

Study Guide Final Exam Algebra 2

The following list shows the number of people (in millions) in the United States whose only means of getting to work was walking.

Year (x)	Number (y)
1940	7.6
1950	7.0
1960	6.4
1970	5.7
1980	5.4
1990	4.5

If $x = 0$ for the year 1940, which equation is the best-fit linear model for the data?

- A $y = -16.5x + 125$
- B $y = -0.06x + 7.6$
- C $y = 0.06x + 10$
- D $y = 7.6x - 0.06$

What is the solution set for $\frac{5}{3} - \frac{2}{x} = \frac{8}{x}$ if $x \neq 0$?

- A $\{2\}$
- B $\left\{\frac{18}{5}\right\}$
- C $\left\{\frac{26}{5}\right\}$
- D $\{6\}$

Which expression is equivalent to $(5y - 3)(2y + 5)$?

- F $10y^2 + 31y - 15$
- G $10y^2 + 19y - 15$
- H $10y^2 - 19y - 15$
- J $10y^2 - 31y - 15$

What is the simplified form of $\sqrt{6} \cdot \sqrt{21}$?

- A $3\sqrt{14}$
- B $14\sqrt{3}$
- C 21
- D 63

What is the factored form of $x^2 - 36z^2$?

- F $(x + 6z)(x - 6z)$
- G $(x + z)(x - 36z)$
- H $(x + 6z)^2$
- J $(x - 6z)^2$

Which is equivalent to $(8 - 12i) - (-1 + 2i)$?

- F** $9 - 10i$
- G** $9 - 14i$
- H** $7 - 10i$
- J** $7 - 14i$

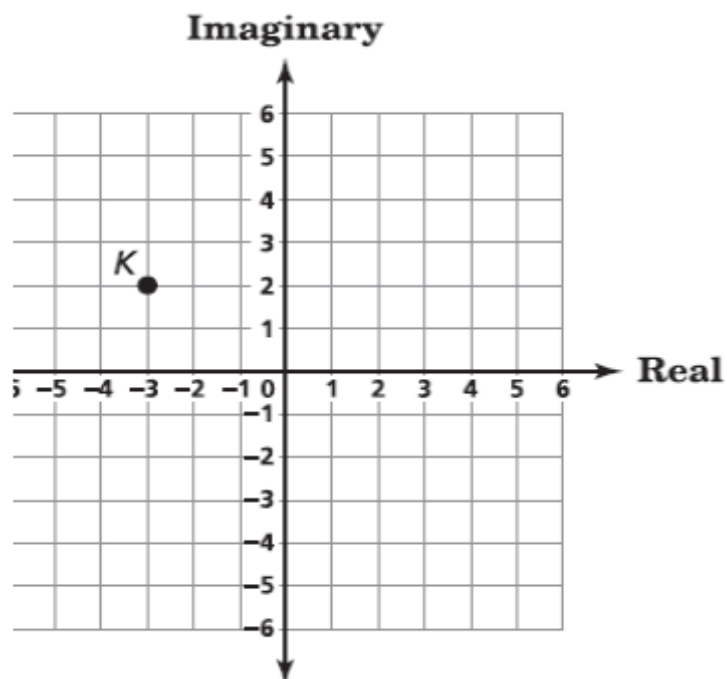
What is the complex conjugate of $\sqrt{-400} + 17$?

- A** $20 - 17i$
- B** $20 + 17i$
- C** $17 - 20i$
- D** $17 + 20i$

Which is equivalent to $(2 - 5i)(-2 + 5i)$?

- A** 21
- B** -29
- C** $21 + 20i$
- D** $-29 - 20i$

The grid below represents a complex plane.



Which complex number is best represented by Point K?

- F** $-3 + 2i$
- G** $-2 + 3i$
- H** $3 - 2i$
- J** $2 - 3i$

Which is equivalent to $13 - \sqrt{-81}$?

- F** 4
- G** $13 - 9i$
- H** $13 + 9i$
- J** 22

Let x and y be real numbers. If $(x + yi) - (2 - 3i) = -6 + 4i$, what are the values of x and y ?

- A** $x = 8, y = 7$
- B** $x = 8, y = 1$
- C** $x = -4, y = 7$
- D** $x = -4, y = 1$

What is the solution to the following system of equations?

$$\begin{bmatrix} -3 & 2 & 5 \\ 2 & 7 & 4 \\ 1 & 0 & -2 \end{bmatrix} \begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} -9 \\ 5 \\ 2 \end{bmatrix}$$

A $\begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} \frac{1}{4} \\ -1 \\ 1 \end{bmatrix}$

C $\begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 39 \\ 17 \\ -29 \end{bmatrix}$

B $\begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 47 \\ 25 \\ -13 \end{bmatrix}$

D $\begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 4 \\ -1 \\ 1 \end{bmatrix}$

What is the value of z in the solution of this system?

$$\begin{aligned} x + y - z &= -5 \\ 2x + z + 1 &= -2y \\ x - y &= 3z + 3 \end{aligned}$$

A -7

B -1

C 3

D 5

The matrix equation $\begin{bmatrix} 4 & -3 \\ -1 & 1 \end{bmatrix} \begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} -2 \\ 6 \end{bmatrix}$ represents which system of linear equations?

F $\begin{cases} 4x - y = -2 \\ -3x + y = 6 \end{cases}$

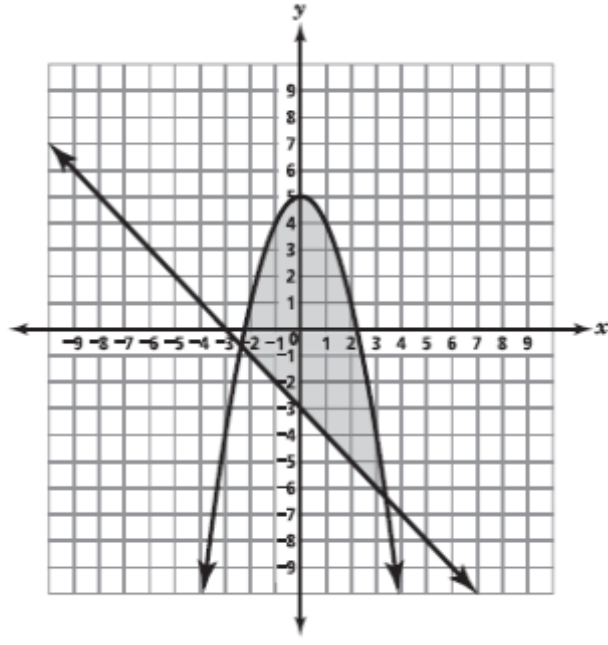
G $\begin{cases} 4x - 3y = -2 \\ -x + y = 6 \end{cases}$

