

Review for Challenging Algebra Curriculum for Placement Into Geometry

Foundations for Algebra

Be able to:

- Simplify an expression using: the order of operations, the distributive property, and/ or adding like terms.
- Recognize that a negative sign in front of parentheses changes the sign of all the terms within
- Identify the subsets of the real number system
- Evaluate algebraic expressions for given values of its variables

Simplify

1) $-(-2-c)$

2) $8(14+10) \div (8-2)$

3) $5(x-3)-2x$

4) $2m^2 - 3mz + 7mz - m^2 + 2$

5) $5 + 2(4)^2 \div 8 + 1$

6) $3x + 2y - 5y + 10x$

7) $2(x-1) - 3(4x+5)$

8) $8(5+30 \div 5)$

9) $40 \div 5(2)$

10) $-4(3x-1)$

11) $50 \div (5 \times 5)$

12) $a^2 + 12ab - 3a^2 - 5ab$

13) $4 - 2(x+7)$

14) $36^{1/2}$

15) $(-11)^2$

Evaluate

16) $x + 3y^2$ for $x = -7$ and $y = 2$

17) $xy + z$ for $x = -4$, $y = 3$, and $z = -3$

18) $b - 2a - c$ for $a = -6$, $b = 6$, and $c = -5$

ANSWERS for Unit A

1) $2+c$

6) $13x-3y$

11) 2

15) 121

2) 32

7) $-10x-17$

12) $-2a^2+7ab$

16) 5

3) $3x-15$

8) 88

13) $-2x-10$

17) -15

4) $m^2+4mz+2$

9) 16

14) 6

18) 23

5) 10

10) $-12x+4$

Solving Equations

Be able to:

- Solve equations using the following steps:
 - eliminate fractions (by multiplying both sides of the equation by the LCD of all terms)
 - eliminate parentheses
 - add like terms on each side
 - eliminate the variable from either side
 - eliminate the constant from the side with the variable
 - eliminate the coefficient
- Recognize solutions that are all real numbers or no solution
- Solve proportions by cross-multiplying
- Solve a formula for a specified variable (solve a literal equation)
- Solve absolute value equations by writing and solving two equations

Solve

- 1) $20 = -d + 13$ 2) $2x + 6 = 4x - 6$ 3) $2y + 12 - 4y = 54$
- 4) $4(y + 3) = 40$ 5) $-\frac{2}{3}x - 5 = -7$ 6) $\frac{-9}{12} = \frac{x}{40}$
- 7) $-2|x| = -8$ 8) $-d + 7 = 3$ 9) $2(3a + 2) = -8$
- 10) $2n + 3n + 7 = -41$ 11) $-8n + 5 = -67$ 12) $\frac{15}{8} = \frac{-12}{6x}$
- 13) $5x - 11 = 3 - x - 14 + 6x$ 14) $3(4a + 2) = -18$ 15) $-2d + 17 = 3$
- 16) $-6 - 3(2k + 4) = 18$ 17) $13 + 2(5c - 2) = 29$ 18) $3x + 3 = 5x - 1$
- 19) $\frac{3x + 7}{2} = 8$ 20) $3(2p + 4) = 2(3p - 6)$ 21) $-3|x| = 6$
- 22) $4x - 7 + 1 = 3 + 3x - 15$ 23) $\frac{a}{5} - 2 = -13$ 24) $\frac{4}{6} = \frac{x}{24}$
- 25) $\frac{x + 2}{6} = \frac{x - 1}{12}$ 26) $|x + 3| = 8$ 27) $3|x - 1| + 2 = 11$ 28) $|x - 5| + 2 = 9$

ANSWERS for Unit B

1) $d = -7$	8) $d = 4$	15) $d = 7$	22) $x = -6$
2) $x = 6$	9) $a = -2$	16) $k = -6$	23) $a = -55$
3) $y = -21$	10) $n = -\frac{48}{5}$	17) $c = 2$	24) $x = 16$
4) $y = 7$	11) $n = 9$	18) $x = \frac{4}{3}$	25) $x = -5$
5) $x = 3$	12) $x = 30$	19) $x = 3$	26) $x = 5$ and -11
6) $x = -30$	13) $0 = 0$, all real #s	20) no solution	27) $x = 4$ and -2
7) $x = 4$ and -4	14) $a = -2$	21) no solution	28) $x = 12$ and -2

Solving Inequalities

Be able to:

