

Precalculus · Angles, Radians and the Unit Circle · Test Answer Key

Common Core F-TF.A.1, F-TF.A.2, F-TF.A.3, F-TF.A.4 · mathovore.fr

This precalculus unit circle test answer key gives the full solution and the scoring guide for each of the 9 test questions on angles, radians and the unit circle.

Scoring guide and worked solutions for the radians and unit circle test. Each note shows how partial credit is split. The total is 20 points. Accept equivalent exact forms such as $1/\sqrt{3}$ when they are simplified correctly.

Precalculus Common Core: F-TF.A.1 · F-TF.A.2 · F-TF.A.3 · F-TF.A.4

Precalculus Unit Circle Test Answer Key: questions 1-5

Question 1: Converting angle measures (2 points)

- a. $225 \cdot \frac{\pi}{180} = \frac{5\pi}{4}$
- b. $\frac{7\pi}{6} \cdot \frac{180^\circ}{\pi} = 210^\circ$

Scoring: 1 point for each correct conversion.

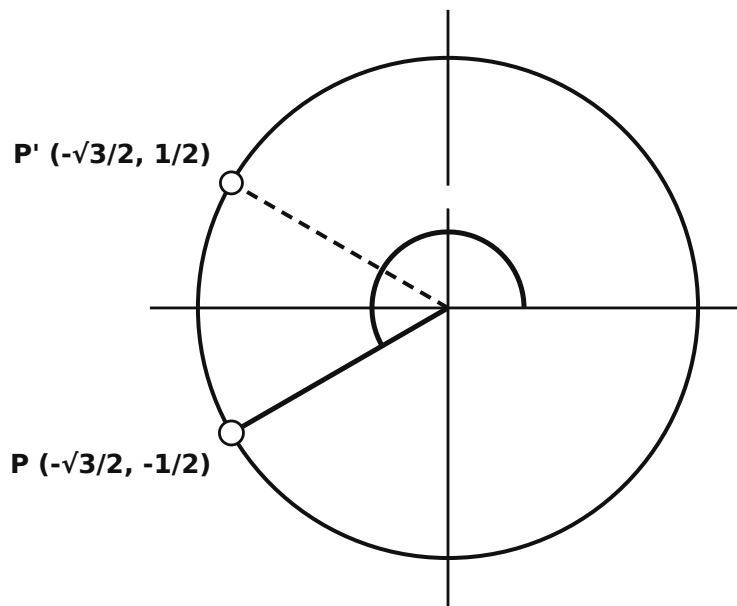
Question 2: Coterminal and reference angles (2 points)

- a. $\frac{23\pi}{6} - 2\pi = \frac{11\pi}{6}$
- b. The angle $\frac{11\pi}{6}$ is in Quadrant IV, and $2\pi - \frac{11\pi}{6} = \frac{\pi}{6}$

Scoring: 1 point for each part; award 0.5 for a correct method with an arithmetic slip.

Question 3: Point on the unit circle (3 points)

- a. $P = (\cos \frac{7\pi}{6}, \sin \frac{7\pi}{6}) = (-\frac{\sqrt{3}}{2}, -\frac{1}{2})$
- b. $\tan \frac{7\pi}{6} = \frac{-1/2}{-\sqrt{3}/2} = \frac{1}{\sqrt{3}} = \frac{\sqrt{3}}{3}$
- c. $\sin(-\frac{7\pi}{6}) = -\sin \frac{7\pi}{6} = -(-\frac{1}{2}) = \frac{1}{2}$

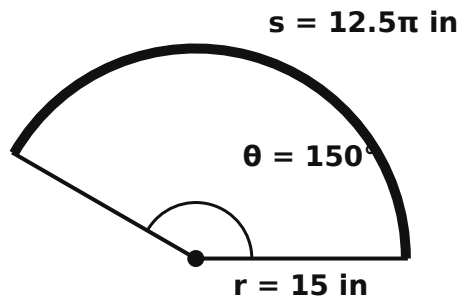


The point for $-7\pi/6$ is the reflection of P across the x-axis.

Scoring: 1 point per part: for (a) 0.5 for each correct coordinate; for (b) 0.5 for the quotient setup and 0.5 for rationalizing; for (c) 0.5 for using the odd property and 0.5 for the value.

