1.

Look at the steps used when solving $3(x - 2) = 3$ for x.

$3(x - 2) = 3$	Write the original equation.
$3x - 6 = 3$	Use the Distributive Property.
$3x - 6 + 6 = 3 + 6$	Step 1
$3x = 9$	Step 2
$\dfrac{3x}{3} = \dfrac{9}{3}$	Step 3
$x = 3$	Step 4

Which step is the result of combining like terms?

A. Step 1
B. Step 2 *(circled)*
C. Step 3
D. Step 4

2.

Which ordered pair is a solution of $3y + 2 = 2x - 5$?

A. $(-5, 2)$
B. $(0, -5)$
C. $(5, 1)$ *(circled)*
D. $(7, 5)$

$3y = 2x - 7$
$y = \frac{2}{3}x - \frac{7}{3}$

Keep calm and substitute on

$\frac{2}{3}(0) - \frac{7}{3}$ $\frac{2}{3}(5) - \frac{7}{3}$

$\frac{2}{3}(-5) - \frac{7}{3}$ $\frac{10}{3} - \frac{7}{3} = \frac{3}{3}$

$\frac{-10}{3} - \frac{7}{3}$

3.

A shop sells one-pound bags of peanuts for $2 and three-pound bags of peanuts for $5. If 9 bags are purchased for a total cost of $36, how many three-pound bags were purchased?

A. 3
B. 6 *(circled)*
C. 9
D. 18

$-2 \begin{bmatrix} x + y = 9 \end{bmatrix}$ $x = \#1$
$2x + 5y = 36$ $y = \#3$

$-2x - 2y = -18$
$\overline{}$
$3y = 18$
$y = 6$

4.

What is a common factor for the expression $24x^2 + 16x + 144$?

A. 16
B. 8x
C. $3x^2 + 2x + 18$ *(circled)* ← left over
D. $8(x - 2)(3x^2 + 9)$ ← factored completely

Not necessarily the GCF

$8(3x^2 + 2x + 18)$

5.

A certain population of bacteria has an average growth rate of 2%. The formula for the growth of the bacteria's population is $A = P_0 \cdot 1.02^t$, where P_0 is the original population and t is the time in hours.

If you begin with 200 bacteria, about how many bacteria will there be after 100 hours?

A. 7
B. 272
C. 1,449 *(circled)*
D. 20,000

$200(1.02)^{100} = 1448.93$

6.

A manager is comparing the cost of buying baseball caps from two different companies.

- Company X charges a $50 fee plus $7 per baseball cap.
- Company Y charges a $30 fee plus $9 per baseball cap.

For what number of baseball caps will the cost be the same at both companies?

A. 10 *(circled)*
B. 20
C. 40
D. 100

$CX = 50 + 7x$ → Equal
$CY = 30 + 9x$

$50 + 7x = 30 + 9x$
$20 = 2x$
$10 = x$

7.

Replaced X

If $f(12) = 4(12) - 20$, which function gives $f(x)$?

A. $f(x) = 4x$
B. $f(x) = 12x$
C. $f(x) = 4x - 20$ *(circled)*
D. $f(x) = 12x - 20$

8.

Which of these is the result of completing the square for the expression $x^2 + 8x - 30$?

A. $(x + 4)^2 - 30$
B. $(x + 4)^2 - 46$ *(circled)*
C. $(x + 8)^2 - 30$
D. $(x + 8)^2 - 94$

they don't know use

$x = \frac{-b}{2a}$

$x = \frac{-8}{2(1)} = \frac{-8}{2} = -4$

always the opposite

$(-4)^2 + 8(-4) - 30$

9.

If $f(12) = 100(0.50)^{12}$, which expression gives $f(x)$?

A. $f(x) = 0.50^x$

B. $f(x) = 100^x$

C. $f(x) = 100(x)^{12}$

(D) $f(x) = 100(0.50)^x$

---

10. Solutions

What are the zeros of the function represented by the quadratic expression $2x^2 + x - 3$?

(A) $x = -\frac{3}{2}$ and $x = 1$

B. $x = -\frac{2}{3}$ and $x = 1$

C. $x = -1$ and $x = \frac{2}{3}$

D. $x = -1$ and $x = -\frac{3}{2}$

$2x^2 + x - 3 = 0$

$(2x^2 - 2x) + (3x - 3) = 0$

$2x(x-1) + 3(x-1) = 0$

$(2x+3)(x-1) = 0$

$x = \frac{-3}{2} \quad x = 1$

* Keep calm and substitute on
* Substitute so the answer equal 0

11.

What are the solutions to the equation $x^2 - 5x = 14$?

A. $x = -7, x = -2$

B. $x = -14, x = -1$

(C) $x = -2, x = 7$

D. $x = -1, x = 14$

$x^2 - 5x - 14 = 0$

$(x-7)(x+2) = 0$

$x = 7 \quad x = -2$

12.

An object is thrown into the air with an initial velocity of 5 m/s from a height of 9 m. The equation $h(t) = -4.9t^2 + 5t + 9$ models the height of the object in meters after t seconds.

About how many seconds does it take for the object to hit the ground? Round your answer to the nearest tenth of a second.

A. 0.9

B. 1.5

(C) 2.0

D. 9.0

* Quadratic Formula

$-4.9t^2 + 5t + 9 = 0$

$b^2 - 4ac$

$(5)^2 - 4(-4.9)(9)$

201.4

$\dfrac{-5 \pm \sqrt{201.4}}{2(-4.9)}$

13.

Which system of equations is satisfied by the point (-1, -4)?

* Substitute *

(A) $x - y = 3 \quad -1 - -4 = 3 \checkmark$

$7x - y = -3 \quad 7(-1) - -4 = -7+4 = -3 \checkmark$

B. $y = -3x + 4$
$y = 3x - 2$

C. $4x + y = 2$
$x - y = 3$

D. $6x - 12y = 24$
$-x - 6y = 4$

14.

Which BEST describes the system?

$-9x + 3y = -6$

$\boxed{y = 3x - 2}$

$3y = 9x - 6$

$\boxed{y = 3x - 2}$

A. The system cannot be solved

B. One solution; the equations represent intersecting lines

C. No solution; the equations represent parallel lines

(D) Infinitely many solutions; the equations represent the same line

---

15.

Solve for x in the following equation:

$y = mx + b$

A. $x = y - \dfrac{m}{b}$

B. $x = \dfrac{y}{m} - b$

(C) $x = \dfrac{y-b}{m}$

D. $x = \dfrac{b-y}{m}$

$y = mx + b$

$-b \qquad -b$

$\dfrac{y-b}{m} = \dfrac{mx}{m}$

16.

Solve the inequality $4 - 5x < 14$.

$-4 \qquad -4$

A. $x < -2$

(B) $x > -2$

C. $x < -50$

D. $x > -50$

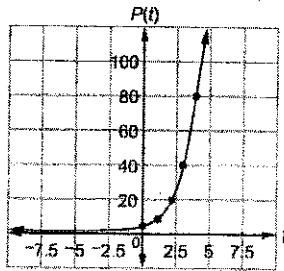$\dfrac{-5x}{-5} < \dfrac{10}{-5}$

$x > -2$

* Divide by a Negative switch the sign *

Graphing and Characteristics

1.

A population of squirrels doubles every year. Initially, there were 5 squirrels. A biologist studying the squirrels created a function to model their population growth: $P(t) = 5(2^t)$, where t is the time in years. The graph of the function is shown.
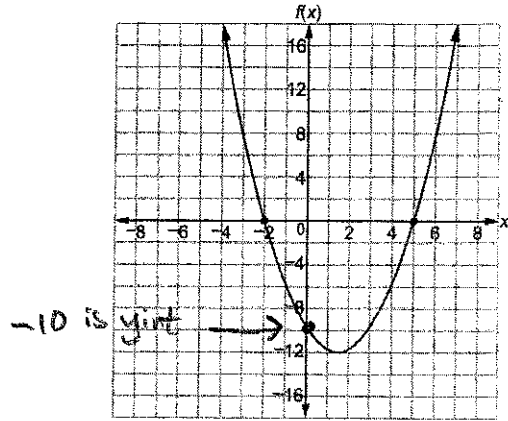

Which values best describe the range of the population?

A. any real number   *No fraction squirrels*
B. any whole number greater than 0   *Started @ 5*
C. any whole number greater than 5
D. any whole number greater than or equal to 5 *(circled)*

2.

Use this graph to answer the question.

—10 is y int

Which function is shown in the graph?

A. $f(x) = x^2 - 3x - 10$ *(circled)*
B. $f(x) = x^2 + 3x - 10$
C. $f(x) = x^2 + x - 12$
D. $f(x) = x^2 - 5x - 8$

$X = \frac{3}{2\cdot 1} = \frac{3}{2}$ ✱ vertex is positive

$X = \frac{-3}{2\cdot 1} = \frac{-3}{2}$

3.

Which of these is an even function?

A. $f(x) = 5x^2 - x^1$ N
B. $f(x) = 3x^3 + x^1$ O
C. $f(x) = 6x^2 - 8x^0$ E *(circled)*
D. $f(x) = 4x^3 + 2x^2$ N

4.

Which function shows the function $f(x) = 3^x$ being translated 5 units down?

A. $f(x) = 3^x - 5$ *(circled)*
B. $f(x) = 3^{(x-5)}$ ← Left
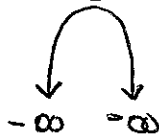C. $f(x) = 3^{(x-5)}$ ← Right
D. $f(x) = 3^x + 5$ ← up

5.

What is the end behavior of the graph of $f(x) = -0.25x^2 - 2x + 1$?

A. As x increases, $f(x)$ increases. As x decreases, $f(x)$ decreases.
B. As x increases, $f(x)$ decreases. As x decreases, $f(x)$ decreases. *(circled)*
C. As x increases, $f(x)$ increases. As x decreases, $f(x)$ increases.
D. As x increases, $f(x)$ decreases. As x decreases, $f(x)$ increases.

increases ∞
decreases -∞

✱ your function is negative

-∞   -∞

6.

Based on the tables, at what point do the lines $y = -x + 5$ and $y = 2x - 1$ intersect?

$y = -x + 5$		$y = 2x - 1$	
x	y	x	y
−1	6	−1	−3
0	5	0	−1
1	4	1	1
2	3	2	3
3	2	3	5

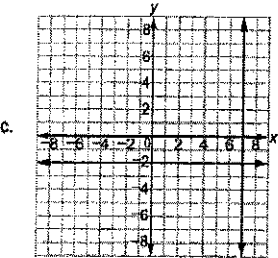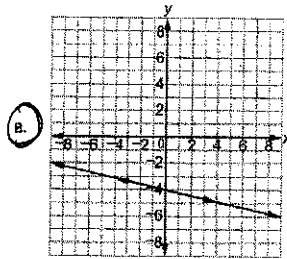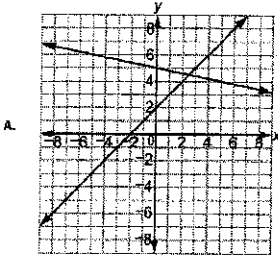*where does one X value have the same y value?*

A. (1, 1)
B. (3, 5)
C. (2, 3) *(circled)*
D. (3, 2)

or check these in your tables to see if they are the same

7. *Infinitely Many Solutions*

6. Which graph represents a system of linear equations that has multiple common coordinate pairs?

A.

B. (circled)

C.

D.

8.
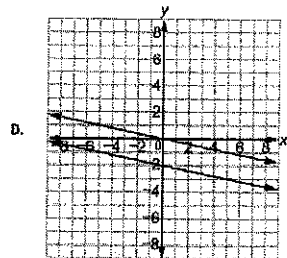
Which statement BEST describes the graph of $f(x + 6)$?

A. The graph of $f(x)$ is shifted up 6 units.
B. The graph of $f(x)$ is shifted left 6 units. (circled)
C. The graph of $f(x)$ is shifted right 6 units.
D. The graph of $f(x)$ is shifted down 6 units.

9.

Which statement BEST describes how the graph of $g(x) = -3x^2$ compares to the graph of $f(x) = x$

$f(x) = x^2$

A. The graph of $g(x)$ is a vertical stretch of $f(x)$ by a factor of 3.
B. The graph of $g(x)$ is a reflection of $f(x)$ across the x-axis.
C. The graph of $g(x)$ is a vertical shrink of $f(x)$ by a factor of $\frac{1}{3}$ and a reflection across the x-axis.
D. The graph of $g(x)$ is a vertical stretch of $f(x)$ by a factor of 3 and a reflection across the x-axis. (circled)

10.

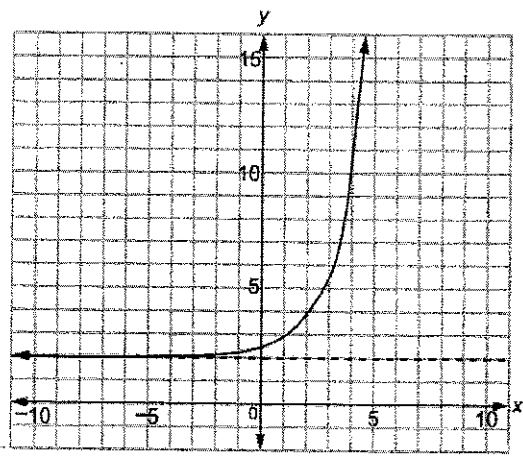Two lines are graphed on this coordinate plane.

(3,1)
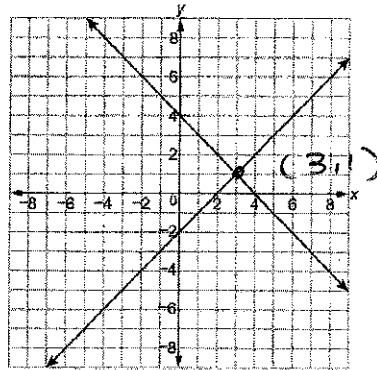
Which point appears to be a solution of the equations of both lines?

A. (0, -2)
B. (0, 4)
C. (2, 0)
D. (3, 1) (circled)

11.

Look at the graph.

Asymptote @ 2

Which equation represents this graph?

A. $y = 2^{(x + 1)} - 2$
B. $y = 2^{(x - 1)} + 2$ (circled)
C. $y = 2^{(x + 2)} - 1$
D. $y = 2^{(x - 2)} + 1$

12.

What is the y-intercept of the graph of $h(x) = 2^x - 4$?

A. $(0, -4)$
(B) $(0, -3)$
C. $(0, 1)$
D. $(0, 2)$

y int is where
$x = 0$

$2^0 - 4$

$1 - 4$

13.

What is the range of the graph of $f(x) = -3(x - 4)$?

A. $(-3, 4)$
B. $(-3, \infty)$
C. $(-\infty, 4)$
(D) $(-\infty, \infty)$

$f(x) = -3x + 12$

↗

Linear function

Arithmetic vs Geometric

1.

Which function represents the sequence?

n	1	2	3	4	5	...
a_n	3	10	17	24	31	...

+7 +7

A. $f(n) = n + 3$
(B) $f(n) = 7n - 4$
C. $f(n) = 3n + 7$
D. $f(n) = n + 7$

2.

Which function represents this sequence?

n	0	1	2	3	4	5	...
a_n	2	6	18	54	162	486	...

A. $f(n) = 3^{n-1}$ ← only use n-1 ×3
B. $f(n) = 6^{n-1}$ when starting 1st term
C. $f(n) = 3(6^{n-1})$
(D) $f(n) = 6(3^{n-1})$

↑ first term

3.

Which explicit formula describes the pattern in this table?

d	c
0	1
1	6
2	36
3	216

×6

A. $C = 6d$
B. $C = d + 6$
(C) $C = 6^d$
D. $C = d^6$

4.

Look at the sequence in this table.

n	1	2	3	4	5	...
a_n	-1	1	3	5	7	...

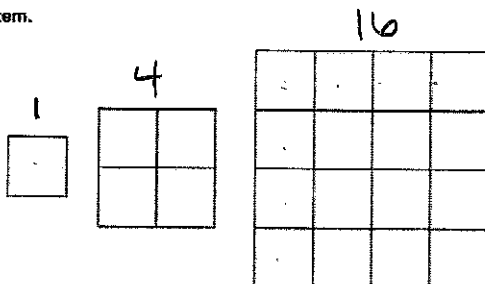**Which function represents the sequence?**   +2 +2

A. $a_n = a_{n-1} + 1$
(B) $a_n = a_{n-1} + 2$
C. $a_n = 2a_{n-1} - 1$
D. $a_n = 2a_{n-1} - 3$

5.

Consider this pattern.

1   4   16

Which recursive formula represents the sequence that represents the pattern?

(A) $a_n = (4)^{(n-1)}$
B. $a_n = (4)^{(a_{n-1})}$
C. $a_n = (a_n)(4)^{(n-1)}$
D. $a_n = (a_n)^4$

Comparing

1.

A table of values is shown for $f(x)$ and $g(x)$.

x	f(x)
0	0
1	1
2	4
3	9
4	16
5	25

x	g(x)
0	−2
1	−1
2	1
3	5
4	13
5	29

Which statement compares the graphs of $f(x)$ and $g(x)$ over the interval [0, 5]?

A. The graph of $f(x)$ always exceeds the graph of $g(x)$ over the interval [0, 5].
B. The graph of $g(x)$ always exceeds the graph of $f(x)$ over the interval [0, 5].
C. The graph of $g(x)$ exceeds the graph of $f(x)$ over the interval [0, 4], the graphs intersect at a point between 4 and 5, and then the graph of $f(x)$ exceeds the graph of $g(x)$.
D. The graph of $f(x)$ exceeds the graph of $g(x)$ over the interval [0, 4], the graphs intersect at a point between 4 and 5, and then the graph of $g(x)$ exceeds the graph of $f(x)$. *(circled)*

2.

Which statement BEST describes the comparison of the function values for $f(x)$ and $g(x)$?

x	f(x)	g(x)
0	0	−10
1	2	−9
2	4	−6
3	6	−1
4	8	6

(handwritten: +2 above f column; +1, +3, +5, +7, +9 for g column; +2, +2, +2, +2 comparisons; 5, 10, 15 and Q)

A. The values of $f(x)$ will always exceed the values of $g(x)$.
B. The values of $g(x)$ will always exceed the values of $f(x)$.
C. The values of $f(x)$ exceed the values of $g(x)$ over the interval [0, 5].
D. The values of $g(x)$ begin to exceed the values of $f(x)$ within the interval [4, 5]. *(circled)*

3.

Which statement is true about the graphs of exponential functions?

A. The graphs of exponential functions never exceed the graphs of linear and quadratic functions.
B. The graphs of exponential functions always exceed the graphs of linear and quadratic functions.
C. The graphs of exponential functions eventually exceed the graphs of linear and quadratic functions. *(circled)*
D. The graphs of exponential functions eventually exceed the graphs of linear functions but not quadratic functions.

4.

Consider this function for cell duplication. The cells duplicate every minute.

$$f(x) = 75(2)^x$$

A. The 75 is the initial number of cells, and the 2 indicates that the number of cells doubles every minute. *(circled)*
B. The 75 is the initial number of cells, and the 2 indicates that the number of cells increases by 2 every minute.
C. The 75 is the number of cells at 1 minute, and the 2 indicates that the number of cells doubles every minute.
D. The 75 is the number of cells at 1 minute, and the 2 indicates that the number of cells increases by 2 every minute.

5.

Which function is modeled in this table?

x	f(x)
1	8
2	40
3	200
4	1,000

(handwritten: ×5, ×5)

A. $f(x) = x + 7$

B. $f(x) = 5x + 8$

C. $f(x) = (8)^x$

D. $f(x) = \dfrac{8}{5}(5)^x$ *(circled)*

6.

Which table represents an exponential function?

A.

x	0	1	2	3	4
y	5	6	7	8	9

(handwritten: +1)

B.

x	0	1	2	3	4
y	22	44	66	88	110

(handwritten: +22)

C.

x	0	1	2	3	4
y	5	13	21	29	37

(handwritten: +8, +8)

D. *(circled)*

x	0	1	2	3	4
y	3	9	27	81	243

(handwritten: ×3)