- Graph inequalities on a number line
- Use the additive and multiplicative properties of equality to solve inequalities
- Recognize that you must reverse the inequality symbol when you multiply or divide both sides of an inequality by a negative number

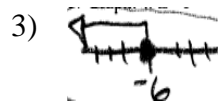
Solve

- 1) $3y + 5 < 26$ 2) $2w + 1 < 7$ 3) Graph: $x \leq -6$
- 4) Solve and graph the inequality: $-5 \leq w - 3$ 5) Solve and graph solution: $-3c < -18$
- 6) Write an inequality that represents each verbal expression: c is greater than 21.
- 7) Write an inequality that represents each verbal expression: z is less than or equal to -5 .
- 8) Graph on a number line: $x < 6$ 9) Solve and graph: $-x \geq 5$
- 10) Solve and graph: $2x - 3(x - 5) > 10$ 11) Solve and graph: $2x + 5 \leq 4x + 1$
- 12) Solve: $-2y - 6 - y > 15$ 13) Solve: $6m - 5m + 2 \geq 11$
- 14) Solve: $2(c - 3) - 2c > 0$ 15) Solve: $-3t + 1 \geq -3(t + 2)$
- 16) Solve: $4 \leq \frac{-2}{5}y$ 17) Solve: $\frac{x}{4} > -1$

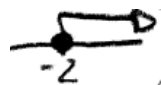
ANSWERS for Unit C

1) $y < 7$

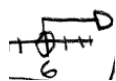
2) $w < 3$



4) $-2 \leq w$

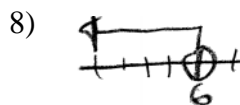


5) $c > 6$



6) $c > 21$

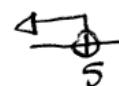
7) $z \leq -5$



9) $x \leq -5$



10) $x < 5$



11) $2 \leq x$



- 12) $y < -7$
13) $y \leq -7$
14) $m \geq 9$
15) All real #s
16) $-10 \geq y$
17) $x > -4$

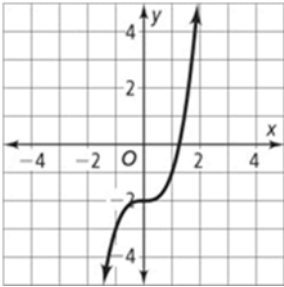
Functions

Be able to:

- Graph points on the coordinate plane
- Identify the coordinates of a point
- Determine whether a relation is a function (from a map, graph, table or list of coordinates)
- Find domain and range of a given relation

Choose the relations that **are** functions:

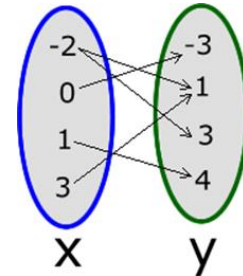
1)



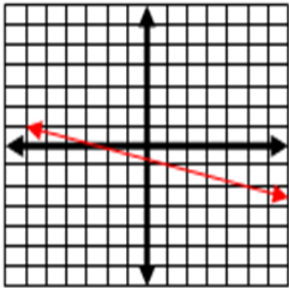
2)

x	y
0	0
1	2
2	-4
3	7

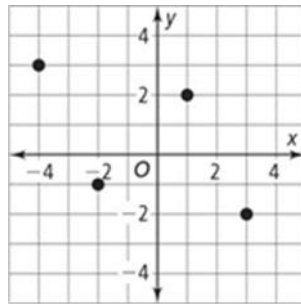
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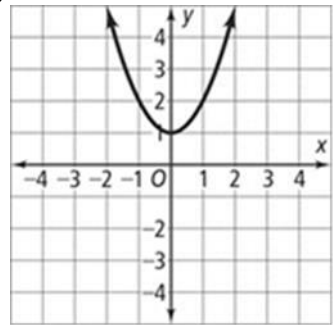
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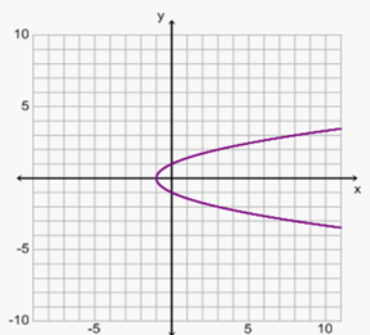
5)



