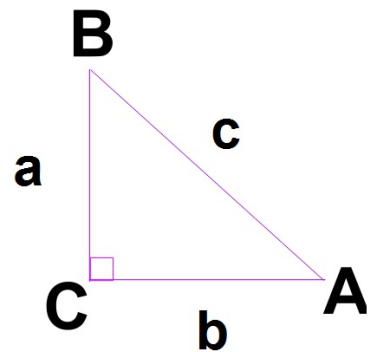


Warm up

1) Find all sides and angles for the right triangle using the information below:

I) $A=28^\circ$ $a=4$

II) $B=35^\circ$ $c=12$



2) Find the ratio of $\frac{\sin A}{a}$, $\frac{\sin B}{b}$ and $\frac{\sin C}{c}$ for both triangles.

Warm up

1) Find all sides and angles for the right triangle using the information below:

I) $A=28^\circ$ $a=4$

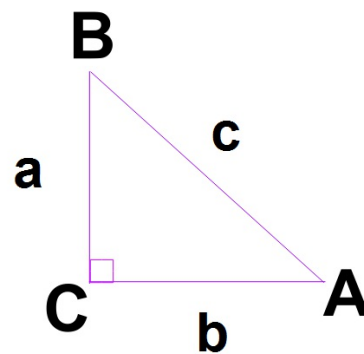
$B=62$ $b=7.5$ $c=8.52$

II) $B=35^\circ$ $c=12$

$A=55$ $a=9.83$ $b=6.9$

2) Ratio for I) .1174

Ratio for II) .0833



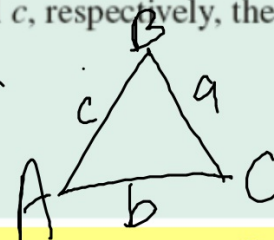
Objective: Solve triangles using the law of Sines

The **Law of Sines** states that the ratio of the sine of an angle to the length of its opposite side is the same for all three angles of any triangle.

Law of Sines

In any $\triangle ABC$ with angles A , B , and C opposite sides a , b , and c , respectively, the following equation is true:

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

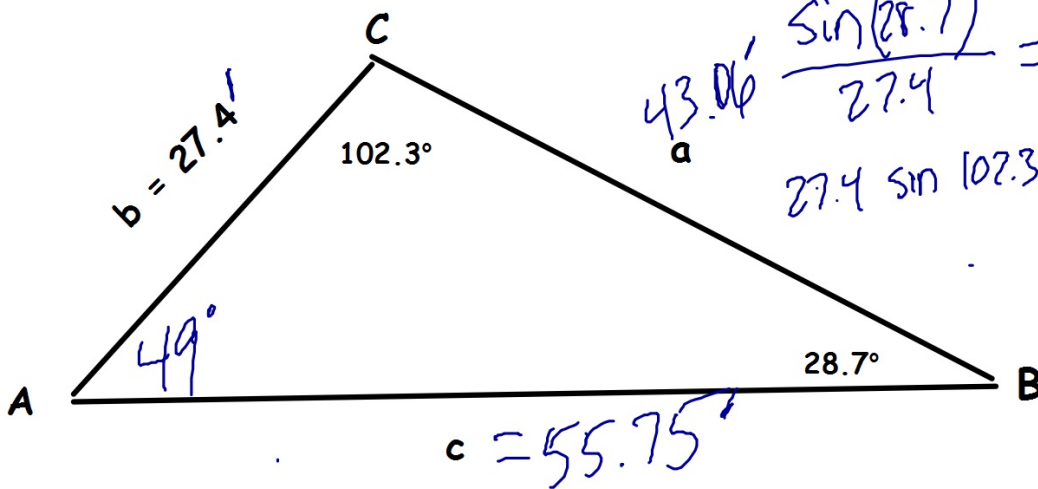


We use law of Sines when give **AAS**, **ASA** or **SSA** to solve a triangle.

Example 1 Given Two Angles and One Side - AAS

For the triangle, $C = 102.3^\circ$, $B = 28.7^\circ$, and $b = 27.4$ feet. Find the remaining angle and sides.

