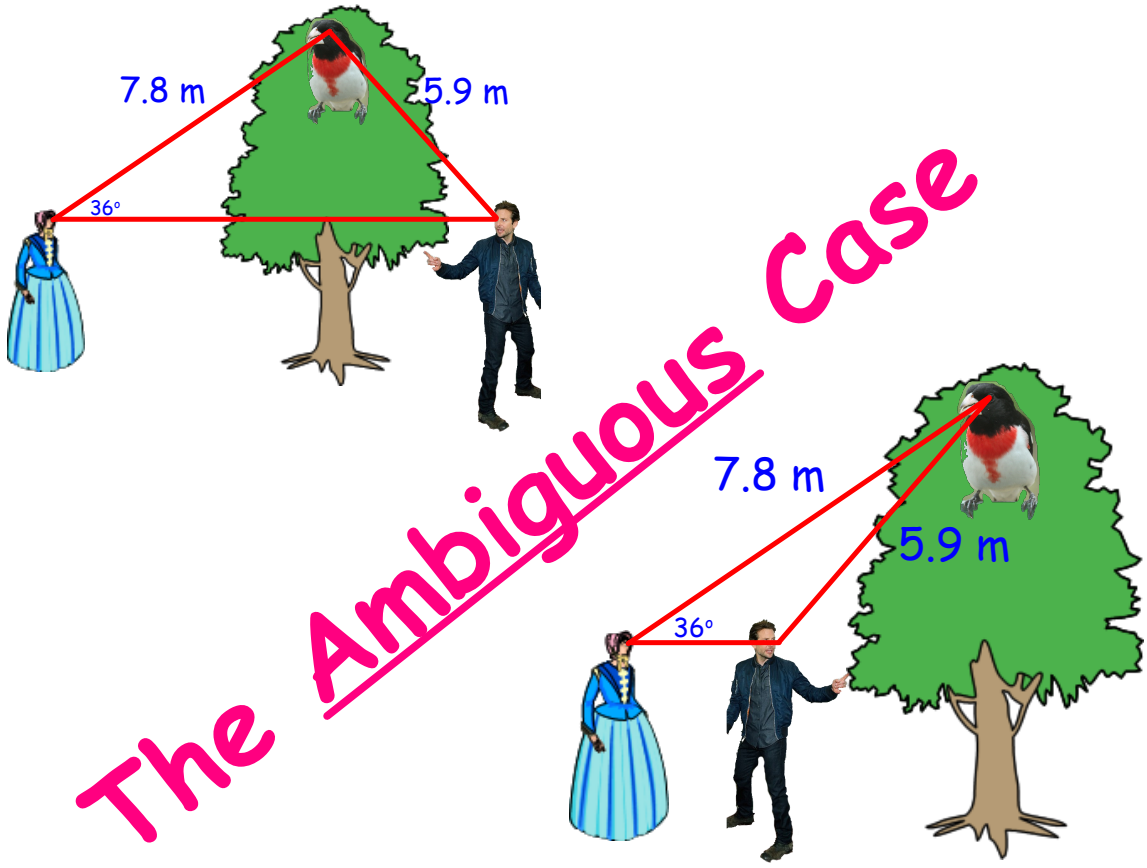
$$G = 51^\circ$$

$$G = 180 - 51$$

$$= 129^\circ$$

$$\frac{x}{\sin 15^\circ} = \frac{5.9}{\sin 36}$$

$$x = 2.6\text{m}$$

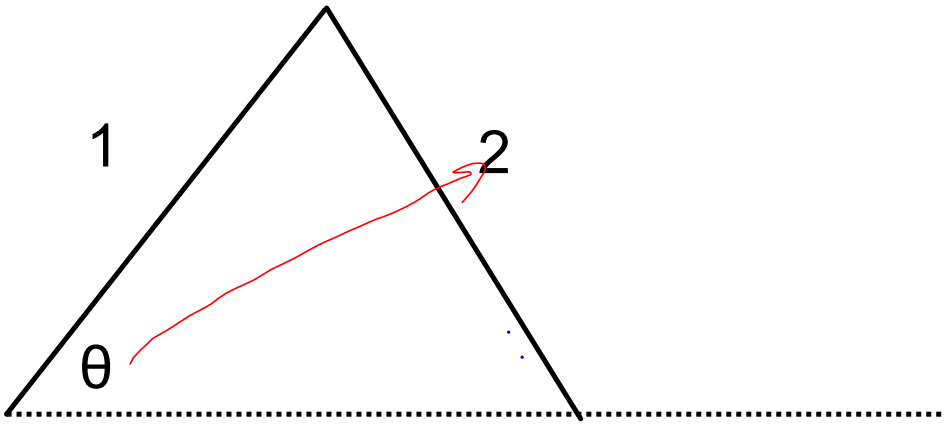


A situation in which 0, 1 or 2 triangles can be drawn given the information in a problem.

