LESSON MAKER PRO

Right Triangle Toolkit

Use side ratios and the Pythagorean Theorem to solve exact-value problems.

HIGH SCHOOL · MA.912.T.1.2

MA.912.T.1.2 "Solve mathematical and real-world problems involving right triangles using trigonometric ratios and the Pythagorean Theorem."

NAME _____ DATE _____

CHOOSE THE RIGHT RELATIONSHIP

For a right triangle, sine is opposite/hypotenuse, cosine is adjacent/hypotenuse, and tangent is opposite/adjacent. Use the Pythagorean Theorem, $a^2 + b^2 = c^2$, when you need a missing side length.

WORKED EXAMPLE

For the triangle shown, find sin B.

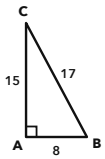


1. sin B = opposite/hypotenuse.
2. The side opposite B is AC, which is 12.
3. The hypotenuse is BC, which is 13.

Answer: 12/13

PRACTICE 6 problems

1 For the triangle shown, find cos B.



ANSWER _____

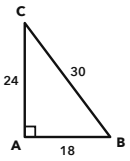
2 A right triangle has legs of 9 units and 40 units. Find the hypotenuse x.

ANSWER _____

3 A right triangle has a hypotenuse of 25 units and one leg of 7 units. Find the other leg x.

ANSWER _____

4 For the triangle shown, find tan B.



ANSWER _____

5 In a right triangle, the sine of an acute angle is 8/17 and the hypotenuse is 34 units. Find the length of the side opposite the angle.

ANSWER _____

6 A right triangle has a hypotenuse of 37 units. The leg adjacent to an acute angle is 35 units. Find the cosine of that angle.

ANSWER _____

APPLY IT Show your work

1 A student flies a drone 21 meters above its launch point. The drone is 20 meters horizontally from the launch point. Find the straight-line distance from the student to the drone and the tangent of the angle of elevation.

WORK SPACE

ANSWER _____

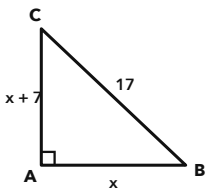
2 A skateboard ramp rises 45 inches over a horizontal run of 28 inches. Find the length of the ramp surface and the cosine of the angle between the ramp and the ground.

WORK SPACE

ANSWER _____

CHALLENGE One step up

For the triangle shown, solve for x. Then explain why the other algebraic solution is not a valid side length.



WORK SPACE AND ANSWER

Right Triangle Toolkit

PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	For the triangle shown, find cos B.	**8/17**
2	A right triangle has legs of 9 units and 40 units. Find the hypotenuse x.	**x = 41**
3	A right triangle has a hypotenuse of 25 units and one leg of 7 units. Find the other leg x.	**x = 24**
4	For the triangle shown, find tan B.	**4/3**
5	In a right triangle, the sine of an acute angle is 8/17 and the hypotenuse is 34 units. Find the length of the side opposite the angle.	**16 units**
6	A right triangle has a hypotenuse of 37 units. The leg adjacent to an acute angle is 35 units. Find the cosine of that angle.	**35/37**

PART 2 · APPLY IT

1. **29 meters; 21/20** Use $20^2 + 21^2 = 29^2$ for the distance. For the angle of elevation, tangent is vertical distance/horizontal distance, or 21/20.
2. **53 inches; 28/53** Use $28^2 + 45^2 = 53^2$ to find the ramp surface. Cosine is the horizontal run divided by the ramp surface, or 28/53.

CHALLENGE

x = 8; x = -15 is rejected because a side length cannot be negative.

Accept equivalent unsimplified work only when the final trigonometric ratio is simplified. For the challenge, students should use $x^2 + (x + 7)^2 = 17^2$ and reject the negative solution.