

Algebra 2 - Radians and the Unit Circle - Worksheet

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

Name: _____ Class: _____ Date: ____/____/____

These 20 problems practice radians and the unit circle (Common Core F-TF.A.1, F-TF.A.2 and F-TF.A.3). The first problems check converting between degrees and radians, the middle problems add exact trig values with reference angles and quadrant signs, and the last six are word problems and multi-step tasks that need arc length on wheels and wipers.

Work in order and show every step. Write each answer in simplest form, and open the answer key only after you have tried the problem yourself.

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

Exercise 1 - Degrees to radians

Convert 60° to radians.

Exercise 2 - A larger angle

Convert 225° to radians.

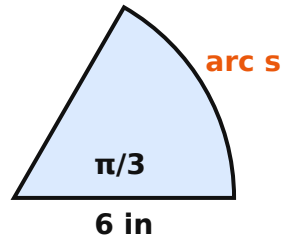
Exercise 3 - Radians to degrees

Convert $\frac{7\pi}{6}$ to degrees.

Exercise 4 - Decimal radians

Convert 2 radians to degrees. Round to the nearest tenth.

Exercise 5 - Arc length



A sector: $s = r$ times the central angle in radians.

A circle has radius 6 inches. Find the arc length for a central angle of $\frac{\pi}{3}$.

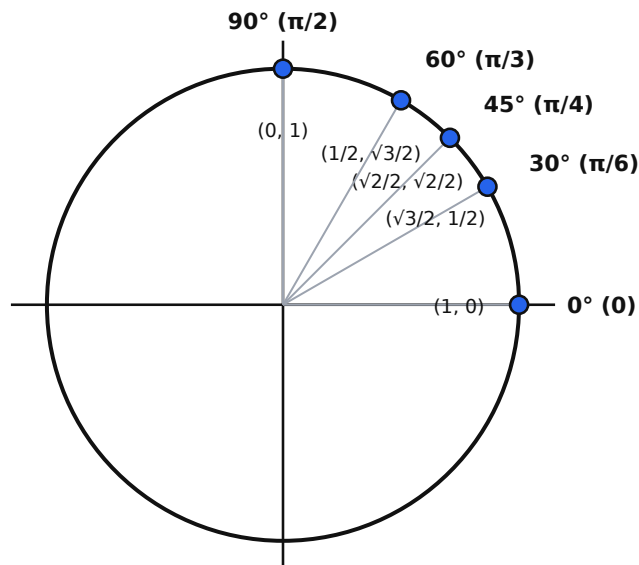
Exercise 6 - Find the angle

An arc of length 15 feet lies on a circle of radius 10 feet. Find the central angle in radians.

Exercise 7 - Axis angle

Give the coordinates of the point on the unit circle at $\frac{\pi}{2}$ and find $\cos \frac{\pi}{2}$ and $\sin \frac{\pi}{2}$.

Exercise 8 - Angle of 30 degrees



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

Use the unit circle to evaluate $\sin \frac{\pi}{6}$, $\cos \frac{\pi}{6}$, and $\tan \frac{\pi}{6}$.

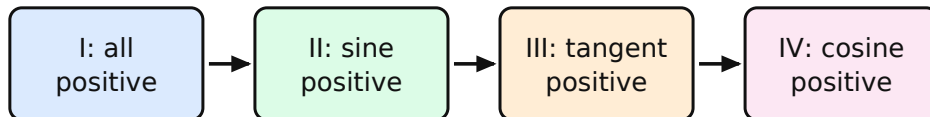
Exercise 9 - Angle of 45 degrees

Evaluate $\sin 45^\circ$, $\cos 45^\circ$, and $\tan 45^\circ$.

Exercise 10 - Quadrant II sine

Evaluate $\sin \frac{2\pi}{3}$.

Exercise 11 - Quadrant II cosine



Signs by quadrant: All, Sine, Tangent, Cosine.

Evaluate $\cos \frac{5\pi}{6}$.

Exercise 12 - Quadrant IV sine

Evaluate $\sin \frac{7\pi}{4}$.

Exercise 13 - Tangent in quadrant II

Evaluate $\tan \frac{3\pi}{4}$.

Exercise 14 - Straight angle

Evaluate $\sin \pi$, $\cos \pi$, and $\tan \pi$.

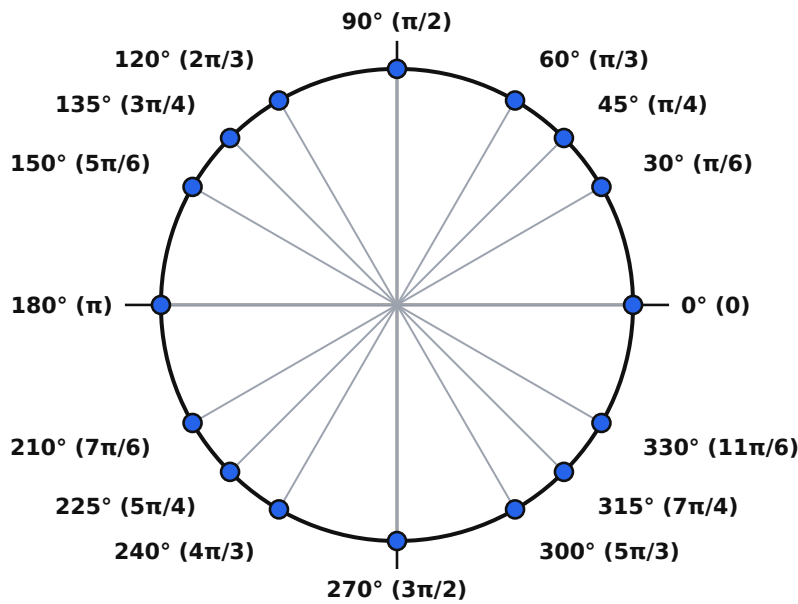
Exercise 15 - Beyond one turn

Evaluate $\sin \frac{13\pi}{6}$ by finding a coterminal angle.

Exercise 16 - Negative angle

Evaluate $\cos\left(-\frac{\pi}{3}\right)$ and $\sin\left(-\frac{\pi}{6}\right)$.

Exercise 17 - Solve $\sin \theta$



Angles around the unit circle in degrees and radians.

Find all angles θ in $[0, 2\pi)$ with $\sin \theta = \frac{\sqrt{2}}{2}$.

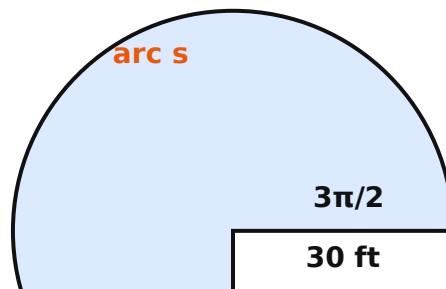
Exercise 18 - Solve $\cos \theta$

Find all angles θ in $[0, 2\pi)$ with $\cos \theta = -\frac{1}{2}$.

Exercise 19 - Identify the angle

The point $\left(-\frac{\sqrt{3}}{2}, \frac{1}{2}\right)$ is on the unit circle. Find the angle in $[0, 2\pi)$.

Exercise 20 - Ferris wheel



A sector: $s = r$ times the central angle in radians.

A Ferris wheel has radius 30 feet. A rider turns through $\frac{3\pi}{2}$ radians. How far does the rider

travel?

Exercise 21 - Windshield wiper

A wiper blade 18 inches long sweeps an angle of 120° . Find the arc length traced by the tip of the blade.

Exercise 22 - Find the error

Mei says $\sin \frac{5\pi}{6} = -\frac{1}{2}$. Explain the error.