



- 1 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
- 2 The lifetime of a particular type of car tire is normally distributed. The mean lifetime is 50,000 miles, with a standard deviation of 5,000 miles. Of a random sample of 15,000 tires, how many of the tires are expected to last for between 45,000 and 55,000 miles?
- A 7,125
- B 10,200
- C 14,250
- D 14,850



- 3 The frequency table below shows the number of runners in specific age groups for a certain race.

Age Group	Number of Runners
0-10	
11-20	
21-30	
31-40	
41-50	
51-60	
61-70	
71-80	
81-90	

What is the shape of the distribution?

- A uniform
- B skewed right
- C skewed left
- D normal



4 A spinner labeled 1 to 9 gives each of the numbers 2, 5, 7, and 9 a $\frac{3}{20}$ chance of being landed upon. The chance of landing on each of the other five numbers is equal. If the spinner is spun 1,000 times, which choice is the **most likely** outcome for the 1,000 spins?

A

Number on Spinner	1	2	3	4	5	6	7	8	9
Number of Occurrences	110	112	111	111	109	112	112	111	112

B

Number on Spinner	1	2	3	4	5	6	7	8	9
Number of Occurrences	82	148	78	80	149	79	151	81	152

C

Number on Spinner	1	2	3	4	5	6	7	8	9
Number of Occurrences	120	122	100	103	108	126	113	104	104

D

Number on Spinner	1	2	3	4	5	6	7	8	9
Number of Occurrences	121	100	119	120	102	120	98	121	99



- 5 A group of 12 people need to form a line. The line will consist of exactly 9 of the people. Person X and Person Y have to be either third or fourth in line. How many different orders are possible?
- A 79,833,600
- B 1,209,600
- C 604,800
- D 362,880
- 6 The probability that it will rain on Saturday is $\frac{2}{3}$. The probability that the temperature on Saturday will reach 100°F is $\frac{4}{9}$. The probability that it will rain or reach 100°F on Saturday is $\frac{4}{5}$. What is the probability it will rain and reach 100°F on Saturday?
- A $\frac{14}{45}$
- B $\frac{16}{45}$
- C $\frac{24}{45}$
- D $\frac{26}{45}$



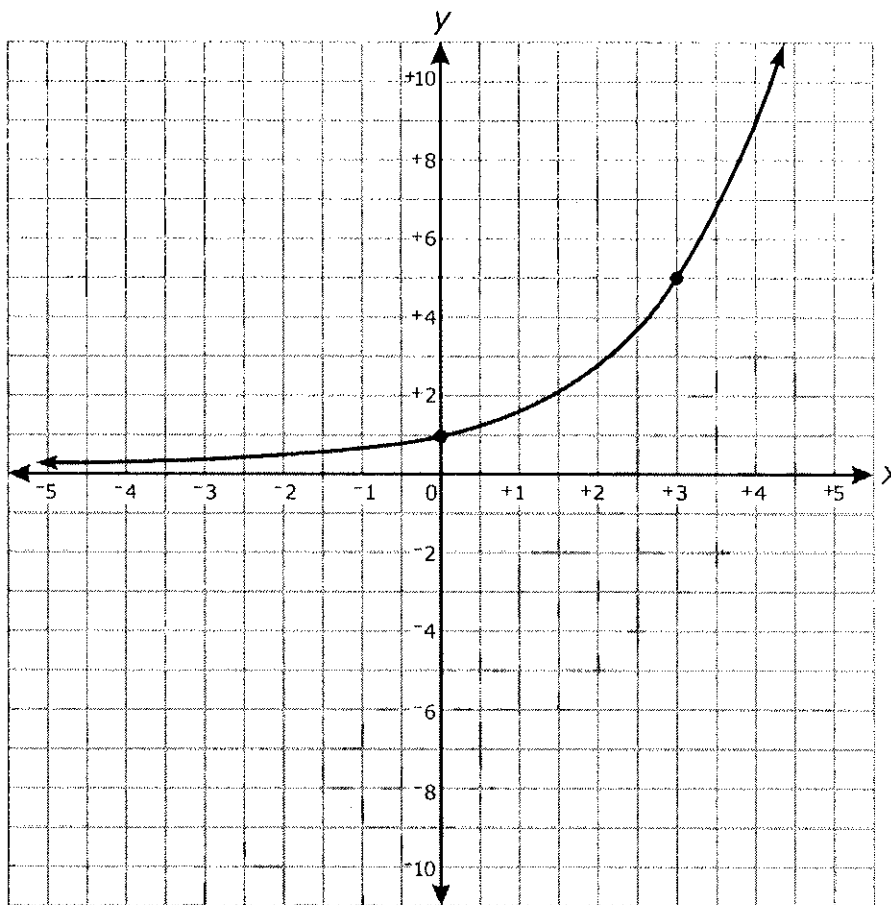
- 7 A manufacturing plant produces a special kind of lightbulb.
- Each lightbulb produced has a 0.040 probability of being defective.
 - Five lightbulbs are chosen at random from the production line.

