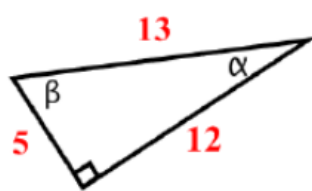
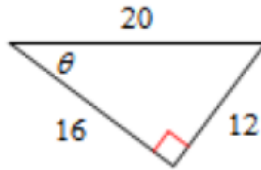



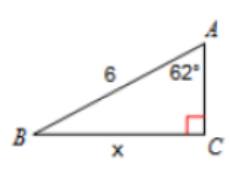
Find the value of the trig functions indicated.

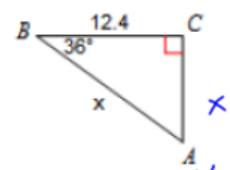
1.  $\sin \alpha = \frac{5}{13}$
 $\tan \beta = \frac{12}{5}$

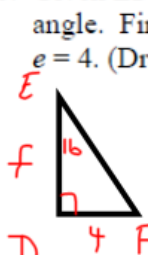
2.  $\cos \theta = \frac{16}{20} = \frac{4}{5}$
 $\tan \theta = \frac{12}{16} = \frac{3}{4}$

3.  $\sin \alpha = \frac{8}{10} = \frac{4}{5}$
 $\sin \beta = \frac{6}{10} = \frac{3}{5}$
 $\tan \alpha = \frac{8}{6} = \frac{4}{3}$
 $\cos \beta = \frac{8}{10} = \frac{4}{5}$


Find the measure of the indicated side. Round to the nearest hundredth.

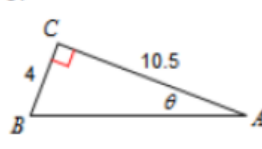
4.  $\sin 62 = \frac{x}{6}$
 $6 \cdot \sin 62 = \frac{x}{6} \cdot 6$
 $x = 5.3$

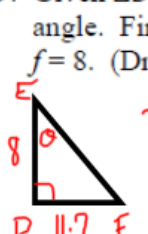
5.  $\cos 36 = \frac{12.4}{x}$
 $x \cdot \cos 36 = \frac{12.4}{x} \cdot x$
 $x \cos 36 = 12.4$
 $x = 15.33$

6. Given $\triangle DEF$ where $\angle D$ is a right angle. Find f if $m\angle E = 16^\circ$ and $e = 4$. (Draw a picture!)  $\tan 16 = \frac{4}{f}$
 $f \cdot \tan 16 = \frac{4}{f} \cdot f$
 $f \cdot \tan 16 = 4$
 $f = \frac{4}{\tan 16}$
 $f = 13.95$

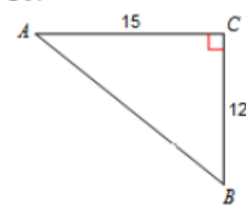
Find the measure of the indicated angle. Round to the nearest hundredth.

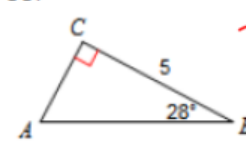
7.  $\tan \theta = \frac{3}{2}$
 $\theta = \tan^{-1}(\frac{3}{2})$
 $\theta = 56.31^\circ$

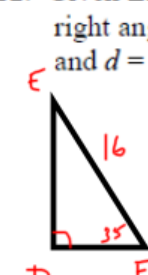
8.  $\tan \theta = \frac{4}{10.5}$
 $\theta = \tan^{-1}(\frac{4}{10.5})$
 $\theta = 20.85^\circ$

9. Given $\triangle DEF$ where $\angle D$ is a right angle. Find $m\angle E$ if $e = 11.7$ and $f = 8$. (Draw a picture!)  $\tan \theta = \frac{11.7}{8}$
 $\theta = \tan^{-1}(\frac{11.7}{8})$
 $\theta = 55.64^\circ$

Solve each triangle. Round to the nearest hundredth.

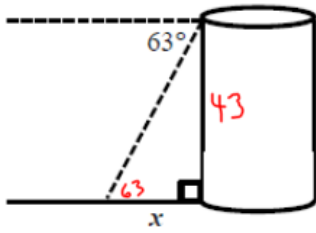
10.  $\tan A = \frac{12}{15}$
 $A = \tan^{-1}(\frac{12}{15})$
 $A = 38.66$
 $\tan B = \frac{15}{12}$
 $B = \tan^{-1}(\frac{15}{12})$
 $B = 51.34$
 $15^2 + 12^2 = c^2$
 $\sqrt{369} = \sqrt{c^2}$
 $19.2 = c$

11.  $\tan 28 = \frac{b}{5}$
 $5 \cdot \tan 28 = \frac{b}{5} \cdot 5$
 $b = 2.65$
 $\cos 28 = \frac{5}{c}$
 $c \cdot \cos 28 = \frac{5}{c} \cdot c$
 $c \cdot \cos 28 = 5$
 $c = \frac{5}{\cos 28}$
 $c = 5.66$
 $m\angle A = 90 - 28$
 $m\angle A = 62^\circ$

12. Given $\triangle DEF$ where $\angle D$ is a right angle and $m\angle F = 35^\circ$ and $d = 16$. (Draw a picture!)  $\sin 35 = \frac{16}{e}$
 $16 \cdot \sin 35 = \frac{16}{e} \cdot e$
 $f = 9.18$
 $\cos 35 = \frac{e}{16}$
 $16 \cdot \cos 35 = \frac{e}{16} \cdot 16$
 $e = 13.11$
 $m\angle E = 90 - 35$
 $E = 55^\circ$

Label the picture given and then solve it. If no picture is given, draw your own and solve!

