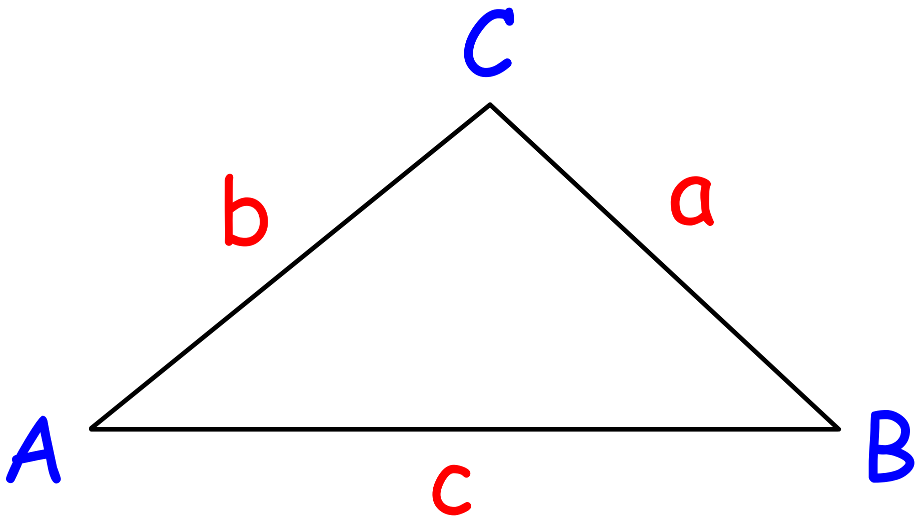
What's Going On?

Checking In	
Minds on	Proving the Sine Law
Action!	Bird Watching
Consolidation	Sketching it Out

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

Minds on

The Sine Law



Solving for a side

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

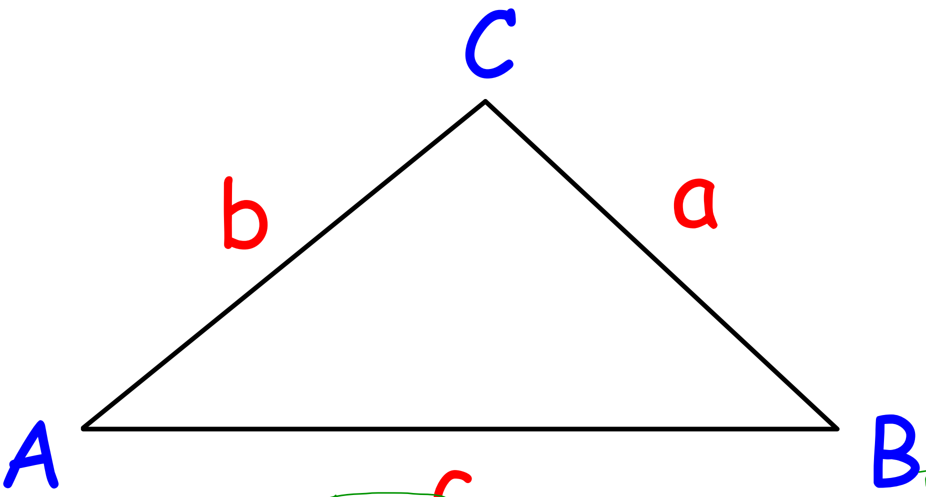
Solving for an angle

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

- Used for non-right angled triangles
- Can be used when we have either
  - Two sides and a corresponding angle to a side
  - Two angles and a corresponding side to an angle

Minds on

Prove It!



