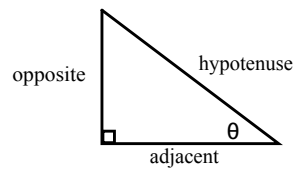


Warm-Up:

In your notes, write the trig ratios for  $\sin\theta$ ,  $\cos\theta$ , and  $\tan\theta$ .



$$\sin\theta = \frac{\text{opposite}}{\text{hypotenuse}}$$
$$\cos\theta = \frac{\text{adjacent}}{\text{hypotenuse}}$$
$$\tan\theta = \frac{\text{opposite}}{\text{adjacent}}$$

## Section 13-1: Right Triangle Trigonometry

Trigonometry is the study of triangles.

There are six trig functions:

sine (sin), cosine (cos), tangent (tan), secant (sec), cosecant (csc) and cotangent (cot).

The trigonometric ratios for the six trig functions where  $\theta$  is the measure of the angle, *opp* is the leg opposite, *adj* is the leg adjacent, and *hyp* is the hypotenuse of the triangle.

$$\sin\theta = \frac{\text{opp}}{\text{hyp}}$$

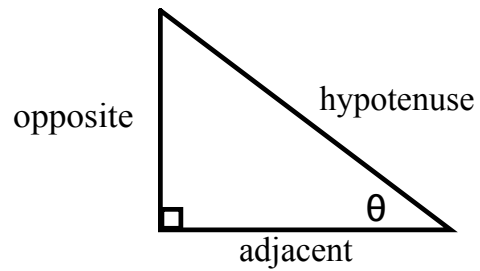
$$\csc\theta = \frac{\text{hyp}}{\text{opp}}$$

$$\cos\theta = \frac{\text{adj}}{\text{hyp}}$$

$$\sec\theta = \frac{\text{hyp}}{\text{adj}}$$

$$\tan\theta = \frac{\text{opp}}{\text{adj}}$$

$$\cot\theta = \frac{\text{adj}}{\text{opp}}$$



Reciprocals:

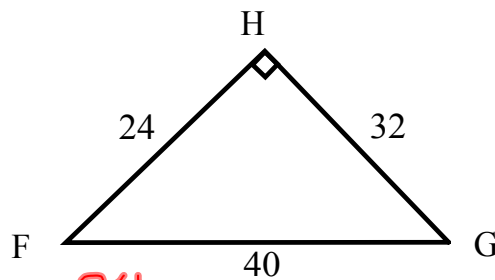
Sine and Cosecant

Cosine and Secant

Tangent and Cotangent

Examples:

1) Find the values of the six trig functions for angle G.



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

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

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

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

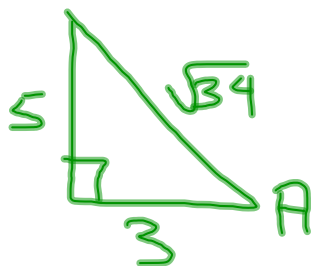
$$\tan G = \frac{24}{32} = \frac{3}{4}$$

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

Examples:

2) If  $\tan A = 5/3$ , find the value of  $\csc A$ .

- A)  $\frac{3}{5}$    B)  $\frac{4}{3}$    C)  $\sqrt{34}$    D)  $\frac{\sqrt{34}}{5}$



$$\frac{5}{3} = \frac{\text{opp}}{\text{adj}}$$

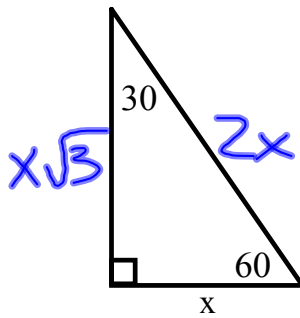
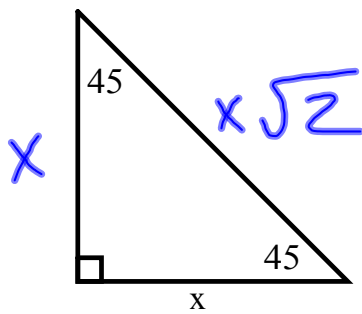
$$5^2 + 3^2 = c^2$$

$$25 + 9 = c^2$$

$$34 = c^2$$

$$\sqrt{34} = c$$

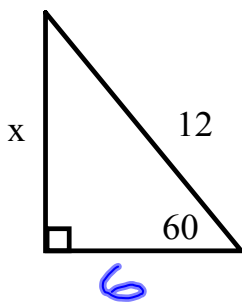
Recall the patterns of a 45-45-90 and 30-60-90 right triangle.