13. The angle of depression is measured from the top of a 43 ft tower to a reference point on the ground. Its value is found to be 63° . How far is the base of the tower from the point on the ground?



$$\tan 63 = \frac{43}{x}$$

$$x \cdot \tan 63 = \frac{43}{\cancel{\tan 63}} \cdot \cancel{\tan 63}$$

$$\frac{x \cdot \tan 63}{\tan 63} = \frac{43}{\tan 63}$$

$$x = 21.91 \text{ ft}$$

14. The entrance of the old town library is 2.3 ft above ground level. A ramp from the ground level to the library entrance is scheduled to be built. The angle of elevation from the base of the ramp to its top is to be 15° . Find the length of the ramp



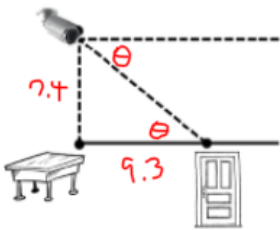
$$\sin 15 = \frac{2.3}{x}$$

$$x \cdot \sin 15 = \frac{2.3}{\cancel{\sin 15}} \cdot \cancel{\sin 15}$$

$$\frac{x \cdot \sin 15}{\sin 15} = \frac{2.3}{\sin 15}$$

$$x = 8.89 \text{ ft}$$

15. A closed circuit TV camera is mounted on a wall 7.4 ft above a security desk in an office building. It is used to view an entrance door 9.3 ft from the desk. Find the angle of depression from the camera lens to the entrance door.

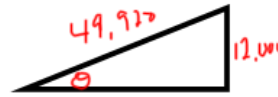


$$\tan \theta = \frac{7.4}{9.3}$$

$$\theta = \tan^{-1} \left(\frac{7.4}{9.3} \right)$$

$$\theta = 38.51^\circ$$

16. A jet took off at a rate of 260 ft/s and climbed in a straight path for 3.2 min. What was the angle of elevation of its path if its final altitude was 12,000 ft?



$$\sin \theta = \frac{12000}{49920}$$

$$\theta = \sin^{-1} \left(\frac{12000}{49920} \right)$$

$$3.2 \text{ min} = 192 \text{ sec}$$

$$260 \text{ ft} \cdot 192 = 49920$$

$$\theta = 13.91^\circ$$

17. The angle of elevation from the bottom of the world's largest slide located in Peru, Vermont, is approximately 10.3° . The slide has a vertical drop of 821 ft. Find the length of the slide.



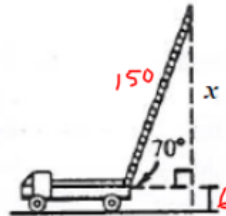
$$\sin 10.3 = \frac{821}{x}$$

$$x \cdot \sin 10.3 = \frac{821}{\cancel{\sin 10.3}} \cdot \cancel{\sin 10.3}$$

$$\frac{x \cdot \sin 10.3}{\sin 10.3} = \frac{821}{\sin 10.3}$$

$$x = 4591.67 \text{ ft}$$

18. The extension ladder on top of a 6 ft high hook and ladder truck is 150 ft long. If the angle of elevation of the ladder is 70° , to what height on a building will the ladder reach?

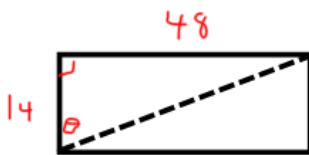


$$\sin 70 = \frac{x}{150}$$

$$150 \sin 70 = \frac{x}{150} \cdot 150$$

$$x = 140.95 + 6 = 146.95 \text{ ft}$$

19. A rectangle is 14 cm wide and 48 cm long. Find the measure of the angles on either side of the diagonals.



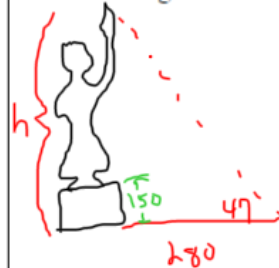
$$\tan \theta = \frac{48}{14}$$

$$\theta = \tan^{-1} \left(\frac{48}{14} \right)$$

$$\theta = 73.74^\circ$$

$$90 - 73.74 = 16.26^\circ$$

20. The Statue of Liberty stands on a 150 ft pedestal. From a point 280 ft from the base of the pedestal, the angle of elevation to the top of Liberty's torch is 47° . Find the height of the statue.



$$\tan 47 = \frac{h}{280}$$

$$280 \tan 47 = \frac{h}{280} \cdot 280$$

$$h = 300.26 \text{ ft} - 150 = 150.26 \text{ ft}$$

Skill Review Simplify the following.

1. $\frac{2}{5} \cdot \frac{4}{3} = \frac{8}{15}$

2. $\frac{5}{\sqrt{3}} \cdot \frac{8}{8} = \frac{5 \cdot \sqrt{3}}{\sqrt{3} \cdot \sqrt{3}}$

$$\frac{5\sqrt{3}}{3}$$

3. $\frac{1}{\left(\frac{\sqrt{3}}{2}\right)} \cdot \frac{2}{\sqrt{3}} = \frac{2 \cdot \sqrt{3}}{\sqrt{3} \cdot \sqrt{3}}$

$$\frac{2\sqrt{3}}{3}$$

4. $\frac{\left(\frac{\sqrt{3}}{4}\right)}{2\sqrt{2}} \cdot \frac{1}{2\sqrt{2}} = \frac{\sqrt{3} \cdot \sqrt{2}}{8\sqrt{2} \cdot \sqrt{2}}$

$$\frac{\sqrt{6}}{16}$$