LESSON MAKER PRO

Angle Ratio Lab

Use right-triangle side ratios to describe acute angles.

HIGH SCHOOL · HSG-SRT.C.6

CCSS.Math.Content.HSG-SRT.C.6 "Understand that by similarity, side ratios in right triangles are properties of the angles in the triangle, leading to definitions of trigonometric ratios for acute angles."

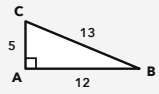
NAME _____ DATE _____

SIDE RATIOS AND ANGLES

In any right triangle, the hypotenuse is opposite the right angle. For a chosen acute angle, sin = opposite/hypotenuse, cos = adjacent/hypotenuse, and tan = opposite/adjacent. Similar right triangles have equal corresponding side ratios, so these ratios depend on the angle, not the triangle's size.

WORKED EXAMPLE

Use triangle ABC. Find sin B.

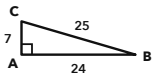


1. For angle B, the opposite side is AC, which is 5.
2. The hypotenuse is BC, which is 13.
3. sin B = opposite/hypotenuse = 5/13.

Answer: sin B = 5/13

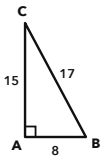
PRACTICE 6 problems

1 Use the triangle shown. Find sin B.



ANSWER _____

2 Use the triangle shown. Find cos C.



ANSWER _____

3 For acute angle θ in a right triangle, the opposite leg is 9 and the adjacent leg is 40. Find tan θ.

ANSWER _____

4 A right triangle has legs 20 and 21 and hypotenuse 29. For acute angle R, the 20-unit leg is opposite R. Find cos R.

ANSWER _____

5 For acute angle S, sin S = 28/53. What is the ratio of the opposite leg to the hypotenuse?

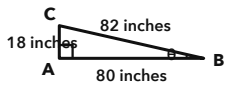
ANSWER _____

6 For acute angle T, tan T = 11/60. If the adjacent leg is 60 units, what is the length of the opposite leg?

ANSWER _____

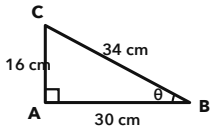
APPLY IT Show your work

1 At a skate park, the side view of a ramp is shown. Let θ be the angle between the ground and the ramp. Find tan θ and sin θ.



ANSWER _____

2 A student builds a phone stand. Its side view is shown, with θ between the desktop and the support. Find cos θ.



ANSWER _____

CHALLENGE One step up

Two right triangles each have acute angle θ. In Triangle 1, the opposite, adjacent, and hypotenuse lengths are 14, 48, and 50. In Triangle 2, the corresponding lengths are 21, 72, and 75. Find tan θ for each triangle. Then explain in one sentence why the values are the same.

WORK SPACE AND ANSWER

ANSWER KEY

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PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	Use the triangle shown. Find sin B.	**sin B = 7/25**
2	Use the triangle shown. Find cos C.	**cos C = 15/17**
3	For acute angle θ in a right triangle, the opposite leg is 9 and the adjacent leg is 40. Find tan θ.	**tan θ = 9/40**
4	A right triangle has legs 20 and 21 and hypotenuse 29. For acute angle R, the 20-unit leg is opposite R. Find cos R.	**cos R = 21/29**
5	For acute angle S, sin S = 28/53. What is the ratio of the opposite leg to the hypotenuse?	**28/53**
6	For acute angle T, tan T = 11/60. If the adjacent leg is 60 units, what is the length of the opposite leg?	**11 units**

PART 2 · APPLY IT

1. **tan θ = 9/40; sin θ = 9/41** Use rise/run for tangent: 18/80 = 9/40. Use rise/hypotenuse for sine: 18/82 = 9/41.
2. **cos θ = 15/17** The side adjacent to θ is 30 cm, and the hypotenuse is 34 cm. Compute 30/34 = 15/17.

CHALLENGE

tan θ = 7/24 for both triangles. The corresponding side lengths in Triangle 2 are 3/2 times those in Triangle 1, so the opposite/adjacent ratios are equal.

Accept equivalent unsimplified ratios, such as 18/80 for 9/40, when the correct sides are used. In the challenge explanation, accept any statement that corresponding side lengths are proportional, so the ratio opposite/adjacent stays the same.