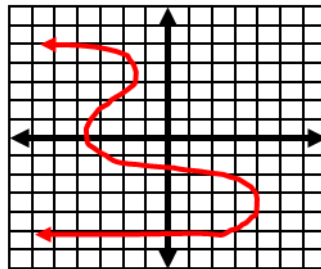
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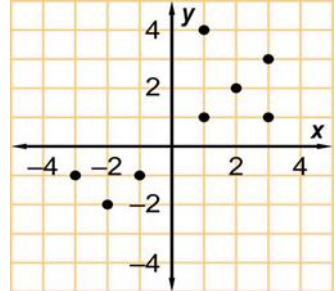
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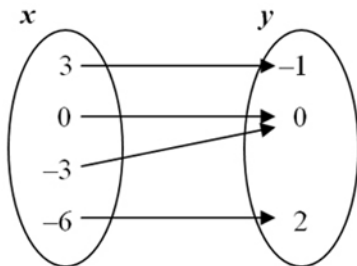
8)



9)



10)



11) Graph and Label each point on the graph at right:

$A(3, -2)$

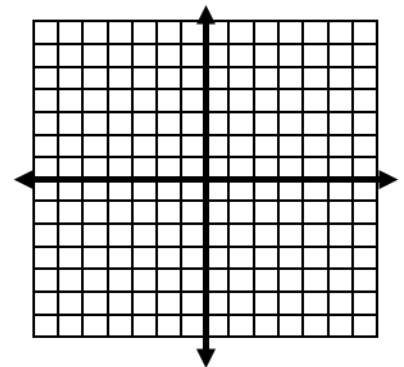
$B(0, 4)$

$C(-6, 0)$

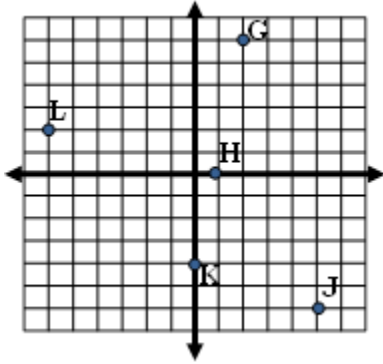
$D(-3, -5)$

$E(4, 4)$

$F(-1, 6)$



12) State the coordinates for each point.



G: _____

H: _____

J: _____

K: _____

L: _____

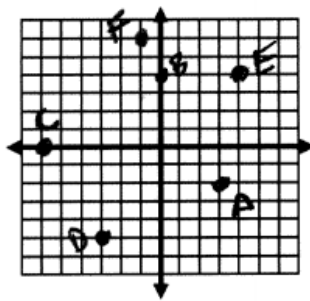
13) Complete the table for the given function.

x	$y = 3x+1$	y
-2		
-1		
0		
1		
2		

ANSWERS for Unit D

- 1) Function
- 2) Function
- 3) Not a function
- 4) Function
- 5) Function
- 6) Function
- 7) Not a function
- 8) Not a function
- 9) Not a function
- 10) Function

11)



12)

- G(2, 6)
 H(1, 0)
 J(5, -6)
 K(0, -4)
 L(-6, 2)

13)

x	$y = 3x+1$	y
-2		-5
-1		-2
0		1
1		4
2		7

Linear Equations & Inequalities and Their Graphs

Be able to:

- Find rate of change (slope) from a table.
- Calculate the slope of a line, given two points or the graph of a line
- Recognize that a line with a positive slope rises to the right, while a line with a negative slope falls to the right
- Find the slope of a horizontal or vertical line
- Graph a line in slope-intercept form, using the y-intercept and the slope
- Graph a line in standard form, using the x-intercept and y-intercept
- Write an equation of a line in slope-intercept form, given the slope and y – intercept, or two points
- Write the equation of a line, given its graph
- Recognize whether a given pair of lines are parallel or perpendicular or neither
- Write the equation of a line, given one point and the equation of a parallel or perpendicular line
- Write linear equations to model and solve real-world applications
- Graph linear inequalities, recognizing that the graph is a shaded region of the coordinate plane and that $<$ and $>$ require a dashed boundary line, while \leq and \geq require a solid boundary line

