

Radians and the Unit Circle Explained

Grade 11 – Algebra 2 math · Test · Standards: F-TF.A.1, F-TF.A.2, F-TF.C.8

Name: _____ Date: _____ Class: _____

This 45-minute test covers radian conversions, exact trigonometric values, the unit circle, arc length and the Pythagorean identity. A calculator is allowed for decimals only. Show every step.

Standards: F-TF.A.1, F-TF.A.2, F-TF.C.8 · **Level:** Grade 11 Algebra 2

Time: 45 minutes · 9 questions · Total: 20 points · Calculator: as allowed by your teacher

Question 1 Convert angle measures (2 points)

- a. Convert 210° to radians. (1 point)
- b. Convert $5\pi/9$ radians to degrees. (1 point)

Question 2 Exact values (3 points)

Find the exact value.

- a. $\sin(2\pi/3)$ (1 point)
- b. $\cos(5\pi/4)$ (1 point)
- c. $\tan(11\pi/6)$ (1 point)

Question 3 Read the unit circle (3 points)

The point shown is on the unit circle.

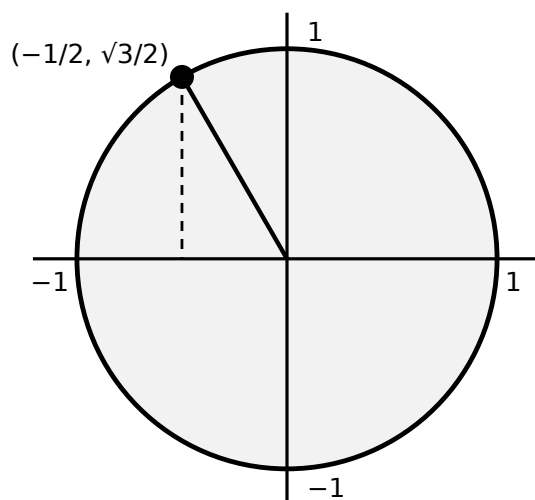


Figure for Question 3.

- Find the angle θ in radians, $0 < \theta < 2\pi$. (1 point)
- Give $\sin \theta$, $\cos \theta$ and $\tan \theta$. (2 points)

Question 4 Arc length (2 points)

A circle has radius 14 feet. Find the length of the arc cut off by a central angle of $11\pi/18$. Give the exact value and the value to the nearest hundredth.

Question 5 Ratios from a given sine (2 points)

Suppose $\sin \theta = -9/41$ and θ is in quadrant III. Find $\cos \theta$ and $\tan \theta$.

Question 6 Ratios from a given cosine (2 points)

Suppose $\cos \theta = -\sqrt{7}/4$ and θ is in quadrant II. Find $\sin \theta$ and $\tan \theta$ exactly.

Question 7 Coterminal angles (2 points)

Find the exact value of $\cos(19\pi/6)$.

Question 8 Verify an identity (2 points)

Show that $(1 - \cos \theta)(1 + \cos \theta) = \sin^2 \theta$.

Question 9 Ferris wheel (2 points)

A Ferris wheel has radius 40 feet. A rider starts at the rightmost point and rotates counterclockwise by $2\pi/3$. How far above the horizontal line through the center is the rider? Give an exact value and a decimal to the nearest tenth.

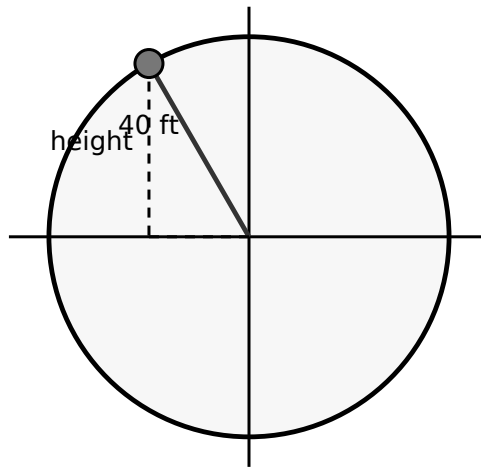


Figure for Question 9.