Summer Math Packet

In preparation for **Honors Math III**, we have prepared a packet of concepts that students should know how to do. These concepts have been taught in previous math classes. This packet does not require you to use a calculator; in fact you should not use a calculator on some of the problem sets where it is noted. Honors Math III builds on the concepts in this packet. We start teaching Math III concepts on the first day of school. We expect you to know the concepts in the packet in order to help you be successful in Honors Math III. Although you do not have to complete every problem in this packet, you will be held responsible for knowing how to complete them all and the content/skills needed.

Answer keys are included at the end of this packet to check your understanding. If you are struggling with this packet, get help from a friend, parent, peer, or tutor. If you can't find someone to help you, there are tutors available. A list of tutors can be found by calling Reagan High School or from Reagan's Student Services' website. Keep in mind these tutors may charge a fee.

For the Geometry Unit, you should know/remember the following formulas:
Area of a rhombus = ½ (product of diagonals)
General Formulas for surface area and volume of right prisms and cylinders

You will have a graded assignment within the first two weeks of school. The graded assignment will cover all the concepts in the packet, but will not be the exact same problems. The graded assignment will contain a calculator inactive part so be prepared by following instructions where calculators are not allowed. You will be able to use your completed packet as a resource on the assessment at the beginning of the year so it is in your best interest to complete as needed.

You can also go to youtube.com and type in the name of the concept and watch videos of math teachers and tutors explain the concepts for FREE!!!!

Vocabulary/Know the difference Review

1. Proportions vs. multiplying fractions

Proportion		Multiplying Fractions
$\frac{2}{x}=\frac{8}{12}$	vs.	$\frac{2}{3}\cdot\frac{8}{12}$

2. x * x = ? vs. x + x = ?

3. order of operations: don't be tricked by these common "mistaken identities"

   a. $5 * 2^3$ vs. $(5 * 2)^3$ b. $5 + 3(x + 4)$ c. -8^2 vs. $(-8)^2$

4. $(x - 9)^2$ vs. $(x + 9)^2$ vs. $(x - 9)(x + 9)$
   a. $(x - 9)^2$ =
   b. $(x + 9)^2$ =
   c. $(x - 9)(x + 9)$ =

5. know the difference between a term, expression, equation, and inequality
   term –

   expression –

   equation –

   inequality –

6. know the difference between solve, evaluate and simplify

   simplify –

   evaluate –

   solve –

7. know the difference between rational and irrational

   rational –

   irrational –

8. know the > and < symbols by name:

9. know coefficient –

10. know factor –

11. reduce factors **not** individual terms

Fractions **DO NOT USE A CALCULATOR**

1) $\frac{2}{3}+\frac{4}{9}$

2) $\frac{7}{4}-\frac{4}{5}$

3) $\frac{3}{4}+\frac{1}{6}$

4) $\frac{2}{3}\bullet\frac{4}{9}$

5) $\frac{7}{4}\bullet\frac{4}{5}$

6) $\frac{3}{4}\bullet\frac{1}{6}$

7) $\frac{2}{3}\div\frac{4}{9}$

8) $\frac{7}{4}\div\frac{4}{5}$

9) $\frac{3}{4}\div\frac{1}{6}$

Solve Equations and Inequalities Review **DO NOT USE A CALCULATOR**

1) $\frac{x}{4}+7=-5$ 2) $2=\frac{-3+x}{7}$

Clear out fractions.

3) $\frac{7}{8}a-\frac{1}{4}+\frac{3}{4}a=\frac{1}{16}+a$

Variables on both sides.

4) 3(x – 8) + 3(2x + 4) = 15 5) 8 + 3(a – 3) = 4(a + 5) 6) 6 – 2x + 5x = 7 + 7x – 15

Solve Inequalities.

When you multiply or divide both sides by a negative remember to flip the inequality.

Get the variable on the left side.

7) $-x+6>-(2x+4)$ 8) $2x-6<-x+6$

Word Problems

You must be able to write the equation or inequality first. Then solve for the variable.

9) The greater of two numbers is 6 more than 4 times the smaller. Their sum is 41. Find the numbers.

10) Find three consecutive integers whose sum is 105.

11) Find three consecutive even integers whose sum is 138.

12) The length of a rectangle is 2 feet more than its width. If its perimeter is 40 feet, find the length and the width.

13) The second angle in a triangle is 3° less than twice the first angle. The third angle measure 8° more than twice the first angle. Find each angle.

14) Jeffery has grades of 93 and 81 on the first two tests of the quarter.
Progress reports will go home after the third test.
If Jeffery does not have an A average on his progress report, he cannot go to the football game that week.
Jeffery will have to make at least what grade on the third test to be allowed to go to the football game?

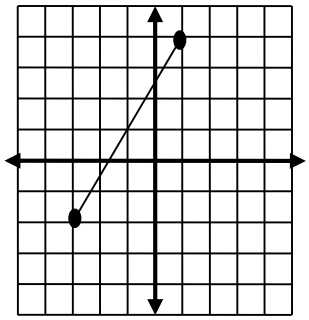
Linear Equations Review:
Slope, Writing Linear Equations, Horizontal & Vertical Lines, Parallel & Perpendicular Lines

Find the slope (rate of change) of the following problems.

1. $(3,-8),\ (-5,-1)$

2.

Day	Temperature ($^\circ F$)
1	60
2	62
3	64
4	66

3. 

4. The cost of museum tickets is $48 for four people and $78 for 10 people. What is the cost per person?

Write the equation of the line in **slope-intercept** form & **standard form** given the following.

5. $(2,5)\quad m=3$

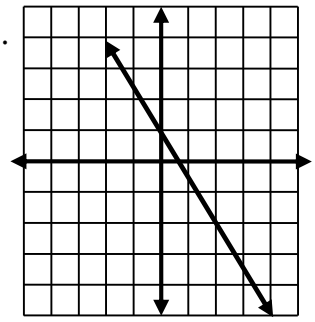
6. $(4,2)\quad m=-\frac{5}{7}$

7. $(2,-6)(1,-2)$

8. $m=-\frac{1}{2},\ b=2$

9. (2, -3) $m = 0$

10. (4, -1) m = undefined

11. 

12. The cost for 7 dance lessons is $82. The cost for 11 lessons is $122. Write a linear equation to find the total cost C for L dance lessons. Then use the equation to find the cost of 4 lessons.

13. Write the equation for a *vertical* line that goes through the point (2, 4).

14. Write the equation for a *horizontal* line that goes through the point (-1, 3).

Solve the equation for y if necessary, and find the slope. Then, find the slope of a line parallel and perpendicular to the original line.

Slope Parallel Perpendicular

15. $2x + 6y = 8$

16. $x = 3$

17. $y = -2$

18. Write the equation for the line parallel to the given line and through the given point. Write the answer in slope intercept and standard forms. $4x – 3y = 9$ and $(3, –1)$

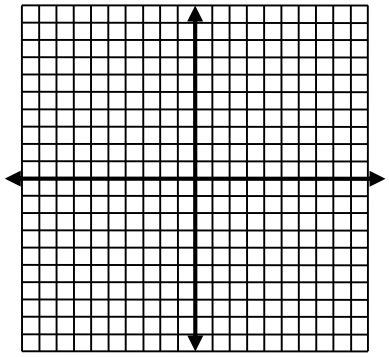
19. Write the equation for the line perpendicular to the given line and through the given point. Write the answer in slope intercept and standard forms. $4x – 3y = 9$ and $(8, –3)$

20. Given a line through $(–2, 4)$ and $(8, –1)$, find the equation of the line perpendicular to that line through the midpoint of those points. Write the answer in slope intercept and standard forms.

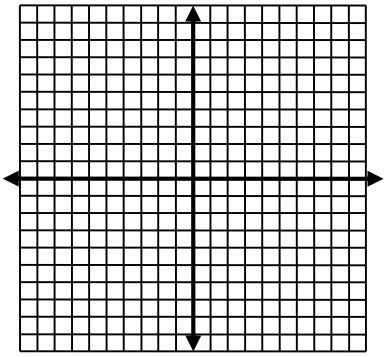
Graphing Linear Equations and Inequalities **DO NOT USE A CALCULATOR**

Graph each of the following lines.

