Warm-up 1/9/17
Find the missing information.
s = ?   r = 5 ft   θ = 18°

$$S = \frac{\pi (5)(18)}{180} = \frac{\pi}{2} \approx 1.57$$

4.2: Trigonometric Functions of Acute Angles
Right Triangle Trigonometry

SohCahToa

hypotenuse   opposite

A   θ   B

adjacent
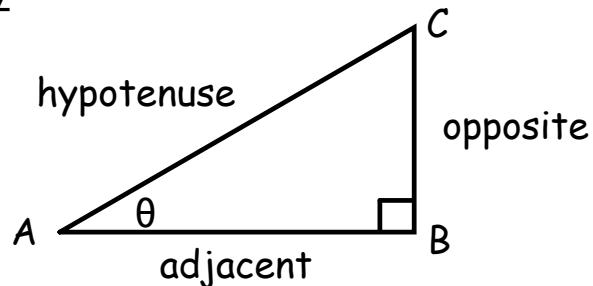
DEFINITION Trigonometric Functions
Let θ be an acute angle in the right △ABC. Then

sine (θ) = sin θ = $\dfrac{\text{opp}}{\text{hyp}}$ cosecant (θ) = csc θ = $\dfrac{\text{hyp}}{\text{opp}}$

cosine (θ) = cos θ = $\dfrac{\text{adj}}{\text{hyp}}$ secant (θ) = sec θ = $\dfrac{\text{hyp}}{\text{adj}}$

tangent (θ) = tan θ = $\dfrac{\text{opp}}{\text{adj}}$ cotangent (θ) = cot θ = $\dfrac{\text{adj}}{\text{opp}}$

Find the values of all six trigonometric functions of the angle θ.
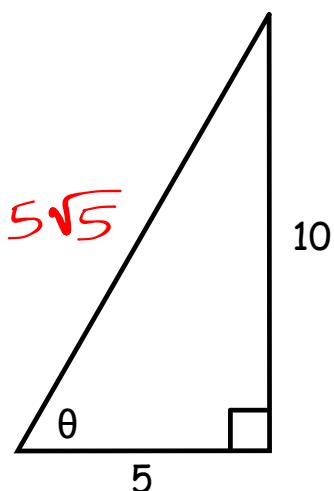
$$\sin \theta = \frac{10}{5\sqrt{5}} = \frac{2\sqrt{5}}{5} \qquad \csc \theta = \frac{\sqrt{5}}{2}$$

$$\cos \theta = \frac{5}{5\sqrt{5}} = \frac{\sqrt{5}}{5} \qquad \sec \theta = \sqrt{5}$$

$$\tan \theta = \frac{10}{5} = 2 \qquad \cot \theta = \frac{1}{2}$$

$5\sqrt{5}$ 10

θ   5

$$5^2 + 10^2 = C^2$$

$$\sqrt{125} = C$$

$$\sqrt{25 \cdot 5}$$

$$\frac{2}{\sqrt{5}} \cdot \frac{\sqrt{5}}{\sqrt{5}} = \frac{2\sqrt{5}}{5} \qquad \frac{1}{\sqrt{5}} \cdot \frac{\sqrt{5}}{\sqrt{5}}$$

Let θ be an acute angle such that sin θ = 5/6. Evaluate the other five trigonometric functions of θ.

5   6

θ $\sqrt{11}$

$$5^2 + b^2 = 6^2$$

$$b = \sqrt{11}$$
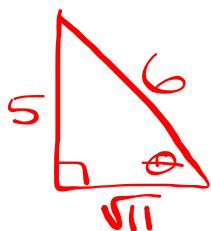
$$\sin \theta = \frac{5}{6} \qquad \csc \theta = \frac{6}{5}$$

$$\cos \theta = \frac{\sqrt{11}}{6} \qquad \sec \theta = \frac{6}{\sqrt{11}} = \frac{6\sqrt{11}}{11}$$

$$\tan \theta = \frac{5}{\sqrt{11}} = \frac{5\sqrt{11}}{11} \qquad \cot \theta = \frac{\sqrt{11}}{5}$$

45° - 45° - 90° Triangles

(Triangle diagram with 45° angles at top and bottom-left, right angle at bottom-right. Hypotenuse labeled $x\sqrt{2}$, vertical leg labeled x, horizontal leg labeled x.)
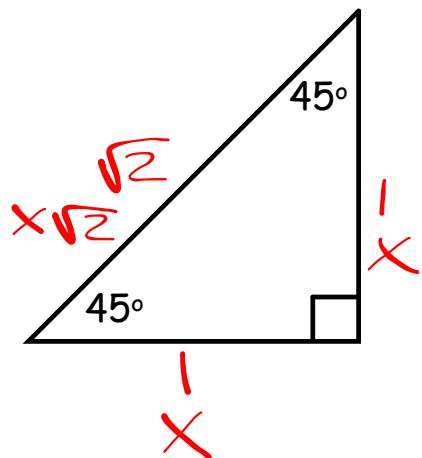
$$\sin 45 = \frac{1}{\sqrt{2}} = \frac{\sqrt{2}}{2} \qquad \csc 45 = \sqrt{2}$$

$$\cos 45 = \frac{\sqrt{2}}{2} \qquad \sec 45 = \sqrt{2}$$

$$\tan 45 = 1 \qquad \cot 45 = 1$$

30° - 60° - 90° Triangles

(Triangle diagram with 30° angle at top, 60° angle at bottom-left, right angle at bottom-right. Hypotenuse labeled 2, vertical leg labeled $\sqrt{3}$, horizontal leg labeled 1.)
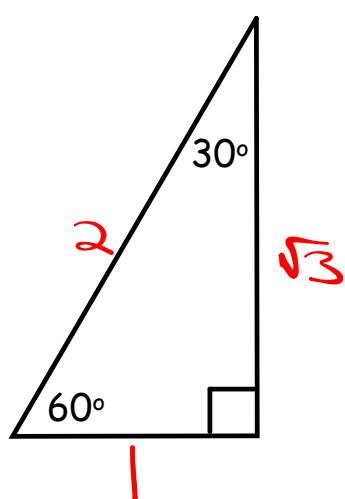
$$\sin 60 = \frac{\sqrt{3}}{2} \qquad \csc 60 = \frac{2\sqrt{3}}{3}$$

$$\cos 60 = \frac{1}{2} \qquad \sec 60 = 2$$

$$\tan 60 = \sqrt{3} \qquad \cot 60 = \frac{\sqrt{3}}{3}$$

$$\sin 30 = \frac{1}{2} \qquad \csc 30 = 2$$

$$\cos 30 = \frac{\sqrt{3}}{2} \qquad \sec 30 = \frac{2\sqrt{3}}{3}$$

$$\tan 30 = \frac{\sqrt{3}}{3} \qquad \cot 30 = \sqrt{3}$$

Assignment: pp. 335 - 337
        2 - 24 evens, 70