

Precalculus - 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 · maths-pdf.fr/en/

Worked solutions and scoring notes for the 9-question radians and unit circle test. Use the scoring line under each solution to award partial credit.

Precalculus · Common Core State Standards: **F-TF.A.1, F-TF.A.2, F-TF.A.3, F-TF.A.4**

Question 1 - Convert angles [2 pts]

$$135 \cdot \frac{\pi}{180} = \frac{3\pi}{4} \cdot \frac{7\pi}{6} \cdot \frac{180}{\pi} = 210^\circ.$$

$$\frac{3\pi}{4} \text{ and } 210^\circ$$

Scoring: 1 point each.

Question 2 - Coterminal angles [2 pts]

$$\frac{5\pi}{6} + 2\pi = \frac{17\pi}{6} \cdot \frac{5\pi}{6} - 2\pi = -\frac{7\pi}{6}.$$

$$\frac{17\pi}{6} \text{ and } -\frac{7\pi}{6}$$

Scoring: 1 point each.

Question 3 - Arc and sector [2 pts]

$$s = 12 \cdot \frac{\pi}{4} = 3\pi \approx 9.42. \quad A = \frac{1}{2}(144)\frac{\pi}{4} = 18\pi \approx 56.55.$$

$$9.42 \text{ ft}; 56.55 \text{ ft}^2$$

Scoring: 1 point each.

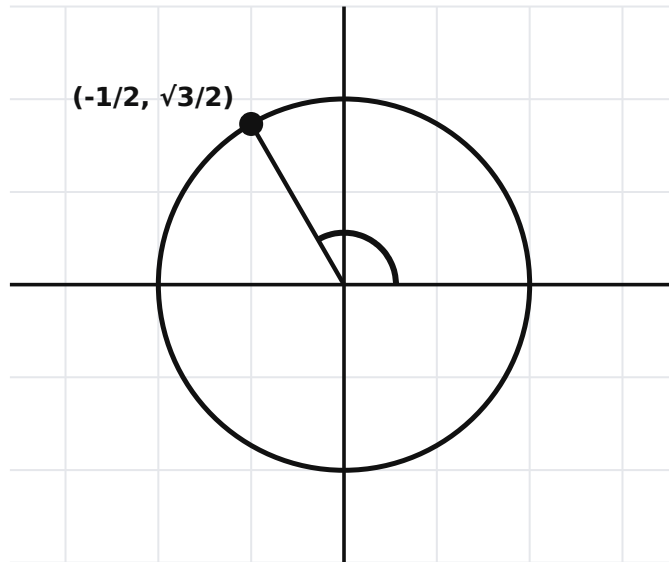
Question 4 - Exact values [2 pts]

$\frac{5\pi}{6}$ has reference angle $\frac{\pi}{6}$ in quadrant II: $\frac{1}{2}$. $\frac{7\pi}{4}$ has reference $\frac{\pi}{4}$ in quadrant IV, where tangent is negative: -1 .

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

Scoring: 1 point each.

Question 5 - Unit circle point [3 pts]



The angle is $2\pi/3$.

(a) The point is in quadrant II with $\cos\theta = -\frac{1}{2}$, so $\theta = \frac{2\pi}{3}$. (b) $\sin = \frac{\sqrt{3}}{2}$, $\cos = -\frac{1}{2}$, $\tan = -\sqrt{3}$. (c) $\pi - \frac{2\pi}{3} = \frac{\pi}{3}$.

$\frac{2\pi}{3}; \frac{\sqrt{3}}{2}, -\frac{1}{2}, -\sqrt{3}; \frac{\pi}{3}$

Scoring: 1 point for each part.

Question 6 - Find the other values [2 pts]

$\cos 2\theta = 1 - \frac{25}{169} = \frac{144}{169}$, positive in quadrant IV: $\frac{12}{13}$. $\tan\theta = -\frac{5}{12}$.

$\cos\theta = \frac{12}{13}$, $\tan\theta = -\frac{5}{12}$

Scoring: 1 point each.

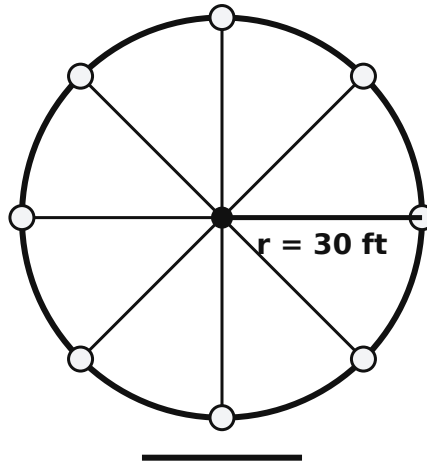
Question 7 - Odd and even [2 pts]

$\sin\left(-\frac{\pi}{3}\right) = -\frac{\sqrt{3}}{2}$. $\frac{11\pi}{6}$ has reference $\frac{\pi}{6}$ in quadrant IV: $\cos = \frac{\sqrt{3}}{2}$.

$$-\frac{\sqrt{3}}{2} \text{ and } \frac{\sqrt{3}}{2}$$

Scoring: 1 point each.

Question 8 - Ferris wheel [3 pts]



One turn is 2π radians in 2 minutes.

(a) $\frac{2\pi}{2} = \pi$ rad/min. (b) $45 \text{ s} = 0.75 \text{ min}$, so $\theta = 0.75\pi$ and $s = 30 \cdot 0.75\pi = 22.5\pi \approx 70.69$. (c) 0.75π rad $= 135^\circ$.

π rad/min; 70.69 ft; 135°

Scoring: 1 point for each part.

Question 9 - Solve for an angle [2 pts]

Cosine is negative in quadrants II and III with reference angle $\frac{\pi}{4}$: $\pi - \frac{\pi}{4}$ and $\pi + \frac{\pi}{4}$.

$$\theta = \frac{3\pi}{4}, \frac{5\pi}{4}$$

Scoring: 1 point for each angle.

Total

20 points