

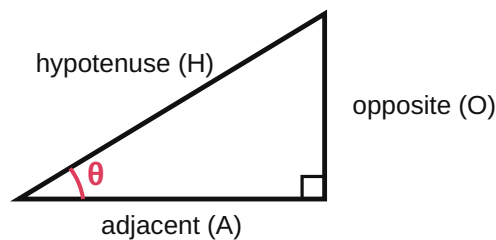
Boost Free Lessons - Year 9 Maths

Lesson 13: Trig Ratios

Name: _____ Grade: _____ Date: _____

Worked Example 1

Name the opposite, adjacent and hypotenuse sides for the angle θ below.



1. The **hypotenuse** is always opposite the right angle, and is the longest side.
2. The **opposite** side is the one directly across the triangle from θ .
3. The **adjacent** side is the remaining side, next to θ but not the hypotenuse.
4. The labels change if you use the other angle, so always label relative to the angle you are working with.

as marked O, A and H

Worked Example 2

A right-angled triangle has opposite 3, adjacent 4 and hypotenuse 5. Write the three trig ratios.

1. Use SOH CAH TOA to remember which sides go with which ratio.
2. $\sin \theta = \frac{O}{H} = \frac{3}{5}$.
3. $\cos \theta = \frac{A}{H} = \frac{4}{5}$.
4. $\tan \theta = \frac{O}{A} = \frac{3}{4}$.

$$\sin \theta = \frac{3}{5}, \cos \theta = \frac{4}{5}, \tan \theta = \frac{3}{4}$$

Remember: SOH CAH TOA: $\sin = \frac{\text{Opp}}{\text{Hyp}}$, $\cos = \frac{\text{Adj}}{\text{Hyp}}$, $\tan = \frac{\text{Opp}}{\text{Adj}}$. Label the sides relative to the angle you are using, before choosing a ratio.



Question 1: Write each ratio as a fraction in simplest form.

1. $O = 5$, $H = 13$. Find $\sin \theta$.

2. $A = 12$, $H = 13$. Find $\cos \theta$.

3. $O = 5$, $A = 12$. Find $\tan \theta$.

4. $O = 8$, $H = 17$. Find $\sin \theta$.

5. $A = 15$, $H = 17$. Find $\cos \theta$.

6. $O = 8$, $A = 15$. Find $\tan \theta$.

7. $O = 7$, $H = 25$. Find $\sin \theta$.

8. $O = 24$, $A = 7$. Find $\tan \theta$.



Question 2: Name the ratio (sin, cos or tan) you would use in each situation.

1. You know the hypotenuse and want the opposite side.
2. You know the adjacent side and want the hypotenuse.
3. You know the opposite side and want the adjacent side.
4. You know both shorter sides and want the angle.
5. You know the opposite side and the hypotenuse, and want the angle.
6. You know the adjacent side and the hypotenuse, and want the angle.



Question 3: Answer the following questions.

1. A right-angled triangle has opposite 6 and adjacent 8. Find the hypotenuse, then write all three ratios.
2. Write $\tan \theta$ when the opposite is 9 and the adjacent is 12, in simplest form.
3. If $\sin \theta = \frac{7}{25}$, what are the lengths of the opposite side and the hypotenuse?
4. Explain why $\sin \theta$ can never be greater than 1.
5. A right-angled triangle has sides 5, 12 and 13. Write $\cos$ of the angle that is opposite the side of length 5.





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Answers: Trig Ratios**Question 1**

1. $\frac{5}{13}$

2. $\frac{12}{13}$

3. $\frac{5}{12}$

4. $\frac{8}{17}$

5. $\frac{15}{17}$

6. $\frac{8}{15}$

7. $\frac{7}{25}$

8. $\frac{24}{7}$

Question 2

1. $\sin$

2. $\cos$

3. $\tan$

4. $\tan$

5. $\sin$

6. $\cos$

Question 3

1. $H = 10$; $\sin \theta = \frac{3}{5}$, $\cos \theta = \frac{4}{5}$, $\tan \theta = \frac{3}{4}$

2. $\frac{3}{4}$

3. Opposite = 7 and hypotenuse = 25

4. The opposite side is always shorter than the hypotenuse, so $\frac{O}{H}$ is always less than 1.

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

