

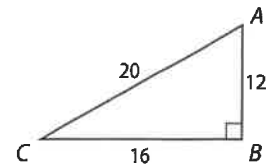
Check Your Understanding

Step-by-Step Solutions begin on page R14.



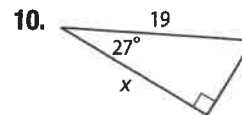
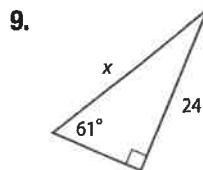
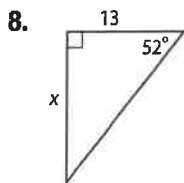
Example 1 Express each ratio as a fraction and as a decimal to the nearest hundredth.

1. $\sin A$
2. $\tan C$
3. $\cos A$
4. $\tan A$
5. $\cos C$
6. $\sin C$

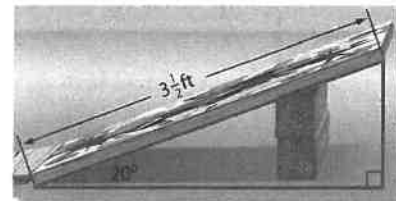


Example 2 7. Use a special right triangle to express $\sin 60^\circ$ as a fraction and as a decimal to the nearest hundredth.

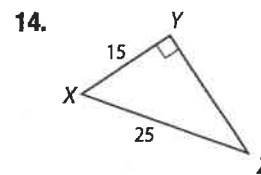
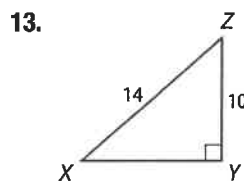
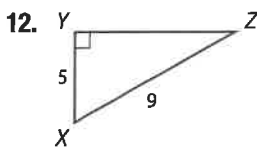
Example 3 Find x . Round to the nearest hundredth.



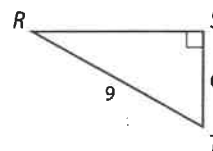
11. **SPORTS** David is building a bike ramp. He wants the angle that the ramp makes with the ground to be 20° . If the board he wants to use for his ramp is $3\frac{1}{2}$ feet long, about how tall will the ramp need to be at the highest point?



Example 4 **CCSS TOOLS** Use a calculator to find the measure of $\angle Z$ to the nearest tenth.



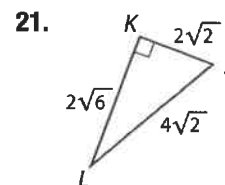
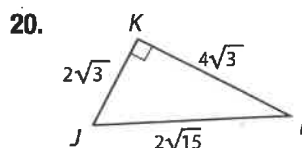
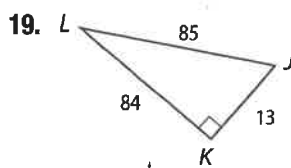
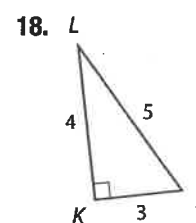
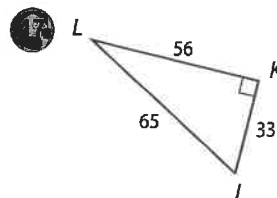
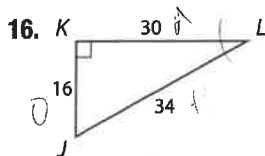
Example 5 15. Solve the right triangle. Round side measures to the nearest tenth and angle measures to the nearest degree.



Practice and Problem Solving

Extra Practice is on page R8.

Example 1 Find $\sin J$, $\cos J$, $\tan J$, $\sin L$, $\cos L$, and $\tan L$. Express each ratio as a fraction and as a decimal to the nearest hundredth.





Example 2 Use a special right triangle to express each trigonometric ratio as a fraction and as a decimal to the nearest hundredth.

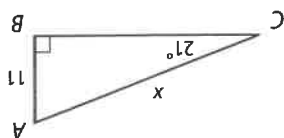
22. $\tan 60^\circ$
25. $\sin 30^\circ$

23. $\cos 30^\circ$
26. $\tan 45^\circ$

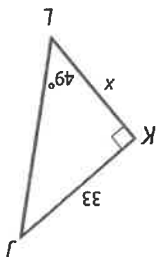
24. $\sin 45^\circ$
27. $\cos 60^\circ$

Example 3

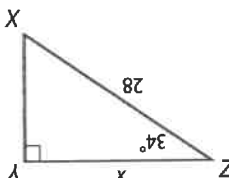
Find x . Round to the nearest tenth.



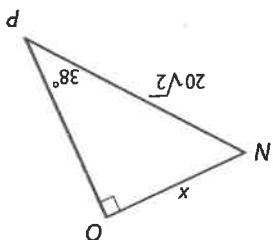
28. Find x .



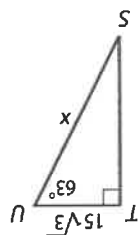
29. Find x .



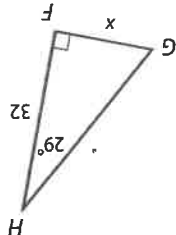
30. Find x .



