

7.5–7.6

»» Sine, Cosine, and Tangent Ratios

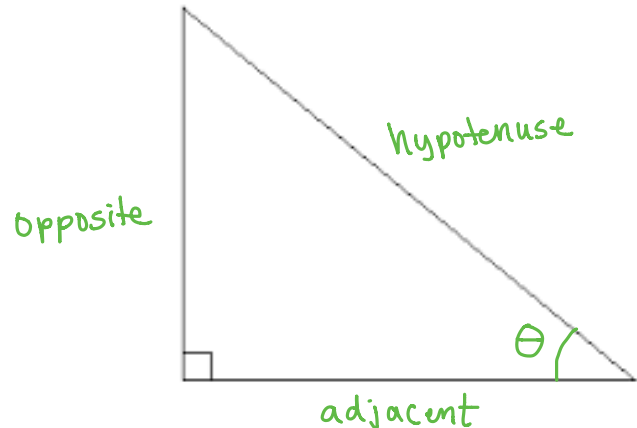
☆ This is a very important section!

Trig Ratios

- ▶ Ratio of the sides of a right triangle compared to an angle θ (theta).
- ▶ Used to find a missing sides or angles in a right triangle.

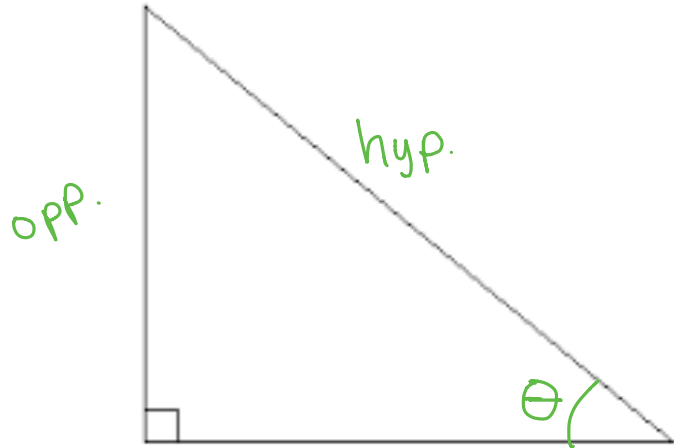
▶ Side Names:

- ▶ hypotenuse (opposite right angle)
- ▶ adjacent (touches θ)
- ▶ opposite (opposite θ)



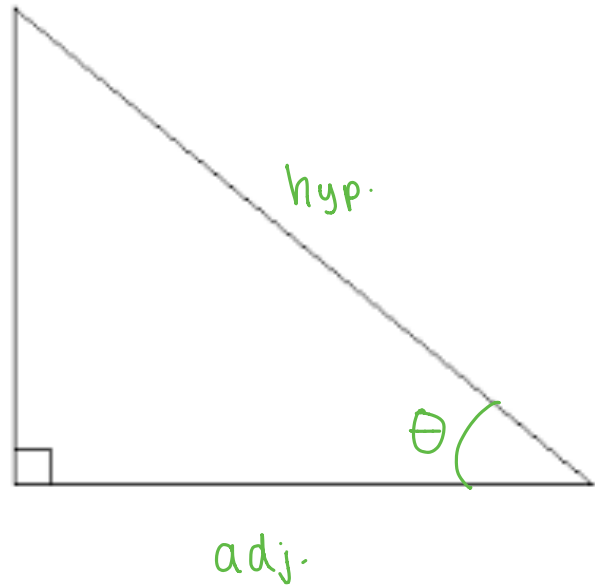
Sine Ratio (sin)

$$\sin \theta = \frac{\text{opposite}}{\text{hypotenuse}}$$



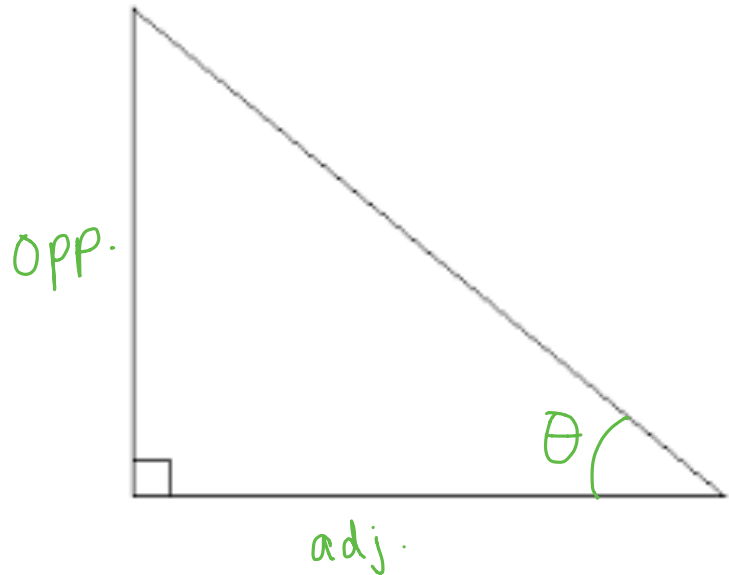
Cosine Ratio (cos)