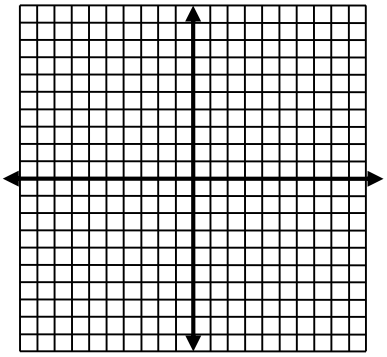
1) slope: $-\frac{3}{4}$, through $(-5, -1)$



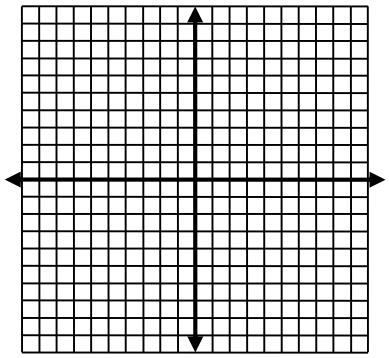
2) slope: 2, through $(-3, 4)$



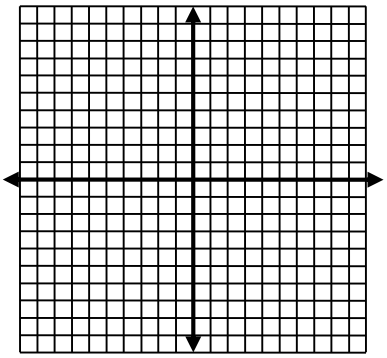
3) slope: $\frac{1}{4}$, y-intercept: -5



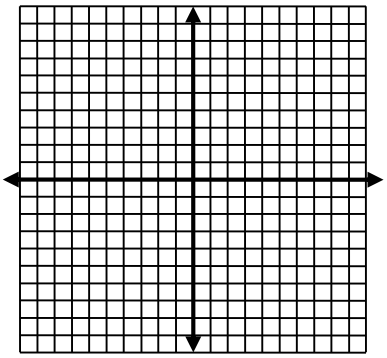
4) slope: -3, x-intercept: 4



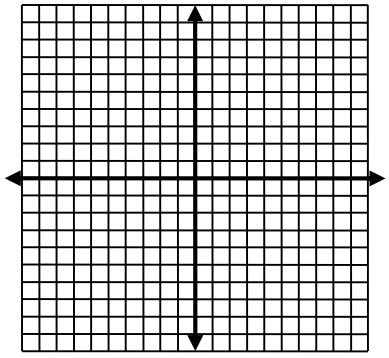
5) $y = \frac{2}{3}x - 4$



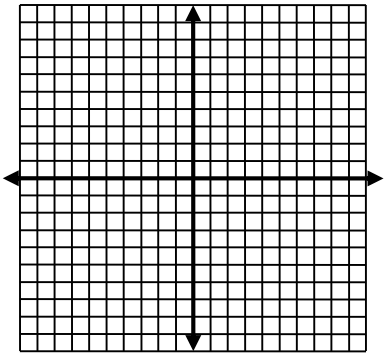
6) $y = 5x + 2$



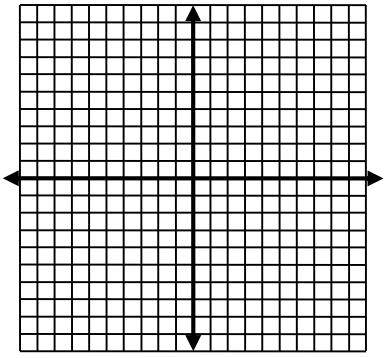
7) $y = -\frac{5}{3}x - 6$



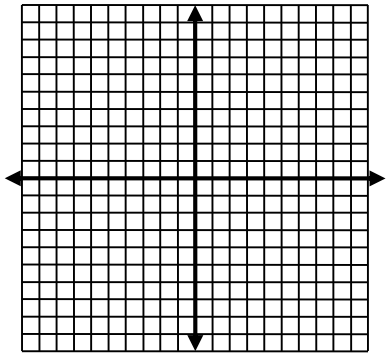
8) $y = -3x + 5$



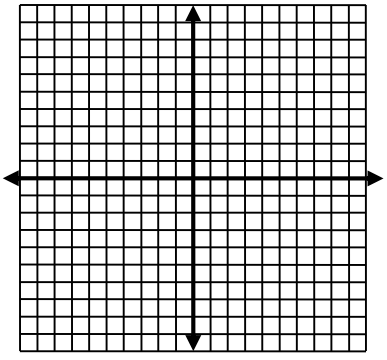
9) $y = \frac{2}{7}x$



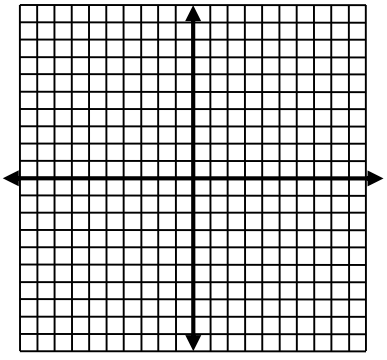
10) $5x - y = 2$



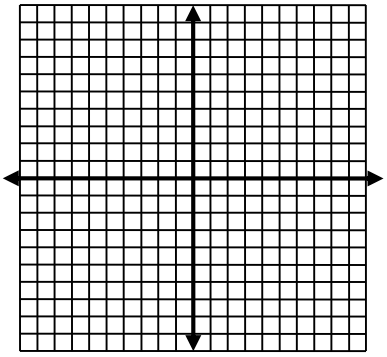
11) $6x + 3y = -12$



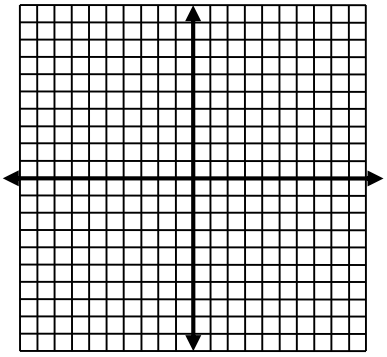
12) $4x + 2y = 0$



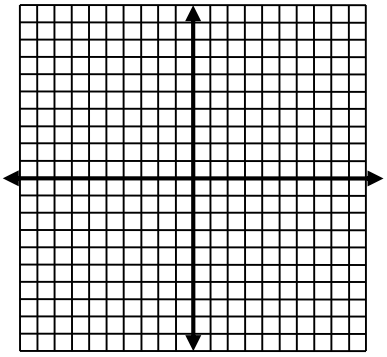
13) $x+3y=15$



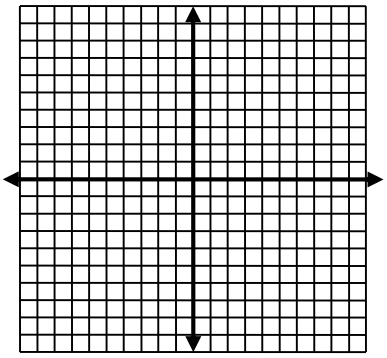
14) $3x+7y=21$



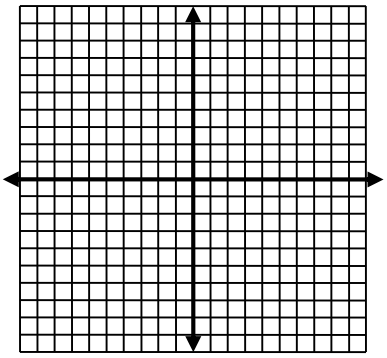
15) $y=3$



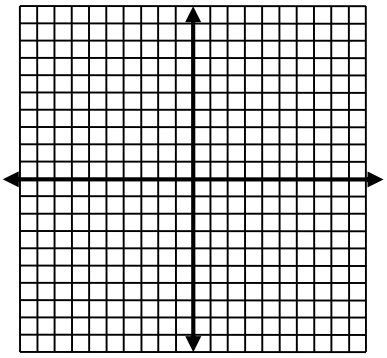
16) $y=-4$



17) no slope; through (2, 5)



18) slope: 0 through (3, –7)



Write each of the following in slope-intercept form: ($y=mx+b$)

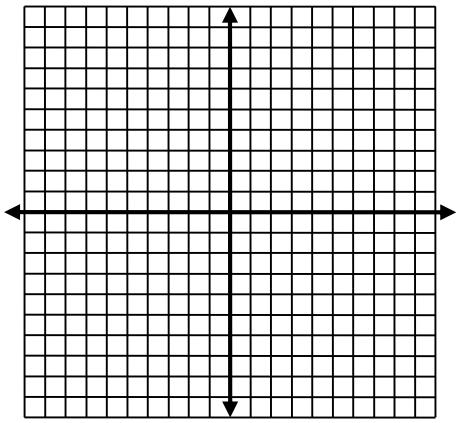
19) A computer technician charges $75 for a consultation plus $35 per hour.

20) The population of Pine Bluff is 6791 and is decreasing at the rate of 7 per year.

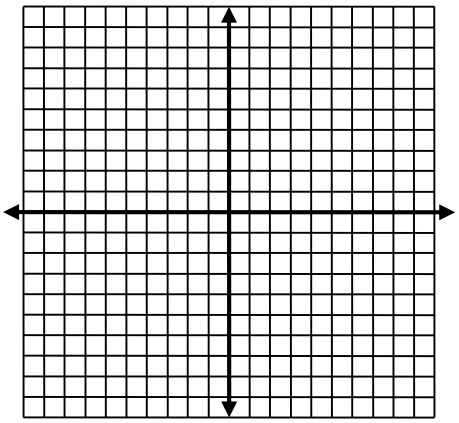
21) A video store charges $10 for a rental card plus a $2 per rental.

Graph each inequality. Remember to use either a solid or dotted line, then SHADE.

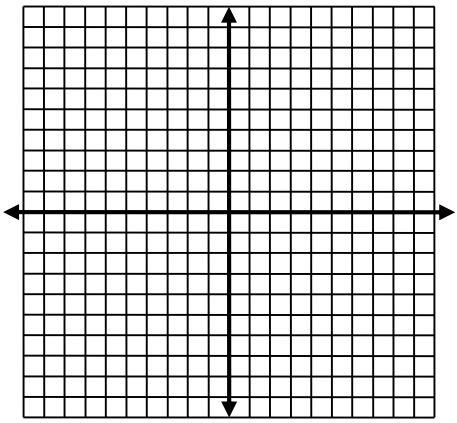
1) $y < x - 5$



2) $x \geq 3y$



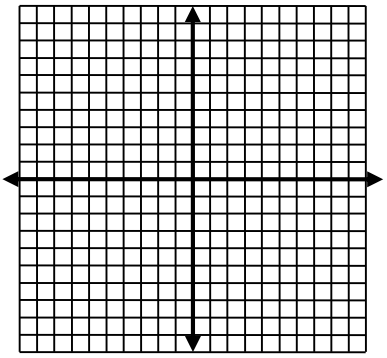
3) $x \leq 4$



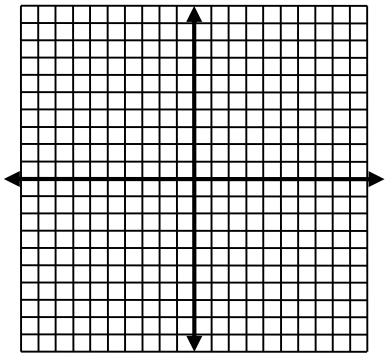
Systems of Equations Review

IF THE LINES INTERSECT ONCE, THE ANSWER IS THE ORDERED PAIR.
IF THE LINES DO NOT INTERSECT (PARALLEL), THE ANSWER IS $\varnothing$.
IF THE LINES ALWAYS TOUCH (ARE THE SAME LINE), THE ANSWER IS INFINITLY MANY SOLUTIONS.

