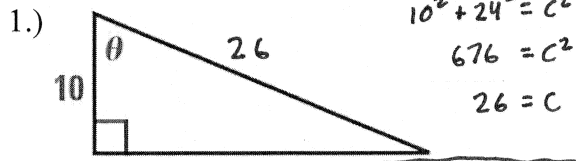


# Lesson 13.1 Worksheet

Name: Key

SOH CAH TOA

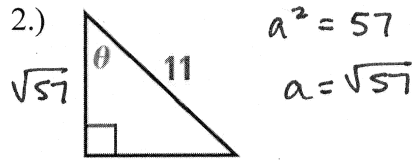
Evaluate the six trigonometric functions of the angle  $\theta$ .



$$\sin \theta = \frac{10}{26} = \frac{5}{13} \quad \csc \theta = \frac{13}{5}$$

$$\cos \theta = \frac{24}{26} = \frac{12}{13} \quad \sec \theta = \frac{13}{12}$$

$$\tan \theta = \frac{10}{24} = \frac{5}{12} \quad \cot \theta = \frac{12}{5}$$

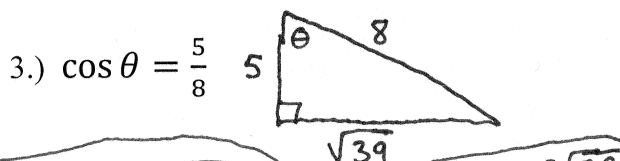


$$\sin \theta = \frac{\sqrt{57}}{11} \quad \csc \theta = \frac{11}{\sqrt{57}}$$

$$\cos \theta = \frac{8}{11} \quad \sec \theta = \frac{11}{8} = \frac{11\sqrt{57}}{8\sqrt{57}}$$

$$\tan \theta = \frac{\sqrt{57}}{8} = \frac{8\sqrt{57}}{64} \quad \cot \theta = \frac{8}{\sqrt{57}}$$

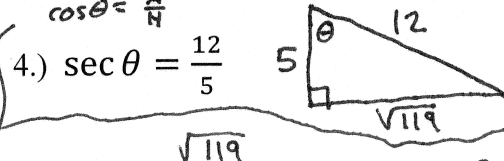
Let  $\theta$  be an acute angle of a right triangle. Find the values of the other five trigonometric functions of  $\theta$ .



$$\sin \theta = \frac{\sqrt{39}}{8} \quad \csc \theta = \frac{8\sqrt{39}}{39}$$

$$\cos \theta = \frac{5}{8} \quad \sec \theta = \frac{8}{5}$$

$$\tan \theta = \frac{\sqrt{39}}{5} \quad \cot \theta = \frac{5\sqrt{39}}{39}$$

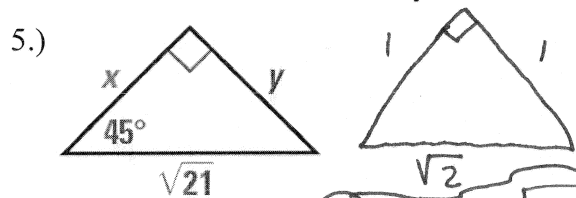


$$\sin \theta = \frac{\sqrt{119}}{12} \quad \csc \theta = \frac{12}{\sqrt{119}} = \frac{12\sqrt{119}}{119}$$

$$\cos \theta = \frac{5}{12} \quad \sec \theta = \frac{12}{5}$$

$$\tan \theta = \frac{\sqrt{119}}{5} \quad \cot \theta = \frac{5}{\sqrt{119}} = \frac{5\sqrt{119}}{119}$$

Find the exact values of  $x$  and  $y$ .

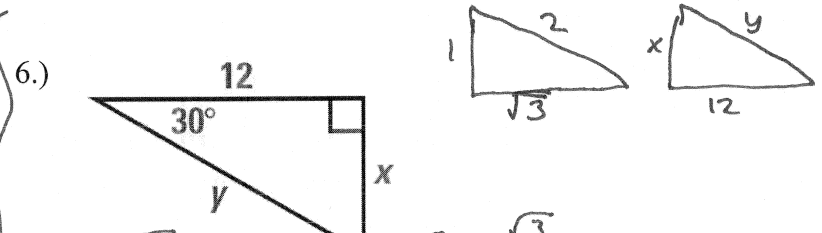


$$\frac{x}{1} = \frac{\sqrt{21}}{\sqrt{2}}$$

$$x \cdot \sqrt{2} = \sqrt{21}$$

$$x = \frac{\sqrt{21}}{\sqrt{2}} \cdot \frac{\sqrt{2}}{\sqrt{2}} = \frac{\sqrt{42}}{2}$$

