



Vocabulary

Review

The Venn diagram at the right shows the relationship between *similar* and *congruent* figures. Write T for *true* or F for *false*.

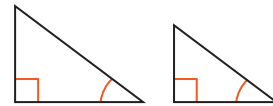
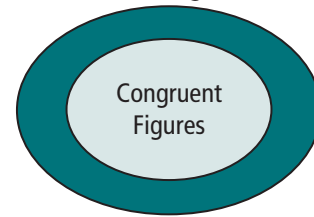
- All *similar* figures are congruent figures.
- All congruent figures are *similar* figures.
- Some *similar* figures are congruent figures.
- Circle the postulate or theorem you can use to verify that the triangles at the right are *similar*.

AA ~ Postulate

SAS ~ Theorem

SSS ~ Theorem

Similar Figures



Vocabulary Builder

ratio (noun) RAY shee oh

Related Words: rate, rational

Definition: A **ratio** is the comparison of two quantities by division.

Example: If there are 6 triangles and 5 squares, the **ratio** of triangles to squares is $\frac{6}{5}$ and the **ratio** of square to triangles is $\frac{5}{6}$.

Use Your Vocabulary

Use the triangle at the right for Exercises 5–7.

5. Circle the *ratio* of the length of the longer leg to the length of the shorter leg.

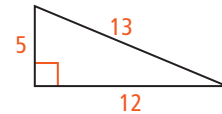
$\frac{5}{13}$ $\frac{5}{12}$ $\frac{12}{13}$ $\frac{13}{12}$ $\frac{12}{5}$ $\frac{13}{5}$

6. Circle the *ratio* of the length of the shorter leg to the length of the hypotenuse.

$\frac{5}{13}$ $\frac{5}{12}$ $\frac{12}{13}$ $\frac{13}{12}$ $\frac{12}{5}$ $\frac{13}{5}$

7. Circle the *ratio* of the length of the longer leg to the length of the hypotenuse.

$\frac{5}{13}$ $\frac{5}{12}$ $\frac{12}{13}$ $\frac{13}{12}$ $\frac{12}{5}$ $\frac{13}{5}$

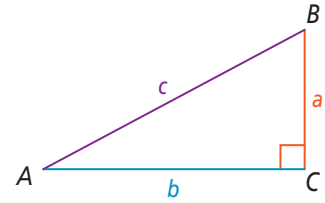


Key Concept The Trigonometric Ratios

$$\text{sine of } \angle A = \frac{\text{length of leg opposite } \angle A}{\text{length of hypotenuse}} = \frac{a}{c}$$

$$\text{cosine of } \angle A = \frac{\text{length of leg adjacent to } \angle A}{\text{length of hypotenuse}} = \frac{\quad}{c}$$

$$\text{tangent of } \angle A = \frac{\text{length of leg opposite } \angle A}{\text{length of leg adjacent to } \angle A} = \frac{\quad}{\quad}$$



Draw a line from each trigonometric ratio in Column A to its corresponding ratio in Column B.

Column A

Column B

- | | |
|--|---|
| <p>8. $\sin B$</p> <p>9. $\cos B$</p> <p>10. $\tan B$</p> <p>11. Reasoning Suppose $\triangle ABC$ is a right isosceles triangle. What would the tangent of $\angle B$ equal? Explain.</p> | <p>$\frac{a}{c}$</p> <p>$\frac{b}{a}$</p> <p>$\frac{b}{c}$</p> |
|--|---|



Problem 1 Writing Trigonometric Ratios

Got It? What are the sine, cosine, and tangent ratios for $\angle G$?

12. Circle the measure of the leg opposite $\angle G$.

8 15 17

13. Circle the measure of the hypotenuse.

8 15 17

14. Circle the measure of the leg adjacent to $\angle G$.

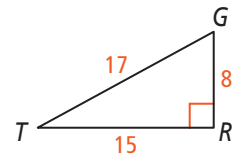
8 15 17

15. Write each trigonometric ratio.

$$\sin G = \frac{\text{opposite}}{\text{hypotenuse}} = \frac{\quad}{\quad}$$

$$\cos G = \frac{\text{adjacent}}{\text{hypotenuse}} = \frac{\quad}{\quad}$$

$$\tan G = \frac{\text{opposite}}{\text{adjacent}} = \frac{\quad}{\quad}$$





Problem 2 Using a Trigonometric Ratio to Find Distance

Got It? Find the value of w to the nearest tenth.

Below is one student's solution.



~~$$\begin{aligned} \cos 54^\circ &= \frac{w}{17} \\ \cos 54^\circ(17) &= w \\ 9.992349289 &\approx w \\ 10 &\approx w \end{aligned}$$~~

16. Circle the trigonometric ratio that uses sides w and 17.

$\sin 54^\circ$ $\cos 54^\circ$ $\tan 54^\circ$

17. What error did the student make?

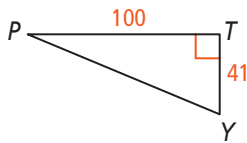
18. Find the value of w correctly.

19. The value of w to the nearest tenth is .



Problem 3 Using Inverses

Got It? Use the figure below. What is $m\angle Y$ to the nearest degree?



20. Circle the lengths that you know.

hypotenuse side adjacent to $\angle Y$ side opposite $\angle Y$

21. Cross out the ratios that you will NOT use to find $m\angle Y$.

sine cosine tangent

22. Underline the correct word to complete the statement.

If you know the sine, cosine, or tangent ratio of an angle, you can use the inverse / ratio to find the measure of the angle.

23. Follow the steps to find $m\angle Y$.

1 Write the ratio.

$$\square Y = \frac{\square}{41}$$

2 Use the inverse.

$$Y = \square \left(\frac{\square}{41} \right)$$

3 Use a calculator.

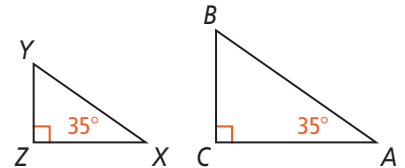
$$Y \approx \square$$

24. To the nearest degree, $m\angle Y \approx \square$.



Lesson Check • Do you UNDERSTAND?

Error Analysis A student states that $\sin A > \sin X$ because the lengths of the sides of $\triangle ABC$ are greater than the lengths of the sides of $\triangle XYZ$. What is the student's error? Explain.



Underline the correct word(s) to complete each sentence.

25. $\triangle ABC$ and $\triangle XYZ$ are / are not similar.

26. $\angle A$ and $\angle X$ are / are not congruent, so $\sin 35^\circ$ is / is not equal to $\sin 35^\circ$.

27. What is the student's error? Explain.



Math Success

Check off the vocabulary words that you understand.

trigonometric ratios

sine

cosine

tangent

Rate how well you can use *trigonometric ratios*.

