

NAME \_\_\_\_\_ DATE \_\_\_\_\_

4-3

# Trigonometric Ratios (Pages 206–214)

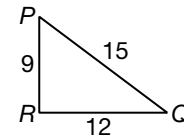
In a right triangle, the side opposite the right angle is the longest side. This side is called the **hypotenuse**. The other two sides are the **legs**.

<b>Definition of Trigonometric Ratios</b>	sine of $\angle A = \frac{\text{measure of leg opposite } \angle A}{\text{measure of hypotenuse}}$	$\sin A = \frac{a}{c}$	
	cosine of $\angle A = \frac{\text{measure of leg adjacent } \angle A}{\text{measure of hypotenuse}}$	$\cos A = \frac{b}{c}$	
	tangent of $\angle A = \frac{\text{measure of leg opposite } \angle A}{\text{measure of leg adjacent } \angle A}$	$\tan A = \frac{a}{b}$	

## EXAMPLES

**A** Find the sine, cosine, and tangent of angle  $Q$ .

$$\begin{aligned} \sin Q &= \frac{\text{opposite leg}}{\text{hypotenuse}} & \cos Q &= \frac{\text{adjacent leg}}{\text{hypotenuse}} & \tan Q &= \frac{\text{opposite leg}}{\text{adjacent leg}} \\ &= \frac{9}{15} \text{ or } 0.6 & &= \frac{12}{15} \text{ or } 0.8 & &= \frac{9}{12} \text{ or } 0.75 \end{aligned}$$



**B** Find the measure of angle  $P$ ,  $m\angle P$ , to the nearest degree.

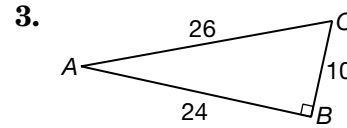
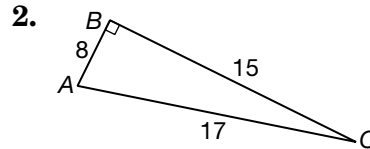
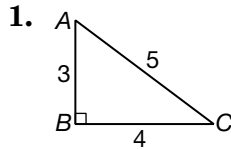
$$\sin P = \frac{\text{opposite leg}}{\text{hypotenuse}} \Rightarrow \sin P = \frac{12}{15} \text{ or } 0.8$$

Use a scientific calculator to find the angle measure with a sine of 0.8.

**Enter:** 0.8 [2nd] [SIN<sup>-1</sup>] **Result:** 53.13010235 So,  $m\angle P \approx 53^\circ$ .

## PRACTICE

For each triangle, find  $\sin C$ ,  $\cos C$ , and  $\tan C$  to the nearest thousandth. Use a calculator to find the value of each trigonometric ratio to the nearest ten thousandth if necessary.



4.  $\sin 14^\circ$       5.  $\cos 68^\circ$       6.  $\tan 80^\circ$       7.  $\cos 60^\circ$       8.  $\sin 85^\circ$

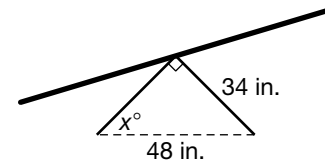
Use a calculator to find the measure of each angle to the nearest degree.

9.  $\sin B = 0.8192$       10.  $\cos M = 0.7660$       11.  $\tan W = 0.2309$   
 12.  $\cos Y = 0.7071$       13.  $\sin P = 0.9052$       14.  $\tan K = 0.2675$



**15. Standardized Test Practice** Which equation can be used to find the measure of the angle under the seesaw?

- A**  $\sin(x^\circ) = \frac{48}{34}$       **B**  $\cos(x^\circ) = \frac{48}{34}$   
**C**  $\sin(x^\circ) = \frac{34}{48}$       **D**  $\tan(x^\circ) = \frac{34}{48}$



**Answers:** 1.  $\sin C = \frac{3}{5}$ ;  $\cos C = \frac{4}{5}$ ;  $\tan C = \frac{3}{4}$     2.  $\sin C = \frac{8}{17}$ ;  $\cos C = \frac{15}{17}$ ;  $\tan C = \frac{8}{15}$     3.  $\sin C = \frac{10}{26}$ ;  $\cos C = \frac{24}{26}$ ;  $\tan C = \frac{5}{12}$     4. 0.2419    5. 0.3746    6. 5.6713    7. 0.5    8. 0.9962    9. 55°    10. 40°    11. 13°    12. 45°    13. 65°    14. 15°    15. C