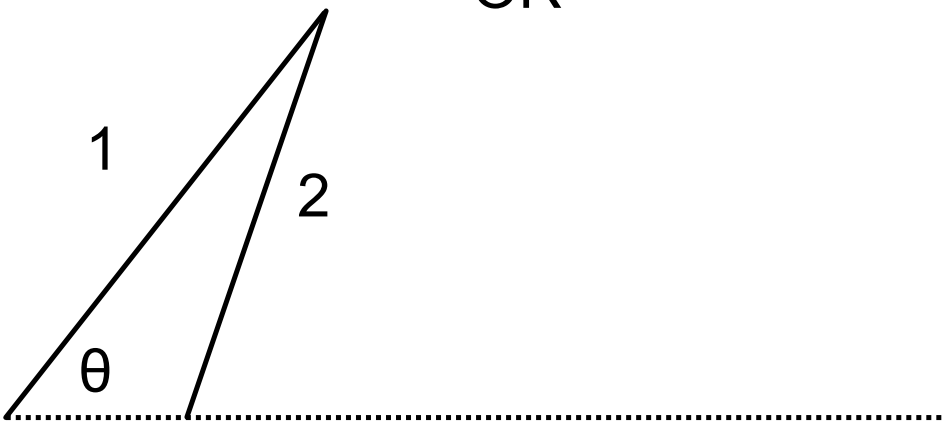
This occurs when you know two side lengths and an angle *opposite* one of the sides.

If the angle is acute, 0, 1 or 2 triangles are possible. If the given angle is obtuse, 0 or 1 triangles are possible.