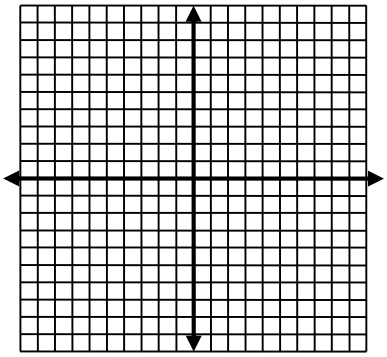
1) $y = -\frac{1}{2}x + 4$
$y = 2x - 6$



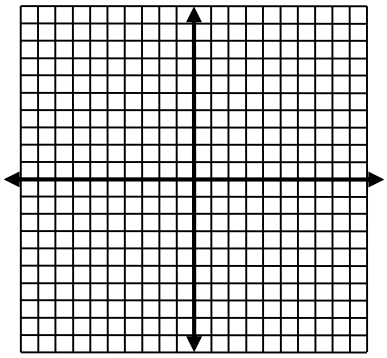
2) $3x - y = 5$
$-x + 2y = 0$



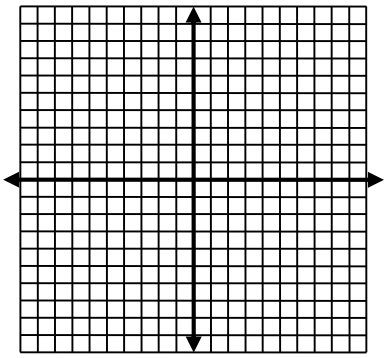
3) $3x + 4y = 8$
$y = 5$



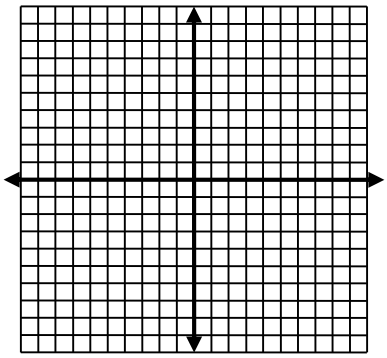
4) $5x - 2y = 4$
$x = -2$



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



6) $2x + 3y = 9$
$4x + 6y = 18$



Solve using Substitution or Elimination.

7) $x + y = 4$
$y = 2x + 1$

8) $x = y - 1$
$y = 4 - 2x$

9) $y = 2x - 5$
$3y - x = 5$

10) $x = -2y$
$x = 2 - 2y$

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

12) $x - y = 6$
$x + y = -2$

13) $-x - 2y = -3$
$2x + 4y = 6$

14) $3x - 2y = 0$
$4x - 3y = 15$

Laws of Exponents Review

(Remember: $x^a \cdot x^b = x^{a+b}$, $(x^a)^b = x^{ab}$, $\frac{x^a}{x^b} = x^{a-b}$, $x^0 = 1$ and $x^{-a} = \frac{1}{x^a}$)

(negative exponents should always be simplified)

1) $3a^4b(-5a^7b^3)$

2) $(-y^2)(3y^2z^2)(-5yz^4)$

3) $(-a^3b^2)(-b^2c^2)(-a^3c^4)$

4) 4^0

5) $(2c^3)(4c^2)$

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

7) $(-ac)(-bc)(-ab)$

8) -4^0

9) $\frac{-40a^{-8}b^{20}}{25a^6b^{10}}$

10) $\frac{x^{10}y^{12}}{x^{10}y^7}$

11) $\frac{-22x^3y^6}{-14x^{13}y^{-3}}$

12) $(-4)^0$

13) $\frac{a^{12}b^2}{a^5b^7}$

14) $\frac{28a^{-8}b^2}{21a^{-15}b^{10}}$

15) $\frac{-27x^3y^{15}}{9x^{13}y^6}$

16) $4x^0$

17) $(x^3)^7$

18) $(3x^2)^4$

19) $(-2x^4y)^6$

20) $(-2x^4)^3$

21) $(a^6)^9$

22) $(4x^8)^3$

23) $(-4x^5y^7)^3$

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

Polynomial and FOIL Review

Simplify.

1) $5x(6x^2+3x-2)$

2) $4ab^4\left(3ab^2-5a^2b\right)$

3) $-6x^2(2x^2+7x-1)$

4) $(x+3)(x+8)$

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

6) $(4x-5)\left(x^3-6\right)$

7) $(5x+2)^2$

Radical & Rational Exponent Review

Simplify Radicals

1. $\sqrt{100}$ 2. $\sqrt{36}$ 3. $-\sqrt{121}$ 4. $\sqrt{-49}$ 5. $\sqrt{8}$

6. $\sqrt{50}$ 7. $\sqrt{45}$ 8. $\sqrt{28}$ 9. $-\sqrt{80}$ 10. $\sqrt{450}$

11. $\sqrt{400}$ 12. $3\sqrt{98}$ 13. $\sqrt{36x^2}$ 14. $\sqrt{7x^2}$ 15. $\sqrt{18a^2}$

16. $\sqrt{20x^2y}$ 17. $\sqrt{100a^2}$ 18. $\sqrt{72a^2}$ 19. $\sqrt{20x^6y^{10}z}$ 20. $\sqrt{75x^{12}y^{20}z^6}$

21. $\sqrt{(x+5)^{12}}$ 22. $\sqrt{x^5}$ 23. $5\sqrt{x^3}$

Rational Exponents DO NOT USE A CALCULATOR

See these as examples of rational exponents: $25^{\frac{1}{2}} = \sqrt{25}$ $125^{\frac{1}{3}} = \sqrt[3]{125}$ $81^{\frac{1}{4}} = \sqrt[4]{81}$

Simplify the following. 24. $16^{\frac{1}{2}}$ 25. $27^{\frac{1}{3}}$ 26. $256^{\frac{1}{4}}$ 27. $-36^{\frac{1}{2}}$

Write as a rational exponent: 28. $\sqrt{121}$ 29. $\sqrt[3]{64}$ 30. $\sqrt[4]{16}$

Function Notation Review

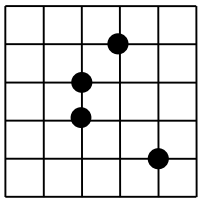
State whether each set is a function. Answer yes or no. Find the domain and the range.

1) {(2, 5), (5, 6), (2, -6), (3, 8)} _____ Domain: _____ Range: _____

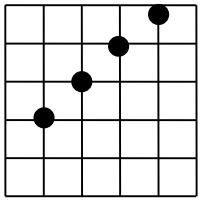
2) {(1, -2), (8, -4), (-3, 8), (-1, 2)} _____ Domain: _____ Range: _____

Use the vertical line test to determine whether each graph is the graph of a function. Answer yes or no.

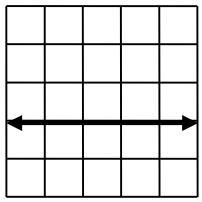
3) _____



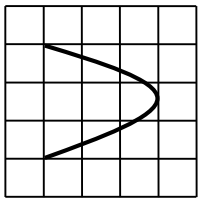
4) _____



5) _____



6) _____



Use $f(x)=x^2-3$ **and** $g(x)=4x-1$ **to find each value.**

7) $f(-3)$ 8) $g(-7)$ 9) $f\left(\frac{4}{3}\right)$ 10) $f(-5)+8$

11) $f(3c)$ 12) $g(w-7)$ 13) $f(2m+3)$ 14) $-2\left[g(x)-3\right]$

15) The temperature of the atmosphere decreases about 5°F for every 1000 feet increase in altitude. Thus, if the temperature at ground level is 77°F, the temperature *t* at a given altitude is found by using the equation $t=77-.005h$, where *h* is the height in feet.

a) Write the equation in function notation where t is a function of h [f(x) is meant as f is a function of x].

b) Find t(100) and explain its meaning in this problem.

16) The function $g(x)=160+1.5x$ models the weight gain of a basketball player as he starts a workout program where *g* is the weight in pounds after *x* weeks.

a) Explain the meaning of 160 in the context of this problem.

b) Explain the meaning of 1.5 in the context of this problem.

c) Evaluate $g(6)$ and explain its meaning.

Solving Quadratic Equations

1) $(x-5)(x+3)=9$

2) $(x-8)(x+1)=-20$

3) $x(x+1)=72$

4) $(x-5)^2+4x=52$

5) $(3x+2)^2=9$

6) $2x^2+56=x^2+15x$

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

Using Midpoint & Distance Formulas

I. Midpoint Formula:

$$\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$$

Find the midpoint of the segments with endpoints at the given coordinates.