$$\sin A = \frac{\boxed{h}}{b} \qquad \sin B = \frac{\boxed{h}}{a}$$

$$h = b \times \sin A \qquad h = a \times \sin B$$

$$\frac{b \times \sin A}{\sin B} = \frac{a \times \cancel{\sin B}}{\cancel{\sin B}}$$

$$\frac{b \times \cancel{\sin A}}{\cancel{\sin A}\ \sin B} = \frac{a}{\sin A}$$

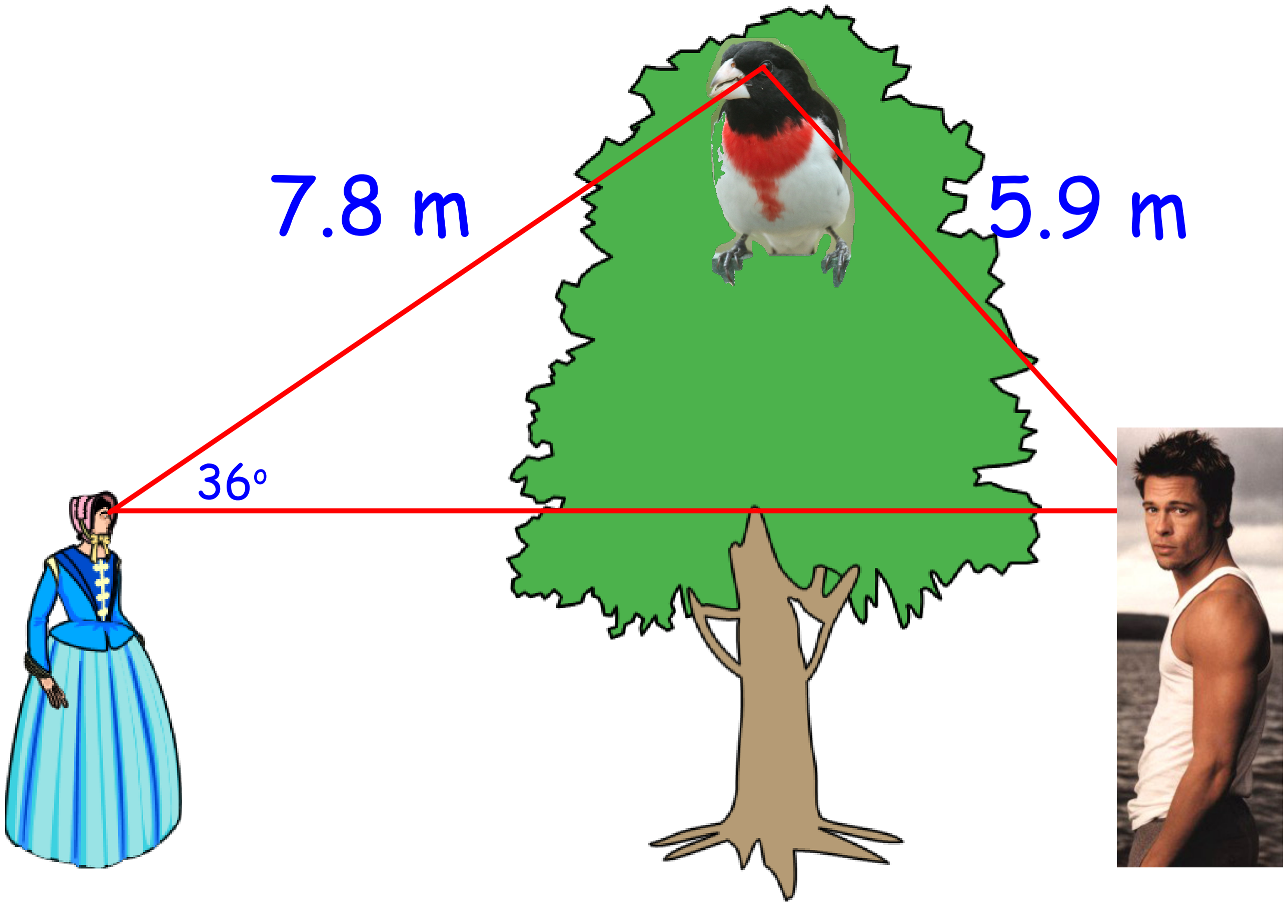
$$\frac{b}{\sin B} = \frac{a}{\sin A}$$

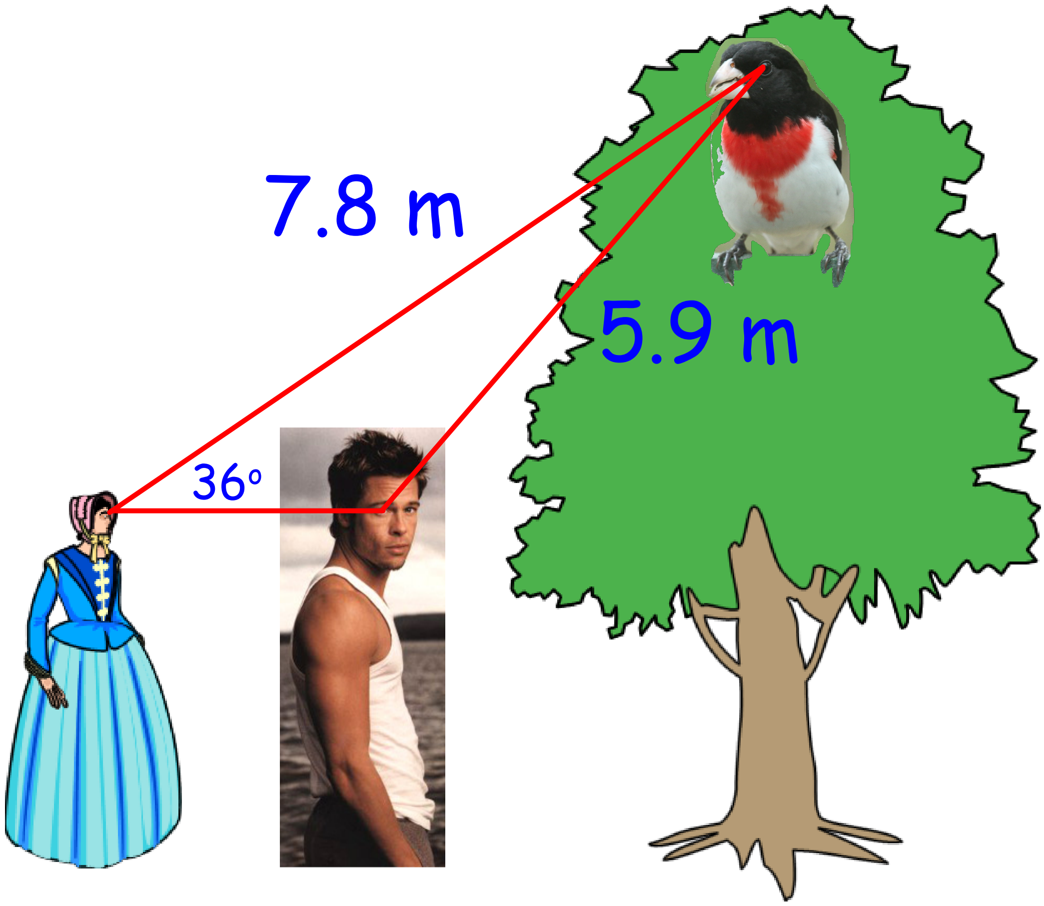
Action!

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?

