

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} - -5 $	24. $8 - [12 \div (\sqrt{400} - 2^5)] + 11$
25. $\frac{5^3 - 42 \div 6}{\sqrt[3]{8}}$	26. $w^2 - 5xy$ (if $x = -3$, $w = -2$, and $y = 1$)
27. $2 m - n^2 + k^3$ (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 #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. $\frac{7}{x-8} = \frac{3}{x}$

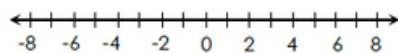
41. Solve $A = \frac{1}{2}bh$ for h .

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

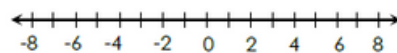
Topic #7: Solving & Graphing Inequalities

Solve and graph each inequality.

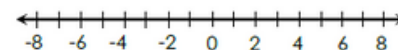
43. $11x + 13 \geq -20$



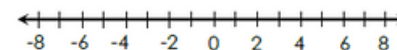
44. $-2x + 6 > 3x - 34$



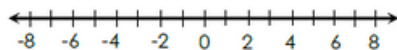
45. $3x - 7(x + 3) \geq -13$



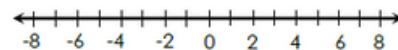
46. $4 - 8x < 2(5 - 3x)$



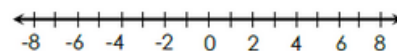
47. $x + 7 \leq 2$ or $\frac{x + 14}{4} \geq 3$



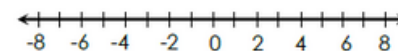
48. $3x + 5 < -16$ or $-5x - 8 \leq -13$



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



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



Topic #9: Applications

<p>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?</p>	<p>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?</p>
<p>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.</p>	<p>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?</p>
<p>58. The expression $400 + 0.15s$ 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?</p>	<p>59. The total cost to rent a pontoon boat for h hours can be represented by the expression $30h + 65$. If Brianna can spend a maximum of \$200, how many hours can she rent the boat?</p>

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.	2.	3.										
<table><tr><td>x</td><td>-1</td><td>2</td><td>5</td><td>-1</td></tr><tr><td>y</td><td>7</td><td>3</td><td>0</td><td>2</td></tr></table>	x	-1	2	5	-1	y	7	3	0	2		
x	-1	2	5	-1								
y	7	3	0	2								
Domain:	Domain:	Domain:										
Range:	Range:	Range:										
Function?	Function?	Function?										
4.	5.	6.										
Domain:	Domain:	Domain:										
Range:	Range:	Range:										
Function?	Function?	Function?										

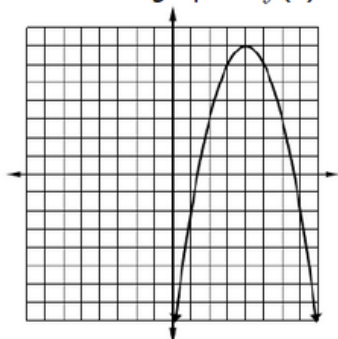
Topic #2: Function Notation & Evaluating Functions

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 $f(3)$.



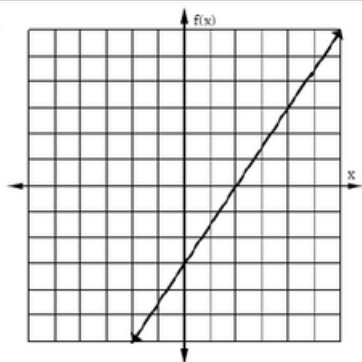
14. Given $f(x) = \frac{5}{2}x + 7$, if $f(x) = -13$, find x .

Topic #3: Zeros of Functions

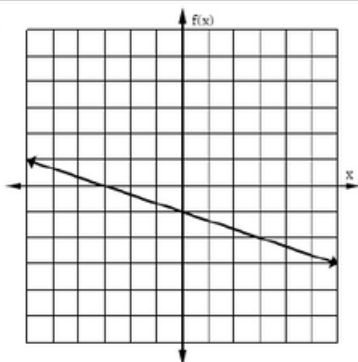
- The zeros of a function are where it passes through the x - axis.
- To find the zeros, set the equation equal to 0, and solve for x !

