

LESSON

Reading Strategies

8-2 Use a Mnemonic

You can remember the trigonometric ratios by using a mnemonic: one word for the first letter of each word in the equations. Here is a sample mnemonic and examples for the triangle at right.

Such
Outrageous
Hats

$$\text{Sine} = \frac{\text{Opposite}}{\text{Hypotenuse}}$$

Example: $\sin B = \frac{24}{26} = \frac{12}{13}$

Can
Attract
Horses

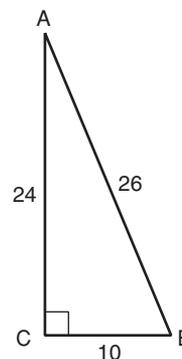
$$\text{Cosine} = \frac{\text{Adjacent}}{\text{Hypotenuse}}$$

Example: $\cos B = \frac{10}{26} = \frac{5}{13}$

Tigers
Or
Alligators

$$\text{Tangent} = \frac{\text{Opposite}}{\text{Adjacent}}$$

Example: $\tan B = \frac{24}{10} = \frac{12}{5}$



1. Make up your own mnemonic for remembering the ratios.

S _____

O _____

H _____

C _____

A _____

H _____

T _____

O _____

A _____

2. How are the ratios for sine and cosine alike?

3. Which side is not used when finding the tangent of an angle? _____

4. Use the triangle above to find the following. Write the ratios both as a fraction and as a decimal rounded to the nearest hundredth.

a. $\sin A =$ _____

b. $\cos A =$ _____

c. $\tan A =$ _____

LESSON 8-2 Review for Mastery

8-2 Trigonometric Ratios continued

You can use a calculator to find the value of trigonometric ratios.
 $\cos 38^\circ \approx 0.7880107536$ or about 0.79

You can use trigonometric ratios to find side lengths of triangles.

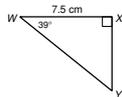
Find WY .

$\cos W = \frac{\text{adjacent leg}}{\text{hypotenuse}}$

Write a trigonometric ratio that involves WY .

$\cos 39^\circ = \frac{7.5 \text{ cm}}{WY}$

Substitute the given values.



$WY = \frac{7.5}{\cos 39^\circ}$

Solve for WY .

$WY \approx 9.65 \text{ cm}$

Simplify the expression.

Use your calculator to find each trigonometric ratio. Round to the nearest hundredth.

- 9. $\sin 42^\circ$ 0.67
- 10. $\cos 89^\circ$ 0.02
- 11. $\tan 55^\circ$ 1.43
- 12. $\sin 6^\circ$ 0.10

Find each length. Round to the nearest hundredth.

- 13. DE

39.65 m
- 14. FH

6.01 in.
- 15. JK

32.91 mm
- 16. US

55.32 cm

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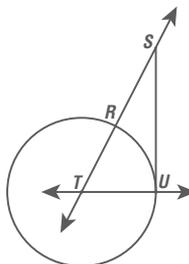
LESSON 8-2 Challenge

8-2 Trigonometric Ratios

Trigonometry was first used to help build pyramids, but the greatest demand for trigonometry came from astronomers. To illustrate the trigonometric functions, astronomers used arcs and chords in circles.

Follow the steps to explore trigonometric functions in a circle. You will need a compass, a protractor, a ruler, and a calculator. Record your measurements in the table. *Hint:* The trigonometric ratio cosine has a reciprocal ratio called secant, defined as $\sec T = \frac{1}{\cosine T}$. In abbreviated form, $\sec T = \frac{1}{\cos T}$.

- With a compass, draw a circle of radius 1 inch, centered at T . Draw an acute angle, $\angle RTU$, in which R and U are points on the circle.
- Draw a line tangent to the circle at U .
- Extend radius TR until it intersects the line that is tangent to the circle at U . Label the point of intersection S .
- Extend TU and TS so you can make the following measurements accurately. With a protractor measure $\angle T$. Given $TU = 1$ inch, measure TS and US in inches.
- Use your calculator to find $\tan T$. To find $\sec T$, find $\cos T$. Then find the reciprocal by using the $\boxed{x^{-1}}$ key. This will give $\sec T$.



Measure of $\angle T$	length US	$\tan T$	length TS	$\sec T$
Possible answer: 63°	Possible answer: $1\frac{3}{4}$ inches	Possible answer: 1.96	Possible answer: $1\frac{15}{16}$ inches	Possible answer: 2.20

The tangent of an angle is defined as opposite over adjacent. The adjacent side of $\angle T$ is TU , which in your diagram is the radius of 1 inch.

- Do you see any connection between the length of US and $\tan T$ and/or the length of TS and $\sec T$? Possible answer:

The length of US is close in value to $\tan T$, and the length of TS is close in value to $\sec T$.

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LESSON 8-2 Problem Solving

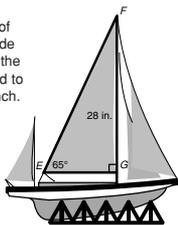
8-2 Trigonometric Ratios

- A ramp is used to load a 4-wheeler onto a truck bed that is 3 feet above the ground. The angle that the ramp makes with the ground is 32° . What is the horizontal distance covered by the ramp? Round to the nearest hundredth.
4.80 ft
- Find the perimeter of the triangle. Round to the nearest hundredth.

9.49 cm
- A right triangle has an angle that measures 55° . The leg adjacent to this angle has a length of 43 cm. What is the length of the other leg of the triangle? Round to the nearest tenth.
61.4 cm
- The hypotenuse of a right triangle measures 9 inches, and one of the acute angles measures 36° . What is the area of the triangle? Round to the nearest square inch.
19 in²

Choose the best answer.

- A 14-foot ladder makes a 62° angle with the ground. To the nearest foot, how far up the house does the ladder reach?
 A 6 ft
 B 7 ft
 C 12 ft
 D 16 ft
- What is EF , the measure of the longest side of the sail on the model? Round to the nearest inch.
 A 31 in.
 B 35 in.
 C 40 in.
 D 60 in.



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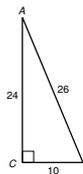
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Example: $\tan B = \frac{24}{10} = \frac{12}{5}$



- Make up your own mnemonic for remembering the ratios.

- Answers will vary.**
- S _____
 - O _____
 - H _____
 - C _____
 - A _____
 - H _____
 - T _____
 - O _____
 - A _____

- How are the ratios for sine and cosine alike?

Both ratios have Hypotenuse in the denominator.

- Which side is not used when finding the tangent of an angle? hypotenuse

- Use the triangle above to find the following. Write the ratios both as a fraction and as a decimal rounded to the nearest hundredth.

a. $\sin A = \frac{10}{26}$ b. $\cos A = \frac{24}{26}$ c. $\tan A = \frac{10}{24}$
0.38 0.92 0.42

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