6-1 day 2

I. Area of a Triangle:
Area = $\frac{1}{2}$·bc·sin A = $\frac{1}{2}$·ab·sin C = $\frac{1}{2}$·ac·sin B

Ex 1) Find the Area if B =120°, a = 32, c = 50

$$A = \frac{1}{2}(32)(50)\sin 120 = 692.82 \text{ units}^2$$

II. Story Problems
Ex 2) The course for a boat race starts at point A and proceeds in the direction S 52 W to point B, then in the direction of S 40 E to point C, and finally back to A. Point C lies 8 km directly south of Point A. Approximate the total distance of the race course.

$$\frac{\sin 88}{8} = \frac{\sin 52}{a} \qquad \frac{\sin 88}{8} = \frac{\sin 40}{c}$$

$$a = 6.31 \text{ km} \qquad c = 5.15 \text{ K}$$

$$= 8 + 6.31 + 5.15$$
$$= \boxed{19.46 \text{ km}}$$

A

52

52

B

88

40

40

8km

C

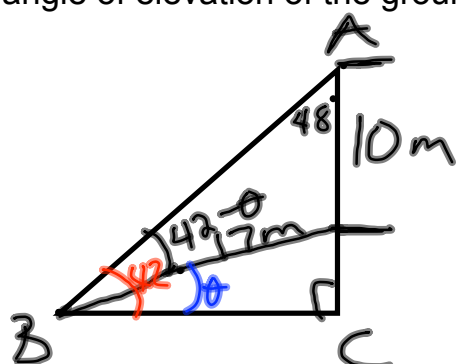$$\begin{array}{r} 180 \\ -52 \\ \hline 88 \end{array}$$

Ex 3) see picture on page 399, #35

Angle of Elevation: A 10-meter telephone pole casts a 17-meter shadow directly down a slope when the angle of elevation of the sun is 42 degrees. Find θ, the angle of elevation of the ground.

$$\frac{\sin 48}{17} = \frac{\sin x}{10}$$

$$\frac{17 \sin x}{17} = \frac{10 \sin 48}{17}$$

$$\sin^{-1}\left(\frac{10\sin 48}{17}\right) = x = 25.92$$

$$42$$
$$-25.92$$
$$\boxed{16.08°}$$

Ex 4) **Railroad Track Design**: The circulular arc of a railroad curve has a chord of length 3000 feet and a central angle of 40 degrees.

A) Draw a diagram that visually represents the problem. Show the known quantities on the diagram and use the variables r and s to represent the radius of the arc and the length of the arc, respectively.

3000 feet

B) Find the radius r of the circular arc.

$\dfrac{\sin 40}{3000} = \dfrac{\sin 70}{r}$

$180 - 40 = 140 \div 2 = 70$

$\boxed{4{,}385.71 \text{ feet}}$

C) Find the length s of the circular arc.

in radians $\rightarrow \theta = \dfrac{s}{r}$

2

$\dfrac{40 \times \pi}{180} = \dfrac{2\pi}{9}$

9

$\dfrac{2\pi}{9} = \dfrac{s}{4385.71}$

$\boxed{3{,}061.80 \text{ ft}}$