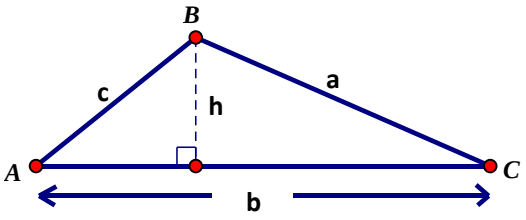
Geometry (G.SRT.10)
Unit Two: Law of Sines (IC30)

Name: _____
Date: _____ Period: _____

1. Derive the Law of Sines.



$\sin A = \frac{h}{c}$ $\quad$ $\sin C = \frac{h}{a}$

$h = c \sin A$ $\quad$ $h = a \sin C$

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

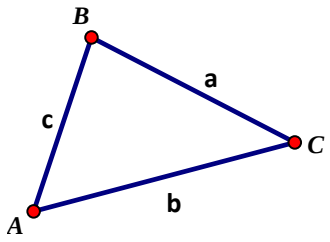
$\frac{\sin A}{a} = \frac{a \sin C}{\frac{c}{a}}$

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

Law of sines:

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

2. Which of the following three pieces of information work with the Law of Sines?



★ You can find m∠B by subtracting from 180°

a) **Yes** or **No**
★ m∠A = 56°
b = 17 cm
★ a = 24 cm

b) **Yes** or **No**
★ m∠B = 107°
★ b = 15 cm
a = 9 cm

c) **Yes** or **No**
★ m∠A = 47°
m∠B = 98°
★ a = 24 cm

d) **Yes** or **No**
m∠A = 49°
m∠C = 33°
★ b = 9 cm
★ m∠B = 98°

e) **Yes** or **No**
a = 10 cm
b = 15 cm
c = 9 cm

f) **Yes** or **No**
m∠C = 41°
b = 14 cm
a = 24 cm

g) **Yes** or **No**
★ m∠A = 39°
★ a = 8 cm
b = 9 cm

h) **Yes** or **No**
m∠A = 20°
m∠B = 65°
m∠C = 95°

i) **Yes** or **No**
m∠C = 41°
m∠B = 98°
★ a = 15 cm
★ m∠A = 41°

As long as there is a side And angle pair, then Law of sines is possible

3. Explain why the Law of Sines doesn't work for ΔABC if you are given, m∠A, b and c.

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

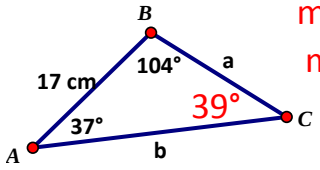
There are no 2 paired together, so there will always be more than one unknown/variable.

4. Jonathan says that you can't use the Law of Sines in ΔABC if you are given m∠A, m∠B and c because there is no 'pairing' of an angle with its opposite side. Brittney disagrees with Jonathan. Brittney is correct; you can use the Law of Sines with this situation. Explain why it is possible.

m∠C = 180° - m∠A – m∠B so although you don't have an angle and opposite side, you can find m∠C.

5. Solve the following problems using the Law of Sines.

a.



m∠C = 180° - 104 – 37
m∠C = 39°

$\frac{\sin 39}{17} = \frac{\sin 37}{a}$

$a = \frac{17 \sin 37}{\sin 39}$

$a \approx 16.26 \text{ cm}$

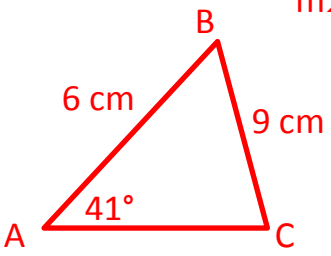
$\frac{\sin 39}{17} = \frac{\sin 104}{b}$

$b = \frac{17 \sin 104}{\sin 39}$

$b \approx 26.21 \text{ cm}$

b. m∠A = 41°, a = 9 cm, c = 6 cm

Draw a Diagram



m∠B = 180 – 41 – 25.94
m∠B = 113.06°

m∠A = 41°
m∠B = 113.06°
m∠C = 25.94°
a = 9 cm
b = 12.62 cm
c = 6 cm

$\frac{\sin 41}{9} = \frac{\sin C}{6}$

$\sin C = \frac{6 \sin 41}{9}$

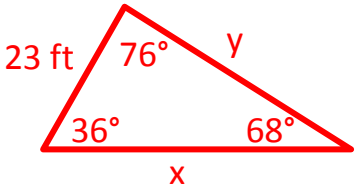
$C \approx 25.94°$

$\frac{\sin 41}{9} = \frac{\sin 113.06}{b}$

$b = \frac{9 \sin 113.06}{\sin 41}$

$b \approx 12.62 \text{ cm}$

6. Bernice has a triangular garden plot. Two of the three angles of her plot measure 76° and 36° and the included side is 23 feet. Find the length of the other two sides.



$\frac{\sin 68}{23} = \frac{\sin 76}{x}$

$x = \frac{23 \sin 76}{\sin 68}$

$x \approx 24.07 \text{ ft}$

$\frac{\sin 68}{23} = \frac{\sin 36}{y}$

$y = \frac{23 \sin 36}{\sin 68}$

$y \approx 14.58 \text{ ft}$