

1. The temperature in an office is controlled by an electronic thermostat. The temperatures vary according to the sinusoidal function $y = 3 \sin\left(\frac{\pi}{12}(t-9)\right) + 19$ where y is the temperature (in Celsius) and t is the time in hours past midnight.

- Identify the period, phase shift, axis, and amplitude of the function. Then sketch a complete graph.
- What is the minimum temperature and when does it occur?
- What is the temperature in the office when the employees arrive at 9 am?
- When is the first time after midnight that the temperature reaches 22°C ?

2. While at the Puyallip Fair, you decide to ride the Ferris Wheel. Your height above the ground in feet, since you began to move, varies sinusoidally with the the time in seconds according to the function

$$h(t) = 22 \cos\left(\frac{\pi}{6}(t-5)\right) + 27.$$

- Identify the period, phase shift, axis, and amplitude of the function. Then sketch a complete graph.
- What is the lowest point that you reach on the wheel? Highest point?
- How long will it take you to travel all the way around the wheel two times?

3. Amanda was watching her little brother Mike play on a swing set. She decided that she would like to find his distance above the ground using a sinusoidal curve. Mike's height (in feet) at any time t (in seconds) can be modelled by $h(t) = 4 \cos(\pi(t-2)) + 5$.

- Identify the period, phase shift, axis, and amplitude of the function. Then sketch a complete graph.
- What is Mike's maximum height? When does he reach this point for the first time?
- What is Mike's minimum height? When does he reach this point for the first time?
- How long will it take for Mike to travel from his maximum height to his minimum height?

4. Aaron rode his bike over a piece of gum and continued riding at a constant rate. The height of the gum (in cm) at any time t (in sec) can be modelled by $h(t) = 15 \cos\left(\frac{\pi}{2}(t-2)\right) + 15$.

- Identify the period, phase shift, axis, and amplitude of the function. Then sketch a complete graph.
- What is the maximum height of the gum?
- After how many seconds does the gum reach its maximum height for the first time?
- How many seconds does it take for the gum to make a complete rotation on the tire?
- When (in sec) will the gum be at its maximum height for the third time?

Convert to degrees or radians.

5. $\frac{5\pi}{36}$ 6. 280° 7. $-\frac{13\pi}{6}$ 8. -190°

Find the reference angle.

9. $\frac{7\pi}{12}$ 10. $\frac{33\pi}{10}$ 11. $\frac{13\pi}{6}$ 12. $-\frac{4\pi}{3}$

Find the exact value.

13. $\sin\frac{5\pi}{4}$ 14. $\cos\frac{11\pi}{6}$ 15. $\cos\frac{7\pi}{3}$ 16. $\sin\frac{5\pi}{3}$ 17. $\cos 3\pi$ 18. $\sin\frac{3\pi}{2}$

Find the value(s) of θ in the domain $[0, 2\pi]$ that make the equation true.

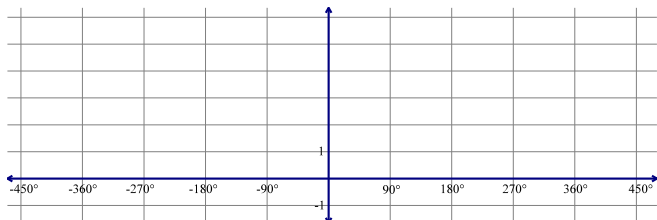
19. $\sin \theta = -\frac{\sqrt{3}}{2}$ 20. $\cos \theta = -1$ 21. $\sin \theta = -1$ 22. $\sin \theta = -\frac{1}{2}$ 23. $\cos \theta = \frac{\sqrt{2}}{2}$

Identify an angle in the domain $[0, 2\pi]$ that is coterminal with θ .

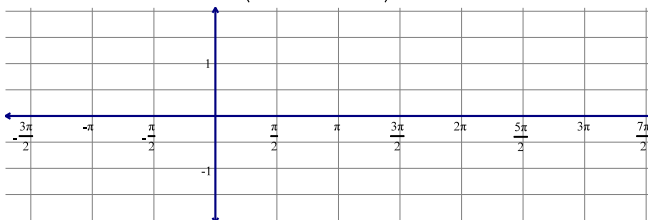
24. $\frac{17\pi}{7}$ 25. $\frac{10\pi}{3}$ 26. $-\frac{25\pi}{9}$

List all transformations, then sketch a complete graph.

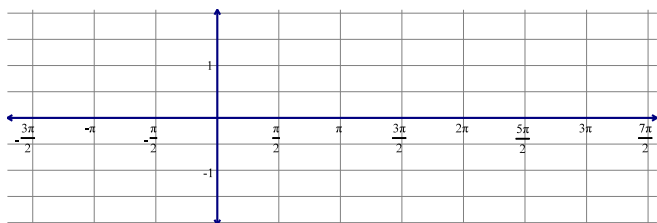
27. $f(x) = \sin(x + 30^\circ) + 4$



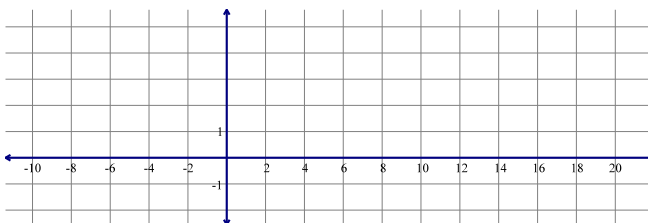
28. $f(x) = \frac{3}{2} \cos\left(\frac{1}{2}\left(x - \frac{\pi}{6}\right)\right)$



29. $f(x) = \frac{1}{2} \sin\left(x + \frac{\pi}{2}\right) + 1$

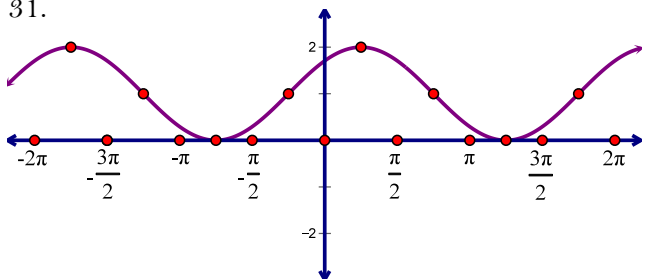


30. $f(x) = 2 \cos\left(\frac{\pi}{5}(x - 2)\right) + 2$

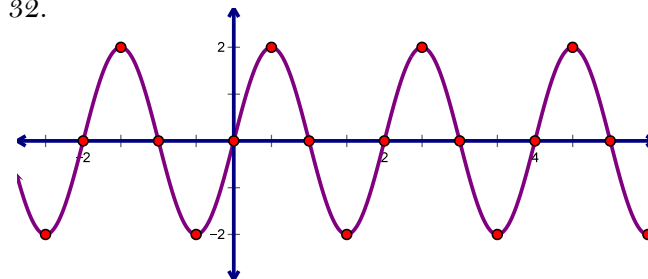


Find the sine equation and the cosine equation of the function graphed.

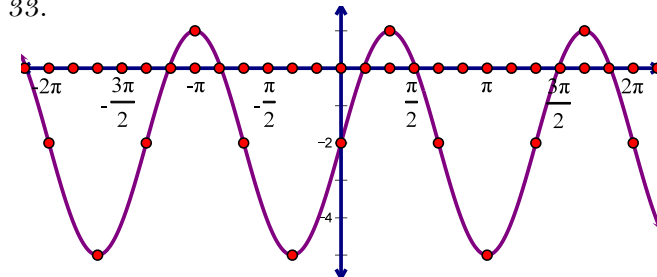
31.



32.



33.



34.