1) What is the y-intercept of

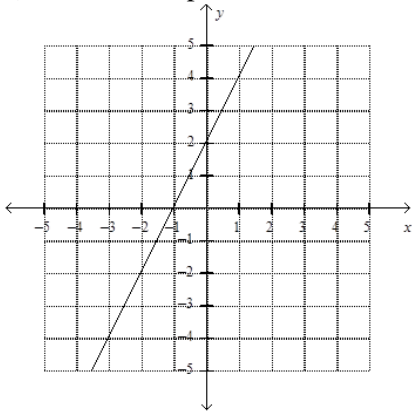
$$y = \frac{1}{3}x - 7?$$

2) What are the x- and y-intercepts of

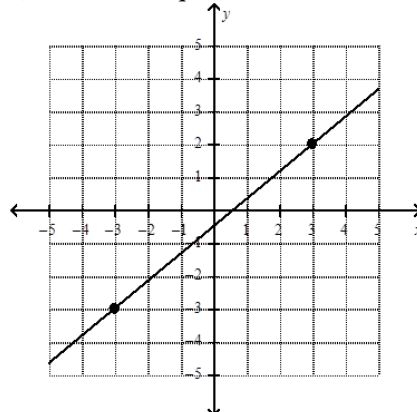
$$3x - 7y = 12?$$

3) Find the slope of the line that passes through the points (2, 7) and (-2, 5)

4) Find the slope of the line.



5) Find the equation of the line.



6) Write an equation for the line through the point $(4, -1)$ with slope $= \frac{-1}{3}$.

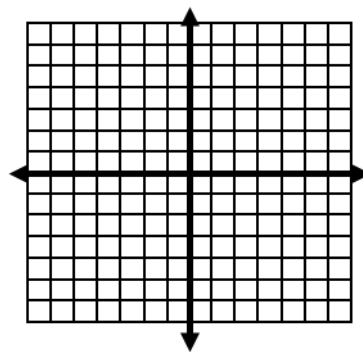
7) What is the y -intercept of $7x - 3y = 6$?

8) Find the slope of the line containing the points $(-2, 3)$ and $(0, 8)$.

Graph the following linear equations on graph at the right.

9) $y = 1$

10) $2x - 4y = 8$

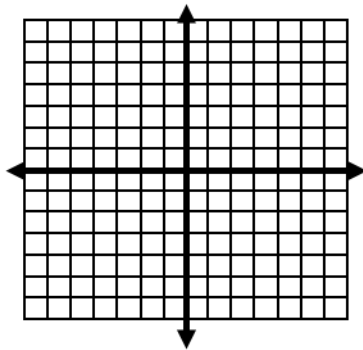


11) State the slope of $y = -2x + 12$.

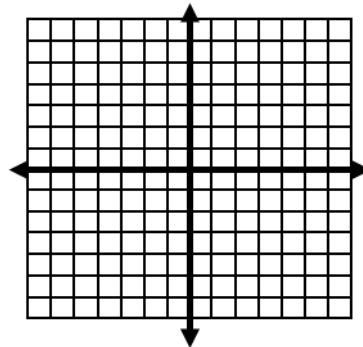
12) Write the equation of the line in slope-intercept form with slope $= \frac{1}{4}$ and y -intercept of $(0, 3)$.

13) What is the slope of the line defined by $x = 2$?

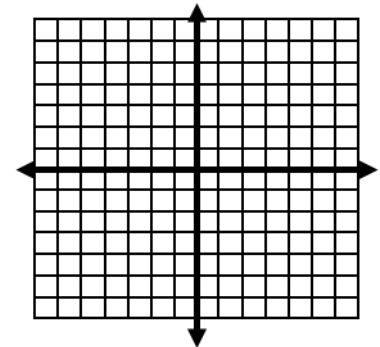
14) State the slope and y -intercept of $y = \frac{1}{3}x - 4$. Graph the line.



