

Triangle Ratio Toolkit

Use side relationships to name and find sine, cosine, and tangent.

HIGH SCHOOL • MA.912.T.1.1

MA.912.T.1.1 "Define trigonometric ratios for acute angles in right triangles."

NAME _____

DATE _____

CHOOSE THE CORRECT SIDES

For an acute angle in a right triangle, $\sin =$ opposite/hypotenuse, $\cos =$ adjacent/hypotenuse, and $\tan =$ opposite/adjacent. The hypotenuse is across from the right angle, while opposite and adjacent depend on which acute angle you choose.

WORKED EXAMPLE

In a right triangle, relative to angle Q, the opposite side is 8, the adjacent side is 15, and the hypotenuse is 17. Find $\sin Q$, $\cos Q$, and $\tan Q$.

1. $\sin Q = \text{opposite/hypotenuse} = 8/17$.
2. $\cos Q = \text{adjacent/hypotenuse} = 15/17$.
3. $\tan Q = \text{opposite/adjacent} = 8/15$.

Answer: $\sin Q = 8/17$, $\cos Q = 15/17$, $\tan Q = 8/15$

PRACTICE 6 problems

- 1** Relative to acute angle A in a right triangle, the opposite side is 5, the adjacent side is 12, and the hypotenuse is 13. Find $\sin A$.

ANSWER _____

- 2** Relative to acute angle B in a right triangle, the adjacent side is 24 and the hypotenuse is 25. Find $\cos B$.

ANSWER _____

- 3** Relative to acute angle C in a right triangle, the opposite side is 20 and the adjacent side is 21. Find $\tan C$.

ANSWER _____

- 4** Relative to acute angle R in a right triangle, the opposite side is 10, the adjacent side is 24, and the hypotenuse is 26. Find $\sin R$, $\cos R$, and $\tan R$.

ANSWER _____

- 5** Triangle ABC is a right triangle with right angle C. For acute angle A, AC is the adjacent side and AB is the hypotenuse. Name the trigonometric ratio represented by AC/AB .

ANSWER _____

- 6** For an acute angle P, $\sin P = 11/61$. Which two sides does this ratio compare?

ANSWER _____

APPLY IT Show your work

- 1** A student is designing a skateboard ramp for a school event. The ramp surface is 25 feet long and rises 7 feet. Let θ be the acute angle between the ramp and the ground. Find $\sin \theta$ and $\tan \theta$.

WORK SPACE

ANSWER _____

- 2** During theater rehearsal, a support cable runs from a floor anchor to a stage light. The cable is 13 meters long, and the anchor is 5 meters horizontally from the point directly below the light. Let ϕ be the acute angle at the anchor between the floor and the cable. Find $\cos \phi$ and $\tan \phi$.

WORK SPACE

ANSWER _____

CHALLENGE One step up

CHALLENGE

For acute angle θ in a right triangle, $\tan \theta = 9/40$. Find $\sin \theta$ and $\cos \theta$. Explain how you know the hypotenuse.

PART 1 • PRACTICE

#	PROBLEM	ANSWER
1	Relative to acute angle A in a right triangle, the opposite side is 5, the adjacent side is 12, and the hypotenuse is 13. Find sin A.	5/13
2	Relative to acute angle B in a right triangle, the adjacent side is 24 and the hypotenuse is 25. Find cos B.	24/25
3	Relative to acute angle C in a right triangle, the opposite side is 20 and the adjacent side is 21. Find tan C.	20/21
4	Relative to acute angle R in a right triangle, the opposite side is 10, the adjacent side is 24, and the hypotenuse is 26. Find sin R, cos R, and tan R.	sin R = 5/13, cos R = 12/13, tan R = 5/12
5	Triangle ABC is a right triangle with right angle C. For acute angle A, AC is the adjacent side and AB is the hypotenuse. Name the trigonometric ratio represented by AC/AB.	cos A
6	For an acute angle P, $\sin P = 11/61$. Which two sides does this ratio compare?	opposite side and hypotenuse

PART 2 • APPLY IT

- sin theta = 7/25, tan theta = 7/24** The ramp is the hypotenuse, and the vertical rise is opposite theta. The ground length is 24 feet, so use opposite/hypotenuse and opposite/adjacent.
- cos phi = 5/13, tan phi = 12/5** The horizontal distance is adjacent phi and the cable is the hypotenuse. The vertical height is 12 meters, so use adjacent/hypotenuse and opposite/adjacent.

CHALLENGE

sin theta = 9/41, cos theta = 40/41. The hypotenuse is 41 because $9^2 + 40^2 = 41^2$.

Accept equivalent fractions when the correct sides are compared, although reduced forms are shown. For the side-name response, accept opposite side and hypotenuse.