1) $(4,15)$ and $(10,1)$

2) $(22,-8)$ and $(-10,6)$

3) $(3,-10)$ and $(30,-20)$

4) $(-9,1.7)$ and $(-11,1.3)$

II. Distance Formula:

$$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Find the distance between each pair of points with the given coordinates. Simplify radicals.

5) $(3,7)$ and $(-1,4)$

6) $(-5,-2)$ and $(3,4)$

7) $(11,5)$ and $(16,9)$

8) $(0,-3)$ and $(4,1)$

Writing and Using Circle Equations Center-Radius Form: $(x-h)^2+(y-k)^2=r^2$

I. Write an equation of the circle having the given center and radius.

1. Center: $(3,2)$ Radius: 2

2. Center: $(-1,4)$ Radius: 3

3. Center: $(5,-2)$ Radius: $\sqrt{5}$

4. Center: $(0,0)$ Radius: 4

II. Write in Center-Radius Form. Then, transform the equation into $x^2+y^2+ax+by+c=0$

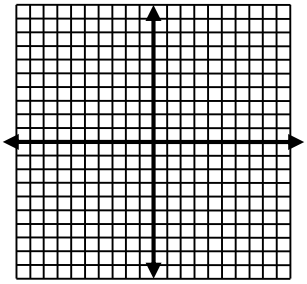
5. Center: $(1,1)$ Radius: 3

6. Center: $(2,3)$ Radius: $\frac{1}{2}$

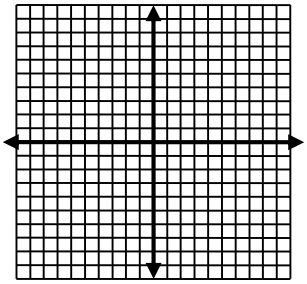
7. Center: $(-5,-2)$ Radius: $3\sqrt{2}$

III. Find the center and radius. Then graph it.

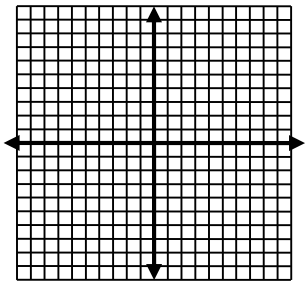
8. $x^2+y^2-9=0$



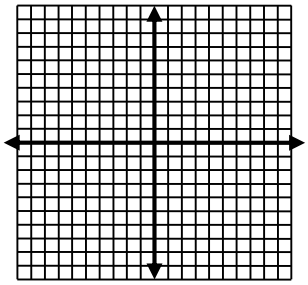
9. $(x-3)^2+(y+4)^2=25$



10. $(x+2)^2+(y-5)^2=16$



11. $x^2+(y+1)^2=36$

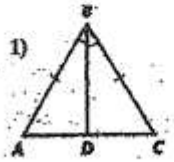


Congruent Triangles

a) Determine whether the following triangles are congruent.
b) If they are, name the triangle congruence (pay attention to proper correspondence when naming the triangles) and then identify the Theorem or Postulate (SSS, SAS, ASA, AAS, HL) that supports your conclusion.
c) Be sure to show any additional congruence markings you used in your reasoning.
d) If the triangles cannot be proven congruent, state "not possible." Then given the reason it is not possible.

**HL if the hypotenuse and leg of one triangle or congruent to the hypotenuse and leg of another than the two triangles are congruent.

1)

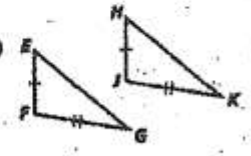


Congruence:

$\Delta ABD \cong \Delta$_____

Reason:

2)

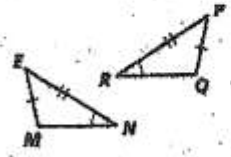


Congruence:

$\Delta EFG \cong \Delta$_____

Reason:

3)

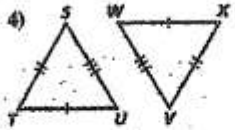


Congruence:

$\Delta EMN \cong \Delta$_____

Reason:

4)

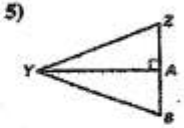


Congruence:

$\Delta STU \cong \Delta$_____

Reason:

5)

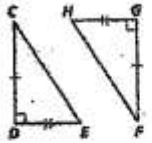


Congruence:

$\Delta YZA \cong \Delta$_____

Reason:

6)

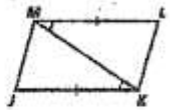


Congruence:

$\Delta CDE \cong \Delta$_____

Reason:

7)

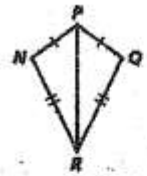


Congruence:

$\Delta KJM \cong \Delta$_____

Reason:

8)

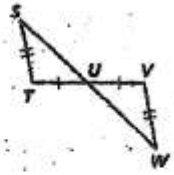


Congruence:

$\Delta NPR \cong \Delta$_____

Reason:

9)

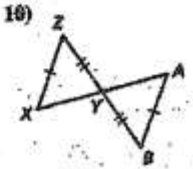


Congruence:

$\Delta STU \cong \Delta$_____

Reason:

10)

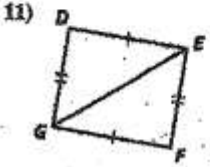


Congruence:

$\Delta XYZ \cong \Delta$_____

Reason:

11)

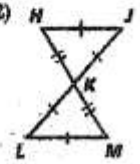


Congruence:

$\Delta DEG \cong \Delta$_____

Reason:

12)

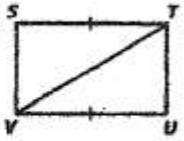


Congruence:

$\Delta HJK \cong \Delta$_____

Reason:

13)

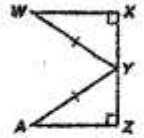


Congruence:

$\Delta STV \cong \Delta$_____

Reason:

14)

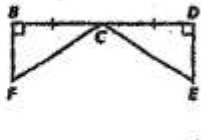


Congruence:

$\Delta WXY \cong \Delta$_____

Reason:

15)



Congruence:

$\Delta BCF \cong \Delta$_____

Reason:

Shifting Absolute Value Graphs $f(x) = a|x-h|+k$ **DO NOT USE A CALCULATOR**

How does the graph of $y=|x|$ change to produce each of the following graphs?

1. $y=|x|+5$ 1. _____

2. $y=|x+2|$ 2. _____

3. $y=|x-9|$ 3. _____

4. $y=-4|x|$ 4. _____

5. $y=|x|-3$ 5. _____

6. $y=\frac{1}{3}|x|$ 6. _____

7. $y=|x+1|-3$ 7. _____

8. $y=2|x-4|$ 8. _____

9. $y=-\frac{1}{2}|x|+1$ 9. _____

Write the equation of the absolute value functions with the following shifts:

10. Up 7 and left 3 10. _____

11. Down 2, Reflects over x-axis, Vertical shrink of $\frac{1}{3}$ 11. _____

12. Right 6, Vertical stretch of 2 12. _____

ANSWER KEYS

Vocabulary/Know the difference Review **KEY**

1. Proportions vs. multiplying fractions
   (cross multiplying for a proportion vs. multiplying numerators and multiplying denominators when multiplying fractions)

   Proportion: $\frac{2}{x} = \frac{8}{12}$ vs. Multiplying Fractions: $\frac{2}{3} \cdot \frac{8}{12}$

   24 = 8x

   3 = x

   $$\frac{(2 \cdot 8)}{(3 \cdot 12)} = \frac{16}{36} = \frac{4}{9}$$

2. x * x = $\boldsymbol{x^2}$ vs. x + x = ***2x***

3. order of operations: don't be tricked by these common "mistaken identities"

   a. $5 * 2^3$ vs. $(5 * 2)^3$ — ***5 * 8 = 40*** ***10^3 = 1000***

   b. 5 + 3(x + 4) — ***5 + 3x + 12 not 8(x + 4)***

   c. -8^2 vs. $(-8)^2$ — ***-1 * 64 = 64*** ***(-8)(-8) = 64***

4. $(x - 9)^2$ vs. $(x + 9)^2$ vs. (x – 9)(x + 9)
   a. $(x - 9)^2$ = $\boldsymbol{x^2 - 9x - 9x + 81 = x^2 - 18x + 81}$
   b. $(x + 9)^2$ = $\boldsymbol{x^2 + 9x + 9x + 81 = x^2 + 18x + 81}$
   c. (x – 9)(x + 9) = $\boldsymbol{x^2 + 9x - 9x - 81 = x^2 - 81}$

5. know the difference between a term, expression, equation, and inequality
   term – ***number, variable, or product of numbers and variables (ex: 2, x, or 2x)***
   expression – ***terms with mathematical symbols (ex: 2x, 2x – 3, $x^2 - 4x + 3$, $\frac{x}{2}$)***
   equation – ***expressions set equal to one another (ex: x = 2, 4x + 3 = 12 – 5x)***
   inequality – ***expressions not equal to one another (ex: x > 2, 4x + 3 ≤ 12 – 5x)***

6. know the difference between solve, evaluate and simplify
   simplify – ***to rewrite an expression in simplest form possible where nothing else can be performed (includes no parentheses or negative exponents; all fractions have been reduced)***
   evaluate – ***to find the value of (once the value has been found, the final result should be written in simplest form)***
   solve – ***to work out the solution to the problem***

7. know the difference between rational and irrational
   rational – ***real number that can be written as a fraction (ex:0, 1, $\frac{1}{3}$, $\sqrt{121}$, 0.25) [repeating or terminating decimals]***

   irrational – ***real number that can't be written as a fraction [nonrepeating, nonterminating decimals] (ex: $\sqrt{12}$, π, 2.478192...)***

