LESSON MAKER PRO

Triangle Ratio Lab

Find exact lengths and ratios in special right triangles.

HIGH SCHOOL · MT.CORE.GEOM.MEAS.3.a

MT.CORE.GEOM.MEAS.3.a "Use similarity to explore and define the sine ratio, cosine ratio, and tangent ratio in terms of right triangles by: Deriving and applying the trigonometric ratios in special right triangles, and"

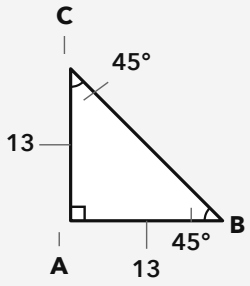
NAME _____ DATE _____

THE BIG IDEA

Similar right triangles have the same side ratios for a matching acute angle. For that angle, sin = opposite/hypotenuse, cos = adjacent/hypotenuse, and tan = opposite/adjacent. Use the side patterns of special right triangles to find exact values without a calculator.

WORKED EXAMPLE

Use the triangle to find sin B, cos B, and tan B.

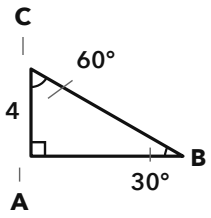


1. Find the hypotenuse: BC = sqrt(13^2 + 13^2) = 13sqrt(2).
2. sin B = AC/BC = 13/(13sqrt(2)) = sqrt(2)/2.
3. cos B = AB/BC = 13/(13sqrt(2)) = sqrt(2)/2.
4. tan B = AC/AB = 13/13 = 1.

Answer: sin B = sqrt(2)/2, cos B = sqrt(2)/2, tan B = 1

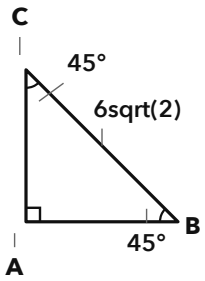
PRACTICE 6 problems

1 Find the length of BC.



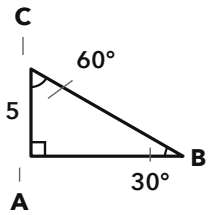
ANSWER _____

2 Find the length of AB.



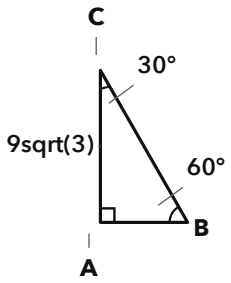
ANSWER _____

3 Find the exact value of tan B.



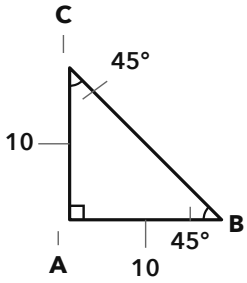
ANSWER _____

4 Find the exact value of sin B.



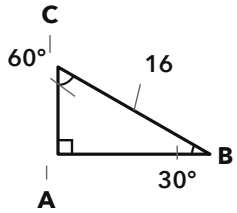
ANSWER _____

5 Find the length of BC.



ANSWER _____

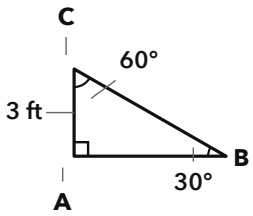
6 Find the length of AB.



ANSWER _____

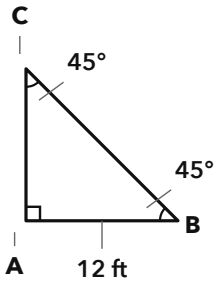
APPLY IT Show your work

1 A skate park ramp has the measurements shown. How long is its sloped surface?



ANSWER _____

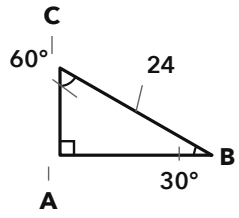
2 At a school concert, a support cable runs from a floor anchor at B to the top of a light stand at C. How long is the cable?



ANSWER _____

CHALLENGE One step up

Find the exact area of triangle ABC. Then explain why tan B would stay the same if every side length were doubled.



WORK SPACE AND ANSWER

ANSWER KEY

Triangle Ratio Lab

PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	Find the length of BC.	**8**
2	Find the length of AB.	**6**
3	Find the exact value of tan B.	**sqrt(3)/3**
4	Find the exact value of sin B.	**sqrt(3)/2**
5	Find the length of BC.	**10sqrt(2)**
6	Find the length of AB.	**8sqrt(3)**

PART 2 · APPLY IT

1. **6 ft** AC is opposite the 30° angle, so it is half the hypotenuse BC. Double 3 ft to get 6 ft.
2. **12sqrt(2) ft** In a 45°-45°-90° triangle, the hypotenuse is sqrt(2) times either leg. Multiply 12 ft by sqrt(2).

CHALLENGE

AC = 12 and AB = 12sqrt(3), so the area is (1/2)(12)(12sqrt(3)) = 72sqrt(3) square units. Doubling both legs doubles both parts of tan B = AC/AB, so the ratio stays the same.

Accept equivalent exact forms, such as 1/sqrt(3) for sqrt(3)/3. Decimal approximations are not exact answers.