33. Find x .

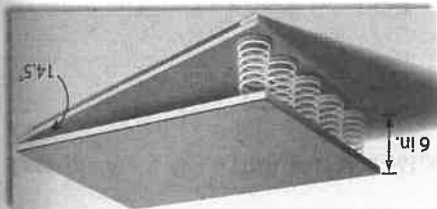


31. Find x .

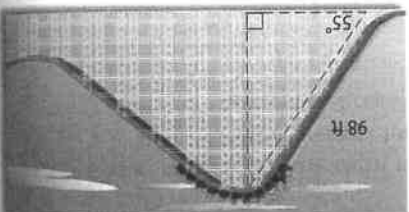


32. Find x .

34. GYMNASTICS The springboard that Eric uses in his gymnastics class has 6-inch coils and forms an angle of 14.5° with the base. About how long is the springboard?

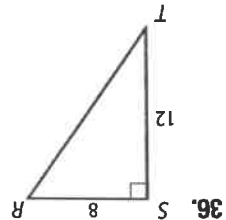


35. ROLLER COASTERS The angle of ascent of the first hill of a roller coaster is 55° . If the length of the track from the beginning of the ascent to the highest point is 98 feet, what is the height of the roller coaster when it reaches the top of the first hill?

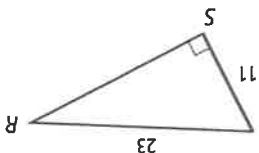


Example 4

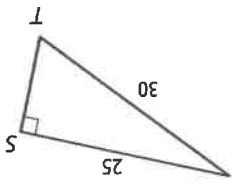
TOOLS Use a calculator to find the measure of $\angle T$ to the nearest tenth.



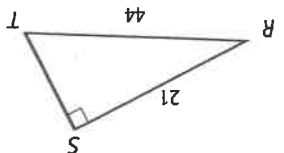
36. Find $\angle T$.



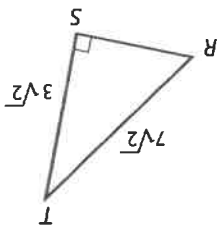
37. Find $\angle T$.



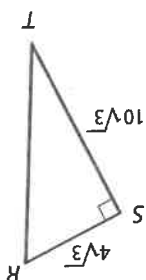
38. Find $\angle T$.



40. Find $\angle T$.



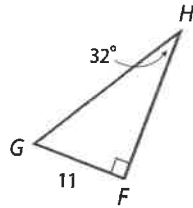
41. Find $\angle T$.



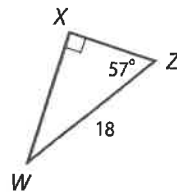
Example 5

Solve each right triangle. Round side measures to the nearest tenth and angle measures to the nearest degree.

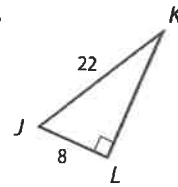
42.



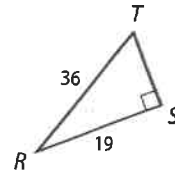
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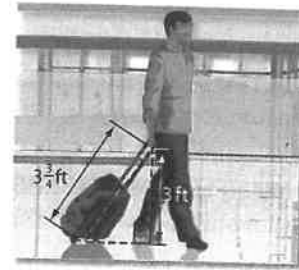
44.



45.



46. **BACKPACKS** Ramón has a rolling backpack that is $3\frac{3}{4}$ feet tall when the handle is extended. When he is pulling the backpack, Ramón's hand is 3 feet from the ground. What angle does his backpack make with the floor? Round to the nearest degree.



COORDINATE GEOMETRY Find the measure of each angle to the nearest tenth of a degree using the Distance Formula and an inverse trigonometric ratio.

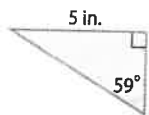
47. $\angle K$ in right triangle JKL with vertices $J(-2, -3)$, $K(-7, -3)$, and $L(-2, 4)$
 48. $\angle Y$ in right triangle XYZ with vertices $X(4, 1)$, $Y(-6, 3)$, and $Z(-2, 7)$
 49. $\angle A$ in right triangle ABC with vertices $A(3, 1)$, $B(3, -3)$, and $C(8, -3)$

50. **SCHOOL SPIRIT** Hana is making a pennant for each of the 18 girls on her basketball team. She will use $\frac{1}{2}$ -inch seam binding to finish the edges of the pennants.
 a. What is the total length of seam binding needed to finish all of the pennants?
 b. If seam binding is sold in 3-yard packages at a cost of \$1.79, how much will it cost?

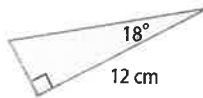


CCSS SENSE-MAKING Find the perimeter and area of each triangle. Round to the nearest hundredth.

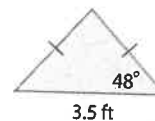
51.



52.



53.



54. Find the tangent of the greater acute angle in a triangle with side lengths of 3, 4, and 5 centimeters.
 55. Find the cosine of the smaller acute angle in a triangle with side lengths of 10, 24, and 26 inches.

56. **ESTIMATION** Ethan and Tariq want to estimate the area of the field that their team will use for soccer practice. They know that the field is rectangular, and they have paced off the width of the field as shown. They used the fence posts at the corners of the field to estimate that the angle between the length of the field and the diagonal is about 40° . If they assume that each of their steps is about 18 inches, what is the area of the practice field in square feet? Round to the nearest square foot.

