

30 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

For X and Y there are only two choices, 2 and then 1

$$10 \cdot 9 \cdot \overbrace{X \cdot Y}^{2 \cdot 1} \cdot 8 \cdot 7 \cdot 6 \cdot 5 \cdot 4$$

The probability that it will rain on Saturday is $\frac{3}{2}$. 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 $\frac{26}{45}$

$$P(\text{rain}) + P(100^\circ) - P(\text{Both}) = P(\text{Rain or } 100^\circ)$$

$$\frac{3}{2} + \frac{4}{9} - P(\text{Both}) = \frac{5}{4}$$

$$\frac{3}{6} + \frac{4}{9} - P(\text{Both}) = \frac{5}{4}$$

$$\frac{10}{16} - P(\text{Both}) = \frac{5}{4}$$

$$-P(\text{Both}) = -\frac{1}{14} - \frac{1}{45}$$

$$P(\text{Both}) = \frac{14}{45}$$

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? * Binomial Probability *

A 0.014 $P(x=2) = 5C2 (.040)^2 (.96)^3$

B 0.016

C 0.018

D 0.020

$= 10 (.0016) (.884736)$

$= 2.01455776$

defective Good

33 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. Option b

option a

put into $y' =$

check and compare points from table

- (1, 0)
- (10, -1)
- (100, -2)

$-y = \log_{10}(x)$

$y = -\log_{10}(x)$

$y = -\log(x)$

rewrite as exponential

$10^{-y} = x$ plus in for y

$y=0 \quad x=1$

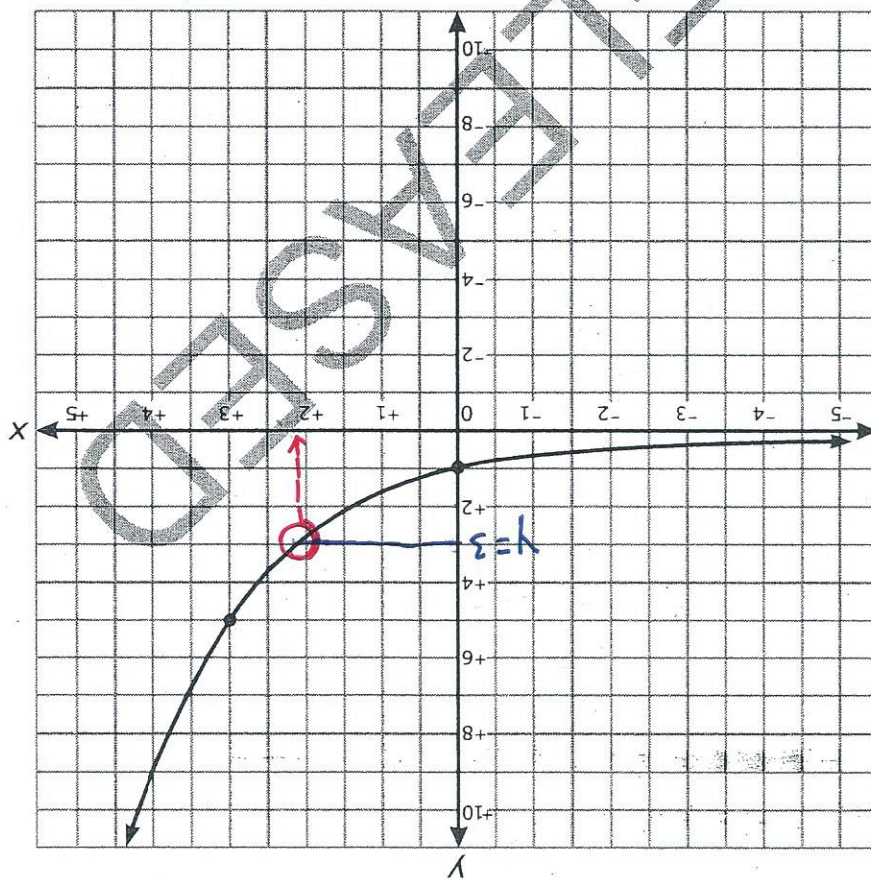
$y=-1 \quad x=10$

$y=-2 \quad x=100$

* Increases by a factor of 10.



34 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

$\log_a 3 = x$
 write as exponential
 $a^x = 3$
 $a^x = 3$
 substitute
 $y = 3$
 $(x, 3)$

35 A piecewise function is shown below.

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

* Same y value at $h(3)$

For what value of p will the function be continuous?

