

Algebra 2 - Graphs of Trigonometric Functions and Identities - Worksheet

Common Core F-TF.B.5, F-TF.C.8, F-IF.C.7e · maths-pdf.fr/en/

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

These 20 problems practice graphs of trigonometric functions and the Pythagorean identity (Common Core F-TF.B.5, F-TF.C.8 and F-IF.C.7e). The first problems check reading amplitude, period, and midline, the middle problems add writing sinusoidal equations and using the Pythagorean identity, and the last six are word problems and multi-step tasks that need Ferris wheel, tide, and daylight models.

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.B.5, F-TF.C.8, F-IF.C.7e**

Exercise 1 - Read the parameters

State the amplitude, period, and midline of $y = 3\sin(2x) + 1$.

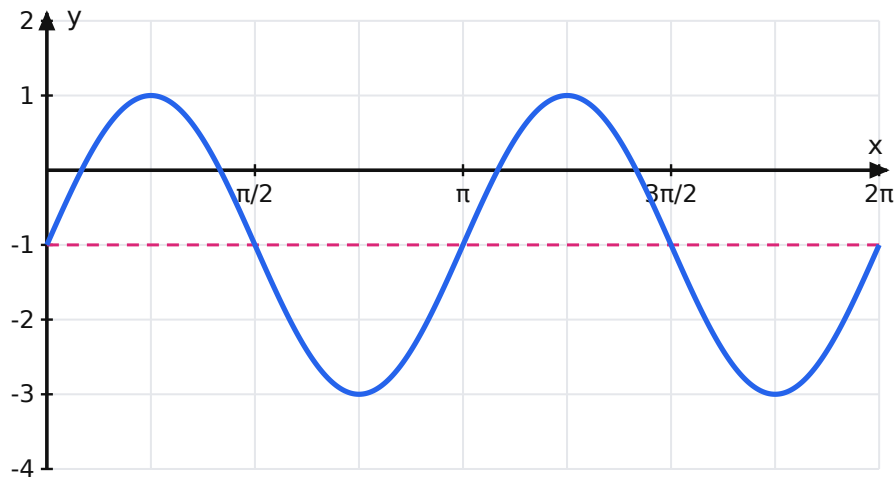
Exercise 2 - Reflection and stretch

State the amplitude and period of $y = -2\cos\left(\frac{x}{2}\right)$ and describe the reflection.

Exercise 3 - Phase shift

Describe the phase shift of $y = \sin\left(x - \frac{\pi}{3}\right) + 2$.

Exercise 4 - Equation from a graph



A sinusoidal graph.

The graph shows a sine-type function with midline $y = -1$, maximum 1, and period π . Write its equation.

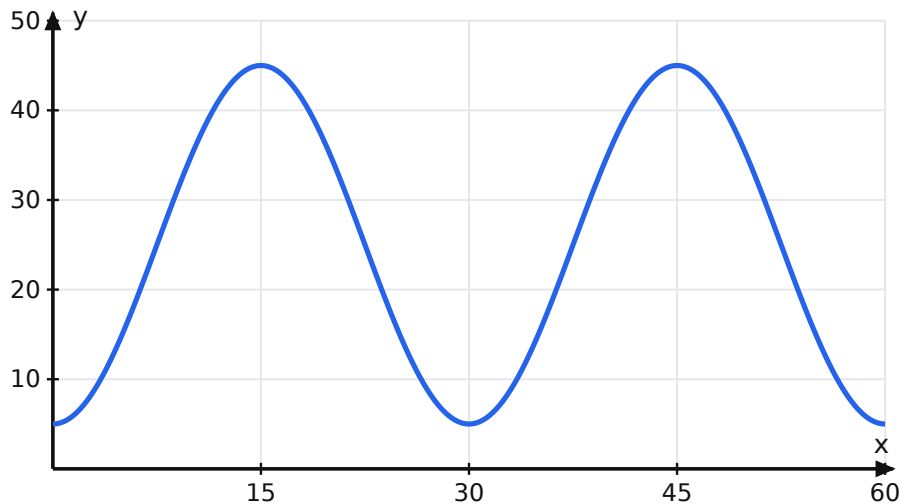
Exercise 5 - Write from features

Write a sine function with amplitude 4, period π , and midline $y = 2$, starting at the midline and rising.

Exercise 6 - Maximum and minimum

Find the maximum and minimum of $y = 5\cos x - 3$.

Exercise 7 - Ferris wheel



Height in feet of a rider over 60 seconds.

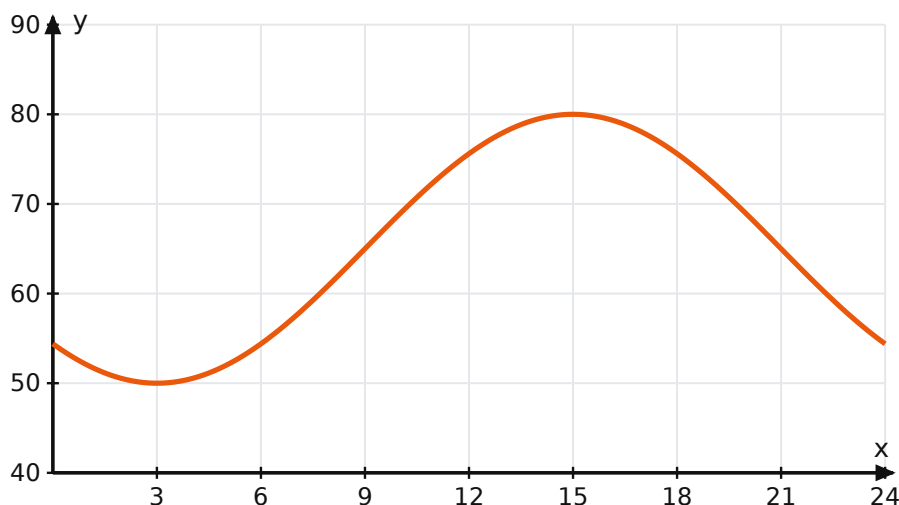
A Ferris wheel has radius 20 feet and its center is 25 feet above the ground. A rider's height is

$h(t) = 25 - 20\cos\left(\frac{\pi}{15}t\right)$ feet after t seconds. Find $h(0)$, $h(15)$, $h(10)$, and the period.

Exercise 8 - Tides

The tide height in feet is $y = 4\sin\left(\frac{\pi}{6}t\right) + 6$, where t is hours after midnight. Find the amplitude, the period, and the height at $t = 3$.

Exercise 9 - Temperature



Temperature in degrees Fahrenheit over a day.

A town's temperature in $^{\circ}\text{F}$ is $T(t) = 15\sin\left(\frac{\pi}{12}(t-9)\right) + 65$, with t in hours after midnight. Find the highest and lowest temperatures, and find $T(15)$.

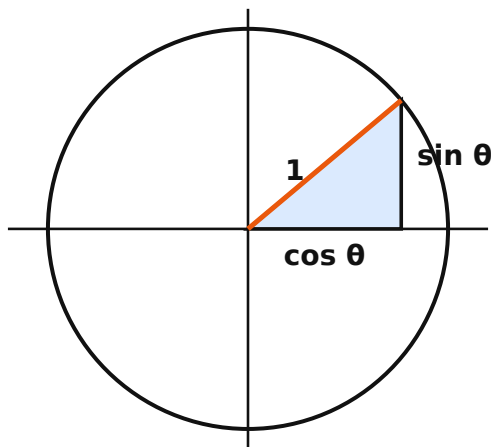
Exercise 10 - Find B from the period

A wave has period $\frac{\pi}{2}$. Find B in $y = \sin(Bx)$.

Exercise 11 - Identity at an angle

Verify $\sin^2\theta + \cos^2\theta = 1$ for $\theta = \frac{\pi}{6}$.

Exercise 12 - Find cosine in quadrant II



The right triangle in the unit circle: $\cos^2 \theta + \sin^2 \theta = 1$.

If $\sin \theta = \frac{3}{5}$ and θ is in quadrant II, find $\cos \theta$ and $\tan \theta$.

Exercise 13 - Find sine in quadrant III

If $\cos \theta = -\frac{5}{13}$ and θ is in quadrant III, find $\sin \theta$ and $\tan \theta$.

Exercise 14 - Quadrant IV

If $\sin \theta = -\frac{1}{2}$ and θ is in quadrant IV, find $\cos \theta$ and $\tan \theta$.

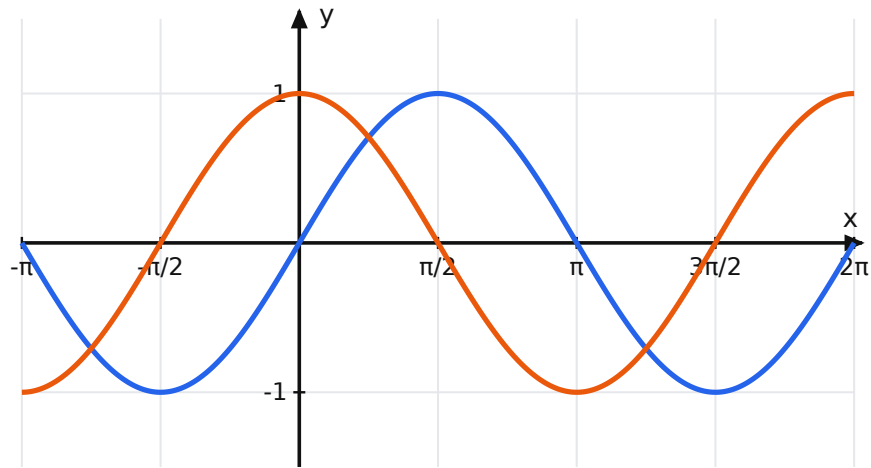
Exercise 15 - Simplify with the identity

Simplify $\frac{\sin^2 x}{1 - \cos x}$.

Exercise 16 - Prove an identity

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

Exercise 17 - Cosine is shifted sine



$y = \sin x$ (blue) and $y = \cos x$ (orange) both have period 2π and amplitude 1.

Use the graph to explain why $\sin\left(x + \frac{\pi}{2}\right) = \cos x$.

Exercise 18 - Daylight

The hours of daylight in a city are $D(t) = 2.5\sin\left(\frac{2\pi}{365}(t-80)\right) + 12$, where t is the day of the year. Find the longest and shortest days and the period.

Exercise 19 - Find the error

Noah says the period of $y = \sin(3x)$ is 3π . Find the mistake and the correct period.

Exercise 20 - Spring

A weight on a spring moves between 6 cm and 18 cm above a table once every 3 seconds, starting at its lowest point. Write a cosine model $y(t) = A\cos(Bt) + D$.