

3.9 Inverse Trigonometric Functions

Name: _____ Class: _____ Date: _____

Total: 9 marks

Objective

Build the skills to answer exam questions on **inverse trigonometric functions**.

You must be able to:

- describe what $\arcsin$, $\arccos$, and $\arctan$ return
- state their restricted **ranges** 值域

1 Worked examples

Study these first. Each one shows the method for a question type used later.

■ Inverse trig functions

- $\arcsin(x)$ = the angle whose sine is x ; range $[-\frac{\pi}{2}, \frac{\pi}{2}]$;
- $\arccos(x)$; range $[0, \pi]$;
- $\arctan(x)$; range $(-\frac{\pi}{2}, \frac{\pi}{2})$.

Each inverts its trig function on a restricted domain.

■ Example

$$\arcsin(1) = \frac{\pi}{2}, \arccos(1) = 0.$$

2 Practice

2.1 State what $\arcsin(x)$ returns. [1]

2.2 State the range of $\arctan(x)$. [1]

2.3 Evaluate $\arcsin(1)$ and $\arccos(1)$. [2]

3 Exam-style questions

3.1 $\arcsin(x)$ gives [1]

- **A** the sine of x
 - **B** the angle whose sine is x
 - **C** $1/\sin x$
 - **D** $\sin(1/x)$
-

3.2 The range of $\arccos(x)$ is [1]

- **A** $[-\frac{\pi}{2}, \frac{\pi}{2}]$
 - **B** $[0, \pi]$
 - **C** all real numbers
 - **D** $[0, 2\pi]$
-

3.3 Evaluate each.

(a) $\arcsin(0)$. [1]

(b) $\arccos(0)$. [1]

(c) $\arctan(1)$. [1]

4 Go further

- work through the **3.9 Inverse Trigonometric Functions** lesson on the **Learn** page;
- read the **Trigonometric and Polar Functions** section of the AP Precalculus hand-out on the **Know** page.

Solutions

2.1 the angle whose sine is x .

2.2 $(-\frac{\pi}{2}, \frac{\pi}{2})$.

2.3 $\arcsin(1) = \frac{\pi}{2}$; $\arccos(1) = 0$.

3.1 B.

3.2 B.

3.3 (a) 0. (b) $\frac{\pi}{2}$. (c) $\frac{\pi}{4}$.