ALGEBRA I REVIEW PACKETS & QUIZZES

Packet 1 (Expressions, Equations, Inequalities)

- The Real Number System
- Properties
- Square and Cube Roots
- Evaluating Numeric and Algebraic Expressions (includes absolute value, square roots, and cube roots)
- Translating Equations & Inequalities
- Solving Multi-Step Equations (includes special solutions)
- Solving Literal Equations for a specified variable.
- Solving & Graphing Multi-Step Inequalities
- Justifying Steps to Solving Equations using Properties
- Applications

Quiz 1

Packet 2 (Relations, Functions, Slope, Graphing Linear Equations)

- Domain and Range (given ordered pairs, tables, mappings, and graphs)
- Determine whether a relation is a function (given ordered pairs, tables, mappings, and graphs)
- Function Notation & Evaluating Functions
- Zeros of Functions (Identify Graphically and Algebraically)
- Slope (given graphs, equations, or two points on the line)
- Slope-Intercept Form vs. Standard Form
- x- and y-intercepts
- Graphing Linear Equations
- Vertical & Horizontal Lines

Quiz 2

Packet 3 (Writing Linear Equations, Line of Best Fit, Direct/Inverse Variation)

- Writing Linear Equations Given a Point and a Slope
- Writing Linear Equations Given Two Points
- Line of Best Fit/Making Predictions
- Determine whether a relation represents a direct or inverse variation given ordered pairs, tables, mappings, equations, and graphs
- Solve for a missing value given a direct or inverse variation relationship.

Quiz 3

Packet 4 (Systems of Equations & Inequalities)

- Recognize the three types of solutions to a system of equations.
- Solve a system of equations graphically.
- Solve a system of equations algebraically, by substitution or elimination.
- Systems of Equations Applications
- Graph a Linear Inequality
- Graph a System of Linear Inequalities
- Identify solutions to a linear inequality or system of linear inequalities

Quiz 4

Packet 5 (Exponent Rules, Simplifying Monomials & Polynomials, Simplifying Radicals)

- Apply the exponent rules to simplify a monomial expression, including expressions with negative exponents.
- Add, subtract, multiply, and divide polynomial expressions.
- Simplify square roots.
- Simplify cube roots.
- Simplify square roots with monomial expressions.

Quiz 5

Packet 6 (Factoring Polynomials, Graphing and Solving Quadratic Equations)

- Factor a polynomial with a greatest common factor.
- Factor special polynomials including difference of squares and quadratic trinomials.
- Factor a polynomial completely requiring more than one step.
- Graph a quadratic equation written in standard form or vertex form.
- Identify the domain, range, axis of symmetry, vertex, x-intercept(s), and y-intercept of a quadratic equation.
- Recognize the transformations that took place from the parent function given a quadratic equation written in vertex form.
- Recognize that a quadratic equation can have one real solution, two real solutions, or no real solutions.
- Solve a quadratic equation using an appropriate method (factoring, square roots, completing the square, or the quadratic formula)
- Applications of quadratic equations.
- Curve of Best Fit (Quadratic Regression)

Quiz 6

Name: _____ **Algebra 1 Review:** Packet #1

Topic #1: The Real Number System

THE REAL NUMBERS (____): _____

IRRATIONAL NUMBERS (____): _____ **RATIONAL NUMBERS (____):** _____

INTEGERS (____): _____

WHOLE NUMBERS (____): _____

NATURAL NUMBERS (____): _____

Name all sets to which each number belongs.

1. $\frac{2}{3}$	**2.** $-\sqrt{50}$	**3.** 0
4. $\lvert -9-4 \rvert$	**5.** $\frac{-28}{7}$	**6.** $\frac{\pi}{\pi}$

Topic #2: Properties

Give two examples of each property.

COMMUTATIVE:
- _____
- _____

ASSOCIATIVE:
- _____
- _____

IDENTITY:
- _____
- _____

INVERSE:
- _____
- _____

ZERO PRODUCT:
- _____
- _____

DISTRIBUTIVE:
- _____
- _____

REFLEXIVE:
- _____
- _____

SYMMETRIC:
- _____
- _____

TRANSITIVE:
- _____
- _____

Name the property that justifies each statement.	
7. $5x + 1 = 1 + 5x$	**8.** $17 = 17$
9. $10y^2 \cdot 0 = 0$	**10.** $-3(m + 8) = -3m - 24$
11. If $2^5 = 32$ and $32 = 8 \cdot 4$, then $2^5 = 8 \cdot 4$	**12.** $8k + 0 = 8k$
13. If $-2x = 20$, then $20 = -2x$	**14.** $\frac{4}{9} \cdot \frac{9}{4} = 1$

Topic #3: Square & Cube Roots

Give the value of each expression.			
15. $\sqrt{25}$	**16.** $\sqrt{324}$	**17.** $\sqrt{144}$	**18.** $\sqrt{\frac{16}{49}}$
19. $\sqrt[3]{27}$	**20.** $\sqrt[3]{343}$	**21.** $\sqrt[3]{64}$	**22.** $\sqrt[3]{1000}$

Topic #4: Evaluating Expressions

Evaluate each expression. Use the variable replacements when given.	
23. $2^3 \cdot (9-2) + \frac{12}{4} - \lvert -5 \rvert$	**24.** $8 - \left[12 \div \left(\sqrt{400} - 2^5\right)\right] + 11$
25. $\frac{5^3 - 42 \div 6}{\sqrt[3]{8}}$	**26.** $w^2 - 5xy$ (if $x = -3$, $w = -2$, and $y = 1$)
27. $2\lvert m - n^2 \rvert + k^3$ (if $k = -2$, $m = -7$, and $n = 4$)	**28.** $\frac{\sqrt{bc}}{(c-a)^2 + b}$ (if $a = 1$, $b = -20$, and $c = -5$)

Topic #5: Translating Equations & Inequalities

Translate using an equation or an inequality. Do not solve.	
29. The quotient of twice a number and 7 is 20.	**30.** Five less than the product of a number and 3 is 14.
31. Seven times the difference of a number and 4 is no more than 10.	**32.** The product of a number and four, increased by one, is at least 7.

Topic #6: Solving Equations

Solve each equation.	
33. $18 = 3 - 3a$	**34.** $4 - \frac{1}{2}n = -12$
35. $\frac{3}{4}x + 17 = 23$	**36.** $9y - 4(y + 1) = 31$
37. $-6(w - 4) + 8w = 2(w + 9)$	**38.** $3m - (7m + 12) = 2(m - 3)$

39. $2x - 2(4x - 3) = 6 - 6x$

40. $\frac{7}{x-8} = \frac{3}{x}$

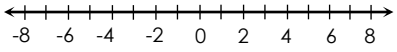
41. Solve $A = \frac{1}{2}bh$ for h.

42. Solve $c = \frac{a^2 + 3b}{4}$ for b.

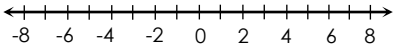
Topic #7: Solving & Graphing Inequalities

Solve and graph each inequality.

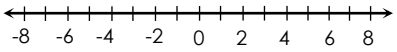
43. $11x + 13 \geq -20$



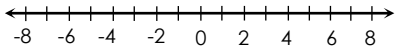
44. $-2x + 6 > 3x - 34$



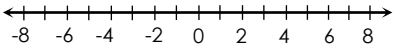
45. $3x - 7(x + 3) \geq -13$



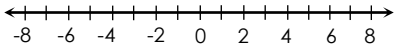
46. $4 - 8x < 2(5 - 3x)$



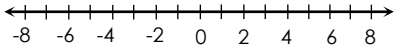
47. $x+7 \le 2$ **or** $\frac{x+14}{4} \ge 3$



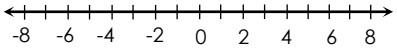
48. $3x+5 < -16$ **or** $-5x-8 \le -13$



49. $-2 \le 3x-2 < 10$



50. $3 < 2x+1 < 13$



Topic #8: Properties of Equality/Justifying Steps when Solving Equations

Properties of Equality: Addition Property of Equality, Subtraction Property of Equality, Multiplication Property of Equality, Division Property of Equality, Substitution Property of Equality

Use a property to justify each step of the equations solved below.

51.

Step	Property/Reason
1. $\frac{1}{3}x+16=11$	**1.** Given
2. $\frac{1}{3}x=-5$	**2.**
3. $x=-15$	**3.**

52.

Step	Property/Reason
1. $5-2(3x+5)=-47$	**1.** Given
2. $5-6x-10=-47$	**2.**
3. $-6x-5=-47$	**3.**
4. $-6x=-42$	**4.**
5. $x=7$	**5.**

53.

Step	Property/Reason
1. $y = 2x - 3;\ y = 5x$	**1.** Given
2. $5x = 2x - 3$	**2.**
3. $3x = -3$	**3.**
4. $x = -1$	**4.**

Topic #9: Applications

54. The height, h, of a plant (in inches) w weeks since it was planted is represented by the equation $\boldsymbol{h = 1.2w + 3}$. How many weeks will it take the plant to reach one foot?

55. The Ravens scored 13 more than three times the number of points that the Bengals scored in their last game. If the Ravens scored 40 points, how many points did the Bengals score?

56. Max is making a rectangular garden with a length that is 5 feet less than twice its width. If the perimeter of the garden is 80 feet, find the dimensions.

57. Macy, Sydney, and Allie are sisters. Macy is two years older than Sydney and Allie is one year less than half the age of Sydney. If the sum of their ages is 31, how old is Macy?

58. The expression $\boldsymbol{400 + 0.15s}$ represents Frank's weekly pay as an appliance salesman where s is his total sales for the week. If he wishes to make at least \$1600 this week, how much will he need in sales?

59. The total cost to rent a pontoon boat for h hours can be represented by the expression $\boldsymbol{30h + 65}$. If Brianna can spend a maximum of \$200, how many hours can she rent the boat?

Algebra 1 Review

QUIZ 1

Name: _____

Date: _____ **Per:** _____

1. Which statement *cannot* be justified by one of the properties of real numbers?

A. $(a + b) + c = a + (b + c)$

B. $a - (b \div c) = (a - b) \div c$

C. $(ab)c = a(bc)$

D. $(a + b) + 0 = 0 + (a + b)$

2. The statement "If $\frac{1}{2}x = 5$, then $x = 10$" is justified by the –

F. Associative property of multiplication

G. Commutative property of multiplication

H. Addition property of equality

J. Multiplication property of equality

3. Which property justifies rewriting

$3x - 5x$
as
$(3 - 5)x$?

A. Associative Property of Multiplication

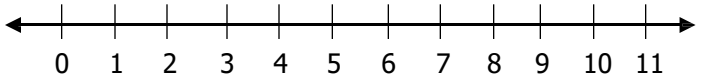
B. Distributive Property

C. Commutative Property of Multiplication

D. Associative Property of Addition

4. Plot the point on the number line that corresponds to the value of the expression below.

$$\sqrt[3]{125}$$



5. Joe, who is the youngest member of the wrestling team at Northwood High School, is 5 years less than one-half the age of the coach. If the coach is n years old, which expression describes Joe's age?

F. $\frac{1}{2}n - 5$

G. $5 - \frac{1}{2}n$

H. $2n + 5$

J. $2n - 5$

6. Simplify the numerical expression below.

$$\frac{72 \div (\sqrt{100} - 4^2)}{\sqrt[3]{27}}$$

ANSWER: _____

7. Find the value of the expression below when $x = -4$ and $y = 2$

$$-3x^2y + 4x$$

ANSWER: _____

8. The formula for the surface area of a cylinder is $SA = 2\pi r(h + r)$. What is the surface area of a cylinder when $r = 3$ centimeters and $h = 4$ centimeters?

A. 28π cm^2 **C.** 36π cm^2

B. 32π cm^2 **D.** 42π cm^2

9. Find the solution to the equation below.

$$5 - \frac{n}{2} = 12$$

ANSWER:

10. Find the solution to the equation below.

$$5(x + 2) = 7(4 - x)$$

F. -9.0 **H.** 3.2

G. 1.5 **J.** 9.0

11. If $\frac{1}{3}t - 6 = 15$, what is the value of t?

A. 21 **C.** 53

B. 27 **D.** 63

12. Select the values of x that make the following inequality true.

$$-3(x + 1) > 15$$

☐ −9	☐ −7	☐ −5
☐ −8	☐ −6	☐ −4

13. What is the solution to the inequality below?

$$-2x + 6 > 3x - 4$$

ANSWER:

14. The formula for the volume of a pyramid is given below.

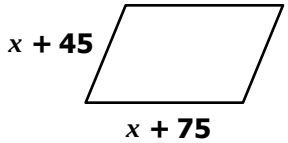
$$V = \frac{1}{3}bh$$

Which equation solves this formula for h?

F. $h = 3Vb$ **H.** $h = \frac{3V}{b}$

G. $h = \frac{3b}{V}$ **J.** $h = \frac{V}{3b}$

15. Tom's property has a shape of a parallelogram with the dimensions shown. If the perimeter of the property is 300 feet, what is the value of x?



A. 90 ft

B. 60 ft

C. 45 ft

D. 15 ft

Name: _____ **Algebra 1 Review:** Packet #2

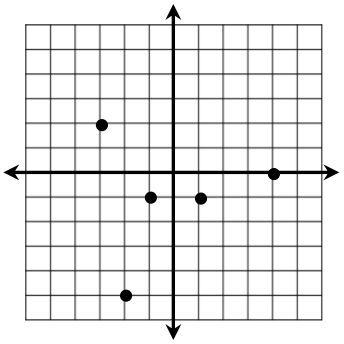
Topic #1: Relations & Functions

- **A relation is** _____.
- **The domain is the set of** _____ **and the range is the set of** _____.
- **A function is a relation with no repeating** _____-_____.
- **To check if a graph is a function, use the** _____ _____ _____.

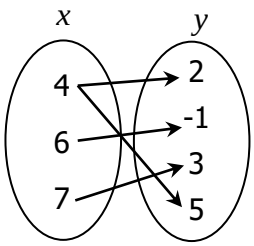
1.

x	-1	2	5	-1
y	7	3	0	2

2.

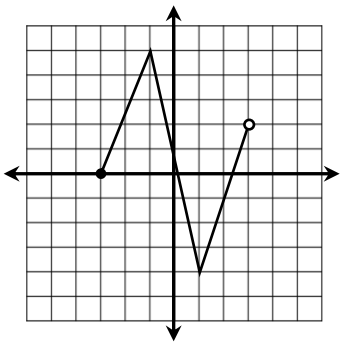


3.



Domain:	**Domain:**	**Domain:**
Range:	**Range:**	**Range:**
Function?	**Function?**	**Function?**

4.



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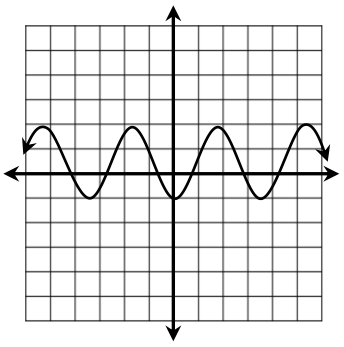

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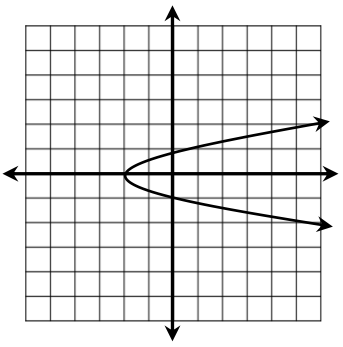
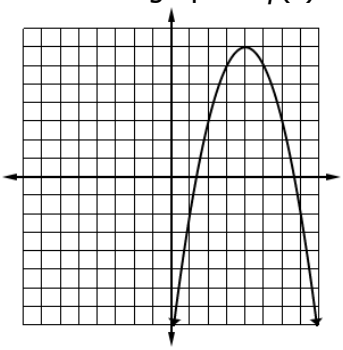


Domain:	**Domain:**	**Domain:**
Range:	**Range:**	**Range:**
Function?	**Function?**	**Function?**

Topic #2: Function Notation & Evaluating Functions

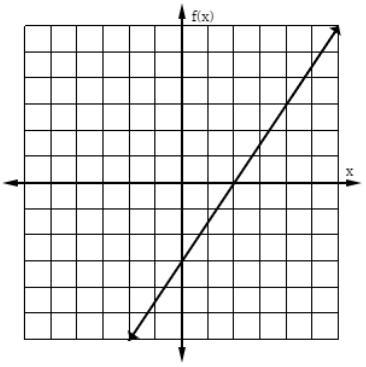
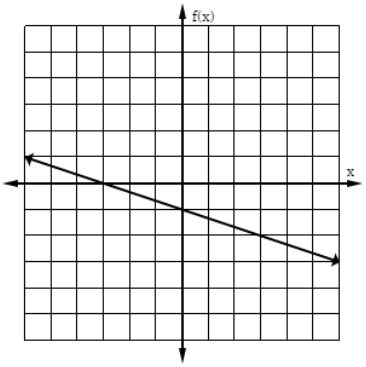
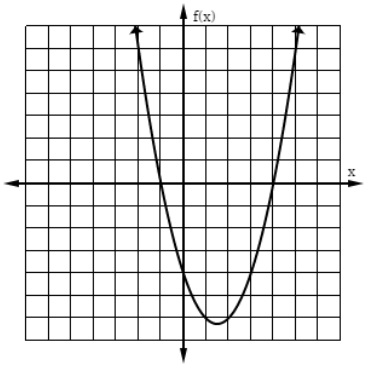
7. If $f(x) = -x - 7$, find $f(-5)$.	**8.** If $g(x) = x^2 - 2x + 11$, find $g(-2)$.
9. If $f(x) = 2x^2 - x$, find $f(-4) - f(9)$.	**10.** If $h(x) = 1 - \frac{2}{3}x$, find $h(-6)$.

11. Find the range of the function $f(x) = 3x - 8$ if the domain is {-4, 2, 7}.	**12.** Find the range of the function $f(x) = -x^2 + 4x$ if the domain is {-2, 0, 1}.
13. Given the graph of $f(x)$ below, find $f(3)$. 	**14.** Given $f(x) = \frac{5}{2}x + 7$, if $f(x) = -13$, find x.

Topic #3: Zeros of Functions

- **The zeros of a function are where it passes through the _____-_____.**
- **To find the zeros, set the equation equal to _____, and solve for x!**

Find the zeros of each function graphed below.

15. 	**16.** 	**17.** 
18. $f(x) = 2x + 2$	**19.** $f(x) = \frac{2}{5}x - 4$	**20.** $f(x) = x^2 + 3x - 40$

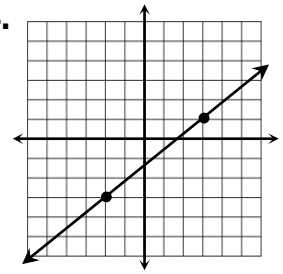
21. $f(x) = 2x^2 - 72$	**22.** $f(x) = x^2 - 10x + 25$	**23.** $f(x) = 5x^2 + 5x - 30$

Topic #4: Slope

There are _____ types of slope. Sketch them below:

Find the slope of each line graphed below.

24.



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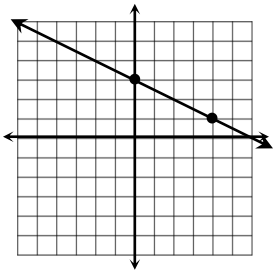

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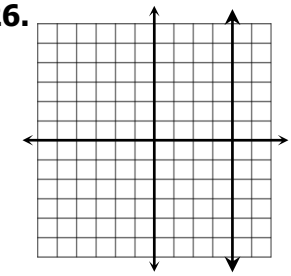

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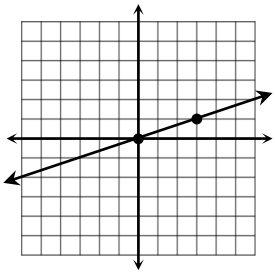


To find the slope formula given two points (x_1, y_1) and (x_2, y_2), use the SLOPE FORMULA:

Find the slope of the line passing through the given two points.

28. (-12, -1) and (-3, -4)	**29.** (-11, 7) and (-11, -2)
30. (9, -3) and (11, -7)	**31.** (12, 11) and (-9, 11)

Topic #5: Slope-Intercept Form & Standard Form

Slope-Intercept Form:	**Standard Form:**
32. Write a linear equation in slope-intercept form with a slope of -1 and a y-intercept of 4.	**33.** Write a linear equation in slope-intercept form with a slope of ¾ and a y-intercept of -5.
For each of the following equations, write the equation in slope-intercept form, then identify the slope and y-intercept.	
34. $x - y = 3$ **Slope-Intercept Form:** _____ **Slope:** _____ **y-int:** _____	**35.** $4x + 10y = -10$ **Slope-Intercept Form:** _____ **Slope:** _____ **y-int:** _____
36. $4x + y = 8$ **Slope-Intercept Form:** _____ **Slope:** _____ **y-int:** _____	**37.** $x - 3y = 6$ **Slope-Intercept Form:** _____ **Slope:** _____ **y-int:** _____

Topic #6: x- and y-Intercepts

- **To find the x-intercept of a line, set _____ equal to _____ and solve for _____.**
- **To find the y-intercept of a line, set _____ equal to _____ and solve for _____.**

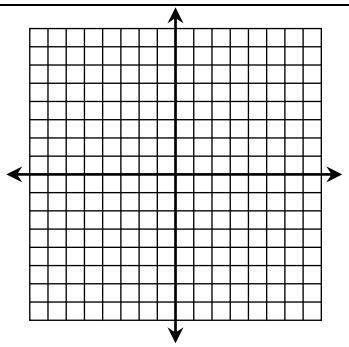
Find the x-intercept and y-intercept of each linear equation.

38. $y = 2x - 10$	**x-intercept:**	**39.** $y = -\frac{3}{2}x + 9$	**x-intercept:**
	y-intercept:		**y-intercept:**
40. $2x + y = -2$	**x-intercept:**	**41.** $3x - 4y = 24$	**x-intercept:**
	y-intercept:		**y-intercept:**

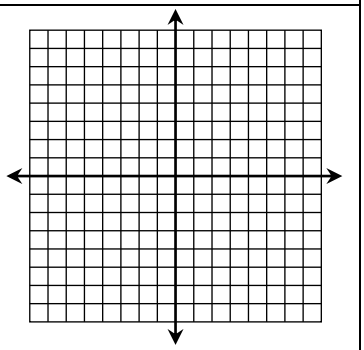
Topic #7: Graphing Linear Equations

Graph each linear equation. Convert to slope-intercept form when necessary.

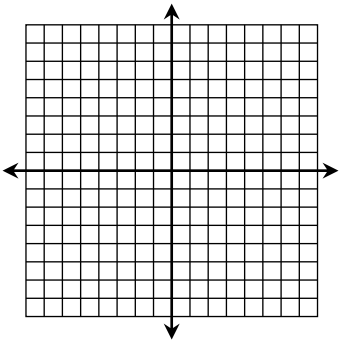
42. $y = -3x + 7$



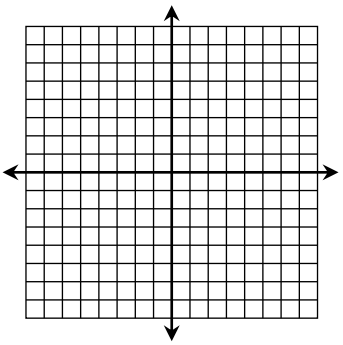
43. $y = 4x$



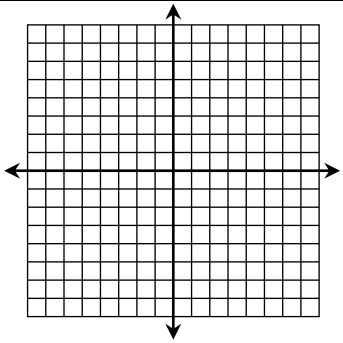
44. $x - y = 5$



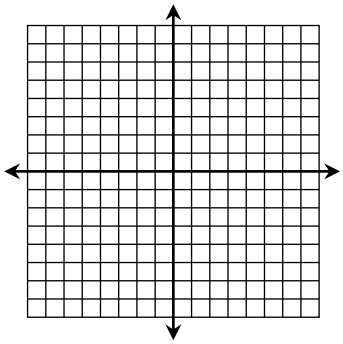
45. $x + 2y = 4$



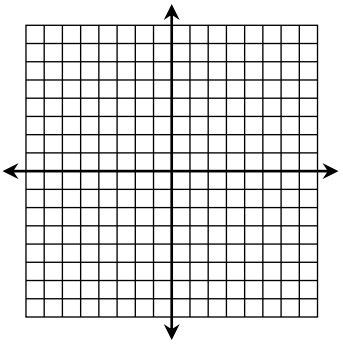
46. $-10x + 8y = -8$



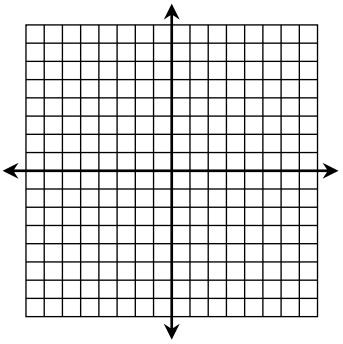
47. $3x - 2y = -6$



48. $x = -5$

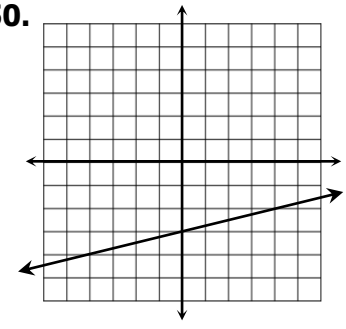


49. $y = 1$



Determine which line best represents the line shown on the graph.

50.



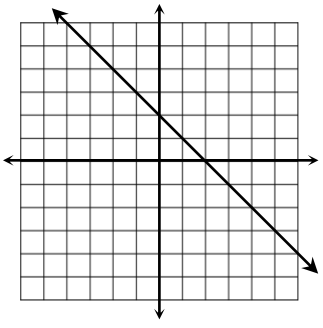
A. $x + 4y = -12$

B. $x - 4y = 12$

C. $4x + y = -3$

D. $4x - y = 3$

51.



A. $x - y = 2$

B. $x - y = -2$

C. $x + y = 2$

D. $x + y = -2$

Algebra 1 Review

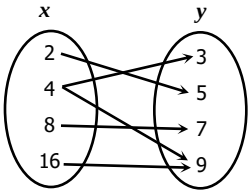
QUIZ 2

Name: _____

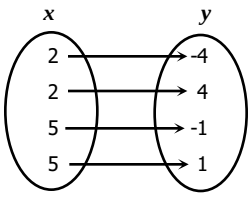
Date: _____ **Per:** _____

1. Which of these data sets represents a function?

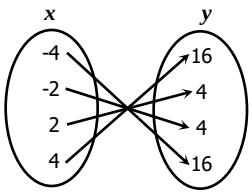
A.



