

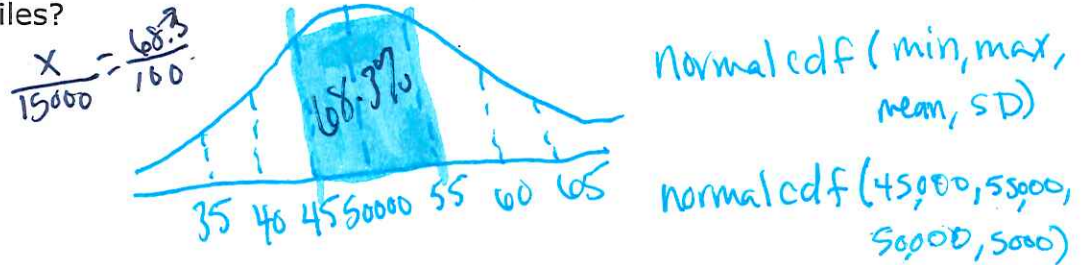
1 Suppose the function $H(t) = 8.5\sin(0.017t - 1.35) + 12$ models the hours of sunlight for a town in Alaska, where $t = 1$ is the first day of the year. Based on the function, what is the approximate range of daylight hours for the town?

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

38-2
 2nd trace
 1. value
 1 lowest day
 182 middle day
 t = time
 1 1st day
 365 last day
 y-values
 picked highest
 put low + high
 Radian s
 Graph
 Sine starts at zero (origin)

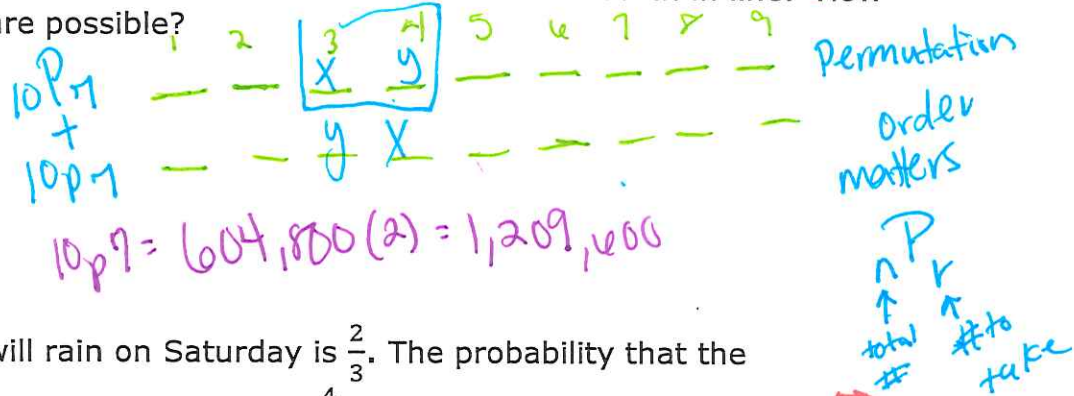
2 The lifetime of a particular type of car tire is normally distributed. The mean lifetime is 50,000 miles, with a standard deviation of 5,000 miles. Of a random sample of 15,000 tires, how many of the tires are expected to last for between 45,000 and 55,000 miles?

- A 7,125
- B 10,200
- C 14,250
- D 14,850



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 the 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 $\frac{26}{45}$

1-4

$P(\text{Rain}) + P(100^\circ\text{F}) - P(\text{Rain or } 100^\circ\text{F})$
 $\left(\frac{2}{3}\right) + \left(\frac{4}{9}\right) - \left(\frac{4}{5}\right) = \frac{14}{45}$

We want the probability of the chance of it being HOT AND RAINY, not just one.

- 7 A manufacturing plant produces a special kind of light bulb.
- Each light bulb produced has a 0.040 probability of being defective.
 - Five light bulbs 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?

- 1-8
- A 0.014
 - B 0.016
 - C 0.018
 - D 0.200

2nd vars A enter

binompdf(n, p, r)
 ↑ # of trials ↑ probability ↑ # of success
 binompdf(5, 0.040, 2)

- 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.~~

Zoom ↓
 ZoomFit
 $\log_b y = x$
 ↑ base
 $\log_{10} y = x$
 $\log_b y = x$
 understood to be there

- 10 A piecewise function is show below:

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

For what value of p will the function be continuous?

- 4-6
- A $\frac{10}{3}$
 - B $\frac{1}{3}$
 - C $\frac{-25}{3}$
 - D $\frac{-34}{3}$

$$-2(3)^2 + 5(3) + 10 = 2(3) + 3p$$

$$-6 + 15 + 10 = 6 + 3p$$

$$19 = 6 + 3p$$

$$13 = 3p$$

$$p = \frac{13}{3}$$

- 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	2
11-20	1
21-30	10
31-40	7
41-50	5
51-60	1
61-70	2
71-80	1
81-90	2

What is the shape of the distribution?

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

2.4

- 11 The equation is $y = 4.7x^{\frac{1}{6}}$ 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.