$x + y = \frac{\sqrt{42}}{2}$



$$\frac{1}{x} = \frac{\sqrt{3}}{12}$$

$$12 = x \cdot \sqrt{3}$$

$$\frac{\sqrt{3}}{\sqrt{3}} \cdot \frac{12}{\sqrt{3}} = x$$

$$\frac{12\sqrt{3}}{3} = x$$

$x = 4\sqrt{3}$

$$\frac{2}{y} = \frac{\sqrt{3}}{12}$$

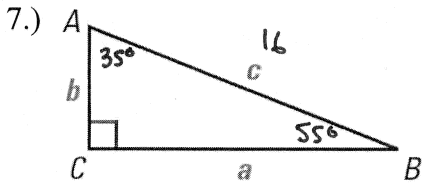
$$24 = y \cdot \sqrt{3}$$

$$\frac{\sqrt{3}}{\sqrt{3}} \cdot \frac{24}{\sqrt{3}} = y$$

$$\frac{24\sqrt{3}}{3} = y$$

$y = 8\sqrt{3}$

Solve  $\triangle ABC$  using the diagram and the given measurements. Round answers to the nearest tenth, when necessary.

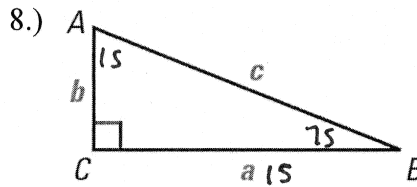


$A = 35^\circ, c = 16$

$A = 35^\circ \quad a = 9.2$   
 $B = 55^\circ \quad b = 13.1$   
 $C = 90^\circ \quad c = 16$

$\sin 55 = \frac{b}{16} \quad \sin 35 = \frac{a}{16}$

$16 \cdot \sin 55 = b \quad 16 \cdot \sin 35 = a$



$B = 75^\circ, a = 15$

$A = 15^\circ \quad a = 15$   
 $B = 75^\circ \quad b = 55.98 \text{ or } 56.0$   
 $C = 90^\circ \quad c = 57.96 \text{ or } 58.0$

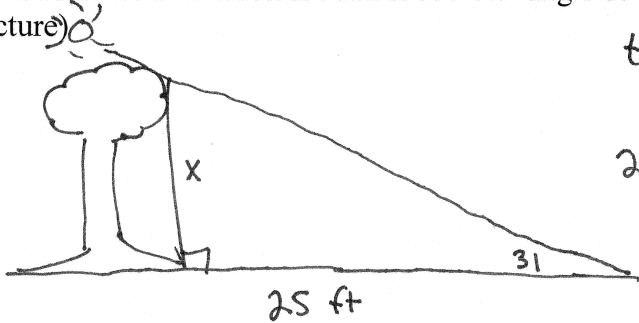
$\tan 75 = \frac{b}{15} \quad c \cdot \sin 15 = \frac{15}{\sin 15}$

$c \cdot \sin 15 = 15$

$c = \frac{15}{\sin 15}$

$15 \cdot \tan 75 = b$

9.) A tree casts a 25 ft shadow when the sun is at a  $31^\circ$  angle of elevation. About how tall is the tree? (Make a picture)



$\tan 31 = \frac{x}{25}$

$25 \cdot \tan 31 = x$

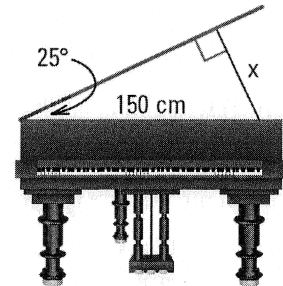
about 15 ft tall

10.) Find the length of the prop holding open the piano.

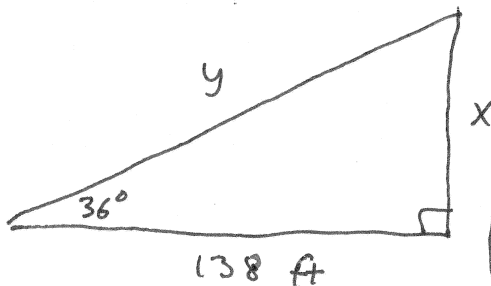
$\sin 25 = \frac{x}{150}$

$150 \cdot \sin 25 = x$

$x \approx 63.4 \text{ cm}$



11.) The Falls Incline Railway at Niagara Falls has an angle of elevation of  $36^\circ$ . The railway extends a horizontal distance of about 138 feet. Find the height and length of the railway. (Make a picture)



$\tan 36 = \frac{x}{138}$

$138 \cdot \tan 36 = x$

$x \approx 100.3 \text{ ft}$   
(height)

$y \cdot \cos 36 = \frac{138}{\cos 36}$

$y \cdot \cos 36 = 138$

$y = \frac{138}{\cos 36}$

$y \approx 170.6 \text{ ft}$   
(length)