$$x^2 + x^2 = c^2$$
$$\sqrt{2x^2} = \sqrt{c^2}$$
$$x\sqrt{2} = c$$

Examples:

3) Write an equation that can be used to find  $x$ . Then solve the equation. Write in both radical and decimal form. Round to the nearest tenth.



$$12 \cdot \sin 60 = \frac{x}{12} \cdot 12$$

$$x = 10.4$$

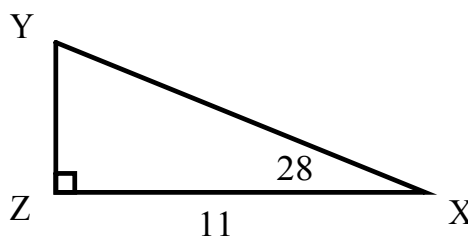
$$x = 6\sqrt{3}$$

Finding all missing measures in a triangle is **solving the triangle**.

Examples:

4) Solve  $\triangle XYZ$ . Round to the nearest tenth.

$$Y = 52$$
$$YZ = 5.8$$
$$YX = 12.5$$



$$\tan 28 = \frac{YZ}{11}$$

$$\cos 28 = \frac{11}{YX}$$

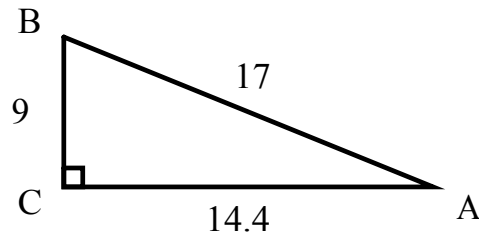
$$YX = \frac{11}{\cos 28}$$

Examples:

5) Solve  $\triangle ABC$ . Round to the nearest tenth.

$$A = 32^\circ$$

$$B = 58^\circ$$

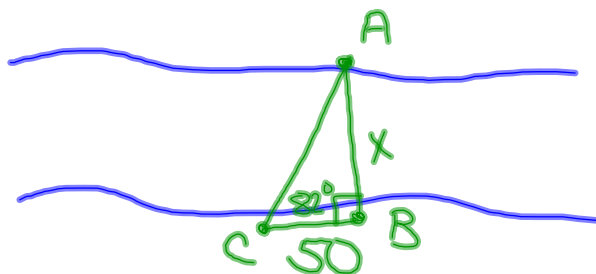


$$\sin A = \frac{9}{17}$$

$$\sin^{-1}\left(\frac{9}{17}\right) = A$$

Examples:

6) In order to construct a bridge, the width of the river must be determined. An engineer places stick A on the far side of the river, stick B and stick C on the near side of the river so that the angle formed between the three sticks make a right angle at stick B. The distance between sticks B and C is 50 meters. The angle of  $82^\circ$  is measured at stick C. Find the width of the river.

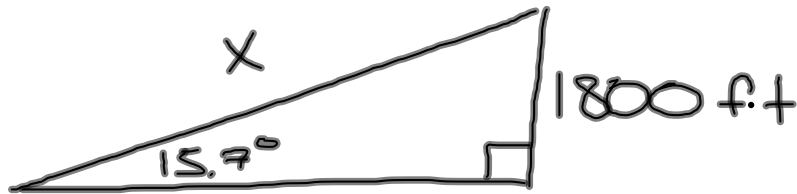


$$50 \tan 82 = \frac{x}{50} 50$$

$$x = 355.7 \text{ m}$$

Examples:

7) A run has an angle of elevation of  $15.7^\circ$  and a vertical drop of 1800 feet. Estimate the length of this run.



$$\sin 15.7 = \frac{1800}{X}$$

$$X = \frac{1800}{\sin 15.7}$$

$$X = 6651.9 \text{ ft}$$

Homework: pg. 765-767 #14-30 even, 34-38 even, 44, 49, 50

Section 13-1 Vocab