Find the zeros of each function graphed below.

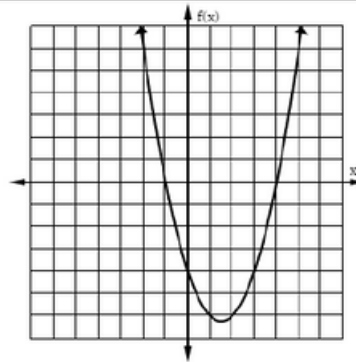
15.



16.



17.



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

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

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

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

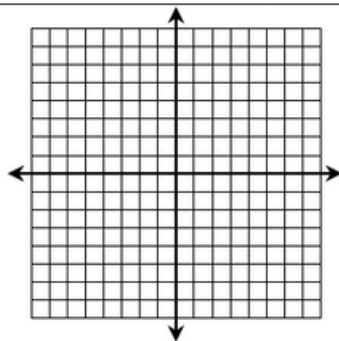
22. $f(x) = x^2 - 10x + 25$

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

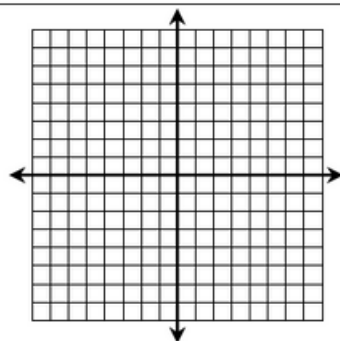
Topic #7: Graphing Linear Equations

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

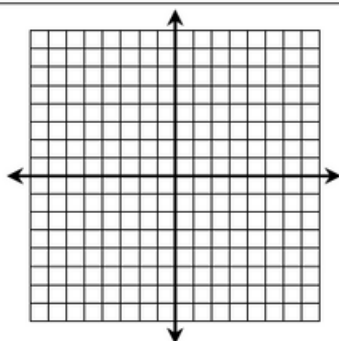
42. $y = -3x + 7$



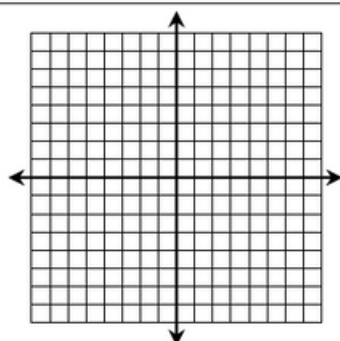
43. $y = 4x$



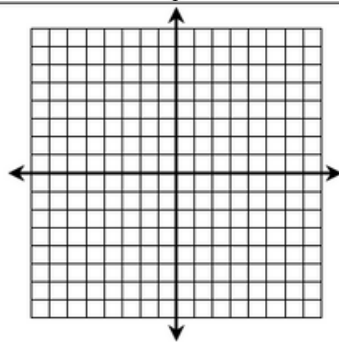
44. $x - y = 5$



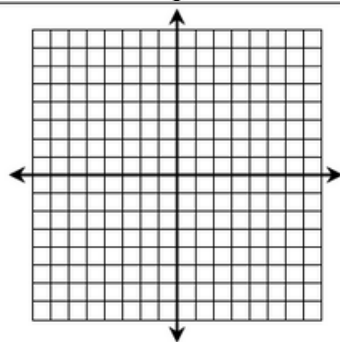
45. $x + 2y = 4$



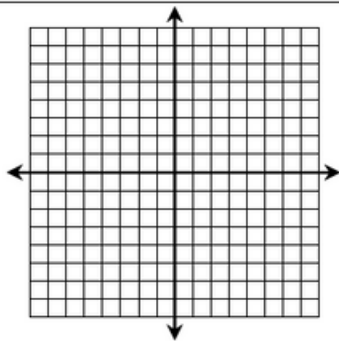
46. $-10x + 8y = -8$



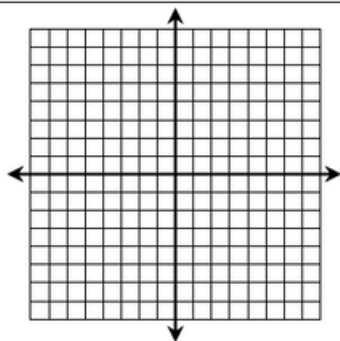
47. $3x - 2y = -6$



48. $x = -5$