H $\begin{cases} 4x + 3y = -2 \\ -x - y = 6 \end{cases}$

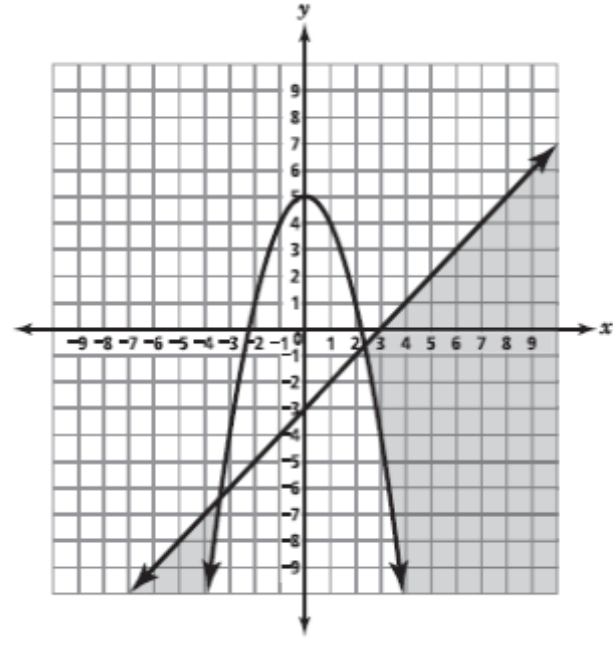
J $\begin{cases} 4x + y = -2 \\ -x - 3y = 6 \end{cases}$

Which graph best represents this system of inequalities?

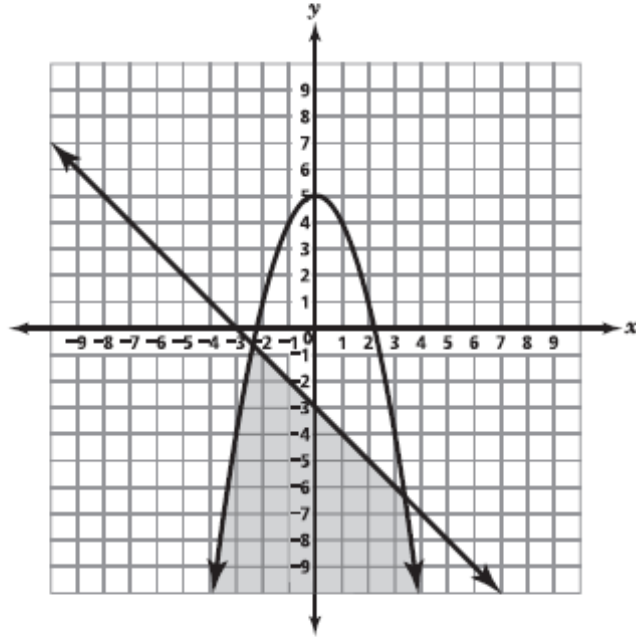
$$\begin{cases} x - y \leq 3 \\ x^2 + y \leq 5 \end{cases}$$



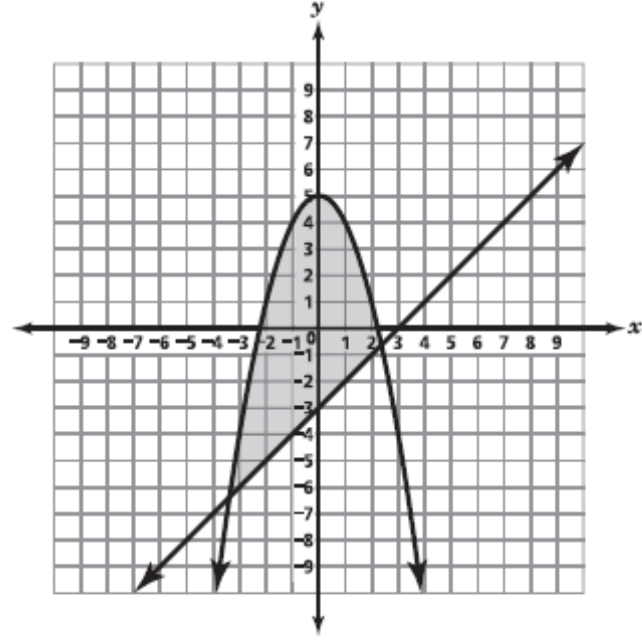
F



H



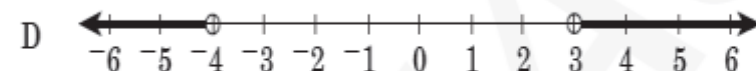
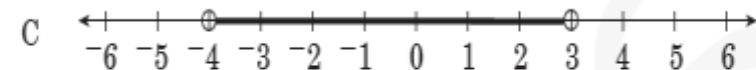
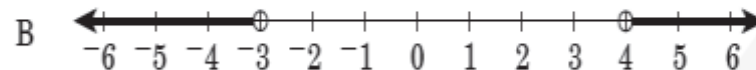
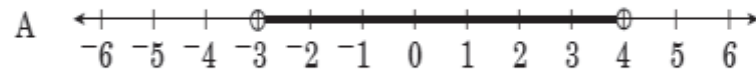
G



J

Which graph shows the solution set for the following inequality?

$$x^2 > x + 12$$



What are all the roots of $x^3 - 3x^2 - x + 3 = 0$?

- A** -1 and 1
- B** 1 and 3
- C** -1, 1, and 3
- D** 1, -1, and -3

Which is a zero of the function

$$f(x) = (x + 3)(2x - 1)(x + 2) ?$$

- A** 3 **C** -1
- B** 0 **D** -2

What are the zeros of $f(x) = x^2 + 7x + 5$?

