North Thurston Public Schools

ALGEBRA 1

EOC Exit Exam Review Packet

Name: Answer Key

Teacher: _____

Period: _____

BIG IDEA of the Week #1:

Finding Slope and y-Intercept

Find the slope and y-intercept for each line, whether as an equation or as two points the line passes through:

i. $(6, -20)$ and $(13, 14)$

$\frac{14+20}{13-6} = \frac{34}{7} = m$

$-20 = \frac{34}{7}(6) + b$

$-20 = \frac{204}{7} + b$

$-\frac{140}{7} = \frac{204}{7} + b$ $\quad b = -\frac{344}{7}$

ii. $y = \frac{8}{3}x + 3$

$m = \frac{8}{3}$ $\quad b = 3$

iii. $3x + 4y = 0$

$4y = -3x$

$y = -\frac{3}{4}x$

$m = -\frac{3}{4}$ $\quad b = 0$

iv. $(15, -8)$ and $(5, -19)$

$\frac{-19+8}{5-15} = \frac{-11}{-10} = \frac{11}{10} = m$

$-8 = \frac{11}{10}(15) + b$

$-8 = \frac{33}{2} + b$

$-\frac{49}{2} = b$

v. $y = -6x + 2$

$m = -6$

$b = 2$

vi. $(0, 7)$ and $(-17, -8)$

$-8 = m(-17) + 7$

$-15 = m(-17)$

$m = \frac{15}{17}$ $\quad b = 7$

vii. $y = -\frac{2}{3}x + 1$

$m = -\frac{2}{3}$ $\quad b = 1$

viii. $4x - y = -3$

$-y = -4x - 3$

$y = 4x + 3$

$m = 4$

$b = 3$

ix. $(18, -1)$ and $(-4, 2)$

$\frac{-1-2}{18+4} = \frac{-3}{22} = m$

$-1 = -\frac{3}{22}(18) + b$

$-1 = -\frac{27}{11} + b$

$\frac{16}{11} = b$

x. $x + y = -5$

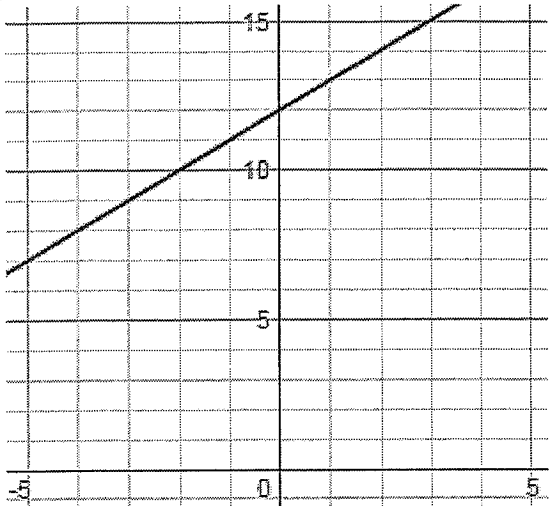
$y = -x - 5$

$m = -1$

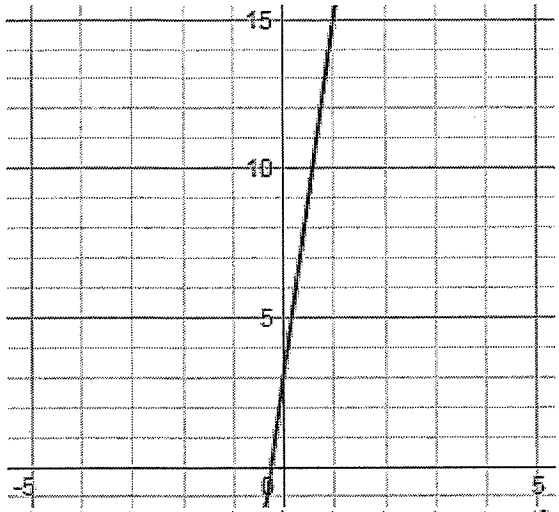
$b = -5$

1. Ingrid is training for an upcoming race. To practice, each day she runs a total of 3 miles. As of today, she has run a total of 12 miles. Let y represent the total number of miles she has run and x represent days (with $x = 0$ representing today). If she continues to run the same amount each day, which graph best models her training routine:

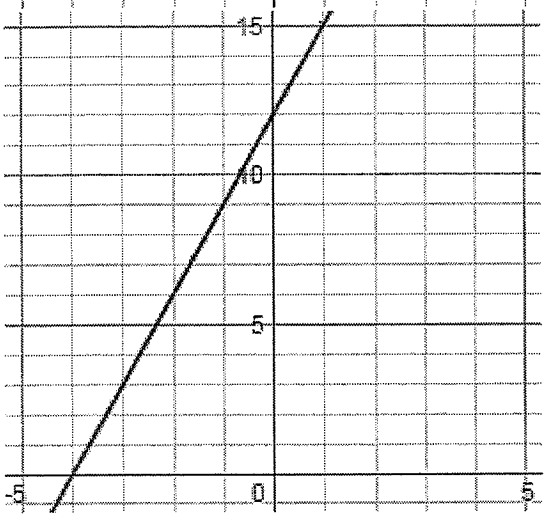
○ A.



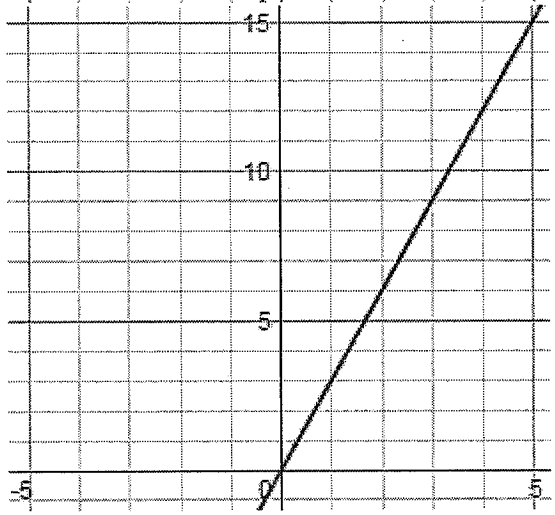
○ B.



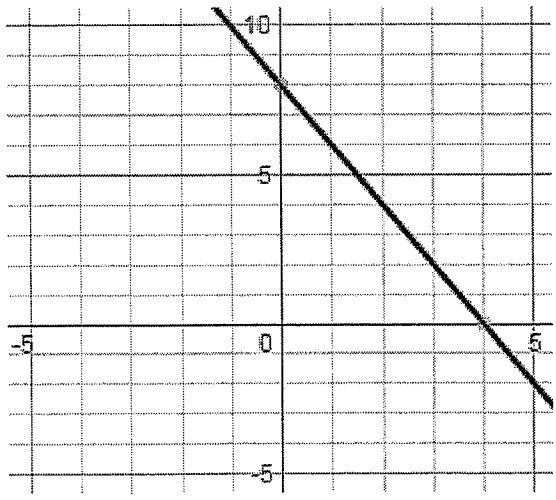
⊗ C.



○ D.



2. Select all coordinate pairs which represent a solution to the function graphed at right:



⊗ A. (3,2)

⊗ B. (4,0)

○ C. (6,1)

○ D. (8,0)

3. The state of New York had a population of approximately 300,000 people in the year 1800. The population of New York was predicted to increase by 1.58% per year. If the percent increase in population is correct, what would the population of New York be in the year 2015?

$300{,}000(1.0158)^{215} = 8727424.101 \simeq 8727424$ people

4. Let $g(x) = 0.25(8)^x$, select all of the equations below which represent solutions of $g(x)$:

○	A.	$g(0) = 0$	⊗	B. $g(1) = 2$
○	C.	$g(2) = 4$	⊗	D. $g(3) = 128$

$-3x - 6 + x^2 - 3x$

5. Select all of the following expressions that are equivalent to $-3(x + 2) + (x - 3)x$:

○	A.	$-5x - 6$	⊗	B. $-3x + (x - 3)x - 6$
⊗	C.	$x^2 - 6x - 6$	○	D. $x^2 - 6x + 2$

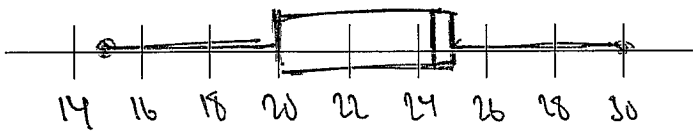
6. Ms. Stevens gave a 30 question quiz to her Algebra 1 class. After grading the quizzes, her students received the following scores:

15, 16, 30, 28, 22, 24, 25, 25, 26, 17, 20, 22, 25, 25

15, 16, 17, 20, 22, 22, 24, 25, 25, 25, 26, 28, 30

a) Create a box-plot of the quiz scores:

24.5



b) Would you describe the box plot as symmetric or skewed? Why? skewed, the upper half of the data is over 5.5 numbers, while the lower half of the data is spread over 9.5 numbers

c) Based on your answers above, find the value for an appropriate measure of center and spread for the quiz scores:

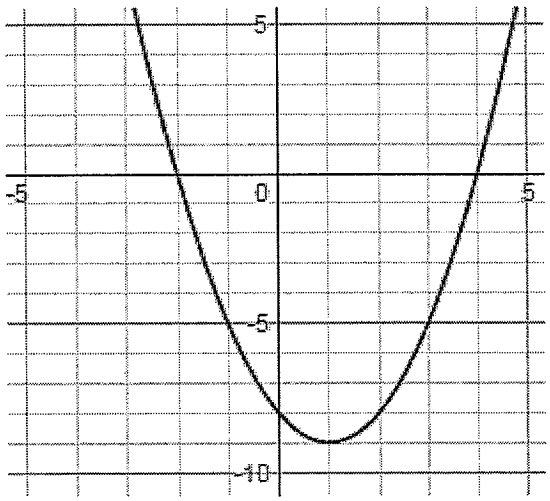
center: median: 24.5

spread: IQR: 5

7. The explicit formula for an arithmetic sequence can be expressed by: $a_n = a_1 + (n - 1)d$. Select all of the following equations which are equivalent to the explicit formula for an arithmetic sequence:

⊗	A.	$d = \frac{a_n - a_1}{n - 1}$	○	B. $n - 1 = \frac{a_n + a_1}{d}$
⊗	C.	$a_n - a_1 = dn - d$	○	D. $a_1 = (n - 1)d - a_n$

8. Consider the function graphed to the right, over which intervals is the function increasing and negative:



○	A.	$(-\infty, 1)$
○	B.	$(-2, 4)$
⊗	C.	$(1, 4)$
○	D.	$(1, \infty)$

9. Create a system of two linear equations such that $(2, 3)$ represents the solution to one of the equations, but not the other, and ~~such that $(4, 2)$~~ represents the solution to the system: multiple solutions

$y = -\frac{1}{2}x + 4$

$y = x - 2$

$x + 4 = 8x - 12$

$16 = 7x \quad x = \frac{16}{7}$

10. Solve: $\frac{x+4}{2} = 4x - 6$:

(X) A. $x = \frac{16}{7}$

○ B. $x = \frac{8}{3}$

○ C. $x = \frac{10}{3}$

○ D. $x = 7$

11. Austin works for a company that sells garden gnomes. The gnomes come in two different sizes: small (which weigh 4 pounds each) and large (which weigh 7 pounds each). Austin ships the garden gnomes to customers in a box that can hold no more than 60 pounds. Brian asks Austin to send him 3 large gnomes and as many small gnomes as he can fit in one box before it exceed the weight limit. How many small gnomes will Austin ship to Brian?

○ A. 6 small gnomes

○ B. 7 small gnomes

(X) C. 9 small gnomes

○ D. 10 small gnomes

$7l + 4s \leq 60$

$7(3) + 4s \leq 60$

$21 + 4s \leq 60$

~~-39~~ $4s \leq 39$

$s \leq 9.75$

12. For each equation below, state the property (Associative, Commutative, or Distributive) that allows us to state that the expression on the left of the equation is equivalent to the expression on the right:

a) $(abc + (a + d)) + dbc = abc + ((a + d) + dbc)$ associative A

b) $abc + ((a + d) + dbc) = abc + a + d + dbc$ associative A

c) $abc + a + d + dbc = a + abc + d + dbc$ commutative C

d) $a + abc + d + dbc = a(1 + bc) + d(1 + bc)$ distributive D

e) $a(1 + bc) + d(1 + bc) = (a + d)(1 + bc)$ distributive D

f) $(a + d)(1 + bc) = (a + d)(bc + 1)$ commutative C

g) $(a + d)(bc + 1) = (a + d)(cb + 1)$ commutative C

h) $(a + d)(cb + 1) = (cb + 1)(a + d)$ commutative C

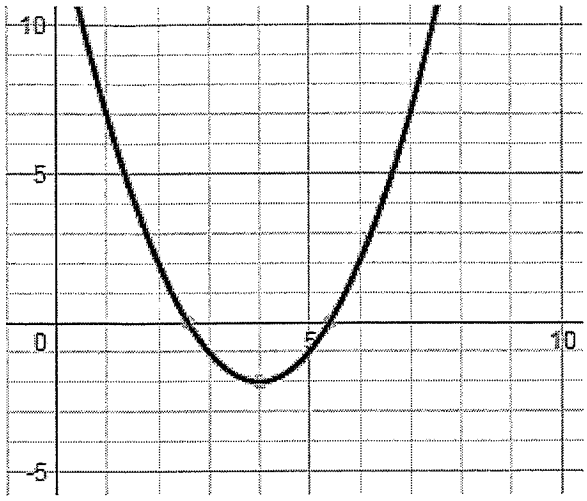
i) $(cb + 1)(a + d) = acb + a + dcb + d$ distributive D

j) $acb + a + dcb + d = abc + a + dbc + d$ commutative C

k) $abc + a + dbc + d = abc + a + d + dbc$ commutative C

l) $abc + a + d + dbc = (abc + (a + d)) + dbc$ associative A

13. The function $g(x)$ is shown in the graph at right. The function $g(x)$ is a transformation of the parent function $f(x) = x^2$. Based on the graph, which function represent $g(x)$ in terms of $f(x)$:



- ○ A. $g(x) = f(x+4) - 2$
- ○ B. $g(x) = f(x+2) - 4$
- ⊗ C. $g(x) = f(x-4) - 2$
- ○ D. $g(x) = f(x-2) + 4$

$(x+2)(2x-3) = 12 \quad 2x^2 - 3x + 4x - 6 = 12 \quad 2x^2 + x - 6 = 12$

14. The dimensions of a rectangle are such that the length is equal to 2 more than a number, and the width is equal to 3 less than twice a number. The area of the rectangle is equal to 12 square units. Select all of the following equations which represent the area of the rectangle:

- ⊗ A. $(2x-3)(x+2) = 12$
- ⊗ B. $2x^2 + x = 18$
- ⊗ C. $2x^2 + x - 6 = 12$
- ⊗ D. $(x+2)(2x-3) = 12$

15. For each of the following sequences, state whether the sequence is arithmetic or geometric, then write the explicit form of the sequence:

a) $6, 2, -2, -6, -10, \ldots$ $A(n) = 6 + (n-1)(-4)$

-4, arithmetic

b) $3, 6, 12, 24, 48, \ldots$ $A(n) = 3(2)^{n-1}$

$\times 2$, geometric

c) $512, 64, 8, 1, \frac{1}{8}, \ldots$ $A(n) = 512\left(\frac{1}{8}\right)^{n-1}$

$\times \frac{1}{8}$, geometric

d) $17, 20, 23, 26, 29, \ldots$ $A(n) = 17 + (n-1)(3)$

$+3$, arithmetic

BIG IDEA of the Week **#2:**

Solving Equations

Solve each of the equations below for x, be sure to check your solution:

i. $x - 8 = 8$

$+8 \quad +8$

$x = 16$

ii. $-133 = -7x$

$\frac{-133}{-7} = \frac{-7x}{-7}$

$x = 19$

iii. $-7 + 3x - 8 = -6$

$3x - 15 = -6$

$3x = 9$

$x = 3$

iv. $-135 = -5(3x + 3)$

$27 = 3x + 3$

$24 = 3x$

$x = 8$

v. $-34 = -3(x + 8) + 7(6x - 7)$

$-34 = -3x - 24 + 42x - 49$

$-34 = 39x - 73$

$39 = 39x$

$x = 1$

vi. $6 - 4x = 4 - 2x$

$2 = 2x$

$x = 1$

vii. $6x + 6 - 4x = 6 + 2x$

$2x + 6 = 2x + 6$

infinite solutions

viii. $-5(1 + 5x) = -6x - 24$

$-5 - 25x = -6x - 24$

$19 = 19x$

$x = 1$

ix. $-3(6 + 4x) = -(x - 2) + 2$

$-18 - 12x = -x + 2 + 2$

$-18 - 12x = -x + 4$

$-22 = 11x$

$x = -22$

x. $-128 = -4x - 2(-6 + 8x)$

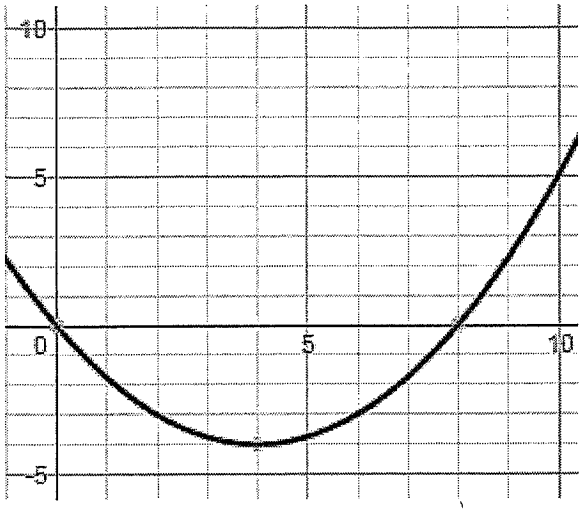
$-128 = -4x + 12 - 16x$

$-128 = -20x + 12$

$-140 = -20x$

$x = 7$

16. The quadratic function $f(x)$ is graphed at right. Select all of the following statements about $f(x)$ which are true:



- ○ A. The vertex at (0,0) is a minimum
- ○ B. The vertex at (0,0) is a maximum
- ⊗ C. The vertex at $(4,-4)$ is a minimum
- ○ D. The vertex at $(4,-4)$ is a maximum

17. Assume $a(x) = b(x)$. If $a(x) = x^2 + 4x + 4$, select all of the following functions which could represent $b(x)$:

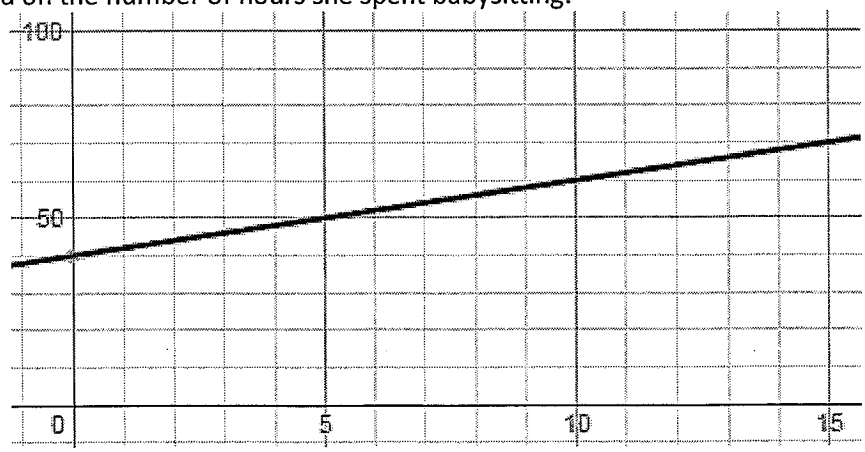
- ⊗ A. $b(x) = (x+2)(x+2)$
- ○ B. $b(x) = x^2 + 8x$
- ⊗ C. $b(x) = x(x+4) + 4$
- ⊗ D. $b(x) = (x+2)^2$

18. After several days of dry weather, it started to rain at a constant rate of 2 centimeters per hour at 5:00am. It continued at this rate until 7:00am, when it started raining at a constant rate of 1.5 centimeters per hour, and continued raining at that rate for the next four hours. From 11:00am to 2:00pm, no rain fell. Starting at 2:00pm the rain fell at a constant rate of 3 cm per hour. The rain fell at that rate for two hours, and then there was no more rain for the remainder of the day:

a) When had a total of 13 centimeters of rain accumulated for that day? 3:00pm

b) On that day, how much total rain had accumulated by 9:00am? 7 cm

19. Janna decided to take a job babysitting on the weekends. She is paid $40 for each day that she babysits, plus an additional $2 per hour. Let y represent the total amount of money she earns per day babysitting, and x represent the number of hours she spends babysitting on a given day. The graph below shows the total amount of money she would earn based on the number of hours she spent babysitting:



How much money would Janna earn for babysitting 7.5 hours?

- ○ A. $15.00
- ○ B. $47.50
- ⊗ C. $55.00
- ○ D. $62.50

20. What is the value of the function $f(x) = -3 + 4^x$ when $x = 2$

○ A. $f(2) = 5$ ○ B. $f(2) = 8$

⊗ C. $f(2) = 13$ ○ D. $f(2) = 16$

21. For each of the following quadratic equations, state the number of real solutions:

a) $x^2 + 4 = 5x + 40$ $x^2 - 5x - 36 = 0$ $(x-9)(x+4) = 0$ (2)

b) $x^2 - 1 = -8x - 8$ $x^2 + 8x + 7 = 0$ $(x+7)(x+1) = 0$ (2)

c) $x^2 + 10x - 4 = 2x - 20$ $x^2 + 8x + 16 = 0$ $(x+4)^2 = 0$ (1)

d) $x^2 + 12 = -6x$ $x^2 + 6x + 12 = 0$ not factorable $\sqrt{6^2 - 4(1)(12)} = \sqrt{-12}$ (0)

10, 21, 32, 43, 54, 65, 76, 87, 90, 91, 92, 93, 94, 95, 96, 97 98, 99

22. Select what would be the most appropriate method to measure center and variability for the following data:

~~10~~, 90, ~~21~~, 91, ~~32~~, ~~92~~, ~~43~~, ~~93~~, ~~54~~, ~~94~~, ~~65~~, ~~95~~, ~~76~~, 96, ~~87~~, 97, ~~98~~, ~~99~~

○ A. Center: Mean; Variability: Interquartile Range ○ B. Center: Mean; Variability: Standard Deviation

⊗ C. Center: Median; Variability: Interquartile Range ○ D. Center: Median; Variability: Standard Deviation

23. Select all of the systems of linear equations and/or inequalities that have more than one solution:

⊗ A. $y = -3x + 6$; $6x + 2y = 12$ ⊗ B. $y \geq 4x - 8$; $y < 4x + 2$

○ C. $y \leq 0.5x - 3$; $y > 0.5x + 2$ ○ D. $-6x - 3y = 6$; $y = -2x - 1$

24. Completely factor the following quadratic expressions:

a) $2x^2 + 7x - 4$ $(2x-1)(x+4)$

b) $6x^2 + 13x + 6$ $(2x+3)(3x+2)$

c) $-2x^2 - 8x - 8$ $-2(x^2 + 4x + 4) = -2(x+2)^2$

d) $6x^2 + 12x + 6$ $6(x^2 + 2x + 1) = 6(x+1)^2$

$2x^2 = 128$ $x^2 = 64$ $x = \pm 8$

25. Which of the following represents the solution set for the equation $2x^2 - 30 = 98$

○ A. $\{\cdots, -3, -2, -1, 0, 1, 2, 3, \cdots\}$ ⊗ B. $\{-8, 8\}$

○ C. $\{8\}$ ○ D. $\{64\}$

26. A scientist is studying a certain colony of fungus. After several months of study, she has determined that the population of the fungi can be modeled by the following function, $f(d) = 4(3)^d$, where d represents time in days, and $f(d)$ represents the total amount of fungi in the colony after d days. Which of the following statements best describes the population of the fungus colony:

○ A. Starting with 3 fungi, the population adds 4% more fungi each day

○ B. Starting with 3 fungi, the population quadruples each day

○ C. Starting with 4 fungi, the population grows by 3 more fungi each day

⊗ D. Starting with 4 fungi, the population increases by a factor of 3 each day

27. Jon decide to conduct a survey of all the students in 8 randomly selected high school math classrooms. Jon was curious to see if there were any differences between female and male students as to what their favorite type of pet was (as such, each respondent could only choose one type of pet as their favorite). Each respondent was asked to give their gender and select their favorite type of pet: "Cat," "Dog," "Other," or "None." As Jon drove home for the day, he realized that he left all of the surveys on top of his car and they were lost. Luckily, Jon had written down some of the information about the survey participants: 270 total students took the survey, of which 152 were female. Among females, 60 replied "Cats" were there favorite, and 20 responded "Other." Among males, 98 replied "Dogs" were there favorite, and 8 responded "None." Additionally, 28 total respondents stated "Other" was there favorite, and 18 selected "None."

a) Complete the two-way frequency table below using Jon's information:

	Cat	Dog	Other	None	Total
Male	4	98	8	8	118
Female	60	62	20	10	152
Total	64	160	28	18	270

b) Garfield claims that cats must be everyone's favorite pet because "Cats" were preferred three times as much as "Other" by female respondents. Do you agree or disagree with Garfield? Why?

disagree, Garfield is only considering female respondents instead of everyone, and Cats aren't even the most popular among female students

c) Odie claims that dogs are clearly everyone's favorite pet, but doesn't give any reason why. State whether you agree or disagree with Odie and justify your answer by using data from the table.

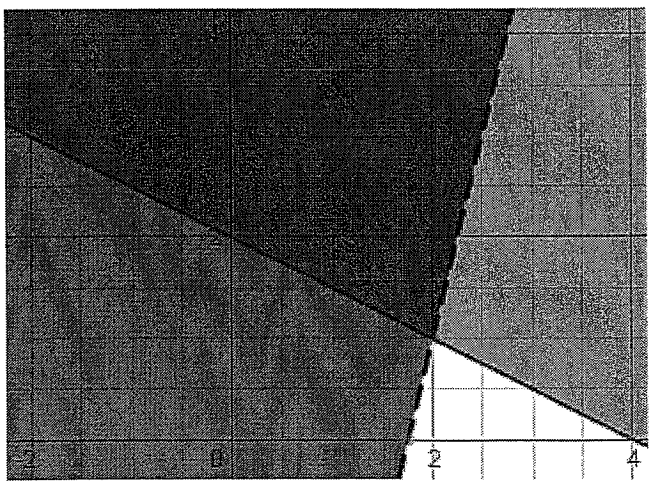
Agree. Cat: $64/270 = 23.7\%$. Other: $28/270 = 10.4\%$.

Dog: $160/270 = 59.3\%$. None: $18/270 = 6.7\%$.

28. The following system of inequalities is shown in the graph at right:

$$y \geq -\frac{1}{2}x + 2$$
$$y > 4x - 7$$

Select all of the coordinate points which represent a solution to this system:



⊗ A. $(0, 2)$

⊗ B. $(1, 3)$

○ C. $(2, 1)$

○ D. $(4, 0)$

29. Tobin and his friends are planning on renting a car for the weekend. The car rental company only charges an initial fee of $100 to rent the vehicle, plus $25 for each person who will be in the vehicle (the driver and all passengers are each expected to pay $25). Tobin and his friends plan on splitting the cost of the rental car equally between them. Let c represent the cost per person, and let p represent the number of people in the vehicle. Which equation best models this situation:

○ A. $c = 25p + 100$ ⊗ B. $c = \frac{100}{p} + 25$

○ C. $c = 125p$ ○ D. $c = \frac{25}{p} + 100$

30. Solve each equation for x, be sure to check your answer:

a) $\frac{1}{4}(8 - 4(x-2)) = \frac{1}{7}(7x+14)$

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

$2 - x + 2 = x + 2$

$4 - x = x + 2$

$2 = 2x$ $x = 1$

b) $\frac{x}{x-2} = \frac{x+1}{x-2}$

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

$x^2 - 2x = x^2 - 2x + x - 2$

$0 = x - 2$ $x = 2$

check: $\frac{2}{2-2} = \frac{2+1}{2-2}$

$\frac{2}{0} = \frac{3}{0}$

No solution

or

$x = x + 1$

$0 = 1$

c) $3(x+2) = x^2 - 2x - 6$

$3x + 6 = x^2 - 2x - 6$

$0 = x^2 - 5x - 12$

not factorable

$a = 1$

$b = -5$

$c = -12$

$x = \frac{5 \pm \sqrt{(-5)^2 - 4(1)(-12)}}{2(1)}$

$x = \frac{5 \pm \sqrt{25 + 48}}{2}$

$x = \frac{5 \pm \sqrt{73}}{2}$

$x = -1.772, 6.772$

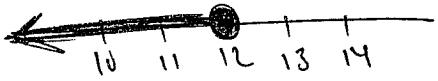
BIG IDEA of the Week **#3:**

Solving Inequalities

Solve each inequality for x, then create an appropriate number line and graph the solution:

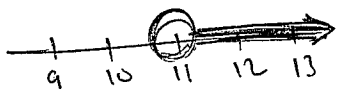
i. $16 + x \leq 28$

$x \leq 12$



ii. $x + 1 > 12$

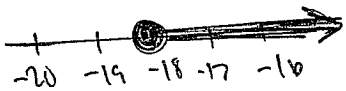
$x > 11$



iii. $-3x + 1 \leq 55$

$-3x \leq 54$

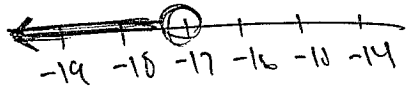
$x \geq -18$



iv. $\frac{2+x}{15} < -1$

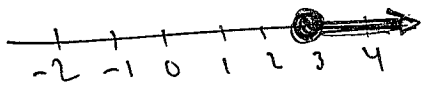
$2 + x < -15$

$x < -17$



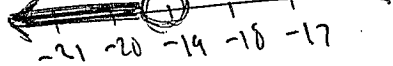
v. $\frac{3}{20} \leq \frac{x}{20}$

$3 \leq x$



vi. $x + 12 < -7$

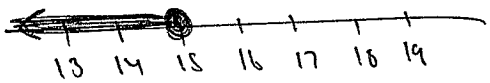
$x < -19$



vii. $\frac{x}{5} + 7 \leq 10$

$\frac{x}{5} \leq 3$

$x \leq 15$



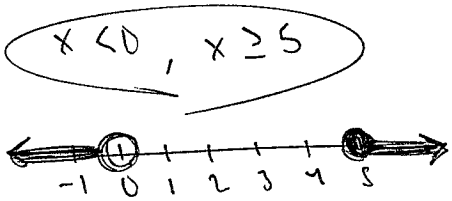
viii. $42 \geq 10x - 8$

$50 \geq 10x$

$5 \geq x$

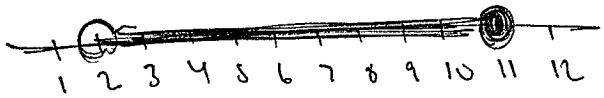
ix. $\frac{x}{2} < 0$ or $7 + x \geq 12$

$x < 0$, $x \geq 5$



x. $7 < x + 5 \leq 14$

$2 < x \leq 11$



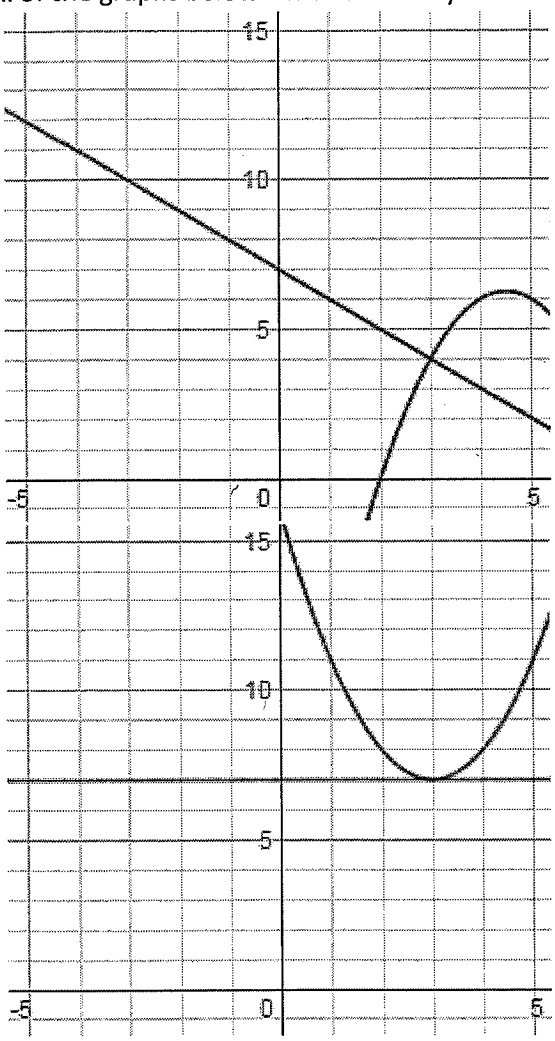
31. The table at right represents a relation of ordered pairs. What changes need to be made to the table so that it would represent a function:

x	y
-1	4
-2	9
0	1
-2	1
1	0

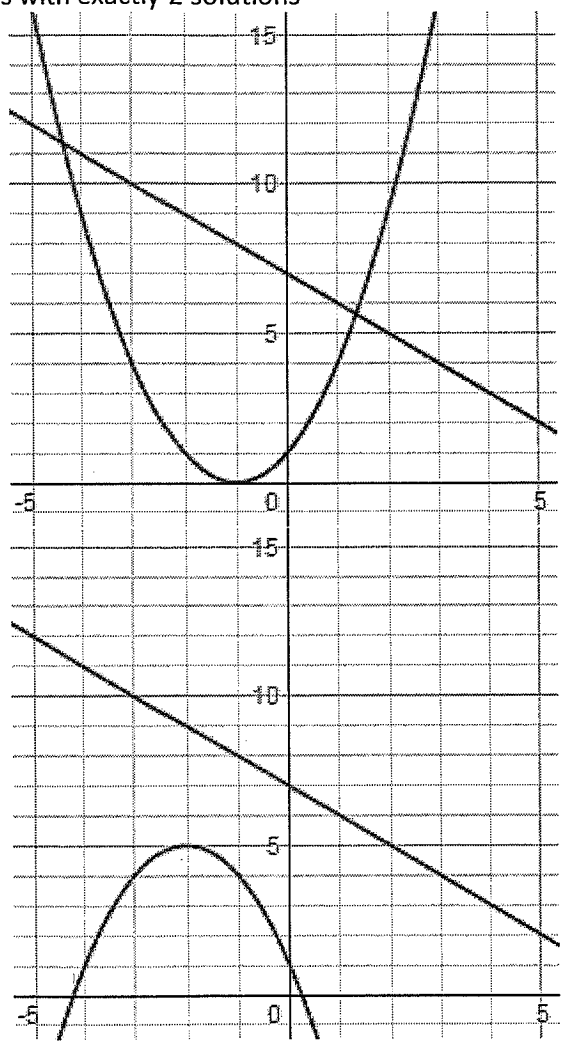
- ○ A. Arrange the x-coordinates in descending order
- ○ B. Replace all negative x-coordinates with positive values
- ⊗ C. Replace $(-2, 1)$ with $(2, 1)$
- ○ D. Replace $(1, 0)$ with $(-1, 0)$

32. Select all of the graphs below which show a system of two equations with exactly 2 solutions

⊗ A.



⊗ B.

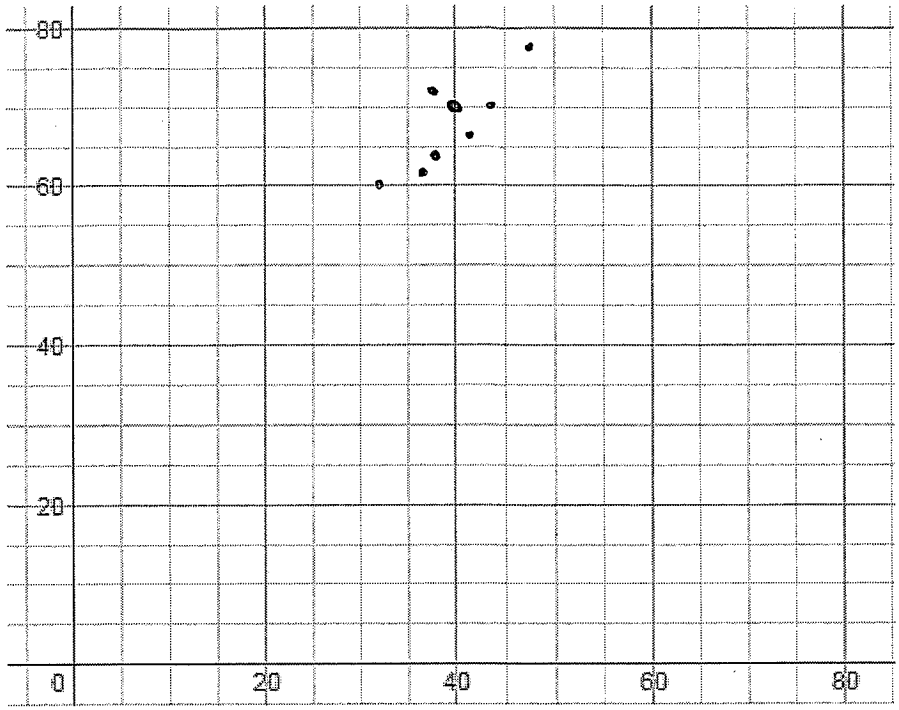


○ C.

○ D.

33. The data in the table below compares waist circumference (in inches) to height (in inches) in adults:

Waist Circumference (in)	Height (in)
40	70
38	64
38	72
36	62
42	66
44	70
48	78
32	60



a) Use the data to make a scatterplot on the graph at right (be sure to label your axes):

b) Based on your scatterplot, would the best fit function for this data be linear, exponential, or quadratic? Why?

linear, a weak linear relationship appears to exist between waist & height a line of best fit could be used to approximate the data: $y = x + 28$

34. Select all of the following functions which represent a parabola that would open downward when graphed:

⊗ A. $a(x) = -2(x+6)^2 + 1$ ○ B. $b(x) = -4(x+2)$

○ C. $c(x) = (-3x+2)(-2x-1)$ ⊗ D. $d(x) = -3x^2 - 3x + 6$

35. A virologist was studying a new species of virus. There were 20 virus in the petri dish at the beginning of the study, and after several days it became apparent that the population quadrupled each day. Let t represent time in days, and $v(t)$ represent the total population on day t. Which of the following best represents the domain:

○ A. $v(t) > 20$ ○ B. t is an integer multiple of 4

○ C. $v(t)$ is a positive integer greater than or equal to 20 ⊗ D. $t \geq 0$

36. Barry, Garry, and Larry are hanging out in the park playing soccer. Barry kicks the ball up in the air as hard as he can, and it follows a path modeled by $b(t) = -0.25x(2x - 24)$, where t represents time in seconds, and $b(t)$ represents the height of Barry's ball in feet after t seconds. Not to be outdone, Garry grabs the ball and kicks it as hard as he can, and it follows a path modeled by $g(t) = -0.5(x-6)^2 + 18$, where t represents time in seconds, and $g(t)$ represents the height of Garry's ball in feet after t seconds. As soon as the ball lands Garry yells, "My ball went so much higher than yours Barry!" Barry retorts, "Well, my ball stayed in the air way longer than yours!" Larry turns to them and says, "You're both wrong!"

a) Who do you agree with, Barry, Garry, or Larry?

Larry

b) Explain your thinking, and be sure to use the functions $b(t)$ and $g(t)$ as part of your explanation:

$b(t) = -0.25x(2x-24) = -0.5x^2 + 6x$

$g(t) = -0.5(x-6)^2 + 18 = -0.5(x^2 - 12x + 36) + 18 = -0.5x^2 + 6x - 18 + 18 = -0.5x^2 + 6x$

$b(t) = g(t)$, so both balls would have reached the same height and stayed in the air the same amount of time

37. Select which property is illustrated by the equation: $(x^2 + y)(x) = (x^3 + xy)$

○ A. Associative Property ○ B. Commutative Property

⊗ C. Distributive Property ○ D. Transitive Property

38. Select which of the following statements best describes the function represent in the table at right:

x	0	2	4	6	8
$f(x)$	1	3	9	27	81

○ A. Since the values of the x-coordinate increase by 2, the function is linear

○ B. Since both x and $f(x)$ are increasing, this is a quadratic function, representing a parabola opening upward

○ C. Since the values of the x-coordinate increase by 2, when the value of $f(x)$ triples, the function has a slope of $3/2$

⊗ D. Since the value of $f(x)$ triples each time the value of the x-coordinate increases by 2, it is an exponential function

39. Hugo has just won the January lottery! Before he can collect his winnings, he has to choose if he would rather get all of his money under Plan A, "The Lump Sum Plan," or Plan B, "The Exponential Payment Plan." If Hugo chooses Plan A, he will be given one check for \$750,000,000 on Day 1 and receive no additional money. If Hugo chooses Plan B, he will be given a check for \$1 on Day 1, a check for \$2 on Day 2, a check for \$4 on Day 3, a check for \$8 on Day 4, and so on, for all 31 days in January. Hugo knows he want to make as much money as possible, but he can't figure out which plan to choose, so he asks you for help. Hugo knows you are a bright mathematician, but he is also a skeptical individual and will need you to include some mathematics (equations, graphs, tables, etc.) in your justification before he is convinced you are right.

a) If Hugo wants to make as much money as possible, should he choose Plan A or Plan B?

b) Justify your choice to Hugo mathematically:

$f(x) = 1(2)^{x-1}$ represents the amount Hugo gets paid each day (x) for the month of January, on the 31st, Hugo would receive a check for \$1,073,741,824 which is more than the total for the lump sum plan. (This doesn't include all of the additional money he would earn with Plan B on Days 1-30)

40. Which values of x make the following equation true: $2x^2 + 8x = 24$

⊗ A. $x = -6, 2$ ○ B. $x = -4, 0$

○ C. $x = -4, 2$ ○ D. $x = -2, 6$

41. Roseanne works for a salad dressing manufacturer. In order for the salad dressing to be ready to ship out to stores, each bottle must be filled to at least 85% of capacity but less than 98% capacity. Let c represent the percentage of capacity of each salad dressing bottle. Choose the correct interval which represents a salad dressing bottle ready to ship:

○ A. $c < 85$ or $c \geq 98$ ○ B. $c \leq 85$ or $c > 98$

⊗ C. $85 \leq c < 98$ ○ D. $85 < c \leq 98$

42. Completely factor each expression:

a) $x^2 - x - 6 = (x-3)(x+2)$

b) $2x^2 + 7x + 6 = (2x+3)(x+2)$

c) $x^2 - 12x + 20 = (x-10)(x-2)$

d) $x^2 + 7x + 12 = (x+4)(x+3)$

43. Roger runs his own landscaping company. To determine how much to charge each client, Roger uses the function $c(h) = -100(.5)^h + 200$, where $c(h)$ represents the total cost (in dollars) for h hours of work per day. Select all of the following values a client could expect to owe Roger for one day of work, if he uses the function $c(h)$ to arrive at the cost for his services:

○	A.	$75	⊗	B.	$150
⊗	C.	$175	○	D.	$250

44. In general, a person who is exposed to 100,000 millirems of radioactivity will experience negative impacts to their health. Bananas (along with carrots, red meat, lima beans and several other foods) are naturally radioactive (the average person is exposed to about 30 millirems each year through the food we eat). An average banana exposes you to just under 0.01 millirems. Let b represent the number of bananas an individual consumes each year. Select all intervals which would keep an individual below 100,000 millirems of exposure from bananas.

let m represent millirem exposure

$m \geq 0$

○	A.	$b \geq 0$ $m < 10{,}000{,}000$
○	B.	$b < 1{,}000{,}000{,}000$ $1 \leq m < 10{,}000$
⊗	C.	$100 \leq b < 1{,}000{,}000$ $10 < m \leq 100$
⊗	D.	$1{,}000 < b \leq 10{,}000$

45. State the domain and range of each of the following functions:

a) $f(x) = 6x - 4$ D: $(-\infty, \infty)$ or $-\infty < x < \infty$ or all real numbers
R: $(-\infty, \infty)$ or $-\infty < y < \infty$ or all real numbers

b) $g(x) = -2(3)^x$ D: $(-\infty, \infty)$ or $-\infty < x < \infty$ or all real numbers
R: $(0, \infty)$ or $0 < y < \infty$ or $y > 0$

c) $h(x) = -x^2 + 4$ D: $(-\infty, \infty)$ or $-\infty < x < \infty$ or all real numbers
R: $(-\infty, 4]$ or $-\infty < y \leq 4$ or $y \leq 4$

d) $k(x) = \sqrt{x-1} + 2$ D: $[1, \infty)$ or $1 \leq x < \infty$ or $x \geq 1$
R: $[2, \infty)$ or $2 \leq y < \infty$ or $y \geq 2$

BIG IDEA of the Week **#4:**

Factoring

Completely factor each expression:

i. $-48b^5 + 42b^3$

$-6(8b^5 - 7b^3)$

$-6b^3(8b^2 - 7)$

ii. $5x^2 + 35xy$

$5(x^2 + 7xy)$

$5x(x + 7y)$

iii. $30n^5 + 18n^4 - 48n^3 + 24n^2$

$6(5n^5 + 3n^4 - 8n^3 + 4n^2)$

$6n^2(5n^3 + 3n^2 - 8n + 4)$

iv. $x^4 + 7x^3 - 18x^2$

$x^2(x^2 + 7x - 18)$

$x^2(x + 9)(x - 2)$

v. $27x^3y^3 + 15xy^2 + 3xy$

$3(9x^3y^3 + 5xy^2 + xy)$

$3xy(9x^2y^2 + 5y + 1)$

vi. $x^2 + 3xy$

$x(x + 3y)$

vii. $-7m^2 - 39m - 20$

$-(7m^2 + 39m + 20)$

$-(7x + 4)(x + 5)$

viii. $27x^2y^4 - 9x^5z$

$9(3x^2y^4 - x^5z)$

$9x^2(3y^4 - x^3z)$

ix. $-6x^3z + 15x^3z^4y + 18x^4z^2y + 18x^5z^2$

$-3(2x^3z - 5x^3z^4y - 6x^4z^2y - 6x^5z^2)$

$-3x^3(2z - 5z^4y - 6xz^2y - 6x^2z^2)$

$-3x^3z(2 - 5z^3y - 6xzy - 6x^2z^4)$

x. $45a^2 - 45a - 200$

$5(9a^2 - 9a - 40)$

$5(3a + 5)(3a - 8)$

46. Let $f(x)$ and $g(x)$ both be linear functions: $f(x)$ has a slope of -3 and a y-intercept of $(0, 9)$, and $g(x)$ is represented in the table at right. Choose the correct interval for which both functions have a positive output:

x	-3	-2	-1	0	1
$g(x)$	-10	-8	-6	-4	-2

○ A. $-\infty < x < \infty$ ○ B. $x > 2$

○ C. $x < 2$ or $x > 3$ ⊗ D. $2 < x < 3$

47. Belle just purchased a new painting. The dimensions of her painting are 21 inches long by 26 inches high. Belle wants to purchase a frame for her new painting. In order to hang the painting where she wants it, the total area of the artwork (painting and frame) must be less than 750 square inches. Let t represent the thickness of the frame in inches. Choose the correct interval for t which represents all possible thicknesses of the frame which meets Belle's requirement for total area:

○ A. $0 < t < 2$

○ B. $0 < t \leq 4$

⊗ C. $0 < t < 4$

○ D. $0 < t \leq 7$

$(21+t)(26+t) < 750 \quad t^2+47t+546<750 \quad +(t+47)<204$

48. Rewrite each quadratic function in vertex form:

a) $f(x) = x^2 + 6x - 2$

$= (x+3)^2 - 9 - 2 \quad = (x+3)^2 - 11$

b) $g(x) = x^2 - 12x + 30$

$= (x-6)^2 - 36 + 30 \quad = (x-6)^2 - 6$

c) $h(x) = x^2 + 4x + 4$

$= (x+2)^2$

d) $k(x) = x^2 - 4x + 4$

$= (x-2)^2$

$(0,-8)\ (2,0)\ (-4,0)$

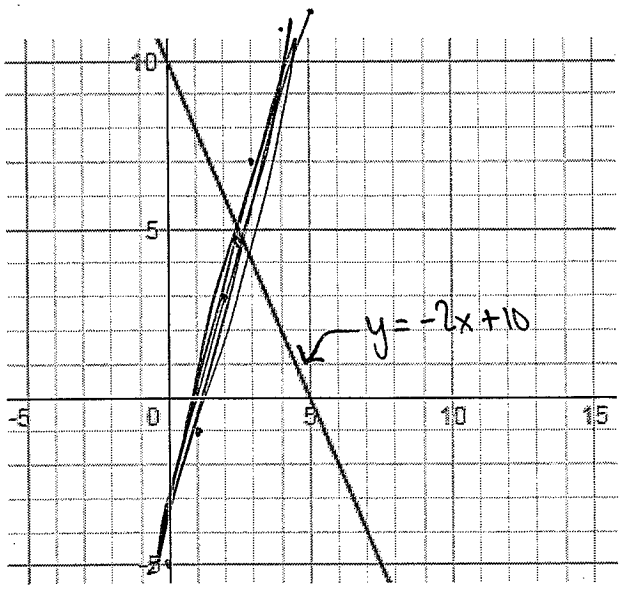
49. Determine all of the x- and y-intercepts for the function $f(x) = x^2 + 2x - 8$

○ A. $(0, -8)$, $(2, 0)$, and $(4, 0)$ ○ B. $(-4, 0)$, $(-2, 0)$, and $(0, -8)$

⊗ C. $(0, -4)$, $(0, -2)$, and $(8, 0)$ ⊗ D. $(0, 2)$, $(0, 4)$, and $(8, 0)$

50. A system of linear equations consists of two functions: $f(x)$ is shown in the graph at right, and $g(x) = 4x - 5$

Choose the coordinate pair which represents the solution to the system of equations:



○ A. $(0, 10)$

⊗ B. $(2.5, 5)$

○ C. $(5, 0)$

○ D. $(7.5, -5)$

51. Let $f(x) = x^2 - 4x$. Evaluate $f(x)$ for the given input, simplify if possible:

a) $f(2) = (2)^2 - 4(2)$

$4 - 8 = -4$

b) $f(-3) = (-3)^2 - 4(-3)$

$9 + 12 = 21$

c) $f(a) = (a)^2 - 4(a) = a^2 - 4a$

d) $f(a+b) = (a+b)^2 - 4(a+b)$

$a^2 + 2ab + b^2 - 4a - 4b$

52. Shirlee, Kay, Elma, and Fiona decided to buy a new television for their apartment, but not everyone contributed the same amount of money to purchase the television. Each person paid an average of $187.50. If Shirlee paid $190, Kay paid $210, and Elma paid $150, how much did Fiona pay for the television:

○ A. $170.00 ○ B. $187.50

⊗ C. $200.00 ○ D. $550.00

53. Claudio is the coach of the Lil' Kickers Elementary School Soccer Team. Each game Claudio brings orange slices for his players to enjoy during halftime. Claudio uses the function $s(p) = 5p + 20$ to determine how many orange slices he needs to bring to each game. Let $s(p)$ represent the total number of orange slices brought to the game, and p represent the number of players present at the game. What is the best interpretation of Claudio's function:

○ A. Claudio brings 20 oranges, cut into 5 equal slices

⊗ B. Claudio brings 5 slices per player, and 20 additional slices

○ C. Claudio brings 25 slices total, to be shared equally among all the players

○ D. Claudio brings 20 slices per player, and 5 additional slices

54. Solve each inequality for x and graph the solution on the number line:

a) $1 \leq 3x - 2 < 22$

$+2 \quad +2 \quad +2$

$3 \leq 3x < 24$

$1 \leq x < 8$

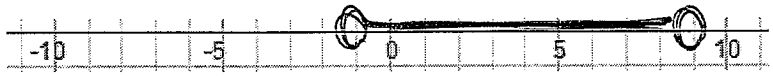
b) $x - 3 < 1$ or $4x \geq 24$

$x < 4 \quad x \geq 6$

c) $5x - 30 < 15$ and $x + 2 > 1$

$5x < 45 \quad x > -1$

$x < 9$



55. A local coffee company, Netherlanders Sisters, is trying to determine how much it costs to run a coffee stand for one day. The daily cost to pay employees can be represented by $15x$, the daily cost for ingredients/supplies can be represented by $10x + 25$, and the daily cost to rent the coffee stand is \$200. It has been determined that the product of the daily cost of employees and the daily cost of ingredients/supplies, plus the daily cost to rent the coffee stand represents the total cost to run the coffee stand for one day. Select all of the functions, $d(x)$, which could be used to find the daily cost to run the coffee stand:

⊗ A. $d(x) = (15x)(10x + 25) + 200$

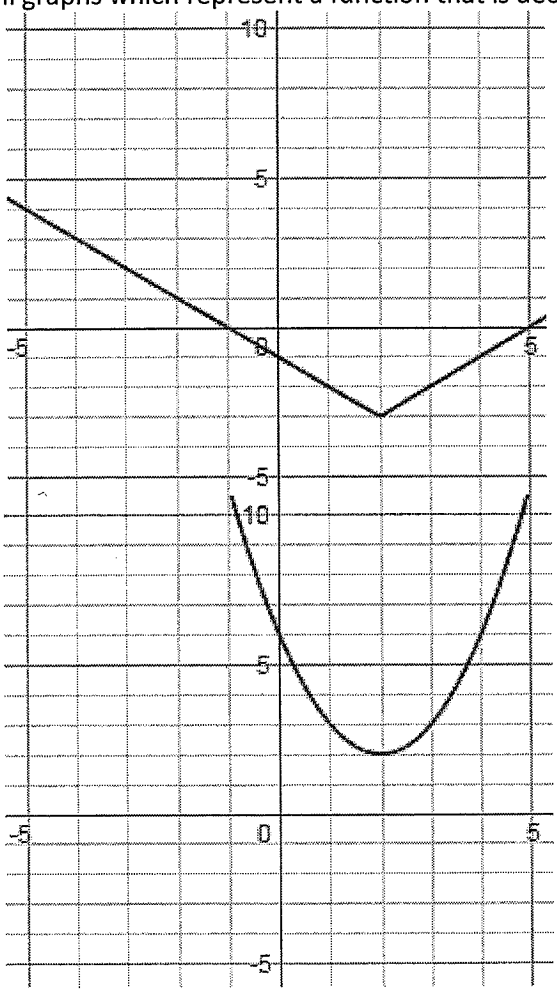
○ B. $d(x) = 15x + (10x + 25) + 200$

○ C. $d(x) = 25x + 225$

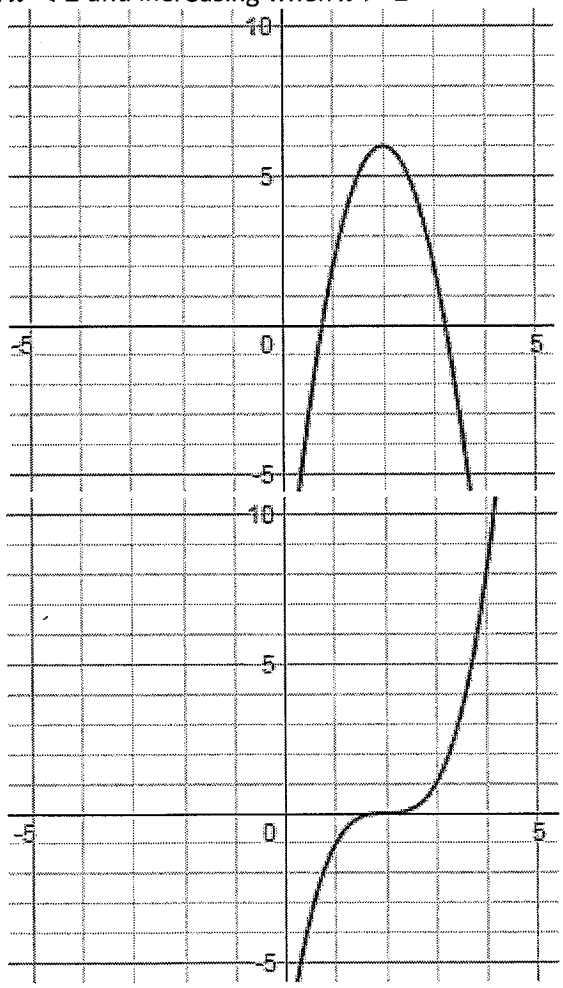
⊗ D. $d(x) = 150x^2 + 375x + 200$

56. Select all graphs which represent a function that is decreasing when $x < 2$ and increasing when $x > 2$

⊗ A.



○ B.



⊗ C.

○ D.

57. Find the solution set of each equation:

a) $(x + 4)(3 - x)(2x - 1) = 0$ $x = -4, 3, \frac{1}{2}$

b) $x(x - 2)^2 = 0$ $x = 0, 2$

c) $x(x + 1) - 2(x + 1) = 0$
$(x - 2)(x + 1) = 0$ $x = 2, -1$

d) $x^2 - 9 = 0$ $x = \pm 3$
$(x - 3)(x + 3) = 0$
or
$x^2 = 9$

58. Carmella just planted seeds for her vegetable garden. Anxious to view the progress of her plants, she checks her garden one afternoon, but sees that 4 weeds she has never seen before are growing in her vegetable garden. After a few weeks, she notices that the number of weeds appears to be tripling each week. If she doesn't do something, she calculates that there could soon be 972 weeds in her garden. If w represents the number of weeks, which equation could be used to determine what week Carmella would expect to find 972 weeds in her garden:

○ A. $3w + 4 = 972$

○ B. $3(4)^w = 972$

⊗ C. $4(3)^w = 972$

○ D. $4(w)^3 = 972$

59. Kyran was given a check for $100 by his grandmother for his birthday, but had to promise her that he would invest the money in a bank until it had at least doubled in value. Kyran agreed, reluctantly, and found a bank where he could invest the $100 in a simple interest account that would gain 5% interest per year. If y represent the number of years that Kyran will invest his money, which inequality could be used to find when he would have at least $200 in his account?

○ A. $200 < 100(1 + 0.05y)$

○ B. $200 > 100(1 + 0.05y)$

⊗ C. $200 \leq 100(1 + 0.05y)$

○ D. $200 \geq 100(1 + 0.05y)$

60. For each of the following sequences, state the initial value, whether it is arithmetic, geometric, or neither, and find the next three terms in the sequence:

a) 2, 4, 6, 8, 10, ... 12, 14, 16
initial: 2
arithmetic

b) 2, 4, 8, 16, 32, ... 64, 128, 256
initial: 2
geometric

c) 100, 50, 25, 12.5, 6.25, ... 3.125, 1.5625, 0.78125
initial: 100
geometric

d) 48, 43, 38, 33, 28, ... 23, 18, 13
initial: 48
arithmetic

BIG IDEA of the Week **#5:**

Solving Systems of Linear Equations

Solve each system of linear equations for both x and y, be sure to check your solutions:

i. $y = x + 7$
$y = -8x + 7$

$x + 7 = -8x + 7$
$9x = 0$
$x = 0$
$y = 7$

ii. $-6x + y = -10$
$5x - y = 10$

$-x = 0$
$x = 0 \quad y = -10$

iii. $4(-5x - 9y = -2)$
$5(4x + 2y = -14)$

$-20x - 36y = -8$
$20x + 10y = -70$
$-26y = -78$
$y = 3$
$x = -5$

$4x + 2(3) = -14$
$4x + 6 = -14$
$4x = -20$
$x = -5$

iv. $5x + 3y = 7$
$5x + 3y = -3$

~~No solution~~
No real solutions

v. $-7x + 7y = -14$
$-7(-8x + y = 5)$

$-7x + 7y = -14$
$56x - 7y = -35$
$49x = -49$
$x = -1$
$y = -3$

$-8(-1) + y = 5$
$8 + y = 5$
$y = -3$

vi. $4(5x + 6y = -24)$
$5(-4x - 5y = 19)$

$20x + 24y = -96$
$-20x - 25y = 95$
$-y = -1$
$y = 1$

vii. $14x - 16y = -20$
$-7x + 8y = 10$

Infinite solutions

viii. $y = 2x + 6$
$-x - y = -3$

$-x - (2x + 6) = -3$
$-x - 2x - 6 = -3$
$-3x = 3$
$x = -1$
$y = 4$

$y = 2(-1) + 6$
$y = -2 + 6$
$y = 4$

ix. $8x + 7y = -20$
$-8x - 8y = 16$

$-y = -4$
$y = 4$
$x = -6$

$8x + 7(4) = -20$
$8x + 28 = -20$
$8x = -48$
$x = -6$

x. $-8(7x + 10y = -10)$
$10(5x + 8y = -2)$

$-56x - 80y = 80$
$50x + 80y = -20$
$-6x = 60$
$x = -10$
$y = 6$

$5(-10) + 8y = -2$
$-50 + 8y = -2$
$8y = 48$
$y = 6$

61. Over Spring Break, Xavier decided to track the number of rabbits he saw in his yard each day. He recorded his observations in the table at right. Let d represent days, and $r(d)$ represent the total number of rabbits Xavier saw on day d. Select all intervals for which $r(d)$ is increasing:

d	1	2	3	4	5	6	7
$r(d)$	12	14	18	13	15	19	14

- [x] A. $1 < d < 3$
- [ ] B. $1 < d < 7$
- [ ] C. $3 < d < 6$
- [x] D. $4 < d < 6$

62. Solve: $x^2 + 8x = 17$

$x^2+8x-17=0$ $\quad \frac{-8 \pm \sqrt{8^2-4(1)(-17)}}{2(1)} = \frac{-8 \pm \sqrt{64+68}}{2} = \frac{-8 \pm \sqrt{132}}{2}$ $\quad -4 \pm \sqrt{33}$

- [ ] A. $x = -\sqrt{37}, \sqrt{29}$
- [ ] B. $x = -5, 3$
- [x] C. $x = -\sqrt{33} - 4, \sqrt{33} - 4$
- [ ] D. $x = -\sqrt{17} - 8, \sqrt{17} - 8$

63. Hugo can't believe his luck - he just won the February lottery! Before he can collect his winnings, he has to choose if he would rather get all of his money under Plan A, "The Lump Sum Plan," or Plan B, "The Exponential Payment Plan." If Hugo chooses Plan A, he will be given one check for \$750,000,000 on Day 1 and receive no additional money. If Hugo chooses Plan B, he will be given a check for \$1 on Day 1, a check for \$2 on Day 2, a check for \$4 on Day 3, a check for \$8 on Day 4, and so on, for all 28 days in February. Hugo knows he want to make as much money as possible, but he can't figure out which plan to choose, so he again asks you for help. Hugo knows you are a bright mathematician, but he is still a skeptical individual and will need you to include some mathematics (equations, graphs, tables, etc.) in your justification before he is convinced you are right.

a) If Hugo wants to make as much money as possible, should he choose Plan A or Plan B?

\$134,217,728

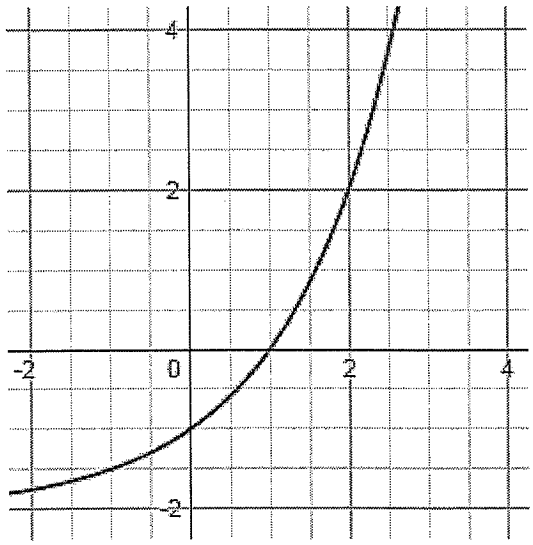
b) Justify your choice to Hugo mathematically:

let d represent days, his daily earnings can be modeled by $1(2)^{d-1}$
On Day 28 he will earn ~~[illegible]~~ which is less than half of 750,000,000, so even adding in all of the earnings from all the other days it will still be less

64. Let $f(x) = -(x-3)^2 + 4$. Select all statements which accurately describe the function $f(x)$:

- [x] A. $f(x)$ is increasing when $x < 3$
- [ ] B. $f(x)$ is positive when $x < 3$
- [ ] C. $f(x)$ is increasing from $3 < x < 5$
- [ ] D. $f(x)$ is positive from $3 < x < 5$

65. The exponential function $g(x) = 2^x - 2$ is shown in the graph at right. Select all of the coordinate pairs which represent solutions to the function $g(x)$:



- [ ] A. $(-1, 0)$
- [ ] B. $(0, 1)$
- [x] C. $(2, 2)$
- [x] D. $(3, 6)$

66. Completely factor each expression:

a) $9x^2 + 3x - 2$ $= (3x-1)(3x+2)$

b) $5x^2 + 10x + 15$ $= 5(x^2+2x+3)$

c) $2x^2 + 3x - 5$ $= (x-1)(2x+5)$

d) $8x^3 + 4x^2 - 4x$ $= x(8x^2+4x-4)$
$= 4x(2x^2+x-1)$
$= 4x(x+1)(2x-1)$

67. Kieran just purchased his first truck for \$4000. He knows that a truck this old will depreciate in value 15% each year. Kieran can use the function $v(t) = 4000(0.85)^t$ to determine the remaining value of his truck in the future. Let t represent the number of years since Kieran has purchased the truck, and $v(t)$ represent the value of the truck t years after it was purchased. What year will the value of the truck first be worth less than half of what Kieran purchased it for originally:

- ○ A. $t = 3$
- ○ B. $t = 4$
- ⊗ C. $t = 5$
- ○ D. $t = 6$

68. Let $f(x)$ and $g(x)$ be functions defined as follows: $f(x) = 3x - 10$, and $g(x)$ is represented in the table at right. Select all statements which accurately describe the functions $f(x)$ and $g(x)$:

$g(x) = 2.5x + 4$

x	0	2	6	14	30
$g(x)$	4	9	19	39	79

- ○ A. While the slope of $f(x)$ is negative, the slope of $g(x)$ is positive
- ⊗ B. The value of both $f(x)$ and $g(x)$ increase as the value of x increases
- ⊗ C. The rate of change of $f(x)$ is greater than the rate of change of $g(x)$
- ○ D. While $f(x)$ is a linear function, $g(x)$ is an exponential function

69. Carlos just bought a new mountain bike for \$575. The value of the bike is expected to depreciate at a rate of 26% each year.

a) Write an function $v(t)$ the models the value of the mountain bike after t years:

$v(t) = 575(.74)^t$

b) How much will the mountain bike be worth in 5 years:

$v(5) = 575(.74)^5 = 127.59288088 \approx \$127.59$

c) Carlos plans on selling the mountain bike and buying a new one once the value of his current bike goes below \$50. When should Carlos plan on buying a new mountain bike:

9 years

$v(8) = 575(.74)^8 \approx 51.71$
$v(9) = 575(.74)^9 \approx 38.26$

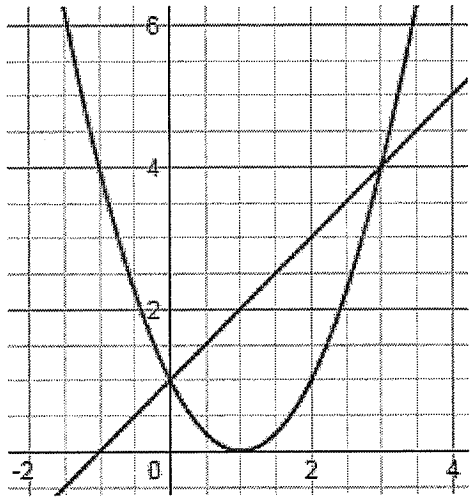
70. Bridgett is trying to find the solutions to the following quadratic equation $2(x-3)^2 = 72$. However she is having trouble finding the solutions, or even sure if there is a solution to the equation. Select all of the statements which are true about Bridgett's quadratic equation:

- ○ A. There is no real solutions to the equation because it cannot be factored
- ○ B. The equation only has one real solution, $x = 3$
- ⊗ C. The graph of the equation has two x-intercepts, so it has two real solutions
- ○ D. The quadratic formula is the only method to find the solutions algebraically

71. The following system of equations is shown in the graph at right:

$$y = x^2 - 2x + 1$$
$$y = x + 1$$

Select all of the coordinate pairs that are solutions to the system of equations:



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

72. Maxwell just bought a new Superb Bouncy Ball and he can't wait to test it out. He runs up to his room and drops it out the window to see just how bouncy it really is. He drops the ball from a height of 60 feet. He notices that after the first bounce the ball returns to a height of 57 feet, and after the second bounce it returns to a height of 54.15 feet.

a) Assuming that Maxwell's ball will continue to bounce in the same manner, write a function $b(x)$ which measures the maximum height the ball reaches after x bounces:

$\frac{57}{60} = .95$ $b(x) = 60(.95)^x$

b) Based on your function, what height will the ball reach after the 5th bounce:

$b(5) = 60(.95)^5 \approx 46.43$ ft

c) After what bounce will the ball fail to reach a height half that of the original height it was dropped from:

$b(14) = 60(.95)^{14} \approx 29.26$ ft $\quad b(13) \approx 30.80$

14th bounce

d) Based on your function, when will the ball stop bouncing (or when will it have a maximum height of 0):

never

e) Based on your answer above, do you think that your function accurately models reality? Why, or why not?

no, in reality the ball would stop bouncing at some point

73. Select all of the expressions below that have $(x-2)$ as a factor:

○ A. $-2x^2-4x$ ⊗ B. x^2-4x+4

○ C. x^2+4x+4 ⊗ D. x^2-4

74. Dianne is picking up something to eat for herself and her friends on the way to school. The coffee stand she stopped at will give her a 15% discount off her purchase of coffee and muffins as long as the total is greater than \$25. Dianne is already planning on spending \$16 on coffee. Let m be the number of muffins Dianne will purchase. If each muffin costs \$3, select all of the values for m that will allow Dianne to get the 15% discount:

○ A. $m>2$ ○ B. $m=3$

⊗ C. $m\geq 4$ ⊗ D. $m=9$

$25 < 3m+16 \quad 9 < 3m \quad m > 3$

75. State the domain and range of each of the following functions:

a) $f(x)=-0.5x-2$

D: $(-\infty,\infty)$ or $-\infty < x < \infty$ or all real numbers

b) $g(x)=2^x+4$

D: $(-\infty,\infty)$ or $-\infty < x < \infty$ or all real numbers

c) $h(x)=(x-2)^2+1$

D: $(-\infty,\infty)$ or $-\infty < x < \infty$ or all real numbers

d) $k(x)=\sqrt{x+1}$

D: $[-1,\infty)$ or $-1 \leq x < \infty$ or $x \geq -1$

BIG IDEA of the Week #6:

More Solving Equations

Solve each of the equations below for x, be sure to check your solution:

i. $x-(-2)=17$

$x+2=17$

$x=15$

ii. $-10-x=2$

$-x=12$

$x=-12$

iii. $6x+6x=12$

$12x=12$

$x=1$

iv. $-7x+7(4x-1)=-175$

$-7x+28x-7=-175$

$21x-7=-175$

$21x=-168$

$x=-8$

v. $6(1-7x)=90$

$1-7x=15$

$-7x=14$

$x=-2$

vi. $-49=-(x+5)-7(2x+2)$

$-49=-x-5-14x-14$

$-49=-15x-19$

$-30=-15x$

$x=2$

vii. $-11-8x+8x=1-2x$

$-11=1-2x$

$-12=-2x$

$x=6$

viii. $-13-3x=5(8x+6)$

$-13-3x=40x+30$

$-43=43x$

$x=-1$

ix. $-28+8x=-4(6x-1)$

$7-2x=6x-1$

$8=8x$

$x=1$

x. $-7(x-5)=8x+4(-3x-1)$

$-7x+35=8x-12x-4$

$-7x+35=-4x-4$

$-3x=-39$

$x=13$

76. Select all of the functions for which an input of $x = -1$ will result in a real number output:

○ A. $a(x) = \frac{3}{x+1}$

⊗ B. $b(x) = \frac{x}{x-1}$

⊗ C. $c(x) = \frac{x}{-1}$

○ D. $d(x) = \frac{2}{x^2-1}$

77. Quadratic expressions can be rewritten in various equivalent forms that reveal different characteristics about the expression. Select all of the statements which accurately describe the advantage(s) of the particular form of the quadratic expression:

○ A. $2x^2 + 4x - 10$
best form to find vertex

⊗ B. $2x^2 + 4x - 10$
best form to find y-intercept

⊗ C. $2(x-2)(x+4)$
best form to find x-intercepts

⊗ D. $2(x-1)^2 + 8$
best form to find vertex

78. Rewrite each quadratic function in vertex form:

a) $f(x) = 3x^2 - 18x + 4 = 3(x^2-6x)+4$
$= 3(x-3)^2 - 27 + 4 = 3(x-3)^2 - 23$

b) $g(x) = -x^2 + 4x - 10 = -(x^2-4x)-10$
$= -(x-2)^2 + 4 - 10 = -(x-2)^2 - 6$

c) $h(x) = 2x^2 + 16x = 2(x^2+8x)$
$= 2(x+4)^2 - 32$

d) $k(x) = -5x^2 - 20x + 1 = -5(x^2+4x)+1$
$= -5(x+2)^2 + 20 + 1$
$= -5(x+2)^2 + 21$

79. Washington has a current population of approximately 7,062,000 people. The projected growth rate for Washington is 1.01% per year. Let t represent years after 2015 and $p(t)$ represent the population of Washington in t years. Which of the following equations could be used to model the total population of Washington:

○ A. $p(t) = 7{,}062{,}000 + 1.0101t$

○ B. $p(t) = 1.0101(7{,}062{,}000)^t$

○ C. $p(t) = 7{,}062{,}000(t)^{1.0101}$

⊗ D. $p(t) = 7{,}062{,}000(1.0101)^t$

80. Select what would be the most appropriate method to measure center and variability for the following data:
$4, 10, 14, 21, 26, 29, 34, 40, 45, 49, 56, 61, 66, 70, 75, 81$

○ A. Center: Mean
Variability: Interquartile Range

⊗ B. Center: Mean
Variability: Standard Deviation

○ C. Center: Median
Variability: Interquartile Range

○ D. Center: Median
Variability: Standard Deviation

81. Completely factor the following expressions:

a) $x^2 - x - 2$ $= (x-2)(x+1)$

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

c) $x^3 - x^2 - 2x$ $= x(x^2 - x - 2)$
$= x(x-2)(x+1)$

d) $-3x^3 + 3x^2 + 6x$ $= -3x(x^2 - x - 2)$
$= -3x(x-2)(x+1)$

82. Prita is saving up to buy her first car. Once she has saved \$5000, she will have enough money to finally buy the car she wants. Prita currently has \$1400 in savings and earns additionally money by doing yard work for her neighbors on the weekends. Prita knows that in 30 weeks, she will have saved away enough money to buy the car. How much money does Prita earn per week doing yard work for her neighbors:

○	A.	\$46.67	⊗	B.	\$120.00
○	C.	\$166.67	○	D.	\$250.00

83. Solve $2x^2 - 8 = 24$ for x: $2x^2 - 8 = 24$ $2x^2 = 32$ $x^2 = 16$ $x = \pm 4$

⊗	A.	$x = -4, 4$	○	B.	$x = -2\sqrt{2}, 2\sqrt{2}$
○	C.	$x = 4$	○	D.	$x = 64$

84. Let $g(x) = 2(3)^x$. Evaluate $g(x)$ for the given input, simplify if possible:

a) $g(4) = 2(3)^4 = 162$

b) $g(-2) = 2(3)^{-2} = 2\left(\frac{1}{9}\right) = \frac{2}{9}$

c) $g(a) + g(b) = 2(3)^a + 2(3)^b$

d) $g(a+b) = 2(3)^{a+b}$

85. Gwen is taking a road trip to visit some family in Eastern Washington. To make sure that she doesn't get a ticket, Gwen sets the cruise control in her car to 59 miles per hour. The distance Gwen travels with the cruise control on can be model by the function $m(h) = 59h$, where h represents hours, and $m(h)$ represents total miles traveled in h hours. Select all of the following values for h that would not be part of the domain of $m(h)$:

⊗	A.	$h = -3/2$	○	B.	$h = 0$
○	C.	$h = 1.5$	○	D.	$h = 10$

86. Select all of the following equation which are equivalent to $4(x+6) = 2x - 8$:

⊗ A. $x + 6 = 0.5x - 2$ ⊗ B. $2x = -32$

⊗ C. $2x + 12 = x - 4$ ○ D. $4x + 6 = 2x - 8$

87. Solve for x:

a) $4x^2 = 16$ $x^2 = 4$ $x = \pm 4$

b) $2x^2 - 6 = 58$ $2x^2 = 64$ $x^2 = 32$ $x = \pm\sqrt{32} = \pm 4\sqrt{2}$

c) $(x-2)^2 = 49$ $x - 2 = \pm 7$ $x = 9, -5$

d) $9(x+2)^2 + 19 = 100$ $9(x+2)^2 = 81$ $(x+2)^2 = 9$ $x + 2 = \pm 3$ $x = 1, -5$

88. Select all values of x which are solutions to the equation $x^2 - 4 = 12$:

⊗ A. $x = -4$ ○ B. $x = 2\sqrt{3}$

⊗ C. $x = 4$ ○ D. $x = 8$

89. Puck has plotted the coordinate points $(0, 1)$ and $(1, 2)$ on a piece of graph paper. He is wondering what coordinate points he could add to his graph to create different types of functions. Select all of the coordinate points below that Puck could add to his graph that would correctly graph a portion of the function described:

⊗ A. $(2, 1)$, $(3, -2)$, and $(4, -7)$ Quadratic Function

○ B. $(2, 1)$, $(3, 2)$, and $(4, 1)$ Absolute Value Function

⊗ C. $(2, 3)$, $(3, 4)$, and $(4, 5)$ Linear Function

⊗ D. $(2, 4)$, $(3, 8)$, and $(4, 16)$ Exponential Function

90. Describe how each function has been transformed from its parent function $f(x) = |x|$:

a) $g(x) = |x - 4|$ shift right 4 units

b) $h(x) = 2|x + 3|$ vertical stretch of 2, shift left 3 units

c) $k(x) = 0.25|x + 5| - 2$ vertical stretch of $\frac{1}{4}$, shift left 5 units, down 2 units (or horizontal stretch of 4)

d) $m(x) = -4|x - 1| + 3$ reflected over x-axis, vertical stretch of 4, shifted right 1 unit, shifted up 3 units

center this

BIG IDEA of the Week **#7:**

More Factoring

Completely factor each expression:

i. $21x^2 - 15xy$

$3x(7x - 5y)$

ii. $-2b^4 + 4b^3 + 12b^2$

$-2b^2(b^2 - 2b - 6)$

iii. $5v^3 - 20v^2$

$5v^2(v - 4)$

iv. $-3x^2 + 51x - 210$

$-3(x^2 - 17x + 70)$

$-3(x - 10)(x - 7)$

v. $-20x^2 + 28xy$

$-4x(5x - 7y)$

vi. $3x^3 + 11x^2 - 42x$

$x(3x^2 + 11x - 42)$

$x(3x - 7)(x + 6)$

vii. $12x^4y^4 + 3x^5y^4z^2 + 27x^7y^4z^3$

$3x^4y^4(4 + xz^2 + 9x^3z^3)$

viii. $81m^6 + 9m^2n^3$

$9m^2(9m^4 +$

$9m^2(9m^4 + n^3)$

ix. $8r^3 - 30r^2 + 27r$

$r(8r^2 - 30r + 27)$

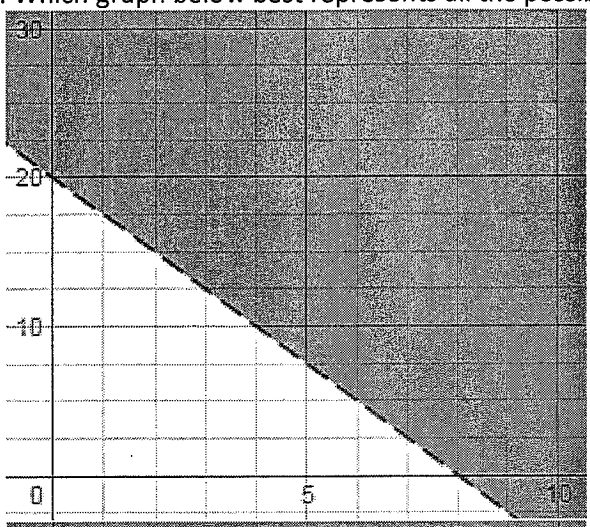
$r(2r - 3)(4r - 9)$

x. $-63x^5y + 81x^4y + 72x^3y^2 + 90x^3y$

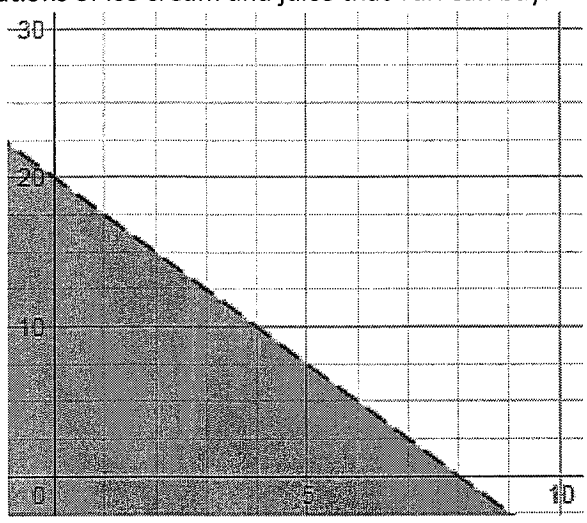
$-9x^3y(7x^2 - 9x - 8y - 10)$

91. Yuri was asked by his mother to pick up some ice cream and apple juice for his little brother's birthday party. Yuri's mother instructed him to buy as much ice cream and juice as he could for less than \$40. Each carton of ice cream costs \$5 and each bottle of juice costs \$2. Let x represent cartons of ice cream and y represent bottles of juice. Which graph below best represents all the possible combinations of ice cream and juice that Yuri can buy:

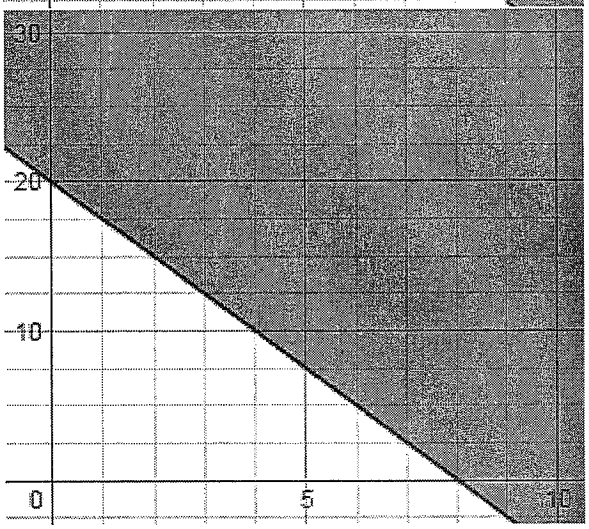
○ A.



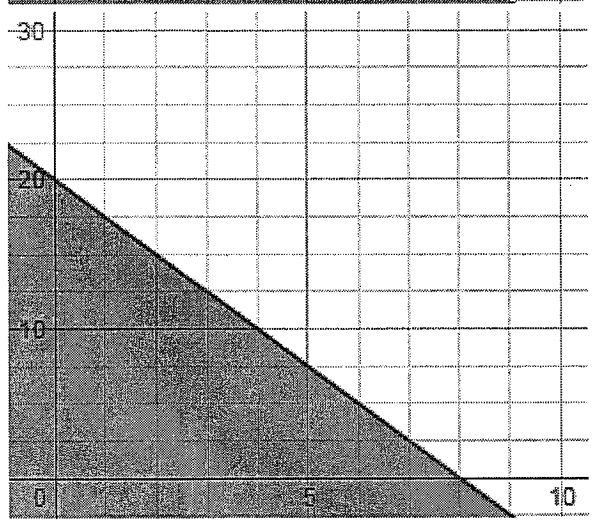
⊗ B.



○ C.



○ D.



92. $F(n)$ is an explicit sequence defined as $F(n) = 4(2)^{n-1}$. Which of the following correctly identifies the type of sequence $F(n)$ is, and correctly lists the first five terms of the sequence:

○ A. Arithmetic, $4, 6, 8, 10, 12, \ldots$

○ B. Exponential, $2, 8, 32, 128, 512, \ldots$

○ C. Geometric, $2, 8, 32, 128, 512, \ldots$

⊗ D. Geometric, $4, 8, 16, 32, 64, \ldots$

93. In 2006, there were approximately 640,550,000 households in the United States with at least one pet. Since then, the amount of households that own a pet has been decreasing by approximately 0.48% per year.

a) Write the function $p(t)$ that models the number of households in the United States that own pets in a given year t since 2006 (let 2006 be $t = 0$):

$p(t) = 640,550,000(.9952)^t$

b) If this trend continued, how many households in the United States would own at least one pet in 2015:

$p(9) = 640,550,000(.9952)^9 \approx 613,403,630$

c) According to your model, what year will there first be less than 600,000,000 households in the United States that own at least one pet:

$p(13) \approx 601,710,316$

$p(14) \approx 598,822,594$

$2006 + 14 = 2020$

94. Select all of the following equations for which $x = -3$ is a solution:

○ A. $6x - 12 = 6$

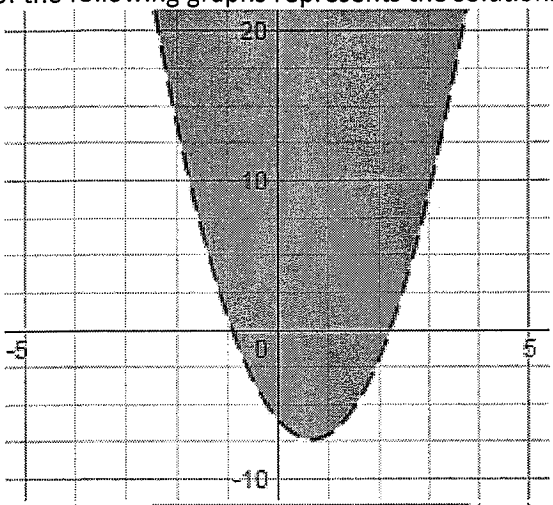
○ B. $2x^2 = -18$

⊗ C. $x^2 - 9 = 0$

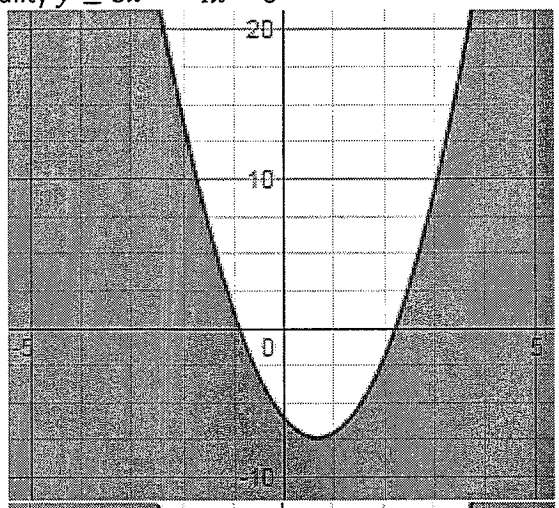
⊗ D. $4x^2 + 12x = 0$

95. Which of the following graphs represents the solutions to the inequality $y \geq 3x^2 - 4x - 6$

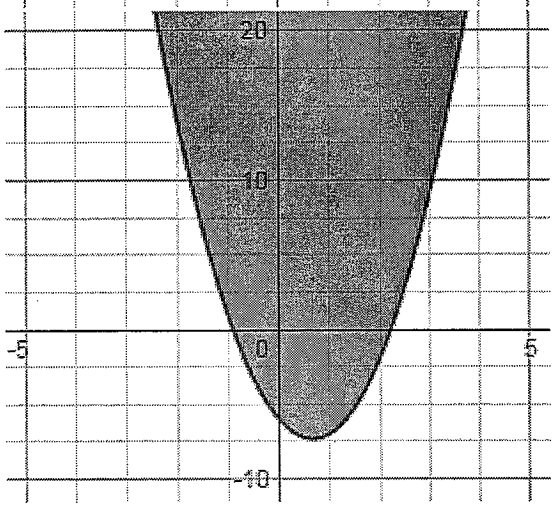
○ A.



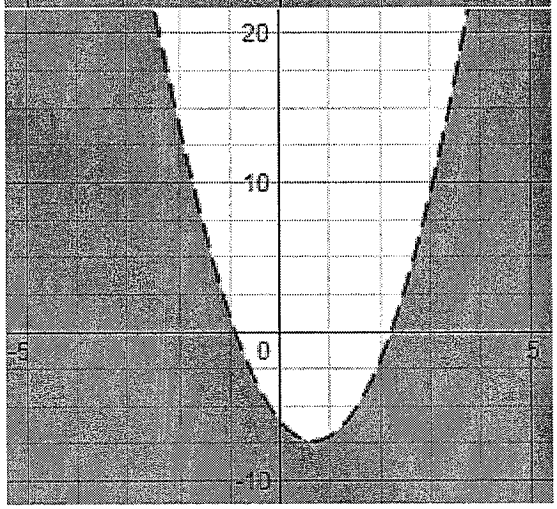
○ B.



⊗ C.



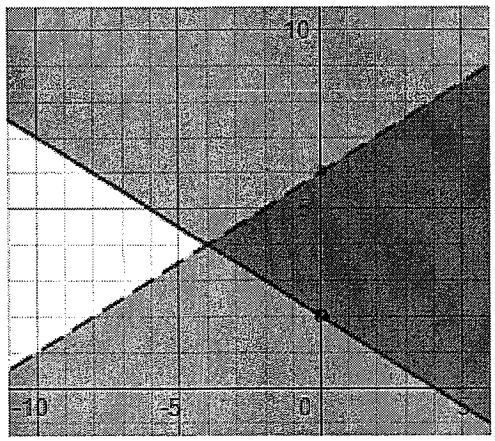
○ D.



96. Write the system of inequalities for the linear inequalities graphed at right:

$y \geq -\frac{1}{2}x + 2 \quad y < \frac{1}{2}x + 6$

$y < 2x + 6$



97. Let $f(x)$ and $g(x)$ be functions defined as follows: $f(x) = -2x + 8$, and $g(x)$ is represented in the table at right. Select all statements which accurately describe the functions $f(x)$ and $g(x)$:

$g(x) = -2x - 4$

x	0	-2	-4	-6	-8
$g(x)$	-4	0	4	8	12

○ A. While the slope of $f(x)$ is negative, the slope of $g(x)$ is positive

⊗ B. The value of both $f(x)$ and $g(x)$ decreases as the value of x increases

○ C. The rate of change of $f(x)$ is greater than the rate of change of $g(x)$

○ D. While $f(x)$ is a linear function, $g(x)$ is a quadratic function

98. Select all of the expressions that are equivalent to $(x + 2)^2 = (x - 2)^2$:

⊗ A. $x = 0$

⊗ B. $x(x + 4) = x(x - 4)$

○ C. $x^2 + 4 = x^2 - 4$

○ D. $x^2 + 4x - 4 = x^2 - 4x + 4$

99. Debbie just opened her first donut shop, Debbie's Decadent Donut Delights! As part of her grand opening special, she is provided discount rates on donuts for customers that buy in bulk. The piecewise function $p(d)$ models the individual price per donut when bought in various assortments of d donuts:

$$p(d) = \begin{cases} \$1.00 & 0 < d \leq 6 \\ \$0.75 & 6 < d < 12 \\ \$0.50 & 12 \leq d \end{cases}$$

→ total donuts

a) What would the total price be for someone who bought 5 donuts:

$p(5) = 1.00(5) = \$5.00$

b) What would the total price be for someone who bought 9 donuts:

$p(9) = 0.75(9) = \$6.75$

c) What would the total price be for someone who bought 100 donuts:

$p(100) = 0.50(100) = \$50$

d) Miguel just paid \$6.00 for donuts at Debbie's. He said that if you guess exactly how many donuts are in his bag, he would give you all of his donuts! How many donuts does Miguel have in his bag:

can't be certain because there are multiple ways he could have paid \$6

$p(6) = 1.00(6) = \$6.00$ $p(8) = 0.75(8) = \$6.00$ $p(12) = .5(12) = \$6.00$

he could have bought 6, 8, or 12 donuts

100. Select all of the following equation which are equivalent to $x^2 - 4 = 16x$:

⊗ A. $(x - 8)^2 = 68$

○ B. $x^2 - 16x + 4 = 0$

⊗ C. $x^2 = 4(4x + 1)$

○ D. $(x - 2)^2 = 20x$

101. Select all of the solutions to the quadratic function $f(x) = x^2 - 4x - 4$:

○ A. $x = -2$

⊗ B. $x = -2\sqrt{2} + 2$

○ C. $x = 2$

⊗ D. $x = 2\sqrt{2} + 2$

102. At long last, the hottest new cell phone, the Elppa eNohpi 7+, is finally out! A first in cell phone technology, the eNohpi 7+ is a perfect rectangular prism: the height of the phone is exactly equal to the length of the phone plus six times the width, the total volume of is 20 inches cubed, and the width is only 0.5 inches! → height

a) Do you have enough information to find the measurements of the length and the width of the eNohpi 7+? yes

$h = l + 6w$ $\quad h = l + 6(.5)$ $\quad lwh = 20$ $\quad h = l + 3$ $\quad (l+3)(l)(0.5) = 20$ $\quad (l^2+3l)(0.5) = 20$ $\quad l^2+3l = 40$ $\quad l^2+3l-40 = 0$

b) If you answered "no" to the previous question, explain what additional information you would need in order to find the other two dimensions. If you answered "yes" to the previous question, find the other two dimensions:

$(l+8)(l-5) = 0$

$l = -8, 5$ $\quad l = 5$ $\quad h = 8$

103. Nani is a lepidopterist (someone who studies moths and butterflies). After spending several year studying a species of moth, she was able to devise the equation $m(t) = 4(3)^t$ to model the population of the moth species in her state. Let t represent years, and $m(t)$ represent the number of moths present in her state after t years. Which of the following best describes the population of moths that Nani is studying:

○ A. Starting with 3 moths, the population increased by a factor of 4 each year

○ B. Starting with 3 moths, the population increased by 4 moths each year

⊗ C. Starting with 4 moths, the population increased by a factor of 3 each year

○ D. Starting with 4 moths, the population increased by 3 moths each year

104. $A(n)$ is a recursive sequence defined as $A(n) = A(n-1) + 3$, and $A(1) = 2$. Which of the following correctly identifies the type of sequence $A(n)$ is, and correctly lists the first five terms of the sequence:

⊗ A. Arithmetic, 2, 5, 8, 11, 14, ...

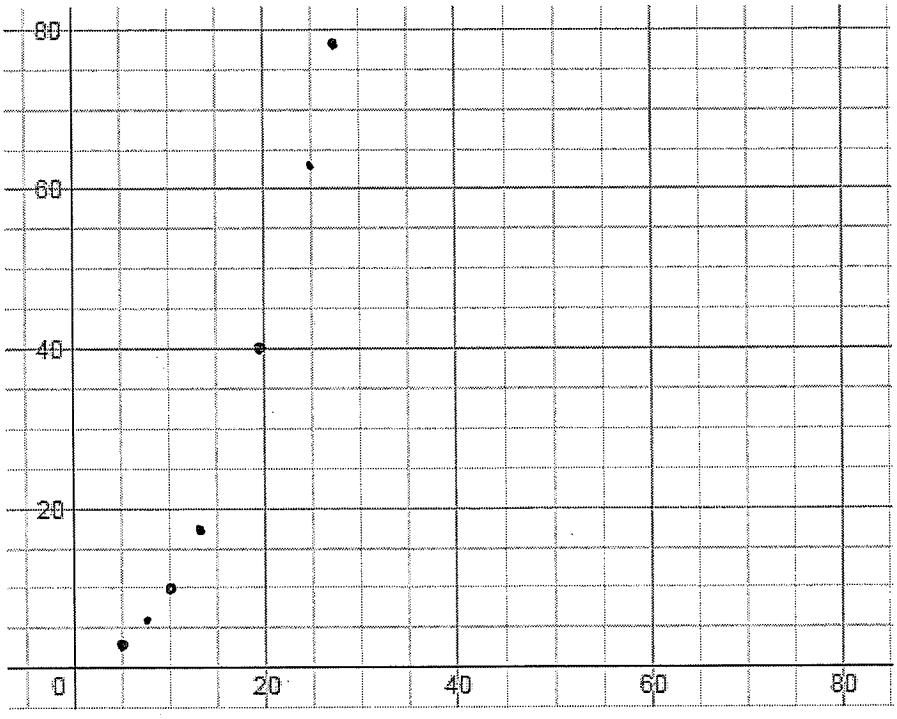
○ B. Arithmetic, 2, 6, 18, 54, 162, ...

○ C. Exponential, 2, 6, 18, 54, 162, ...

○ D. Geometric, 2, 5, 8, 11, 14, ...

105. The data in the table below compares cost of a product (in dollars) to positive online reviews (percentage)

Cost (Dollars)	Positive Online Reviews (%)
5	2.5
10	10
13	16.9
28	78.4
20	40
8	6.4
31	96.1
25	62.5



a) Use the data to make a scatterplot on the graph at right (be sure to label your axes):

b) Based on your scatterplot, would the best fit function for this data be linear, exponential, or quadratic? Why?

exponential, the y-value appears to be increasing by a factor of the previous values

BIG IDEA of the Week #8:

Solving Quadratic Equations

Find all of the solutions of the quadratic equations below, be sure to check your solutions:

i. $x^2 - 13x + 42 = 0$

$(x-7)(x-6) = 0$

$x = 7, 6$

ii. $6x^2 + 54x + 112 = 4$

$6x^2 + 54x + 108 = 0$

$6(x^2 + 9x + 18) = 0$

$6(x+3)(x+6) = 0$

$x = -3, -6$

iii. $7x^2 + 53 = 5 + 62x$

$7x^2 - 62x + 48 = 0$

$(7x-6)(x-8) = 0$

$x = 6/7, 8$

iv. $x^2 - 4x = -3$

$x^2 - 4x + 3 = 0$

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

$x = 1, 3$

v. $3(x+6)^2 = 0$

$x = -6$

vi. $-6x^2 - 8x - 64 = -8x^2$

$2x^2 - 8x - 64 = 0$

$2(x^2 - 4x - 32) = 0$

$2(x-8)(x+4) = 0$

$x = 8, -4$

vii. $7x^2 - 14 = 47x$

$7x^2 - 47x - 14 = 0$

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

$x = -2/7, 7$

viii. $10x^2 - 48x - 72 = 0$

$2(5x^2 - 24x - 36) = 0$

$2(5x+6)(x-6) = 0$

$x = -6/5, 6$

ix. $(x+1)(x+2) = 0$

$x = -1, -2$

x. $5x^2 - 26x - 3 = -8$

$5x^2 - 26x + 5 = 0$

$(5x-1)(x-5) = 0$

$x = 1/5, 5$

106. Let $f(x)$ be an exponential function defined as $f(x) = 2^x - 4$. Select all statements which accurately describe the average rate of change for $f(x)$:

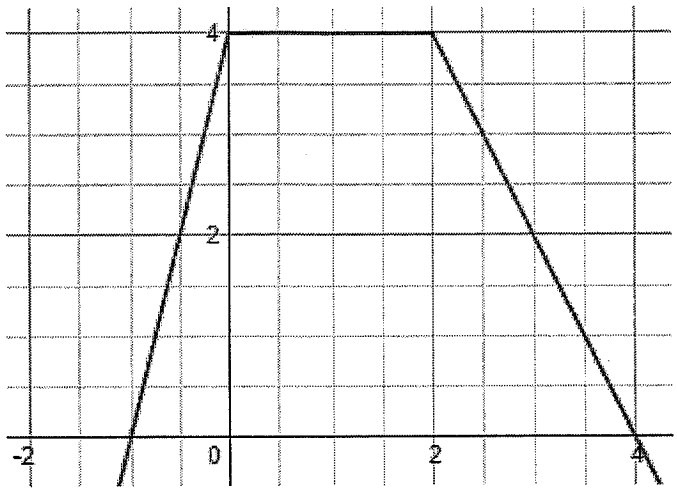
- ⊗ A. The average rate of change of $f(x)$ over the interval $2 < x < 4$ is 6
- ⊗ B. The average rate of change of $f(x)$ will always be positive
- ○ C. The average rate of change of $f(x)$ is negative when $x \leq 0$
- ○ D. The average rate of change of $f(x)$ remains constant across different intervals

107. Let $x = -8$ and $y = 0.75$. Select all of the following equation which our true:

- ⊗ A. $xy = x + \frac{8}{3}y$
- ⊗ B. $x - x = y - y$
- ○ C. $x + y = -8.75$
- ⊗ D. $\frac{y}{x} = \frac{-3}{32}$

108. Write a piecewise function for the function $p(x)$ shown in the graph at right:

$$f(x) = \begin{cases} 4x+4 & x < 0 \\ 4 & 0 \leq x \leq 2 \\ -2x+8 & x > 2 \end{cases}$$



109. Quincy and Casey went to the Farmer's Market to pick up some fresh produce. Quincy bought 2 apples and 6 carrots for a total of \$5.50. Casey paid a total of \$2.00 for 2 carrots and 1 apple. Select all of the following statements which accurately describe the price of the apples and carrots:

- ○ A. 1 apple costs more than 1 carrot
- ○ B. 1 apple costs the same as 1 carrot
- ⊗ C. 1 apple costs less than 1 carrot
- ○ D. Quincy and Casey could not have paid the same price for each apple

110. Select all of the functions that would pass through the coordinate points $(0, 1)$ and $(2, 4)$ when graphed:

- ○ A. $a(x) = -(x-2)^2 + 4$
- ⊗ B. $b(x) = 2^x$
- ⊗ C. $c(x) = \frac{3}{2}x + 1$
- ⊗ D. $d(x) = \frac{3}{4}x^2 + 1$

111. Let $h(x) = -x^2 + 4x - 3$. Evaluate $h(x)$ for the given input, simplify if possible:

a) $h(2) = -(2)^2 + 4(2) - 3 = -4 + 8 - 3 = 1$

b) $h(-3) = -(-3)^2 + 4(-3) - 3 = -9 - 12 - 3 = -24$

c) $h(2-3) = h(-1) = -(-1)^2 + 4(-1) - 3 = -1 - 4 - 3 = -8$

d) $h(2) - h(3) =$ ~~4-24-24~~ $h(3) = -(3)^2 + 4(3) - 3 = -9 + 12 - 3 = 0$

$h(2) - h(3) = 1 - 0 = 1$

no multiple choice solutions valid

112. Find the solution to the inequality $-3x + 4 \leq 2(x + 7)$

○ A. $x \geq \frac{18}{5}$ ○ B. $x \leq 3.6$

○ C. $x \geq 2$ ○ D. $x \leq 2$

$x \geq -2$

113. Select all of the equations that are equivalent to $ax + b = cx - b$:

⊗ A. $a = c - \frac{2b}{x}$ ⊗ B. $b = \frac{x(c-a)}{2}$

○ C. $c = \frac{abx}{2}$ ○ D. $x = \frac{c-b}{a+b}$

114. Rachel is cutting some ribbon for an art project. Rachel grabs a 100 inch piece of ribbon and decided to cut it into two piece such that when the length of the longer piece is divided by the length of the shorter piece, the ratio is 3.

a) Let x be the length of the shorter piece of ribbon. Write an equation that can be used to find the length of the cut piece of ribbon:

let x = length of the shorter piece $\frac{100-x}{x} = 3$

b) State the domain of the equation you created in the previous step:

D: $0 < x \leq 100$ (if x is the shorter length then D: $0 < x < 50$)

c) Based on the equation you came up with and the stated domain, do you think it is possible for Rachel to cut pieces of ribbon from a 100 inch ribbon such that the ratio of the longer piece to the shorter piece is 3? If not, explain why it is not possible to find a solution to this problem. If you think it is possible, find the solution(s):

yes $\frac{100-x}{x} = 3$ $100 - x = 3x$ $100 = 4x$ $x = 25$in

short: 25 in long: 75 in

115. What is the value of the function $f(x) = \frac{x^2-4}{x-2}$ when $x = -2$

○ A. $f(2) = -8$ ⊗ B. $f(2) = 0$

○ C. Infinite solutions ○ D. No real solutions

116. Select all of the values of x that make the following equation true $(x + 2)(2x - 3) = (x + 2)(x - 4)$:

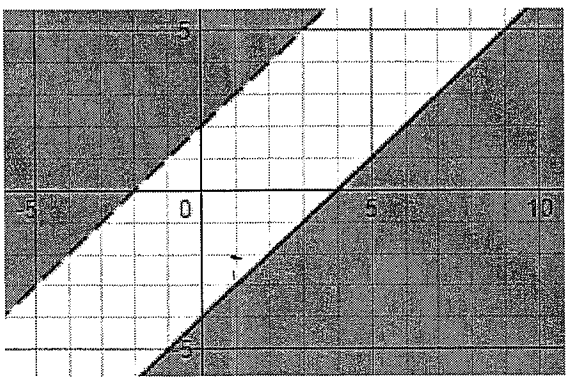
⊗ A. $x = -2$ ⊗ B. $x = -1$

○ C. $x = 1.5$ ○ D. $x = 4$

117. Write the system of inequalities for the linear inequalities graphed at right:

$y \leq x - 4$

$y > x + 2$



118. Select all of the transformations of $g(x) = -2(x+3)^2 - 4$ from its parent function $f(x) = x^2$:

⊗ A. Reflected over the y-axis ⊗ B. Shifted to the right 2 units

⊗ C. Shifted to the left 3 units ⊗ D. Shifted down 4 units

Select all equations which could be two solutions

119. A system of linear equations has the solution $(-2, -12)$. If the first equation of the system is $y = 3x - 6$, ~~what is~~ the second equation in the system:

⊗ A. $y = -4x - 4$ ⊗ B. $y = -3x + 6$

⊗ C. $y = -2x - 16$ ⊗ D. $y = 8x + 4$

120. Bert and Ernie having been training for an upcoming 5K race. Ernie is convinced he is faster and tells Bert that after running for 10 minutes he had traveled 1.25 miles. Bert says that he thinks he is going to win the race because he ran 2.25 miles in only 18 minutes.

a) Write the function $e(t)$, which ~~models how many miles~~ Ernie has run after t minutes:

$e(t) = \frac{1.25}{10}t$ or $e(t) = .125t$

b) Write the function $b(t)$, which ~~models how many miles~~ Bert has run after t minutes:

$b(t) = \frac{2.25}{18}t$ or $b(t) = .125t$

c) Find the value of t such that $e(t) = b(t)$:

Since $e(t) = b(t) = .125t$, the two functions are equal for all values of t

d) A 5K race is just under 3.11 miles long. Based on your previous answers, who do you think will finish the race first, Bert or Ernie:

Bert and Ernie run at the same rate so they will finish at the exact same time.

e) Would your answer to the previous question remain the same if Bert and Ernie decided to run a 10K (which is just under 6.22 miles) instead? Why or why not?

Since the rate is the same, changing the distance they run wouldn't impact this, they would still finish at the same time