Geometry Placement Exam Review, 2016

The following overview of Algebra 1 is intended to help you review the concepts that will be on your placement exam. Solutions are included.

UNIT A 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) $-12x+4$		

Unit B: 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) $n = -48/5$	17) $c = 2$	24) $x = 16$
4) $y = 7$	11) $n = 9$	18) $x = 4/3$	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

Unit C: 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: $x\le -6$

4) Solve and graph the inequality: $-5\le w-3$

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: $-x\ge 5$

10) Solve and graph: $2x-3(x-5)>10$

11) Solve and graph: $2x+5\le 4x+1$

12) Solve: $-2y-6-y>15$

13) Solve: $6m-5m+2\ge 11$

14) Solve: $2(c-3)-2c>0$

15) Solve: $-3t+1\ge -3(t+2)$

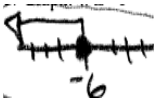
16) Solve: $4\le \frac{-2}{5}y$

17) Solve: $\frac{x}{4}>-1$

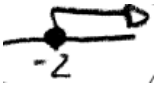
ANSWERS for Unit C

1) $y<7$

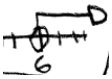
2) $w<3$

3) 

4) $-2\le w$

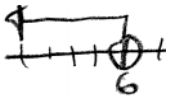


5) $c>6$

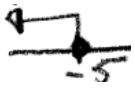


6) $c>21$

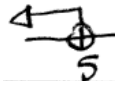
7) $z\le -5$

8) 

9) $x\le -5$



10) $x<5$



11) $2\le x$

12) $y<-7$

13) $y\le -7$

14) $m\ge 9$

15) All real #s

16) All real #s

17) $-10\ge y$

18) $x>-4$

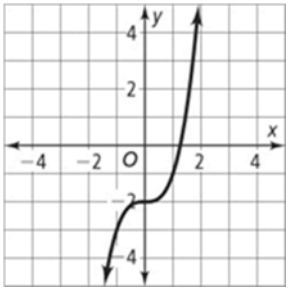
Unit D: Functions

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:

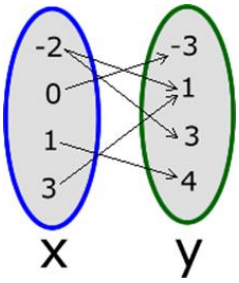
1)



2)

x	y
0	0
1	2
2	−4
3	7

3)



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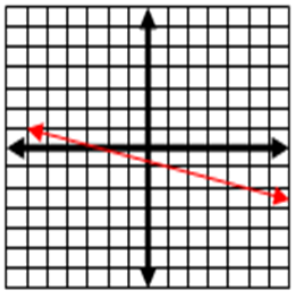

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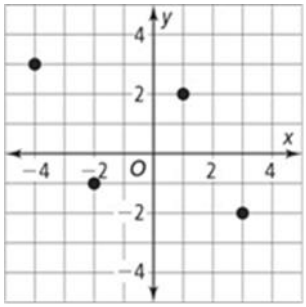

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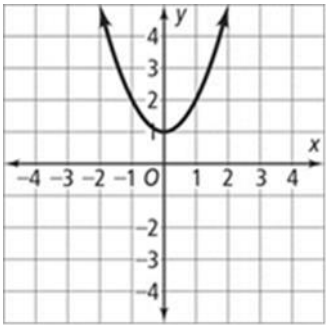

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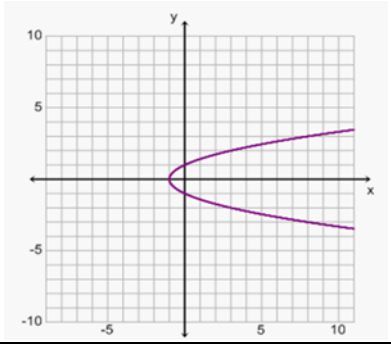

