

Algebra 2 - Radians and the Unit Circle - Test Answer Key

Common Core F-TF.A.1, F-TF.A.2, F-TF.A.3 · maths-pdf.fr/en/

Use this answer key and scoring guide to grade the test on radians and the unit circle (F-TF.A.1). Each solution shows the full reasoning, and the scoring note explains how many points to award for correct setup, correct work, and a correct final answer. Partial credit rewards a sound method even when a small arithmetic slip changes the result.

Algebra 2 · Common Core State Standards: **F-TF.A.1, F-TF.A.2, F-TF.A.3**

Question 1 - Convert angles [2 pts]

a. $150 \cdot \frac{\pi}{180} = \frac{5\pi}{6}$

b. $\frac{5\pi}{3} \cdot \frac{180}{\pi} = 300$

(a) $\frac{5\pi}{6}$; (b) 300°

Scoring: 1 point for each conversion.

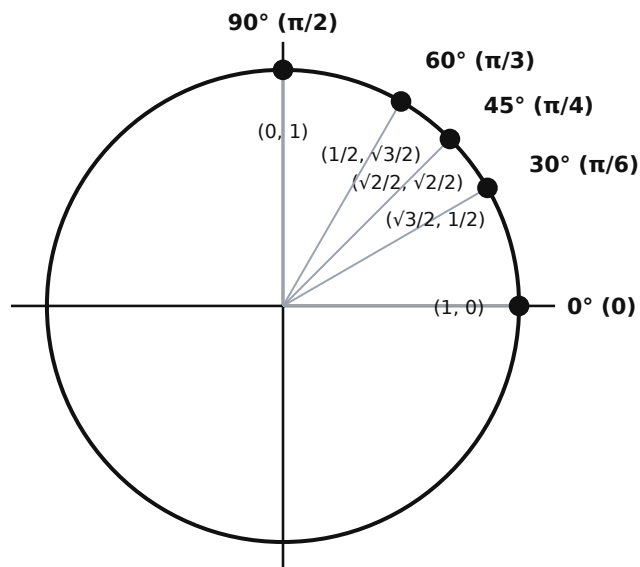
Question 2 - Arc length [2 pts]

$$s = 8 \cdot \frac{5\pi}{6} = \frac{20\pi}{3}.$$

$20\pi/3$ cm

Scoring: 1 point for $s = r\theta$, 1 point for the value.

Question 3 - Exact values [3 pts]



Quadrant I: the points $(\cos \theta, \sin \theta)$ for the special angles.

a. $\frac{\sqrt{3}}{2}$

b. $\frac{\sqrt{2}}{2}$

c. $\frac{\sqrt{3}}{3}$

(a) $\frac{\sqrt{3}}{2}$; (b) $\frac{\sqrt{2}}{2}$; (c) $\frac{\sqrt{3}}{3}$

Scoring: 1 point for each value.

Question 4 - Reference angles [3 pts]

a. Quadrant III, reference $\frac{\pi}{3}$: cosine negative, $-\frac{1}{2}$.

b. Quadrant IV, reference $\frac{\pi}{6}$: sine negative, $-\frac{1}{2}$.

c. Quadrant III, reference $\frac{\pi}{4}$: tangent positive, 1.

(a) $-\frac{1}{2}$; (b) $-\frac{1}{2}$; (c) 1

Scoring: 1 point for each value.

Question 5 - Solve for the angle [2 pts]

Reference angle $\frac{\pi}{4}$; cosine is positive in quadrants I and IV.

$$\theta = \frac{\pi}{4} \text{ or } 2\pi - \frac{\pi}{4} = \frac{7\pi}{4}.$$

$$\theta = \frac{\pi}{4}, \frac{7\pi}{4}$$

Scoring: 1 point for each solution.

Question 6 - Coterminal and negative angles [2 pts]

$$\frac{9\pi}{4} - 2\pi = \frac{\pi}{4}, \text{ so } \sin \frac{9\pi}{4} = \frac{\sqrt{2}}{2}.$$

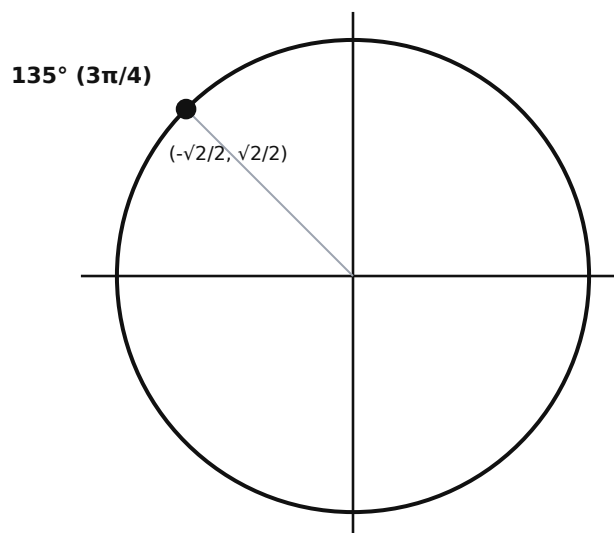
$-\frac{2\pi}{3}$ is in quadrant III with reference angle $\frac{\pi}{3}$: $-\frac{1}{2}$.

$$\frac{\sqrt{2}}{2} \text{ and } -\frac{1}{2}$$

Scoring: 1 point for each value.

Question 7 - Point on the unit circle [2 pts]

Reference angle $\frac{\pi}{4}$, quadrant II: x negative, y positive.



$$P = (-\sqrt{2}/2, \sqrt{2}/2).$$

$$P = \left(-\frac{\sqrt{2}}{2}, \frac{\sqrt{2}}{2}\right)$$

Scoring: 1 point for each coordinate.

Question 8 - Bike wheel [2 pts]

$$s = 14 \cdot \frac{5\pi}{2} = 35\pi \text{ inches, about 110 inches.}$$

35π in, about 110 in

Scoring: 1 point for $s = r\theta$, 1 point for the value.

Question 9 - Find the error [2 pts]

$\tan \frac{\pi}{2} = \frac{\sin(\pi/2)}{\cos(\pi/2)} = \frac{1}{0}$, which is undefined. A zero in the denominator makes tangent undefined, not zero.

$\tan(\pi/2)$ is undefined

Scoring: 1 point for the ratio, 1 point for the conclusion.

Total

20 points