8. know the symbols by name: ***> as "greater than" vs. < as "less than"***

9. know coefficient – ***numerical factor of a monomial [number being multiplied by a variable]***

10. know factor – ***two or more numbers that multiply to produce another number [2 and 5 are factors of 10]***

11. reduce entire factors **not** parts of a factor (individual terms)

    - **you can reduce** $\frac{10x-5}{2x-1}$ by rewriting the numerator in factored form first: $\frac{10x-5}{2x-1} = \frac{5(2x-1)}{2x-1} = 5$
    - **you <u>can't</u> reduce** $\frac{10x-5}{2x-1}$ by trying to reduce just $\frac{10x-5}{2x-1}$

Fractions **DO NOT USE A CALCULATOR**

1) $\frac{2}{3}+\frac{4}{9}=\frac{10}{9}$

2) $\frac{7}{4}-\frac{4}{5}=\frac{19}{20}$

3) $\frac{3}{4}+\frac{1}{6}=\frac{11}{12}$

4) $\frac{2}{3}\bullet\frac{4}{9}=\frac{8}{27}$

5) $\frac{7}{4}\bullet\frac{4}{5}=\frac{7}{5}$

6) $\frac{3}{4}\bullet\frac{1}{6}=\frac{1}{8}$

7) $\frac{2}{3}\div\frac{4}{9}=\frac{3}{2}$

8) $\frac{7}{4}\div\frac{4}{5}=\frac{35}{16}$

9) $\frac{3}{4}\div\frac{1}{6}=\frac{9}{2}$

Solve Equations and Inequalities Review **DO NOT USE A CALCULATOR**

1) $\frac{x}{4}+7=-5$ x=-48 2) $2=\frac{-3+x}{7}$ x=17

Clear out fractions.

3) $\frac{7}{8}a-\frac{1}{4}+\frac{3}{4}a=\frac{1}{16}+a$ a=1/2

Variables on both sides.

4) $3(x-8)+3(2x+4)=15$ $x=3$

5) $8+3(a-3)=4(a+5)$ $a=-21$

6) $6-2x+5x=7+7x-15$ $x=-\frac{7}{2}$

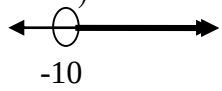
Solve Inequalities.

When you multiply or divide both sides by a negative remember to flip the inequality.

Get the variable on the left side.

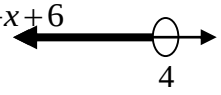
7) $-x+6>-(2x+4)$

$x>-10$



8) $2x-6<-x+6$

$x<4$



Word Problems

You must be able to write the equation or inequality first. Then solve for the variable.

9) The greater of two numbers is 6 more than 4 times the smaller. Their sum is 41. Find the numbers.

$x+(4x+6)=41$ 7 and 34

10) Find three consecutive integers whose sum is 105. $x+(x+1)+(x+2)=105$ 34,35,36

11) Find three consecutive even integers whose sum is 138. $x+(x+2)+(x+4)=138$ 44, 46, 48

12) The length of a rectangle is 2 feet more than its width. If its perimeter is 40 feet, find the length and the width.

$40=2w+2(w+2)$ Length: 11 Width: 9

13) The second angle in a triangle is 3° less than twice the first angle. The third angle measure 8° more than twice the first angle. Find each angle. $x+(2x-3)+(2x+8)=180$ 35, 67, 78

14) Jeffery has grades of 93 and 81 on the first two tests of the quarter. Progress reports will go home after the third test
If Jeffery does not have an A average on his progress report, he cannot go to the football game that week.
Jeffery will have to make at least what grade on the third test to be allowed to go to the football game?

$\frac{93+81+x}{3}\geq 93$

$x\geq 105$

Linear Equations Review: **KEY**
Slope, Writing Linear Equations, Horizontal & Vertical Lines, Parallel & Perpendicular Lines

Find the slope (rate of change) of the following problems.

1. $(3,-8),\ (-5,-1)$

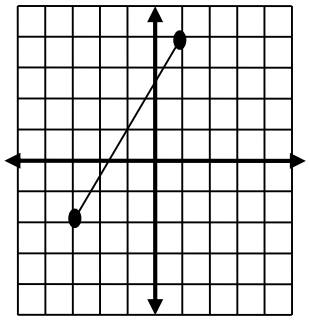
$$-\frac{7}{8}$$

2.

Day	Temperature ($^\circ F$)
1	60
2	62
3	64
4	66

$$2$$

3.



$$\frac{3}{2}$$

4. The cost of museum tickets is $48 for four people and $78 for 10 people. What is the cost per person?

$5 per person

Write the equation of the line in **slope-intercept** form & **standard form** given the following.

5. $(2,5)\quad m=3$

$$y=3x-1$$

$$3x-y=1$$

6. $(4,2)\quad m=-\frac{5}{7}$

$$y=-\frac{5}{7}x+\frac{34}{7}$$

$$5x+7y=34$$

7. $(2,-6)(1,-2)$

$$y=-4x+2$$

$$4x+y=2$$

8. $m=-\frac{1}{2}$, $b=2$

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

$$x+2y=4$$

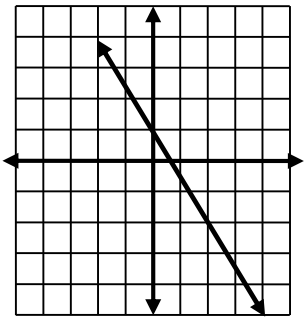
9. (2, -3) $m = 0$

$$y=-3$$

10. (4, -1) m = undefined

$$x=4$$

11.



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

$$3x+2y=2$$

12. The cost for 7 dance lessons is $82. The cost for 11 lessons is $122. Write a linear equation to find the total cost *C* for *L* dance lessons. Then use the equation to find the cost of 4 lessons.

$$C=10L+12$$

$$\$52$$

13. Write the equation for a *vertical* line that goes through the point (2, 4). **x = 2**

14. Write the equation for a *horizontal* line that goes through the point (-1, 3). **y = 3**

Solve the equation for y if necessary, and find the slope. Then, find the slope of a line parallel and perpendicular to the original line.

	Slope	Parallel	Perpendicular
15. 2x + 6y = 8			
$y = -\frac{1}{3}x + \frac{4}{3}$	$-\frac{1}{3}$	$-\frac{1}{3}$	3
16. x = 3	**undefined/none=**	**undefined/none**	0
17. y = -2	0	0	**undefined/none**

18. Write the equation for the line parallel to the given line and through the given point. Write the answer in slope intercept and standard forms. 4x – 3y = 9 and (3, –1)

$y = \frac{4}{3}x - 5$ $\qquad$ $4x - 3y = 15$

19. Write the equation for the line perpendicular to the given line and through the given point. Write the answer in slope intercept and standard forms. 4x – 3y = 9 and (8, –3)

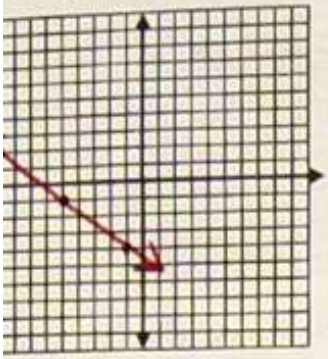
$y = -\frac{3}{4}x + 3$ $\qquad$ $3x + 4y = 12$

20. Given a line through (–2, 4) and (8, –1), find the equation of the line perpendicular to that line through the midpoint of those points. Write the answer in slope intercept and standard forms.

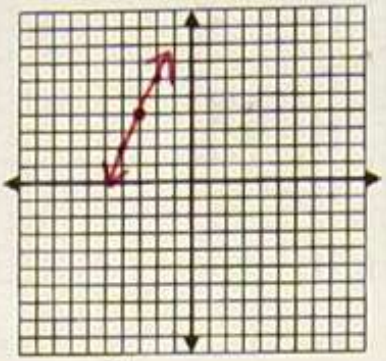
$y = 2x - \frac{9}{2}$ $\qquad$ $4x - 2y = 9$

Homework: Graph each of the following lines.

