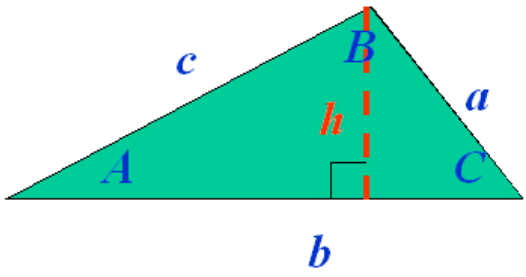
Aim: What is the Law of Sines?

MR12 #84

HW: Page 567-568 # 3,7,16,22

Green Book Page 34(except #11)

Do Now:



Find:

a) $\sin \angle A$

b) $\sin \angle C$

c) Solve each for h.

Let's write some trig functions we know from the right triangles formed.

$$\sin A = \frac{h}{c}$$

$$c \sin A = h$$

Solve these for *h*

Since these both = *h* we can substitute

$$\sin C = \frac{h}{a}$$

$$a \sin C = h$$

divide both sides by *ac*

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

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

Law of Sines

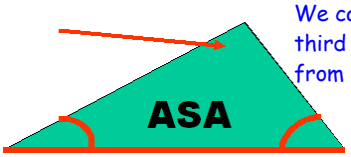
This process can be repeated dropping a perpendicular from a different vertex of the triangle. What we get when we combine these is:

THE LAW OF SINES

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

What this says is that you can set up the ratio of the sine of any angle in a triangle and the side opposite it and it will equal the ratio of the sine of any other angle and the side opposite it. If you know three of these pieces of information, you can then solve for the fourth.

There are three possible configurations that will enable use the Law of Sines. They are shown below.



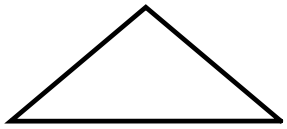
We can easily get the third angle by subracting from 180.

You may have a side and then an angle and then another

You may have two sides and then an angle not between them.

This is called the Ambiguous Case as more than one triangle may be formed.

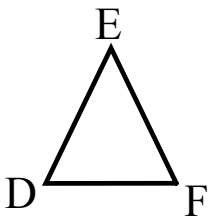
1. In $\triangle ABC$, $a = 10$, $m\angle A = 30^o$ and $m\angle B = 50^o$.
Find b to the nearest integer.



2. In $\triangle ABC$, $c = 12$, $m\angle B = 120^o$, and $m\angle C = 45$.
Find the exact value of b.

3.

In Δ DEF, m $\angle$D = 50^0, m $\angle$E = 95, and f = 12.6. Find d to the nearest tenth.



2. In ΔABC, $m\angle A = 30°$, $m\angle B = 45°$, and $c = 12$. Find a to the nearest tenth.

3. In ΔABC, a = 12, $\sin A = 1/3$, $\sin C = 1/4$. Find c.

4. In ΔABC, $a = 20$, $b = 16$ and $m\angle B = 25°$. Find $m\angle C$ to the nearest degree.

5. Points A and B are on opposite sides of a lunar crater. Point C is 50m from A. If $m\angle A = 112°$, and $m\angle C = 42°$, what is the width of the crater?