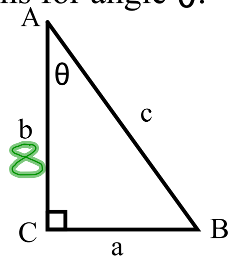
Warm-Up:

1) Find the values of the six trigonometric functions for angle θ.

$\sin\theta = \frac{a}{c}$ $\csc\theta = \frac{c}{a}$

$\cos\theta = \frac{b}{c}$ $\sec\theta = \frac{c}{b}$

$\tan\theta = \frac{a}{b}$ $\cot\theta = \frac{b}{a}$



2) Solve ΔABC if A = 15°, C = 90°, and b = 8. Round measures of sides to the nearest tenth, and measures of angles to the nearest degree.

$8 \cdot \tan 15 = \frac{a}{8} \cdot 8$

$2.1 = a$

$(2.1)^2 + 8^2 = c^2$

$4.41 + 64 = c^2$

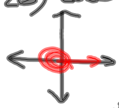
$\sqrt{68.41} = \sqrt{c^2}$

$8.3 = c$

$$\boxed{\begin{aligned} B &= 75^\circ \\ a &\approx 2.1 \\ c &\approx 8.3 \end{aligned}}$$

26, 48, 46

26) $\csc 5400 = \csc 0 = \frac{1}{\sin 0}$



Undefined

46) $R = \frac{V_0^2 \sin 2\theta}{32}$ $\theta = 30^\circ$ $V_0 = 80\ ft/sec$

$R = \frac{80^2 \cdot \sin(2 \cdot 30)}{32} = \frac{6400 \cdot \frac{\sqrt{3}}{2}}{32}$

173.2 ft

$R = \frac{V_0^2}{32}$

$500 = \frac{V_0^2}{32}$

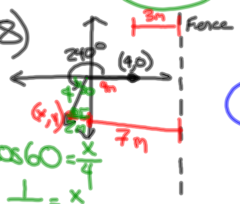
$16000 = V_0^2$

$V_0 = 126.5\ ft/\cancel{sec} \cdot 3600\ \frac{\cancel{sec}}{hr}$

$455400\ ft/hr \cdot \frac{1}{5280}$

86.25

48)



9m

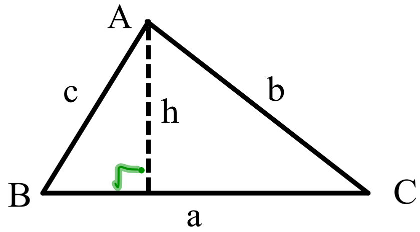
$\cos 60 = \frac{x}{4}$

$\frac{1}{2} = \frac{x}{4}$

$x = 2$

Section 13-4: Law of Sines

Write a formula for the area of the triangle below.



$A = \frac{1}{2} bh$

$A = \frac{1}{2} ah$

Suppose we dont know the height. What is a different expression representing the height? (Hint: Use the sine function).

$c \cdot \sin B = \frac{h}{c} \cdot c$

$h = c \cdot \sin B$

$b \cdot \sin C = \frac{h}{b} b$

$h = b \cdot \sin C$

What is a new equation for the area of this triangle?

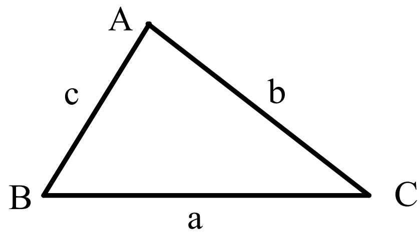
$A = \frac{1}{2} ac \cdot \sin B$ $\quad A = \frac{1}{2} ab \cdot \sin C$

Area Formula for a Triangle:

$A = \frac{1}{2} bc \sin A$

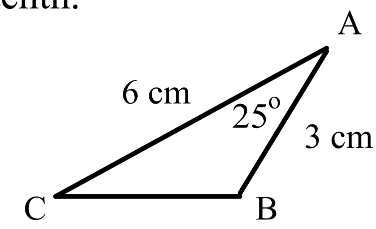
$A = \frac{1}{2} ac \sin B$

$A = \frac{1}{2} ab \sin C$



Examples:

1) Find the area of ΔABC to the nearest tenth.



$$A = \frac{1}{2}bc\cdot\sin A$$

$$A = \frac{1}{2}(3)(6)\cdot\sin 25$$

$$A = 3.8\ \text{cm}^2$$

All three area formulas represent the same area, so

$$\frac{1}{2}\,bc \sin A = \frac{1}{2}\,ac \sin B = \frac{1}{2}\,ab \sin C$$

Divide all three sides by 1/2 *abc*, what is left?

$$\frac{\cancel{\tfrac{1}{2}}\cancel{b}\cancel{c}\cdot\sin A}{\cancel{\tfrac{1}{2}}a\cancel{b}\cancel{c}} = \frac{\cancel{\tfrac{1}{2}}\cancel{a}\cancel{c}\cdot\sin B}{\cancel{\tfrac{1}{2}}\cancel{a}b\cancel{c}} = \frac{\cancel{\tfrac{1}{2}}\cancel{a}\cancel{b}\cdot\sin C}{\cancel{\tfrac{1}{2}}\cancel{a}\cancel{b}c}$$

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

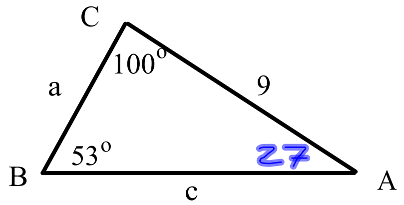
The Law of Sines:

In ΔABC, the ratio between the sine of any angle and its opposite side to the ratio between the sine of any other angle and its opposite side.

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

Examples:

2) Solve ΔABC.



$$\frac{\sin 27}{a} = \frac{\sin 53}{9}$$

$$\frac{9\cdot\sin 27}{\sin 53} = \frac{a\cdot\cancel{\sin 53}}{\cancel{\sin 53}}$$

$$\frac{\sin 100}{c} = \frac{\sin 53}{9}$$

$$\frac{c\cdot\cancel{\sin 53}}{\cancel{\sin 53}} = \frac{9\cdot\sin 100}{\sin 53}$$

$$\boxed{\begin{array}{l} A = 27^\circ \\ a \approx 5.1 \\ c \approx 11.1 \end{array}}$$

$\sin A = 0.51$

$\sin^{-1}(.51) = A$

Homework: pg. 790-791 #12-22 even, 32, 34, 40, 41

Section 13-4 Vocab