Geometry

Ch. 8 Handout 8.4

Sine and Cosine Ratios

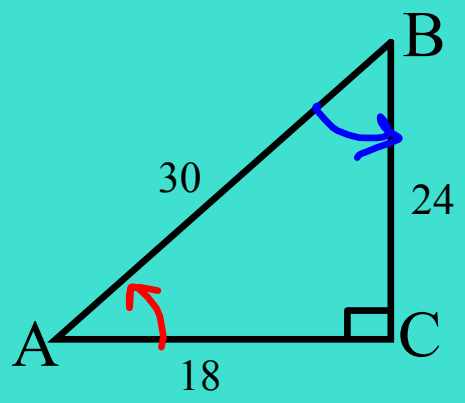
Tangent of an acute angle in a right triangle

$$\tan \angle = \frac{opp}{adj}$$

Pull

is a ratio of the length of the opposite side of an angle to the length of the adjacent side of the right triangle.

Example:



$$\tan \angle A = \frac{24}{18}$$

$$\tan \angle B = \frac{18}{24}$$

$\tan A = \frac{4}{3}$

$\tan B = \frac{3}{4}$

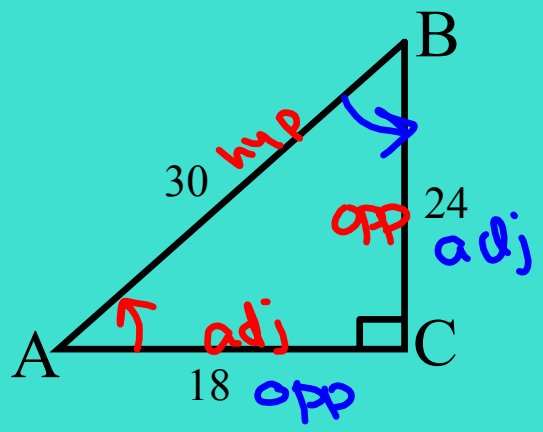
Sine of an acute angle in a right triangle

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

Pull

is a ratio of the length of the opposite side of an angle to the hypotenuse of the right triangle.

Example:



$$\sin\angle A = \frac{24}{30}$$

$\sin A = \frac{4}{5}$

$$\sin\angle B = \frac{18}{30}$$

$\sin B = \frac{3}{5}$

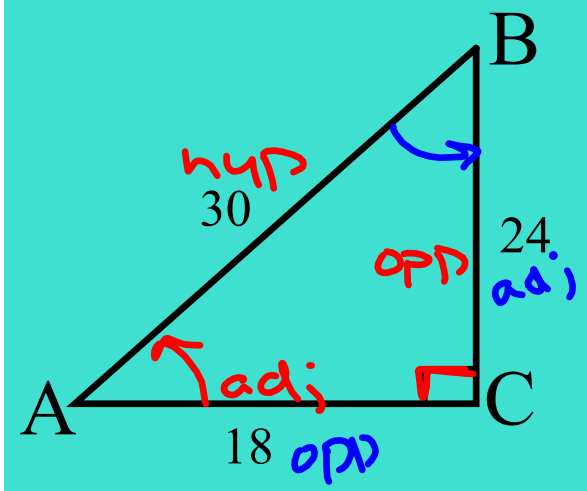
Cosine of an acute angle in a right triangle

$$\cos\angle = \frac{adj}{hyp}$$

Pull

is a ratio of the length of the adjacent side of an angle to the hypotenuse of the right triangle.

