Student Workbook

Inverse Trigonometric Functions

Name:

Date:

Period:

Learning Target: I can evaluate inverse trigonometric functions and compositions of trig and inverse trig functions.

Vocabulary

Term	Meaning
arcsin(x)	Domain [-1,1], Range [-π/2, π/2]
arccos(x)	Domain [-1,1], Range [0, π]
arctan(x)	Domain all reals, Range (-π/2, π/2)

Key Concept: Why We Restrict the Domain

SINE, COSINE, AND TANGENT ARE PERIODIC They fail the horizontal line test over their full domain, so their inverses only exist if we restrict to an interval where they ARE one-to-one. This restricted interval becomes the RANGE of the inverse function.

EXAMPLE 1

Evaluate arcsin(1/2). We need the angle in [-π/2, π/2] whose sine is 1/2.

arcsin(1/2) = ________

EXAMPLE 2

Evaluate arccos(-√2/2). We need the angle in [0, π] whose cosine is -√2/2.

arccos(-√2/2) = ________

COMMON MISTAKE

arcsin(sin(x)) does NOT always equal x! It only works when x is already inside arcsin's range, [-π/2, π/2].

Key Concept: Composition of Different Trig Functions

EXAMPLE 3

Evaluate sin(arccos(3/5)). Let θ = arccos(3/5), so $\cos\theta = 3/5$ with θ in $[0,\pi]$ (Quadrant I, since cosine is positive).

Using the Pythagorean identity or a 3-4-5 triangle: $\sin\theta$ = ________

Guided Practice — Part A: Evaluate arcsin & arccos

A1 Evaluate arcsin($\sqrt{3}/2$).

A2 Evaluate arccos(1/2).

Guided Practice — Part B: Evaluate arctan

B1 Evaluate arctan($\sqrt{3}$).

B2 Evaluate arctan(0).

Guided Practice — Part C: Same-Function Composition

C1 Evaluate cos(arccos(0.7)).

C2 Evaluate sin(arcsin(-0.4)).

Guided Practice — Part D: Different-Function Composition

D1 Evaluate cos(arcsin(3/5)).

D2 Evaluate tan(arccos(5/13)).

BEFORE YOU MOVE ON

Check with a partner: for compositions of different functions, did you sketch a right triangle or use the Pythagorean identity to find the missing side?