LESSON MAKER PRO

Right Triangle Toolkit

Use ratios and the Pythagorean Theorem to find missing lengths.

HIGH SCHOOL · HSG-SRT.C.8

CCSS.Math.Content.HSG-SRT.C.8 "Use trigonometric ratios and the Pythagorean Theorem to solve right triangles in applied problems. *"

NAME _____ DATE _____

CHOOSE THE RIGHT TOOL

For a right triangle, sin θ = opposite/hypotenuse, cos θ = adjacent/hypotenuse, and tan θ = opposite/adjacent. If you know two side lengths, use a^2 + b^2 = c^2, where c is the hypotenuse.

WORKED EXAMPLE

A right triangle has legs 20 and 21. Let θ be opposite the leg of length 20. Find the hypotenuse and sin θ.

1. Use 20^2 + 21^2 = c^2.
2. 400 + 441 = 841, so c^2 = 841.
3. c = 29.
4. sin θ = opposite/hypotenuse = 20/29.

Answer: Hypotenuse = 29; sin θ = 20/29

PRACTICE 6 problems

1 A right triangle has legs 9 and 40. Find the hypotenuse.

ANSWER _____

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

ANSWER _____

3 For a right triangle, tan θ = 5/12. If the side adjacent to θ is 36, find the side opposite θ and the hypotenuse.

ANSWER _____

4 For a right triangle, sin θ = 8/17. If the hypotenuse is 51, find the side opposite θ.

ANSWER _____

5 For a right triangle, cos θ = 3/5. If the side adjacent to θ is 27, find the hypotenuse and the side opposite θ.

ANSWER _____

6 A right triangle has θ = 30 degrees and a hypotenuse of 22. Use sin 30 degrees = 1/2 and cos 30 degrees = sqrt(3)/2 to find the leg opposite θ and the leg adjacent to θ.

ANSWER _____

APPLY IT Show your work

1 At a film club shoot, a camera operator points a camera at a drone that is 24 m above level ground. The angle of elevation is θ, and tan θ = 3/4. How far is the camera from the point directly below the drone, and how far is the camera from the drone?

WORK SPACE

ANSWER _____

2 For a school theater production, a 45 ft support cable runs from the top of a stage tower to a ground anchor 27 ft from the tower. How tall is the tower?

WORK SPACE

ANSWER _____

CHALLENGE One step up

CHALLENGE

In a right triangle, tan θ = 8/15 and the hypotenuse is 68. Find both legs. Explain how the hypotenuse helps you choose the scale factor.

_____

_____

ANSWER KEY

Right Triangle Toolkit

PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	A right triangle has legs 9 and 40. Find the hypotenuse.	**41**
2	A right triangle has a hypotenuse of 25 and one leg of 7. Find the other leg.	**24**
3	For a right triangle, tan θ = 5/12. If the side adjacent to θ is 36, find the side opposite θ and the hypotenuse.	**Opposite = 15; hypotenuse = 39**
4	For a right triangle, sin θ = 8/17. If the hypotenuse is 51, find the side opposite θ.	**24**
5	For a right triangle, cos θ = 3/5. If the side adjacent to θ is 27, find the hypotenuse and the side opposite θ.	**Hypotenuse = 45; opposite = 36**
6	A right triangle has θ = 30 degrees and a hypotenuse of 22. Use sin 30 degrees = 1/2 and cos 30 degrees = sqrt(3)/2 to find the leg opposite θ and the leg adjacent to θ.	**Opposite = 11; adjacent = 11sqrt(3)**

PART 2 · APPLY IT

1. **32 m from the point below the drone; 40 m from the drone** Use 24/x = 3/4 to get x = 32 m. Then use 24^2 + 32^2 = d^2 to get d = 40 m.
2. **36 ft** The cable is the hypotenuse, so use h^2 + 27^2 = 45^2. This gives h^2 = 1296, so h = 36 ft.

CHALLENGE

The opposite leg is 32 and the adjacent leg is 60. The ratio gives legs 8k and 15k; the Pythagorean Theorem gives a hypotenuse of 17k, so 17k = 68 and k = 4.

Accept equivalent exact radical notation for 11sqrt(3), such as 11√3, but not a rounded decimal. For applied problems, accept correct units and equivalent reasoning, and require both requested distances in the drone problem.