$$\cos \theta = \frac{\text{adjacent}}{\text{hypotenuse}}$$



Tangent Ratio (tan)

$$\tan \theta = \frac{\text{opposite}}{\text{adjacent}}$$



To Help Remember Use:

▶ SOH CAH TOA

↓

$$\sin \theta = \frac{\text{Opposite}}{\text{Hypotenuse}}$$

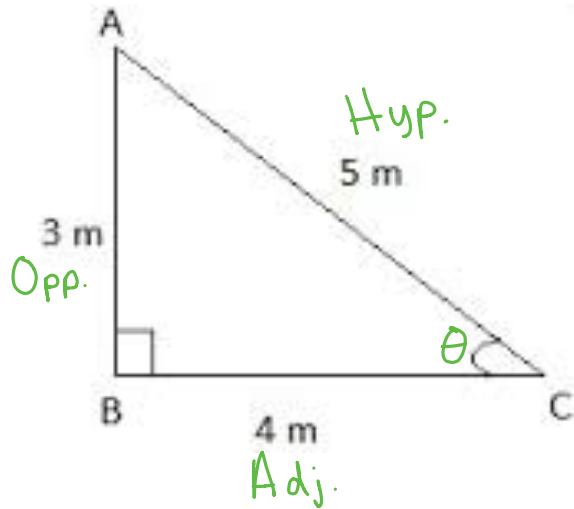
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$$\cos \theta = \frac{\text{Adjacent}}{\text{Hypotenuse}}$$

↓

$$\tan \theta = \frac{\text{Opposite}}{\text{Adjacent}}$$

EX: Find sin, cos, and tan of angle C.



$$\sin \theta = \frac{O}{H} = \boxed{\frac{3}{5}}$$

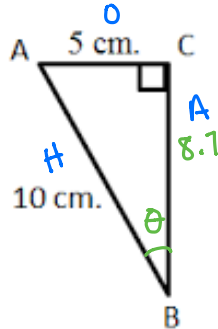
$$\cos \theta = \frac{A}{H} = \boxed{\frac{4}{5}}$$

$$\tan \theta = \frac{O}{A} = \boxed{\frac{3}{4}}$$

EX: Find sin, cos, and tan of angle B and angle E.

* Find missing side:

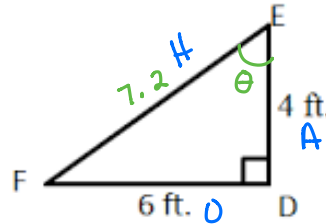
$$\begin{aligned} 5^2 + x^2 &= 10^2 \\ 25 + x^2 &= 100 \\ -25 & \quad -25 \\ \hline \sqrt{x^2} &= \sqrt{75} \\ x &= 8.7 \end{aligned}$$



$$\sin \theta = \frac{O}{H} = \frac{5}{10} = \frac{1}{2} = \boxed{0.5}$$

$$\cos \theta = \frac{A}{H} = \frac{8.7}{10} = \boxed{0.87}$$

$$\tan \theta = \frac{O}{A} = \frac{5}{8.7} = \boxed{0.57}$$



* Find missing side:

$$\begin{aligned} 4^2 + 6^2 &= x^2 \\ 16 + 36 &= x^2 \\ \sqrt{52} &= \sqrt{x^2} \\ 7.2 &= x \end{aligned}$$

$$\sin \theta = \frac{O}{H} = \frac{6}{7.2} = \boxed{0.83}$$

$$\cos \theta = \frac{A}{H} = \frac{4}{7.2} = \boxed{0.56}$$

$$\tan \theta = \frac{O}{A} = \frac{6}{4} = \frac{3}{2} = \boxed{1.5}$$