Sine Law and Ambiguous Case Triangles

Learning Goal: By the end of today, I will be able recognize problem types that have more than one answer using the Sine Law.

Nov 17-5:57 PM

Sine Law

- used when there are NO, 90 degree angles
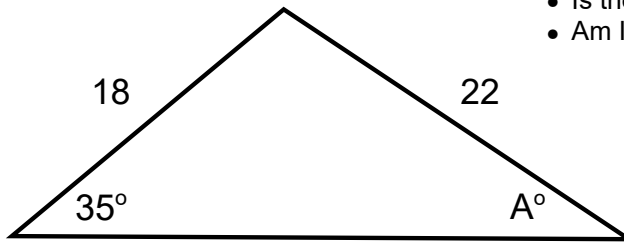- used when we have an "opposite side - angle" pair or a completed ratio

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

or

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

Nov 10-3:35 PM
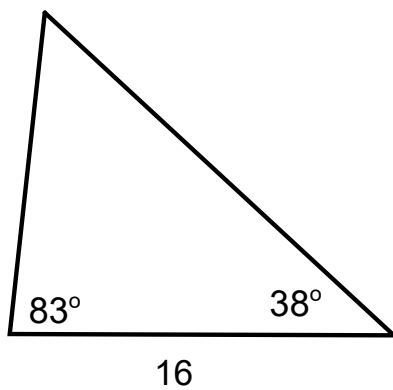
Find the missing value in the triangle below:

Checklist
- Is the triangle a RIGHT triangle?
- Is there an opposite side angle pair?
- Am I looking for an angle or a ratio (side)?

18   22

35°   A°

May 28-11:40 AM

Find ALL of the missing values in the triangle below:
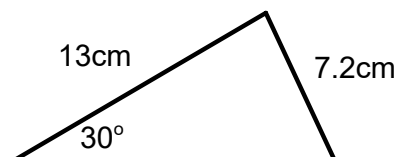
Checklist
- Is the triangle a RIGHT triangle?
- Is there an opposite side angle pair?
- Am I looking for an angle or a ratio (side)?
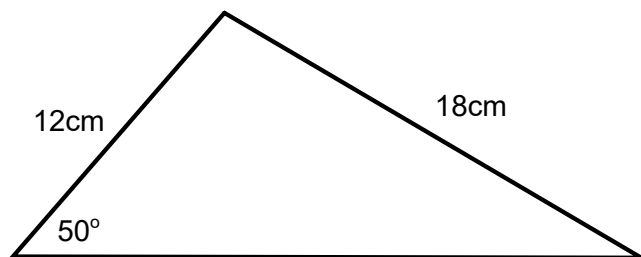
83°   38°

16

May 28-11:40 AM

Be careful....
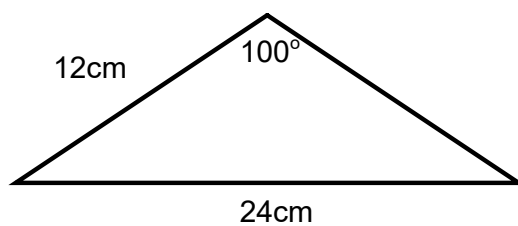
Solve the following for the missing sides and angles:

13cm

7.2cm

30°

Solve the following for the missing sides and angles:

12cm 18cm

50°

Nov 17-5:59 PM

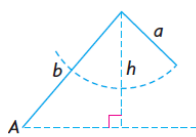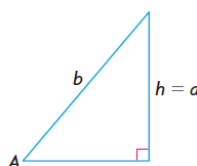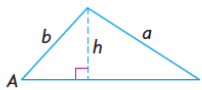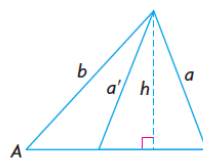Solve the following for the missing sides and angles:

12cm 100°

24cm

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The Ambiguous Case Triangle is created when we have two sides and an un-contained angle. This does not mean there are guaranteed two answers, but it does create the possibility of more than one answer.
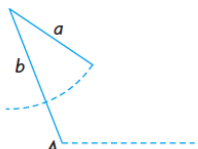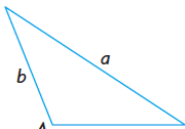
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Cases of Ambiguity

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

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

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

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

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

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

If ∠A is obtuse and $a < b$ or $a = b$, no triangle exists.

If ∠A is obtuse and $a > b$, one triangle exists.

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Determine the number of possible triangles that could be drawn with the given measures. Then, find the measures of the other angles in each possible triangle. Round to the nearest tenth of a degree, if necessary.

Triangle ABC, a = 12 , b = 26, <A=70°

Success Criteria

1. Draw the most obvious triangle to scale

2. Draw the second form of the triangle if possible

3. Use Sine Law to solve

4. Watch for the CAST principle when calculating the angle

Nov 17-6:18 PM

Determine the number of possible triangles that could be drawn with the given measures. Then, find the measures of the other angles in each possible triangle. Round to the nearest tenth of a degree, if necessary.

Triangle ABC, a = 25 , b = 6, <A=50°

Success Criteria

1. Draw the most obvious triangle to scale

2. Draw the second form of the triangle if possible

3. Use Sine Law to solve

4. Watch for the CAST principle when calculating the angle

Nov 17-6:18 PM

Albert and Belle are part of a scientific team studying thunderclouds. The team is about to launch a weather balloon into an active part of a cloud. Albert's rope is 7.8 m long and makes an angle of 36° with the ground. Belle's rope is 5.9 m long.

How far, to the nearest tenth of a metre, is Albert from Belle?

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Homework

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