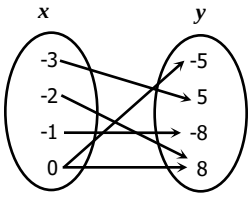
C.



B.



D.



2. Which of the following does not represent a function of x?

F.

x	1	1	1	1
y	1	2	3	4

H.

x	1	2	3	4
y	1	1	2	4

G.

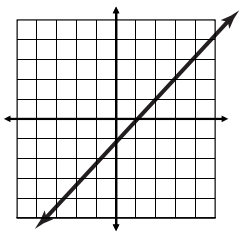
x	1	2	3	4
y	2	2	2	2

J.

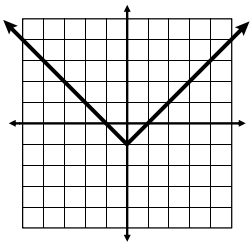
x	0	2	4	6
y	0	1	3	5

3. Which of the following could not be the graph of a function of x?

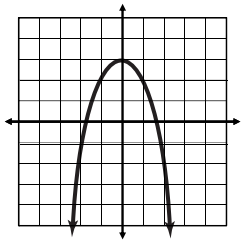
A.



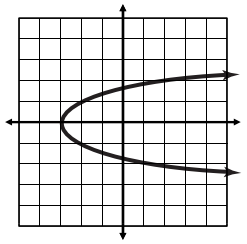
C.



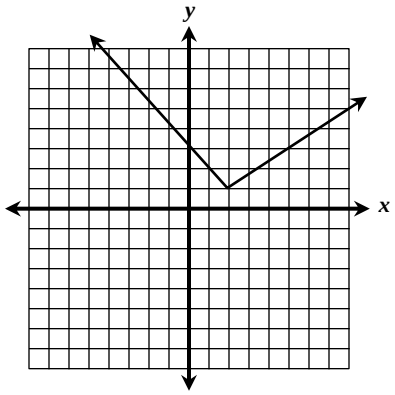
B.



D.



4. What is the apparent range of the function of x shown below?



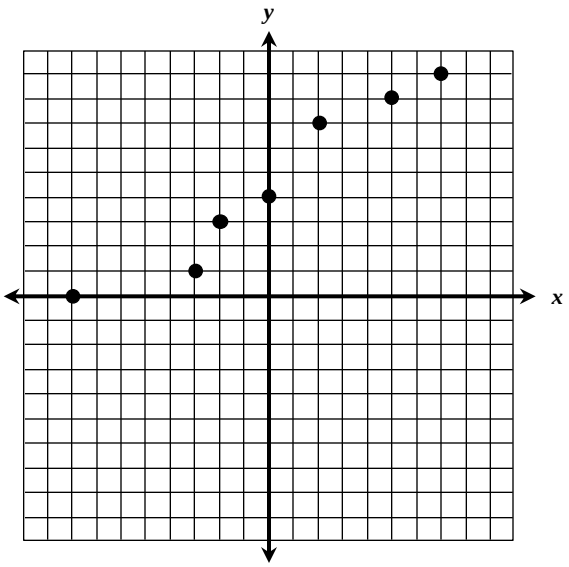
F. $x \geq 1$

G. $y \geq 1$

H. $y \geq 2$

J. all real numbers

5. The following is a graph of a function of x. Which of the following values belong to the domain of the function?



☐ –1	☐ –3	☐ 0
☐ 8	☐ 2	☐ –7

6. If $f(x) = -2x^2 + x - 5$, what is $f(3)$?

ANSWER: _____

7. What is the range of the function $f(x) = (x - 1)^2$ when the domain is {-5, 0, 5}?

A. {1, 16, 36}
B. {1, 24}
C. {1, 26}
D. {-12, -2, 8}

8. Which is a zero of the function given below?

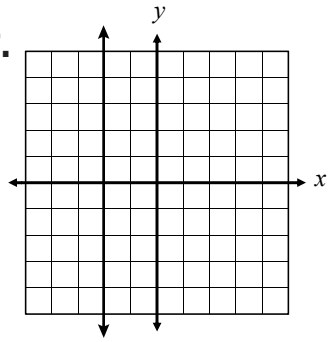
$$f(x) = x^2 - x - 12$$

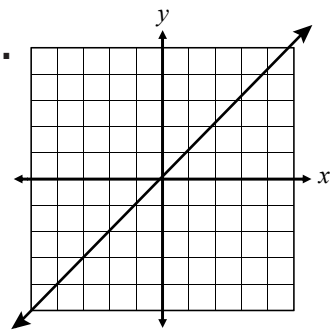
F. 1
G. 2
H. 3
J. 4

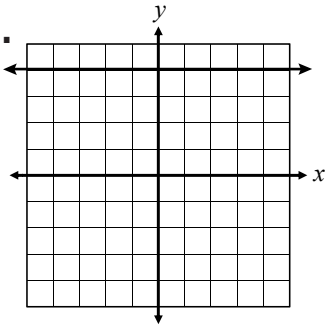
9. What is the slope of the line $4x + 8y = 12$?

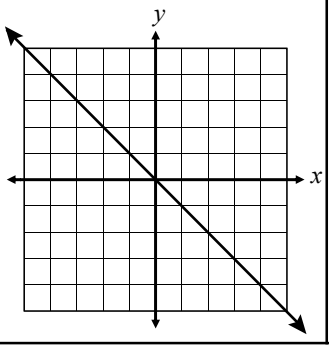
A. 4
B. $\frac{3}{2}$
C. -4
D. $-\frac{1}{2}$

10. What graph best represents a line with an undefined slope?

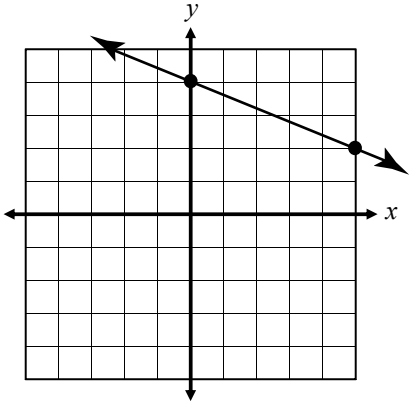
F.


H.


G.


J.


11. What is the apparent slope of the line graphed below?



A. $\frac{5}{2}$
B. $\frac{2}{5}$
C. $-\frac{5}{2}$
D. $-\frac{2}{5}$

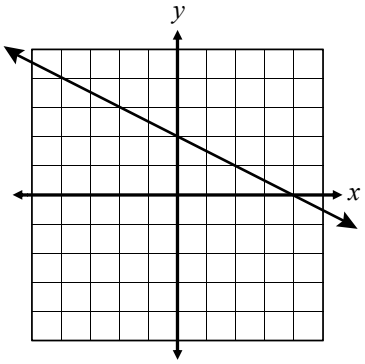
12. What is the slope of the line that passes through the points (5, 0) and (10, 0)?

F. 0
G. 1
H. 5
J. undefined

13. What is the slope of the line that passes through the points (3, 2) and (-1, -4)? Write your answer as a fraction in simplest form

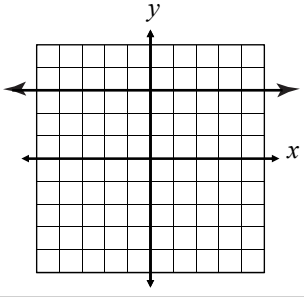
ANSWER:

14. What is the equation of the graphed line?



A. $x + 2y = 4$
B. $x + 2y = -4$
C. $2x + y = 2$
D. $2x - y = 2$

15. What is the equation of the graphed line?



F. $y = x + 3$
G. $y = 3x$
H. $y = 3$
J. $x = 3$

Name: _____ **Algebra 1 Review:** Packet #3

Topic #1: Writing Linear Equations Given a Point and a Slope

When given a point (x_1, y_1) and the slope, m, use the point-slope formula:

Write a linear equation in slope-intercept form using the given point and slope.

1. (2, 7); slope = 3	**2.** (1, 4); slope = -1
3. (4, -2); slope = $-\frac{1}{2}$	**4.** (6, -1); slope = $\frac{2}{3}$

Topic #2: Writing Linear Equations Given Two Points

When given two ordered pairs (x_1, y_1) and (x_2, y_2), use the slope formula followed by point-slope formula:

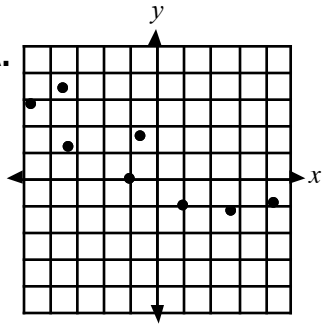
Write a linear equation in slope-intercept form using the given two points.

5. (-1, 1) and (-3, -7)	**6.** (0, 3) and (5, 1)
7. (-2, -3) and (1, 2)	**8.** (4, 1) and (-6, -4)

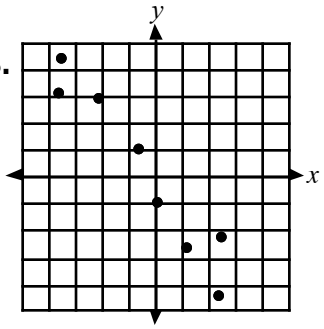
Topic #3: Line of Best Fit

9. Which scatterplot most likely has a line of best fit represented by $y = -2x - 1$?

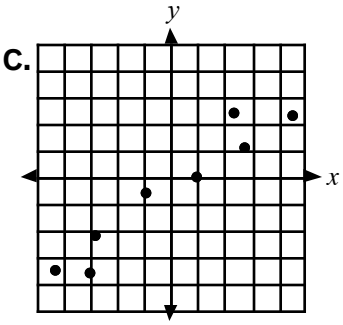
A.



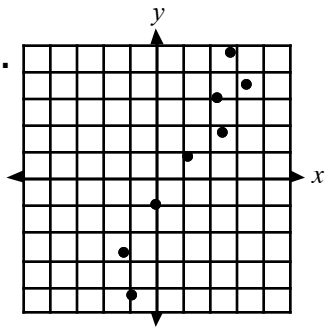
B.



C.



D.



10. The table below shows the meal cost and tip for the last 10 tables that a waiter served.

Meal Cost, x	**Tip, y**
\$25.62	\$4.50
\$37.94	\$6.50
\$16.25	\$3.25
\$42.98	\$7.50
\$28.32	\$5.00

a) Find the line of best fit for the data.

b) If a meal costs \$60, estimate the tip expected.

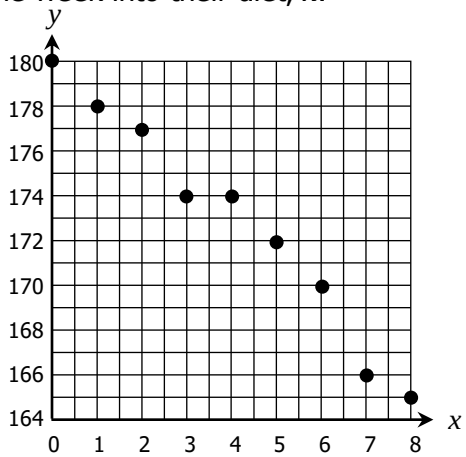
11. The table below shows the annual sales, in thousands, for a coffee shop in certain years since it opened in 2004.

Year, x	**Sales, y**
2004	205
2008	286
2010	327
2015	428
2017	470

a) Find the line of best fit for the data.

b) According to your equation, how many years will it take the shop to reach \$750,000 in annual sales?

12. The scatter plot shows the weight of a person, y, and the week into their diet, x.



a) Find the line of best fit for the data.

b) Predict the person's weight after 12 weeks.

Topic #4: Direct and Inverse Variation

	DIRECT VARIATION	**INVERSE VARIATION**
What is it?		
Equation Form	(where k is the constant of variation)	(where k is the constant of variation)
How do you test for it?	**Check for a constant** _____**!**	**Check for a constant** _____**!**
What does the graph look like?		
How do you solve for missing values?		

Determine whether the equation represents a direct variation, inverse variation, or neither.

13. $y = -3x$

14. $xy = 24$

15. $y = \frac{60}{x}$

16. $\frac{y}{8} = x$

17. $y = \frac{2}{5}x + 1$

18. $x - 2y = 0$

Determine if a direct or inverse variation exists. Identify the constant of variation and write the equation if possible.

19.

{(6, 8), (4, 12), (3, 16), (2, 24)}

20.

x	y
0	0
3	5
6	10
9	15

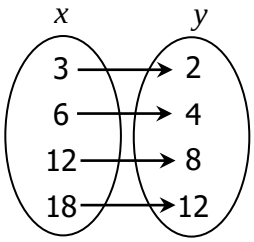
21.

x	y
1.5	20
2.5	12
4	7.5
5	6

22.

{(-10, 5), (-8, 4), (-6, 3), (-2, 1)}

23.



24.

x	2	4	8	11
y	1.5	3	6	8.25

If the values below represent a direct variation, find the missing value.

25. (5, 14) and (x, 28)

26. (8, 52) and (12, y)

27.

x	y
0	0
4	9
?	31.5
20	45

If the values below represent an inverse variation, find the missing value.

28. (4, 12) and (3, y)

29. (x, 12.8) and (15, 6.4)

30.

x	y
2.5	102.4
5	51.2
8	32
12.5	y

Read each problem carefully, then solve using the applicable variation.

31. The interest earned on an account varies directly with the balance in the account. If an account with a balance of $200 earns $12.50 in interest, find the amount of interest earned on an account with a balance of $500.

32. The height of a TV varies directly with its width. If a TV with a width of 16 inches has a height of 9 inches, find the width of a TV with a height of 20.25 inches.

33. The time spent in line to enter a concert varies inversely to the number of gates open. If just 3 gates are open, the wait time is about 50 minutes. Find the wait time if there are 8 gates open.

34. The number of songs that an MP3 player can store varies inversely with the average size of the song. A certain MP3 player can store 800 songs with an average size of 4 megabytes. If the average size of a song is 5 megabytes, how many songs can the player store?

Algebra 1 Review

QUIZ 3

Name: _____

Date: _____ **Per:** _____

1. Write the equation of the line passing through the point (2, -1) with a slope of -3.

ANSWER:

2. Which is an equation of the line with a slope of $\frac{2}{3}$ passing through the point (4, -1)?

A. $y = -\frac{1}{4}x + \frac{2}{3}$

B. $y = -4x + \frac{2}{3}$

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

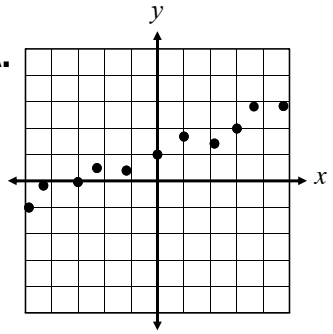
D. $y = \frac{2}{3}x - \frac{11}{3}$

3. Write the equation of the line passing through the points (-4, -7) and (8, -13)

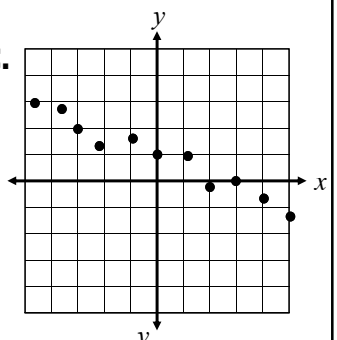
ANSWER:

4. Which scatterplot most likely has a line of best fit represented by $y = 3x + 1$?

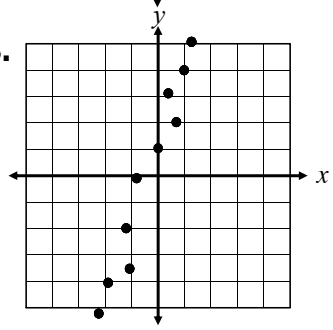
A.



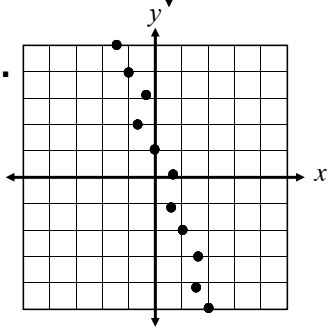
C.



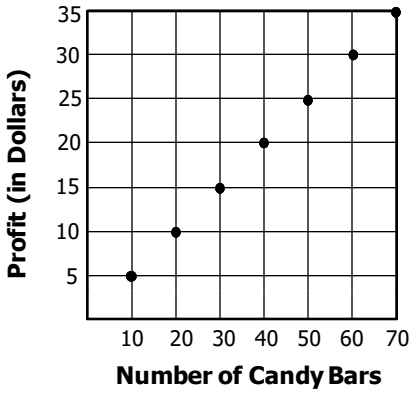
B.



D.



5. The graph represents the relationship between the number of candy bars sold and the amount of profit made during the softball team's candy bar sale.



Which is closest to the minimum number of candy bars that must be sold to make a $400 profit?

A. 650
B. 700
C. 750
D. 800

6. Which table does not show a direct variation?

F.

x	-2	-1	0	1
y	-8	-4	0	4

H.

x	0	3	6	9
y	0	1	2	3

G.

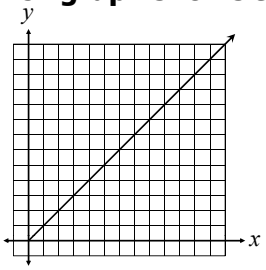
x	1	2	3	4
y	5	10	15	20

J.

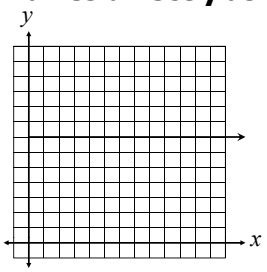
x	1	2	3	4
y	1	4	9	16

7. Which graph shows that y varies directly as x?

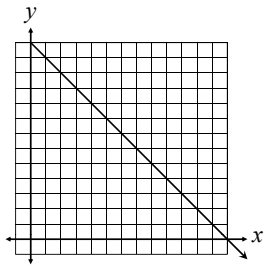
A.



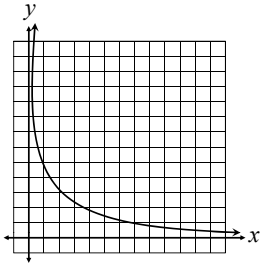
C.



B.



D.



8. Which set of ordered pairs satisfies an inverse variation?

F. (6, 3) and (8, 4)

G. (2, -3) and (4, 5)

H. (4, -2) and (-5, 10)

J. (2, 6) and (-3, -4)

9. In the table below, y varies inversely as x. What is the missing value?

x	y
3	4
6	2
24	?

A. 1

B. 3

C. 0.5

D. 0.25

10. If the point (2, -10) lies on the graph of a direct variation, which represents the direct variation equation?

F. $y = -20x$

G. $y = \frac{-20}{x}$

H. $y = -5x$

J. $y = \frac{-5}{x}$

11. Which equation represents an inverse variation with a constant of 56?

A. $\frac{y}{x} = 56$

B. $\frac{7}{y} = \frac{8}{x}$

C. $\frac{1}{4}y = 14x$

D. $\frac{xy}{2} = 28$

12. The graph of an equation representing a direct variation passes through the point (6, 10). Give another point with integral coordinates that is also on the graph of this equation.

(☐ , ☐)

13. For a group of objects made of the same material, the weight of an object varies directly with its volume. If an object that has a volume of 30 cubic inches weighs 24 ounces, what is the constant of variation?

F. $\frac{4}{5}$

G. 720

H. $\frac{5}{4}$

J. 6

14. The time required to complete a job varies inversely as the number of people working. It takes 4 hours for 7 electricians to wire a building. How long would it take 3 electricians to do the job?

A. 1 hr 43 min

B. 5 hr 15 min

C. 7 hr 30 min

D. 9 hr 20 min

15. Sarah burned 280 calories running 20 minutes. The next day, Sarah burned 490 calories running for 35 minutes.

- **Let c represent the number of calories.**
- **Let t represent time, in minutes, spent running.**

Which equation represents this relationship?

A. $c = 5600t$

B. $ct = 5600$

C. $c = 14t$

D. $t = 14c$

Name: _____ **Algebra 1 Review:** Packet #4

Topic #1: Systems of Equations

1. What is a system of equations? _____

2. The possible solutions are _____

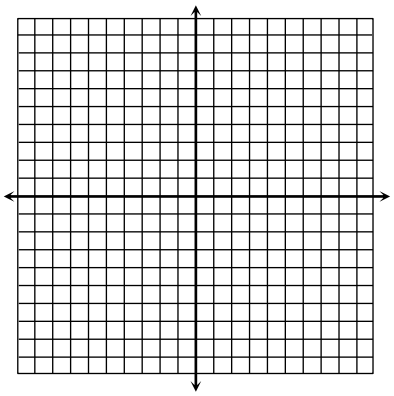
_____

_____

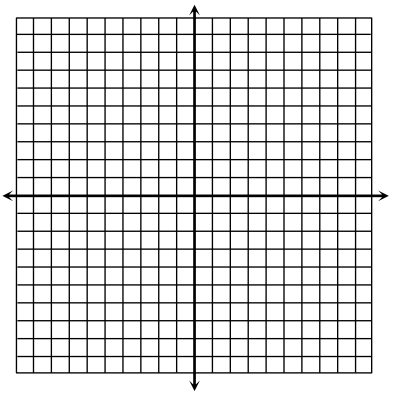
Topic #2: Solving Systems Graphically

Solve each system of equations by graphing.

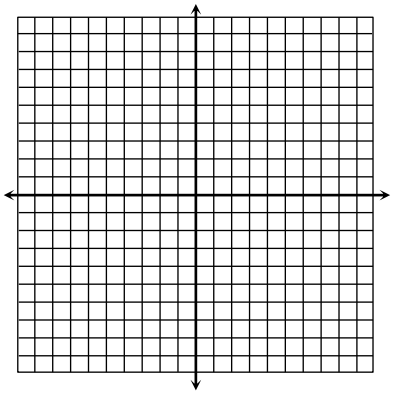
3. $\begin{cases} y = -3x + 2 \\ y = x - 6 \end{cases}$



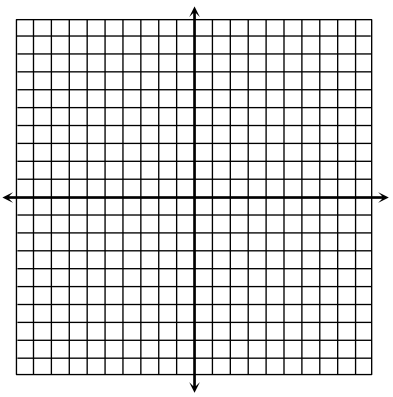
4. $\begin{cases} 2x + y = 1 \\ x - 2y = 18 \end{cases}$



5. $\begin{cases} 4x + y = -1 \\ 2y = 6 - 8x \end{cases}$



6. $\begin{cases} x + 5y = -10 \\ 4x - 2y = -18 \end{cases}$



Topic #3: Systems of Equations Algebraically

Use either substitution or elimination to solve each system of equations.

7. $\begin{cases} x + y = -4 \\ x - y = 2 \end{cases}$

8. $\begin{cases} x + y = 4 \\ 2x - 5y = 15 \end{cases}$

9. $\begin{cases} 4x+3y=-1 \\ 5x+4y=1 \end{cases}$	**10.** $\begin{cases} y=4x+2 \\ y=x-1 \end{cases}$
11. $\begin{cases} x=2y-3 \\ 2x-3y=-5 \end{cases}$	**12.** $\begin{cases} 2x+3y=4 \\ y=5x-27 \end{cases}$

Topic #4: Applications

Use a system of equations to solve each of the following problems.
13. Briana bought 3 bottles of ketchup and 2 bottles of mustard and for \$11.85. Logan bought 2 bottles of ketchup and 5 bottles of mustard for \$13.73. Find the cost of each.
14. The Boy Scouts are selling two types of popcorn as part of a fundraiser, butter and caramel. Butter popcorn sells for \$5 per bag and caramel popcorn sells for \$6.50 per bag. So far, Alec has sold 40 total bags and raised \$221. Find the number of bags he has sold for each type of popcorn.

15. A restaurant has tables that seat 6 people and booths that seat 4 people. If the restaurant a total of 37 tables and booths that can accommodate up to 180 people, how many booths do they have?

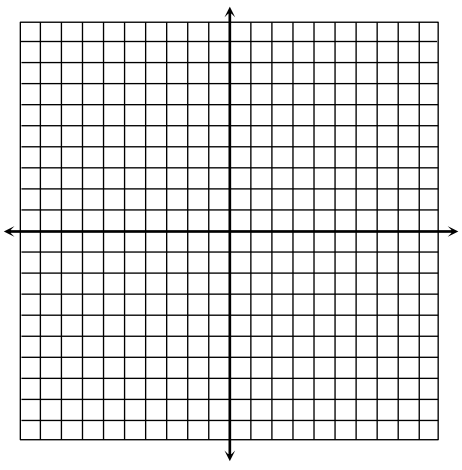
16. Scott and his wife Maria have cell phone plans in which they pay for each call minute and text message they send. Last month, Scott used 95 call minutes and sent 207 text messages for $23.55. Maria used 162 call minutes and sent 124 text messages for $17.26. Find the cost for each call minute.

17. Camille has a collection of 61 nickels and quarters worth $6.85. How many of each coin does she have?

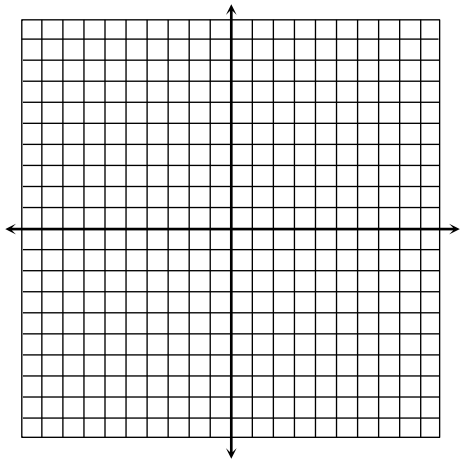
Topic #5: Linear Inequalities

Graph each linear inequality.

