

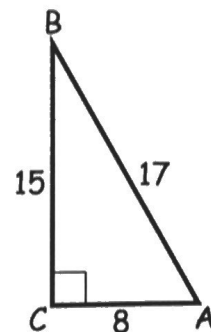
Name: Key Date: _____

RIGHT TRIANGLE TRIG

1) a) Find the 3 trig ratios from Angle A and Angle B.

$$\begin{aligned} \sin A &= \frac{15}{17} & \sin B &= \frac{8}{17} \\ \cos A &= \frac{8}{17} & \cos B &= \frac{15}{17} \\ \tan A &= \frac{15}{8} & \tan B &= \frac{8}{15} \end{aligned}$$

therefore the $\sin A = \cos B$ & $\cos A = \sin B$

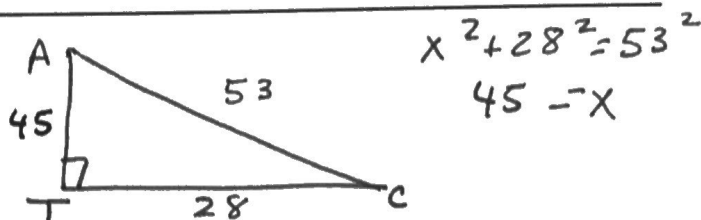


2) Draw $\triangle CAT$ where $\angle ATC = 90^\circ$, $CA = 53$, and $CT = 28$.

a) What is the length of AT? 45

b) What is $\sin C$? $\frac{45}{53}$

c) What is $\tan A$? $\frac{28}{45}$

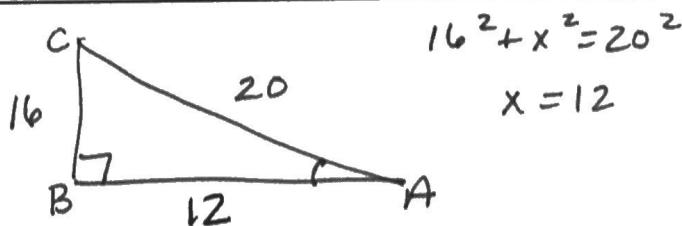


3) Draw $\triangle ABC$ where $\angle B = 90^\circ$ and $\sin A = \frac{16}{20}$.

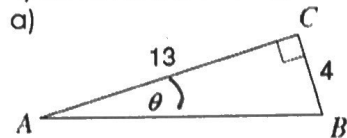
a) What is the length of AB? 12

b) What is $\tan A$? $\frac{16}{12} = \frac{4}{3}$

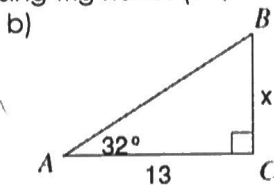
c) What is $\cos A$? $\frac{16}{20} = \frac{4}{5}$



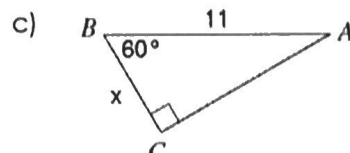
4) Solve for the missing side or angle using Trig Ratios (sin, cos, tan).



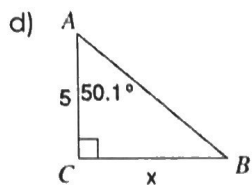
$$\begin{aligned} \tan \theta &= \frac{4}{13} \\ \tan^{-1}\left(\frac{4}{13}\right) &\approx \boxed{17.1^\circ} \end{aligned}$$



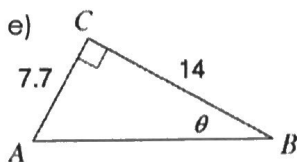
$$\begin{aligned} \tan(32) &= \frac{x}{13} \\ x &= 13 \cdot \tan(32) \\ x &\approx \boxed{8.12} \end{aligned}$$



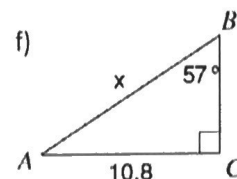
$$\begin{aligned} \cos(60) &= \frac{x}{11} \\ x &= 11 \cdot \cos(60) \\ x &= \boxed{5.5} \end{aligned}$$



$$\begin{aligned} \tan(50.1) &= \frac{x}{5} \\ x &= 5 \cdot \tan(50.1) \\ x &\approx \boxed{6.0} \end{aligned}$$