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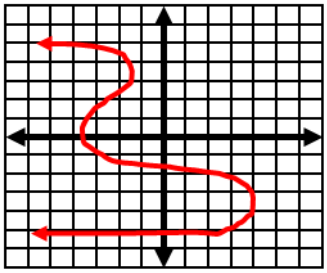

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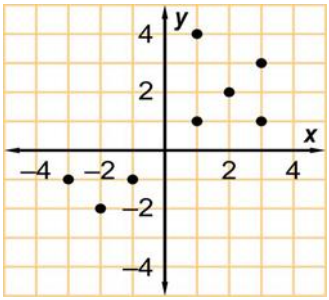

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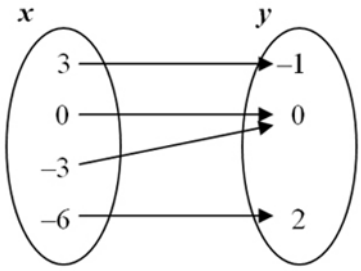


11) Graph and Label each point on the graph at right:

$A(3, -2)$

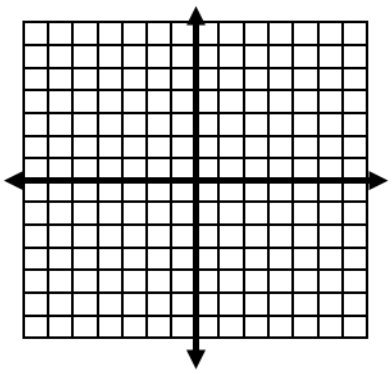
$B(0, 4)$

$C(-6, 0)$

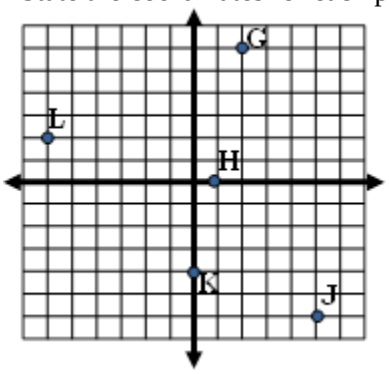
$D(-3, -5)$

$E(4, 4)$

$F(-1, 6)$



12) State the coordinates for each point.



G: _____

H: _____

J: _____

K: _____

L: _____

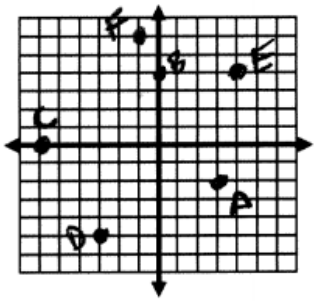
13) Complete the table for the given function.

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

Unit E: Linear Equations & Inequalities and Their Graphs

Be able to:

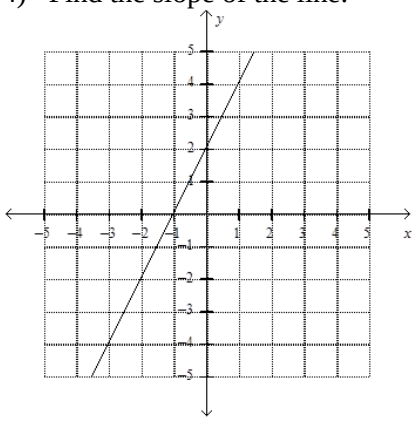
- Find rate of change (slope) from a table.
- Calculate the slope of a line, given two points or the graph of a line
- Recognize that a line with a positive slope rises to the right, while a line with a negative slope falls to the right
- Find the slope of a horizontal or vertical line
- Graph a line 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 ≤ and ≥ require a solid boundary line

1) What is the ***y***-intercept of $y = \frac{1}{3}x - 7$?

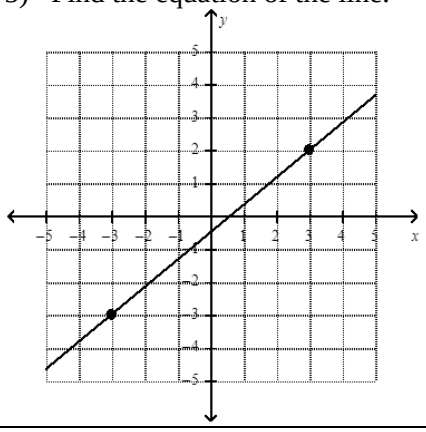
2) What are the ***x***- and ***y***-intercepts of $3x - 7y = 12$?

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 $= \frac{-1}{3}$.

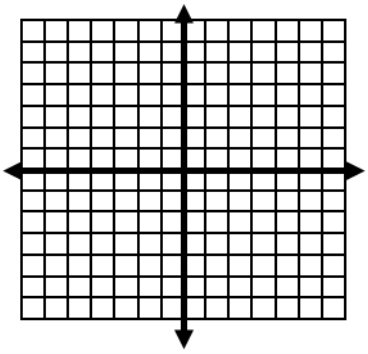
7) What is the ***y***-intercept of $7x - 3y = 6$?

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) $2x - 4y = 8$

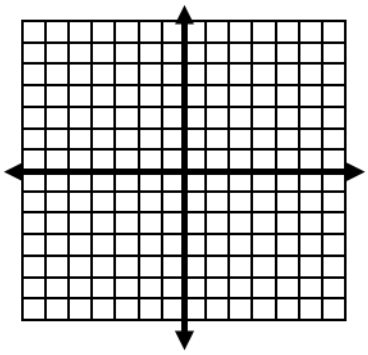


11) State the slope of $y = -2x + 12.$

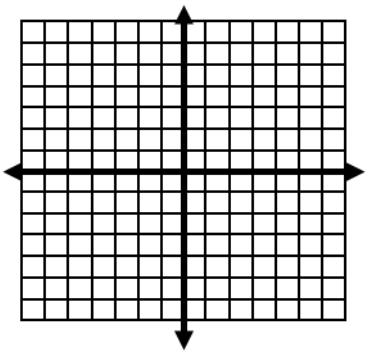
12) Write the equation of the line in slope-intercept form with slope $= \frac{1}{4}$ and ***y***-intercept of (0, 3).

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

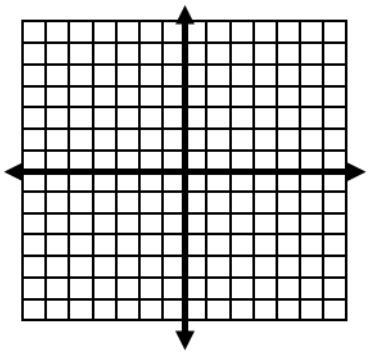
14) State the slope and ***y***-intercept of $y = \frac{1}{3}x - 4.$ Graph the line.



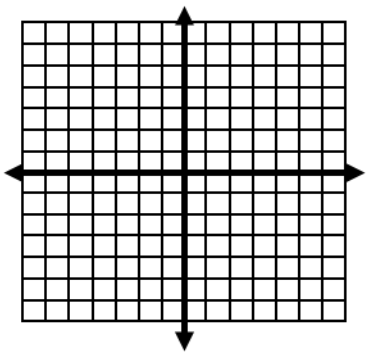
15) Graph: $y = \frac{-1}{2}x - 5$



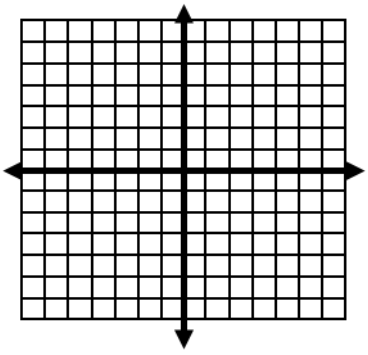
16) Graph: $y = \frac{5}{3}x - 2$



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



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



ANSWERS for Unit E

1) $(0,\ -7)$

2) x-int$(4,\ 0)$

y-int$\left(0,\ {}^{12}\!/_{-7}\right)$

3) $m = {}^{1}\!/_{2}$

4) $m = 2$

5) $(y-2) = \frac{5}{6}(x-3)$

or $y = \frac{5}{6}x - \frac{1}{2}$

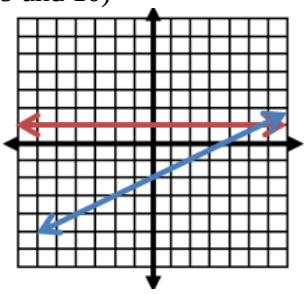
6) $(y+1) = \frac{-1}{3}(x-4)$

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

7) $(0,\ -2)$

8) $m = {}^{5}\!/_{2}$

9 and 10)

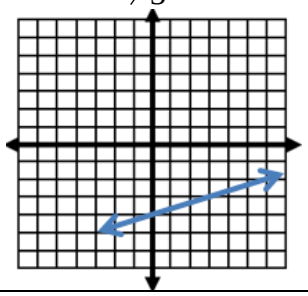


11) $m = -2$

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

13) undefined

14) $m = {}^{1}\!/_{3}$, $(0,\ -4)$



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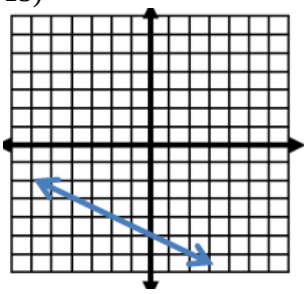

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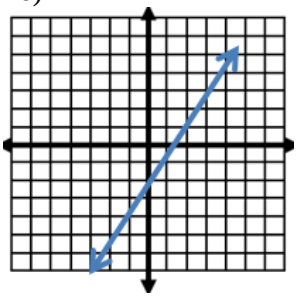

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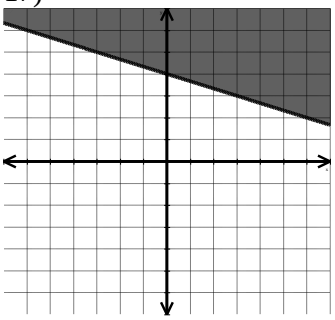

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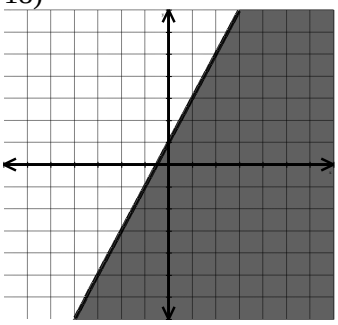


Unit F: Systems of Equations & Inequalities

Be able to:

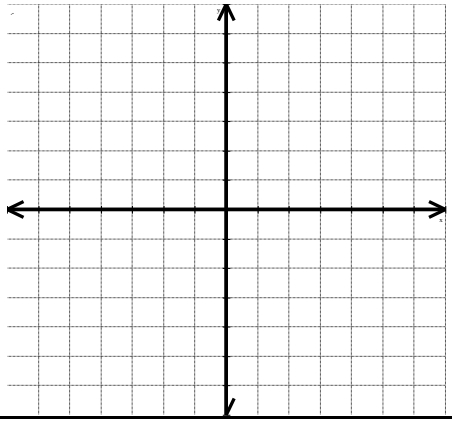
- Recognize that the solution to a system of linear equations is the point of intersection of their graphs
- Recognize that if there is no intersection, there is no solution
- Recognize that if the equations represent the same line, there are infinite solutions
- Determine if a given point is a solution 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:

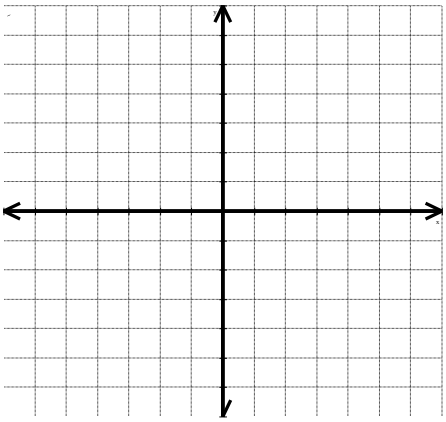
2) $y = -\frac{1}{2}x - 2$

$y = x + 1$



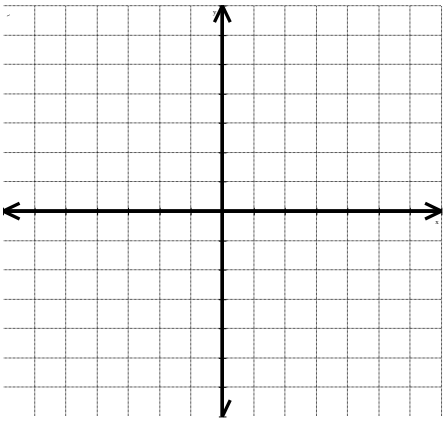
3) $x + y = 2$

$y = -2x - 1$



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) $x - y = 3$

$3x + y = 25$

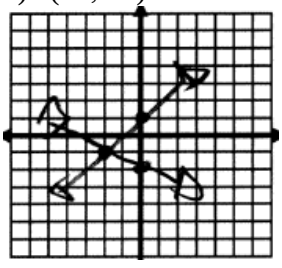
13) $3x + y = 10$

$y = -3x + 4$

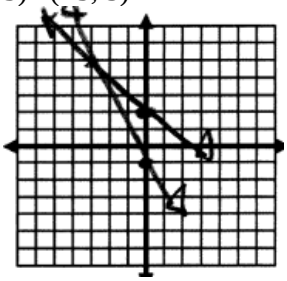
ANSWERS for Unit F

1) True

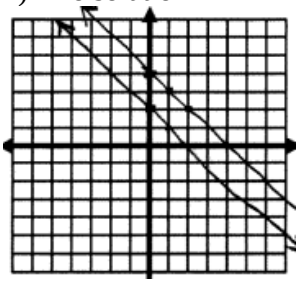
2) (−2, −1)



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

Unit G: 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) $2^2 2^3$ 22) $\left(x^2y^3\right)\left(x^4y^5\right)$ 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) $\left(x^5\right)^3$ 28) $\left(2^3\right)^7$ 29) $b^5\left(b^3\right)^2$

30) $\left(3z^6\right)^2$ 31) $(5x)^3$ 32) $\left(x^3y\right)^2\left(x^3y^2\right)$ 33) $\left(4xy^3\right)^2\left(x^3\right)^6$

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

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

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 $\boldsymbol{x^2 + bx + c}$.
- To factor trinomials of the form $\boldsymbol{x^2 + bx + c}$.
- 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) $8x+36$

Factor completely.

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) $p^2+10p+16$ 26) $x^2+32x+60$ 27) $4x^2+20x+25$

28) $y^2-12y-28$ 29) $8x^2+14x+3$ 30) $4x^2-9$

31) $2x^2-1x-1$ 32) $6y^2-7y-5$ 33) x^2-16

34) $6x^2+19x+3$ 35) a^2-4a+3

Multiply

36) $(x-2)(x+1)$ 37) $(x+3)(x-7)$ 38) $(3x-2)(x-4)$

39) $(2x+5)(x+7)$ 40) $(9a-8)(7a+4)$ 41) $(3x-4)(2x-5)$

42) $(x+1)^2$ 43) $(x-9)^2$ 44) $(x+5)(x+5)$

45) $(x-3)(x+3)$ 46) $(x+1)(x-1)$ 47) $(5x-9)(5x+9)$

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) $4x\left(x^2-2x+3\right)$
22) $2x\left(x^2+5x-3\right)$
23) $16ab^2c^5\left(4ab-2c^2\right)$
24) $4uv\left(3u^2+4v^3\right)$
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) $25x^2-81$