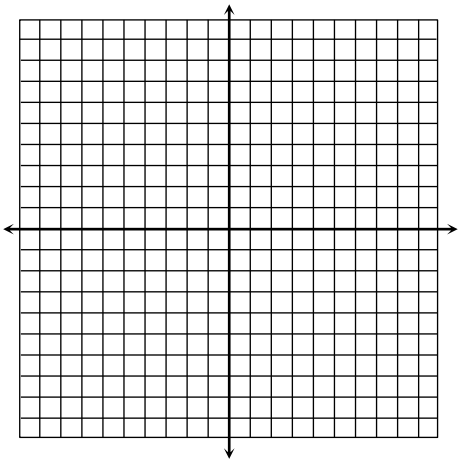
18. $y > -3x - 1$



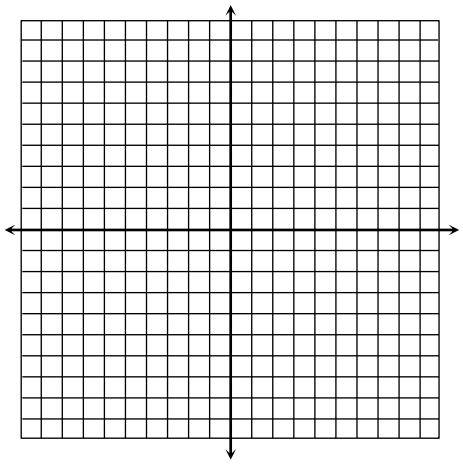
19. $5x + 3y \leq 6$



20. $x - 2y \leq 8$



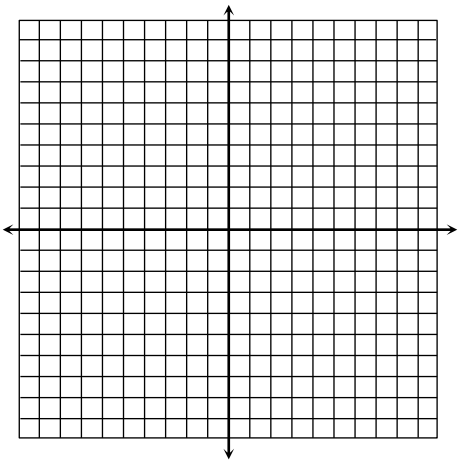
21. $y > 1$



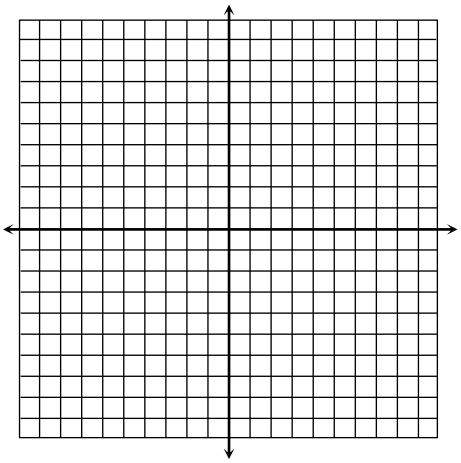
Topic #6: Systems of Linear Inequalities

Graph the solution to each system of inequalities.

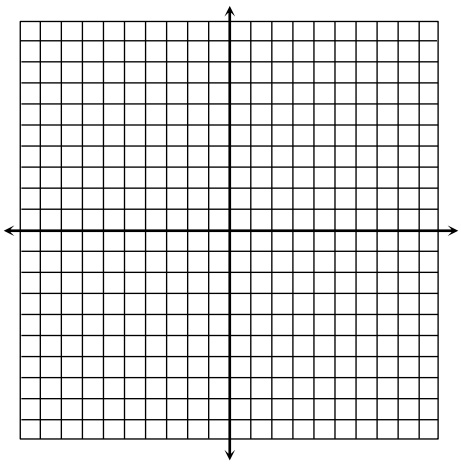
22. $\begin{cases} x + y < -1 \\ x - y > 8 \end{cases}$



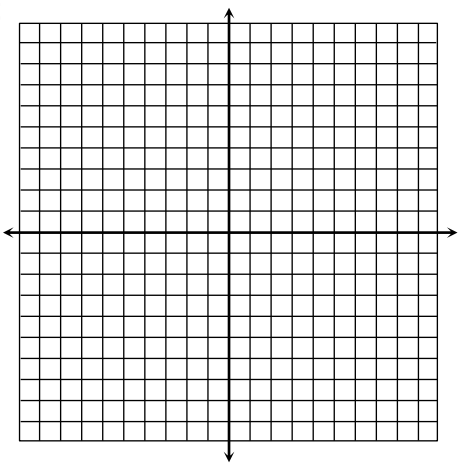
23. $\begin{cases} -x + 3y \leq 21 \\ y \geq -x + 4 \end{cases}$



24. $\begin{cases} 4x + y \geq 4 \\ 3x - 2y < 14 \end{cases}$



25. $\begin{cases} 4x - 5y > -35 \\ x \leq -3 \end{cases}$



Algebra 1 Review

QUIZ 4

Name: _____

Date: _____ **Per:** _____

1. What is the solution to the system below?

$$\begin{cases} x + y = 5 \\ x - y = 3 \end{cases}$$

A. (8, -3)
C. (5, 2)
B. (6, -1)
D. (4, 1)

2. What is the solution to the system below?

$$\begin{cases} x + 3y = 0 \\ 2x - y = -7 \end{cases}$$

F. $\left(10\frac{1}{2}, -3\frac{1}{2}\right)$
H. $\left(-3, \frac{1}{3}\right)$
G. (-3, 1)
J. (3, 1)

3. What is the solution to the system below?

$$\begin{cases} -4x + 5y = 27 \\ x - 6y = -2 \end{cases}$$

(☐ , ☐)

4. What is the solution to the system below?

$$\begin{cases} y = 5x - 9 \\ y = x + 3 \end{cases}$$

(☐ , ☐)

5. What is the solution to the system below?

$$\begin{cases} 3x + y = 11 \\ y = x + 3 \end{cases}$$

A. (4, 7)
C. (2, 17)
B. $\left(\frac{1}{2}, 3\frac{1}{2}\right)$
D. (2, 5)

6. What is the solution to the system below?

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

F. (6, 2)
G. (-1, -5)
H. No Solution
J. Infinite Solutions

7. Rob has a collection of nickels and dimes worth $1.65. If there are 25 coins total, how many dimes does he have?

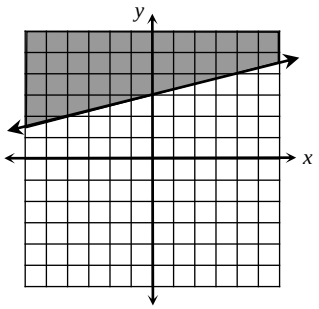
ANSWER: ☐

8. Keesha bought 11 binders and notebooks from the store and spent $45. Binders cost $6 each and notebooks cost $2.50 each. Which two equations can be used to find the number of binders, b, and notebooks, n, she purchased?

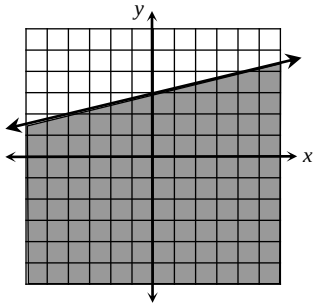
☐ $b+n=11$	☐ $6b+2.5n=11$
☐ $b+n=45$	☐ $6b+2.5n=45$

9. Which graph represents the solution to the inequality $x-4y \le -12$?

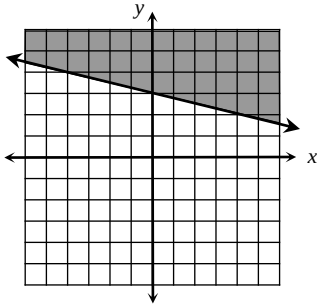
A.



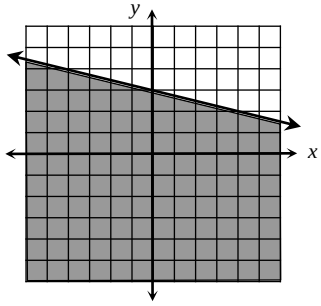
C.



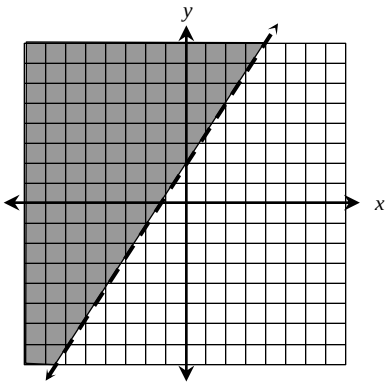
B.



D.



10. Which inequality represents the graph?



F. $y \ge \frac{3}{2}x+2$

G. $y \le \frac{3}{2}x+2$

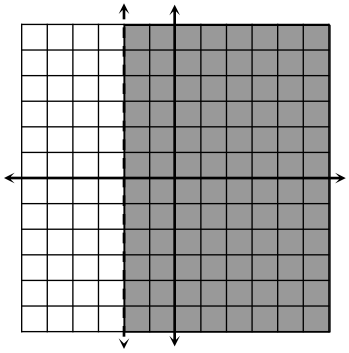
H. $y > \frac{3}{2}x+2$

J. $y < \frac{3}{2}x+2$

11. Which ordered pairs are solutions to the inequality $2x-y > -4$? Check all that apply.

☐ $(-4,-3)$	☐ $(1,-6)$	☐ $(-2,-5)$
☐ $(8, 2)$	☐ $(4, 0)$	☐ $(-3, 5)$

12. Which inequality represents the graph?



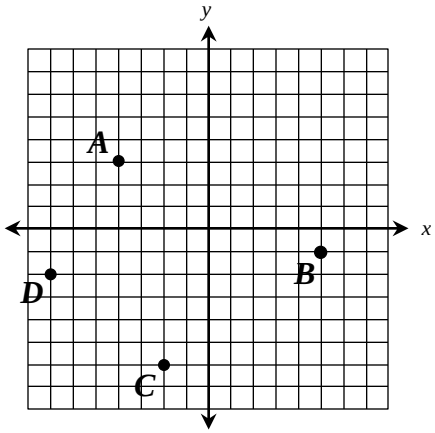
A. $x < -2$

B. $x > -2$

C. $y > -2$

D. $y < -2$

13. Which point on the graph below is included in the solution to the following system of equations?



$$\begin{cases} y \ge \frac{2}{3}x+1 \\ 5x+6y \le -30 \end{cases}$$

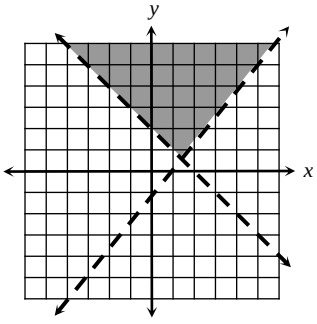
A. A **C.** C

B. B **D.** D

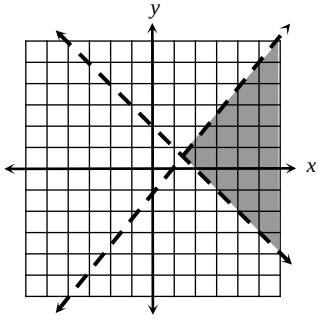
14. Which graph represents the solution to the system of inequalities below?

$$\begin{cases} 5x-4y > 4 \\ x+y < 2 \end{cases}$$

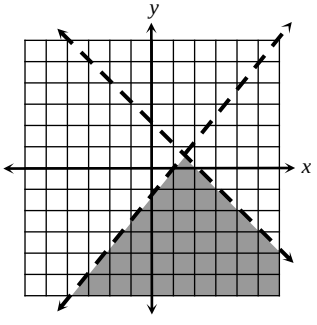
A.



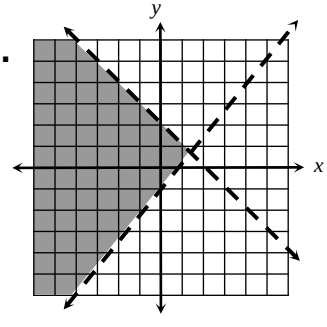
C.



B.



D.



Name: _____ **Algebra 1 Review:** Packet #5

Topic #1: Simplifying Monomials

PRODUCT RULE	QUOTIENT RULE	POWER RULE	NEGATIVE EXPONENT RULE
$x^a \cdot x^b =$	$\frac{x^a}{x^b} =$	$(x^a)^b =$	$x^{-a} =$

Simplify each expression.

1. $7m \cdot m^2 \cdot 8v^5$	**2.** $(4x^3y^5)^3$	**3.** $\frac{35k^{10}}{5k^2}$
4. $(-2a^6bc^3)^2 \cdot -5ab^2$	**5.** $\frac{r^{16}s^2t^3}{r^4s^2t^8}$	**6.** $\frac{(-3k^6)^2}{5k^3 \cdot 3k^3}$
7. $\left(\frac{4m^4n^2}{6m^5n}\right)^2$	**8.** $(-2y^4) \cdot (xy^3)^2 - 13x^2y^{10}$	**9.** $\frac{-5p^2q^8}{20p^{-1}q^2}$
10. $\frac{a^{12}b^{-3}}{(ab)^{-4}}$	**11.** $(2v)^{-2} \cdot (6v^{-7})^3$	**12.** $\left(\frac{c^{-7}d}{3c^{-2}d^5}\right)^4$

Topic #2: Simplifying Polynomials

Simplify each expression.

13. $(n^2 - 3n + 14) + (3n^2 + n - 25)$	**14.** $(2x^2 + 3x - 2) - (x^2 - 4x - 1)$
15. $(5 - 8k) - (8k - 13 + 2k^2)$	**16.** $(6 + m^3 + m - 3m^2) + (7m^3 + 11 - 6m + m^2)$
17. $3a^2b^3(2a^2 - 7ab + b^2)$	**18.** $8p(p^2 + 7p - 2) - (9p^3 - 2p^2)$

19. $(x-9)(x+7)$

20. $(w+8)(w-8)$

21. $(v+1)(4v+3)$

22. $(2k-5)(3k-4)$

23. $(2a+5b)(a-3b)$

24. $(2y-1)^2$

25. $(x-4)(x^2+5x+3)$

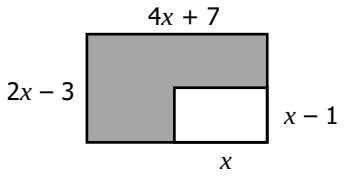
26. $(2c+1)(c^2-3c-11)$

27. $\dfrac{18a^3b+12a^2b^2-6ab}{6ab}$

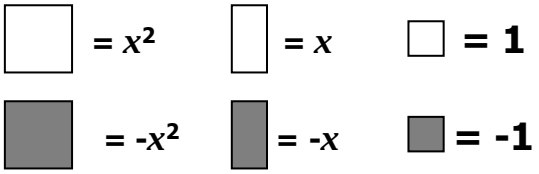
28. $\dfrac{-24x^4-8x^3+40x^2}{-8x^2}$

29. The length of a rectangular classroom floor is 19 feet less than twice its width. Write an expression to represent the area of the floor in simplest form.

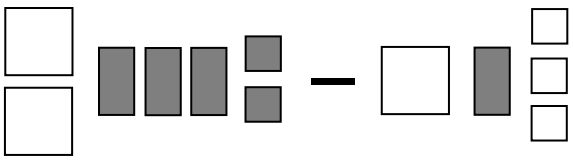
30. Write an expression to represent the area of the shaded region below in simplest form.



Use the polynomial models below to answer question 31.



31. Write a polynomial to represent the following:



Topic #3: Simplifying Radicals (Square Roots and Cube Roots)

List the first 15 perfect square numbers:

_____

Write each expression in simplest form.

32. $\sqrt{75}$	**33.** $\sqrt{40}$	**34.** $\sqrt{448}$	**35.** $\sqrt{392}$

List the first 10 perfect cube numbers:

_____

Write each expression in simplest form.

36. $\sqrt[3]{48}$	**37.** $\sqrt[3]{250}$	**38.** $\sqrt[3]{108}$	**29.** $\sqrt[3]{192}$

Topic #4: Simplifying Monomial Square Roots

Write each expression in simplest form.

40. $\sqrt{24x^2}$	**41.** $\sqrt{81m^5}$	**42.** $\sqrt{72p^{16}}$
43. $\sqrt{45r^9}$	**44.** $\sqrt{320x^{18}}$	**45.** $\sqrt{28ab^4}$
46. $\sqrt{\frac{1}{9}x^2y^{10}}$	**47.** $\sqrt{108r^{25}s^7t^6}$	**48.** $\sqrt{147c^{15}d^{20}}$

Algebra 1 Review

QUIZ 5

Name: _____

Date: _____ **Per:** _____

1. Which is equivalent to the expression below?

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

A. $x^2 + 3x + 4$

B. $x^2 - 7x + 6$

C. $x^2 - 3x - 6$

D. $x^2 - 7x + 4$

2. Which is equivalent to $(-2ab^3)(-3a^2b^5)$?

F. $-5ab$

G. $6a^2b^{15}$

H. $6a^3b^2$

J. $6a^3b^8$

3. Which is a simplified form of the following expression?

$$(xy^3)(xy)^4$$

A. x^2y^7

B. x^4y^{12}

C. x^5y^7

D. x^5y^{12}

4. If $ab \neq 0$, which is equivalent to $\frac{-12a^3b^2}{6ab^2}$?

F. $2a^2b$

G. $-2a^2$

H. $-6a^2b$

J. $6a^4b^4$

5. Which is equivalent to $(2x^{-2}y) \cdot (8x^{-3}y^{-3})$?

A. $\frac{16}{x^5y^2}$

B. $\frac{16}{x^6y^2}$

C. $\frac{10}{x^5y^2}$

D. $10x^6y^2$

6. Which is equivalent to $\left(\frac{-2m^2n^3}{m^2n^4}\right)^2$?

F. $\frac{-4m}{n^2}$

G. $\frac{-4}{n^2}$

H. $\frac{4m}{n^2}$

J. $\frac{4}{n^2}$

7. Fill in the boxes with values that make the statement true

$$\frac{p^5q^6}{p^{-3}q^{\square}} = p^{\square}q^3$$

8. If $x \neq 0$, which expression is equivalent to

$$\frac{10x^{12} - 2x^8 + 2x^4}{2x^4}?$$

A. $8x^3 - x^2$

B. $5x^8 - x^4$

C. $8x^3 - x^2 + 1$

D. $5x^8 - x^4 + 1$

9. Which expression is equivalent to

$$2x^3y(x^2y - 3xy^2)?$$

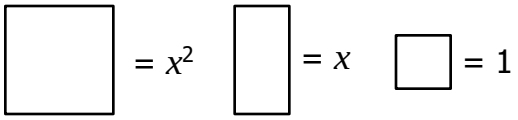
F. $2x^5y^2 - 6x^4y^3$

G. $3x^5y^2 - 5x^4y^3$

H. $2x^6y^2 - 6x^3y^2$

J. $2x^6y - 6x^3y^3$

10. Consider the following models:



Which expression represents the following diagram?

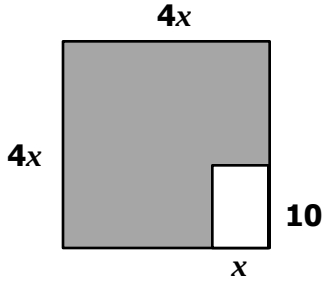
A. $(x + 2)(x + 1)$

B. $(3x + 2)(x + 1)$

C. $(3x^2 + 2)(x + 1)$

D. $(x^2 + x)(3x^2 + 2)$

11. Which expression represents the area of the shaded region below?



F. $8x^2 - 10x$

G. $8x^2 - x - 10$

H. $16x^2 - 10x$

J. $16x^2 - x - 10$

12. What is $\sqrt{192}$ expressed in simplest radical form?

A. $8\sqrt{3}$

B. $6\sqrt{5}$

C. $4\sqrt{12}$

D. $2\sqrt{48}$

13. What is $\sqrt[3]{243}$ expressed in simplest radical form?

F. $6\sqrt[3]{2}$

G. $3\sqrt[3]{9}$

H. $9\sqrt[3]{3}$

J. $9\sqrt[3]{2}$

14. What is $\sqrt{80k^3}$ expressed in simplest radical form?

A. $4k\sqrt{5k}$

B. $4k^2\sqrt{5k}$

C. $2k\sqrt{10k}$

D. $2k^2\sqrt{10k}$

15. Fill in the boxes with values that make the statement true.

$$\sqrt{\square\, m^{17}} = 3m^{\square}\sqrt{7m}$$

16. Which of the following radical expressions simplifies to $6x^4y^2\sqrt{2y}$?

F. $\sqrt{12x^8y^3}$

G. $\sqrt{12x^{16}y^5}$

H. $\sqrt{72x^{16}y^5}$

J. $\sqrt{72x^8y^5}$

Name: _____ **Algebra 1 Review:** Packet #6

Topic #1: Factoring Polynomials

Factor each polynomial.			
Greatest Common Factor (GCF)	**1.** $21c - 12$	**2.** $x^6y + 8x^2y$	**3.** $75a^2b^3c - 30ab^2$
Difference of Squares $(a^2 - b^2)$	**4.** $w^2 - 64$	**5.** $9k^2 - 1$	**6.** $4m^2 - 81n^2$
Trinomial $(x^2 + bx + c)$	**7.** $p^2 - 13p + 30$	**8.** $y^2 - 3y - 40$	**9.** $a^2 + 12a + 36$
Trinomial $(ax^2 + bx + c)$	**10.** $3x^2 + 10x + 3$	**11.** $12c^2 + 5c - 2$	**12.** $4v^2 - 16v + 7$

Factor each polynomial completely.		
13. $12x^2 - 12$	**14.** $n^3 - 4n^2 - 60n$	**15.** $8m^2 - 21$
16. $5w^2 - 15w - 20$	**17.** $8v - 98v^3$	**18.** $4x^2 - 10x + 4$
19. $27ab - 75ab^3$	**20.** $12y^2 - 16y - 16$	**21.** $3h^2 - 6h + 3$

Topic #2: Dividing Polynomials by a Binomial (using Factoring)

Find each quotient.

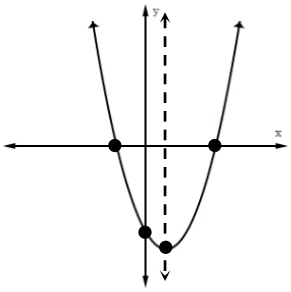
22. $\dfrac{x^2-12x+20}{x-10}$

23. $\dfrac{3y^2-16y+5}{3y-1}$

24. $(k^2-1)\div(k+1)$

Topic #3: Graphing Quadratic Equations

A quadratic equation creates a U-shaped curve called a PARABOLA.



Standard Form:

Axis of Symmetry: $x=\dfrac{-b}{2a}$

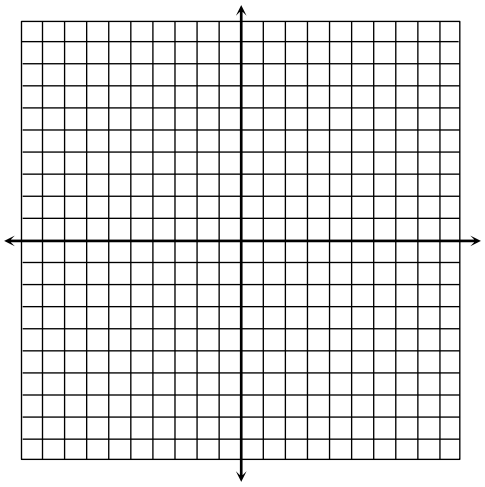
Vertex Form:

Axis of Symmetry: $x = h$**; Vertex:** (h, k)

Graph each equation using a table of values. Identify all key characteristics.

25. $y = x^2 - 6x + 8$

x	y



Domain:

Range:

Axis of Symmetry:

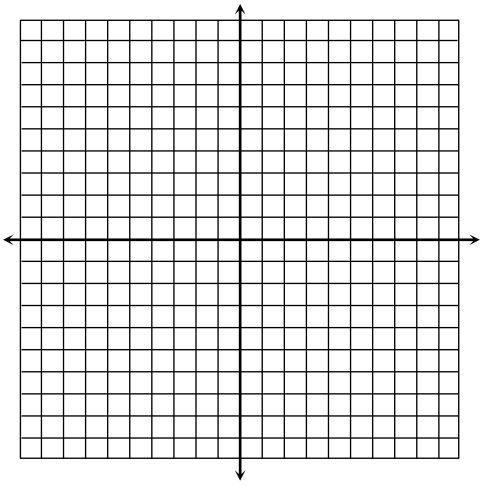
Vertex:

x**-intercepts (zeros):**

y**-intercept:**

26. $y = -x^2 + 4x - 5$

x	y



Domain:

Range:

Axis of Symmetry:

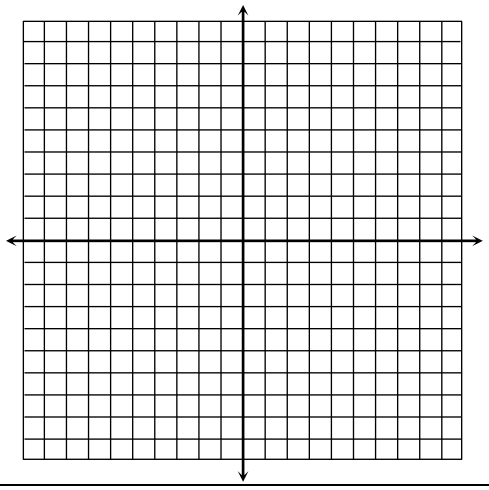
Vertex:

x**-intercepts (zeros):**

y**-intercept:**

27. $y = 3x^2 - 3$

x	y



Domain:

Range:

Axis of Symmetry:

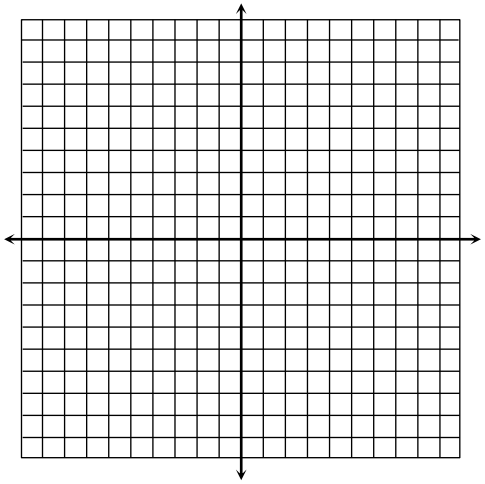
Vertex:

x-intercepts (zeros):

y-intercept:

28. $y = -(x+4)^2 + 9$

x	y



Domain:

Range:

Axis of Symmetry:

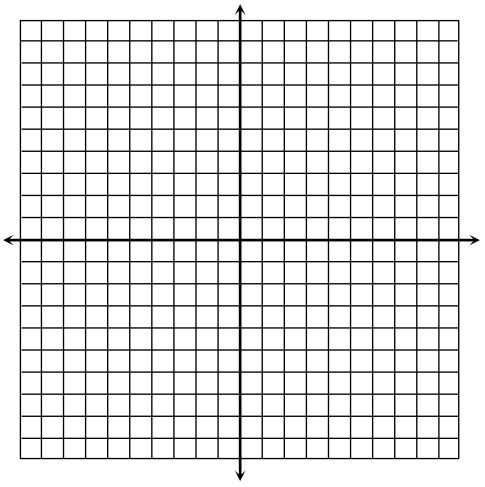
Vertex:

x-intercepts (zeros):

y-intercept:

29. $y = 2(x-1)^2$

x	y



Domain:

Range:

Axis of Symmetry:

Vertex:

x-intercepts (zeros):

y-intercept:

Topic #4: Transformations of the Quadratic Function

Recall that vertex form describes transformations from the quadratic parent function, $y = x^2$.