Evaluate $h(3)$ for each piece of function:

① $h(3) = -2(3)^2 + 5(3) + 10 = -2(9) + 15 + 10 = -18 + 25 = 7$

② $h(3) = 2(3) + 3p = 6 + 3p$

$7 = 6 + 3p$

$1 = 3p$

$p = \frac{1}{3}$

A $\frac{10}{3}$

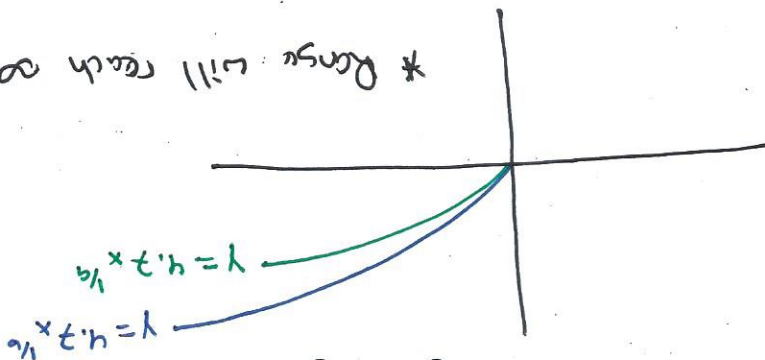
B $\frac{1}{3}$

C $-\frac{25}{3}$

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

36 The equation $y = 4.7x^{\frac{6}{1}}$ 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.

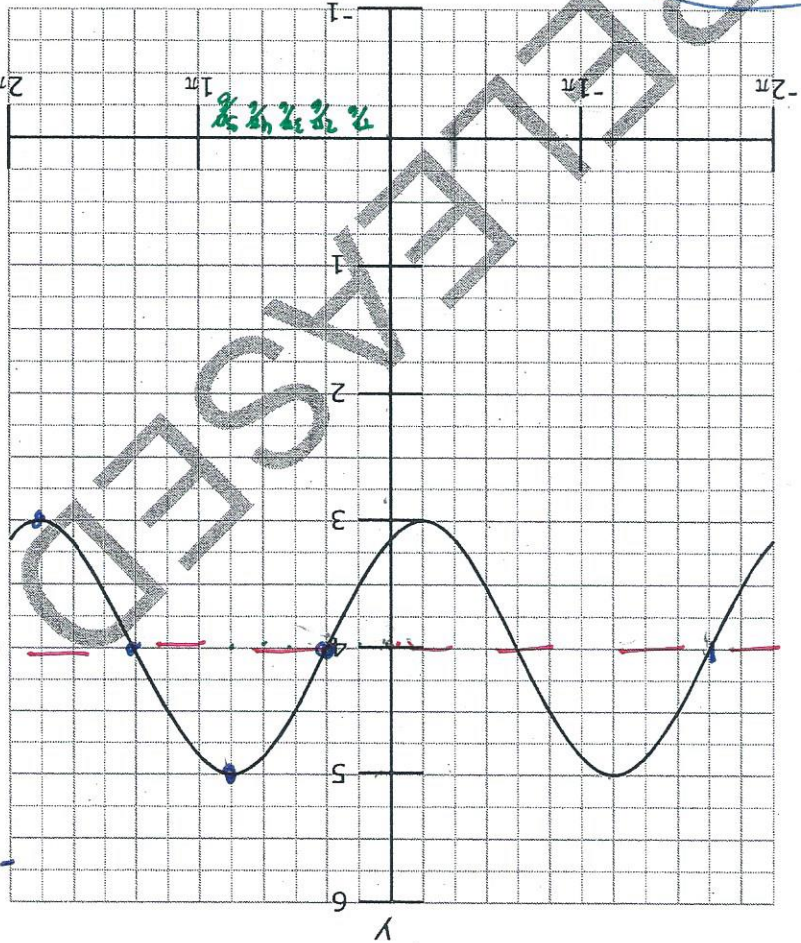


* graph the original, then give the denominator a larger value like $\frac{1}{9}$. Graph and compare new with original.

* Range will reach ∞ quicker on original.

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37 Which function correctly represents the graph below?



check for sin first!

$$p = \frac{c}{2\pi} - (-1 \cdot \frac{c}{2\pi})$$

$$\frac{c}{2\pi} + \frac{c}{2\pi} = \frac{c}{\pi} = 2\pi$$

$$p = -b \cdot p$$

$$= -1 \cdot 2\pi = -2\pi$$

$$c = -\frac{3}{\pi}$$

$p = 1$

Interval is $\frac{\pi}{2}$

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

All have a vs of π $p = 1$
 NO AMP change! so amp = 2 $a = 1$

* Cos would have a ps of $-\frac{5\pi}{6}$
 so not cos!