Acute - 2 Possibilities



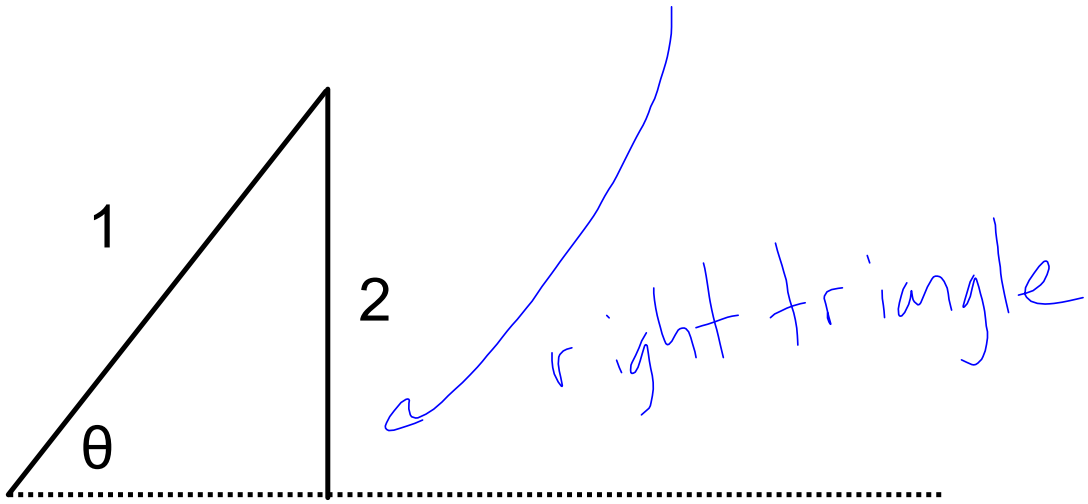
OR



2 is shorter than 1

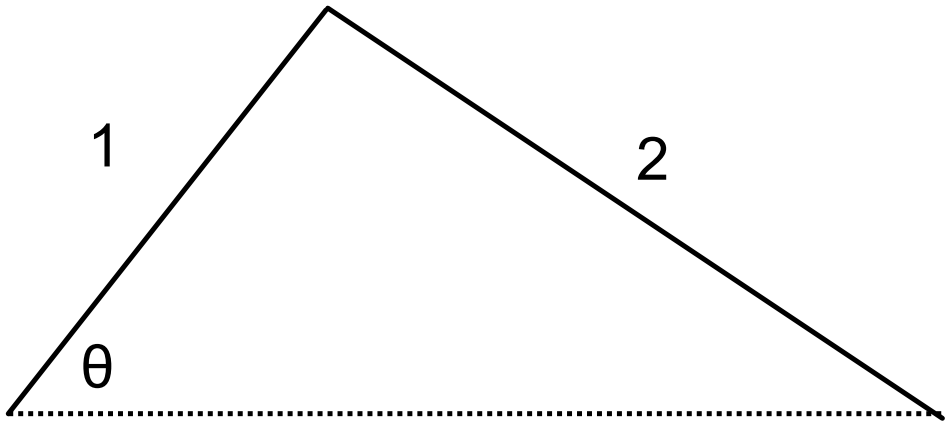
*must be greater than height of triangle

Acute - 1 Possibility



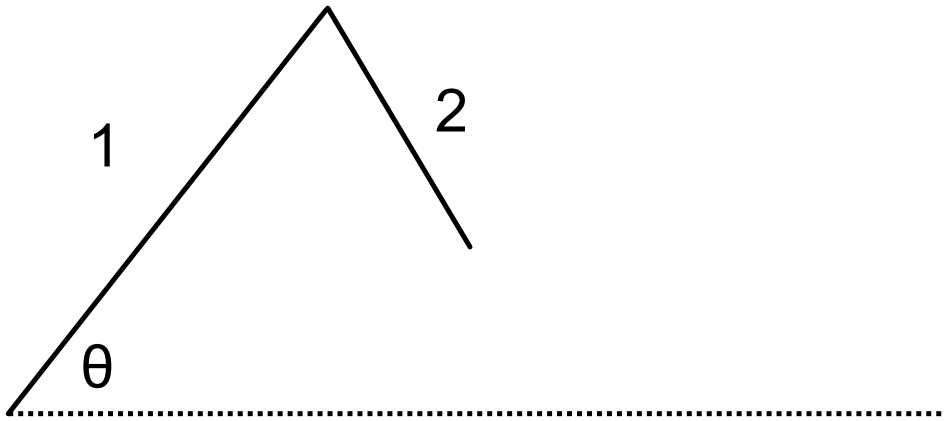
2 is equal to the height

Acute - 1 Possibility



2 is longer than 1

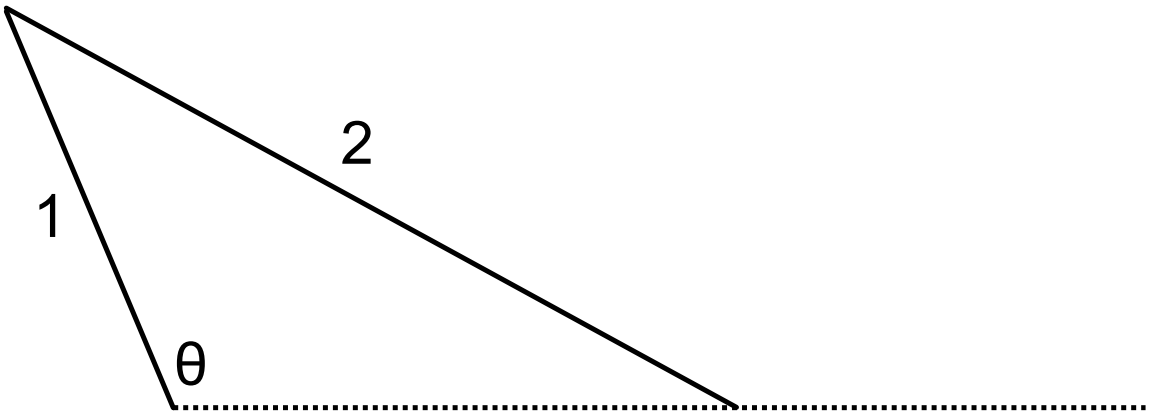
Acute - 0 Possibilities



2 is too short

(less than height of triangle)

Obtuse - 1 Possibility



2 is longer than 1

Obtuse - 0 Possibilities

2 is shorter than 1

or equal to 1

Consolidation

A Few Examples