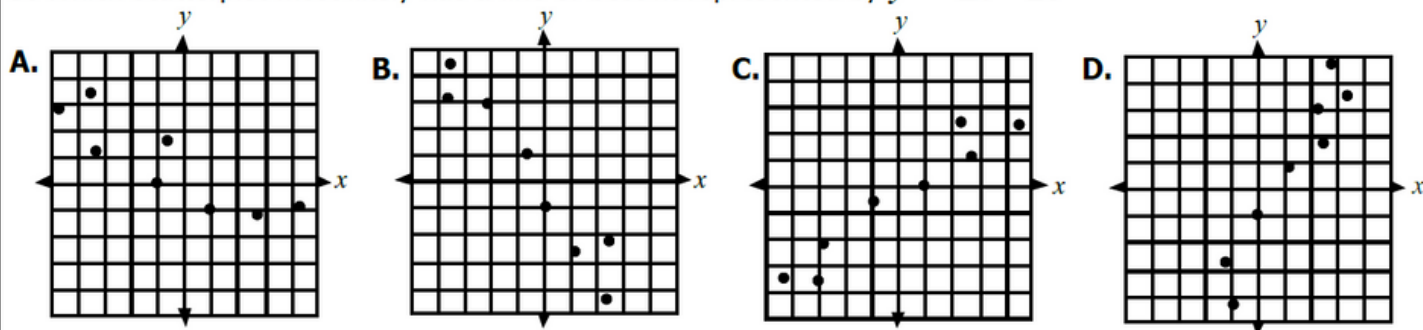


49. $y = 1$



Topic #3: Line of Best Fit

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



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.

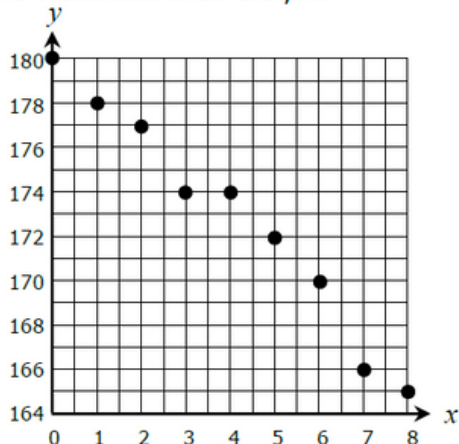
11. The table below shows the annual sales, in thousands, for a coffee shop in certain years since it opened in 2004.

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?	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 <u>ratio</u> !	Check for a constant <u>product</u> !

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. $x - 2y = 0$

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?

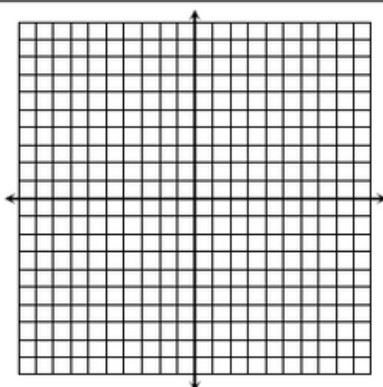
Topic #1: Systems of Equations

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 (\emptyset) for parallel lines; infinite solutions (∞)
for identical lines

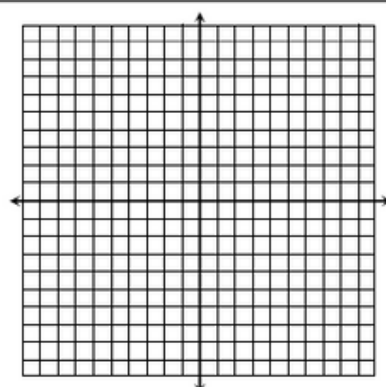
Topic #2: Solving Systems Graphically

Solve each system of equations by graphing.