To the nearest thousandth, what is the probability that exactly two of the five bulbs will be defective?

- A 0.014
- B 0.016
- C 0.018
- D 0.020
- 8 What is the meaning of the base of the function $y = -\log(x)$?
- A As y decreases by 1, x increases by a factor of 10.
- B As y decreases by 1, x increases by 10.
- C As y increases by 1, x increases by a factor of 10.
- D As y increases by 1, x increases by 10.



9 The graph of $y = a^x$ is shown below.



Which choice is closest to $\log_a 3$?

- A 0.9
- B 2.1
- C 3.2
- D 4.8



10 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 $-\frac{34}{3}$

11 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.

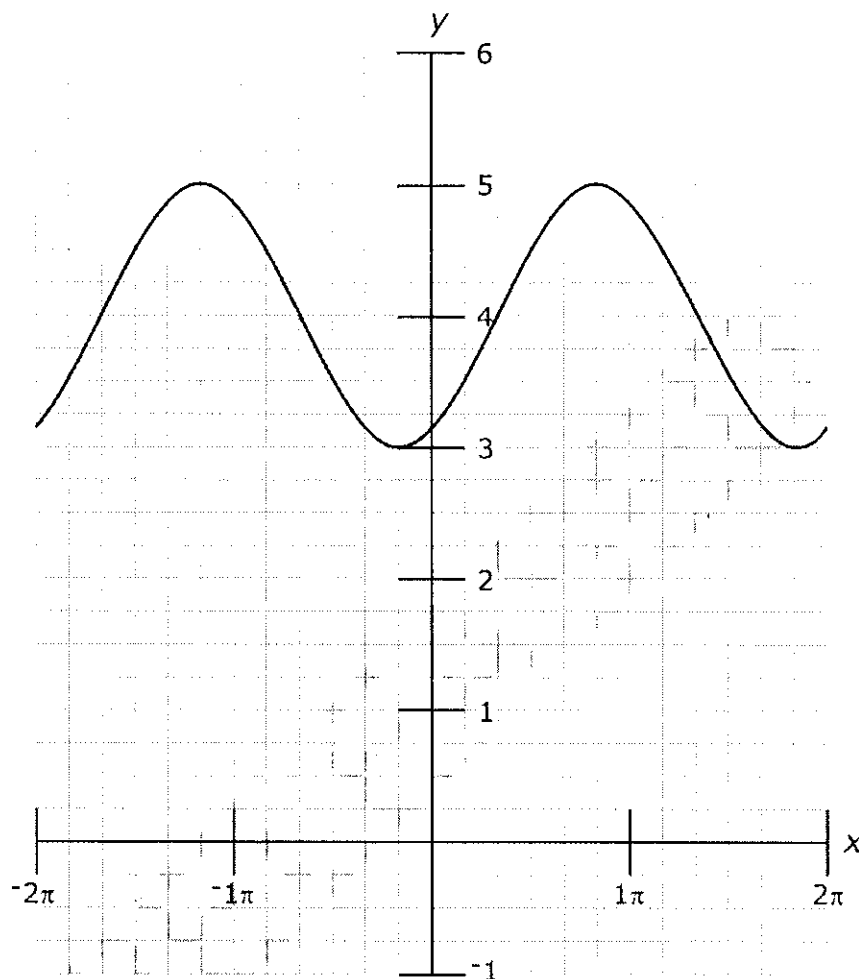
B The transformed graph will not approach a horizontal asymptote while the original graph will.

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.



12 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 $y = \cos\left(x + \frac{\pi}{3}\right) + 4$



- 13 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 $y = \frac{3}{2} \sin\left(\frac{x}{12} + 3\right) - 1$
- 14 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



15 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.

16 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 $|r| > 1$.



17 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 $a_n = 2n^2 - 2n - 1$