



# TRIGONOMETRIC RATIOS

## RIGHT TRIANGLES

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## TOPIC OUTLINE

Sine

Cosine

Tangent

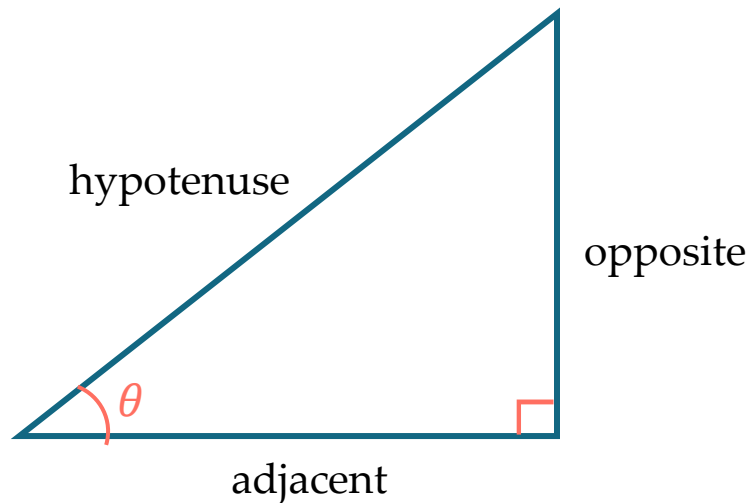


# TRIGONOMETRIC RATIOS



# TRIGONOMETRIC RATIOS

Consider a right triangle with  $\theta$  as one of its acute angles.



## Trigonometric Ratios

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

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

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

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

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

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



# RECIPROCAL IDENTITIES

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$$\sin \theta = \frac{1}{\csc \theta}$$

$$\csc \theta = \frac{1}{\sin \theta}$$

$$\cos \theta = \frac{1}{\sec \theta}$$

$$\sec \theta = \frac{1}{\cos \theta}$$

$$\tan \theta = \frac{1}{\cot \theta}$$

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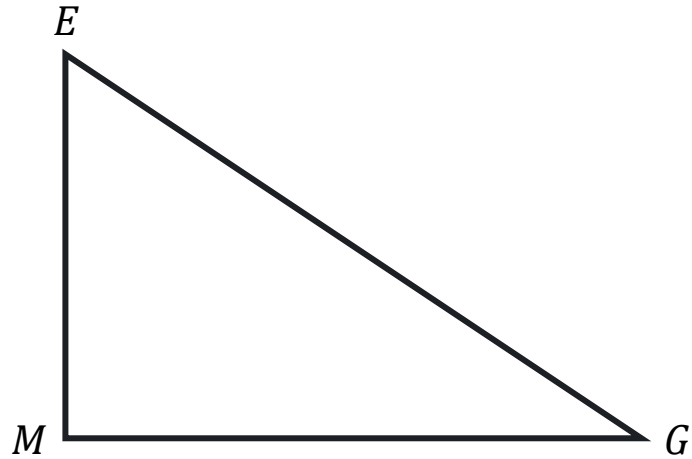
$$\cot \theta = \frac{\text{adjacent}}{\text{opposite}}$$



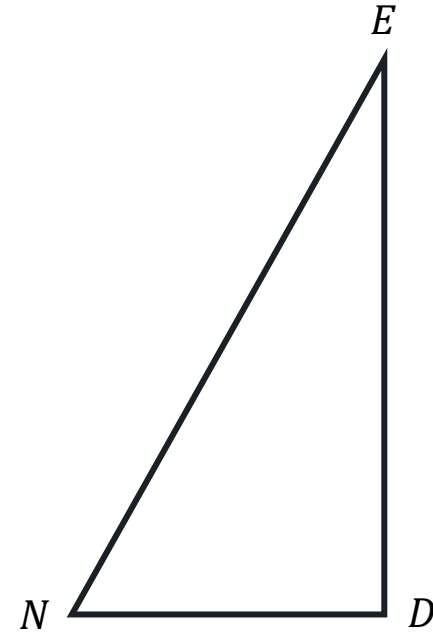
## EXERCISE

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Relative to angle  $G$ , which side is the adjacent side of  $\triangle EMG$ ?