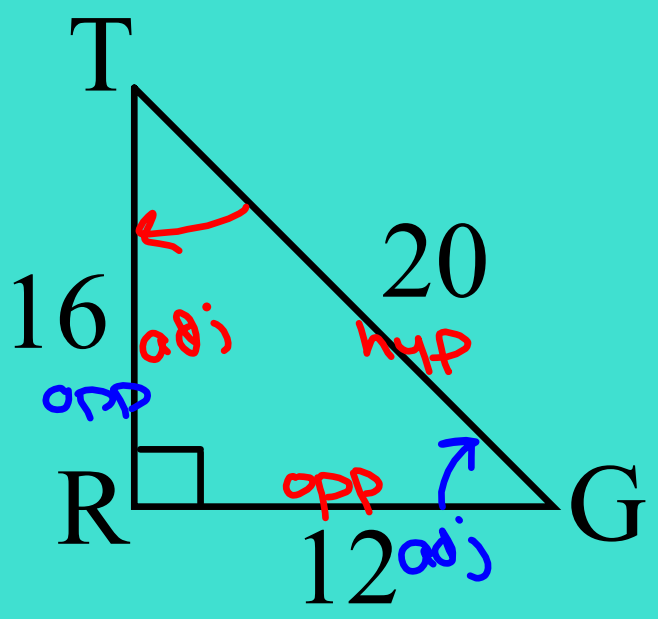
Example:



$\cos\angle A = \frac{18}{30}$ $\cos A = \frac{3}{5}$

$\cos\angle B = \frac{24}{30}$ $\cos B = \frac{4}{5}$

1. Use the triangle to find sin T, cos T, sin G, and cos G. Write your answers in simplest terms.



$\sin T = \frac{12}{20}$

$\cos T = \frac{16}{20}$

$\sin G = \frac{16}{20}$

$\cos G = \frac{12}{20}$

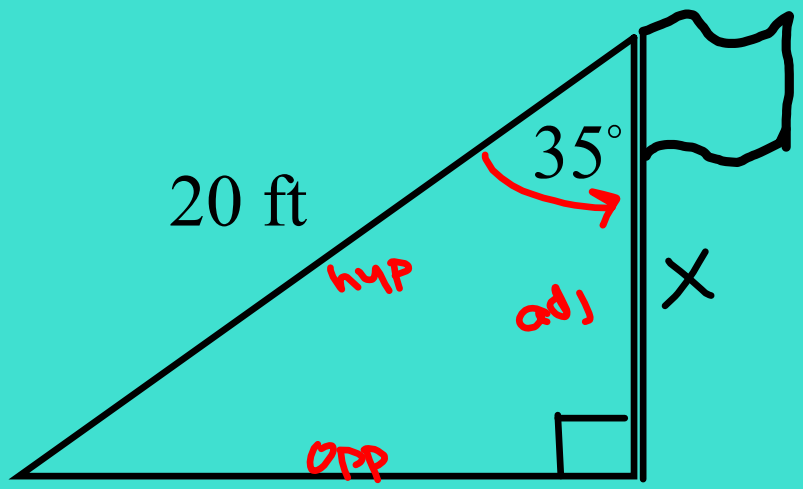
$\sin T = \frac{3}{5}$

$\cos T = \frac{4}{5}$

$\sin G = \frac{4}{5}$

$\cos G = \frac{3}{5}$

A 20-ft wire supporting a flagpole forms a 35° angle with the flagpole. To the nearest foot, how high is the flagpole?



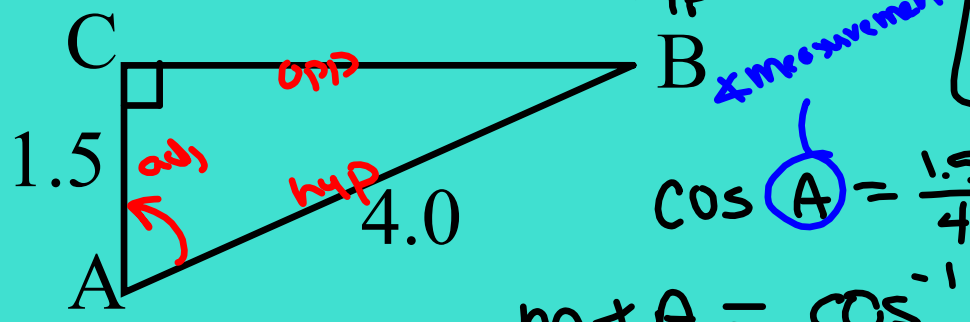
$\cos 4 = \frac{adj}{hyp}$

$20 \cos 35 = \frac{x}{20}(20)$

$20 \cos 35 = x$

$x \approx 16$ ft

3. A right triangle has a leg 1.5 units long and hypotenuse 4.0 units long. Find the measure of its acute angles to the nearest degree.



