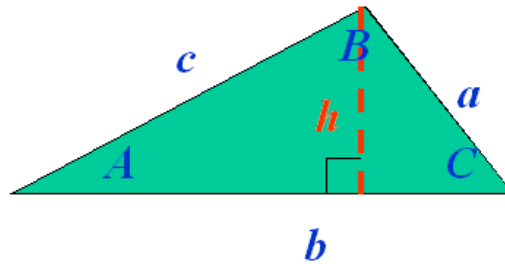


Aim: What is the Law of Sines?

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

Green Book #

Do Now:



Find:

a)  $\sin \angle A$

b)  $\sin \angle C$

c) Solve each for h.

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

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

Solve these for h

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

$$c \sin A = h$$

Since these both = h we can substitute

$$a \sin C = h$$

divide both sides by ac

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

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

Law of Sines

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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.

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



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.

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

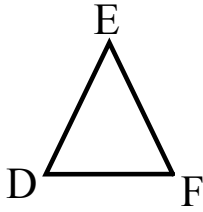
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2. In  $\triangle ABC$ ,  $c = 12$ ,  $m\angle B = 120$ , and  $m\angle C = 45$ .  
Find the exact value of  $b$ .

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3.

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



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2. In  $\triangle ABC$ ,  $m\angle A = 30^\circ$ ,  $m\angle B = 45^\circ$ , and  $c = 12$ . Find  $a$  to the nearest tenth.

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

In  $\triangle ABC$ ,  $a = 20$ ,  $b = 16$  and  $m\angle B = 25^\circ$ . Find  $m\angle C$  to the nearest degree.

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

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