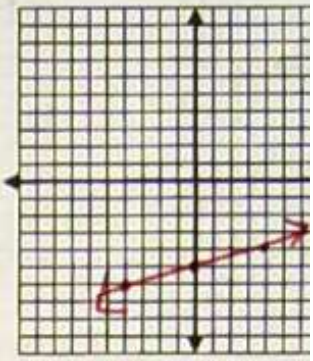
pe: $-\frac{3}{4}$, through $(-5, -1)$



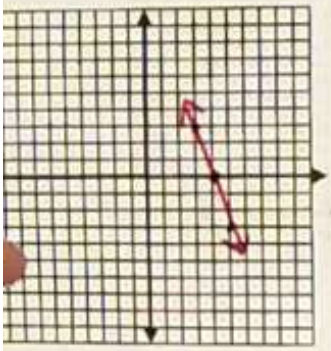
2) slope: 2, through $(-3, 4)$



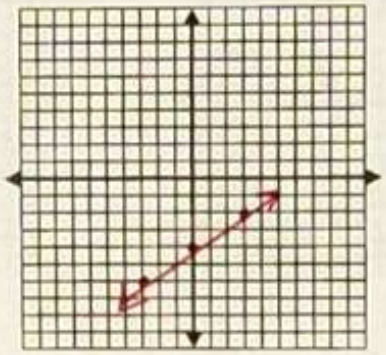
3) slope: $\frac{1}{4}$, y-inter



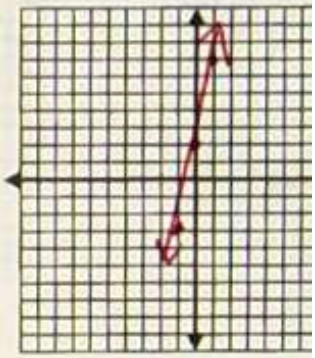
pe: -3, x-intercept: 4



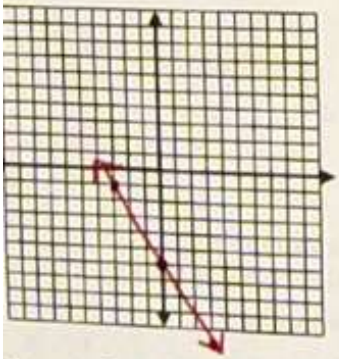
5) $y = \frac{2}{3}x - 4$



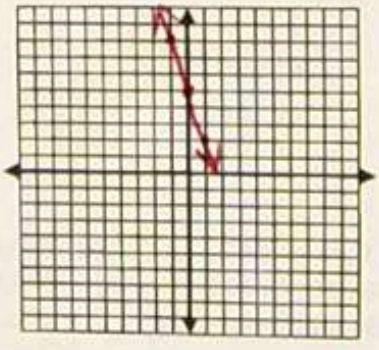
6) $y = 5x + 2$



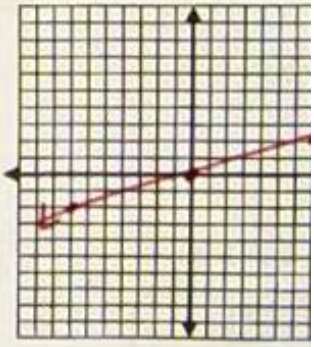
$= -\frac{5}{3}x - 6$



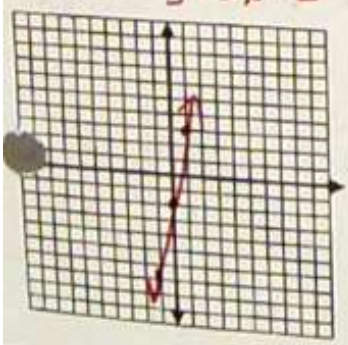
8) $y = -3x + 5$



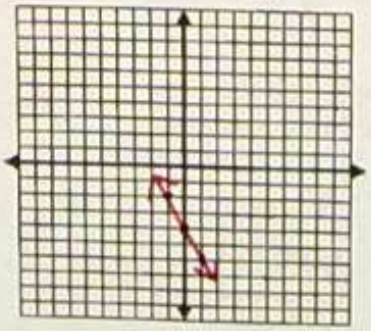
9) $y = \frac{2}{7}x$



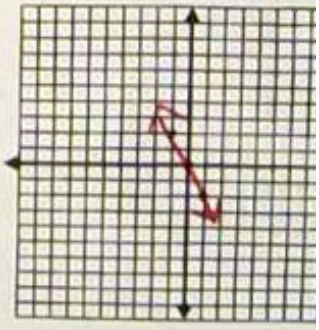
$5x - y = 2$ $y = 5x - 2$



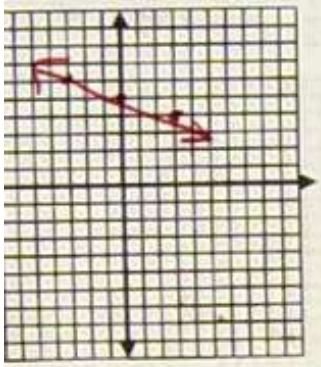
11) $6x + 3y = -12$ $y = -2x - 4$



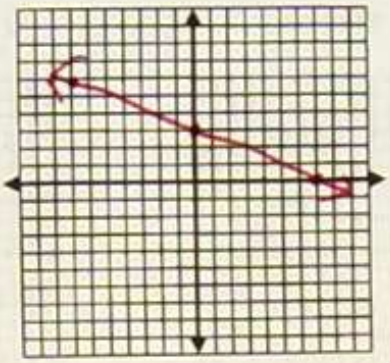
12) $4x + 2y = 0$ $y =$



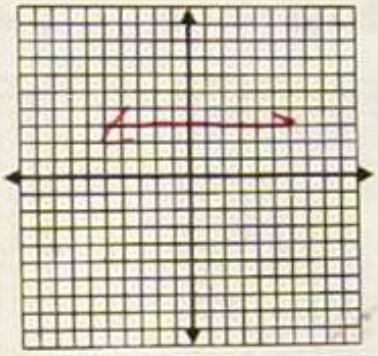
$y = 15$ $y = -\frac{1}{3}x + 5$



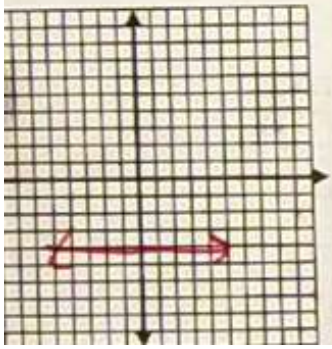
14) $3x + 7y = 21$ $y = -\frac{3}{7}x + 3$



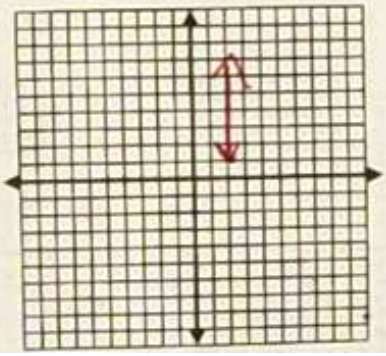
15) $y = 3$



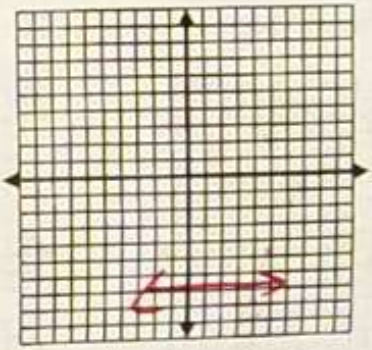
-4



17) no slope; through (2, 5)



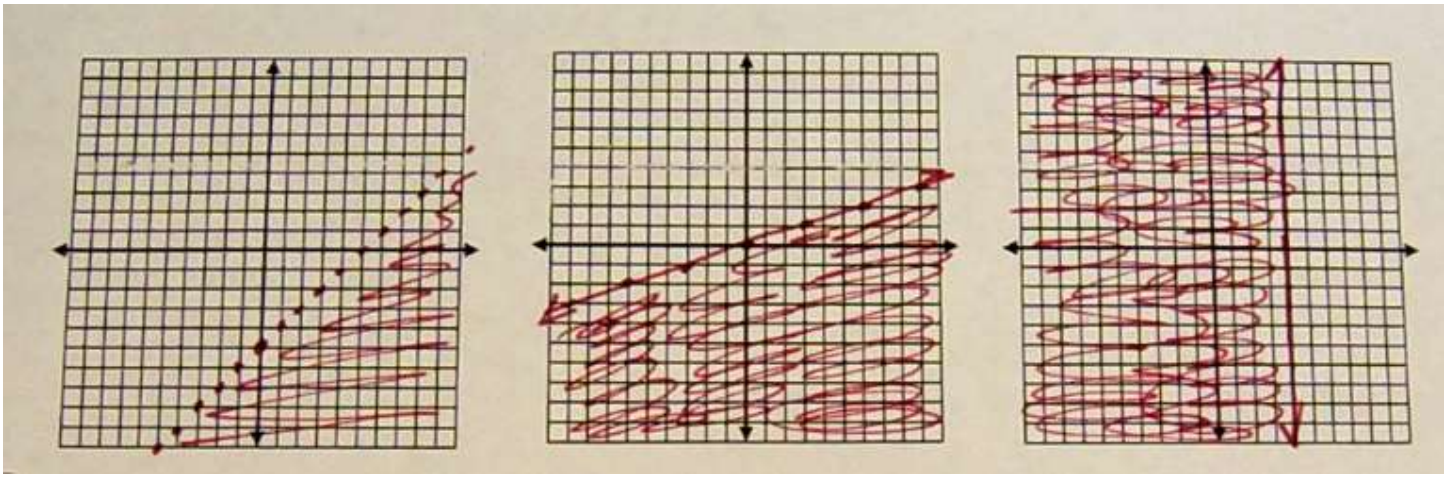
18) slope: 0 through (3, –7)



19) $y = 35x + 75$

20) $y = -7x + 6791$

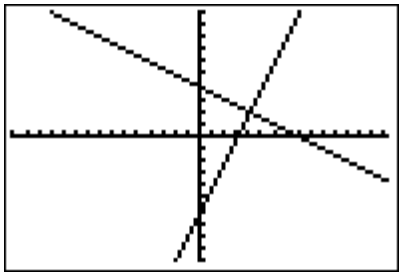
21) $y = 2x + 10$



Systems of Equations Review

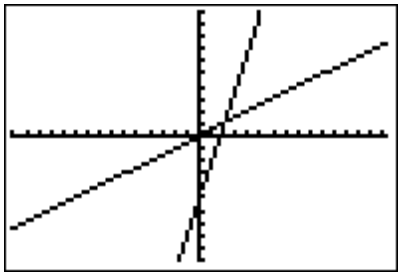
IF THE LINES INTERSECT ONCE, THE ANSWER IS THE ORDERED PAIR.
IF THE LINES DO NOT INTERSECT (PARALLEL), THE ANSWER IS $\varnothing$.
IF THE LINES ALWAYS TOUCH (ARE THE SAME LINE), THE ANSWER IS INFINITLY MANY SOLUTIONS.