38 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 $y = 6 \sin\left(\frac{12}{x} - 3\right) + 1$

B $y = \frac{2}{3} \cos\left(\frac{3x}{4} + 1\right) - 3$

C $y = 6 \cos\left(\frac{3x}{4} - 1\right) + 3$

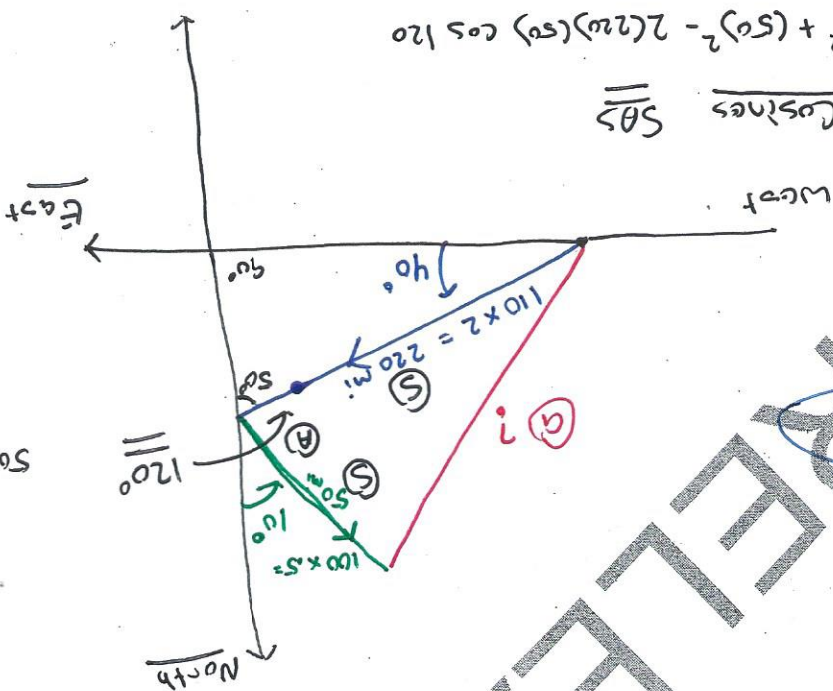
D $y = \frac{2}{3} \sin\left(\frac{12}{x} + 3\right) - 1$

$f(x) = \frac{amp}{4}$
 $amp = 12$
 $amp = 12$
 $amp = 3$
 $b = \frac{1}{4}$
 $pcr = \frac{6}{2\pi}$
 $pcr = \frac{2\pi}{4}$
 $pcr = 8\pi$
 $3pcr f(x)$
 24π
 $3(8\pi)$
 24π
 $24\pi = 2\pi \cdot b$
 $b = \frac{1}{12}$
 $2amp f(x)$
 $2(3) = 6$
 $c = 6$
 $g(x)$

39

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



Law of Cosines

$$a^2 = (220)^2 + (50)^2 - 2(220)(50) \cos 120$$

$$a^2 = 61900$$

$$a \approx 248.797$$

$$50 + x + 10 = 180$$

$$x = 120$$

42. 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 $a_n = 2n^2 - 2n - 1$

Cannot just simplify the above equation, so find the first 4 or 5 terms. Then check in the explicit (simplified) equations!

Recursive

$$\begin{aligned}
 a_1 &= 1 \\
 a_2 &= a_1 + 2(1) = 1 + 2 = 3 \\
 a_3 &= a_2 + 2(2) = 3 + 4 = 7 \\
 a_4 &= a_3 + 2(3) = 7 + 6 = 13 \\
 a_5 &= a_4 + 2(4) = 13 + 8 = 21
 \end{aligned}$$

$$\begin{aligned}
 a_5 &= a_4 + 2(4) = 13 + 8 = 21 \\
 a_5 &= a_{5-1} + 2(5-1)
 \end{aligned}$$

$$\begin{aligned}
 P &= a_n = 2n - 1 \\
 a_1 &= 2(1) - 1 = 1 \\
 a_2 &= 2(2) - 1 = 3 \\
 a_3 &= 2(3) - 1 = 5
 \end{aligned}$$

$$\begin{aligned}
 B &= a_n = n^2 - n + 1 \\
 a_1 &= (1)^2 - 1 + 1 = 1 \\
 a_2 &= (2)^2 - 2 + 1 = 1 \\
 a_3 &= (3)^2 - 3 + 1 = 7 \\
 a_4 &= (4)^2 - 4 + 1 = 13 \\
 a_5 &= (5)^2 - 5 + 1 = 21
 \end{aligned}$$

* Now check each one for the values you found.

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