

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

Common Core F-TF.A.1, F-TF.A.2, F-TF.C.8 · mathovore.fr

Full solutions with a scoring guide for each question. Award partial credit when the method is right but a sign or arithmetic slip appears, and do not deduct twice for the same carried-over error.

Algebra 2 Common Core: F-TF.A.1 · F-TF.A.2 · F-TF.C.8

Question 1: Converting angle measures (2 points)

- a. $150 \cdot \frac{\pi}{180} = \frac{5\pi}{6}$.
b. $\frac{7\pi}{4} \cdot \frac{180^\circ}{\pi} = 315^\circ$.

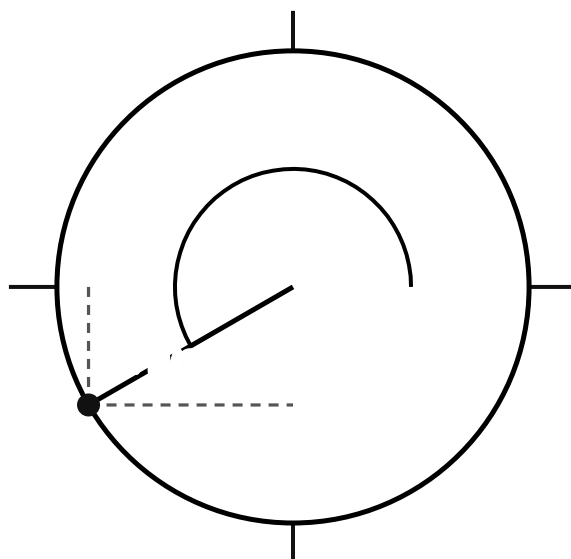
Scoring: 1 point for each correct conversion.

Question 2: Arc length and angle (2 points)

- a. $s = 9 \cdot \frac{2\pi}{3} = 6\pi$ in.
b. $\theta = \frac{12}{8} = 1.5$ radians.

Scoring: 1 point for each part; accept 18.85 inches for part a if the decimal is correct.

Question 3: Point on the unit circle (2 points)



The point is $\left(-\frac{\sqrt{3}}{2}, -\frac{1}{2}\right)$.

Reference angle $\frac{\pi}{6}$ in Quadrant III, where both coordinates are negative: $\left(-\frac{\sqrt{3}}{2}, -\frac{1}{2}\right)$.

Scoring: 1 point for the reference angle or correct magnitudes; 1 point for both signs and the final point.

Question 4: Exact sine and cosine (2 points)

- Quadrant IV, reference $\frac{\pi}{3}$, sine negative: $-\frac{\sqrt{3}}{2}$.
- Quadrant II, reference $\frac{\pi}{4}$, cosine negative: $-\frac{\sqrt{2}}{2}$.

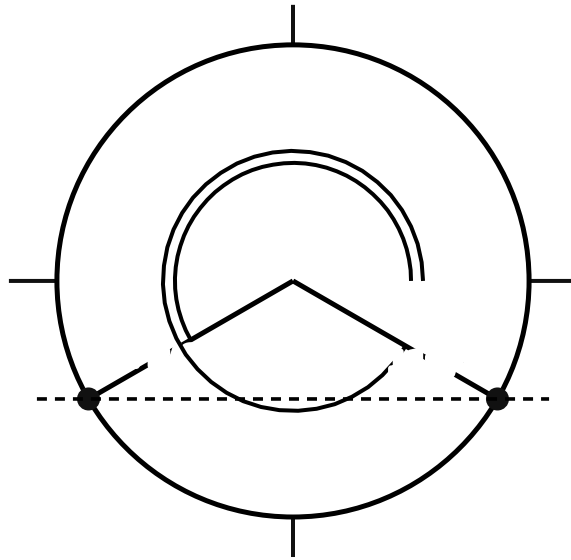
Scoring: 1 point for each correct value with its sign.

Question 5: Tangent values (2 points)

- $\sin \frac{7\pi}{4} = -\frac{\sqrt{2}}{2}$ and $\cos \frac{7\pi}{4} = \frac{\sqrt{2}}{2}$: -1 .
- $\sin \frac{2\pi}{3} = \frac{\sqrt{3}}{2}$ and $\cos \frac{2\pi}{3} = -\frac{1}{2}$: $-\sqrt{3}$.

Scoring: 1 point for each value.

Question 6: Solving a sine equation (2 points)



The two points where $y = -\frac{1}{2}$.

Reference angle $\frac{\pi}{6}$; sine is negative in Quadrants III and IV: $\theta = \frac{7\pi}{6}, \frac{11\pi}{6}$.

Scoring: 1 point for the reference angle and the two quadrants; 1 point for both angles (1 point if only one is given).

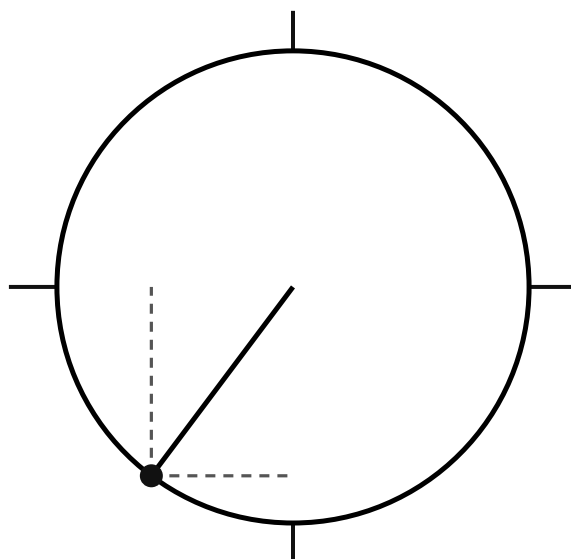
Question 7: Sine and tangent from cosine (2 points)

a. $\sin^2 \theta = 1 - \frac{144}{169} = \frac{25}{169}$; sine is positive in Quadrant II: $\frac{5}{13}$.

b. $\tan \theta = \frac{5/13}{-12/13} = -\frac{5}{12}$.

Scoring: 1 point for $\sin \theta$ with the correct sign; 1 point for $\tan \theta$.

Question 8: Using symmetry (3 points)



The point for θ .

a. $\cos 2\theta = 1 - \frac{16}{25} = \frac{9}{25}$; Quadrant III: $\cos \theta = -\frac{3}{5}$.

b. $\tan \theta = \frac{-4/5}{-3/5} = \frac{4}{3}$.

c. The angle $-\theta$ reflects the point across the x-axis: $\sin(-\theta) = \frac{4}{5}$ and $\cos(-\theta) = -\frac{3}{5}$.

Scoring: 1 point per part; in part c, 1 point requires both values.

Question 9: Ferris wheel (3 points)

a. $25 + 20 \cdot \frac{1}{2} = 35$ ft.

b. $25 + 20\left(-\frac{\sqrt{3}}{2}\right) = 25 - 10\sqrt{3} \approx 7.68$ ft.

c. $20\sin\theta = -10$, so $\sin\theta = -\frac{1}{2}$: $\theta = \frac{7\pi}{6}, \frac{11\pi}{6}$.

Scoring: 1 point per part.

Total
20 points