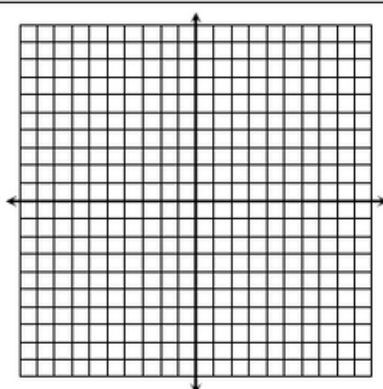
3.
$$\begin{cases} y = -3x + 2 \\ y = x - 6 \end{cases}$$



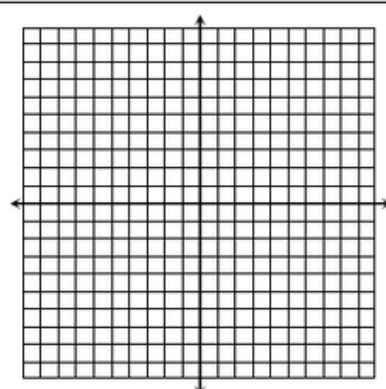
4.
$$\begin{cases} 2x + y = 1 \\ x - 2y = 18 \end{cases}$$



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

$$9. \begin{cases} 4x + 3y = -1 \\ 5x + 4y = 1 \end{cases}$$

$$10. \begin{cases} y = 4x + 2 \\ y = x - 1 \end{cases}$$

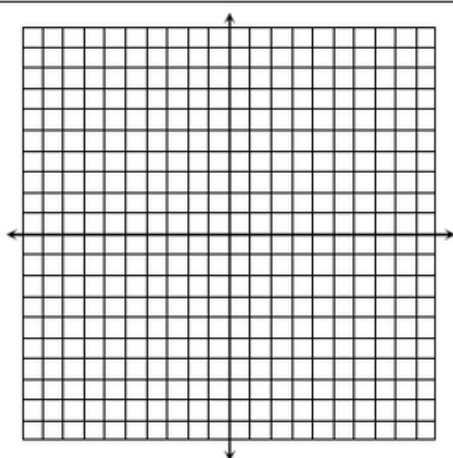
$$11. \begin{cases} x = 2y - 3 \\ 2x - 3y = -5 \end{cases}$$

$$12. \begin{cases} 2x + 3y = 4 \\ y = 5x - 27 \end{cases}$$

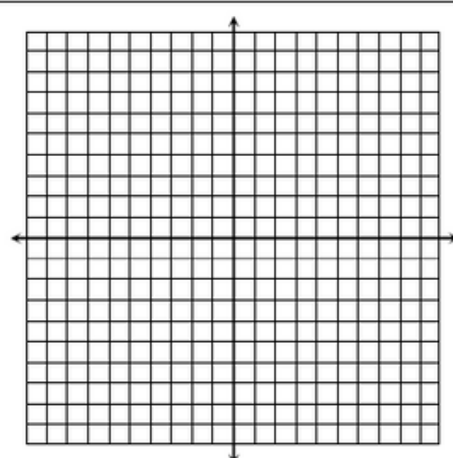
Topic #6: Systems of Linear Inequalities

Graph the solution to each system of inequalities.