$\cos A = \frac{adj}{hyp}$

measurement

$\cos(A) = \frac{1.5}{4}$

$m\angle A = \cos^{-1}\left(\frac{1.5}{4}\right)$

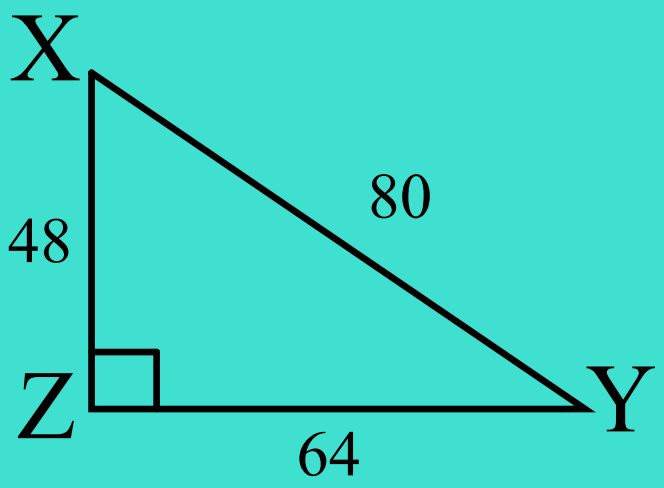
$m\angle A \approx 68$

$m\angle B \approx 22$

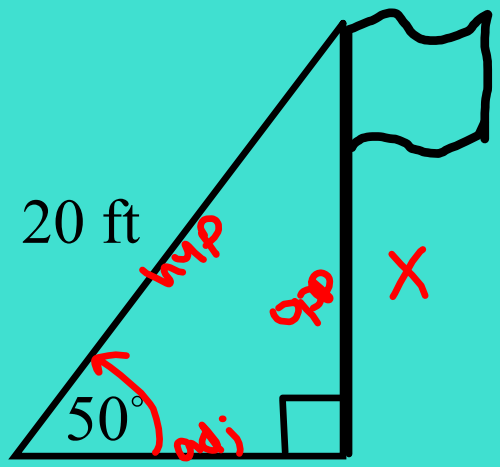
90
−68
22

4. a) Write the sine and cosine ratios for $\angle X$ and $\angle Y$.

b) In general, how are sin X and cos Y related?



5. A 20-ft wire supporting a flagpole forms a 50° angle with the ground. What is the height of the flagpole to the nearest foot?



$$\sin 4 = \frac{opp}{hyp}$$

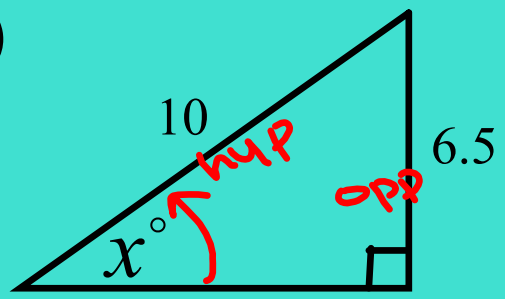
$$20 \sin 50 = \frac{x}{20} \quad (20)$$

$$20 \sin 50 = x$$

$$x \approx 15 \text{ ft}$$

6. Find the value of x. Round your answer to the nearest degree.

a)