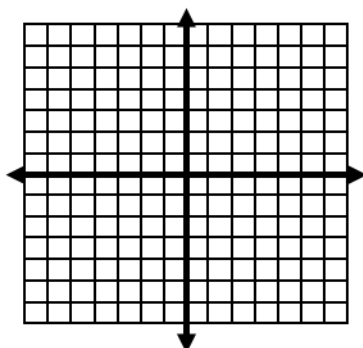
15) Graph: $y = \frac{-1}{2}x - 5$



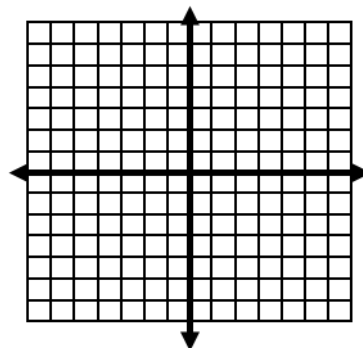
16) Graph: $y = \frac{5}{3}x - 2$



17) Graph: $y > \frac{-1}{3}x + 4$



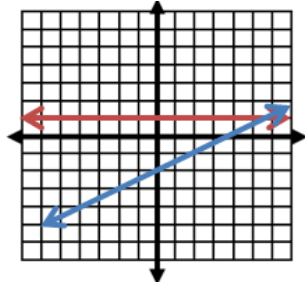
18) Graph: $y \leq 2x + 1$



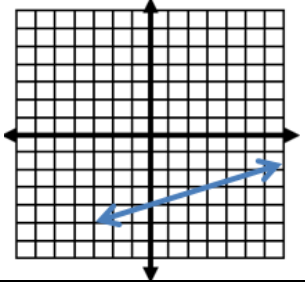
ANSWERS for Unit E

- 1) $(0, -7)$
- 2) x -int $(4, 0)$
 y -int $(0, 12/-7)$
- 3) $m = 1/2$
- 4) $m = 2$
- 5) $(y - 2) = \frac{5}{6}(x - 3)$
or $y = \frac{5}{6}x - \frac{1}{2}$
- 6) $(y + 1) = \frac{-1}{3}(x - 4)$
or $y = \frac{-1}{3}x + \frac{1}{3}$
- 7) $(0, -2)$
- 8) $m = 5/2$

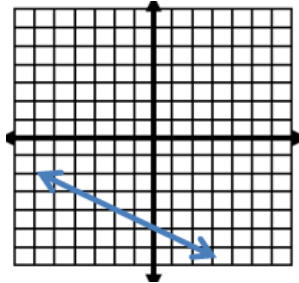
9 and 10)



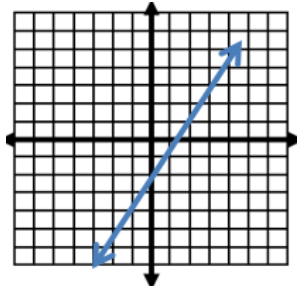
- 11) $m = -2$
- 12) $y = \frac{-1}{4}x + 3$
- 13) undefined
- 14) $m = 1/3, (0, -4)$



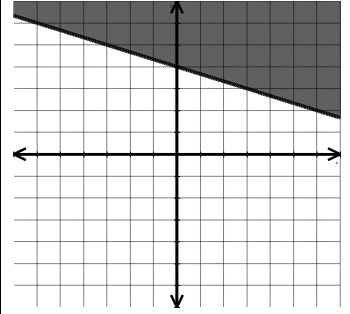
15)



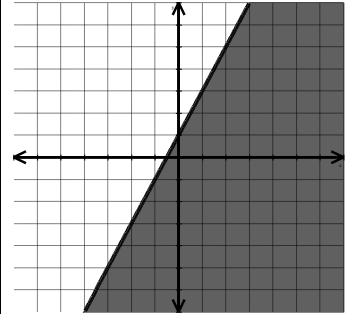
16)



17)



18)



Systems of Equations & Inequalities

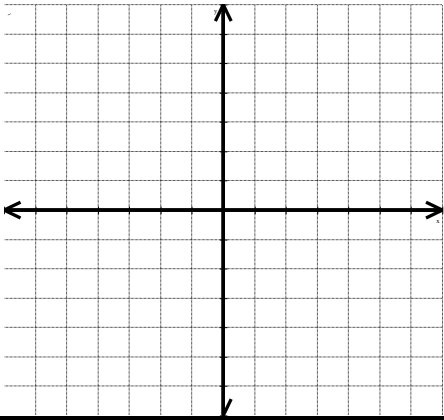
Be able to:

- Recognize that the solution to a system of linear equations is the point of intersection of their graphs
- Recognize that if there is no intersection, there is no solution
- Recognize that if the equations represent the same line, there are infinite solutions
- Determine if a given point is a solution to a system
- Solve systems of equations by graphing
- Solve systems of equations using substitution
- Solve systems of equations by elimination
- Solve systems of inequalities by graphing
- Solve application problems including those using perimeter, coins, and mixtures

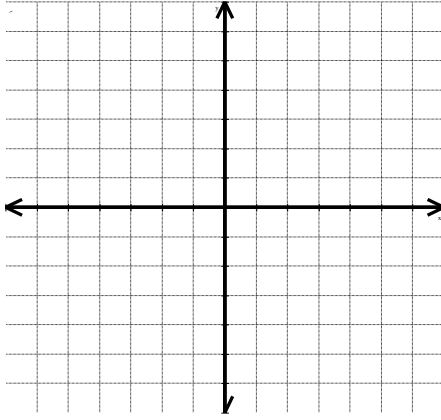
- 1) When you solve a system of equations by graphing, the solution is the point of intersection, true or false?

Solve each by graphing:

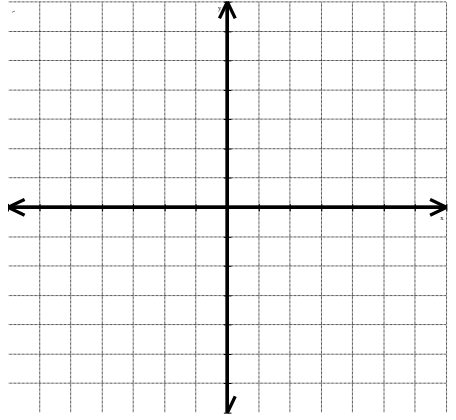
2) $y = -\frac{1}{2}x - 2$
 $y = x + 1$



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



4) $3x + 3y = 12$
 $y = -x + 2$



Solve each using substitution:

5) $y = 2x + 8$
 $2x + 2y = -20$

6) $y = x - 7$
 $2x + y = 8$

Solve each using elimination:

7) $10x - 6y = 12$
 $-5x + 9y = 12$

8) $-6x - 4y = 1$
 $12x + 8y = -8$

9) $5x + y = -18$
 $-x - y = 10$

Solve each using any method:

10) $y = 3x + 2$
 $2x + y = -8$

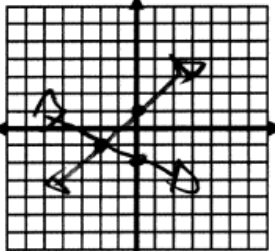
11) $2x + 4y = -6$
 $x - 3y = 7$

12) $x - y = 3$
 $3x + y = 25$

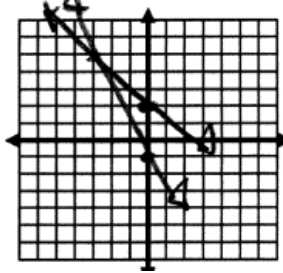
13) $3x + y = 10$
 $y = -3x + 4$

ANSWERS for Unit F

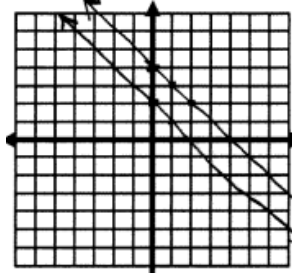
- 1) True
 2) $(-2, -1)$



3) $(-3, 5)$



4) No solution



- 5) $(-6, -4)$
 6) $(5, -2)$
 7) $(3, 3)$
 8) No solution
 9) $(-2, -8)$
 10) $(-2, -4)$
 11) $(1, -2)$
 12) $(7, 4)$
 13) No solution

Operation with Exponents

Be able to:

- To simplify expressions involving zero and negative exponents
- To multiply powers with the same base.
- To raise a power to a power.
- To raise a product to a power.
- To divide powers with the same base.
- To raise a quotient to a power.
- To rewrite expressions involving radicals and rational expressions

Simplify

- 1) 5^0 2) $\left(\frac{b^3}{5}\right)^0$ 3) $(2x)^0$ 4) $2x^0$ 5) $(-7)^0$
- 6) $\left(\frac{3a^2y^3}{w}\right)^4$ 7) m^1 8) 5^1 9) $(-7)^1$ 10) $(2x)^1$
- 11) $\left(\frac{3a^2y^3}{w}\right)^1$ 12) $\left(\frac{b^3}{5}\right)^1$ 13) 8^{-1} 14) 4^{-2} 15) $\frac{3}{a^{-1}}$
- 16) x^{-5} 17) $7c^{-1}d^2$ 18) $\frac{n^{-5}}{m^2}$ 19) $\frac{1}{p^{-4}}$ 20) x^5x^3
- 21) 2^22^3 22) $(x^2y^3)(x^4y^5)$ 23) $m^3mm^2mm^5$ 24) $(-5)^{-2}(-5)^7$
- 25) $2a \cdot 10b^5 \cdot 3a^2$ 26) $4x^3 \cdot 7x^{-8}$ 27) $(x^5)^3$ 28) $(2^3)^7$ 29) $b^5(b^3)^2$
- 30) $(3z^6)^2$ 31) $(5x)^3$ 32) $(x^3y)^2(x^3y^2)$ 33) $(4xy^3)^2(x^3)^6$
- 34) $\frac{3^{10}}{3^8}$ 35) $\frac{a^{10}}{a^{13}}$ 36) $\frac{x^6}{x^{12}}$ 37) $\frac{a^{12}b^2d^6}{a^5b^3c^{-1}d^6}$ 38) $\frac{m^2n^7}{m^5n^3}$
- 39) $\left(\frac{x^5}{y^3}\right)^4$ 40) $\left(\frac{2x^6}{y^4}\right)^{-3}$ 41) $\left(\frac{m^4}{n^3}\right)^{-1}$ 42) $\left(\frac{b^3}{5}\right)^2$
- 43) $\left(\frac{3a^2y^3}{w}\right)^4$ 44) $81^{1/4}$ 45) $25^{1/2}$ 46) $\sqrt[5]{32}$