Question 4: Arc length of a sector (2 points)

- a. $150^\circ = \frac{5\pi}{6}$
 b. $s = 15 \cdot \frac{5\pi}{6} = 12.5\pi \approx 39.27$ in



The crust is 12.5π inches long.

Scoring: 1 point for each part.

Question 5: Angular and linear speed (3 points)

- a. $\omega = \frac{2\pi}{8} = \frac{\pi}{4}$ rad/min

b. $v = r\omega = 50 \cdot \frac{\pi}{4} = 12.5\pi \approx \mathbf{39.27 \text{ ft/min}}$

c. $12.5\pi \cdot 20 = 250\pi \approx \mathbf{785.40 \text{ ft}}$

Scoring: 1 point for each part.

Precalculus Unit Circle Test Answer Key: questions 6-9

Question 6: Solving trigonometric equations (2 points)

a. The reference angle is $\frac{\pi}{6}$. The value is negative, so the terminal side is in Quadrant II or III: $\theta = \pi - \frac{\pi}{6} = \frac{5\pi}{6}$ and $\theta = \pi + \frac{\pi}{6} = \frac{7\pi}{6}$.

b. The reference angle is $\frac{\pi}{4}$. The value is positive, so the terminal side is in Quadrant I or III: $\theta = \frac{\pi}{4}$ and $\theta = \pi + \frac{\pi}{4} = \frac{5\pi}{4}$.

Scoring: 1 point for each part (0.5 for each correct angle).

Question 7: Even and odd (2 points)

a. $\tan\left(-\frac{5\pi}{4}\right) = -\tan\frac{5\pi}{4} = -1$, so **-1**

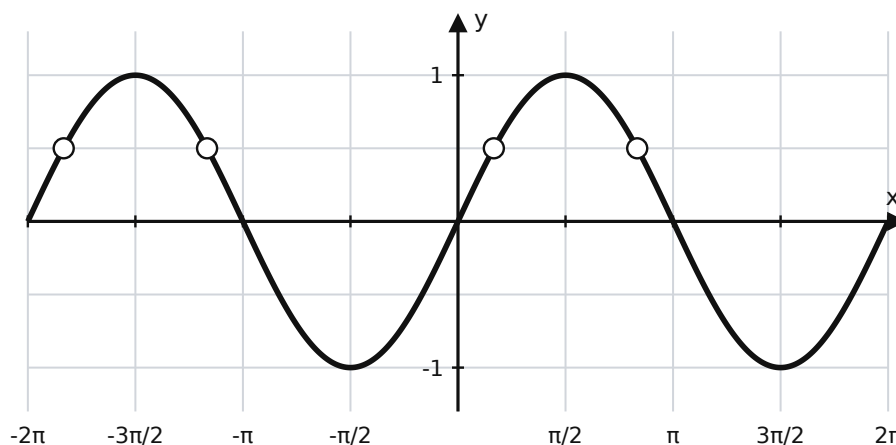
b. $f(-x) = (-x)^2 \sin(-x) = -x^2 \sin x = -f(x)$, so **f is odd**

Scoring: 1 point for each part; part (b) needs the computation of $f(-x)$.

Question 8: Periodicity of sine (2 points)

a. The graph repeats every 2π .

b. $\sin\frac{13\pi}{6} = \sin\left(\frac{\pi}{6} + 2\pi\right) = \sin\frac{\pi}{6} = \frac{1}{2}$. Also $-\frac{7\pi}{6} + 2\pi = \frac{5\pi}{6}$ and $\sin\frac{5\pi}{6} = \frac{1}{2}$



Sine repeats its values every 2π : for example $\sin(5\pi/6) = \sin(-7\pi/6) = 1/2$.

Scoring: 1 point for the period; 1 point for both values (0.5 each).

Question 9: Unit circle coordinates (2 points)

a. $\sin^2\theta = 1 - \frac{64}{289} = \frac{225}{289}$; sine is positive in Quadrant II, so $\sin\theta = \frac{15}{17}$
b. $\tan\theta = \frac{15/17}{-8/17} = -\frac{15}{8}$

Scoring: 1 point for each part; part (b) can be earned with an incorrect part (a) if the quotient is correct.

Scoring summary

Total
20 points: add the points of every question of this precalculus unit circle test answer key.

How to use this precalculus unit circle test answer key

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