A $\left\{ \frac{7 \pm 2\sqrt{5}}{2} \right\}$

B $\left\{ \frac{-7 \pm 2\sqrt{5}}{2} \right\}$

C $\left\{ \frac{7 \pm \sqrt{29}}{2} \right\}$

D $\left\{ \frac{-7 \pm \sqrt{29}}{2} \right\}$

The profit (P), in dollars, for a company is modeled by the function $P(x) = -750x^2 + 15,000x$, where x is the number of items produced. For which values of x will the company lose money?

- A** $x < 2$
- B** $2 < x \leq 10$
- C** $10 \leq x < 20$
- D** $x > 20$

If $g \neq 0$ and $h \neq 0$, which expression represents this quotient?

$$\frac{15g^8h^4 - 18g^8h^2 + 15g^5h^3}{3g^5h^2}$$

- A** $5g^3h^2 - 6g^3 + 5h$
- B** $5g^3h^2 - 6g^3h + 5gh$
- C** $12g^3h^2 - 15g^3 + 12h$
- D** $12g^{13}h^6 - 15g^{13} + 12h^5$

Divide:

$$(6x^3 - 11x^2 - 47x - 20) \div (2x + 1)$$

- A** $3x^2 - 7x - 20$
- B** $3x^2 + 7x - 20$
- C** $3x^2 - 4x - 20$
- D** $3x^2 + 4x - 20$

Which set contains all the real numbers that are not part of the domain of

$$f(x) = \frac{x + 4}{x^2 + 4x - 32}?$$

- F** $\{8\}$
- G** $\{-4\}$
- H** $\{-4, 8\}$
- J** $\{-8, 4\}$

Which binomial is a factor of $(x^3 - x^2 + 3x - 3)$?

- A** $x - 3$
- B** $x + 1$
- C** $x^2 - 1$
- D** $x^2 + 3$

Which expression is equivalent to

$$\frac{x + 3}{6x - 3} \div \frac{x^2 + 2x - 3}{2x - 1}?$$

- A** $3(x - 1)$
- B** $\frac{x - 1}{3}$
- C** $\frac{3}{x - 1}$
- D** $\frac{1}{3(x - 1)}$

The area of a rectangular window is $(4x^2 - 21x - 18)$. Both the length and the width are polynomials with integer coefficients. Which of the following could represent the length of the window?

- A** $4x + 6$
- B** $4x + 3$
- C** $x + 6$
- D** $x + 3$

Which expression is equivalent to

$$\frac{y^{\frac{1}{2}}}{8x^{\frac{4}{3}}} \div \frac{x^{\frac{1}{3}}y^{\frac{5}{2}}}{6} \text{ for all } x, y \neq 0?$$

F $\frac{1}{2x^{\frac{5}{6}}y^2}$ **H** $\frac{3y^2}{4x^{\frac{4}{9}}}$

G $\frac{3}{4x^{\frac{5}{3}}y^2}$ **J** $\frac{y^3}{48x^4}$

$$\frac{6(a+2)}{a} \cdot \frac{a^3}{a+2} =$$

A $\frac{6}{a^2}$

B $\frac{6(a+2)}{a}$

C $6a^2$

D $\frac{6a^2 + 24a + 24}{a^4}$

Simplify $\frac{9}{x^{-1}+1}$ for all values of x for which the expression is defined.

A $\frac{9}{2}$

B $\frac{9x}{2}$

C $\frac{9}{x+1}$

D $\frac{9x}{x+1}$

What are the vertical asymptotes of the function $f(x) = \frac{4x^2 - 100}{2x^2 + x - 15}$?

A $x = -5, x = 5$

B $x = -5, x = 4, x = 5$

C $x = -3, x = \frac{5}{2}$

D $x = -3, x = \frac{5}{2}, x = \frac{20}{3}$

Simplify: $\frac{\frac{1}{y} - \frac{1}{x}}{\frac{1}{y} + \frac{1}{x}}$

A $\frac{x-y}{x+y}$

B $\frac{x+y}{x-y}$

C 0

D -1

Simplify:

$$\left(x^{\frac{3}{4}}\right)^3$$

A $x^{\frac{27}{64}}$

B $x^{\frac{9}{4}}$

C $x^{\frac{9}{12}}$

D $x^{\frac{15}{4}}$

Which expression is equivalent to

$$\frac{x^2 - 9x + 8}{x^2 + 9x + 8} \cdot \frac{x + 8}{8x - 8} \text{ if no}$$

denominators equal zero?

F $\frac{-(x+8)}{8x-8}$

H $\frac{x-8}{8(x-1)}$

G $\frac{x-8}{8(x+1)}$

J $\frac{x-1}{8(x+1)}$

Sonya and Alex shared their work on the equation $|2x + 3| = 13$, as shown below.

Sonya's Work

$$|2x + 3| = 13$$

$$-2x + 3 = 13 \text{ or } 2x + 3 = 13$$

$$-2x = 10 \text{ or } 2x = 10$$

$$x = -5 \text{ or } x = 5$$

Alex's Work

$$|2x + 3| = 13$$

$$2x + 3 = 13 \text{ or } 2x + 3 = -13$$

$$2x = 10 \text{ or } 2x = -16$$

$$x = 5 \text{ or } x = -8$$

Which statement is true?

- A** Alex solved the equation correctly.
- B** Sonya solved the equation correctly.
- C** The only solution for the original equation is 5.
- D** Neither Alex nor Sonya solved the equation correctly.

Solve for x : $-\frac{1}{2}|2x + 6| + 2 = 0$

A $x = 5$ or $x = 1$

B $x = 5$

C $x = -5$ or $x = -1$

D $x = -1$

Solve for x : $\frac{x-1}{x+5} = \frac{x}{2(x+5)}$

A -5

B 2

C -5 or 2

D 5 or -2

Which is the solution set of the equation $x + 2 = \frac{4}{x-2}$?

A $\{\pm 2\sqrt{2}\}$

B $\{2\sqrt{2}\}$

C $\left\{\frac{-1 \pm \sqrt{17}}{2}\right\}$

D $\left\{\frac{-1 + \sqrt{17}}{2}\right\}$

What is the solution set for $(x + 1)^2 = 49$?