- 13 Which function has an amplitude that is twice the size and 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 $y = \frac{3}{2}\sin\left(\frac{x}{12} + 3\right) + 1$

$P = \frac{2\pi}{k} \approx 75.4$

$P = \frac{2\pi}{\frac{3}{4}} = 8.4$

$y = a \cos(bx+c) + d$
 ↑ amplitude ↑ period ↑

$2(a) = 2(3) = 6$

period = $\frac{2\pi}{b} = \frac{2\pi}{\frac{1}{4}} \approx 25.13$ 75.4

4. A spinner is 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?

$P(2) = \frac{3}{20} \approx 0.15$ | $P(5) = \frac{3}{20} \approx 0.15$ | $P(7) = \frac{3}{20} \approx 0.15$ | $P(9) = \frac{3}{20} \approx 0.15$
 $1 - (4 \cdot \frac{3}{20}) = 0.40$ | $1 - (7 \cdot 0.15) = 0.40$

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

$P(1, 3, 4, 6, 8) = 0.40$

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

$\frac{40}{5} = 0.08$

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

for 2, 5, 7, 9
 $\frac{x}{1000} = \frac{15\%}{100}$
 $x \approx 150$

← # of outcomes for 1, 3, 4, 6, 8
 $\frac{x}{1000} = \frac{8\%}{100}$ ← % for each
 $x \approx 80$

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

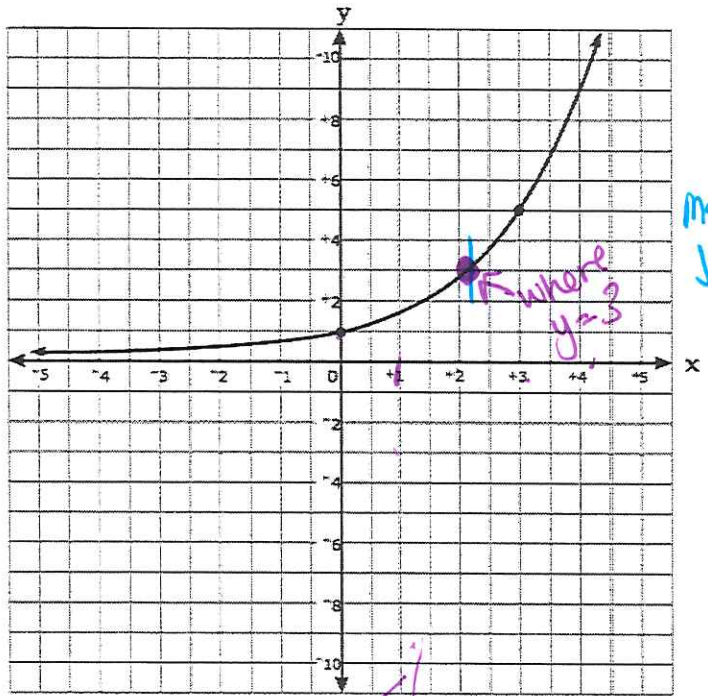
Which choice is closest to

- ~~A. 0.9~~
- B. 2.1**
- ~~C. 3.2~~
- ~~D. 4.8~~

$\log_a 3?$

$\log_b y = x$

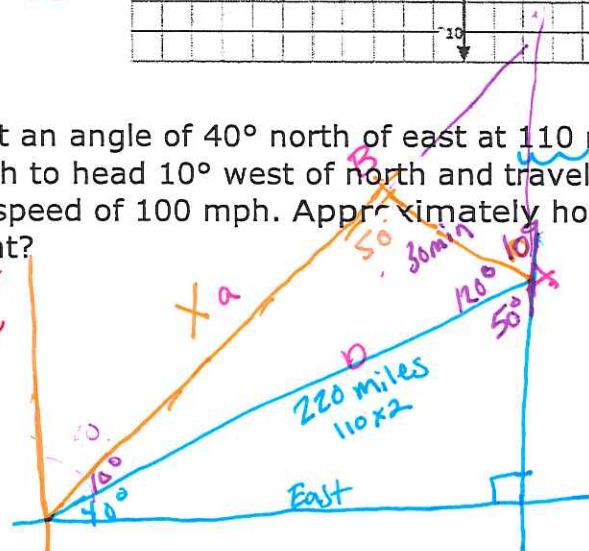
Finding value for x where $y=3$.
 $b^x = y$
 $x = 3$



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**

$\frac{\sin A}{a} = \frac{\sin B}{b} = \frac{\sin C}{c}$



DEGREE MODE
 $\frac{\sin 120^\circ}{x} = \frac{\sin 50^\circ}{220}$
 $x \sin 50^\circ = \frac{220 \sin 120^\circ}{\sin 50^\circ}$
 $x \approx 248.7$

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

$b_1 = 10$
 $b_2 = 3(10-6) = 12$
 $b_3 = 3(12-6) = 18$
 $b_4 = 3(18-6) = 36$
 $b_5 = 3(36-6) = 90$

Plug in to form recursive

$a_n = 3n^2 - 6$ ← Explicit
 $b_n = 3(b_{n-1} - 6); b_1 = 10$
 $= 3(5)^2 - 6 = 69$
 $b_5 = 90$
 $90 - 69 = 21$

- ~~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?

$$-4 + (-2) + (-1) + \left(-\frac{1}{2}\right) + \left(-\frac{1}{4}\right) + \dots$$

- 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 $|r| > 1$.

Find r
 $\frac{a_n}{a_1} = \frac{-1}{-4} = \frac{1}{4}$
 $\frac{a_3}{a_2} = \frac{-1/2}{-1/2} = \frac{1}{2}$
 $r = \frac{1}{2}$
 $\left|\frac{1}{2}\right| < 1$
 $\frac{1}{2} < 1$ ✓
 Fraction decimal

Converges

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

- A $a_n = 2n - 1$ | 3, 5
- B $a_n = n^2 - n + 1$ | 1, 3, 7, 13
- C $a_n = n^2 - 2n + 2$
- D $a_n = 2n^2 - 2n - 1$

↑ recursive
 explicit formula?

y =

x	y
1	1
2	3
3	7
4	13

$a_1 =$

$$a_2 = a_1 + 2(2-1)$$

$$a_2 = 1 + 2(1)$$

$$a_2 = 3$$

$$a_3 = 3 + 2(3-1)$$

$$= 3 + 2(2)$$

$$= 7$$

$$a_4 = 7 + 2(4-1)$$

$$= 7 + 2(3)$$

$$= 13$$