ANSWERS for Unit G

- | | | | |
|------------------------------|-------------------------|----------------------|------------------------|
| 1) 1 | 7) m | 13) $\frac{1}{8}$ | 18) $\frac{1}{n^5m^2}$ |
| 2) 1 | 8) 5 | 14) $\frac{1}{16}$ | 19) p^4 |
| 3) 1 | 9) -7 | 15) $3a$ | 20) x^8 |
| 4) 2 | 10) $2x$ | 16) $\frac{1}{x^5}$ | 21) 32 |
| 5) 1 | 11) $\frac{3a^2y^3}{w}$ | 17) $\frac{7d^2}{c}$ | 22) x^6y^8 |
| 6) $\frac{81a^8y^{12}}{w^4}$ | 12) $\frac{63}{5}$ | | 23) m^{12} |

24) -3125	31) $125x^3$	38) $\frac{n^4}{m^3}$	42) $\frac{b^6}{25}$
25) $60a^3b^5$	32) x^6y^4	39) $\frac{x^{20}}{y^{12}}$	43) $\frac{81a^8y^{12}}{w^4}$
26) $\frac{28}{x^5}$	33) $16x^{20}y^6$	40) $\frac{y^{12}}{8x^{18}}$	44) 3
27) x^{15}	34) 9	41) $\frac{n^3}{m^4}$	45) 5
28) 2,097,152	35) $\frac{1}{a^8}$		46) 2
29) b^{11}	36) $\frac{1}{x^7}$		
30) $9z^{12}$	37) $\frac{a^7c}{b}$		

Polynomials and Factoring

Be Able to:

- To classify, add, and subtract polynomials.
- To multiply a monomial by a polynomial.
- To factor a monomial from a polynomial.
- To multiply two binomials or a binomial by a trinomial.
- To find the square of a binomial and to find the product of a sum and difference.
- To factor trinomials of the form $x^2 + bx + c$.
- To factor trinomials of the form $x^2 + bx + c$.
- To factor perfect-square trinomials and the differences of two squares
- To factor higher-degree polynomials by grouping

Simplify

- | | | | |
|--|------------------------|--|---------------------|
| 1) $3x^2 + 5x^2$ | 2) $6x - 2x$ | 3) $4x^3y - x^3y$ | 4) $12ab^2 + 5ab^2$ |
| 5) $(a + b - 4c) + (2a + 5c)$ | | 6) $(2m - 5n) + (3m + 4n)$ | |
| 7) $(2x^3 + 4x^2 - 6) - (5x^3 + 2x - 2)$ | | 8) $(6x^2 + 3x + 7) + (2x^2 - 6x - 4)$ | |
| 9) $5(x^3 - 7)$ | 10) $6(x^2 + 2y)$ | 11) $-x(x^2 - x + 1)$ | |
| 12) $4(a^2 - 2ab + b^2)$ | 13) $x(x^2 + 5x + 6)$ | 14) $x^2(x + 4)$ | |
| 15) $-2g^2(3g^3 + 6g - 5)$ | 16) $4b(5b^2 + b + 6)$ | | |

Find the GCD for each expression.

