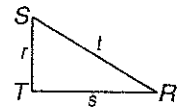


7-4 Study Guide and Intervention

Trigonometry

Trigonometric Ratios The ratio of the lengths of two sides of a right triangle is called a **trigonometric ratio**. The three most common ratios are **sine**, **cosine**, and **tangent**, which are abbreviated *sin*, *cos*, and *tan*, respectively.

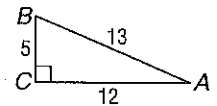


$$\begin{aligned} \sin R &= \frac{\text{leg opposite } \angle R}{\text{hypotenuse}} \\ &= \frac{r}{t} \end{aligned}$$

$$\begin{aligned} \cos R &= \frac{\text{leg adjacent to } \angle R}{\text{hypotenuse}} \\ &= \frac{s}{t} \end{aligned}$$

$$\begin{aligned} \tan R &= \frac{\text{leg opposite } \angle R}{\text{leg adjacent to } \angle R} \\ &= \frac{r}{s} \end{aligned}$$

Example Find $\sin A$, $\cos A$, and $\tan A$. Express each ratio as a decimal to the nearest thousandth.



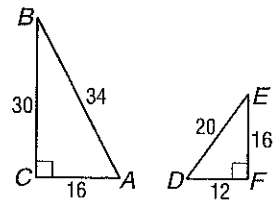
$$\begin{aligned} \sin A &= \frac{\text{opposite leg}}{\text{hypotenuse}} \\ &= \frac{BC}{AB} \\ &= \frac{5}{13} \\ &\approx 0.385 \end{aligned}$$

$$\begin{aligned} \cos A &= \frac{\text{adjacent leg}}{\text{hypotenuse}} \\ &= \frac{AC}{AB} \\ &= \frac{12}{13} \\ &\approx 0.923 \end{aligned}$$

$$\begin{aligned} \tan A &= \frac{\text{opposite leg}}{\text{adjacent leg}} \\ &= \frac{BC}{AC} \\ &= \frac{5}{12} \\ &\approx 0.417 \end{aligned}$$

Exercises

Find the indicated trigonometric ratio as a fraction and as a decimal. If necessary, round to the nearest ten-thousandth.



1. $\sin A$
2. $\tan B$
3. $\cos A$
4. $\cos B$
5. $\sin D$
6. $\tan E$
7. $\cos E$
8. $\cos D$

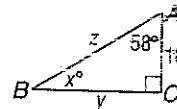
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Study Guide and Intervention *(continued)*

Trigonometry

Use Trigonometric Ratios In a right triangle, if you know the measures of two sides or if you know the measures of one side and an acute angle, then you can use trigonometric ratios to find the measures of the missing sides or angles of the triangle.

Example Find x , y , and z . Round each measure to the nearest whole number.



a. Find x .

$$x + 58 = 90$$

$$x = 32$$

b. Find y .

$$\tan A = \frac{y}{18}$$

$$\tan 58^\circ = \frac{y}{18}$$

$$y = 18 \tan 58^\circ$$

$$y \approx 29$$

c. Find z .

$$\cos A = \frac{18}{z}$$

$$\cos 58^\circ = \frac{18}{z}$$

$$z \cos 58^\circ = 18$$

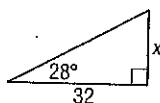
$$z = \frac{18}{\cos 58^\circ}$$

$$z \approx 34$$

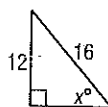
Exercises

Find x . Round to the nearest tenth.

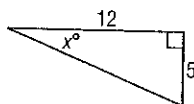
1.



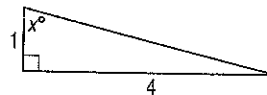
2.



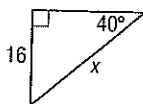
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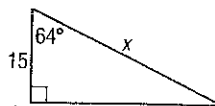
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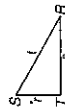
Study Guide and Intervention
Trigonometry

Trigonometric Ratios The ratio of the lengths of two sides of a right triangle is called a **trigonometric ratio**. The three most common ratios are sine, cosine, and tangent, which are abbreviated *sin*, *cos*, and *tan*, respectively.

$$\sin R = \frac{\text{leg opposite } \angle R}{\text{hypotenuse}} = \frac{r}{t}$$

$$\cos R = \frac{\text{leg adjacent to } \angle R}{\text{hypotenuse}} = \frac{s}{t}$$

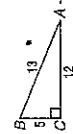
$$\tan R = \frac{\text{leg opposite } \angle R}{\text{leg adjacent to } \angle R} = \frac{r}{s}$$



Example

Find $\sin A$, $\cos A$, and $\tan A$. Express each ratio as a decimal to the nearest thousandth.

$$\begin{aligned} \sin A &= \frac{\text{opposite leg}}{\text{hypotenuse}} = \frac{BC}{AB} = \frac{5}{13} \approx 0.385 \\ \cos A &= \frac{\text{adjacent leg}}{\text{hypotenuse}} = \frac{AC}{AB} = \frac{12}{13} \approx 0.923 \\ \tan A &= \frac{\text{opposite leg}}{\text{adjacent leg}} = \frac{BC}{AC} = \frac{5}{12} \approx 0.417 \end{aligned}$$



Exercises

Find the indicated trigonometric ratio as a fraction and as a decimal. If necessary, round to the nearest ten-thousandth.

1. $\sin A = \frac{15}{17} \approx 0.8824$

2. $\tan B = \frac{8}{15} \approx 0.5333$

3. $\cos A = \frac{8}{17} \approx 0.4706$

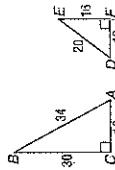
4. $\cos B = \frac{15}{17} \approx 0.8824$

5. $\sin D = \frac{4}{5} = 0.8$

6. $\tan E = \frac{3}{4} = 0.75$

7. $\cos E = \frac{4}{5} = 0.8$

8. $\cos D = \frac{3}{5} = 0.6$



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Study Guide and Intervention
Trigonometry

Use Trigonometric Ratios In a right triangle, if you know the measures of two sides or if you know the measures of one side and an acute angle, then you can use trigonometric ratios to find the measures of the missing sides or angles of the triangle.

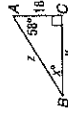
Example

Find x , y , and z . Round each measure to the nearest whole number.

a. Find x .
 $x + 65 = 90$
 $x = 32$

b. Find y .
 $\tan A = \frac{y}{18}$
 $\tan 58^\circ = \frac{y}{18}$
 $y = 18 \tan 58^\circ$
 $y \approx 29$

c. Find z .
 $\cos A = \frac{18}{z}$
 $\cos 68^\circ = \frac{18}{z}$
 $z \cos 68^\circ = 18$
 $z = \frac{18}{\cos 68^\circ}$
 $z \approx 34$



Exercises

Find x . Round to the nearest tenth.

