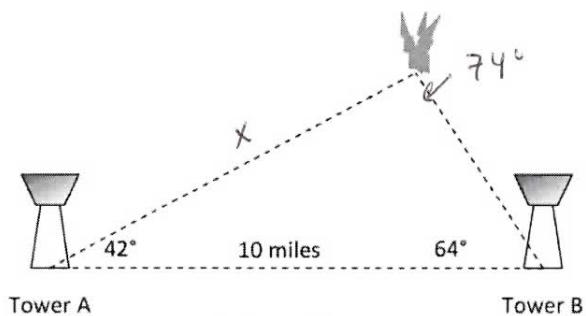# Day 3

Copy: Two forms of quiz plus notes on 4.1

PreCalculus
Notes 4-1

Chapter 4
Quiz 1 on ...

Warm-up:

Fire towers A and B are located 10 miles apart. They use the direction of the other tower as 0°. Rangers at fire tower A spots a fire at 42°, and rangers at fire tower B spot the same fire at 64°. How far from tower A is the fire to the nearest tenth of a mile?

74°

x

42°   10 miles   64°

Tower A   Tower B

$$\frac{\sin 74}{10} = \frac{\sin 64}{x}$$

$$x = 9.4 \text{ mi}$$

Two ships leave port at 4 p.m. One is headed at a bearing of N 38 E and is traveling at 11.5 miles per hour. The other is traveling 13 miles per hour at a bearing of S 47 E. How far apart are they when dinner is served at 6 p.m.?

2 hrs.

N

23 mi

38°

a

Port 95°

47°   b

26 mi

distance
d= between
ships

S
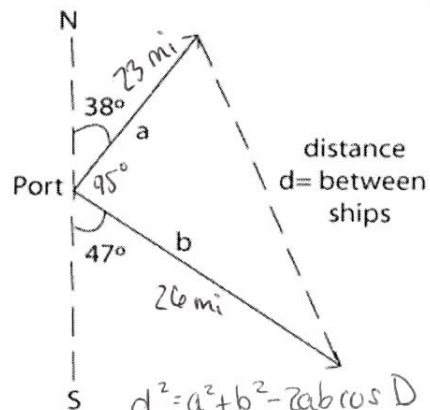
$$d^2 = a^2 + b^2 - 2ab \cos D$$
$$d^2 = 23^2 + 26^2 - 2(23)(26) \cos 95$$
$$d^2 = 1309.24 \quad d = 36.2 \text{ mi}$$

Pasted from
<http://www.algebralab.org/practice/practice.aspx?file=Word_LawofCosines.xml>

Homework Questions?

Today's Objectives:

• Find values of trigonometric functions for acute angles of right triangles.

- Solve right triangles.

KeyConcept Trigonometric Functions

Let θ be an acute angle in a right triangle and the abbreviations opp, adj, and hyp refer to the length of the side opposite θ, the length of the side adjacent to θ, and the length of the hypotenuse, respectively.
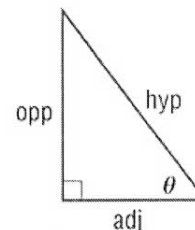
Then the six trigonometric functions of θ are defined as follows.

$$\text{sine }(\theta) = \sin\theta = \frac{\text{opp}}{\text{hyp}}$$

$$\text{cosine }(\theta) = \cos\theta = \frac{\text{adj}}{\text{hyp}}$$

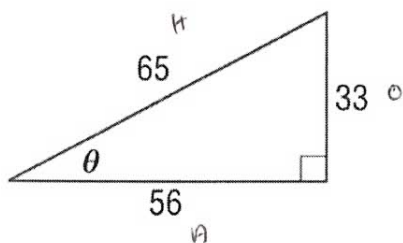$$\text{tangent }(\theta) = \tan\theta = \frac{\text{opp}}{\text{adj}}$$

reciprocals

$$\text{cosecant }(\theta) = \csc\theta = \frac{\text{hyp}}{\text{opp}} \qquad \frac{1}{\sin\theta}$$

$$\text{secant }(\theta) = \sec\theta = \frac{\text{hyp}}{\text{adj}} \qquad \frac{1}{\cos\theta}$$

$$\text{cotangent }(\theta) = \cot\theta = \frac{\text{adj}}{\text{opp}} \qquad \frac{1}{\tan\theta}$$

Textbook page 220

Find the exact values of the six trigonometric functions of ϑ.

$$\sin\theta = \frac{33}{65} \qquad\qquad \sec\theta = \frac{65}{56}$$

$$\cos\theta = \frac{56}{65} \qquad\qquad \csc\theta = \frac{65}{33}$$

$$\tan\theta = \frac{33}{56} \qquad\qquad \cot\theta = \frac{56}{33}$$

If $\sin\theta = \frac{1}{3}$, find the exact values of the five remaining trigonometric functions for the acute angle θ.