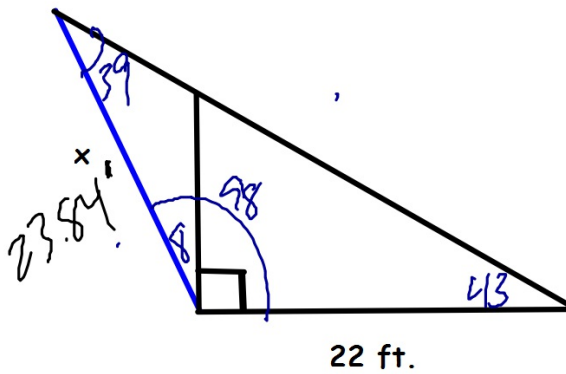
SOLVE THE TRIANGLE



$$\frac{\sin(28.7)}{27.4} = \frac{\sin(102.3)}{c}$$
$$27.4 \sin 102.3 = \sin(28.7)(c)$$

Example 2 Given Two Angles and One Side - ASA

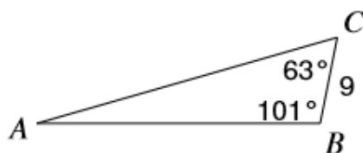
A pole tilts toward the sun at an 8° angle from the vertical, and it casts a 22-foot shadow. The angle of elevation from the tip of the shadow to the top of the pole is 43° . How tall is the pole?



$$\frac{\sin 39}{22} = \frac{\sin 43}{x}$$

Find each measurement indicated. Round your answers to the nearest tenth.

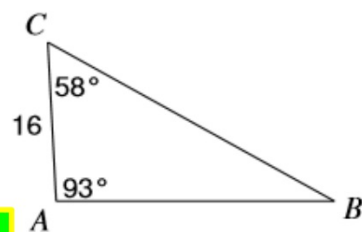
4) Find \overline{AB}



29.1

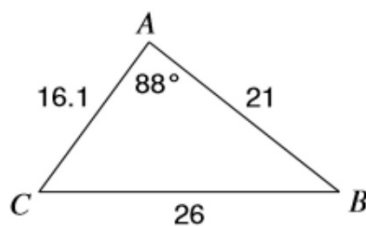


5) Find \overline{BC}



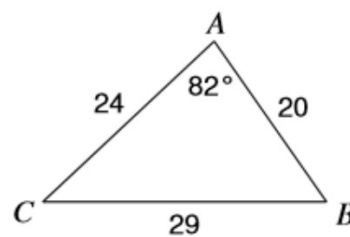
33

6) Find $m\angle C$



53.8°

7) Find $m\angle C$



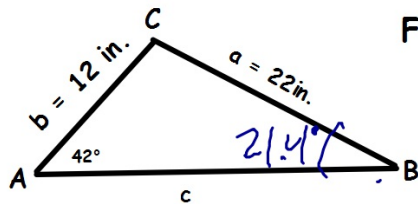
43.1°

The Ambiguous Case (SSA)

3 Cases

- 1) one solution
- 2) no solution
- 3) two solutions

Example 3 - Single Solution Case-SSA



Find the remaining side and angles.

$$\frac{\sin 42}{22} = \frac{\sin B}{12}$$

When given SSA it is possible to have no solutions, two solutions, or one solutions.

When given angle is obtuse.

- a. If opposite side is largest: one solution**
- b. If opposite side is smallest: no solution**

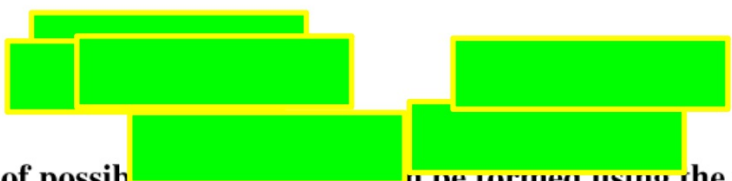
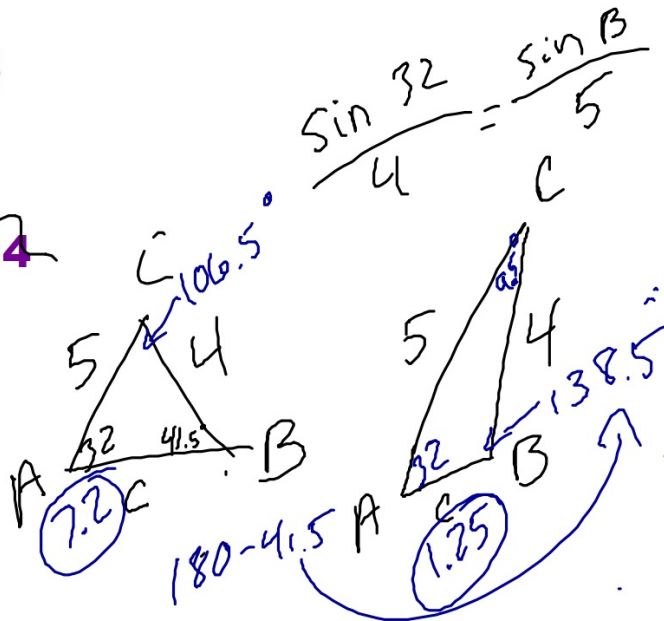
When given angle is acute

- a. If opposite side is largest: one solution**
- b. If opposite side is smallest: you will have**
 - 1. no solution: if the sine of given angle times side not opposite is larger than either side.**
 - 2. two solutions: if the above is smaller than given sides.**
 - 3. one solution: if the sine of given angle times side not opposite is equal to the opposite side.**

Tell how many solutions and find all solutions?

