

# Precalculus · Inverse Trigonometric Functions and Trigonometric Equations · Test Answer Key

Common Core F-TF.B.6, F-TF.B.7 · mathovore.fr

This precalculus inverse trig test answer key gives the full solution and the scoring guide for each of the 9 test questions on inverse trigonometric functions and trigonometric equations.

Use this key to score the test out of 20 points. Each solution shows the work and a scoring guide. Accept equivalent forms and radians written as decimals when a calculator was allowed.

**Precalculus Common Core: F-TF.B.6 · F-TF.B.7**

## Precalculus Inverse Trig Test Answer Key: questions 1-5

### Question 1: Exact inverse values (3 points)

- a.  $-\frac{\pi}{4}$
- b.  $\frac{5\pi}{6}$
- c.  $-\frac{\pi}{3}$

*Scoring: 1 point per part; an answer outside the range of the inverse function earns no credit.*

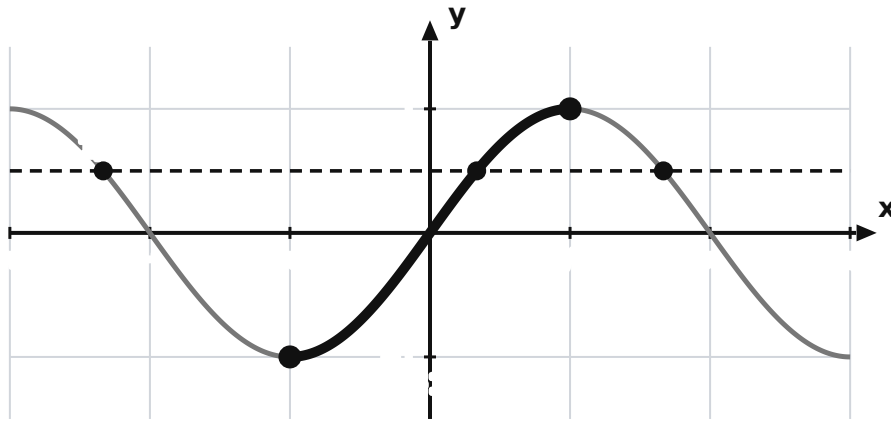
### Question 2: Compositions (2 points)

- a.  $\cos \frac{7\pi}{4} = \frac{\sqrt{2}}{2}$ , so  $\frac{\pi}{4}$
- b.  $\sin \frac{4\pi}{3} = -\frac{\sqrt{3}}{2}$ , so  $-\frac{\pi}{3}$

*Scoring: 1 point per part; the common wrong answers  $\frac{7\pi}{4}$  and  $\frac{4\pi}{3}$  earn 0.*

### Question 3: Restricted sine (2 points)

- a.  $\left[-\frac{\pi}{2}, \frac{\pi}{2}\right]$
- b. Sine is not one-to-one: for example  $\sin 0 = \sin \pi = 0$ , so a horizontal line meets the graph more than once and the inputs cannot be recovered from the output.



Horizontal line meeting the graph several times.

*Scoring: Part (a): 1 point. Part (b): 1 point for noting that two inputs give the same output (or the horizontal line test fails).*

#### Question 4: Triangle compositions (2 points)

- Adjacent 5, hypotenuse 13, opposite  $\sqrt{169-25}=12$ :  $\frac{12}{13}$
- The angle is in Quadrant IV, where cosine is positive. Opposite  $-4$ , hypotenuse 5, adjacent 3:  $\frac{3}{5}$

*Scoring: 1 point per part; an answer of  $-\frac{3}{5}$  in part (b) earns 0.*

#### Question 5: Exact equation (2 points)

$\cos x = \frac{\sqrt{3}}{2}$ . The reference angle is  $\frac{\pi}{6}$ ; cosine is positive in Quadrants I and IV.

$$x = \frac{\pi}{6} \text{ or } x = \frac{11\pi}{6}$$

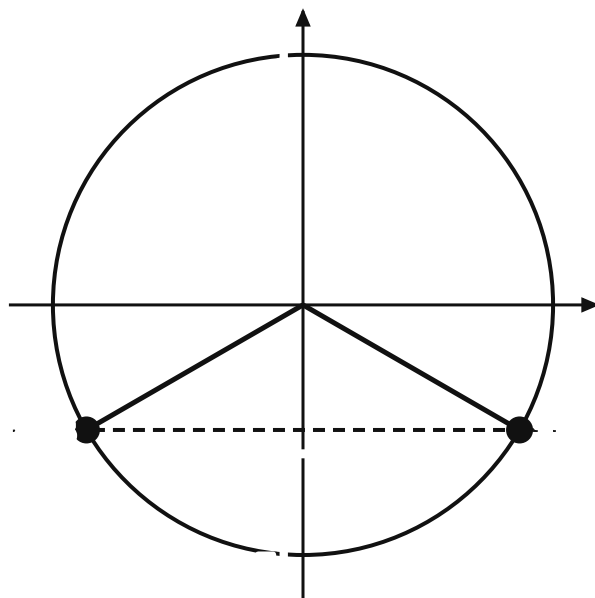
*Scoring: 1 point for isolating the cosine and the reference angle; 1 point for both solutions.*