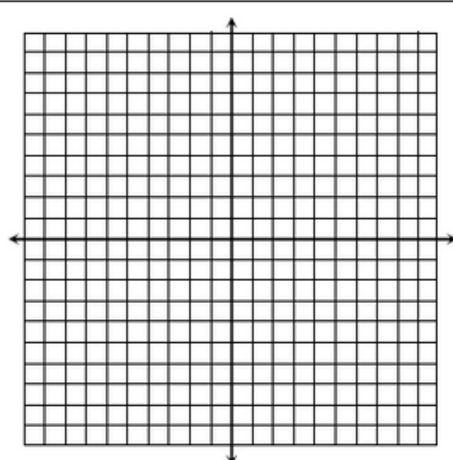
$$22. \begin{cases} x + y < -1 \\ x - y > 8 \end{cases}$$



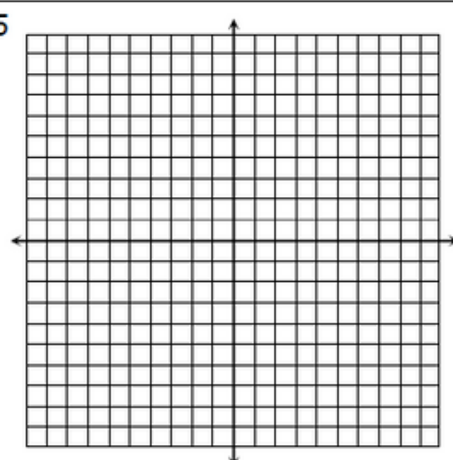
$$23. \begin{cases} -x + 3y \leq 21 \\ y \geq -x + 4 \end{cases}$$



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



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



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. $7m \cdot m^2 \cdot 8v^5$	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. $\frac{18a^3b + 12a^2b^2 - 6ab}{6ab}$	28. $\frac{-24x^4 - 8x^3 + 40x^2}{-8x^2}$	

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. $\sqrt{147c^{15}d^{20}}$

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. $12x^2 - 12$	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.

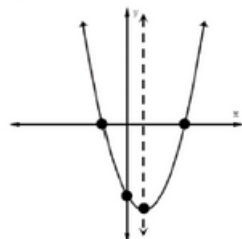
22. $\frac{x^2 - 12x + 20}{x - 10}$

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

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:

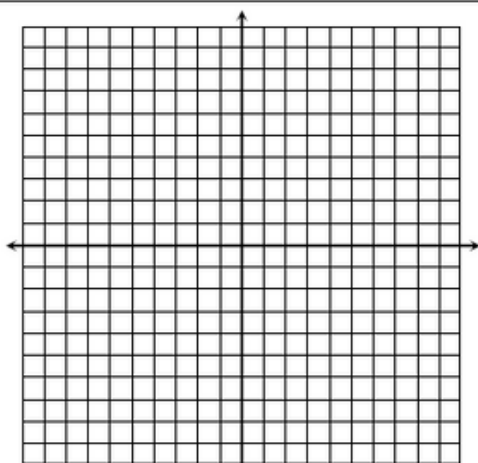
$$y = ax^2 + bx + c$$

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

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

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

x	y



Domain:

Range:

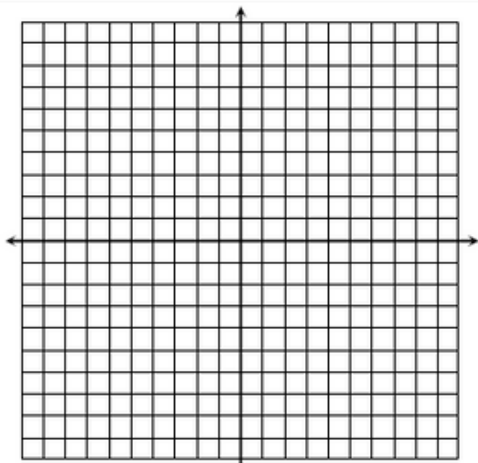
Axis of Symmetry:

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: