

3.5 Sinusoidal Functions

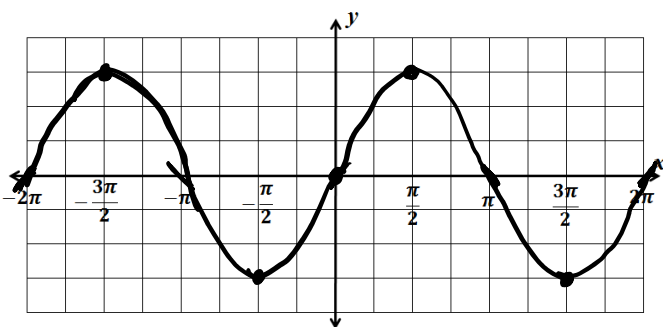
AP Precalculus

Solutions

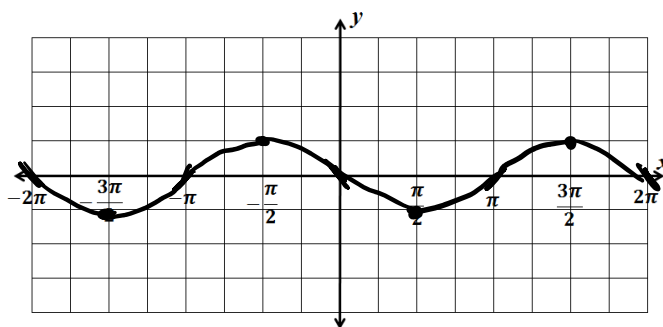
3.5 Practice

Graph the trig function.

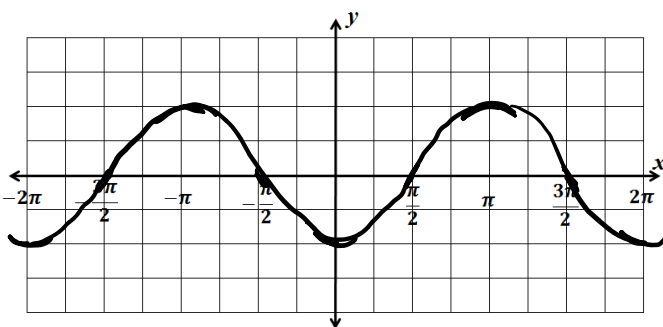
1. $f(\theta) = 3 \sin \theta$



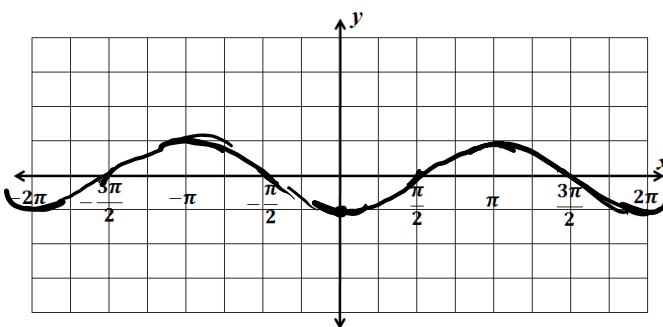
2. $y = -\sin x$



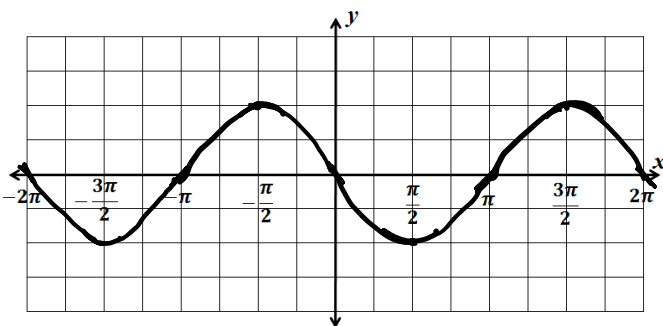
3. $f(\theta) = -2 \cos \theta$



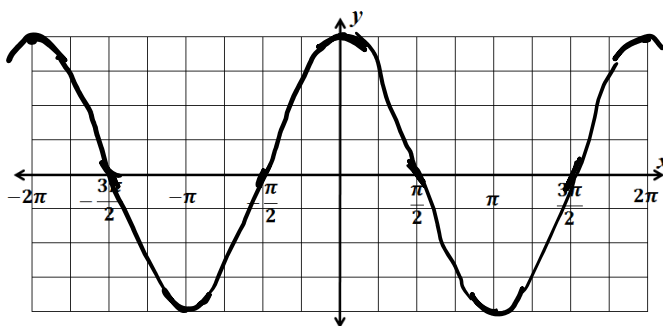
4. $y = -\cos x$



5. $f(\theta) = -2 \sin \theta$

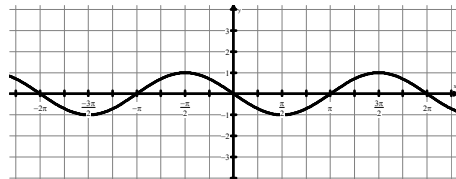


6. $f(t) = 4 \cos t$



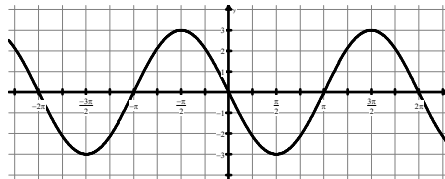
Write the equation of the following *sine* curves.

7.



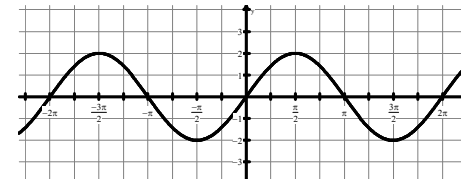
$y = -\sin x$

8.



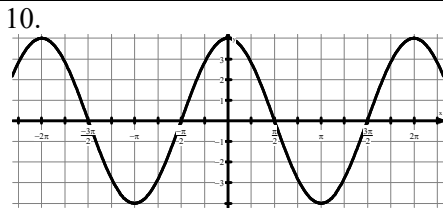
$y = -3 \sin x$

9.

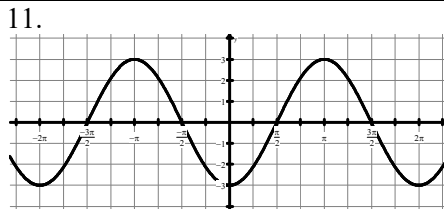


$y = 2 \sin x$

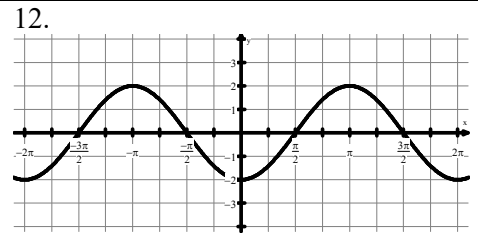
Write the equation of the following *cosine* curves.



$y = 4 \cos x$



$y = -3 \cos x$



$y = -2 \cos x$

For each problem, the sinusoid has been vertically shifted and has the given maximum and minimum values. Write the equation of the midline for the sinusoid AND find the amplitude.

13. Max value: 40
Min value: 28

$\frac{40+28}{2} = \frac{68}{2} = 34$

midline: $y = 34$
 $|a| = 6$

14. Max value: 1.9
Min value: 0.1

$\frac{1.9+0.1}{2} = \frac{2}{2} = 1$

midline: $y = 1$
 $|a| = 0.9$

15. Max value: 65
Min value: 30

$\frac{65+30}{2} = \frac{95}{2} = 47.5$

midline: $y = 47.5$
 $|a| = 17.5$

16. Max value: 10
Min value: -6

$\frac{10+(-6)}{2} = \frac{4}{2} = 2$

midline: $y = 2$
 $|a| = 8$

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3.5 Test Prep

17. The daily low temperatures of a certain city over a period of time are modeled with a sinusoidal function the xy -plane. The minimum daily low temperature is 24°F , and the maximum daily low temperature is 52°F . Based on these temperatures, which of the following is the best value for the amplitude of the sinusoidal function?

midline: $\frac{52+24}{2} = \frac{76}{2} = 38$

$|a| = |52 - 38| = 14$

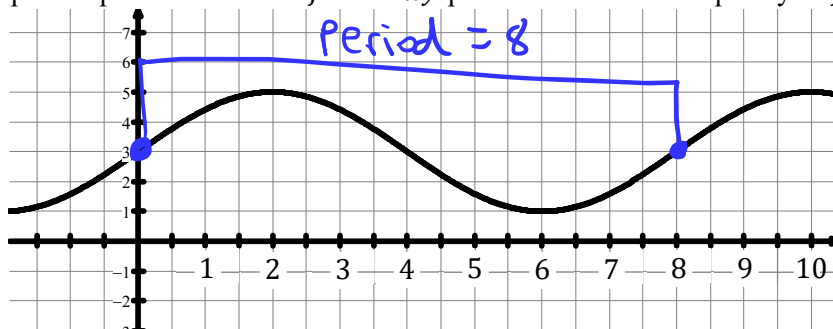
(A) 76

(B) 38

(C) 28

(D) 14

18. The figure shows the graph of a periodic function f in the xy -plane. What is the frequency of f ?



Freq = $\frac{1}{\text{period}}$

(A) $\frac{1}{8}$

(B) $\frac{\pi}{8}$

(C) $\frac{\pi}{4}$

(D) 8

19. **Calculator active.** Mr. Brust's patience with his 4th period class seems to have cycles of ups and downs. His patience can be modeled by the function $P(t) = 30 \cos(0.15t) + 60$, where t is the number of minutes he has spent with his 4th period class and $P(t)$ is his patience level. A person's patience level is measured as 100 being the most patience anyone can possibly have, and 0 representing no patience. Which of the following best describes the behavior of $P(t)$ on minute 30?

hint: If you are graphing the function on a calculator, be sure your mode is set to RADIANS and not DEGREES.

- (A) The amount of patience is increasing at a decreasing rate.
- (B) The amount of patience is decreasing at a decreasing rate.
- (C) The amount of patience is increasing at an increasing rate.
- (D) The amount of patience is decreasing at an increasing rate.

C

If the graph is "concave up", then the rate of change is increasing.