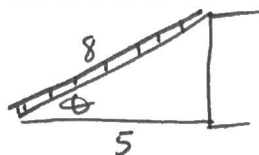


$$\begin{aligned} \sin \theta &= \frac{7.7}{14} \\ \sin^{-1}\left(\frac{7.7}{14}\right) &\approx \boxed{28.2^\circ} \end{aligned}$$



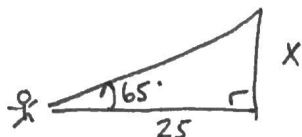
$$\begin{aligned} \sin(57) &= \frac{10.8}{x} \\ x &= 10.8 / \sin(57) \\ x &\approx \boxed{12.9} \end{aligned}$$

5) An 8 foot ladder is leaning against a wall so that the base is 5 feet from the base of the wall. What angle does the ladder make with the ground? Round to the nearest tenth.



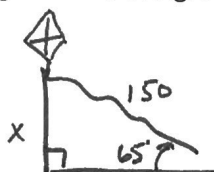
$$\cos \theta = \frac{5}{8} \quad \cos^{-1}\left(\frac{5}{8}\right) \approx 51.32 \rightarrow \boxed{51.3^\circ}$$

6) A surveyor is standing 25 feet from a building and is looking at the top with an angle of elevation of 65°. How tall is the building? Round to the nearest tenth.



$$\tan(65) = \frac{x}{25} \quad x = 25 \cdot \tan(65) \approx \boxed{53.6 \text{ ft}}$$

7) A kite is being flown using 150 yards of string. The kite has an angle of elevation with the ground of 65 degrees. How high above the ground is the kite?



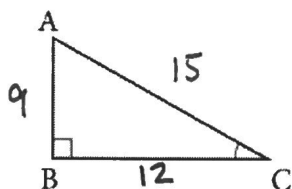
$$\sin(65) = \frac{x}{150} \quad x = 150 \cdot \sin(65) \approx \boxed{135.9 \text{ yds}}$$

8) In the triangle, BC = 12 cm and $\tan C = \frac{3}{4}$. What is the measure in degrees of angle C? What is the length of the hypotenuse?

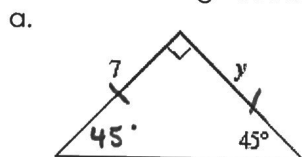
$$\frac{3}{4} = \frac{9}{12}$$

$$9^2 + 12^2 = x^2 \quad \boxed{x = 15}$$

$$m\angle C = \tan^{-1}\left(\frac{3}{4}\right) \quad \boxed{\approx 36.9^\circ}$$



9. Find all missing sides using trig ratios:

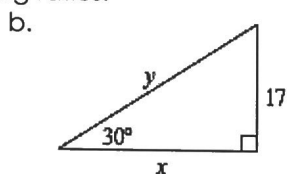


$$\boxed{y = 7}$$

$$\sin(45) = \frac{7}{x}$$

$$x = 7 / \sin(45)$$

$$\boxed{x = 9.9}$$



$$\tan(30) = \frac{17}{x}$$

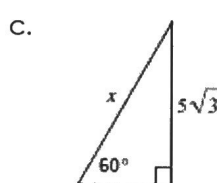
$$x = 17 / \tan(30)$$

$$\boxed{x = 29.4}$$

$$\sin(30) = \frac{17}{y}$$

$$\boxed{y = 34}$$

$$y = 17 / \sin(30)$$

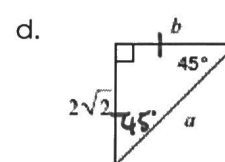


$$\tan(60) = \frac{5\sqrt{3}}{y}$$

$$\boxed{y = 5}$$

$$\sin(60) = \frac{5\sqrt{3}}{x}$$

$$\boxed{x = 10}$$



$$\boxed{b = 2\sqrt{2}}$$

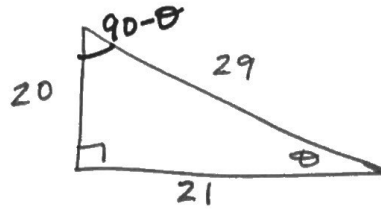
$$\sin(45) = \frac{2\sqrt{2}}{a}$$

$$a = \frac{2\sqrt{2}}{\sin(45)}$$

$$\boxed{a = 4}$$

More Complements:

10. Given $\sin \theta = \frac{20}{29}$.



$$20^2 + x^2 = 29^2$$

$$\cos \theta = \frac{21}{29}$$

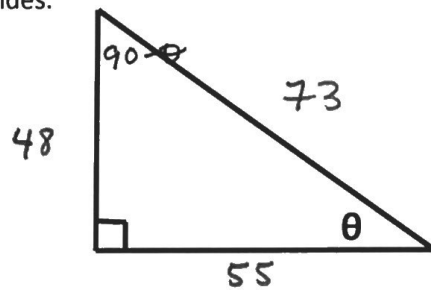
$$\sin(90 - \theta) = \frac{21}{29}$$

$$\cos(90 - \theta) = \frac{20}{29}$$

11. Given the following trigonometric values, label ALL of the triangle's sides.

$$\tan \theta = \frac{48}{55}$$

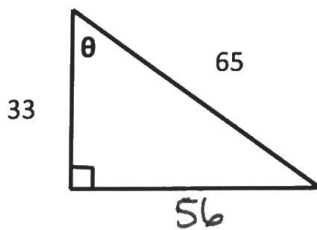
$$48^2 + 55^2 = 5329$$



Missing side length = 73

$$\cos \theta = \frac{55}{73} \quad \sin(90 - \theta) = \frac{55}{73} \quad \cos(90 - \theta) = \frac{48}{73} \quad \sin \theta = \frac{48}{73}$$

12. Given the triangle below, find the length missing side. Then answer the questions about the triangle.

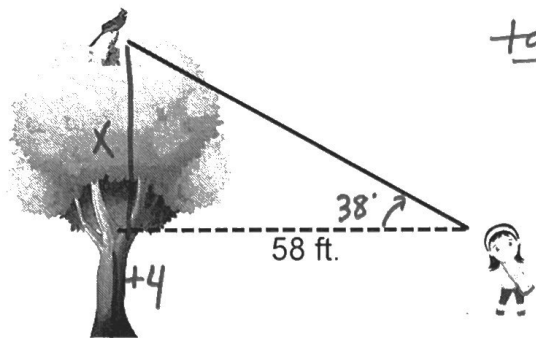


$$33^2 + x^2 = 65^2$$

$$x^2 = 3136$$

Missing side length = 56

$$\sin \theta = \frac{56}{65} \quad \cos \theta = \frac{33}{65} \quad \sin(90 - \theta) = \frac{33}{65} \quad \cos(90 - \theta) = \frac{56}{65}$$



$$\tan(38) = \frac{X}{58}$$

$$X = 58 \cdot \tan(38)$$

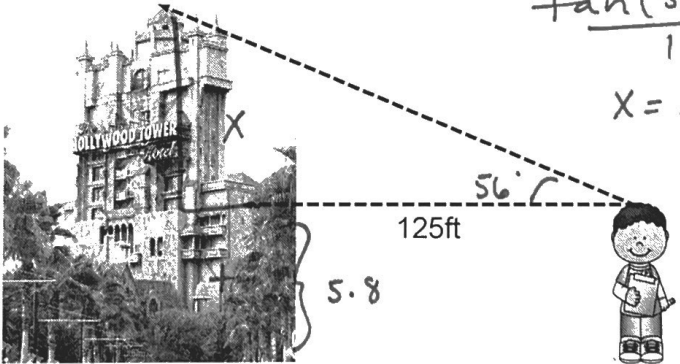
$$45.3$$

$$+ 4$$

$$\underline{\hspace{1.5cm}}$$

4 ft. **49.3 ft**

Carmen is a 4 foot tall young girl who is standing 58 ft. away from a tree. She is looking up at a cardinal, who has flown to the very top of the tree, with a 38 degree angle of elevation. Carmen is wondering how tall is the tree in case she decides to climb after it?



$$\tan(56) = \frac{X}{125}$$

$$X = 125 \cdot \tan(56)$$

$$X = 185.3$$

$$+ 5.8$$

$$\underline{\hspace{1.5cm}}$$

5.8ft **191.1 ft**

Harry is 5.8 ft. tall. He is looking up at the Tower of Terror at a 56 degree angle of elevation. Harry is wondering how tall is the Tower of Terror. If he can get a good enough estimate, his teacher said he could ride the ride!