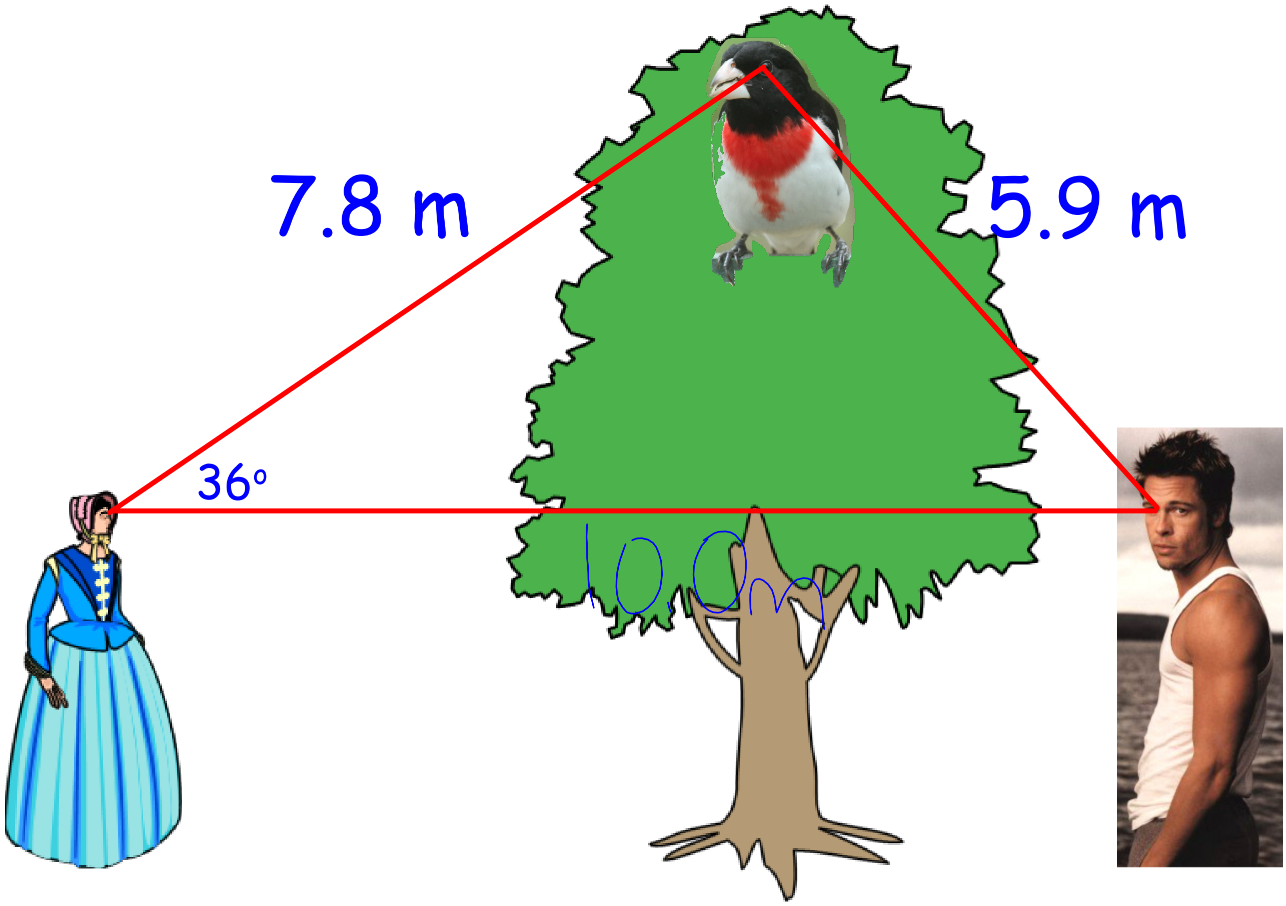

7.8 m
5.9 m
36°

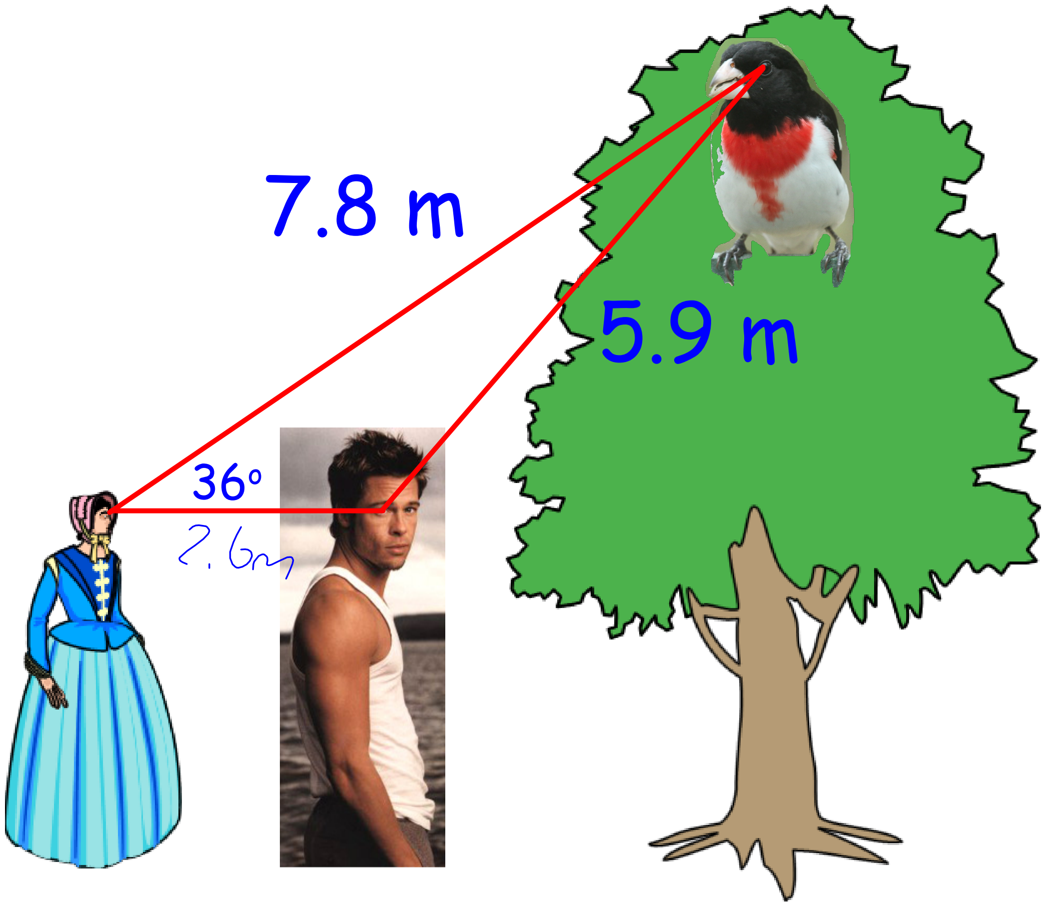

7.8 m
5.9 m
36°

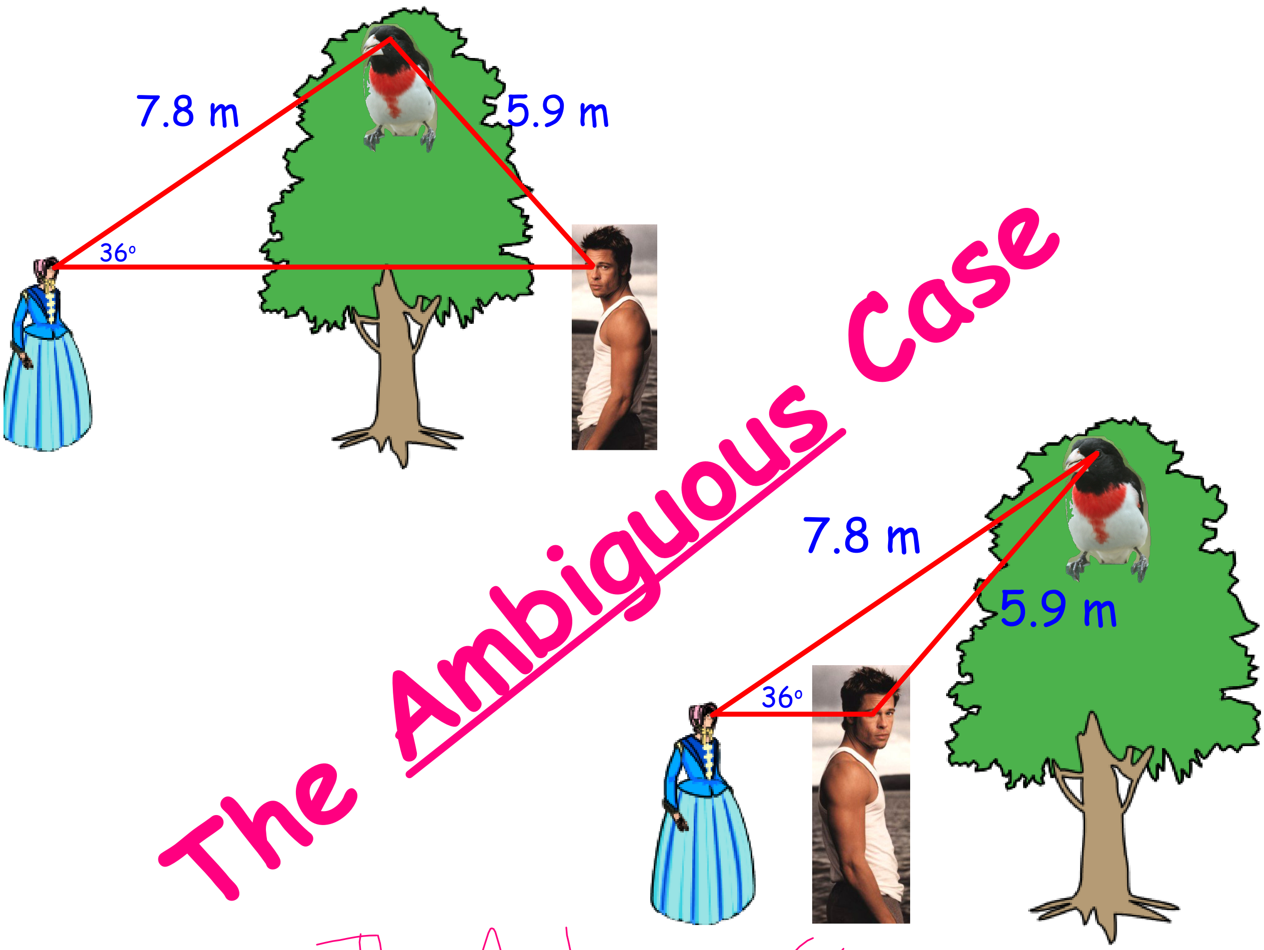
They are

2.6 m / 10.0 m

apart!...?


7.8 m
5.9 m
36°
10.0m


7.8 m
5.9 m
36°
2.6m



The Ambiguous Case

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.

- In the ambiguous case, if $\angle A$, a, and b are given and $\angle A$ is acute, there are four cases to consider. In each case, the height of the triangle is $h = b \sin A$.

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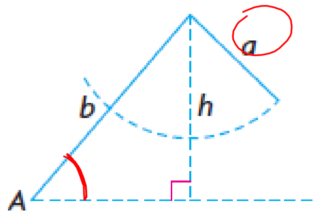
If $\angle A$ is acute and $a < h$, no triangle exists.



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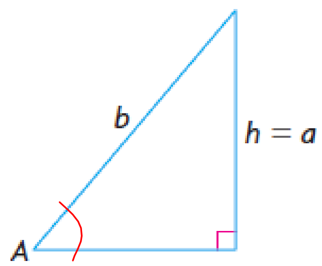
If $\angle A$ is acute and $a = h$, one right triangle exists.



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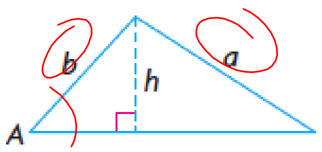
If $\angle A$ is acute and $a > b$, one triangle exists.



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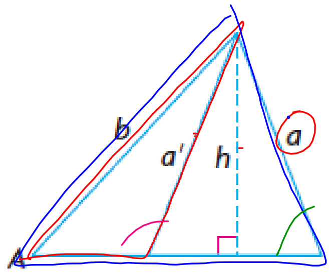
If $\angle A$ is acute and $h < a < b$, two triangles exist.



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If $\angle A$, a, and b are given and $\angle A$ is obtuse, there are two cases to consider.

If $\angle A$ is obtuse and $a < b$ or $a = b$, no triangle exists.	If $\angle A$ is obtuse and $a > b$, one triangle exists.