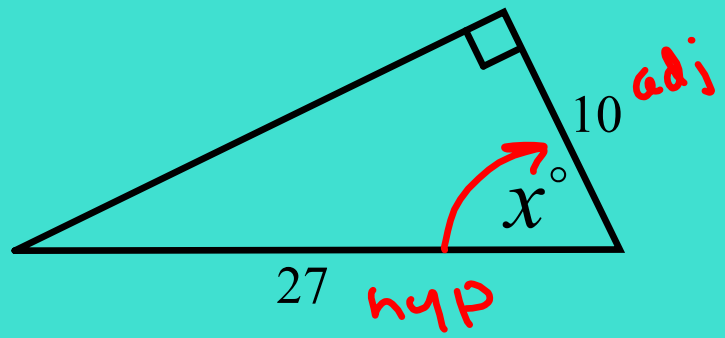


$\sin x = \frac{6.5}{10}$

$x = \sin^{-1}\left(\frac{6.5}{10}\right)$

$x \approx 41°$

b)

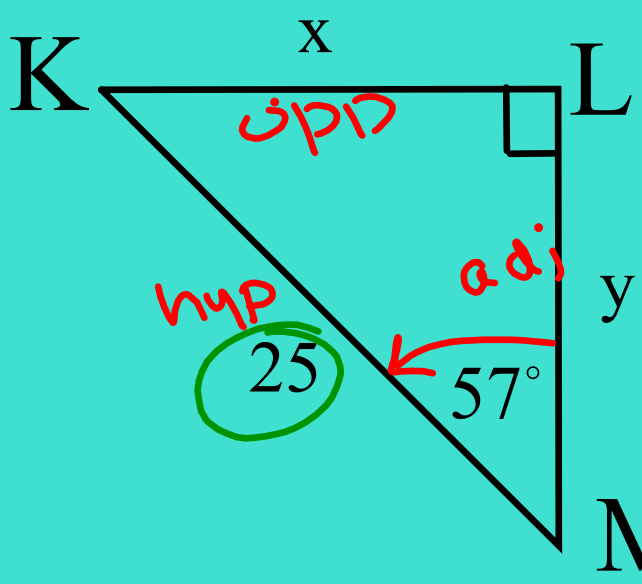


$\cos x = \frac{10}{27}$

$x = \cos^{-1}\left(\frac{10}{27}\right)$

$x \approx 68°$

7. Find x and y to the nearest tenth.



$(25)\sin 57 = \frac{x}{25}(25)$

$25\sin 57 = x$

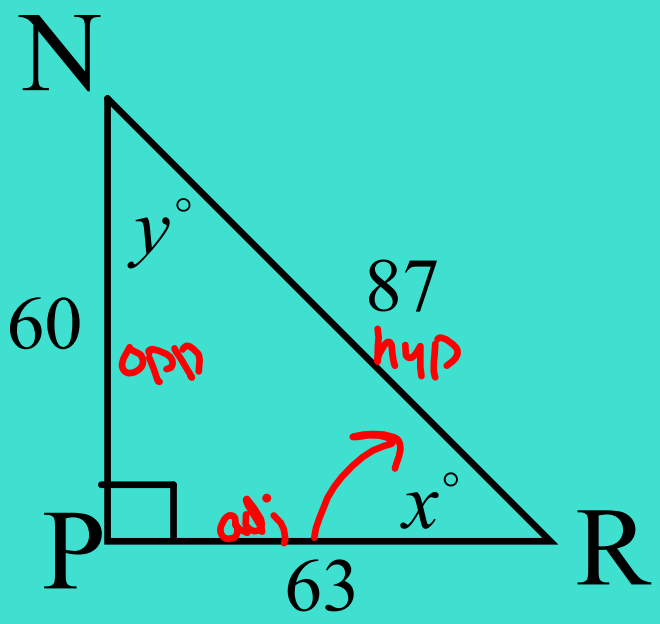
$x \approx 21$

$25\cos 57 = \frac{y}{25}(25)$

$25\cos 57 = y$

$y \approx 13.6$

8. Find x and y to the nearest degree.



$\cos x = \frac{63}{87}$

$x = \cos^{-1}\left(\frac{63}{87}\right)$

$x \approx 44°$

$y \approx 46°$