Given $y = a(x-h)^2 + k$:

Translations (Shifts)				**Reflections**	**Dilations** (compress/stretch)	
$+ h$	shifts left	$+ k$	shifts up	If a is negative, the graph reflects over the x-axis.	$\lvert a \rvert > 1$	creates a vertical stretch
$- h$	shifts right	$- k$	shifts down		$\lvert a \rvert < 1$	creates a vertical compression

Given each equation, describes the transformations from the parent function $y = x^2$.		
30. $y = (x+5)^2 + 3$	**31.** $y = -2(x-4)^2$	**32.** $y = \frac{1}{3}(x+1)^2 - 4$
Transformations from the function $y = x^2$ are described below. Write an equation to represent the new function.		
33. translated 3 units right and 2 units up	**34.** vertically stretched by a factor of 4, then translated 5 units down	**35.** reflected over the x-axis, then translated 7 units left and 1 unit up

Topic #5: Solving Quadratic Equations

▪ The **solutions** to a quadratic equation are the point(s) at which the parabola intersects the _____-_____. ▪ Solutions are also referred to as **roots**, **zeros**, or **x-intercepts**. ▪ A quadratic equation can have **two solutions**, **one solution**, or **no real solutions**.	**Methods to Solve a Quadratic Equation:** ▪ Factoring ▪ Square Roots ▪ Completing the Square ▪ Quadratic Formula

Solve each equation. Simplify all irrational solutions.	
36. $x^2 + 8x = 0$	**37.** $4x^2 = 10x$
38. $2x^2 - 72 = 0$	**39.** $4x^2 - 43 = 6$
40. $\frac{1}{2}x^2 - 30 = 10$	**41.** $9 - x^2 = 17$

42. $x^2 + 5x = 6$	**43.** $x^2 = 18x - 81$
44. $x^2 - 4x - 14 = 0$	**45.** $-x^2 - 14x = 37$
46. $3x^2 = 30 - 9x$	**47.** $6x^2 - x - 2 = 0$
48. $2x^2 + 8x - 3 = 0$	**49.** $4x^2 - 10x = 5$

Topic #6: Applications

50. The dimensions of a rectangle can be represented by the expressions $(x + 7)$ and $(x - 3)$. If the area of the rectangle is 75 square feet, find the value of x.

51. The stress distribution on a structure is given by $s = 2x^2 + 4x - 30$ where s is stress in pounds per square inch and x is the distance in feet from a reference point. At what distance is the stress equal to 0 pounds per square inch?

52. A toy rocket is launched from a platform that is 48 feet high. The rocket's height above the ground is modeled by the equation $h = -16t^2 + 32t + 48$. What is the rocket's height at 2 seconds?

Topic #7: Curve of Best Fit (Quadratic Regression)

53. The table below shows a college's annual budget (in millions of dollars) over a 5-year period.

Year	Budget
2007	38
2008	20
2009	42
2010	67
2011	89

a) Find an equation for the curve of best fit.

b) Predict the college's budget in 2018.

54. The table below shows the height h (in feet) of a hammer t seconds after it was dropped from the top of a building by a construction worker.

Time, t	Height, h
0	384
0.5	380
1	368
1.5	348
2	320

a) Find an equation for the curve of best fit.

b) Find the time it will take the hammer to reach the ground.

Algebra 1 Review

QUIZ 6

Name: _____

Date: _____ **Per:** _____

1. Which of the following binomials is a factor of $x^2 - 13x - 30$?

A. $(x + 15)$ **C.** $(x - 10)$

B. $(x - 3)$ **D.** $(x + 2)$

2. If the polynomial below is completely factored, which expressions represent its factors? Check all that apply.

$$64x^4y - 36x^2y$$

☐ $4x^4$	☐ $4x - 3$	☐ $4x - 3y$
☐ $4x^2y$	☐ $8x - 6$	☐ $4x + 3$

3. Given Polynomial A and Polynomial B below, which binomial factor do they have in common?

Polynomial A	Polynomial B
$2n^2 + n - 36$	$n^2 - 10n + 24$

F. $(n - 4)$ **H.** $(n - 12)$

G. $(n + 2)$ **J.** $(n - 2)$

4. If the area of a rectangle can be represented by the expression $x^2 + 10x - 24$, which two binomials could represent the length and width of the rectangle?

☐ $(x - 12)$	☐ $(x + 6)$	☐ $(x - 2)$
☐ $(x - 8)$	☐ $(x + 12)$	☐ $(x - 4)$

5. Which polynomials are prime? Check all that apply.

☐ $x^2 - 10x - 35$	☐ $25x^2 + 4$
☐ $18c - 21d$	☐ $2x^2 - 9x - 10$
☐ $8x^2 + 14x + 3$	☐ $x^2 + 7x$

6. Which polynomial is equivalent to the expression below if $w \neq 3$?

$$\frac{3w^2 - w - 24}{w - 3}$$

A. $3w^2 - 8$

B. $3w^2 + 8$

C. $3w - 8$

D. $3w + 8$

7. Which quadratic equation has a vertex located at (4, -3)?

F. $y = 4x^2 + 3$

G. $y = (x + 4)^2 - 3$

H. $y = x^2 - 8x + 13$

J. $y = x^2 + 8x - 3$

8. Which statement is false regarding the quadratic equation below?

$$y = -(x + 1)^2 + 4$$

A. The axis of symmetry is $x = -1$

B. The range is $y \leq 4$.

C. The x-intercepts are (1, 0) and (-3, 0).

D. The y-intercept is (0, 4).

9. Which two transformations can be used to obtain the graph of $y = 3(x - 5)^2$ from the graph of $y = x^2$?

F. A vertical compression and a translation 5 units left.

G. A vertical stretch and a translation 5 units left.

H. A vertical compression and a translation 5 units right.

J. A vertical stretch and a translation 5 units right.

10. Which of the functions below have exactly two distinct real zeros?

I. $f(x) = -x^2 + 14x - 45$

II. $f(x) = 4x^2 + 4$

III. $f(x) = 2x^2 + 12x + 18$

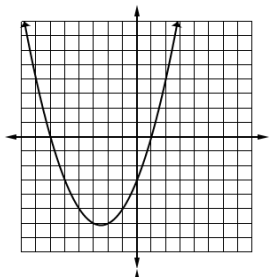
IV. $f(x) = 3x^2 - 4x - 4$

A. I and IV **C.** II and III

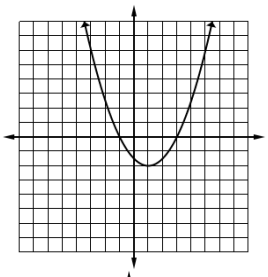
B. I, II, and III **D.** III and IV

11. If a quadratic function has binomial factors of $(x - 3)$ and $(x + 1)$, which graph could represent this function?

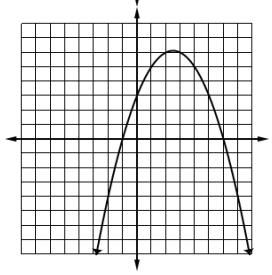
A.



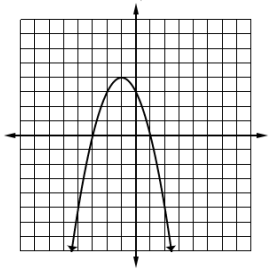
C.



B.



D.



12. Which number is a solution to the quadratic equation below?

$x^2 - 8x - 48 = 0$

F. -12

G. 12

H. -8

J. 6

13. What are the solutions to the equation below?

$3x^2 - 7x = 20$

A. $\left\{-5, \frac{4}{3}\right\}$

B. $\left\{-\frac{4}{3}, 5\right\}$

C. $\left\{-4, \frac{5}{3}\right\}$

D. $\left\{-\frac{5}{3}, 4\right\}$

14. What are the solutions to the equation below?

$16 - 2x^2 = -64$

F. $\{\pm 2\sqrt{6}\}$

G. $\{\pm 2\sqrt{10}\}$

H. $\{\pm 4\sqrt{6}\}$

J. $\{\pm 4\sqrt{10}\}$

15. Write the values in the boxes below to show the solutions the equation $x^2 - 2x - 17 = 0$.

$$x = \square \pm \square \sqrt{\square}$$

16. The width of a rectangle is fifteen feet less than its length. If the area of the rectangle is 54 square feet, find the width.

A. 3 feet

B. 6 feet

C. 9 feet

D. 18 feet

Use for questions 17-18: The table below gives the height h (in feet) of a baseball t seconds after it was thrown by a fan onto the field.

t	0	0.5	1	1.5	2
h	200	212	216	212	200

17. Write an equation for the curve of best fit.

ANSWER:

18. What is the height of the ball 4 seconds after it was thrown?

ANSWER:

Name: _____ **Algebra 1 Review:** Packet #1

Topic #1: The Real Number System

THE REAL NUMBERS ($\mathbb{R}$): All rational and irrational

IRRATIONAL NUMBERS (I): π, $\sqrt{17}$, $-\sqrt{43}$ **RATIONAL NUMBERS (Q):** $1\frac{1}{2}$, $0.\overline{6}$, -4.5, $\frac{9}{7}$

INTEGERS ($\mathbb{Z}$): $\cdots, -3, -2, -1, 0, 1, 2, 3, \cdots$

WHOLE NUMBERS (W): $0, 1, 2, 3, \cdots$

NATURAL NUMBERS (N): $1, 2, 3, 4, \cdots$

Name all sets to which each number belongs.

1. $\frac{2}{3}$ R Q	2. $-\sqrt{50}$ R I	3. 0 R Q Z W
4. $\lvert -9-4 \rvert$ R Q Z W N	5. $\frac{-28}{7}$ R Q Z	6. $\frac{\pi}{\pi}$ R Q Z W N

Topic #2: Properties

Give two examples of each property.

COMMUTATIVE:
- $a+b=b+a$
- $a \cdot b = b \cdot a$

ASSOCIATIVE:
- $(a+b)+c = a+(b+c)$
- $(a \cdot b) \cdot c = a \cdot (b \cdot c)$

IDENTITY:
- $a+0=a$
- $a \cdot 1 = a$

INVERSE:
- $a + (-a) = 0$
- $a \cdot \frac{1}{a} = 1$

ZERO PRODUCT:
- $a \cdot 0 = 0$
- $(x^2+1) \cdot 0 = 0$

DISTRIBUTIVE:
- $a(b+c) = ab+ac$
- $-7(x+3) = -7x-21$

REFLEXIVE:
- $a=a$
- $17y = 17y$

SYMMETRIC:
- If $a=b$, then $b=a$.
- If $3x=15$, then $15=3x$

TRANSITIVE:
- If $a=b$ and $b=c$, then $a=c$.
- If $\sqrt{49}=7$ and $7=6+1$, then $\sqrt{49}=6+1$.

Name the property that justifies each statement.	
7. $5x + 1 = 1 + 5x$ Commutative	**8.** $17 = 17$ Reflexive
9. $10y^2 \cdot 0 = 0$ Zero Product	**10.** $-3(m + 8) = -3m - 24$ Distributive
11. If $2^5 = 32$ and $32 = 8 \cdot 4$, then $2^5 = 8 \cdot 4$ Transitive	**12.** $8k + 0 = 8k$ Identity
13. If $-2x = 20$, then $20 = -2x$ Symmetric	**14.** $\frac{4}{9} \cdot \frac{9}{4} = 1$ Inverse

Topic #3: Square & Cube Roots

Give the value of each expression.			
15. $\sqrt{25}$ 5	**16.** $\sqrt{324}$ 18	**17.** $\sqrt{144}$ 12	**18.** $\sqrt{\frac{16}{49}}$ $\frac{4}{7}$
19. $\sqrt[3]{27}$ 3	**20.** $\sqrt[3]{343}$ 7	**21.** $\sqrt[3]{64}$ 4	**22.** $\sqrt[3]{1000}$ 10

Topic #4: Evaluating Expressions

Evaluate each expression. Use the variable replacements when given.	
23. $2^3 \cdot (9-2) + \frac{12}{4} - \lvert -5 \rvert$ $8 \cdot 7 + 3 - 5$ $56 + 3 - 5$ $59 - 5 = \boxed{54}$	**24.** $8 - \left[12 \div \left(\sqrt{400} - 2^5\right)\right] + 11$ $8 - [12 \div (20 - 32)] + 11$ $8 - [12 \div (-12)] + 11$ $8 - (-1) + 11 = \boxed{20}$
25. $\frac{5^3 - 42 \div 6}{\sqrt[3]{8}}$ $\frac{125 - 7}{2} = \frac{118}{2} = \boxed{59}$	**26.** $w^2 - 5xy$ (if $x = -3$, $w = -2$, and $y = 1$) $(-2)^2 - 5(-3)(1)$ $4 + 15$ $\boxed{19}$
27. $2\lvert m - n^2 \rvert + k^3$ (if $k = -2$, $m = -7$, and $n = 4$) $2\lvert -7 - (4)^2 \rvert + (-2)^3$ $2\lvert -7 - 16 \rvert + (-8)$ $2(23) - 8 = \boxed{38}$	**28.** $\frac{\sqrt{bc}}{(c-a)^2 + b}$ (if $a = 1$, $b = -20$, and $c = -5$) $\frac{\sqrt{-20 \cdot -5}}{(-5-1)^2 + (-20)} = \frac{\sqrt{100}}{36 - 20} = \frac{10}{16}$ $= \boxed{\frac{5}{8}}$

Topic #5: Translating Equations & Inequalities

Translate using an equation or an inequality. Do not solve.

29. The quotient of twice a number and 7 is 20.

$\frac{2x}{7} = 20$

30. Five less than the product of a number and 3 is 14.

$3x - 5 = 14$

31. Seven times the difference of a number and 4 is no more than 10.

$7(x-4) \leq 10$

32. The product of a number and four, increased by one, is at least 7.

$4x + 1 \geq 7$

Topic #6: Solving Equations

Solve each equation.

33. $18 = 3 - 3a$

$-3 \quad -3$

$15 = -3a$

$\frac{15}{-3} = \frac{-3a}{-3}$

$\boxed{a = -5}$

34. $4 - \frac{1}{2}n = -12$

$-4 \quad -4$

$-2 \cdot -\frac{1}{2}n = -16 \cdot -2$

$\boxed{n = 32}$

35. $\frac{3}{4}x + 17 = 23$

$-17 \quad -17$

$\frac{4}{3} \cdot \frac{3}{4}x = 6 \cdot \frac{4}{3}$

$\boxed{x = 8}$

36. $9y - 4(y+1) = 31$

$9y - 4y - 4 = 31$

$5y - 4 = 31$

$+4 \quad +4$

$\frac{5y}{5} = \frac{35}{5}$

$\boxed{y = 7}$

37. $-6(w-4) + 8w = 2(w+9)$

$-6w + 24 + 8w = 2w + 18$

$2w + 24 = 2w + 18$

$-2w \quad -2w$

$24 \neq 18$

$\boxed{\text{No Solution}}$

38. $3m - (7m+12) = 2(m-3)$

$3m - 7m - 12 = 2m - 6$

$-4m - 12 = 2m - 6$

$+4m \quad +4m$

$-12 = 6m - 6$

$+6 \quad +6$

$\frac{-6}{6} = \frac{6m}{6}$

$\boxed{m = -1}$

39. $2x-2(4x-3)=6-6x$

$2x-8x+6=6-6x$

$-6x+6=6-6x$

$+6x \qquad +6x$

$6=6$

$\boxed{\infty}$

40. $\frac{7}{x-8}=\frac{3}{x}$

$7\cdot x=3(x-8)$

$7x=3x-24$

$-3x \quad -3x$

$\frac{4x}{4}=\frac{-24}{4}$

$\boxed{x=-6}$

41. Solve $A=\frac{1}{2}bh$ for h.

$\frac{2A}{b}=\frac{bh}{b}$

$\boxed{\frac{2A}{b}=h}$

42. Solve $c=\frac{a^2+3b}{4}$ for b.

$4c=a^2+3b$

$-a^2 \quad -a^2$

$\frac{4c-a^2}{3}=\frac{3b}{3}$

$\boxed{\frac{4c-a^2}{3}=b}$

Topic #7: Solving & Graphing Inequalities

Solve and graph each inequality.

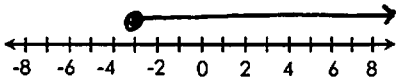
43. $11x+13\geq -20$

$-13 \quad -13$

$\frac{11x}{11}\geq\frac{-33}{11}$

$\boxed{x\geq -3}$

$\boxed{[-3,\infty)}$



44. $-2x+6>3x-34$

$-3x \quad -3x$

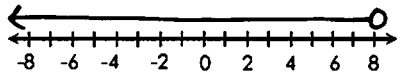
$-5x+6>-34$

$-6 \quad -6$

$\frac{-5x}{-5}>\frac{-40}{-5}$

$\boxed{x<8}$

$\boxed{(-\infty,8)}$



45. $3x-7(x+3)\geq -13$

$3x-7x-21\geq -13$

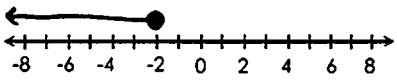
$-4x-21\geq -13$

$+21 \quad +21$

$\frac{-4x}{-4}\geq\frac{8}{-4}$

$\boxed{x\leq -2}$

$\boxed{(-\infty,-2]}$



46. $4-8x<2(5-3x)$

$4-8x<10-6x$

$+6x \quad +6x$

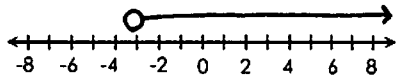
$4-2x<10$

$-4 \quad -4$

$\frac{-2x}{-2}<\frac{6}{-2}$

$\boxed{x>-3}$

$\boxed{(-3,\infty)}$



47. $x+7\le 2$ **or** $\frac{x+14}{4}\ge 3$

$-7\ -7$

$x\le -5$

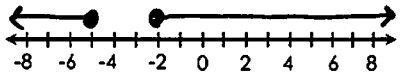
$x+14\ge 12$

$-14\ -14$

$x\ge -2$

$x\le -5$ or $x\ge -2$

$(-\infty,-5]$ or $[-2,\infty)$



48. $3x+5<-16$ **or** $-5x-8\le -13$

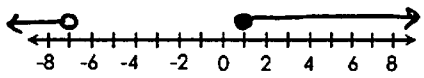
$-5\ -5$ $\qquad$ $+8\ +8$

$\frac{3x}{3}<\frac{-21}{3}$ $\qquad$ $\frac{-5x}{-5}\le\frac{-5}{-5}$

$x<-7$ $\qquad$ $x\ge 1$

$x<-7$ or $x\ge 1$

$(-\infty,-7)$ or $[1,\infty)$



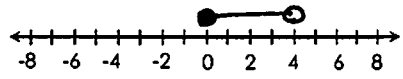
49. $-2\le 3x-2<10$

$+2\ \ +2\ +2$

$\frac{0}{3}\le\frac{3x}{3}<\frac{12}{3}$

$0\le x<4$

$[0,4)$



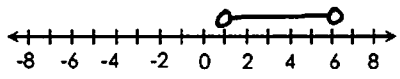
50. $3<2x+1<13$

$-1\ \ -1\ -1$

$\frac{2}{2}<\frac{2x}{2}<\frac{12}{2}$

$1<x<6$

$(1,6)$



Topic #8: Properties of Equality/Justifying Steps when Solving Equations

Properties of Equality: Addition Property of Equality, Subtraction Property of Equality, Multiplication Property of Equality, Division Property of Equality, Substitution Property of Equality

Use a property to justify each step of the equations solved below.

51.

Step	Property/Reason
1. $\frac{1}{3}x+16=11$	**1.** Given
2. $\frac{1}{3}x=-5$	**2.** Subtraction Property of Equality
3. $x=-15$	**3.** Multiplication Property of Equality

52.

Step	Property/Reason
1. $5-2(3x+5)=-47$	**1.** Given
2. $5-6x-10=-47$	**2.** Distributive Property
3. $-6x-5=-47$	**3.** Simplify
4. $-6x=-42$	**4.** Addition Property of Equality
5. $x=7$	**5.** Division Property of Equality

53.

Step	Property/Reason
1. $y = 2x - 3;\ y = 5x$	**1.** Given
2. $5x = 2x - 3$	**2.** Substitution Property
3. $3x = -3$	**3.** Subtraction Property of Equality
4. $x = -1$	**4.** Division Property of Equality

Topic #9: Applications

54. The height, h, of a plant (in inches) w weeks since it was planted is represented by the equation $h = 1.2w + 3$. How many weeks will it take the plant to reach one foot?

$12 = 1.2w + 3$
$-3 \quad -3$
$9 = 1.2w$
$\frac{9}{1.2} = \frac{1.2w}{1.2}$
$7.5 = w$

7.5 weeks

55. The Ravens scored 13 more than three times the number of points that the Bengals scored in their last game. If the Ravens scored 40 points, how many points did the Bengals score?

let x = Bengals
let $3x+13$ = Ravens

$3x + 13 = 40$
$-13 \quad -13$
$\frac{3x}{3} = \frac{27}{3}$
$x = 9$

9 pts

56. Max is making a rectangular garden with a length that is 5 feet less than twice its width. If the perimeter of the garden is 80 feet, find the dimensions.

let x = width
let $2x-5$ = length

$2(x) + 2(2x-5) = 80$
$2x + 4x - 10 = 80$
$6x = 90$
$x = 15$

15 ft by 25 ft

57. Macy, Sydney, and Allie are sisters. Macy is two years older than Sydney and Allie is one year less than half the age of Sydney. If the sum of their ages is 31, how old is Macy?

let x = Sydney
let $x+2$ = Macy
let $\frac{1}{2}x - 1$ = Allie

$x + x + 2 + \frac{1}{2}x - 1 = 31$
$2.5x + 1 = 31$
$2.5x = 30$
$x = 12$

14 years old

58. The expression **400 + 0.15*s*** represents Frank's weekly pay as an appliance salesman where s is his total sales for the week. If he wishes to make at least \$1600 this week, how much will he need in sales?

$1600 = 400 + 0.15s$
$1200 = 0.15s$
$8000 = s$

\$8000

59. The total cost to rent a pontoon boat for h hours can be represented by the expression **30*h* + 65**. If Brianna can spend a maximum of \$200, how many hours can she rent the boat?

$30h + 65 \leq 200$
$30h \leq 135$
$h \leq 4.5$

4.5 hrs

Algebra 1 Review

QUIZ 1

Name: _____

Date: _____ **Per:** _____

1. Which statement *cannot* be justified by one of the properties of real numbers?

A. $(a + b) + c = a + (b + c)$

B. $a - (b \div c) = (a - b) \div c$

C. $(ab)c = a(bc)$

D. $(a + b) + 0 = 0 + (a + b)$

2. The statement "If $\frac{1}{2}x = 5$, then $x = 10$" is justified by the –

F. Associative property of multiplication

G. Commutative property of multiplication

H. Addition property of equality

J. Multiplication property of equality

3. Which property justifies rewriting

$$3x - 5x$$
as
$$(3 - 5)x \text{ ?}$$

A. Associative Property of Multiplication

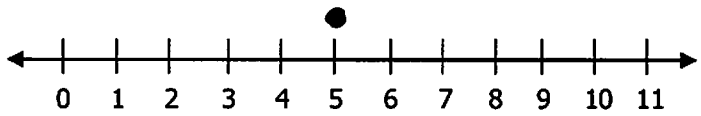
B. Distributive Property

C. Commutative Property of Multiplication

D. Associative Property of Addition

4. Plot the point on the number line that corresponds to the value of the expression below.

$$\sqrt[3]{125}$$



5. Joe, who is the youngest member of the wrestling team at Northwood High School, is 5 years less than one-half the age of the coach. If the coach is n years old, which expression describes Joe's age?

F. $\frac{1}{2}n - 5$

G. $5 - \frac{1}{2}n$

H. $2n + 5$

J. $2n - 5$

6. Simplify the numerical expression below.

$$\frac{72 \div (\sqrt{100} - 4^2)}{\sqrt[3]{27}}$$

$\frac{72 \div (10 - 16)}{3} = \frac{72 \div (-6)}{3} = \frac{-12}{3}$

ANSWER: -4

7. Find the value of the expression below when $x = -4$ and $y = 2$

$$-3x^2y + 4x$$

$-3(-4)^2(2) + 4(-4)$

$-3(16)(2) - 16$

$-96 - 16$

ANSWER: -112

8. The formula for the surface area of a cylinder is $SA = 2\pi r(h + r)$. What is the surface area of a cylinder when $r = 3$ centimeters and $h = 4$ centimeters?

$2\pi 3(4+3)$

$6\pi(7)$

A. 28π cm^2 **C.** 36π cm^2

B. 32π cm^2 **(D.)** 42π cm^2

9. Find the solution to the equation below.

$$5 - \frac{n}{2} = 12$$

$$-2 \cdot \frac{-n}{2} = 7 \cdot -2$$

$$n = -14$$

ANSWER: -14

10. Find the solution to the equation below.

$$5(x+2) = 7(4-x)$$

$5x + 10 = 28 - 7x$

$12x + 10 = 28$

$12x = 18$

$x = 1.5$

F. -9.0 **H.** 3.2

(G.) 1.5 **J.** 9.0

11. If $\frac{1}{3}t - 6 = 15$, what is the value of t?

$3 \cdot \frac{1}{3}t = 21 \cdot 3$

$t = 63$

A. 21 **C.** 53

B. 27 **(D.)** 63

12. Select the values of x that make the following inequality true.

$-3(x+1) > 15$

$-3x - 3 > 15$

$-3x > 18$

$x < -6$

☑ −9	☑ −7	☐ −5
☑ −8	☐ −6	☐ −4

13. What is the solution to the inequality below?

$$-2x + 6 > 3x - 4$$

$-5x + 6 > -4$

$-5x > -10$

$x < 2$

ANSWER: $x < 2$

14. The formula for the volume of a pyramid is given below.

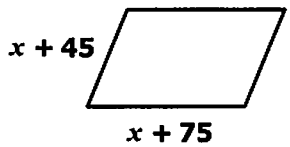
$$V = \frac{1}{3}bh \qquad 3V = bh$$

Which equation solves this formula for h?