1) $y = -\frac{1}{2}x + 4$
$y = 2x - 6$



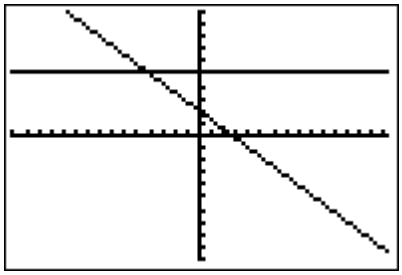
$(4, 2)$

2) $3x - y = 5$
$-x + 2y = 0$



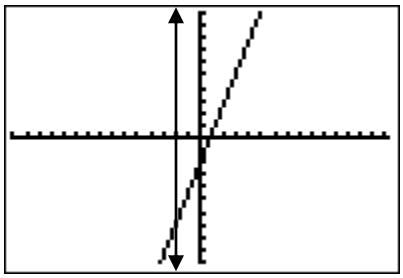
$(2, 1)$

3) $3x + 4y = 8$
$y = 5$



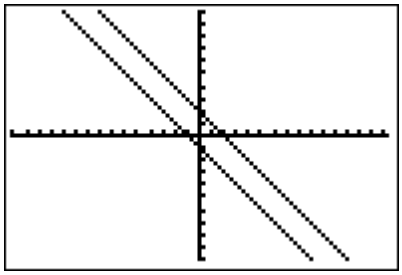
$(-4, 5)$

4) $5x - 2y = 4$
$x = -2$



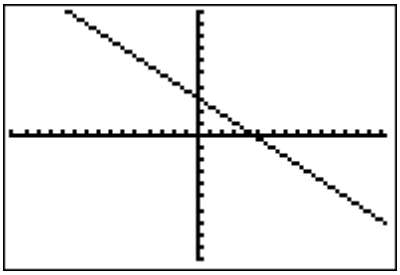
$(-2, -7)$

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



$\varnothing$

6) $2x + 3y = 9$
$4x + 6y = 18$



infinitely many

7) $x + y = 4$
$y = 2x + 1$

$(1, 3)$

8) $x = y - 1$
$y = 4 - 2x$

$(1, 2)$

9) $y = 2x - 5$
$3y - x = 5$

$(4, 3)$

10) $x = -2y$
$x = 2 - 2y$

$\varnothing$

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

$(5, 3)$

12) $x - y = 6$
$x + y = -2$

$(2, -4)$

13) $-x - 2y = -3$
$2x + 4y = 6$

infinitely many

14) $3x - 2y = 0$
$4x - 3y = 15$

$(-30, -45)$

Laws of Exponents Review **KEY**

(Remember: $x^a \cdot x^b = x^{a+b}$, $(x^a)^b = x^{ab}$, $\frac{x^a}{x^b} = x^{a-b}$, $x^0 = 1$ and $x^{-a} = \frac{1}{x^a}$)

(negative exponents should always be simplified)

1) $3a^4b(-5a^7b^3)$

$-15a^{11}b^4$

2) $(-y^2)(3y^2z^2)(-5yz^4)$

$15y^5z^6$

3) $(-a^3b^2)(-b^2c^2)(-a^3c^4)$

$-a^6b^4c^6$

4) 4^0

1

5) $(2c^3)(4c^2)$

$8c^5$

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

$30x^7$

7) $(-ac)(-bc)(-ab)$

$-a^2b^2c^2$

8) -4^0

-1

9) $\frac{-40a^{-8}b^{20}}{25a^6b^{10}}$

$-\frac{8b^{10}}{5a^{14}}$

10) $\frac{x^{10}y^{12}}{x^{10}y^7}$

y^5

11) $\frac{-22x^3y^6}{-14x^{13}y^{-3}}$

$\frac{11y^9}{7x^{10}}$

12) $(-4)^0$

1

13) $\frac{a^{12}b^2}{a^5b^7}$

$\frac{a^7}{b^5}$

14) $\frac{28a^{-8}b^2}{21a^{-15}b^{10}}$

$\frac{4a^7}{3b^8}$

15) $\frac{-27x^3y^{15}}{9x^{13}y^6}$

$-\frac{3y^9}{x^{10}}$

16) $4x^0$

4

17) $(x^3)^7$

x^{21}

18) $(3x^2)^4$

$81x^8$

19) $(-2x^4y)^6$

$64x^{24}y^6$

20) $(-2x^4)^3$

$-8x^{12}$

21) $(a^6)^9$

a^{54}

22) $(4x^8)^3$

$64x^{24}$

23) $(-4x^5y^7)^3$

$-64x^{15}y^{21}$

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

-32

Polynomials and FOIL

1) $30x^3+15x^2-10x$ **2)** $12a^2b^6-20a^3b^5$ **3)** $-12x^4-24x^3+6x^2$

4) $x^2+11x+24$ **5)** $4x^2+2x-12$ **6)** $4x^4-5x^3-24x+30$

7) $25x^2+20x+4$

Radical & Rational Exponent Review

Simplify Radicals

1. $\sqrt{100}$ 10

2. $\sqrt{36}$ 6

3. $-\sqrt{121}$ -11

4. $\sqrt{-49}$ **not real**

5. $\sqrt{8}$ $2\sqrt{2}$

6. $\sqrt{50}$ $5\sqrt{2}$

7. $\sqrt{45}$ $3\sqrt{5}$

8. $\sqrt{28}$ $2\sqrt{7}$

9. $-\sqrt{80}$ $-4\sqrt{5}$

10. $\sqrt{450}$ $15\sqrt{2}$

11. $\sqrt{400}$ 20

12. $3\sqrt{98}$ $21\sqrt{2}$

13. $\sqrt{36x^2}$ $6x$

14. $\sqrt{7x^2}$ $x\sqrt{7}$

15. $\sqrt{18a^2}$ $3a\sqrt{2}$

16. $\sqrt{20x^2y}$ $2x\sqrt{5y}$

17. $\sqrt{100a^2}$ $10a$

18. $\sqrt{72a^2}$ $6a\sqrt{2}$

19. $\sqrt{20x^6y^{10}z}$ $2x^3y^5\sqrt{5z}$

20. $\sqrt{75x^{12}y^{20}z^6}$ $5x^6y^{10}z^3\sqrt{3}$

21. $\sqrt{(x+5)^{12}}$ $(x+5)^6$

22. $\sqrt{x^5}$ $x^2\sqrt{x}$

23. $5\sqrt{x^3}$ $5x\sqrt{x}$

Rational Exponents

See these as examples of rational exponents: $25^{\frac{1}{2}} = \sqrt{25}$ $125^{\frac{1}{3}} = \sqrt[3]{125}$ $81^{\frac{1}{4}} = \sqrt[4]{81}$

Simplify the following.

24. $16^{\frac{1}{2}}$ 4

25. $27^{\frac{1}{3}}$ 3

26. $256^{\frac{1}{4}}$ 4

27. $-36^{\frac{1}{2}}$ -6

Write as a rational exponent:

28. $\sqrt{121}$ $121^{\frac{1}{2}}$

29. $\sqrt[3]{64}$ $64^{\frac{1}{3}}$

30. $\sqrt[4]{16}$ $16^{\frac{1}{4}}$

Function Notation Review **KEY**

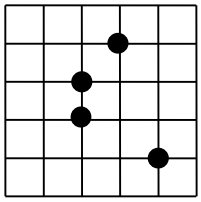
State whether each set is a function. Answer yes or no. Find the domain and the range.

1) {(2, 5), (5, 6), (2, -6), (3, 8)} no Domain: $\{2,3,5\}$ Range: $\{-6,5,6,8\}$

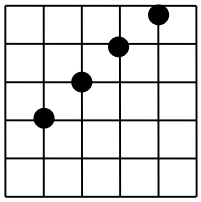
2) {(1, -2), (8, -4), (-3, 8), (-1, 2)} yes Domain: $\{-3,-1,1,8\}$ Range: $\{-4,-2,2,8\}$

Use the vertical line test to determine whether each graph is the graph of a function. Answer yes or no.

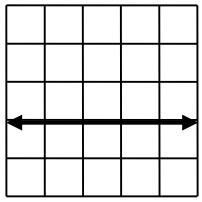
3) no



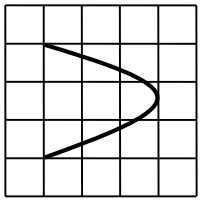
4) yes



5) yes



6) no



Use $f(x)=x^2-3$ **and** $g(x)=4x-1$ **to find each value.**

7) $f(-3)$ 6

8) $g(-7)$ -29

9) $f\left(\frac{4}{3}\right)$ $-\frac{11}{9}$

10) $f(-5)+8$ 30

11) $f(3c)$ $9c^2-3$

12) $g(w-7)$ $4w-29$

13) $f(2m+3)$ $4m^2+12m+6$

14) $-2\left[g(x)-3\right]$ $-8x+8$

15) The temperature of the atmosphere decreases about 5°F for every 1000 feet increase in altitude. Thus, if the temperature at ground level is 77°F, the temperature *t* at a given altitude is found by using the equation $t=77-.005h$, where *h* is the height in feet.

a) Write the equation in function notation where t is a function of h. [f(x) is meant as f is a function of x]

$t(h)=77-.005h$

b) Find t(100) and explain its meaning in this problem. 76.5

16) The function $g(x)=160+1.5x$ models the weight gain of a basketball player as he starts a workout program where *g* is the weight in pounds after *x* weeks.

a) Explain the meaning of 160 in the context of this problem. ***Starting/initial weight (y-intercept)***

b) Explain the meaning of 1.5 in the context of this problem. ***# of pounds added per week (slope)***

c) Evaluate $g(6)$ and explain its meaning. ***169; weight 6 weeks after starting***

Solve Quadratic Equations ANSWERS

1) $(x-5)(x+3)=9$

$x=6,-4$

2) $(x-8)(x+1)=-20$

$x=3,4$

3) $x(x+1)=72$

$x=-9,8$

4) $(x-5)^2+4x=52$

$x=9,-3$

5) $(3x+2)^2=9$

$x=-\frac{5}{3},\frac{1}{3}$

6) $2x^2+56=x^2+15x$

$x=8,7$

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

$x=-5,2$

Using Midpoint & Distance Formulas

I. Midpoint Formula:

$$\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$$

Find the midpoint of the segments with endpoints at the given coordinates.