1. $A=32^\circ$ $a=4$ $b=5$

2. $B=68^\circ$ $a=6$ $b=4$

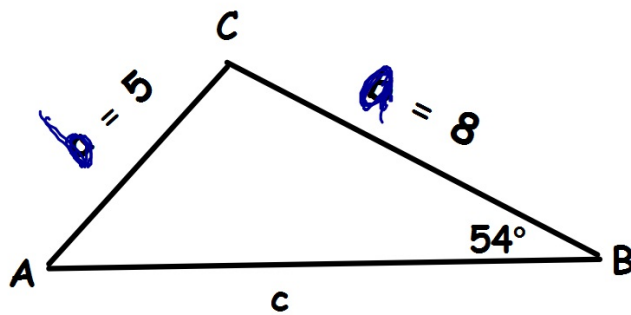


State the number of possible triangles that can be formed using the given measurements.

19) $m\angle C = 63^\circ$, $b = 9$, $c = 12$

20) $m\angle B = 33^\circ$, $a = 27$, $b = 22$

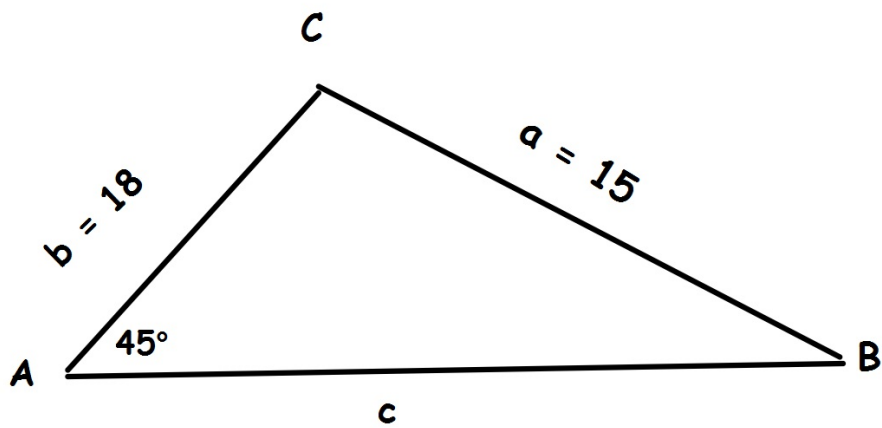
Example 4: Use the given information to solve the triangle.



$$\frac{\sin 54}{5} = \frac{\sin A}{8}$$

Example 5: Two Solution Case - SSA

Find two triangles for which $a = 15$ meters, $b = 18$ meters, and $A = 45^\circ$.



Solve each triangle. Round your answers to the nearest tenth.

11) $m\angle A = 70^\circ, c = 26, a = 25$



13) $m\angle C = 145^\circ, b = 7, c = 33$



12) $m\angle B = 45^\circ, a = 28, b = 27$



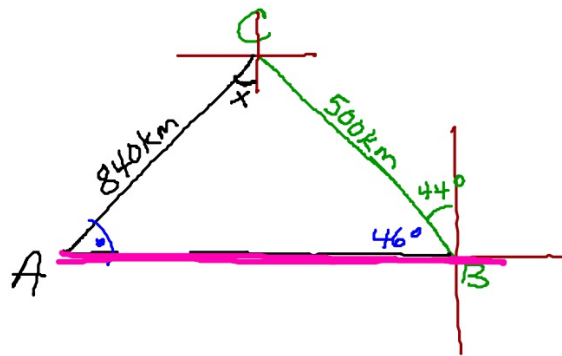
14) $m\angle B = 73^\circ, a = 7, b = 5$



Use the given information to solve the triangle. If two solutions exist, find both.

$$A = 94^\circ, a = 14.6, b = 14.6$$

A plane flies 500 km with a bearing of N 44° W from B to C. The plane then flies southwest 840 km from C to A and is due west of location B. Find the bearing of the flight from C to A.



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2, 5, 10, 38, 40

13, 14, 20