F. $h = 3Vb$ **(H.)** $h = \frac{3V}{b}$

G. $h = \frac{3b}{V}$ **J.** $h = \frac{V}{3b}$

15. Tom's property has a shape of a parallelogram with the dimensions shown. If the perimeter of the property is 300 feet, what is the value of x?



$2(x+45) + 2(x+75) = 300$

$2x + 90 + 2x + 150 = 300$

$4x + 240 = 300$

$4x = 60$

A. 90 ft

B. 60 ft

C. 45 ft

(D.) 15 ft

Name: _____ **Algebra 1 Review:** Packet #2

Topic #1: Relations & Functions

- A **relation** is a set of ordered pairs.
- The **domain** is the set of x-values and the **range** is the set of y-values.
- A **function** is a relation with no repeating x-values.
- To check if a graph is a function, use the vertical line test.

1.

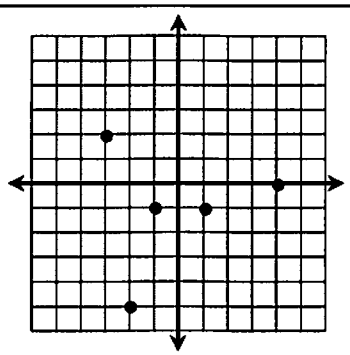
x	-1	2	5	-1
y	7	3	0	2

Domain: $\{-1, 2, 5\}$

Range: $\{0, 2, 3, 7\}$

Function? No

2.

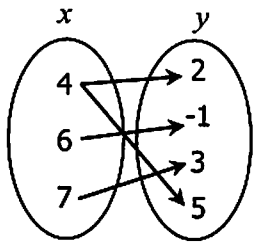


Domain: $\{-3, -2, -1, 1, 4\}$

Range: $\{-4, -1, 0, 2\}$

Function? Yes

3.

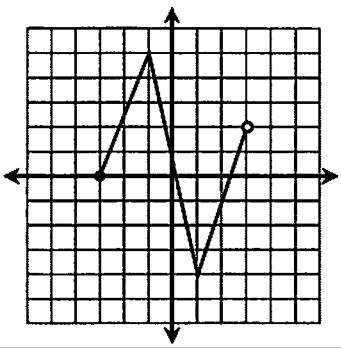


Domain: $\{4, 6, 7\}$

Range: $\{-1, 2, 3, 5\}$

Function? No

4.

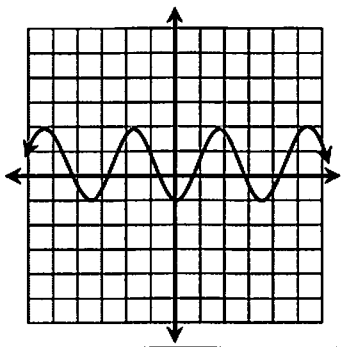


Domain: $-3 \leq x < 3$

Range: $-4 \leq y \leq 5$

Function? Yes

5.

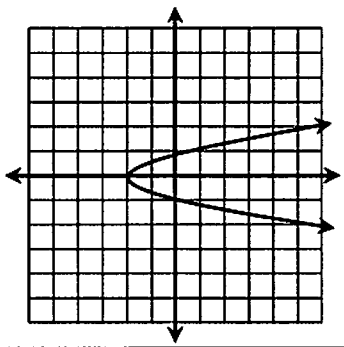


Domain: $\mathbb{R}$

Range: $-1 \leq y \leq 2$

Function? Yes

6.



Domain: $x \geq -2$

Range: $\mathbb{R}$

Function? No

Topic #2: Function Notation & Evaluating Functions

7. If $f(x) = -x - 7$, find $f(-5)$.

$f(-5) = -(-5) - 7$

$= 5 - 7 \quad = \boxed{-2}$

8. If $g(x) = x^2 - 2x + 11$, find $g(-2)$.

$g(-2) = (-2)^2 - 2(-2) + 11$

$= 4 + 4 + 11 \quad = \boxed{19}$

9. If $f(x) = 2x^2 - x$, find $f(-4) - f(9)$.

$f(-4) = 2(-4)^2 - (-4) = 36$

$f(9) = 2(9)^2 - 9 = 153$

$36 - 153 = \boxed{-117}$

10. If $h(x) = 1 - \frac{2}{3}x$, find $h(-6)$.

$h(-6) = 1 - \frac{2}{3}(-6) \quad = 1 + 4 \quad = \boxed{5}$

11. Find the range of the function $f(x) = 3x - 8$ if the domain is {-4, 2, 7}.

$f(-4) = 3(-4) - 8 = -20$

$f(2) = 3(2) - 8 = -2$

$f(7) = 3(7) - 8 = 13$

$\{-20, -2, 13\}$

12. Find the range of the function $f(x) = -x^2 + 4x$ if the domain is {-2, 0, 1}.

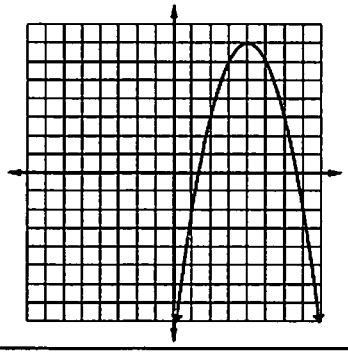
$f(-2) = -(-2)^2 + 4(-2) = -12$

$f(0) = -(0)^2 + 4(0) = 0$

$f(1) = -(1)^2 + 4(1) = 3$

$\{-12, 0, 3\}$

13. Given the graph of $f(x)$ below, find $f(3)$.



6

14. Given $f(x) = \frac{5}{2}x + 7$, if $f(x) = -13$, find x.

$-13 = \frac{5}{2}x + 7$

$-7 \qquad -7$

$\frac{2}{5} \cdot -20 = \frac{5}{2}x \cdot \frac{2}{5}$

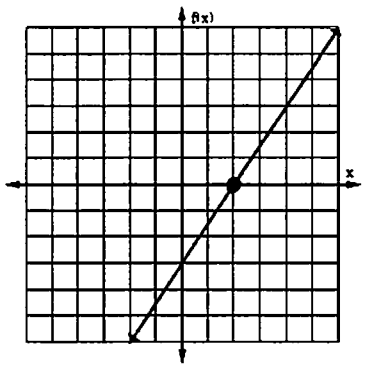
$x = -8$

Topic #3: Zeros of Functions

- **The zeros of a function are where it passes through the** x-axis.
- **To find the zeros, set the equation equal to** 0**, and solve for x!**

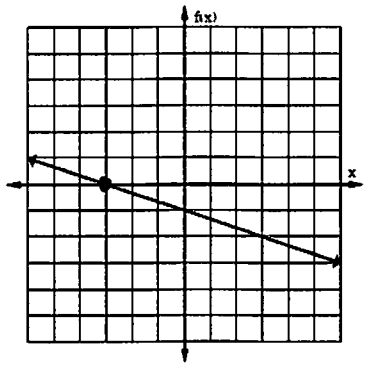
Find the zeros of each function graphed below.

15.



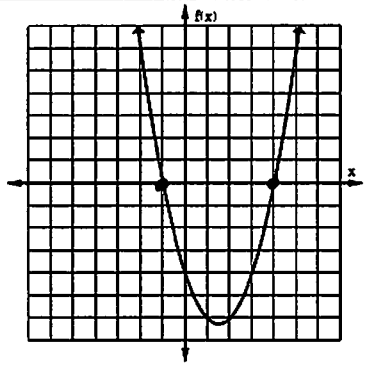
$x = 2$

16.



$x = -3$

17.



$x = \{-1, 4\}$

18. $f(x) = 2x + 2$

$0 = 2x + 2$

$-2 = 2x$

$-1 = x$

19. $f(x) = \frac{2}{5}x - 4$

$0 = \frac{2}{5}x - 4$

$4 = \frac{2}{5}x$

$x = 10$

20. $f(x) = x^2 + 3x - 40$

$0 = x^2 + 3x - 40$

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

$x + 8 = 0$	$x - 5 = 0$
$x = -8$	$x = 5$

$x = \{-8, 5\}$

21. $f(x) = 2x^2 - 72$

$2x^2 - 72 = 0$

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

$2 \mid (x+6)(x-6) = 0$

$2 \neq 0 \mid x+6=0 \mid x-6=0$

$x=-6 \mid x=6$

$x = \{-6, 6\}$

22. $f(x) = x^2 - 10x + 25$

$x^2 - 10x + 25 = 0$

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

$x-5=0 \mid x-5=0$

$x=5 \mid x=5$

$x = 5$

23. $f(x) = 5x^2 + 5x - 30$

$5x^2 + 5x - 30 = 0$

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

$5 \mid (x+3)(x-2) = 0$

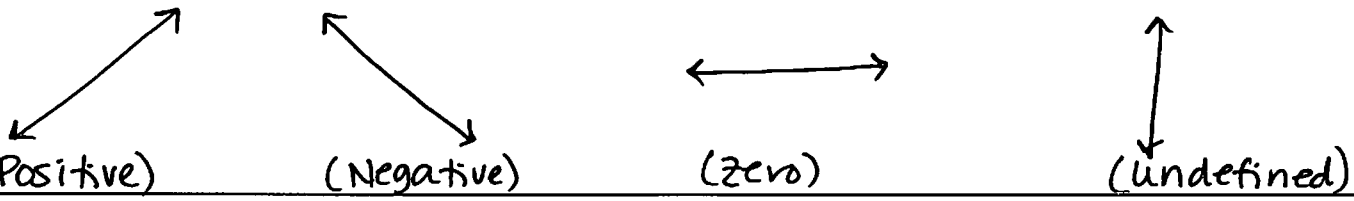
$5 \neq 0 \mid x+3=0 \mid x-2=0$

$x=-3 \mid x=2$

$x = \{-3, 2\}$

Topic #4: Slope

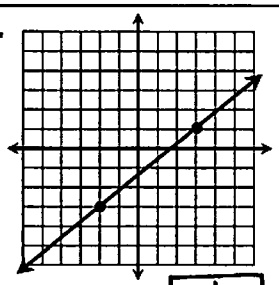
There are 4 **types of slope. Sketch them below:**



(Positive) (Negative) (zero) (undefined)

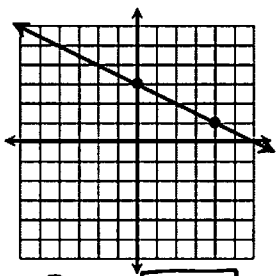
Find the slope of each line graphed below.

24.



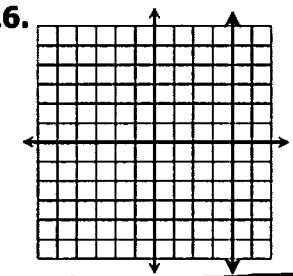
$\frac{4}{5}$

25.



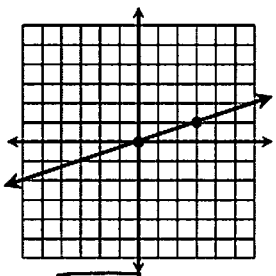
$-\frac{2}{4} = -\frac{1}{2}$

26.



undefined

27.



$\frac{1}{3}$

To find the slope formula given two points (x_1, y_1) and (x_2, y_2), use the SLOPE FORMULA:

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

Find the slope of the line passing through the given two points.

28. (-12, -1) and (-3, -4)

$m = \frac{-4+1}{-3+12} = \frac{-3}{9} = -\frac{1}{3}$

29. (-11, 7) and (-11, -2)

$m = \frac{-2-7}{-11+11} = \frac{-9}{0}$

= undefined

30. (9, -3) and (11, -7)

$m = \frac{-7+3}{11-9} = \frac{-4}{2} = -2$

31. (12, 11) and (-9, 11)

$m = \frac{11-11}{-9-12} = \frac{0}{-21} = 0$

Topic #5: Slope-Intercept Form & Standard Form

Slope-Intercept Form: $y = mx + b$	**Standard Form:** $Ax + By = C$
32. Write a linear equation in slope-intercept form with a slope of -1 and a y-intercept of 4. $y = -x + 4$	**33.** Write a linear equation in slope-intercept form with a slope of ¾ and a y-intercept of -5. $y = \frac{3}{4}x - 5$

For each of the following equations, write the equation in slope-intercept form, then identify the slope and y-intercept.

34. $x - y = 3$

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

Slope-Intercept Form: $y = x - 3$

Slope: 1 **y-int:** -3

35. $4x + 10y = -10$

$\frac{10y}{10} = \frac{-4x}{10} - \frac{10}{10}$

Slope-Intercept Form: $y = -\frac{2}{5}x - 1$

Slope: $-\frac{2}{5}$ **y-int:** -1

36. $4x + y = 8$

Slope-Intercept Form: $y = -4x + 8$

Slope: -4 **y-int:** 8

37. $x - 3y = 6$

$\frac{-3y}{-3} = \frac{-x}{-3} + \frac{6}{-3}$

Slope-Intercept Form: $y = \frac{1}{3}x - 2$

Slope: $\frac{1}{3}$ **y-int:** -2

Topic #6: x- and y-Intercepts

- **To find the x-intercept of a line, set** y **equal to** 0 **and solve for** x.
- **To find the y-intercept of a line, set** x **equal to** 0 **and solve for** y.

Find the x-intercept and y-intercept of each linear equation.

38. $y = 2x - 10$

$0 = 2x - 10$

$10 = 2x$

$5 = x$

$y = 2(0) - 10$

$y = 0 - 10$

$y = -10$

x-intercept: 5; (5,0)

y-intercept: -10; (0,-10)

39. $y = -\frac{3}{2}x + 9$

$0 = -\frac{3}{2}x + 9$

$-9 = -\frac{3}{2}x$

$6 = x$

$y = -\frac{3}{2}(0) + 9$

$y = 0 + 9$

$y = 9$

x-intercept: 6; (6,0)

y-intercept: 9; (0,9)

40. $2x + y = -2$

$2x + 0 = -2$

$2x = -2$

$x = -1$

$2(0) + y = -2$

$0 + y = -2$

$y = -2$

x-intercept: -1; (-1,0)

y-intercept: -2; (0,-2)

41. $3x - 4y = 24$

$3x - 4(0) = 24$

$3x - 0 = 24$

$3x = 24$

$x = 8$

$3(0) - 4y = 24$

$0 - 4y = 24$

$-4y = 24$

$y = -6$

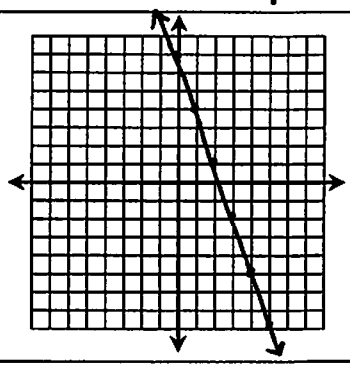
x-intercept: 8; (8,0)

y-intercept: -6; (0,-6)

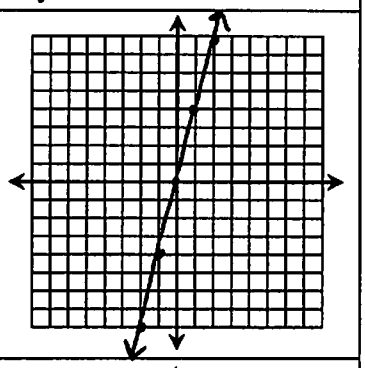
Topic #7: Graphing Linear Equations

Graph each linear equation. Convert to slope-intercept form when necessary.

42. $y = -3x + 7$



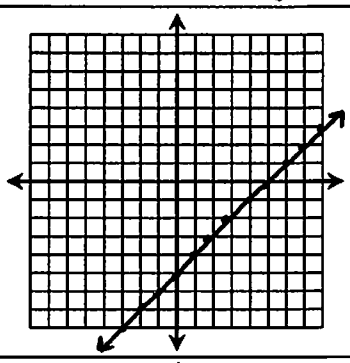
43. $y = 4x$



44. $x - y = 5$

$-y = -x + 5$

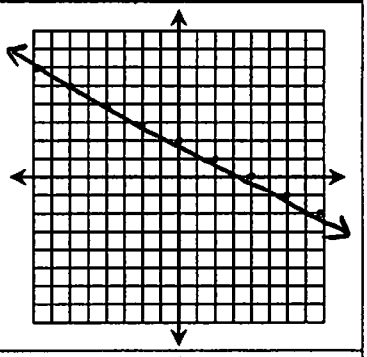
$y = x - 5$



45. $x + 2y = 4$

$2y = -x + 4$

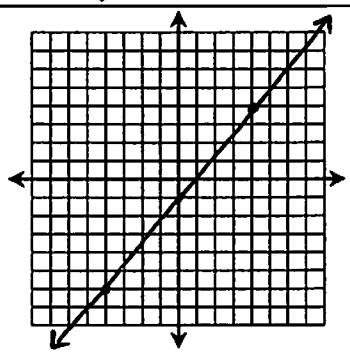
$y = -\frac{1}{2}x + 2$



46. $-10x + 8y = -8$

$8y = 10x - 8$

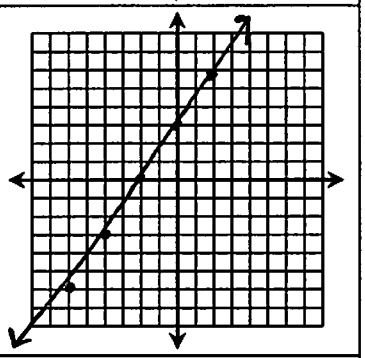
$y = \frac{5}{4}x - 1$



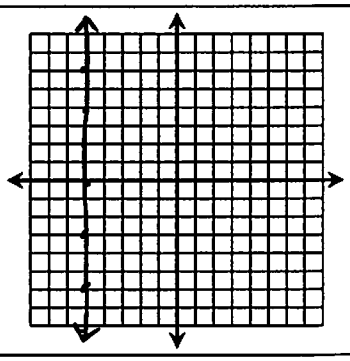
47. $3x - 2y = -6$

$-2y = -3x - 6$

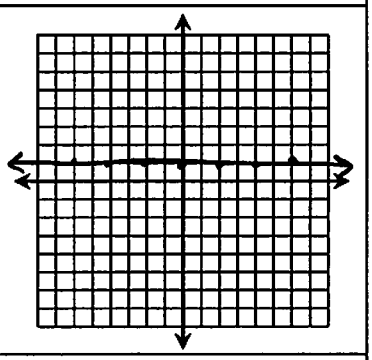
$y = \frac{3}{2}x + 3$



48. $x = -5$

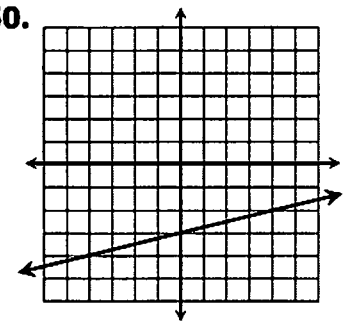


49. $y = 1$



Determine which line best represents the line shown on the graph.

50.



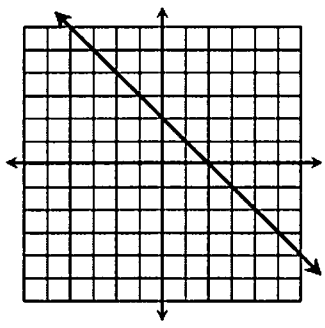
A. $x + 4y = -12$

B. $x - 4y = 12$

C. $4x + y = -3$

D. $4x - y = 3$

51.



A. $x - y = 2$

B. $x - y = -2$

C. $x + y = 2$

D. $x + y = -2$

Algebra 1 Review

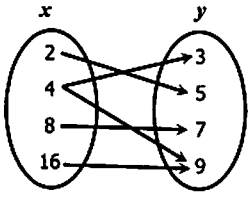
QUIZ 2

Name: _____

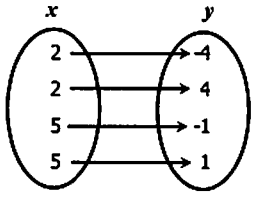
Date: _____ **Per:** _____

1. Which of these data sets represents a function?

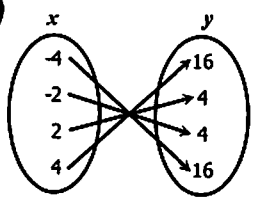
A.



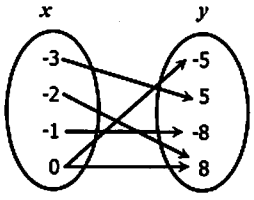
C.



B.



D.



2. Which of the following does not represent a function of x?

F.

x	1	1	1	1
y	1	2	3	4

H.

x	1	2	3	4
y	1	1	2	4

G.

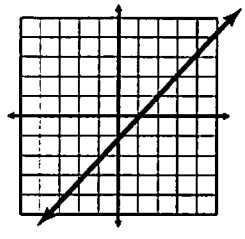
x	1	2	3	4
y	2	2	2	2

J.

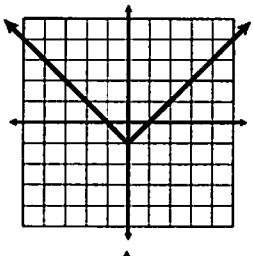
x	0	2	4	6
y	0	1	3	5

3. Which of the following could not be the graph of a function of x?

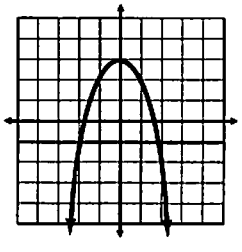
A.



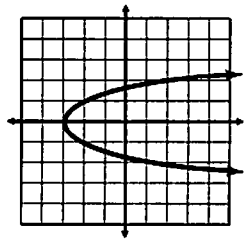
C.



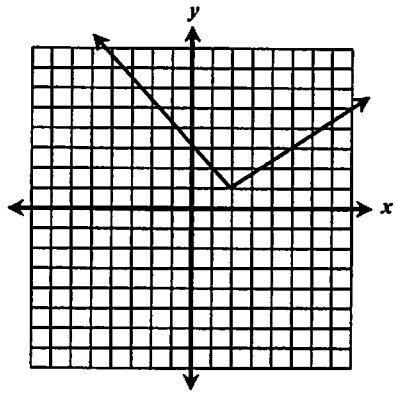
B.



D.



4. What is the apparent range of the function of x shown below?



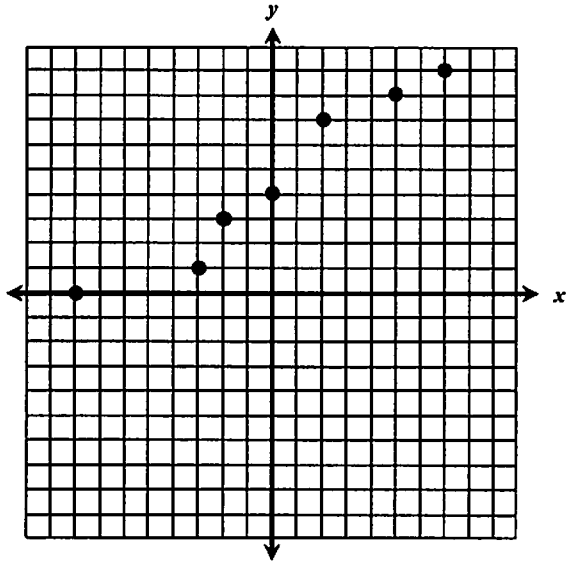
F. $x \geq 1$

G. $y \geq 1$

H. $y \geq 2$

J. all real numbers

5. The following is a graph of a function of x. Which of the following values belong to the domain of the function?



- ☐ −1
- ☑ −3
- ☑ 0
- ☐ 8
- ☑ 2
- ☐ −7

6. If $f(x) = -2x^2 + x - 5$, what is $f(3)$?

$f(3) = -2(3)^2 + 3 - 5$

$= -2(9) + 3 - 5$

$= -18 + 3 - 5$

ANSWER: −20

7. What is the range of the function $f(x) = (x-1)^2$ when the domain is {-5, 0, 5}?

$f(-5) = (-5-1)^2 = 36$

$f(0) = (0-1)^2 = 1$

$f(5) = (5-1)^2 = 16$

(A.) {1, 16, 36}
C. {1, 26}
B. {1, 24}
D. {-12, -2, 8}

8. Which is a zero of the function given below?

$f(x) = x^2 - x - 12$

$0 = (x-4)(x+3)$

$x-4=0 \mid x+3=0$

$x=4 \mid x=-3$

F. 1
G. 2
H. 3
(J.) 4

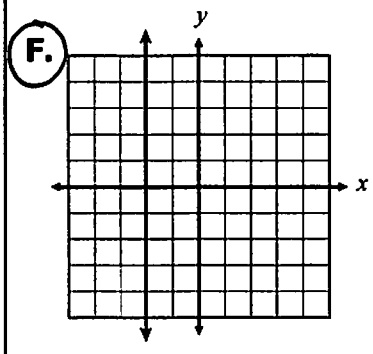
9. What is the slope of the line $4x + 8y = 12$?

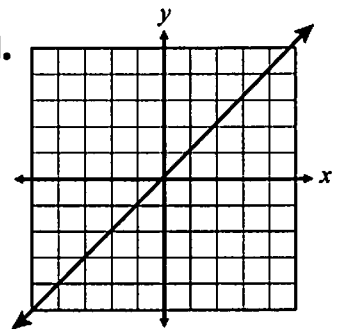
$8y = -4x + 12$

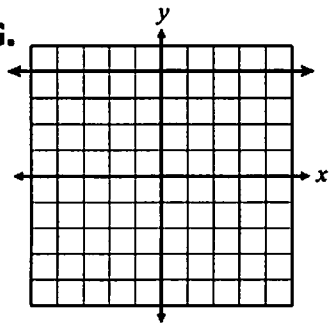
$y = -\frac{1}{2}x + \frac{3}{2}$

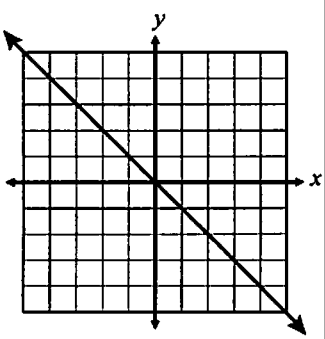
A. 4
C. -4
B. $\frac{3}{2}$
(D.) $-\frac{1}{2}$

10. What graph best represents a line with an undefined slope?

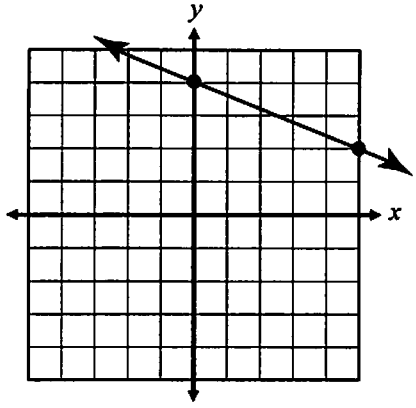
(F.)


