

Honors Pre-Calculus – Released Exam Practice - 2016

Suppose the function $H(t) = 8.5\sin(0.017t - 1.35) + 12$ models the hours of sunlight for a town in Alaska, where $t = 1$ is the first day of the year. Based on the function, what is the **approximate** range of daylight hours for the town?

- A 3.5 to 20.5
- B 4 to 20
- C 4.5 to 19.5
- D 5 to 19

A piecewise function is shown below.

$$h(x) = \begin{cases} -2x^2 + 5x + 10 & \text{for } -4 \leq x < 3 \\ 2x + 3p & \text{for } 3 \leq x \leq 5 \end{cases}$$

For what value of p will the function be continuous?

- A $\frac{10}{3}$
- B $\frac{1}{3}$
- C $-\frac{25}{3}$
- D $-\frac{34}{3}$

The third term of a geometric sequence is 96, and the fifth term is 1,536. What is the sum of the first ten terms of this sequence?

- A 4,092
- B 1,572,864
- C 2,097,150
- D 33,554,400

The equation $y = 4.7x^{\frac{1}{6}}$ is graphed on the coordinate plane. How does increasing the denominator of the exponent transform the graph?

- A The transformed graph will approach a horizontal asymptote while the original graph will not.
- B The transformed graph will not approach a horizontal asymptote while the original graph will.
- C The transformed graph will go to ∞ slower than the original graph as the value of x gets larger.
- D The transformed graph will go to ∞ faster than the original graph as the value of x gets larger.

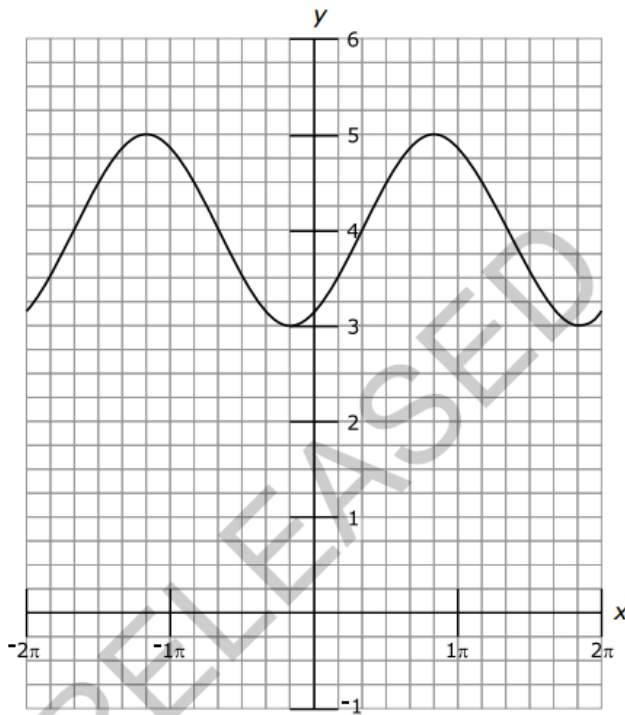
Which function has an amplitude that is twice the size and a period that is three times the size of the function $y = 3\cos\left(\frac{x}{4} - 1\right) + 2$?

- A $y = 6\sin\left(\frac{x}{12} - 3\right) + 1$
- B $y = \frac{3}{2}\cos\left(\frac{3x}{4} + 1\right) - 3$
- C $y = 6\cos\left(\frac{3x}{4} - 1\right) + 3$
- D $y = \frac{3}{2}\sin\left(\frac{x}{12} + 3\right) - 1$

A plane takes off and travels at an angle of 40° north of east at 110 mph for 2 hours. It then adjusts its path to head 10° west of north and travels in that direction for half an hour at a speed of 100 mph. **Approximately** how far away is the plane from its starting point?

- A 182 miles
- B 200 miles
- C 238 miles
- D 249 miles

Which function correctly represents the graph below?



- A $y = \sin\left(x - \frac{\pi}{3}\right) + 4$
- B $y = \sin\left(x + \frac{\pi}{3}\right) + 4$
- C $y = \cos\left(x - \frac{\pi}{3}\right) + 4$
- D $y = \cos\left(x + \frac{\pi}{3}\right) + 4$

A Ferris wheel is designed in such a way that the height (h), in feet, of the seat above the ground at any time, t , is modeled by the function

$$h(t) = 60 - 55 \sin\left(\frac{\pi}{10}t + \frac{\pi}{2}\right).$$



What is the **maximum** height a seat reaches?

- A 55 feet
- B 60 feet
- C 110 feet
- D 115 feet

Which statement is true about the fifth terms of the two sequences below?

$$a_n = 3n^2 - 6$$

$$b_n = 3(b_{n-1} - 6); b_1 = 10$$

- A The fifth term of the recursive sequence exceeds the fifth term of the explicit sequence by 63.
- B The fifth term of the explicit sequence exceeds the fifth term of the recursive sequence by 63.
- C The fifth term of the recursive sequence exceeds the fifth term of the explicit sequence by 21.
- D The fifth term of the explicit sequence exceeds the fifth term of the recursive sequence by 21.

Which statement is true about the series shown below?

$$-4 + -2 + -1 + \frac{-1}{2} + \frac{-1}{4} + \dots$$

- A The series converges because $|r| < 1$.
- B The series diverges because $|r| < 1$.
- C The series converges because $|r| > 1$.
- D The series diverges because $|r| > 1$.

What is the explicit form of the equation $a_n = a_{n-1} + 2(n - 1); a_1 = 1$?

- A $a_n = 2n - 1$
- B $a_n = n^2 - n + 1$
- C $a_n = n^2 - 2n + 2$
- D $a_n = 2n^2 - 2n - 1$