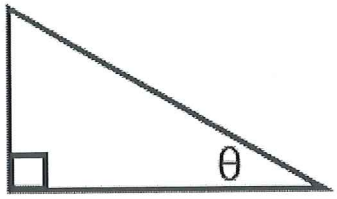
Notes + HW

13.1 Right Triangle Trigonometry

Using these sides, you can define six **trigonometric functions: sine, cosine, tangent, cosecant, secant,** and **cotangent**. These functions are abbreviated sin, cos, tan, csc, sec, and cot, respectively.



KEY CONCEPT *Trigonometric Functions*

If θ is the measure of an acute angle of a right triangle, *opp* is the measure of the leg opposite θ, *adj* is the measure of the leg adjacent to θ, and *hyp* is the measure of the hypotenuse, then the following are true.

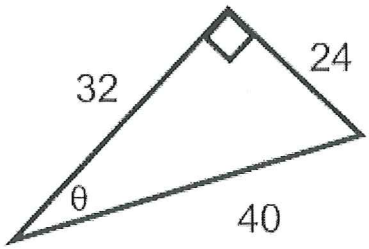
$$\sin\theta = \frac{\text{opp}}{\text{hyp}} \qquad \cos\theta = \frac{\text{adj}}{\text{hyp}} \qquad \tan\theta = \frac{\text{opp}}{\text{adj}}$$

$$\csc\theta = \frac{\text{hyp}}{\text{opp}} \qquad \sec\theta = \frac{\text{hyp}}{\text{adj}} \qquad \cot\theta = \frac{\text{adj}}{\text{opp}}$$

Notice that the sine, cosine, and tangent functions are reciprocals of the cosecant, secant, and cotangent functions, respectively. Thus, the following are also true.

$$\csc\theta = \frac{1}{\sin\theta} \qquad \sec\theta = \frac{1}{\cos\theta} \qquad \cot\theta = \frac{1}{\tan\theta}$$

Ex1 Find the 6 trigonometric ratios.



$\sin\theta = \frac{24}{40} = \frac{3}{5}$

$\csc\theta = \frac{40}{24} = \frac{5}{3}$

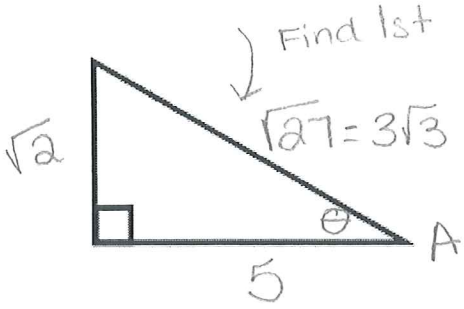
$\cos\theta = \frac{32}{40} = \frac{4}{5}$

$\sec\theta = \frac{40}{32} = \frac{5}{4}$

$\tan\theta = \frac{24}{32} = \frac{3}{4}$

$\cot\theta = \frac{32}{24} = \frac{4}{3}$

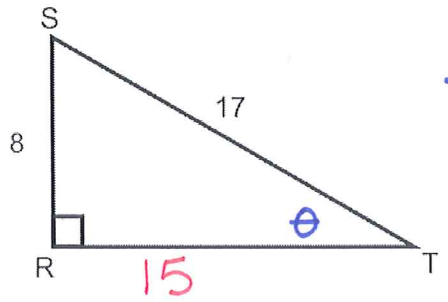
Ex 2 If tan A = $\frac{\sqrt{2}}{5}$, then find csc A. $= \frac{h}{o}$



$$CSC = \frac{3\sqrt{3}}{\sqrt{2}} = \boxed{\frac{3\sqrt{6}}{2}}$$

Ex 3 Solve ΔRST. Round measures of sides to nearest tenth and angle measures to nearest degree.

$$\sin \angle T = \frac{8}{17}$$



$$\angle T = \sin^{-1}\left(\frac{8}{17}\right)$$

$$\angle T \approx 28.1^\circ \approx 28^\circ$$

$$\therefore \angle S \approx 62^\circ \text{ by } \Delta \text{ Sum}$$

$$8^2 + RT^2 = 17^2$$

$$RT = 15 \checkmark$$

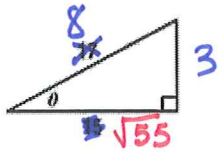
1.) $\sin\theta = \frac{3}{8}$, $\csc\theta = \frac{8}{3}$

$\cos\theta = \frac{\sqrt{55}}{8}$ $\sec\theta = \frac{8\sqrt{55}}{55}$

$\tan\theta = \frac{3\sqrt{55}}{55}$ $\cot\theta = \frac{\sqrt{55}}{3}$

HOMEWORK:

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

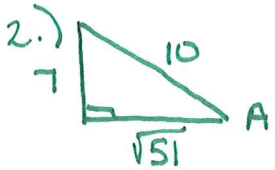


2. **Standardized Test Practice**

   If $\sin A = \frac{7}{10}$, find the value of $\cos A$.

   A. $\frac{7\sqrt{149}}{149}$ **B.** $\frac{\sqrt{51}}{10}$ **C.** $\frac{10}{7}$ **D.** $\frac{\sqrt{51}}{7}$

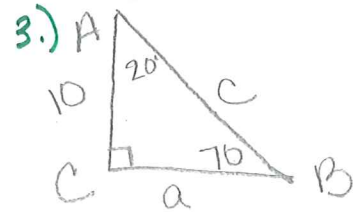
2.)



$\cos A = \frac{\sqrt{51}}{10}$

3. **Solve ΔABC if $A = 20°$, $C = 90°$, and $b = 10$. Round measures of sides to the nearest tenth and measures of angles to the nearest degree.**

3.)



$\tan 20 = \frac{a}{10}$

$\boxed{a \approx 3.6}$

$\cos 20 = \frac{10}{c}$

$\boxed{c \approx 10.6}$