H.


G.


J.


11. What is the apparent slope of the line graphed below?



A. $\frac{5}{2}$
B. $\frac{2}{5}$
C. $-\frac{5}{2}$
(D.) $-\frac{2}{5}$

12. What is the slope of the line that passes through the points (5, 0) and (10, 0)?

(F.) 0
G. 1
H. 5
J. undefined

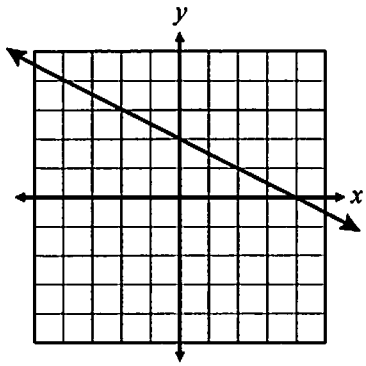
$m = \frac{0-0}{10-5} = \frac{0}{5}$

13. What is the slope of the line that passes through the points (3, 2) and (-1, -4)? Write your answer as a fraction in simplest form

$m = \frac{-4-2}{-1-3} = \frac{-6}{-4} = \frac{3}{2}$

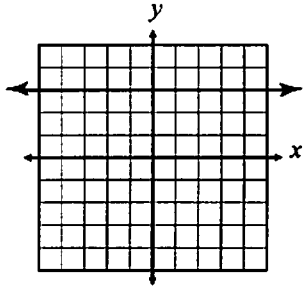
ANSWER: $m = 3/2$

14. What is the equation of the graphed line?



(A.) $x + 2y = 4$
B. $x + 2y = -4$
C. $2x + y = 2$
D. $2x - y = 2$

15. What is the equation of the graphed line?



F. $y = x + 3$
G. $y = 3x$
(H.) $y = 3$
J. $x = 3$

Name: _____ **Algebra 1 Review:** Packet #3

Topic #1: Writing Linear Equations Given a Point and a Slope

When given a point (x_1, y_1) and the slope, m, use the point-slope formula:

$$y - y_1 = m(x - x_1)$$

Write a linear equation in slope-intercept form using the given point and slope.

1. (2, 7); slope = 3

$y - 7 = 3(x - 2)$

$y - 7 = 3x - 6$

$+7 \qquad +7$

$\boxed{y = 3x + 1}$

2. (1, 4); slope = -1

$y - 4 = -1(x - 1)$

$y - 4 = -x + 1$

$+4 \qquad +4$

$\boxed{y = -x + 5}$

3. (4, -2); slope = $-\frac{1}{2}$

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

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

$-2 \qquad -2$

$\boxed{y = -\frac{1}{2}x}$

4. (6, -1); slope = $\frac{2}{3}$

$y + 1 = \frac{2}{3}(x - 6)$

$y + 1 = \frac{2}{3}x - 4$

$-1 \qquad -1$

$\boxed{y = \frac{2}{3}x - 5}$

Topic #2: Writing Linear Equations Given Two Points

When given two ordered pairs (x_1, y_1) and (x_2, y_2), use the slope formula followed by point-slope formula:

$$m = \frac{y_2 - y_1}{x_2 - x_1} \quad \Rightarrow \quad y - y_1 = m(x - x_1)$$

Write a linear equation in slope-intercept form using the given two points.

5. (-1, 1) and (-3, -7)

$m = \frac{-7 - 1}{-3 + 1}$

$m = \frac{-8}{-2}$

$m = 4$

$y - 1 = 4(x + 1)$

$y - 1 = 4x + 4$

$+1 \qquad +1$

$\boxed{y = 4x + 5}$

6. (0, 3) and (5, 1)

$m = \frac{1 - 3}{5 - 0}$

$m = \frac{-2}{5}$

$y - 3 = \frac{-2}{5}(x - 0)$

$y - 3 = -\frac{2}{5}x$

$\boxed{y = \frac{-2}{5}x + 3}$

7. (-2, -3) and (1, 2)

$m = \frac{2 + 3}{1 + 2}$

$m = \frac{5}{3}$

$y - 2 = \frac{5}{3}(x - 1)$

$y - 2 = \frac{5}{3}x - \frac{5}{3}$

$\boxed{y = \frac{5}{3}x + \frac{1}{3}}$

8. (4, 1) and (-6, -4)

$m = \frac{-4 - 1}{-6 - 4}$

$m = \frac{-5}{-10}$

$m = \frac{1}{2}$

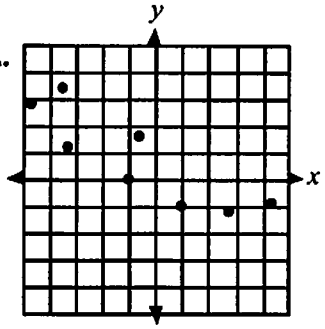
$y - 1 = \frac{1}{2}(x - 4)$

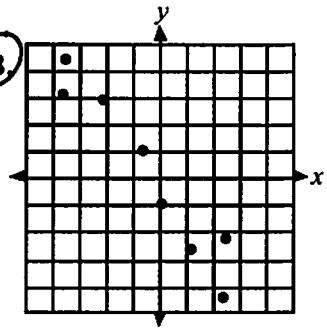
$y - 1 = \frac{1}{2}x - 2$

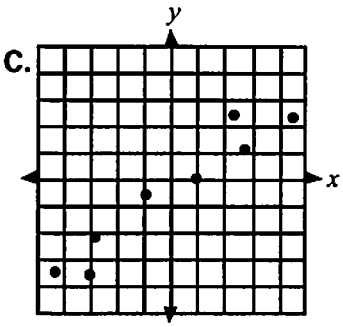
$\boxed{y = \frac{1}{2}x - 1}$

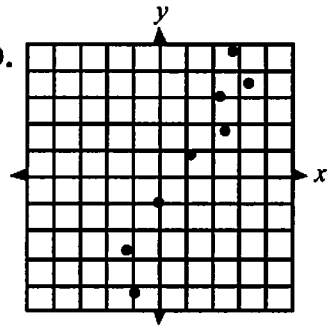
Topic #3: Line of Best Fit

9. Which scatterplot most likely has a line of best fit represented by $y = -2x - 1$?

A. 

B. 

C. 

D. 

10. The table below shows the meal cost and tip for the last 10 tables that a waiter served.

Meal Cost, x	Tip, y
\$25.62	\$4.50
\$37.94	\$6.50
\$16.25	\$3.25
\$42.98	\$7.50
\$28.32	\$5.00

a) Find the line of best fit for the data.

$y = 0.16x + 0.55$

b) If a meal costs \$60, estimate the tip expected.

$y = 0.16(60) + 0.55$

$y = 10.15$

\$10.15

11. The table below shows the annual sales, in thousands, for a coffee shop in certain years since it opened in 2004.

	Year, x	Sales, y
0	2004	205
4	2008	286
6	2010	327
11	2015	428
13	2017	470

a) Find the line of best fit for the data.

$y = 20.4x + 204.8$

b) According to your equation, how many years will it take the shop to reach \$750,000 in annual sales?

$750 = 20.4x + 204.8$

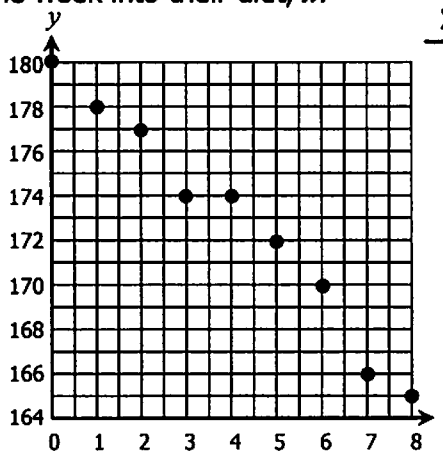
$-204.8 \quad -204.8$

$\frac{545.2}{20.4} = \frac{20.4x}{20.4}$

$26.7 = x$

27 yrs

12. The scatter plot shows the weight of a person, y, and the week into their diet, x.



X	Y
0	180
1	178
2	177
3	174
4	174
5	172
6	170
7	166
8	165

a) Find the line of best fit for the data.

$y = -1.9x + 180.4$

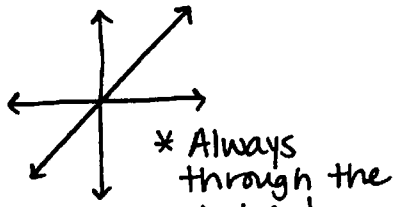
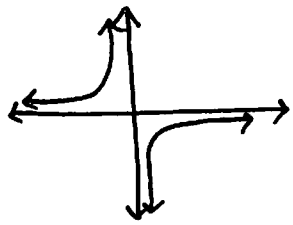
b) Predict the person's weight after 12 weeks.

$y = -1.9(12) + 180.4$

$y = 157.6$

≈ 158 lb

Topic #4: Direct and Inverse Variation

	DIRECT VARIATION	INVERSE VARIATION
What is it?	A specific relationship with a constant ratio between all ordered pairs.	A specific relationship with a constant product between all ordered pairs.
Equation Form	$y = k \cdot x$ (where k is the constant of variation)	$y = \frac{k}{x}$ (where k is the constant of variation)
How do you test for it?	**Check for a constant** ratio !	**Check for a constant** product !
What does the graph look like?	 * Always through the origin!	
How do you solve for missing values?	$\frac{y}{x} = \frac{y}{x}$	$x \cdot y = x \cdot y$

Determine whether the equation represents a direct variation, inverse variation, or neither.

13. $y = -3x$

Direct

14. $xy = 24$

$y = \frac{24}{x}$ Inverse

15. $y = \frac{60}{x}$

Inverse

16. $\frac{y}{8} = x$

$y = 8x$ Direct

17. $y = \frac{2}{5}x + 1$

Neither

18. $x - 2y = 0$

$-2y = -x$

$y = \frac{1}{2}x$ Direct

Determine if a direct or inverse variation exists. Identify the constant of variation and write the equation if possible.

19.

{(6, 8), (4, 12), (3, 16), (2, 24)}

Inverse $x \cdot y = 48$

$y = \frac{48}{x}$

20.

x	y
0	0
3	5
6	10
9	15

Direct

$\frac{y}{x} = \frac{5}{3}$

$y = \frac{5}{3}x$

21.

x	y
1.5	20
2.5	12
4	7.5
5	6

Inverse

$x \cdot y = 30$

$y = \frac{30}{x}$

22.

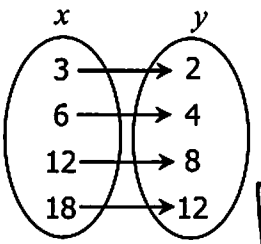
{(-10, 5), (-8, 4), (-6, 3), (-2, 1)}

Direct

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

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

23.



Direct

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

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

24.

x	2	4	8	11
y	1.5	3	6	8.25

Direct

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

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

If the values below represent a direct variation, find the missing value.

25. (5, 14) and (x, 28)

$\frac{14}{5} = \frac{28}{x}$

$14x = 140$

$x = 10$

26. (8, 52) and (12, y)

$\frac{52}{8} = \frac{y}{12}$

$8y = 624$

$y = 78$

27.

x	y
0	0
4	9
?	31.5
20	45

$\frac{9}{4} = \frac{31.5}{x}$

$9x = 126$

$x = 14$

If the values below represent an inverse variation, find the missing value.

28. (4, 12) and (3, y)

$4 \cdot 12 = 3 \cdot y$

$48 = 3y$

$16 = y$

29. (x, 12.8) and (15, 6.4)

$x \cdot 12.8 = 15 \cdot 6.4$

$12.8x = 96$

$x = 7.5$

30.

x	y
2.5	102.4
5	51.2
8	32
12.5	y

$8 \cdot 32 = 12.5 \cdot y$

$256 = 12.5y$

$20.48 = y$

Read each problem carefully, then solve using the applicable variation.

31. The interest earned on an account varies directly with the balance in the account. If an account with a balance of \$200 earns \$12.50 in interest, find the amount of interest earned on an account with a balance of \$500. $\left(\frac{\text{Int}}{\text{Bal}}\right)$

$\frac{12.50}{200} = \frac{x}{500}$

$200x = 6250$

$x = \$31.25$

32. The height of a TV varies directly with its width. If a TV with a width of 16 inches has a height of 9 inches, find the width of a TV with a height of 20.25 inches. $\left(\frac{H}{W}\right)$

$\frac{9}{16} = \frac{20.25}{x}$

$9x = 324$

$x = 36$ in

33. The time spent in line to enter a concert varies inversely to the number of gates open. If just 3 gates are open, the wait time is about 50 minutes. Find the wait time if there are 8 gates open.

$3 \cdot 50 = 8 \cdot x$

$150 = 8x$

$18.75 = x$

18.75 min

(18 min, 45 sec)

34. The number of songs that an MP3 player can store varies inversely with the average size of the song. A certain MP3 player can store 800 songs with an average size of 4 megabytes. If the average size of a song is 5 megabytes, how many songs can the player store?

$800 \cdot 4 = 5 \cdot x$

$3200 = 5x$

$640 = x$

640 Songs

Algebra 1 Review

QUIZ 3

Name: _____

Date: _____ **Per:** _____

1. Write the equation of the line passing through the point (2, -1) with a slope of -3.

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

$y+1 = -3x+6$

$-1 \qquad -1$

$y = -3x+5$

ANSWER: $y = -3x+5$

2. Which is an equation of the line with a slope of $\frac{2}{3}$ passing through the point (4, -1)?

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

$y+1 = \frac{2}{3}x - \frac{8}{3}$

A. $y = -\frac{1}{4}x + \frac{2}{3}$

B. $y = -4x + \frac{2}{3}$

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

(D.) $y = \frac{2}{3}x - \frac{11}{3}$

3. Write the equation of the line passing through the points (-4, -7) and (8, -13)

$m = \frac{-13+7}{8+4}$

$m = \frac{-6}{12}$

$m = -\frac{1}{2}$

$y+7 = -\frac{1}{2}(x+4)$

$y+7 = -\frac{1}{2}x - 2$

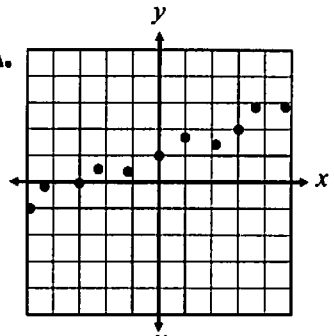
$-7 \qquad -7$

$y = -\frac{1}{2}x - 9$

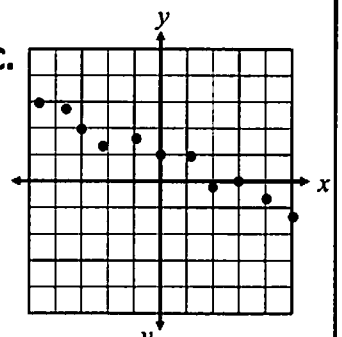
ANSWER: $y = -\frac{1}{2}x - 9$

4. Which scatterplot most likely has a line of best fit represented by $y = 3x + 1$?

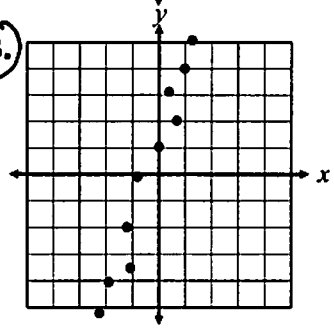
A.



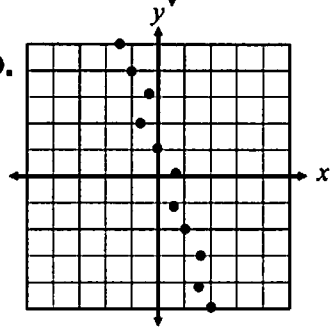
C.



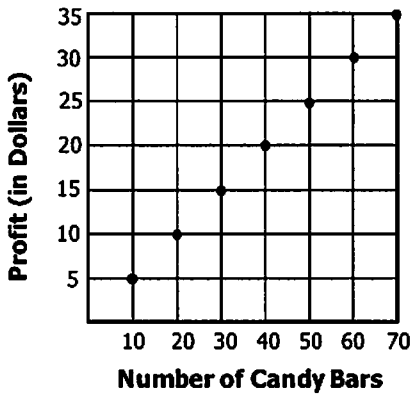
(B.)



D.



5. The graph represents the relationship between the number of candy bars sold and the amount of profit made during the softball team's candy bar sale.



Which is closest to the minimum number of candy bars that must be sold to make a $400 profit?

A. 650
B. 700
C. 750
(D.) 800

6. Which table does not show a direct variation?

F.

x	-2	-1	0	1
y	-8	-4	0	4

H.

x	0	3	6	9
y	0	1	2	3

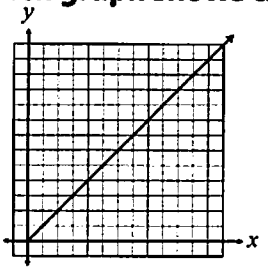
G.

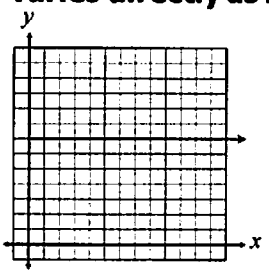
x	1	2	3	4
y	5	10	15	20

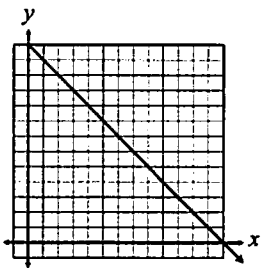
(J.)

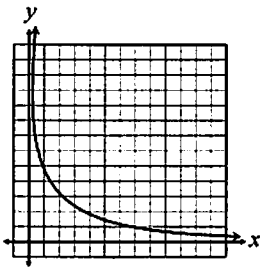
x	1	2	3	4
y	1	4	9	16

7. Which graph shows that y varies directly as x?

(A.) 

C. 

B. 

D. 

8. Which set of ordered pairs satisfies an inverse variation?

F. (6, 3) and (8, 4)

G. (2, -3) and (4, 5)

H. (4, -2) and (-5, 10)

(J.) (2, 6) and (-3, -4)

9. In the table below, y varies inversely as x. What is the missing value?

x	y
3	4
6	2
24	?

A. 1

B. 3

(C.) 0.5

D. 0.25

10. If the point (2, -10) lies on the graph of a direct variation, which represents the direct variation equation? $\frac{y}{x} = \frac{-10}{2} = -5$

F. $y = -20x$

(H.) $y = -5x$

G. $y = \frac{-20}{x}$

J. $y = \frac{-5}{x}$

11. Which equation represents an inverse variation with a constant of 56?

A. $\frac{y}{x} = 56$

B. $\frac{7}{y} = \frac{8}{x}$

C. $\frac{1}{4}y = 14x$

(D.) $\frac{xy}{2} = 28$

$xy = 56$

$y = \frac{56}{x}$

12. The graph of an equation representing a direct variation passes through the point (6, 10). Give another point with integral coordinates that is also on the graph of this equation.

*Answers vary *

(3 , 5)

13. For a group of objects made of the same material, the weight of an object varies directly with its volume. If an object that has a volume of 30 cubic inches weighs 24 ounces, what is the constant of variation?

y = weight

x = volume

$\frac{24}{30} = \frac{4}{5}$

(F.) $\frac{4}{5}$

H. $\frac{5}{4}$

G. 720

J. 6

14. The time required to complete a job varies inversely as the number of people working. It takes 4 hours for 7 electricians to wire a building. How long would it take 3 electricians to do the job?

$4 \cdot 7 = 3 \cdot x$

$28 = 3x$

$9\frac{1}{3} = x$

A. 1 hr 43 min

B. 5 hr 15 min

C. 7 hr 30 min

(D.) 9 hr 20 min

15. Sarah burned 280 calories running 20 minutes. The next day, Sarah burned 490 calories running for 35 minutes.

- **Let c represent the number of calories.**
- **Let t represent time, in minutes, spent running.**

(20, 280) (35, 490)

Which equation represents this relationship?

A. $c = 5600t$

B. $ct = 5600$

(C.) $c = 14t$

D. $t = 14c$

Name: _____ **Algebra 1 Review:** Packet #4

Topic #1: Systems of Equations

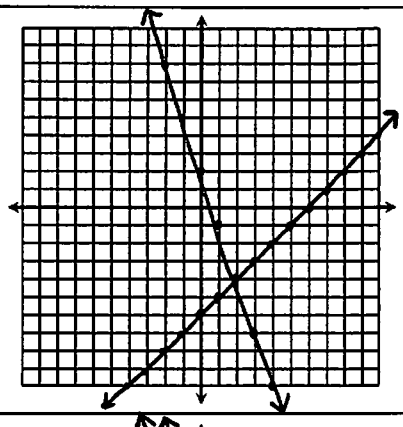
1. What is a system of equations? Two linear equations on the same graph

2. The possible solutions are one solution (x,y) for intersecting lines; No solution (θ) for parallel lines; infinite solutions (∞) for identical lines

Topic #2: Solving Systems Graphically

Solve each system of equations by graphing.

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

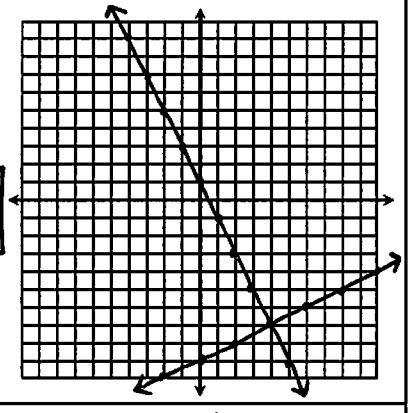


(2,-4)

4. $\begin{cases} 2x + y = 1 \\ x - 2y = 18 \end{cases}$

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

$x - 2y = 18$
$-2y = -x + 18$
$y = \frac{1}{2}x - 9$

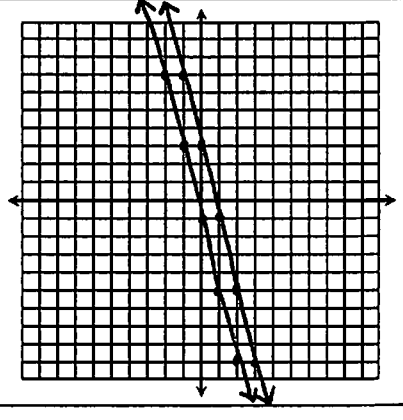


(4,-7)

5. $\begin{cases} 4x + y = -1 \\ 2y = 6 - 8x \end{cases}$

$4x + y = -1$
$y = -4x - 1$

$2y = -8x + 6$
$y = -4x + 3$

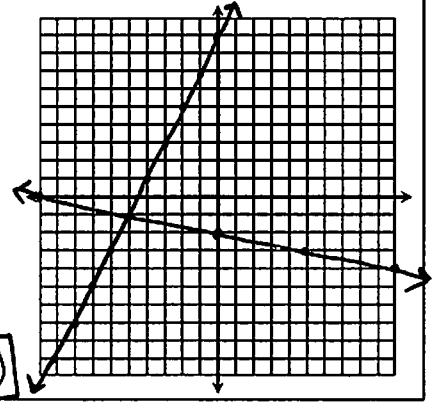


θ

6. $\begin{cases} x + 5y = -10 \\ 4x - 2y = -18 \end{cases}$

$5y = -x - 10$
$y = -\frac{1}{5}x - 2$

$-2y = -4x - 18$
$y = 2x + 9$



(5,-1)

Topic #3: Systems of Equations Algebraically

Use either substitution or elimination to solve each system of equations.

7. $\begin{cases} x + y = -4 \\ + \; x - y = 2 \end{cases}$

$2x = -2$
$x = -1$

$-1 + y = -4$
$y = -3$

(-1,-3)

8. $\begin{cases} x + y = 4 \quad) \cdot 2 \\ 2x - 5y = 15 \end{cases}$

$2x + 2y = 8$
$-(2x - 5y = 15)$

$7y = -7$
$y = -1$

$x - 1 = 4$
$x = 5$

(5,-1)

9. $\begin{cases} 4x+3y=-1 \\ 5x+4y=1 \end{cases}$ $\begin{matrix} \cdot 4 \\ \cdot 3 \end{matrix}$

$16x+12y=-4$

$-(15x+12y=3)$

$x=-7$

$4(-7)+3y=-1$

$-28+3y=-1$

$3y=27$

$y=9$

$(-7,9)$

10. $\begin{cases} y=4x+2 \\ y=x-1 \end{cases}$

$-(\quad)$

$0=3x+3$

$-3=3x$

$-1=x$

$y=-1-1$

$y=-2$

$(-1,-2)$

11. $\begin{cases} x=2y-3 \\ 2x-3y=-5 \end{cases}$

$2(2y-3)-3y=-5$

$4y-6-3y=-5$

$y-6=-5$

$y=1$

$x=2(1)-3$

$x=2-3$

$x=-1$

$(-1,1)$

12. $\begin{cases} 2x+3y=4 \\ y=5x-27 \end{cases}$

$2x+3(5x-27)=4$

$2x+15x-81=4$

$17x=85$

$x=5$

$y=5(5)-27$

$y=25-27$

$y=-2$

$(5,-2)$

Topic #4: Applications

Use a system of equations to solve each of the following problems.

