

Algebra 2 · Graphs of Trigonometric Functions

· Test

Common Core F-TF.B.5, F-IF.C.7e · mathovore.fr

Name: _____ Date: ____/____/____ Score: _____

This test covers graphs of sine and cosine in Algebra 2: amplitude, period, midline, phase shift, writing equations from graphs and modeling periodic situations. It has 9 questions worth 20 points. Allow 45 minutes, use radian mode, and show your work.

Test information

- **Grade:** Algebra 2
- **Chapter:** Graphs of Trigonometric Functions
- **Common Core:** F-TF.B.5, F-IF.C.7e
- **Time:** 45 minutes
- **Total:** 20 points (Question 1: 2 pts; Question 2: 2 pts; Question 3: 2 pts; Question 4: 2 pts; Question 5: 2 pts; Question 6: 2 pts; Question 7: 3 pts; Question 8: 3 pts; Question 9: 2 pts)

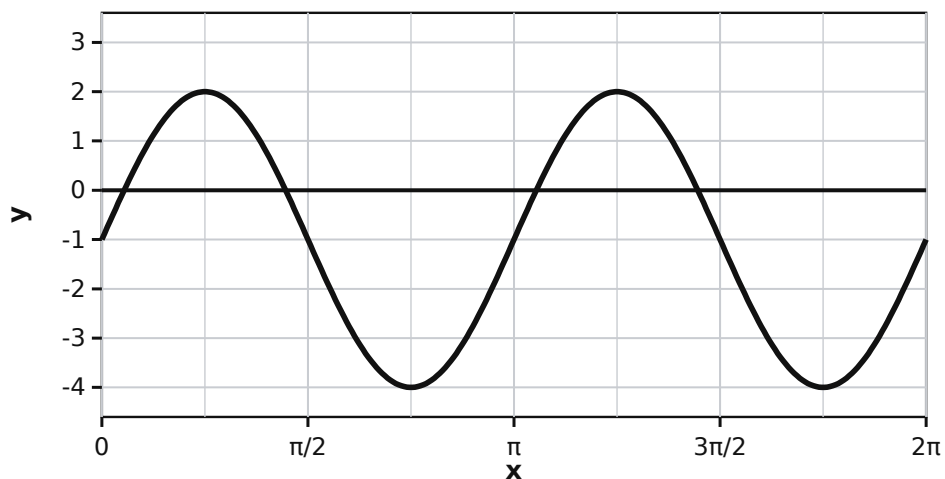
Question 1: Features of a sinusoid (2 points)

Consider $y = -2\sin\left(3\left(x - \frac{\pi}{6}\right)\right) + 4$.

- a. State the amplitude and the midline. (1 point)
- b. State the period and the phase shift. (1 point)

Question 2: Equation from a graph (2 points)

The graph shows a sine wave.



Graph for Question 2.

- State the midline and the amplitude. (1 point)
- Write an equation of the form $y = A\sin(Bx) + D$ for the graph. (1 point)

Question 3: Evaluate exactly (2 points)

Let $f(x) = 4\cos x - 2$. Find the exact value of each.

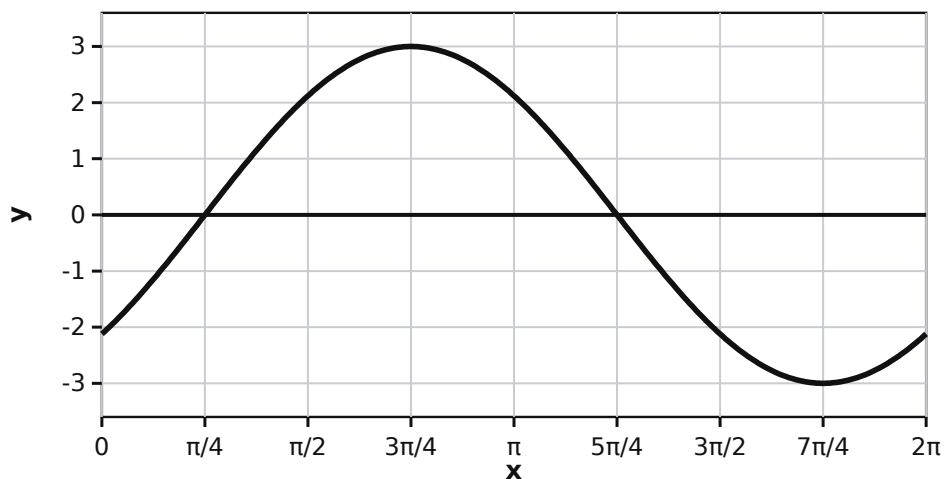
- $f\left(\frac{\pi}{3}\right)$ (1 point)
- $f(\pi)$ (1 point)

Question 4: Write a cosine model (2 points)

A cosine function has a maximum value of 9, a minimum value of -1 and a period of 6. Write an equation of the form $y = A\cos(Bx) + D$ with $A > 0$ and $B > 0$. Show how you found each constant.

Question 5: Phase shift from a graph (2 points)

The graph shows $y = A\sin(x - C)$ with $A > 0$ and $0 < C < \pi$.



Graph for Question 5.

Find A and C , and write the equation.

Question 6: Compare two sine waves (2 points)

Compare $f(x) = \sin x$ and $g(x) = \sin 2x$ on the interval $[0, 4\pi]$.

- State the period of each function. (1 point)
- How many complete cycles does each graph make on the interval? (1 point)

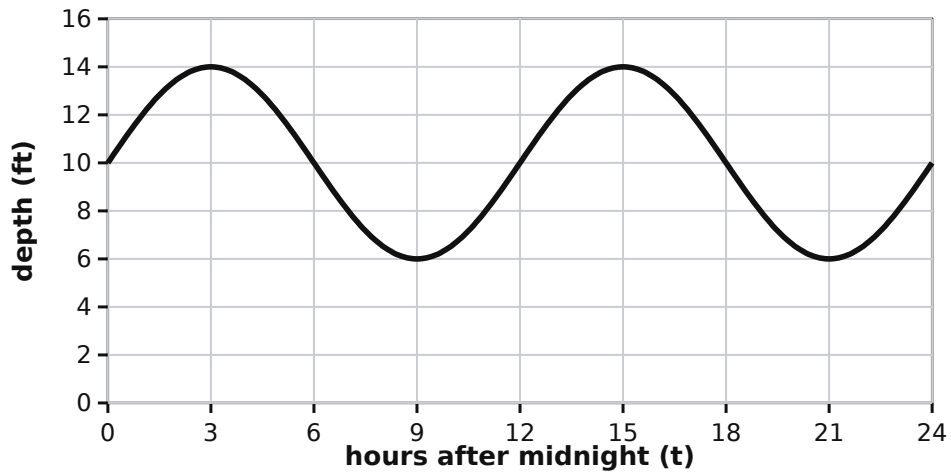
Question 7: Ferris wheel height (3 points)

Priya's Ferris wheel has height $h(t) = 30 - 22\cos\left(\frac{\pi t}{18}\right)$ feet, where t is in seconds.

- Find the lowest and highest heights. (1 point)
- How long does one full turn take? (1 point)
- Find the height at $t = 6$ seconds. (1 point)

Question 8: Harbor depth model (3 points)

The graph shows the depth of water at a harbor on one day, where t is the number of hours after midnight. The depth follows $D(t) = A\cos(B(t-C)) + K$ with $A > 0$, $B > 0$ and $C > 0$.



Graph for Question 8.

- Find the amplitude, midline and period. (1 point)
- Write the function $D(t)$. (1 point)
- Find the depth at $t=5$. (1 point)

Question 9: Temperature model (2 points)

The temperature in Diego's town is $T(t) = 60 + 12\sin\left(\frac{\pi(t-8)}{12}\right)$ degrees Fahrenheit, where t is the number of hours after midnight.

- Find the maximum temperature and the time it first occurs. (1 point)
- Find the temperature at $t=11$ to the nearest tenth. (1 point)