3

1

θ

$2\sqrt{2}$

x

$$\sin \theta = \frac{1}{3}$$

$$\cos \theta = \frac{2\sqrt{2}}{3}$$

$$\tan \theta = \frac{1}{2\sqrt{2}} \cdot \frac{\sqrt{2}}{\sqrt{2}} = \frac{\sqrt{2}}{4}$$

$$\sec \theta = \frac{3}{2\sqrt{2}} \cdot \frac{\sqrt{2}}{\sqrt{2}} = \frac{3\sqrt{2}}{4}$$
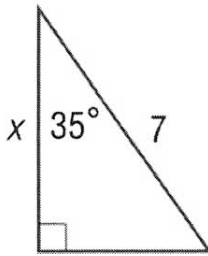
$$\csc \theta = \frac{3}{1} = 3$$
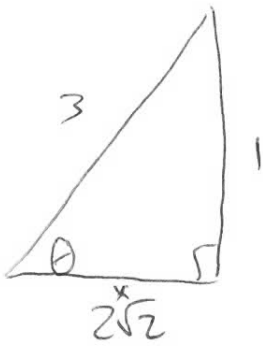
$$\cot \theta = \frac{2\sqrt{2}}{1} = 2\sqrt{2}$$
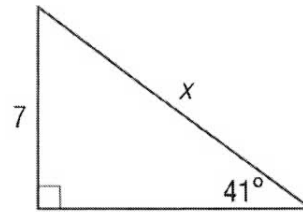
$1^2 + x^2 = 3^2$

$x^2 = 8$

$x = 2\sqrt{2}$

Find the value of x for each triangle. Round to the nearest tenth, if necessary.
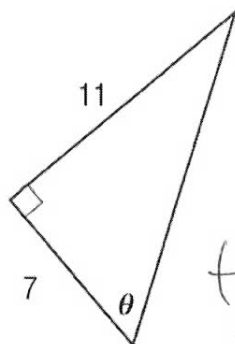
x | 35° | 7

$\cos 35 = \frac{x}{7}$

$x = 5.7$

7 | x | 41°

$\sin 41 = \frac{7}{x}$

$x = 50°$

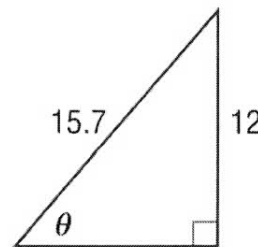**Use a trigonometric function to find the measure of ϑ. Round to the nearest degree, if necessary.**

11

7

θ

$\tan \theta = \frac{11}{7}$

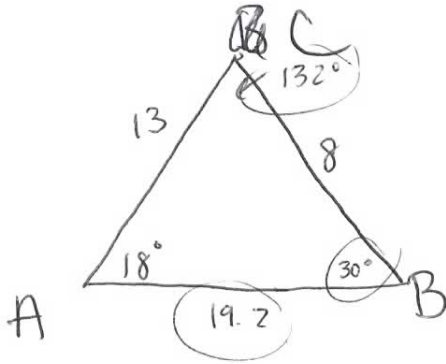$\theta = \tan^{-1}\left(\frac{11}{7}\right)$

$\theta = 58°$

15.7 | 12

θ

$\sin \theta = \frac{12}{15.7}$

$\theta = \sin^{-1}\left(\frac{12}{15.7}\right)$

$\theta = 50°$

$A = 18°$, $a = 8$, $b = 13$

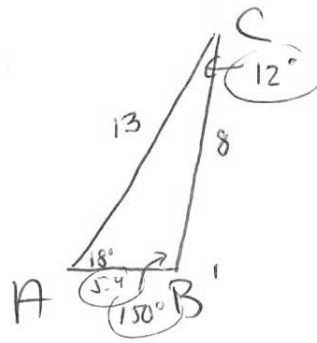First triangle (C = 132°):
- 13, 8 sides; angles 18°, 30° at B, 132° at C
- base 19.2

$$\frac{\sin 18}{8} = \frac{\sin B}{13}$$

$$\sin B = 0.50$$

$$B = 30°$$

$$\frac{\sin 18}{8} = \frac{\sin 132}{c}$$

$$c = 19.2$$

Second triangle (C = 12°):
- 13, 8 sides; angles 18°, 150° at B, 12° at C
- 5.4

$$\frac{\sin 18}{8} = \frac{\sin 12}{c}$$

$$c = 5.4$$

6 ft, 20, 24, θ

$$6^2 = 24^2 + 20^2 - 2(24)(20)\cos\theta$$

$$-940 = -960\cos\theta$$

$$0.9791 = \cos\theta$$

$$11.7° = \theta$$