Relative to angle  $N$ , which side is the opposite side of  $\triangle END$ ?

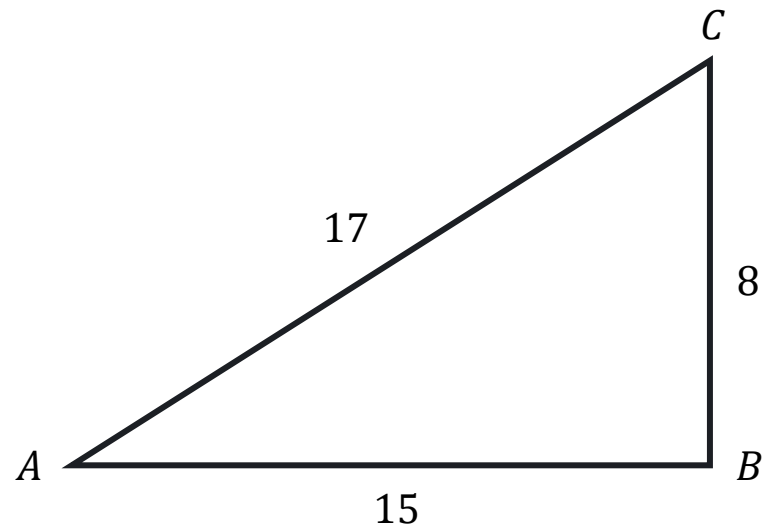


## EXERCISE

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In the given triangle, find  $\sin A$ ,  $\cos C$ ,  $\csc A$ , and  $\tan C$ .

Solution



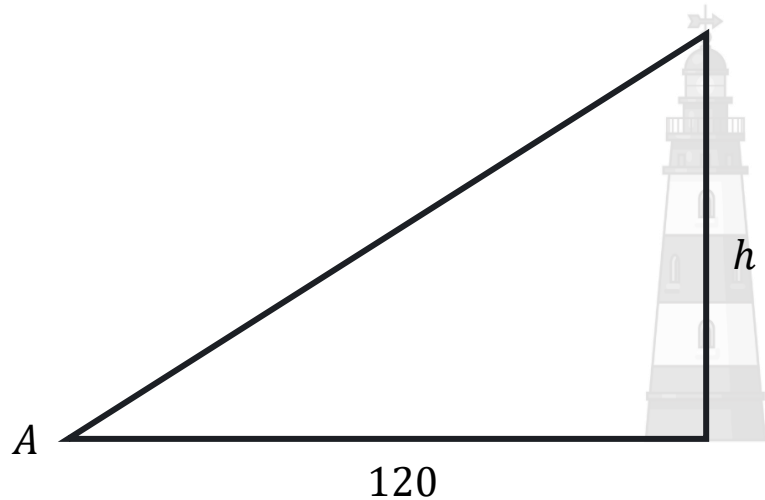
## EXERCISE

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A surveyor wants to determine the height of a lighthouse. Standing 120 feet away from its base, he measures the angle of elevation to the top and find that:

$$\tan A = \frac{2}{3}$$

Using this information, calculate the height of the lighthouse.



Solution





## EXERCISE

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Find the cosine of an angle if its sine is  $\frac{3}{5}$ .

Solution



## EXERCISE

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Find the cosine of an angle if its sine is  $\frac{3}{5}$ .

Solution



## EXERCISE

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A ladder is leaning against the side of a house. The ladder is 26 feet long and forms an angle with the ground such that the cosine of the angle is  $\frac{1}{4}$ . How far is the base of the ladder from the house?

Solution



## EXERCISE

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A base line AC 350 ft. in length is laid along one bank of a river. On the opposite bank a point B is located so that CB is perpendicular to AC. The tangent of the angle CAB is then measured and found to be  $\frac{16}{5}$ . Find the width of the river.

Solution



# SEATWORK