- | | |
|------------------|---------------|
| 17) $6w^2 - 14w$ | 18) $8x + 36$ |
|------------------|---------------|

Unit H Polynomials and Factoring

Be Able to:

- To classify, add, and subtract polynomials.
- To multiply a monomial by a polynomial.
- To factor a monomial from a polynomial.
- To multiply two binomials or a binomial by a trinomial.
- To find the square of a binomial and to find the product of a sum and difference.
- To factor trinomials of the form $x^2 + bx + c$.
- To factor trinomials of the form $x^2 + bx + c$.
- To factor perfect-square trinomials and the differences of two squares
- To factor higher-degree polynomials by grouping

Simplify

1. $3x^2 + 5x^2$	2. $6x - 2x$
3. $4x^3y - x^3y$	4. $12ab^2 + 5ab^2$
5. $(a + b - 4c) + (2a + 5c)$	6. $(2m - 5n) + (3m + 4n)$
7. $(2x^3 + 4x^2 - 6) - (5x^3 + 2x - 2)$	8. $(6x^2 + 3x + 7) + (2x^2 - 6x - 4)$
9. $5(x^3 - 7)$	10. $6(x^2 + 2y)$
11. $-x(x^2 - x + 1)$	12. $4(a^2 - 2ab + b^2)$

13. $x(x^2 + 5x + 6)$	14. $x^2(x + 4)$
15. $-2g^2(3g^3 + 6g - 5)$	16. $4b(5b^2 + b + 6)$
17. Find the GCF of $6w^2 - 14w$	18. Find the GCF of $8x + 36$
19. $x^2 + 3x$	20. $5x + 10$
21. $4x^3 - 8x^2 + 12x$	22. $2x^4 + 10x^2 - 6x$
23. $48a^2b^3c^5 - 32ab^2c^7$	24. $12u^3v + 16uv^4$
25. $(x - 2)(x + 1)$	26. $(x + 3)(x - 7)$
27. $(3x - 2)(x - 4)$	28. $(2x + 5)(x + 7)$

29. $(9a - 8)(7a + 4)$	30. $(3x - 4)(2x - 5)$
31. $(x + 1)^2$	32. $(x - 9)^2$
33. $(x + 5)(x + 5)$	34. $(x - 3)(x + 3)$
35. $(x + 1)(x - 1)$	36. $(5x - 9)(5x + 9)$
37. $a^2 - 4a + 3$	
Factor	
38. $p^2 + 10p + 16$	39. $x^2 + 32x + 60$
40. $4x^2 + 20x + 25$	41. $y^2 - 12y - 28$
42. $8x^2 + 14x + 3$	43. $4x^2 - 9$

44. $2x^2 - 1x - 1$	45. $6y^2 - 7y - 5$		
46. $x^2 - 16$	47. $6x^2 + 19x + 3$		
ANSWERS for Unit H 1) $8x^2$ 2) $4x$ 3) $3x^3y$ 4) $17ab^2$ 5) $3a + b + c$ 6) $5m - n$ 7) $-3x^3 + 4x^2 - 2x - 4$ 8) $8x^2 - 3x + 3$ 9) $5x^3 - 35$ 10) $6x^2 + 12y$ 11) $-x^3 + x^2 - x$ 12) $4a^2 - 8ab + 4b^2$	13) $x^3 + 5x^2 + 6x$ 14) $x^3 + 4x^2$ 15) $-6g^5 - 12g^3 + 10g^2$ 16) $20b^3 + 4b^2 + 24b$ 17) GCF: $2w$ 18) GCF: 4 19) $x(x + 3)$ 20) $5(x + 2)$ 21) $4x(x^2 - 2x + 3)$ 22) $2x(x^2 + 5x - 3)$ 23) $16ab^2c^5(4ab - 2c^2)$ 24) $4uv(3u^2 + 4v^3)$	25) $(p + 8)(p + 2)$ 26) $(x + 30)(x + 2)$ 27) $(2x + 5)(2x + 5)$ 28) $(y - 14)(y + 2)$ 29) $(4x + 1)(2x + 3)$ 30) $(2x - 3)(2x + 3)$ 31) $(2x + 1)(x - 1)$ 32) $(2x + 1)(3y - 5)$ 33) $(x + 4)(x - 4)$ 34) $(6x + 1)(x + 3)$ 35) $(a - 3)(a - 1)$	36) $x^2 - x - 2$ 37) $x^2 - 4x - 21$ 38) $3x^2 - 14x + 8$ 39) $2x^2 + 19x + 35$ 40) $63a^2 - 20a - 32$ 41) $6x^2 - 23x + 20$ 42) $x^2 + 2x + 1$ 43) $x^2 - 18x + 81$ 44) $x^2 + 10x + 25$ 45) $x^2 - 9$ 46) $x^2 - 1$ 47) $25x^2 - 81$