13. Briana bought 3 bottles of ketchup and 2 bottles of mustard and for \$11.85. Logan bought 2 bottles of ketchup and 5 bottles of mustard for \$13.73. Find the cost of each.

x = ketchup

y = mustard

$\begin{matrix} (3x+2y=11.85)\cdot 2 \\ (2x+5y=13.73)\cdot 3 \end{matrix}$

$6x+4y=23.70$

$-(6x+15y=41.19)$

$-11y=-17.49$

$y=1.59$

$3x+2(1.59)=11.85$

$3x+3.18=11.85$

$3x=8.67$

$x=2.89$

\$2.89 / ketchup

\$1.59 / mustard

14. The Boy Scouts are selling two types of popcorn as part of a fundraiser, butter and caramel. Butter popcorn sells for \$5 per bag and caramel popcorn sells for \$6.50 per bag. So far, Alec has sold 40 total bags and raised \$221. Find the number of bags he has sold for each type of popcorn.

x = butter

y = caramel

$(x+y=40)\cdot 5$

$5x+6.5y=221$

$5x+5y=200$

$-(5x+6.5y=221)$

$-1.5y=21$

$y=14$

$x+14=40$

$x=26$

26-butter and 14-caramel

15. A restaurant has tables that seat 6 people and booths that seat 4 people. If the restaurant a total of 37 tables and booths that can accommodate up to 180 people, how many booths do they have?

x = table
y = booth

$(x+y=37)\cdot 4$
$6x+4y=180$

$4x+4y=148$
$-(6x+4y=180)$
$-2x=-32$
$x=16$

$16+y=37$
$y=21$

21 booths

16. Scott and his wife Maria have cell phone plans in which they pay for each call minute and text message they send. Last month, Scott used 95 call minutes and sent 207 text messages for $23.55. Maria used 162 call minutes and sent 124 text messages for $17.26. Find the cost for each call minute.

x = call
y = text

$(95x+207y=23.55)\cdot 124$
$(162x+124y=17.26)\cdot 207$

$11780x+25668y=2920.20$
$-(33534x+25668y=3572.82)$
$-21754x=-652.62$
$x=0.03$

$0.03/min

17. Camille has a collection of 61 nickels and quarters worth $6.85. How many of each coin does she have?

x = nickel
y = quarter

$(x+y=61)\cdot 0.05$
$.05x+.25y=6.85$

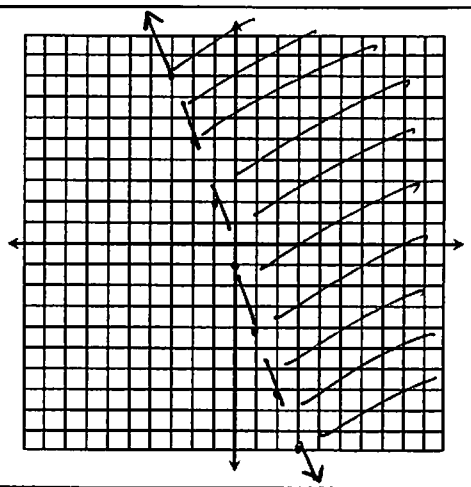
$0.05x+.05y=3.05$
$-(.05x+.25y=6.85)$
$-.2y=-3.8$
$y=19$

42 Nickels
19 Quarters

Topic #5: Linear Inequalities

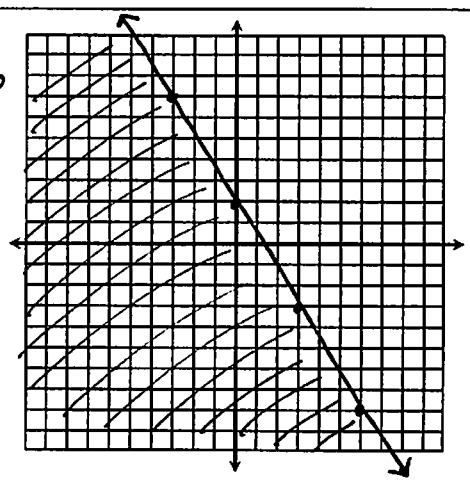
Graph each linear inequality.

18. $y>-3x-1$



19. $5x+3y\le 6$

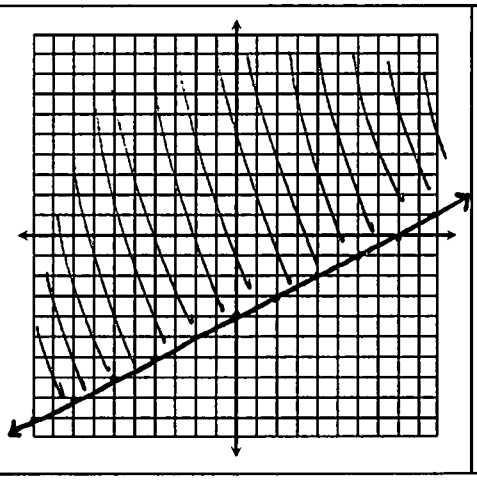
$3y\le -5x+6$
$y\le -\frac{5}{3}x+2$



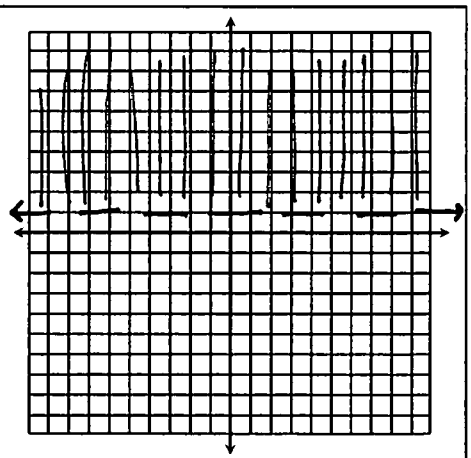
20. $x - 2y \leq 8$

$-2y \leq -x + 8$

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



21. $y > 1$



Topic #6: Systems of Linear Inequalities

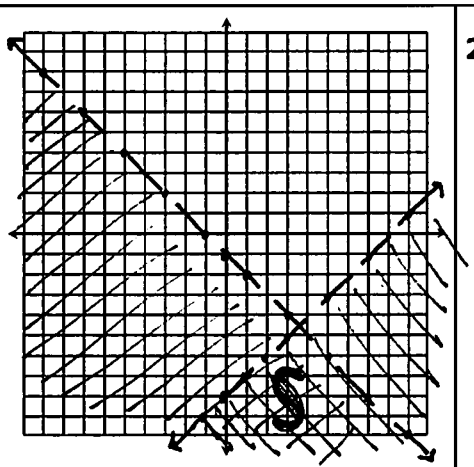
Graph the solution to each system of inequalities.

22. $\begin{cases} x + y < -1 \\ x - y > 8 \end{cases}$

$y < -x - 1$

$-y > -x + 8$

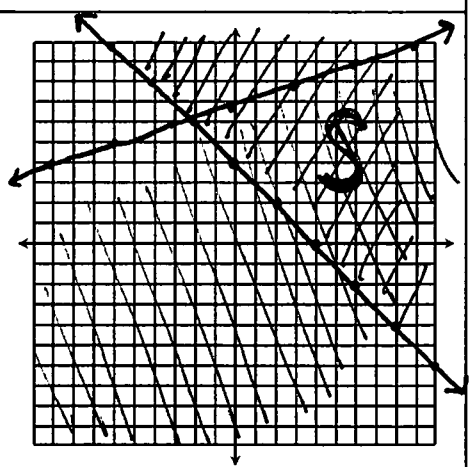
$y < x - 8$



23. $\begin{cases} -x + 3y \leq 21 \\ y \geq -x + 4 \end{cases}$

$3y \leq x + 21$

$y \leq \frac{1}{3}x + 7$

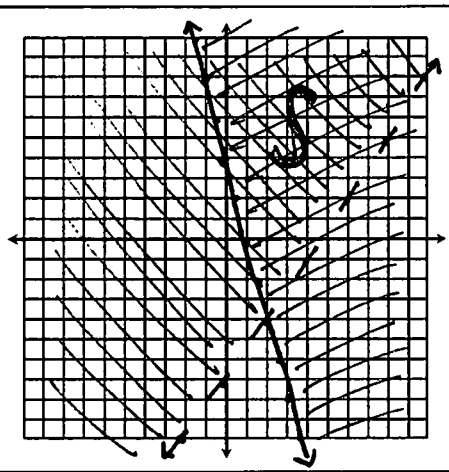


24. $\begin{cases} 4x + y \geq 4 \\ 3x - 2y < 14 \end{cases}$

$y \geq -4x + 4$

$-2y < -3x + 14$

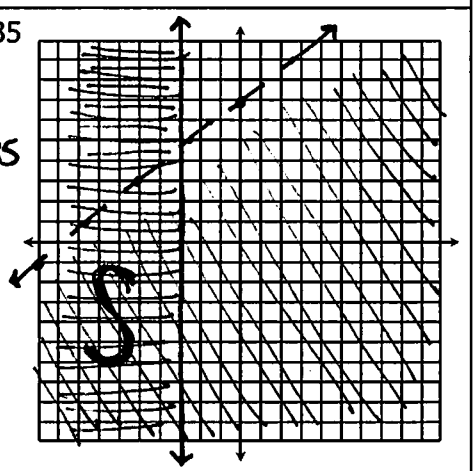
$y > \frac{3}{2}x - 7$



25. $\begin{cases} 4x - 5y > -35 \\ x \leq -3 \end{cases}$

$-5y > -4x - 35$

$y < \frac{4}{5}x + 7$



Algebra 1 Review

QUIZ 4

Name: _____

Date: _____ **Per:** _____

1. What is the solution to the system below?

$$\begin{cases} x+y=5 \\ x-y=3 \end{cases}$$

$2x = 8$

$x = 4$

A. (8, -3)
C. (5, 2)
B. (6, -1)
D. (4, 1)

2. What is the solution to the system below?

$$\begin{cases} x+3y=0 \\ 2x-y=-7 \end{cases} \cdot 3$$

$-3+3y=0$

$3y=3$

$y=1$

$x+3y=0$

$6x-3y=-21$

$7x=-21$

$x=-3$

F. $\left(10\frac{1}{2}, -3\frac{1}{2}\right)$
H. $\left(-3, \frac{1}{3}\right)$
G. (-3, 1)
J. (3, 1)

3. What is the solution to the system below?

$$\begin{cases} -4x+5y=27 \\ x-6y=-2 \end{cases} \cdot 4$$

$-4x+5y=27$

$4x-24y=-8$

$-19y=19$

$y=-1$

$x+6=-2$

$x=-8$

$(-8, -1)$

4. What is the solution to the system below?

$$\begin{cases} y=5x-9 \\ y=x+3 \end{cases}$$

$0=4x-12$

$12=4x$

$3=x$

$y=3+3$

$y=6$

$(3, 6)$

5. What is the solution to the system below?

$$\begin{cases} 3x+y=11 \\ y=x+3 \end{cases}$$

$3x+x+3=11$

$4x=8$

$x=2$

$y=2+3$

$y=5$

A. (4, 7)
C. (2, 17)
B. $\left(\frac{1}{2}, 3\frac{1}{2}\right)$
D. (2, 5)

6. What is the solution to the system below?

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

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

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

$-4=-4$

∞

F. (6, 2)
G. (-1, -5)
H. No Solution
J. Infinite Solutions

7. Rob has a collection of nickels (x) and dimes (y) worth $1.65. If there are 25 coins total, how many dimes does he have?

$(x+y=25) \cdot .05$

$.05x+.10y=1.65$

$.05x+.05y=1.25$

$-(.05x+.10y=1.65)$

$-.05y=-.40$

$y=8$

ANSWER: 8 dimes

8. Keesha bought 11 binders and notebooks from the store and spent $45. Binders cost $6 each and notebooks cost $2.50 each. Which two equations can be used to find the number of binders, b, and notebooks, n, she purchased?

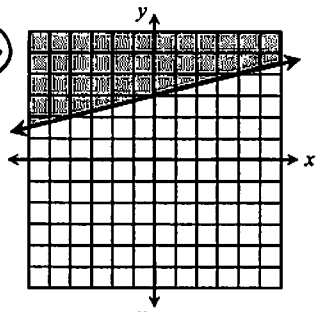
☑ $b+n=11$	☐ $6b+2.5n=11$
☐ $b+n=45$	☑ $6b+2.5n=45$

9. Which graph represents the solution to the inequality $x-4y \le -12$?

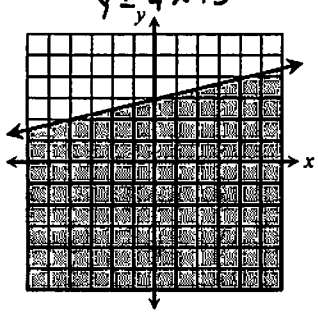
$-4y \le -x-12$

$y \ge \frac{1}{4}x+3$

(A.)



C.



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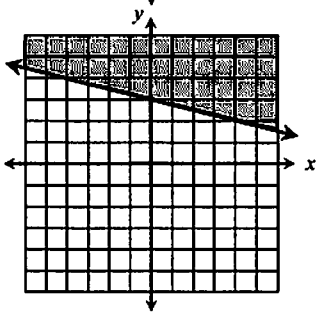

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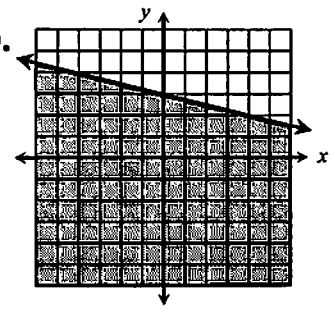
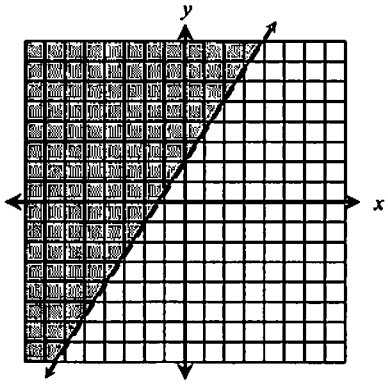


10. Which inequality represents the graph?



F. $y \ge \frac{3}{2}x+2$

G. $y \le \frac{3}{2}x+2$

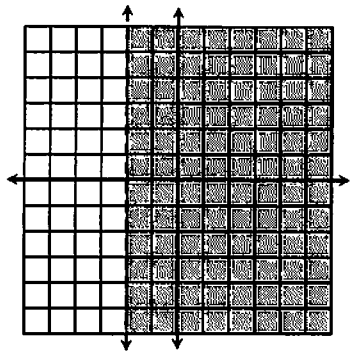
(H.) $y > \frac{3}{2}x+2$

J. $y < \frac{3}{2}x+2$

11. Which ordered pairs are solutions to the inequality $2x-y > -4$? Check all that apply.

☐ $(-4,-3)$	☑ $(1,-6)$	☑ $(-2,-5)$
☑ $(8, 2)$	☑ $(4, 0)$	☐ $(-3, 5)$

12. Which inequality represents the graph?



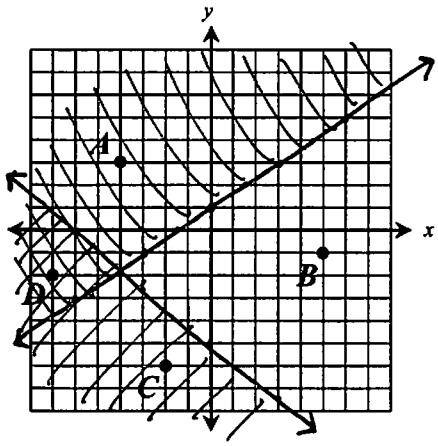
A. $x < -2$

(B.) $x > -2$

C. $y > -2$

D. $y < -2$

13. Which point on the graph below is included in the solution to the following system of equations?



$$\begin{cases} y \ge \frac{2}{3}x+1 \\ 5x+6y \le -30 \end{cases}$$

$6y \le -5x-30$

$y \le -\frac{5}{6}x-5$

A. A C. C

B. B (D.) D

14. Which graph represents the solution to the system of inequalities below?

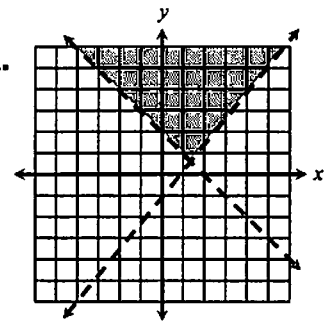
$y < -x+2$

$$\begin{cases} 5x-4y > 4 \\ x+y < 2 \end{cases}$$

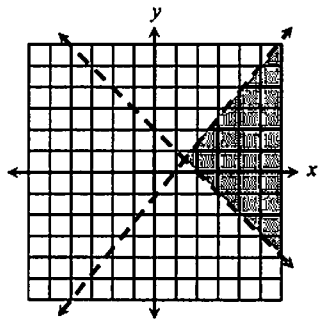
$-4y > -5x+4$

$y < \frac{5}{4}x-1$

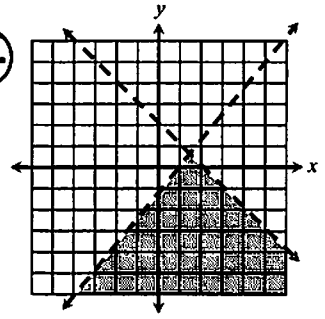
A.



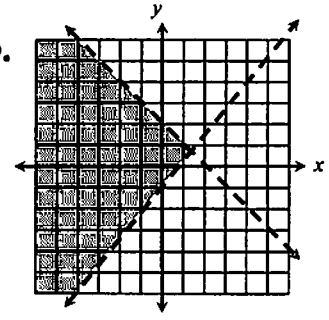
C.



(B.)



D.



Name: _____ **Algebra 1 Review:** Packet #5

Topic #1: Simplifying Monomials

PRODUCT RULE	QUOTIENT RULE	POWER RULE	NEGATIVE EXPONENT RULE
$x^a \cdot x^b = x^{a+b}$	$\frac{x^a}{x^b} = x^{a-b}$	$(x^a)^b = x^{a \cdot b}$	$x^{-a} = \frac{1}{x^a}$

Simplify each expression.

1. $7m \cdot m^2 \cdot 8v^5$

$56m^3v^5$

2. $(4x^3y^5)^3$

$64x^9y^{15}$

3. $\frac{35k^{10}}{5k^2}$

$7k^8$

4. $(-2a^6bc^3)^2 \cdot -5ab^2$

$4a^{12}b^2c^6 \cdot -5ab^2$

$-20a^{13}b^4c^6$

5. $\frac{r^{16}s^2t^3}{r^4s^2t^8}$

$r^{12}t^{-5}$

$= \frac{r^{12}}{t^5}$

6. $\frac{(-3k^6)^2}{5k^3 \cdot 3k^3}$

$\frac{9k^{12}}{15k^6}$

$= \frac{3k^6}{5}$

7. $\left(\frac{4m^4n^2}{6m^5n}\right)^2$

$\left(\frac{2n}{3m}\right)^2$

$= \frac{4n^2}{9m^2}$

8. $(-2y^4) \cdot (xy^3)^2 - 13x^2y^{10}$

$(-2y^4) \cdot (x^2y^6) - 13x^2y^{10}$

$-2x^2y^{10} - 13x^2y^{10}$

$= -15x^2y^{10}$

9. $\frac{-5p^2q^8}{20p^{-1}q^2}$

$-\frac{p^3q^6}{4}$

10. $\frac{a^{12}b^{-3}}{(ab)^{-4}}$

$\frac{a^{12}b^{-3}}{a^{-4}b^{-4}}$

$= a^{16}b$

11. $(2v)^{-2} \cdot (6v^{-7})^3$

$\frac{1}{4}v^{-2} \cdot 216v^{-21}$

$= \frac{54}{v^{23}}$

12. $\left(\frac{c^{-7}d}{3c^{-2}d^5}\right)^4$

$\frac{c^{-28}d^4}{81c^{-8}d^{20}}$

$= \frac{1}{81c^{20}d^{16}}$

Topic #2: Simplifying Polynomials

Simplify each expression.

13. $(n^2 - 3n + 14) + (3n^2 + n - 25)$

$4n^2 - 2n - 11$

14. $(2x^2 + 3x - 2) - (x^2 - 4x - 1)$

$x^2 + 7x - 1$

15. $(5 - 8k) - (8k - 13 + 2k^2)$

$-2k^2 - 16k + 18$

16. $(6 + m^3 + m - 3m^2) + (7m^3 + 11 - 6m + m^2)$

$8m^3 - 2m^2 - 5m + 17$

17. $3a^2b^3(2a^2 - 7ab + b^2)$

$6a^4b^3 - 21a^3b^4 + 3ab^5$

18. $8p(p^2 + 7p - 2) - (9p^3 - 2p^2)$

$8p^3 + 56p^2 - 16p - 9p^3 + 2p^2$

$-p^3 + 58p^2 - 16p$

19. $(x-9)(x+7)$

$x^2+7x-9x-63$

$\boxed{x^2-2x-63}$

20. $(w+8)(w-8)$

$w^2-8w+8w-64$

$\boxed{w^2-64}$

21. $(v+1)(4v+3)$

$4v^2+3v+4v+3$

$\boxed{4v^2+7v+3}$

22. $(2k-5)(3k-4)$

$6k^2-8k-15k+20$

$\boxed{6k^2-23k+20}$

23. $(2a+5b)(a-3b)$

$2a^2-6ab+5ab-15b^2$

$\boxed{2a^2-ab-15b^2}$

24. $(2y-1)^2$

$(2y-1)(2y-1)$

$4y^2-2y-2y+1$

$\boxed{4y^2-4y+1}$

25. $(x-4)(x^2+5x+3)$

$x^3+5x^2+3x-4x^2-20x-12$

$\boxed{x^3+x^2-17x-12}$

26. $(2c+1)(c^2-3c-11)$

$2c^3-6c^2-22c+c^2-3c-11$

$\boxed{2c^3-5c^2-25c-11}$

27. $\dfrac{18a^3b+12a^2b^2-6ab}{6ab}$

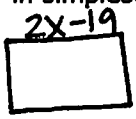
$\boxed{3a^2+2ab-1}$

28. $\dfrac{-24x^4-8x^3+40x^2}{-8x^2}$

$\boxed{3x^2+x-5}$

29. The length of a rectangular classroom floor is 19 feet less than twice its width. Write an expression to represent the area of the floor in simplest form.

$2x-19$

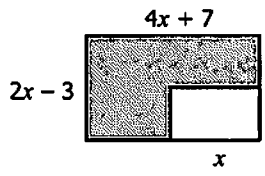


x

$x(2x-19)$

$\boxed{2x^2-19x}$

30. Write an expression to represent the area of the shaded region below in simplest form.



$(2x-3)(4x+7)$

$8x^2+14x-12x-21$

$8x^2+2x-21$

$-\quad -\quad -\quad -$

$x(x-1)$

x^2-x

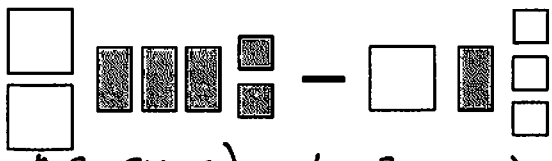
$\boxed{SA=7x^2+3x-21}$

Use the polynomial models below to answer question 31.

 $= x^2$  $= x$ $\square = 1$

 $= -x^2$  $= -x$ $\blacksquare = -1$

31. Write a polynomial to represent the following:



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

$\boxed{x^2-2x-5}$

Topic #3: Simplifying Radicals (Square Roots and Cube Roots)

List the first 15 perfect square numbers:

1, 4, 9, 16, 25, 36, 49, 64, 81, 100, 121, 144, 169, 196, 225

Write each expression in simplest form.

32. $\sqrt{75}$

$\sqrt{25} \cdot \sqrt{3}$

$\boxed{5\sqrt{3}}$

33. $\sqrt{40}$

$\sqrt{4} \cdot \sqrt{10}$

$\boxed{2\sqrt{10}}$

34. $\sqrt{448}$

$\sqrt{64} \cdot \sqrt{7}$

$\boxed{8\sqrt{7}}$

35. $\sqrt{392}$

$\sqrt{196} \cdot \sqrt{2}$

$\boxed{14\sqrt{2}}$

List the first 10 perfect cube numbers:

1, 8, 27, 64, 125, 216, 343, 512, 729, 1000

Write each expression in simplest form.

36. $\sqrt[3]{48}$

$\sqrt[3]{8} \cdot \sqrt[3]{6}$

$\boxed{2\sqrt[3]{6}}$

37. $\sqrt[3]{250}$

$\sqrt[3]{125} \cdot \sqrt[3]{2}$

$\boxed{5\sqrt[3]{2}}$

38. $\sqrt[3]{108}$

$\sqrt[3]{27} \cdot \sqrt[3]{4}$

$\boxed{3\sqrt[3]{4}}$

29. $\sqrt[3]{192}$

$\sqrt[3]{64} \cdot \sqrt[3]{3}$

$\boxed{8\sqrt[3]{3}}$

Topic #4: Simplifying Monomial Square Roots

Write each expression in simplest form.

40. $\sqrt{24x^2}$

$\sqrt{4x^2}\ \sqrt{6}$

$\boxed{2x\sqrt{6}}$

41. $\sqrt{81m^5}$

$\sqrt{81m^4}\ \sqrt{m}$

$\boxed{9m^2\sqrt{m}}$

42. $\sqrt{72p^{16}}$

$\sqrt{36p^{16}}\ \sqrt{2}$

$\boxed{6p^8\sqrt{2}}$

43. $\sqrt{45r^9}$

$\sqrt{9r^8}\ \sqrt{5r}$

$\boxed{3r^4\sqrt{5r}}$

44. $\sqrt{320x^{18}}$

$\sqrt{64x^{18}}\ \sqrt{5}$

$\boxed{8x^9\sqrt{5}}$

45. $\sqrt{28ab^4}$

$\sqrt{4b^4}\ \sqrt{7a}$

$\boxed{2b^2\sqrt{7a}}$

46. $\sqrt{\frac{1}{9}x^2y^{10}}$

$\boxed{\frac{1}{3}xy^5}$

47. $\sqrt{108r^{25}s^7t^6}$

$\sqrt{36r^{24}s^6t^6}\ \sqrt{3rs}$

$\boxed{6r^{12}s^3t^3\sqrt{3rs}}$

48. $\sqrt{147c^{15}d^{20}}$

$\sqrt{49c^{14}d^{20}}\ \sqrt{3c}$

$\boxed{7c^7d^{10}\sqrt{3c}}$

Algebra 1 Review

QUIZ 5

Name: _____

Date: _____ **Per:** _____

1. Which is equivalent to the expression below?

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

(A.) $x^2 + 3x + 4$
B. $x^2 - 7x + 6$
C. $x^2 - 3x - 6$
D. $x^2 - 7x + 4$

2. Which is equivalent to $(-2ab^3)(-3a^2b^5)$?

F. $-5ab$
G. $6a^2b^{15}$
H. $6a^3b^2$
(J.) $6a^3b^8$

3. Which is a simplified form of the following expression?

$$(xy^3)(xy)^4$$

$xy^3 \cdot x^4y^4$

A. x^2y^7
B. x^4y^{12}
(C.) x^5y^7
D. x^5y^{12}

4. If $ab \neq 0$, which is equivalent to $\frac{-12a^3b^2}{6ab^2}$?

F. $2a^2b$
(G.) $-2a^2$
H. $-6a^2b$
J. $6a^4b^4$

5. Which is equivalent to $(2x^{-2}y) \cdot (8x^{-3}y^{-3})$?

$16x^{-5}y^{-2}$

(A.) $\frac{16}{x^5y^2}$
B. $\frac{16}{x^6y^2}$
C. $\frac{10}{x^5y^2}$
D. $10x^6y^2$

6. Which is equivalent to $\left(\frac{-2m^2n^3}{m^2n^4}\right)^2$?

$\left(\frac{-2}{n}\right)^2$

F. $\frac{-4m}{n^2}$
G. $\frac{-4}{n^2}$
H. $\frac{4m}{n^2}$
(J.) $\frac{4}{n^2}$

7. Fill in the boxes with values that make the statement true

$$\frac{p^5q^6}{p^{-3}q^{\boxed{3}}} = p^{\boxed{8}}q^3$$

8. If $x \neq 0$, which expression is equivalent to

$$\frac{10x^{12} - 2x^8 + 2x^4}{2x^4}?$$

A. $8x^3 - x^2$
C. $8x^3 - x^2 + 1$
B. $5x^8 - x^4$
(D.) $5x^8 - x^4 + 1$

9. Which expression is equivalent to

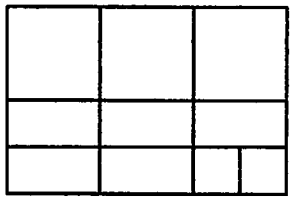
$$2x^3y(x^2y - 3xy^2)?$$

(F.) $2x^5y^2 - 6x^4y^3$
H. $2x^6y^2 - 6x^3y^2$
G. $3x^5y^2 - 5x^4y^3$
J. $2x^6y - 6x^3y^3$

10. Consider the following models:

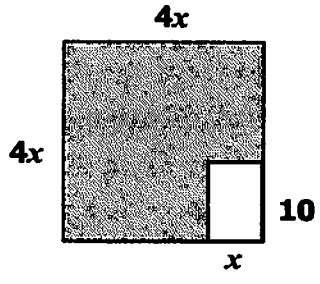
□ $= x^2$ ▯ $= x$ □ $= 1$

Which expression represents the following diagram?