1) $(4,15)$ and $(10,1)$

$(7,8)$

2) $(22,-8)$ and $(-10,6)$

$(6,-1)$

3) $(3,-10)$ and $(30,-20)$

$(\frac{33}{2}, -15)$

4) $(-9,1.7)$ and $(-11,1.3)$

$(-10, \frac{3}{2})$

II. Distance Formula:

$$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Find the distance between each pair of points with the given coordinates. Simplify radicals.

5) $(3,7)$ and $(-1,4)$

5

6) $(-5,-2)$ and $(3,4)$

10

7) $(11,5)$ and $(16,9)$

$\sqrt{41}$

8) $(0,-3)$ and $(4,1)$

$4\sqrt{2}$

Writing and Using Circle Equations Center-Radius Form: $(x-h)^2+(y-k)^2=r^2$

I. Write an equation of the circle having the given center and radius.

1. Center: $(3,2)$ Radius: 2

2. Center: $(-1,4)$ Radius: 3

3. Center: $(5,-2)$ Radius: $\sqrt{5}$

4. Center: $(0,0)$ Radius: 4

$(x-3)^2+(y-2)^2=4$ $(x+1)^2+(y-4)^2=9$ $(x-5)^2+(y+2)^2=5$ $x^2+y^2=16$

II. Write in Center-Radius Form. Then, transform the equation into $x^2+y^2+ax+by+c=0$

5. Center: $(1,1)$ Radius: 3

6. Center: $(2,3)$ Radius: $\frac{1}{2}$

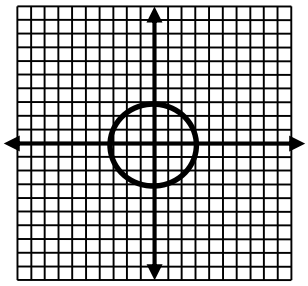
7. Center: $(-5,-2)$ Radius: $3\sqrt{2}$

$x^2+y^2-2x-2y-7=0$ $x^2+y^2-4x-6y+\frac{51}{4}=0$ $x^2+y^2+10x+4y+11=0$

III. Find the center and radius. Then graph it.

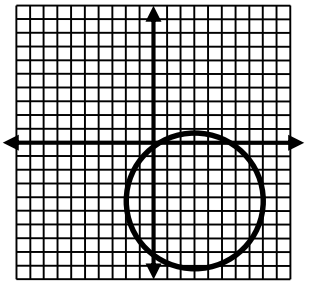
8. $x^2+y^2-9=0$

C: $(0,0)$ r = 3



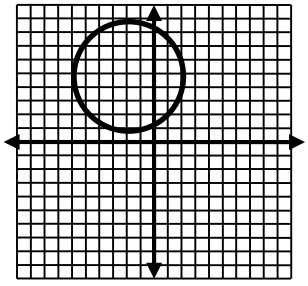
9. $(x-3)^2+(y+4)^2=25$

C: (3, –4) r = 5



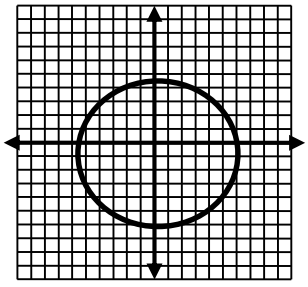
10. $(x+2)^2+(y-5)^2=16$

C: (–2, 5) r = 4



11. $x^2+(y+1)^2=36$

C: (0, –1) r = 6

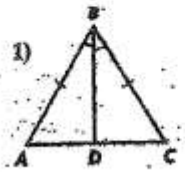


Congruent Triangles

a) Determine whether the following triangles are congruent.
b) If they are, name the triangle congruence (pay attention to proper correspondence when naming the triangles) and then identify the Theorem or Postulate (SSS, SAS, ASA, AAS, HL) that supports your conclusion.
c) Be sure to show any additional congruence markings you used in your reasoning.
d) If the triangles cannot be proven congruent, state "not possible." Then given the reason it is not possible.

**HL if the hypotenuse and leg of one triangle or congruent to the hypotenuse and leg of another than the two triangles are congruent.

1)

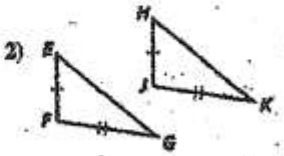


Congruence:

$\Delta ABD \cong \Delta$ CBD

Reason: SAS

2)



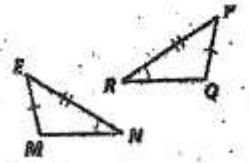
Congruence:

$\Delta EFG \cong \Delta$ _____

NOT $\cong$

Reason:

3)



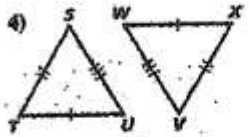
Congruence:

$\Delta EMN \cong \Delta$ _____

NOT $\cong$

Reason:

4)

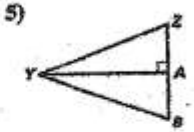


Congruence:

$\Delta STU \cong \Delta$ VXW

Reason: SSS

5)



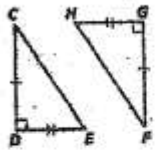
Congruence:

$\Delta YZA \cong \Delta$ _____

NOT $\cong$

Reason:

6)

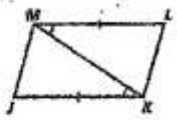


Congruence:

$\Delta CDE \cong \Delta$ FGH

Reason: SAS

7)

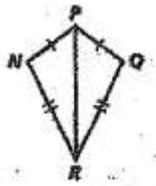


Congruence:

$\Delta KJM \cong \Delta$ MLK

Reason: SAS

8)

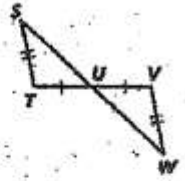


Congruence:

$\Delta NPR \cong \Delta$ QPR

Reason: SSS

9)



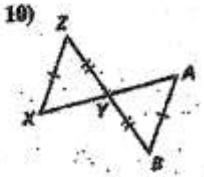
Congruence:

$\Delta STU \cong \Delta$ _____

NOT $\cong$

Reason:

10)



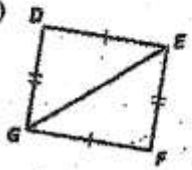
Congruence:

$\Delta XYZ \cong \Delta$ _____

NOT $\cong$

Reason:

11)

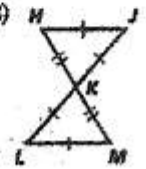


Congruence:

$\Delta DEG \cong \Delta$ FGE

Reason: SSS

12)

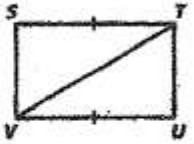


Congruence:

$\Delta HJK \cong \Delta$ MLK

Reason: SSS or SAS

13)

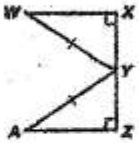


Congruence:

$\Delta STV \cong \Delta$ _____

Reason: NOT $\cong$

14)

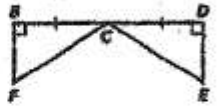


Congruence:

$\Delta WXY \cong \Delta$ _____

Reason: NOT $\cong$

15)



Congruence:

$\Delta BCF \cong \Delta$ _____

Reason: NOT $\cong$

Shifting Absolute Value Graphs $f(x) = a|x-h|+k$ **DO NOT USE A CALCULATOR**

How does the graph of $y=|x|$ change to produce each of the following graphs?

1. $y=|x|+5$ 1. _____ up 5_____

2. $y=|x+2|$ 2. _____ left 2 _____

3. $y=|x-9|$ 3. _____ right 9 _____

4. $y=-4|x|$ 4. ___ reflect over x-axis; vertical stretch _

5. $y=|x|-3$ 5. _____down 3 _____

6. $y=\frac{1}{3}|x|$ 6. _____ vertical shrink _____

7. $y=|x+1|-3$ 7. _____ left 1; down 3 _____

8. $y=2|x-4|$ 8. ___ vertical stretch; right 4 _____

9. $y=-\frac{1}{2}|x|+1$ 9. _ reflect over x-axis; vertical shrink; up 1

Write the equation of the absolute value functions with the following shifts:

10. Up 7 and left 3 10. ____ $f(x)=|x+3|+7$ _

11. Down 2, Reflects over x-axis, Vertical shrink of $\frac{1}{3}$ 11. _ $f(x)=-\frac{1}{3}|x|-2$ _

12. Right 6, Vertical stretch of 2 12. ____ $f(x)=2|x-6|$ ____