

Right Triangle Routes

Use ratios and side lengths to solve right-triangle situations.

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 TOOL

For a chosen acute angle x , use $\sin x = \text{opposite/hypotenuse}$, $\cos x = \text{adjacent/hypotenuse}$, and $\tan x = \text{opposite/adjacent}$. For side lengths, use $a^2 + b^2 = c^2$, where c is the hypotenuse. Keep exact values, including square roots, when no decimal is needed.

WORKED EXAMPLE

A right triangle has legs of 9 cm and 40 cm. Find the hypotenuse h .

- $h^2 = 9^2 + 40^2$
- $h^2 = 81 + 1600 = 1681$
- $h = \sqrt{1681} = 41$

Answer: 41 cm

PRACTICE 6 problems

- 1** The legs of a right triangle are 6 cm and 10 cm. Find the hypotenuse in simplest radical form.

ANSWER _____

- 2** A right triangle has a hypotenuse of 61 units and one leg of 11 units. Find the other leg.

ANSWER _____

- 3** Relative to acute angle x , a right triangle has an opposite side of 7 units and an adjacent side of 24 units. Find $\tan x$.

ANSWER _____

- 4** In a right triangle, $\sin x = 3/5$. If the hypotenuse is 45 cm, find the side opposite x .

ANSWER _____

- 5** In a right triangle, $\cos x = 4/5$. The side adjacent to x is 28 units. Find the hypotenuse.

ANSWER _____

- 6** A right triangle has a hypotenuse of 22 units and an acute angle x of 30° . Find the side opposite x .

ANSWER _____

APPLY IT Show your work

- 1** The media club mounts a camera 7 ft above the floor. A cable runs straight from the camera to a floor outlet that is 24 ft away horizontally. How long is the cable?

WORK SPACE

ANSWER _____

- 2** At a skate park, a ramp makes a 30° angle with the ground. The vertical rise of the ramp is 6 ft. How long is the ramp surface?

WORK SPACE

ANSWER _____

CHALLENGE One step up

CHALLENGE

At a robotics competition, a robot travels up a 10 m ramp that makes a 45° angle with the floor. From the top, it travels 10 m straight across a level platform. Find the straight-line distance from the robot's starting point to its final point in simplest radical form.

PART 1 • PRACTICE

#	PROBLEM	ANSWER
1	The legs of a right triangle are 6 cm and 10 cm. Find the hypotenuse in simplest radical form.	$2\sqrt{34}$ cm
2	A right triangle has a hypotenuse of 61 units and one leg of 11 units. Find the other leg.	60 units
3	Relative to acute angle x , a right triangle has an opposite side of 7 units and an adjacent side of 24 units. Find $\tan x$.	$7/24$
4	In a right triangle, $\sin x = 3/5$. If the hypotenuse is 45 cm, find the side opposite x .	27 cm
5	In a right triangle, $\cos x = 4/5$. The side adjacent to x is 28 units. Find the hypotenuse.	35 units
6	A right triangle has a hypotenuse of 22 units and an acute angle x of 30° . Find the side opposite x .	11 units

PART 2 • APPLY IT

- 25 ft** Use the Pythagorean Theorem: $c^2 = 7^2 + 24^2 = 625$. Therefore, $c = 25$.
- 12 ft** Use $\sin 30^\circ = \text{opposite/hypotenuse} = 6/r$. Since $\sin 30^\circ = 1/2$, $r = 12$.

CHALLENGE

$10\sqrt{2 + \sqrt{2}}$ m

Accept equivalent exact radical forms, such as $\sqrt{136}$ for $2\sqrt{34}$. For trigonometric ratios, accept equivalent fractions only if they are simplified correctly.