F $\{-48, 48\}$

G $\{-8, 6\}$

H $\{-6, 6\}$

J $\{-6, 8\}$

The period for a pendulum to complete one swing is t , the time in seconds. The period can be approximated by the formula $t = 2\pi\sqrt{\frac{\ell}{9.81}}$, where ℓ is the length of the pendulum in meters. If the period of a pendulum is 2.5 seconds, which is closest to the length of the pendulum?

- F** 1.55 meters
- G** 3.17 meters
- H** 3.90 meters
- J** 9.76 meters

What is the solution set for

$$\sqrt{k+64} - 8 = -2 ?$$

- A** $\{-28\}$ **C** $\{4\}$
- B** $\{-124\}$ **D** $\{\}$

Which expression is equivalent to $\sqrt[5]{32x^{10}y^2}$?

- A** $2x^2y^{\frac{2}{5}}$ **C** $\frac{32}{5}x^{\frac{1}{2}}y^{\frac{5}{2}}$
- B** $2x^5y^{-3}$ **D** $\frac{32}{5}x^{50}y^{10}$

Which value of x makes this equation true?

$$9(x-7)^{\frac{4}{3}} = 9$$

- A** 1
- B** 7
- C** 8
- D** 34

Solve: $3x - 7\sqrt{x} + 2 = 0$

- A** $x = \frac{1}{9}, x = 4$
- B** $x = \frac{1}{3}, x = 4$
- C** $x = \frac{1}{9}, x = -\frac{1}{3}$
- D** $x = \frac{1}{3}, x = \frac{1}{9}$

What is the solution to $\sqrt[3]{x-4} = -5$?

- A** $x = -121$
- B** $x = -1$
- C** $x = 29$
- D** $x = 129$

In which direction is the graph of $f(x) = \frac{5}{x+b}$ translated when b increases?

- A left
- B right
- C up
- D down

In which direction does the graph of $y = (x+2)^{\frac{1}{2}} + c$ shift as c decreases?

- A right
- B left
- C up
- D down

The graph of $f(x) = x^2 + 3$ is translated to produce the graph of $g(x) = (x+2)^2 + 3$. In which direction was the graph of f translated?

- A up
- B down
- C left
- D right

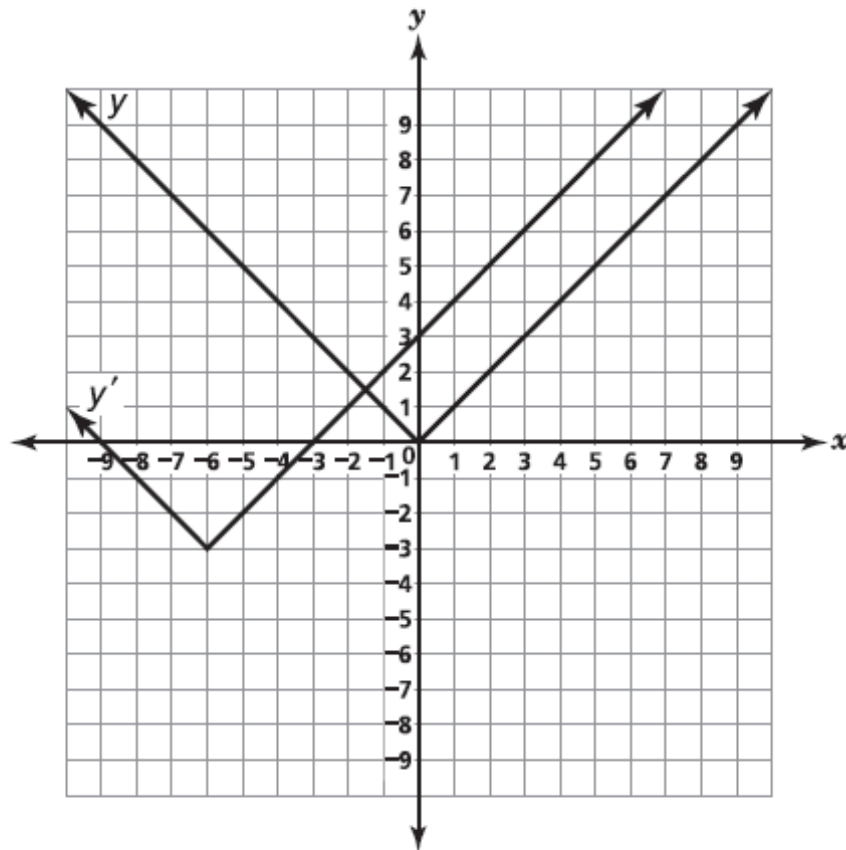
In the function $f(x) = a(x-4)^2$, where $a > 0$, what happens to the graph of f as the value of a increases?

- A The graph narrows.
- B The graph widens.
- C The graph shifts up.
- D The graph shifts right.

Which equation represents the graph of $y = x^2$ translated 1 unit right and 2 units down?

- A $y = -(x-1)^2 - 2$
- B $y = (x-1)^2 - 2$
- C $y = -(x+1)^2 + 2$
- D $y = (x+1)^2 - 2$

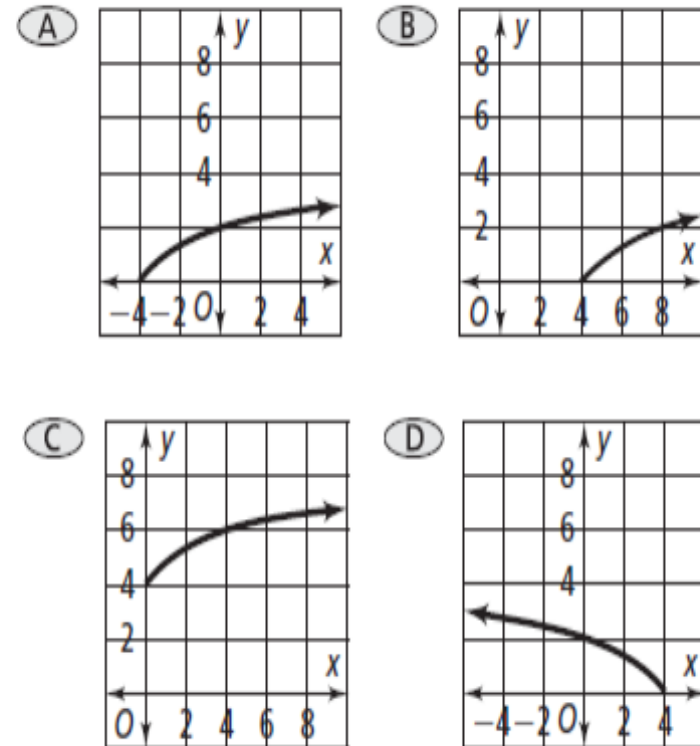
In the grid below, the graph of the equation $y = |x|$ is transformed to create y' .



Which equation is best represented by the graph of y' ?

- A** $y = |x - 6| + 3$
- B** $y = |x + 6| + 3$
- C** $y = |x - 6| - 3$
- D** $y = |x + 6| - 3$

What is the graph of $y = \sqrt{x} + 4$?



**Given $f(x) = -3x + 4$ and $g(x) = x + 7$,
what is the value of $g(f(2))$?**

- A** -23 **C** 5
B -18 **D** 7

If $f(x) = 2x + 1$ and $g(x) = x^3$, what is
 $f(g(3))$?

- A** 343
B 189
C 55
D 34

If $f(x) = 2x^2 - 7x$, what is the value of $f(-4)$?

- F** -44
G -4
H 60
J 92

If $h(x) = 2x$ and $g(x) = 3x^2 + 1$,
what is $h(g(x))$?

- A** $6x^2 + 1$
B $6x^2 + 2$
C $12x^2 + 1$
D $12x^2 + 2$

What is the value of $g(f(-4))$ for these
functions?

$$f(x) = x + 6 \text{ and } g(x) = 4x^2$$

- A** 16
B 64
C 70
D 262

If $f(x) = \sqrt{x^2 - 1}$ and $g(x) = \sqrt{x - 1}$,
which expression represents $\frac{f(x)}{g(x)}$, for
 $x > 1$?

- A** \sqrt{x}
B $\sqrt{x - 1}$
C $\sqrt{x + 1}$
D $\frac{1}{\sqrt{x + 1}}$

Which is the inverse of the function
 $f(x) = x - 9$?

A $f^{-1}(x) = \frac{1}{x+9}$

B $f^{-1}(x) = x + 9$

C $f^{-1}(x) = 9 - x$

D $f^{-1}(x) = \frac{1}{x-9}$

What is the inverse of

$g(x) = \sqrt{5x-2} + 1$, for all $x \geq \frac{2}{5}$?

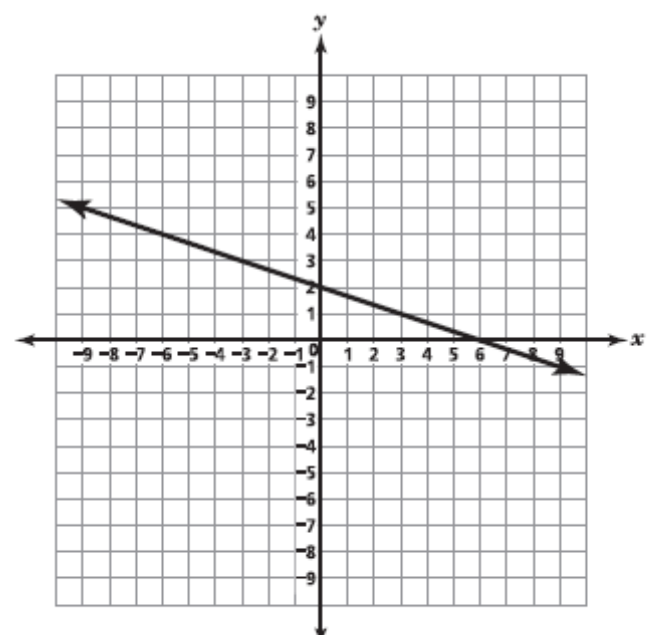
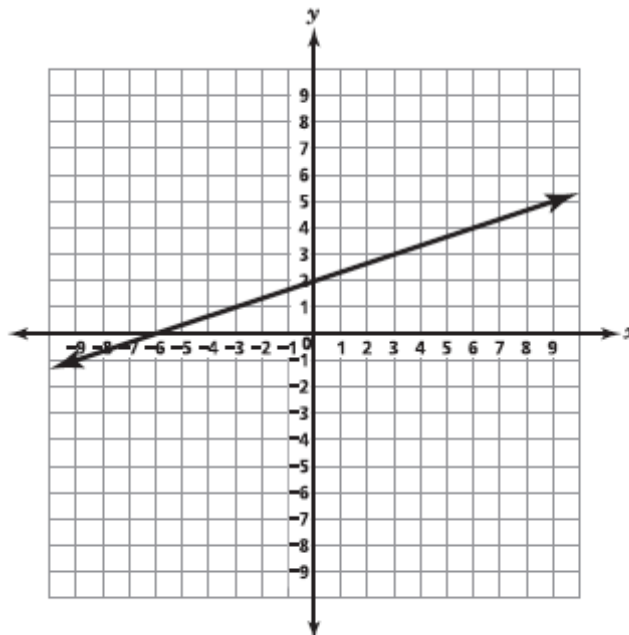
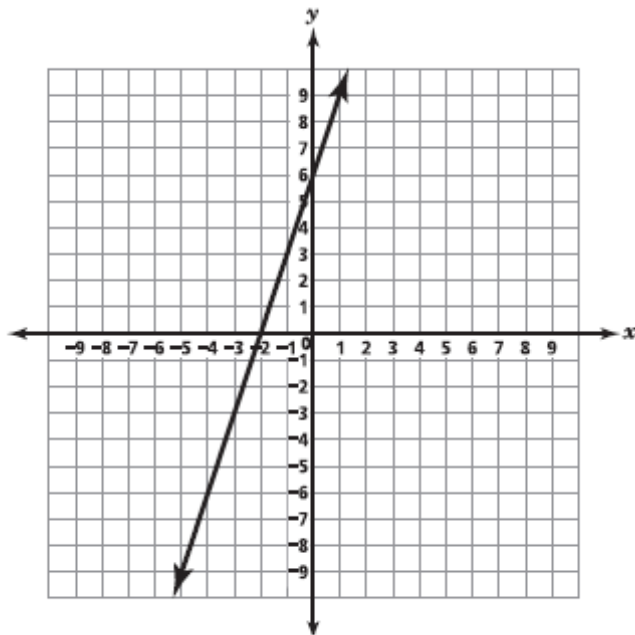
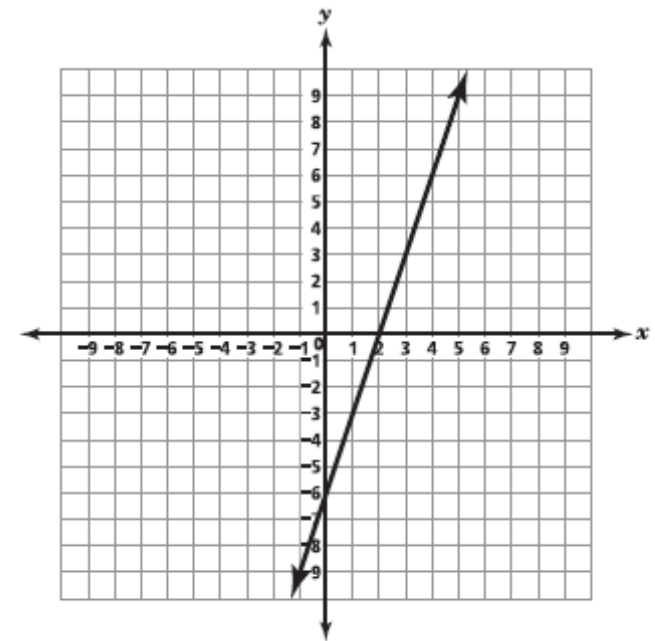
F $g^{-1}(x) = \frac{(x-1)^2 + 2}{5}$

G $g^{-1}(x) = \frac{(x-1)^2}{5} + 2$

H $g^{-1}(x) = \frac{(x+1)^2 - 2}{5}$

J $g^{-1}(x) = \frac{(x+1)^2}{5} - 2$

Which graph represents the inverse
 of $h(x) = -3x + 6$?



The volume of a cylinder with a radius of r centimeters and a height that is 3 centimeters shorter than the radius is represented by the function $V(t)$.

$$V(t) = \pi r^2(r - 3)$$

What is the range of $V(t)$ in this situation?

- F** all real numbers
- G** all real numbers less than -3
- H** all real numbers greater than 3
- J** all real numbers greater than 0

Which table of values best represents the function below?

$$f(x) = 6(0.2)^x$$

F

x	y
0	1
0.25	1.05
0.5	1.10
0.75	1.15
1	1.2

H

x	y
0	6
0.25	4
0.5	2.7
0.75	1.8
1	1.2

G

x	y
0	0.2
0.25	0.31
0.5	0.49
0.75	0.77
1	1.2

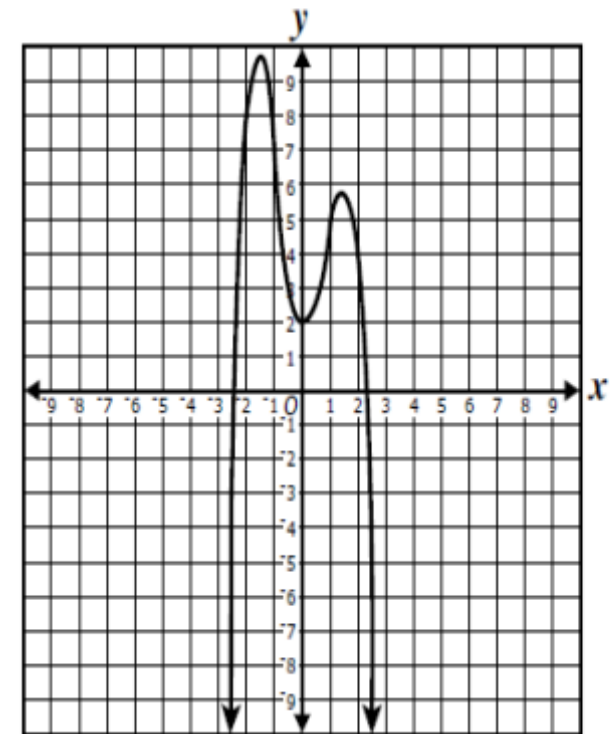
J

x	y
0	6
0.25	1.2
0.5	0.24
0.75	0.05
1	0.01

The graph of a 4th-degree polynomial is shown.

Exactly how many real zeros does this function have?

- F** 1
- G** 2
- H** 3
- J** 4



When interest is compounded n times a year, the accumulated amount (A) after t years is given by the formula

$$A = P\left(1 + \frac{r}{n}\right)^{nt}$$

where P is the initial principal and r is the annual rate of interest.

Approximately how long will it take \$2,000 to double at an annual interest rate of 5.25% compounded monthly?

- A 13.98 years C 13.23 years
B 13.71 years D 13.08 years

In 1950, a U.S. population model was $y = 151 \cdot (1.013)^{t-1950}$ million people, where t is the year. What did the model predict the U.S. population would be in the year 2000?

- A 247 million
B 255 million
C 263 million
D 288 million

Copper production increased at a rate of about 4.9% per year between 1988 and 1993. In 1993, copper production was approximately 1.801 billion kilograms. If this trend continued, which equation **best** models the copper production (P), in billions of kilograms, since 1993? (Let $t = 0$ for 1993.)

- A $P = 1.801(4.900)^t$
B $P = 1.801(1.490)^t$
C $P = 1.801(1.049)^t$
D $P = 1.801(0.049)^t$

The population of a small town in North Carolina is 4,000, and it has a growth rate of 3% per year. Which expression can be used to calculate the town's population x years from now?

- A $3(4,000)^x$ C $4,000x^{1.03}$
B $4,000(1.03)^x$ D $4,000x^3$

A single microscopic organism divides into two organisms every 3 days. Use the formula $N(t) = N_0(2)^{\frac{t}{3}}$, where t is the time in days, $N(t)$ is the number of organisms at t days, and N_0 is the number of organisms at $t = 0$.

Approximately how long would it take one organism to produce a population of about 10,000 organisms?

- A 1,667 days
B 333 days
C 126 days
D 40 days

Which equation is equivalent to $\ln 7 + 3 \ln x = 5 \ln 2$?

- A $\ln 7x^3 = \ln 25$
B $\ln 7x^3 = \ln 32$
C $\ln 10x = \ln 10$
D $\ln 21x = \ln 10$

Which is the logarithmic form of the exponential equation $2^3 = 8$?

- (A) $\log_8 2 = 3$ (B) $\log_8 3 = 2$
 (C) $\log_3 8 = 2$ (D) $\log_2 8 = 3$

. Which exponential function is equivalent to $y = \log_3 x$?

- (F) $y = 3^x$ (H) $y = x^3$
 (G) $y = \frac{x}{3}$ (I) $x = 3^y$

. Which expression is equivalent to $\log_5 32$?

- (A) $\log 5 + \log 32$
 (B) $\log 5 - \log 32$
 (C) $(\log 5)(\log 32)$
 (D) $\frac{\log 32}{\log 5}$

Which of the following is the logarithmic form of the equation $4^{-3} = \frac{1}{64}$?

- (A) $\log_{-3} \left(\frac{1}{64} \right) = 4$ (C) $\log_4 \left(\frac{1}{64} \right) = -3$
 (B) $\log_{-3} 4 = \frac{1}{64}$ (D) $\log_{\frac{1}{64}} 4 = -3$

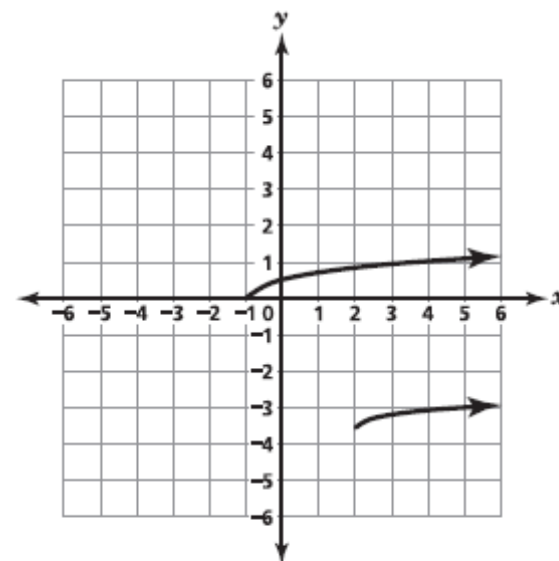
If $\log(3x + 25) = 2$, what is the value of x ?

- (A) 25 (B) 75 (C) $41\frac{2}{3}$ (D) 100

If $2^{3x+2} = 64$, what is the value of x ?

- (F) $\frac{8}{3}$ (G) $\frac{4}{3}$
 (H) 2 (I) $\frac{3}{4}$

The graph of the equation $y = \log(2x + 3)$ is translated right 3 units and down 3.5 units to form a new graph. Which equation best represents the new graph?



- A** $y = \log(2x + 9) + 3.5$
B $y = \log(2x + 9) - 3.5$
C $y = \log(2x - 3) + 3.5$
D $y = \log(2x - 3) - 3.5$

Which lists four consecutive terms of an arithmetic sequence?

- F** 3, 10, 17, 24
- G** 1, 4, 9, 16
- H** 1, 2, 4, 8
- J** -5, 6, 10, 13

What is the value of $\sum_{n=3}^8 (15 - 4n)$?

- F** -42
- G** -17
- H** 88
- J** 363

Using $a_n = a_1 r^{n-1}$, what is the 10th term in this geometric sequence?

0.2, 1, 5, 25, 125, ...

- A** 78,125
- B** 390,625
- C** 1,953,125
- D** 9,765,625

What is the value of

$$\sum_{n=1}^3 (17n - 15) ?$$

- A** 2
- B** 19
- C** 36
- D** 57

Given: $S_n = \frac{1}{2}n[2a_1 + (n-1)d]$

An outdoor theater has 37 seats in the first row, 40 seats in the second row, and 43 seats in the third row. If this pattern continues, what is the total number of seats in the first 10 rows?

- A** 120
- B** 320
- C** 505
- D** 520

The table shows the amount of oil, in liters, needed to fill a cylindrical can based on the radius, in centimeters, of the can. The height of each can is the same.

Amount of Oil in Cylindrical Cans

Radius of Can (in centimeters)	Amount of Oil (in liters)
10	2
15	4.5
20	8
25	12.5

These data are best modeled by which type of function?

- F** cubic
- G** linear
- H** quadratic
- J** logarithmic

What is the range of the equation below?

$$y = -|x - 8| + 3$$

- F** all real numbers less than or equal to -8
- G** all real numbers less than or equal to 3
- H** all real numbers greater than -8
- J** all real numbers greater than 3

Given: $f(x) = (x - 4)^2 - 1$

What is the vertex of the graph for this function?

- A** $(-4, -1)$
- B** $(-4, 1)$
- C** $(4, -1)$
- D** $(4, 1)$

The scores from a math quiz are shown in the table.

Math Quiz Scores

Score	Frequency
10	1
20	3
30	7
40	10
50	4

Which is closest to the value of the standard deviation of these scores?

- A** 105.0
- B** 35.2
- C** 10.2
- D** 5.9

The daily high temperatures in degrees Fahrenheit ($^{\circ}\text{F}$) in Chattanooga, Tennessee, for two 1-week periods are listed below.

- 90, 86, 91, 85, 82, 89, 90
- 89, 92, 92, 94, 91, 99, 95

What is the interquartile range for these data over the two weeks?

- A** 3°F
- B** 5°F
- C** 10°F
- D** 13°F

Javier placed the same three ads in a monthly paper for each of the last 10 months. The monthly number of responses he received to each ad are listed below.

Ad 1: 0, 0, 1, 2, 3, 4, 4, 6, 7, 11

Ad 2: 0, 1, 2, 3, 3, 4, 5, 8, 10, 10

Ad 3: 2, 2, 3, 4, 4, 5, 6, 7, 8, 11

Javier used this information to calculate the interquartile range for each ad. Which lists the ads in order from least to greatest interquartile range?

A grocery store manager wants to determine how many servings of fresh fruit her adult customers eat per day. She randomly surveys adult customers in the produce aisle of her store about their eating habits. Which statement best explains why her survey could be biased?

- A** The sample does not include children.
- B** The produce aisle contains more than just fresh fruit.
- C** Adults who do not eat fresh fruit are less likely to shop in a local grocery store.
- D** Adults who do not eat fresh fruit are less likely to be found in the produce aisle.

- A** Ad 1, Ad 2, Ad 3
- B** Ad 1, Ad 3, Ad 2
- C** Ad 3, Ad 1, Ad 2
- D** Ad 3, Ad 2, Ad 1

A researcher used a linear regression of the data in this table to determine the relationship between a city's distance from the equator and its average maximum temperature in January.

City	Distance from Equator (miles)	Temperature (°C)
Madrid, Spain	2,781	9
Tokyo, Japan	2,454	8
Guatemala City, Guatemala	1,005	23
New Delhi, India	1,965	21
Oslo, Norway	4,130	-2
Mexico City, Mexico	1,333	19

Which best describes the linear correlation between a city's distance from the equator and its average maximum temperature in January?

- F** strong negative correlation
- G** strong positive correlation
- H** weak negative correlation
- J** weak positive correlation

This table displays the results of an experiment on exponential growth.

x	y
0	6
1	9.6
2	15.4
3	24.6
4	39.3
5	62.9

Based on these results, which is closest to the value of y when $x = -2$?

- F** -23
- G** 0.04
- H** 2.34
- J** 19

Dylan performed an experiment by tossing pennies onto a table. He removed the pennies that landed face-up, recorded the number of pennies remaining, and then tossed the remaining pennies onto the table. The chart below shows the number of pennies Dylan had remaining on the table after 4 tosses.

Penny Tossing Experiment

Number of Tosses, t	0	1	2	3	4
Number of Pennies Remaining, p	500	232	120	63	30

Which regression equation best fits these data?

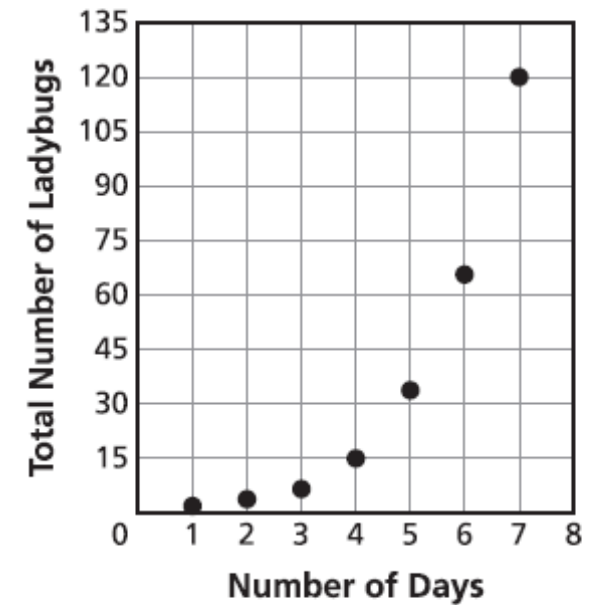
A $p = -111t + 411$

B $p = 458t^{\frac{1}{2}}$

C $p = 263t^{-1.4}$

D $p = 485\left(\frac{1}{2}\right)^t$

Ladybugs Seen in Garden Over Time



Which type of function do these data points best fit?

- A** cubic
- B** exponential
- C** linear
- D** quadratic

The principal of an elementary school that has a total of 650 students wants to determine which cereal is preferred among the students. Which method of data collection will give the most accurate results?

- A** assign a number to each student in the library and ask which cereal is preferred
- B** assign a number to each student and ask every third grader with a number that is a multiple of 5 which cereal is preferred
- C** assign a number to each classroom and ask all students in 1 selected classroom per grade level which cereal is preferred
- D** assign a number to each classroom and ask the girls in 5 selected classrooms which cereal is preferred

Sharan owns stores in both Memphis and Nashville. The number of years of experience for the managers of her stores in the two cities are listed below.

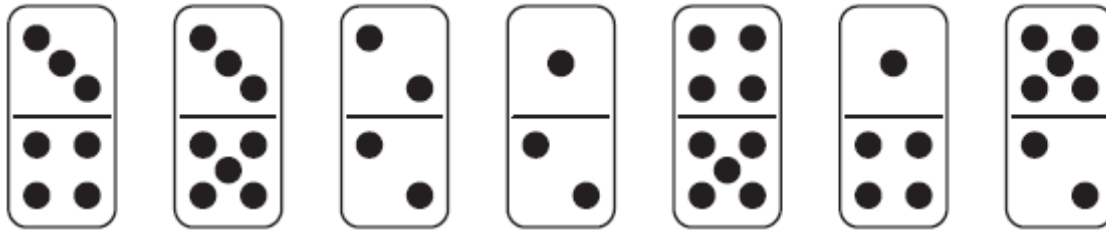
Memphis: 8, 8, 10, 10, 16, 19, 20, 22, 22, 22, 25

Nashville: 11, 11, 13, 13, 15, 17, 18, 19, 20, 20, 21, 25, 26, 28, 28

Which statement about the two sets of data is true?

- F** The median of the data for the Memphis stores is less than the median of the data for the Nashville stores.
- G** The standard deviation for the data for the Memphis stores is greater than the standard deviation of the data for the Nashville stores.
- H** The mean of the data for the Memphis stores is greater than the mean of the data for the Nashville stores.
- J** The interquartile range in the data for the Memphis stores is less than the interquartile range in the data for the Nashville stores.

Carlos is playing a game using tiles. Each tile is divided into two groups of dots. He needs to select a tile with a group of 3 dots or a group of 5 dots to be able to play. The tiles he can choose from are shown below.



Carlos will randomly select one tile at a time, without replacement, until he selects a tile with either a group of 3 dots or a group of 5 dots. What is the probability that he will need to select a total of 4 tiles in order to play?

- A** $\frac{3}{7}$ **C** $\frac{1}{35}$
- B** $\frac{5}{11}$ **D** $\frac{3}{32}$