LESSON MAKER PRO

Find the Angle

Use inverse trig functions to work backward from a ratio.

HIGH SCHOOL · F.BF.B.4.e

F.BF.B.4.e "Build inverse trigonometric functions."

NAME _____ DATE _____

ONE RATIO, ONE ANGLE

An inverse trig function gives an angle from a trig ratio. To make each inverse give just one angle, use these ranges: $\sin^{-1}$ gives angles from -90° to 90°, $\cos^{-1}$ gives angles from 0° to 180°, and $\tan^{-1}$ gives angles between -90° and 90°. All angles on this page are in degrees.

WORKED EXAMPLE

Find $\sin^{-1}(-\sqrt{3}/2)$.

1. Look for an angle whose sine is $-\sqrt{3}/2$.
2. $\sin(-60°) = -\sqrt{3}/2$.
3. -60° is in the range from -90° to 90°.

Answer: -60°

PRACTICE 6 problems

1 Find $\sin^{-1}(1/2)$.

ANSWER _____

2 Find $\sin^{-1}(0)$.

ANSWER _____

3 Find $\cos^{-1}(0)$.

ANSWER _____

4 Find $\cos^{-1}(-1/2)$.

ANSWER _____

5 Find $\tan^{-1}(1)$.

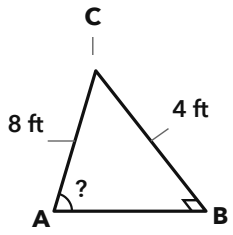
ANSWER _____

6 Find $\tan^{-1}(-1)$.

ANSWER _____

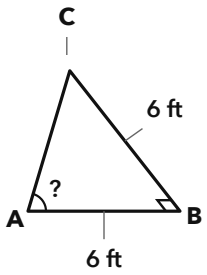
APPLY IT Show your work

1 A skate park requires a ramp angle of at least 30°. Find the ramp's angle at A. Does this ramp meet the rule?



ANSWER _____

2 For a school video, a phone at C films a dancer at A. Find the angle of elevation from A to C.



ANSWER _____

CHALLENGE One step up

Let $f(x) = \cos(x)$ for $180° \le x \le 360°$. Find $f^{-1}(1/2)$. Explain why 60° is not the answer.

WORK SPACE AND ANSWER

ANSWER KEY

Find the Angle

PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	Find $\sin^{-1}(1/2)$.	**30°**
2	Find $\sin^{-1}(0)$.	**0°**
3	Find $\cos^{-1}(0)$.	**90°**
4	Find $\cos^{-1}(-1/2)$.	**120°**
5	Find $\tan^{-1}(1)$.	**45°**
6	Find $\tan^{-1}(-1)$.	**-45°**

PART 2 · APPLY IT

1. **30°; yes, it meets the rule.** The rise is opposite angle A, and the ramp is the hypotenuse, so $\sin(A) = 4/8 = 1/2$. Thus $A = \sin^{-1}(1/2) = 30°$, which meets the minimum.
2. **45°** Relative to angle A, the opposite and adjacent sides are both 6 ft. Thus $A = \tan^{-1}(6/6) = \tan^{-1}(1) = 45°$.

CHALLENGE

300°. Although $\cos(60°) = 1/2$, 60° is outside the given domain. The angle 300° is in the domain and has cosine 1/2.

Accept equivalent inverse-trig expressions when they identify the correct angle. In the challenge, the explanation must use the restricted domain.