A. $(x + 2)(x + 1)$
C. $(3x^2 + 2)(x + 1)$
(B.) $(3x + 2)(x + 1)$
D. $(x^2 + x)(3x^2 + 2)$

11. Which expression represents the area of the shaded region below?



F. $8x^2 - 10x$
G. $8x^2 - x - 10$
(H.) $16x^2 - 10x$
J. $16x^2 - x - 10$

12. What is $\sqrt{192}$ expressed in simplest radical form?

$\sqrt{64} \cdot \sqrt{3}$

(A.) $8\sqrt{3}$
B. $6\sqrt{5}$
C. $4\sqrt{12}$
D. $2\sqrt{48}$

13. What is $\sqrt[3]{243}$ expressed in simplest radical form?

$\sqrt[3]{27} \cdot \sqrt[3]{9}$

F. $6\sqrt[3]{2}$
(G.) $3\sqrt[3]{9}$
H. $9\sqrt[3]{3}$
J. $9\sqrt[3]{2}$

14. What is $\sqrt{80k^3}$ expressed in simplest radical form?

$\sqrt{16k^2} \cdot \sqrt{5k}$

(A.) $4k\sqrt{5k}$
B. $4k^2\sqrt{5k}$
C. $2k\sqrt{10k}$
D. $2k^2\sqrt{10k}$

15. Fill in the boxes with values that make the statement true.

$$\sqrt{\boxed{63}\, m^{17}} = 3m^{\boxed{8}}\sqrt{7m}$$

16. Which of the following radical expressions simplifies to $6x^4y^2\sqrt{2y}$?

F. $\sqrt{12x^8y^3}$
G. $\sqrt{12x^{16}y^5}$
H. $\sqrt{72x^{16}y^5}$
(J.) $\sqrt{72x^8y^5}$

Name: _____ **Algebra 1 Review:** Packet #6

Topic #1: Factoring Polynomials

Factor each polynomial.

Greatest Common Factor (GCF)	**1.** $21c-12$ $3(7c-4)$	**2.** x^6y+8x^2y $x^2y(x^4+8)$	**3.** $75a^2b^3c-30ab^2$ $15ab^2(5abc-2)$
Difference of Squares (a^2-b^2)	**4.** w^2-64 $(w+8)(w-8)$	**5.** $9k^2-1$ $(3k+1)(3k-1)$	**6.** $4m^2-81n^2$ $(2m+9n)(2m-9n)$
Trinomial (x^2+bx+c)	**7.** $p^2-13p+30$ $(p-3)(p-10)$	**8.** $y^2-3y-40$ $(y-8)(y+5)$	**9.** $a^2+12a+36$ $(a+6)(a+6)$ $=(a+6)^2$
Trinomial (ax^2+bx+c)	**10.** $3x^2+10x+3$ $x^2+10x+9$ $(x+\frac{9}{3})(x+\frac{1}{3})$ $(x+3)(3x+1)$	**11.** $12c^2+5c-2$ $c^2+5c-24$ $(c+\frac{8}{12})(c-\frac{3}{12})$ $(3c+2)(4c-1)$	**12.** $4v^2-16v+7$ $v^2-16v+28$ $(v-\frac{14}{4})(v-\frac{2}{4})$ $(2v-7)(2v-1)$

Factor each polynomial completely.

13. $12x^2-12$ $12(x^2-1)$ $12(x+1)(x-1)$	**14.** n^3-4n^2-60n $n(n^2-4n-60)$ $n(n-10)(n+6)$	**15.** $8m^2-21$ Prime (cannot be factored)
16. $5w^2-15w-20$ $5(w^2-3w-4)$ $5(w-4)(w+1)$	**17.** $8v-98v^3$ $2v(4-49v^2)$ $2v(2+7v)(2-7v)$	**18.** $4x^2-10x+4$ $2(2x^2-5x+2)$ $2(x^2-5x+4)$ $2(x-\frac{4}{1})(x-\frac{1}{2})$ $2(x-2)(2x-1)$
19. $27ab-75ab^3$ $3ab(9-25b^2)$ $3ab(3+5b)(3-5b)$	**20.** $12y^2-16y-16$ $4(3y^2-4y-4)$ $4(y^2-4y-12)$ $4(y-\frac{6}{3})(y+\frac{2}{3})$ $4(y-2)(3y+2)$	**21.** $3h^2-6h+3$ $3(h^2-2h+1)$ $3(h-1)(h-1)$ $3(h-1)^2$

Topic #2: Dividing Polynomials by a Binomial (using Factoring)

Find each quotient.

22. $\frac{x^2-12x+20}{x-10}$

$\frac{(x-10)(x-2)}{x-10}$

$= \boxed{x-2}$

23. $\frac{3y^2-16y+5}{3y-1}$

$\frac{(3y-1)(y-5)}{3y-1}$

$= \boxed{y-5}$

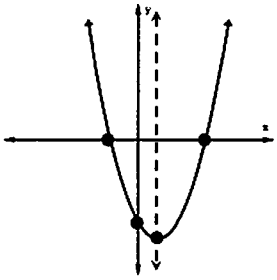
24. $(k^2-1) \div (k+1)$

$\frac{(k+1)(k-1)}{k+1}$

$= \boxed{k-1}$

Topic #3: Graphing Quadratic Equations

A quadratic equation creates a U-shaped curve called a PARABOLA.



Standard Form: $y = ax^2 + bx + c$

Axis of Symmetry: $x = \frac{-b}{2a}$

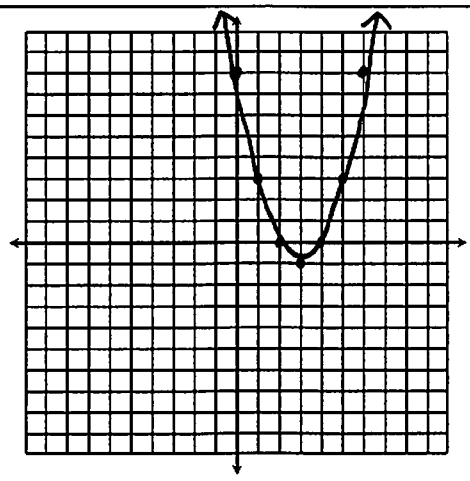
Vertex Form: $y = a(x-h)^2 + k$

Axis of Symmetry: $x = h$; **Vertex:** (h, k)

Graph each equation using a table of values. Identify all key characteristics.

25. $y = x^2 - 6x + 8$

x	y
0	8
1	3
2	0
3	-1
4	0
5	3
6	8



Domain: $\mathbb{R}$

Range: $y \geq -1$

Axis of Symmetry: $x = 3$

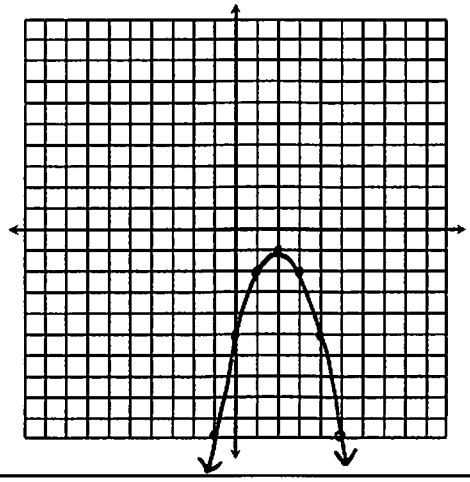
Vertex: $(3, -1)$

x-intercepts (zeros): $x = \{2, 4\}$

y-intercept: $(0, 8)$

26. $y = -x^2 + 4x - 5$

x	y
-1	-10
0	-5
1	-2
2	-1
3	-2
4	-5
5	-10



Domain: $\mathbb{R}$

Range: $y \leq -1$

Axis of Symmetry: $x = 2$

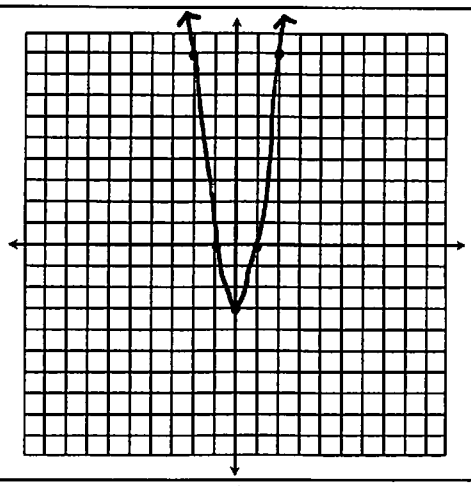
Vertex: $(2, -1)$

x-intercepts (zeros): $\emptyset$

y-intercept: $(0, -5)$

27. $y = 3x^2 - 3$

x	y
-3	24
-2	9
-1	0
0	-3
1	0
2	9
3	24



Domain: $\mathbb{R}$

Range: $y \geq -3$

Axis of Symmetry: $x = 0$

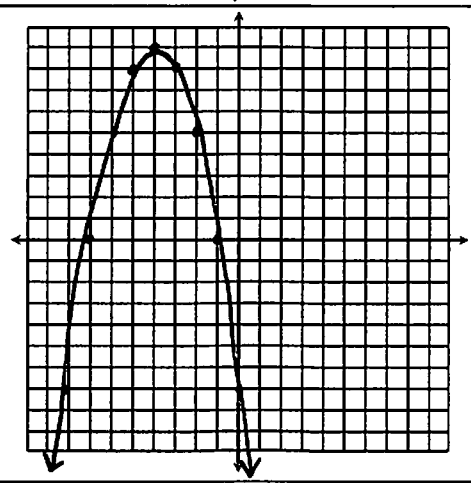
Vertex: $(0, -3)$

x-intercepts (zeros): $x = \{-1, 1\}$

y-intercept: $(0, -3)$

28. $y = -(x+4)^2 + 9$

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



Domain: $\mathbb{R}$

Range: $y \leq 9$

Axis of Symmetry: $x = -4$

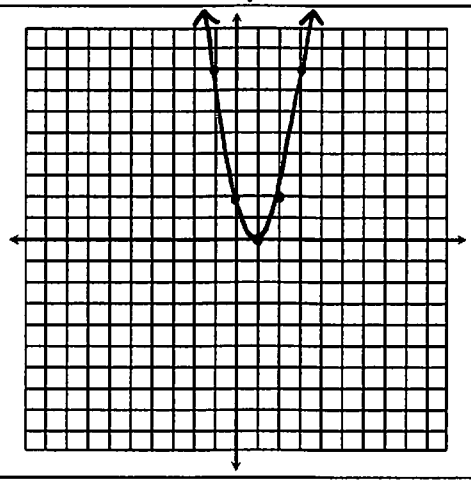
Vertex: $(-4, 9)$

x-intercepts (zeros): $x = \{-7, -1\}$

y-intercept: $(0, -7)$

29. $y = 2(x-1)^2$

x	y
-2	18
-1	8
0	2
1	0
2	2
3	8
4	18



Domain: $\mathbb{R}$

Range: $y \geq 0$

Axis of Symmetry: $x = 1$

Vertex: $(1, 0)$

x-intercepts (zeros): $x = \{1\}$

y-intercept: $(0, 2)$

Topic #4: Transformations of the Quadratic Function

Recall that vertex form describes transformations from the quadratic parent function, $y = x^2$.

Given $y = a(x-h)^2 + k$:

Translations (Shifts)				**Reflections**	**Dilations** (compress/stretch)	
$+ h$	shifts left	$+ k$	shifts up	If a is negative, the graph reflects over the x-axis.	$\lvert a \rvert > 1$	creates a vertical stretch
$- h$	shifts right	$- k$	shifts down		$\lvert a \rvert < 1$	creates a vertical compression

Given each equation, describes the transformations from the parent function $y = x^2$.

30. $y = (x+5)^2 + 3$

Translated left 5 and up 3

31. $y = -2(x-4)^2$

Vertical stretch by 2; Reflected over x-axis; Translate right 4

32. $y = \frac{1}{3}(x+1)^2 - 4$

Compress by 1/3; Translate left 1 and down 4

Transformations from the function $y = x^2$ are described below. Write an equation to represent the new function.

33. translated 3 units right and 2 units up

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

34. vertically stretched by a factor of 4, then translated 5 units down

$y = 4x^2 - 5$

35. reflected over the x-axis, then translated 7 units left and 1 unit up

$y = -(x+7)^2 + 1$

Topic #5: Solving Quadratic Equations

- The **solutions** to a quadratic equation are the point(s) at which the parabola intersects the X - axis.
- Solutions are also referred to as **roots, zeros,** or **x-intercepts.**
- A quadratic equation can have **two solutions, one solution,** or **no real solutions.**

Methods to Solve a Quadratic Equation:

- Factoring
- Square Roots
- Completing the Square
- Quadratic Formula

Solve each equation. Simplify all irrational solutions.

36. $x^2 + 8x = 0$

$x(x+8) = 0$

$x = 0$ | $x + 8 = 0$

$x = -8$

$x = \{-8, 0\}$

37. $4x^2 = 10x$

$4x^2 - 10x = 0$

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

$2x = 0$ | $2x - 5 = 0$

$x = 0$ | $2x = 5$

$x = \frac{5}{2}$

$x = \{0, \frac{5}{2}\}$

38. $2x^2 - 72 = 0$

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

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

$2 \neq 0$ | $x+6=0$ | $x-6=0$

$x = -6$ | $x = 6$

$x = \{-6, 6\}$

39. $4x^2 - 43 = 6$

$4x^2 - 49 = 0$

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

$2x+7=0$ | $2x-7=0$

$x = \frac{-7}{2}$ | $x = \frac{7}{2}$

$x = \{-\frac{7}{2}, \frac{7}{2}\}$

40. $\frac{1}{2}x^2 - 30 = 10$

$2 \cdot \frac{1}{2}x^2 = 40 \cdot 2$

$\sqrt{x^2} = \sqrt{80}$

$x = \pm 4\sqrt{5}$

41. $9 - x^2 = 17$

$-x^2 = 8$

$\sqrt{x^2} = \sqrt{-8}$

$x = \emptyset$

42. $x^2 + 5x = 6$

$x^2+5x-6=0$

$(x+6)(x-1)=0$

$x+6=0$	$x-1=0$
$x=-6$	$x=1$

$\boxed{x=\{-6,1\}}$

43. $x^2 = 18x - 81$

$x^2-18x+81=0$

$(x-9)(x-9)=0$

$x-9=0$	$x-9=0$
$x=9$	$x=9$

$\boxed{x=\{9\}}$

44. $x^2 - 4x - 14 = 0$

$x^2-4x=14$

$(-2)^2=4$

$x^2-4x+4=14+4$

$\sqrt{(x-2)^2}=\sqrt{18}$

$x-2=\pm 3\sqrt{2}$

$\boxed{x=\{2\pm 3\sqrt{2}\}}$

45. $-x^2 - 14x = 37$

$x^2+14x=-37$

$(7)^2=49$

$x^2+14x+49=-37+49$

$\sqrt{(x+7)^2}=\sqrt{12}$

$x+7=\pm 2\sqrt{3}$

$\boxed{x=\{-7\pm 2\sqrt{3}\}}$

46. $3x^2 = 30 - 9x$

$3x^2+9x-30=0$

$3(x^2+3x-10)=0$

$3|(x+5)|(x-2)=0$

$3\neq 0$	$x+5=0$	$x-2=0$
	$x=-5$	$x=2$

$\boxed{x=\{-5,2\}}$

47. $6x^2 - x - 2 = 0$

$x^2-x-12=0$

$\frac{(x-4)}{6}\frac{(x+3)}{6}=0$

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

$3x-2=0$	$2x+1=0$
$x=\frac{2}{3}$	$x=-\frac{1}{2}$

$\boxed{x=\{-\frac{1}{2},\frac{2}{3}\}}$

48. $2x^2 + 8x - 3 = 0$

$x=\frac{-8\pm\sqrt{8^2-4(2)(-3)}}{2(2)}$

$x=\frac{-8\pm\sqrt{64+24}}{4}$

$x=\frac{-8\pm\sqrt{88}}{4}$

$x=\frac{-8\pm 2\sqrt{22}}{4}$

$\boxed{x=\{\frac{-4\pm\sqrt{22}}{2}\}}$

49. $4x^2 - 10x = 5$

$4x^2-10x-5=0$

$x=\frac{10\pm\sqrt{(-10)^2-4(4)(-5)}}{2(4)}$

$x=\frac{10\pm\sqrt{100+80}}{8}$

$x=\frac{10\pm\sqrt{180}}{8}$

$x=\frac{10\pm 6\sqrt{5}}{8}$

$\boxed{x=\{\frac{5\pm 3\sqrt{5}}{4}\}}$

Topic #6: Applications

50. The dimensions of a rectangle can be represented by the expressions $(x + 7)$ and $(x - 3)$. If the area of the rectangle is 75 square feet, find the value of x.

$(x+7)(x-3) = 75$

$x^2 + 4x - 21 = 75$

$x^2 + 4x - 96 = 0$

$(x+12)(x-8) = 0$

$x+12=0$	$x-8=0$
$x=-12$	$x=8$

$x = 8$ ft

51. The stress distribution on a structure is given by $s = 2x^2 + 4x - 30$ where s is stress in pounds per square inch and x is the distance in feet from a reference point. At what distance is the stress equal to 0 pounds per square inch?

$2x^2+4x-30 = 0$

$2(x^2+2x-15) = 0$

$2(x+5)(x-3) = 0$

$2 \neq 0$	$x+5=0$	$x-3=0$
	$x=-5$	$x=3$

$x = 3$ ft

52. A toy rocket is launched from a platform that is 48 feet high. The rocket's height above the ground is modeled by the equation $h = -16t^2 + 32t + 48$. What is the rocket's height at 2 seconds?

$h = -16(2)^2 + 32(2) + 48$

$h = -16(4) + 64 + 48$

$h = -64 + 64 + 48$

$h = 48$ ft

Topic #7: Curve of Best Fit (Quadratic Regression)

53. The table below shows a college's annual budget (in millions of dollars) over a 5-year period.

	Year	Budget
0	2007	38
1	2008	20
2	2009	42
3	2010	67
4	2011	89

a) Find an equation for the curve of best fit.

$y = 5.93x^2 - 8.81x + 33.26$

b) Predict the college's budget in 2018. $(x = 11)$

$y = 5.93(11)^2 - 8.81(11) + 33.26$

$y = 653.88$

\$654,000

54. The table below shows the height h (in feet) of a hammer t seconds after it was dropped from the top of a building by a construction worker.

Time, t	Height, h
0	384
0.5	380
1	368
1.5	348
2	320

a) Find an equation for the curve of best fit.

$y = -16x^2 + 384$

b) Find the time it will take the hammer to reach the ground.

$0 = -16x^2 + 384$

$16x^2 = 384$

$\sqrt{x^2} = \sqrt{24}$

$x = \pm 4.9$

4.9 sec

Algebra 1 Review

QUIZ 6

Name: _____

Date: _____ **Per:** _____

1. Which of the following binomials is a factor of $x^2 - 13x - 30$?

A. $(x + 15)$
B. $(x - 3)$
C. $(x - 10)$
D. $(x + 2)$

2. If the polynomial below is completely factored, which expressions represent its factors? Check all that apply.

$64x^4y - 36x^2y$

$4x^2y(16x^2 - 9)$

☐ $4x^4$	☑ $4x - 3$	☐ $4x - 3y$
☑ $4x^2y$	☐ $8x - 6$	☑ $4x + 3$

3. Given Polynomial A and Polynomial B below, which binomial factor do they have in common?

Polynomial A	Polynomial B
$2n^2 + n - 36$	$n^2 - 10n + 24$
$(2n+9)(n-4)$	$(n-6)(n-4)$

F. $(n - 4)$
G. $(n + 2)$
H. $(n - 12)$
J. $(n - 2)$

4. If the area of a rectangle can be represented by the expression $x^2 + 10x - 24$, which two binomials could represent the length and width of the rectangle?

☐ $(x - 12)$	☐ $(x + 6)$	☑ $(x - 2)$
☐ $(x - 8)$	☑ $(x + 12)$	☐ $(x - 4)$

5. Which polynomials are prime? Check all that apply.

☑ $x^2 - 10x - 35$	☑ $25x^2 + 4$
☐ $18c - 21d$	☑ $2x^2 - 9x - 10$
☐ $8x^2 + 14x + 3$	☐ $x^2 + 7x$

6. Which polynomial is equivalent to the expression below if $w \neq 3$?

$$\frac{3w^2 - w - 24}{w - 3}$$

$$= \frac{(3w+8)(w-3)}{w-3}$$

A. $3w^2 - 8$
B. $3w^2 + 8$
C. $3w - 8$
D. $3w + 8$

7. Which quadratic equation has a vertex located at (4, -3)?

F. $y = 4x^2 + 3$
G. $y = (x + 4)^2 - 3$
H. $y = x^2 - 8x + 13$
J. $y = x^2 + 8x - 3$

8. Which statement is false regarding the quadratic equation below?

$$y = -(x+1)^2 + 4$$

A. The axis of symmetry is $x = -1$
B. The range is $y \leq 4$
C. The x-intercepts are (1, 0) and (-3, 0).
D. The y-intercept is $(0, 4)$.

9. Which two transformations can be used to obtain the graph of $y = 3(x - 5)^2$ from the graph of $y = x^2$?

F. A vertical compression and a translation 5 units left.
G. A vertical stretch and a translation 5 units left.
H. A vertical compression and a translation 5 units right.
J. A vertical stretch and a translation 5 units right.

10. Which of the functions below have exactly two distinct real zeros?

I. $f(x) = -x^2 + 14x - 45$

II. $f(x) = 4x^2 + 4$

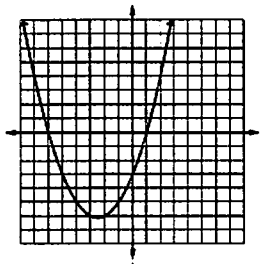
III. $f(x) = 2x^2 + 12x + 18$

IV. $f(x) = 3x^2 - 4x - 4$

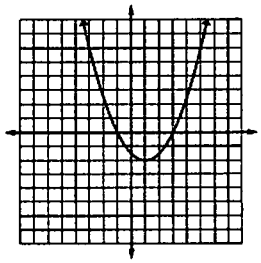
(A.) I and IV
B. I, II, and III
C. II and III
D. III and IV

11. If a quadratic function has binomial factors of $(x - 3)$ and $(x + 1)$, which graph could represent this function?

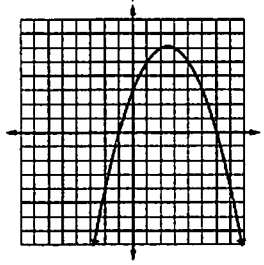
A.



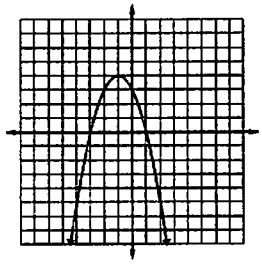
(C.)



B.



D.



12. Which number is a solution to the quadratic equation below?

$x^2 - 8x - 48 = 0$

$(x-12)(x+4)=0$

$x-12=0$ | $x+4=0$

$x=12$ | $x=-4$

F. -12
(G.) 12
H. -8
J. 6

13. What are the solutions to the equation below?

$3x^2 - 7x = 20$

$3x^2-7x-20=0$

$x^2-7x-60=0$

$(x-12)(x+5)=0$

$\frac{3}{3}$ $\frac{3}{3}$

$(x-4)(3x+5)=0$

$x=4$ | $x=-5/3$

A. $\left\{-5, \frac{4}{3}\right\}$
B. $\left\{-\frac{4}{3}, 5\right\}$
C. $\left\{-4, \frac{5}{3}\right\}$
(D.) $\left\{-\frac{5}{3}, 4\right\}$

14. What are the solutions to the equation below?

$16 - 2x^2 = -64$

$-2x^2 = -80$

$\sqrt{x^2} = \sqrt{40}$

$x = \pm\sqrt{40}$

F. $\{\pm 2\sqrt{6}\}$
(G.) $\{\pm 2\sqrt{10}\}$
H. $\{\pm 4\sqrt{6}\}$
J. $\{\pm 4\sqrt{10}\}$

15. Write the values in the boxes below to show the solutions the equation $x^2 - 2x - 17 = 0$.

$x^2-2x+1 = 17+1$

$(x-1)^2 = 18$

$x-1 = \pm 3\sqrt{2}$

$x = \boxed{1} \pm \boxed{3}\sqrt{\boxed{2}}$

16. The width of a rectangle is fifteen feet less than its length. If the area of the rectangle is 54 square feet, find the width.

$x(x-15)=54$

$x^2-15x-54=0$

$(x-18)(x+3)=0$

$x=18$ | $x=-3$

Length = 18; width = 3

(A.) 3 feet
B. 6 feet
C. 9 feet
D. 18 feet

Use for questions 17-18: The table below gives the height h (in feet) of a baseball t seconds after it was thrown by a fan onto the field.

t	0	0.5	1	1.5	2
h	200	212	216	212	200

17. Write an equation for the curve of best fit.

ANSWER: $h = -16t^2 + 32t + 200$

18. What is the height of the ball 4 seconds after it was thrown?

$-16(4)^2 + 32(4) + 200$

ANSWER: 72 ft