### Precalculus Inverse Trig Test Answer Key: questions 6-9

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#### Question 6: Sine on the unit circle (2 points)

- $x = \frac{7\pi}{6}$  and  $x = \frac{11\pi}{6}$
- $x = \frac{7\pi}{6} + 2\pi k$  or  $x = \frac{11\pi}{6} + 2\pi k$ ,  $k$  an integer



The two angles on the line.

*Scoring: 1 point per part. In part (b) the point requires both families.*

### Question 7: Equation by calculator (2 points)

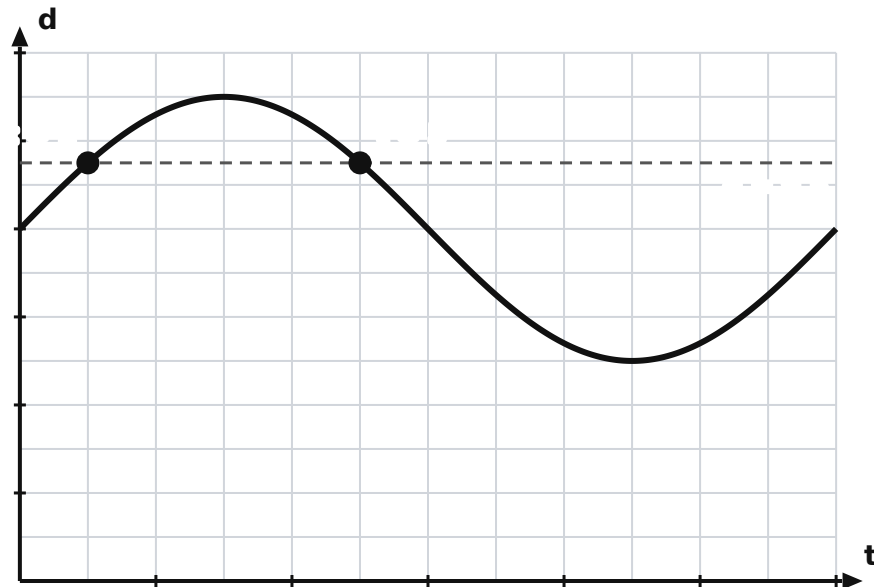
$\cos x = 0.4$ .  $x = \cos^{-1}(0.4) \approx 1.16$ . The second solution is  $2\pi - 1.1593 \approx 5.12$ .

$x \approx 1.16$  **or**  $x \approx 5.12$

*Scoring: 1 point for each solution.*

### Question 8: Dock depth (3 points)

- $3\sin\frac{\pi t}{6} = 1.5$ , so  $\sin\frac{\pi t}{6} = \frac{1}{2}$ . Then  $\frac{\pi t}{6} = \frac{\pi}{6}$  or  $\frac{5\pi}{6}$ , so  $t = 1$  **and**  $t = 5$  (7 a.m. and 11 a.m.)
- The depth is at least 9.5 ft for  $1 \leq t \leq 5$ , from 7 a.m. to 11 a.m.



Line  $d = 9.5$  meets the curve at  $t = 1$  and  $t = 5$ .

Scoring: Part (a): 1 point for  $\sin \frac{\pi t}{6} = \frac{1}{2}$ , 1 point for both times. Part (b): 1 point for the interval.

### Question 9: Quadratic equation (2 points)

Factor:  $(2\sin x - 1)(\sin x + 1) = 0$ .  $\sin x = \frac{1}{2}$  gives  $x = \frac{\pi}{6}$  or  $\frac{5\pi}{6}$ .  $\sin x = -1$  gives  $x = \frac{3\pi}{2}$ .

$$x = \frac{\pi}{6}, \frac{5\pi}{6}, \frac{3\pi}{2}$$

Scoring: 1 point for factoring and the two sine values; 1 point for all three solutions.

### Scoring summary

| Total                                                                                                |
|------------------------------------------------------------------------------------------------------|
| <b>20 points:</b> add the points of every question of this precalculus inverse trig test answer key. |

### How to use this precalculus inverse trig test answer key

Use this precalculus inverse trig test answer key to score the test fairly and to see which skills need more practice.

