

Since the new ratios are inverses or reciprocals of the sine, cosine, and tangent, they can also be expressed as shown below.

$$\csc \theta = \frac{1}{\sin \theta} \quad \sec \theta = \frac{1}{\cos \theta} \quad \cot \theta = \frac{1}{\tan \theta}$$

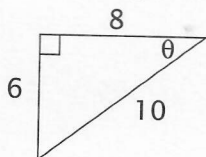
Example 2

Show that the relationships above are true using the ratios from example 1.

$\csc \theta = \frac{1}{\sin \theta}$ $\frac{5}{3} = \frac{1}{\frac{3}{5}}$ $\frac{5}{3} = \frac{1 \times \frac{5}{3}}{\frac{3}{5} \times \frac{5}{3}}$ $\frac{5}{3} = \frac{5}{3} \quad \checkmark$	$\sec \theta = \frac{1}{\cos \theta}$ $\frac{5}{4} = \frac{1}{\frac{4}{5}}$ $\frac{5}{4} = \frac{1 \times \frac{5}{4}}{\frac{4}{5} \times \frac{5}{4}}$ $\frac{5}{4} = \frac{5}{4} \quad \checkmark$	$\cot \theta = \frac{1}{\tan \theta}$ $\frac{4}{3} = \frac{1}{\frac{3}{4}}$ $\frac{4}{3} = \frac{1 \times \frac{4}{3}}{\frac{3}{4} \times \frac{4}{3}}$ $\frac{4}{3} = \frac{4}{3} \quad \checkmark$
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Practice Problems 1

Find all six trig ratios for θ .



1. $\sin \theta =$

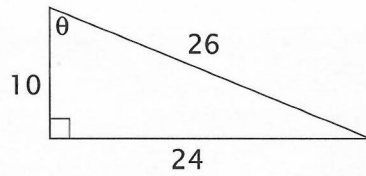
4. $\csc \theta =$

2. $\cos \theta =$

5. $\sec \theta =$

3. $\tan \theta =$

6. $\cot \theta =$



7. $\sin \theta =$

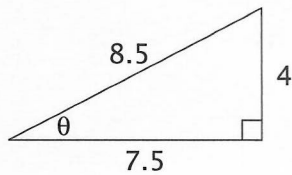
10. $\csc \theta =$

8. $\cos \theta =$

11. $\sec \theta =$

9. $\tan \theta =$

12. $\cot \theta =$



13. $\sin \theta =$

16. $\csc \theta =$

14. $\cos \theta =$

17. $\sec \theta =$

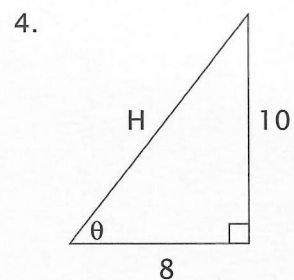
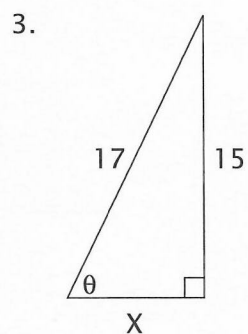
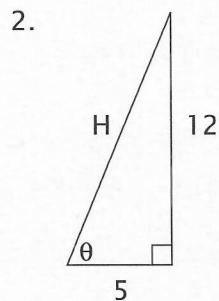
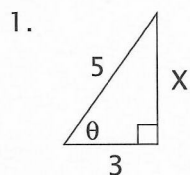
15. $\tan \theta =$

18. $\cot \theta =$

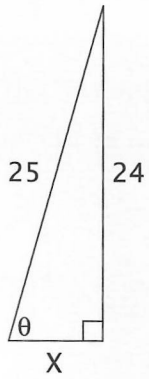
The other new concept in this lesson involves changing the fractions to decimals rounded to the ten-thousandths place. Look at the solutions for #1–6, and then go back and complete #7–18 by changing each fraction to a decimal.

Practice Problems 2

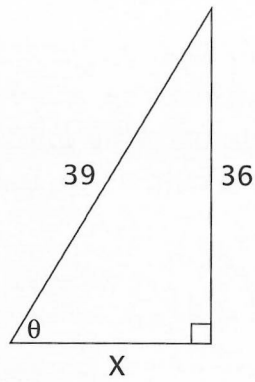
Find the missing side, and then name all six trigonometric ratios of θ for each triangle. State your answers as fractions and as decimals. If an answer has a radical in it, leave it as a radical.



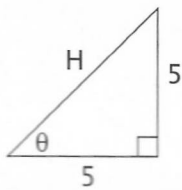
5.



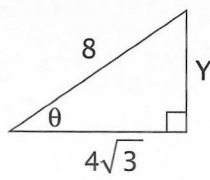
6.



7.



8.



9.

