TIMOTHY
CHRISTIAN SCHOOL

Entering Algebra 2/Adv. Algebra 2 Summer Packet 2022

Please complete every problem and SHOW ALL WORK. No Work = No Credit. Write your final answers on the answer sheet at the end of the packet. This assignment will be graded for both accuracy on the answer sheet (75%) and for showing work throughout the packet (25%). It is due on the first day you return to school. This packet will count as a test grade in the first marking period of the new school year.

This Packet has been designed to give a review of Algebra 1 skills that are essential for student success in Algebra 2. The packet should be completed over the course of the summer and not in the last week before the new school year begins.

Suggested timeline for completing this packet.

Week of July 4 – Practice Set #1

Week of July 11 – Practice Set #2 & #3

Week of July 18 – Practice Set #4

Week of July 25 – Practice Set #5

Week of August 1 – Practice Set #6

Week of August 8 – Practice Set #7

Week of August 15 – Practice Set #8

Week of August 22 – Practice Set #9 & #10

PRACTICE SET 1

Simplify.

1. $8x - 9y + 16x + 12y$

2. $14y + 22 - 15y^2 + 23y$

3. $5n - (3 - 4n)$

4. $-2(11b - 3)$

5. $10q(16x + 11)$

6. $-(5x - 6)$

7. $3(18z - 4w) + 2(10z - 6w)$

8. $(8c + 3) + 12(4c - 10)$

9. $9(6x - 2) - 3(9x^2 - 3)$

10. $-(y - x) + 6(5x + 7)$

B. Solving Equations

I. Solving Two-Step Equations

A couple of hints:

1. To solve an equation, UNDO the order of operations and work in the reverse order.
2. REMEMBER! Addition is "undone" by subtraction, and vice versa. Multiplication is "undone" by division, and vice versa.

$$\begin{aligned} &Ex.1: \; 4x - 2 = 30 \\ &+2 \quad +2 \\ &4x = 32 \\ &\div 4 \quad \div 4 \\ &x = 8 \end{aligned}$$

$$\begin{aligned} &Ex.2: \; 87 = -11x + 21 \\ &-21 \qquad\quad -21 \\ &66 = -11x \\ &\div -11 \quad \div -11 \\ &-6 = x \end{aligned}$$

II. Solving Multi-step Equations With Variables on Both Sides of the Equal Sign

- When solving equations with variables on both sides of the equal sign, be sure to get all terms with variables on one side and all the terms without variables on the other side.

$$\begin{aligned} &Ex.3: \; 8x + 4 = 4x + 28 \\ &-4 \qquad -4 \\ &8x = 4x + 24 \\ &-4x \quad -4x \\ &4x = 24 \\ &\div 4 \quad \div 4 \\ &x = 6 \end{aligned}$$

III. Solving Equations that need to be simplified first

- In some equations, you will need to combine like terms and/or use the distributive property to simplify each side of the equation, and then begin to solve it.

$$\begin{aligned} &Ex.4: \; 5(4x - 7) = 8x + 45 + 2x \\ &20x - 35 = 10x + 45 \\ &-10x \qquad -10x \\ &10x - 35 = 45 \\ &+35 \quad +35 \\ &10x = 80 \\ &\div 10 \quad \div 10 \\ &x = 8 \end{aligned}$$

PRACTICE SET 2

Solve each equation. You must show all work.

1. $5x - 2 = 33$
2. $140 = 4x + 36$
3. $8(3x - 4) = 196$
4. $45x - 720 + 15x = 60$
5. $132 = 4(12x - 9)$
6. $198 = 154 + 7x - 68$
7. $-131 = -5(3x - 8) + 6x$
8. $-7x - 10 = 18 + 3x$
9. $12x + 8 - 15 = -2(3x - 82)$
10. $-(12x - 6) = 12x + 6$

IV. Solving Literal Equations

- A literal equation is an equation that contains more than one variable.
- You can solve a literal equation for one of the variables by getting that variable by itself (isolating the specified variable).

$Ex. 1: 3xy = 18,$ Solve for x.

$$\frac{3xy}{3y} = \frac{18}{3y}$$

$$x = \frac{6}{y}$$

$Ex. 2: 5a - 10b = 20,$ Solve for a.

$$+10b = +10b$$

$$5a = 20 + 10b$$

$$\frac{5a}{5} = \frac{20}{5} + \frac{10b}{5}$$

$$a = 4 + 2b$$

PRACTICE SET 3

Solve each equation for the specified variable.

1. $Y + V = W$, for V

2. $9wr = 81$, for w

3. $2d - 3f = 9$, for f

4. $dx + t = 10$, for x

5. $P = (g - 9)180$, for g

6. $4x + y - 5h = 10y + u$, for x

C. Rules of Exponents

Multiplication: Recall $(x^m)(x^n) = x^{(m+n)}$ $\qquad$ *Ex*: $(3x^4y^2)(4xy^5) = (3\cdot 4)(x^4 \cdot x^1)(y^2 \cdot y^5) = 12x^5y^7$

Division: Recall $\dfrac{x^m}{x^n} = x^{(m-n)}$ $\qquad$ *Ex*: $\dfrac{42m^5j^2}{-3m^3j} = \left(\dfrac{42}{-3}\right)\left(\dfrac{m^5}{m^3}\right)\left(\dfrac{j^2}{j^1}\right) = -14m^2j$

Powers: Recall $(x^m)^n = x^{(m\cdot n)}$ $\qquad$ *Ex*: $(-2a^3bc^4)^3 = (-2)^3(a^3)^3(b^1)^3(c^4)^3 = -8a^9b^3c^{12}$

Power of Zero: Recall $x^0 = 1, x \neq 0$ $\qquad$ *Ex*: $5x^0y^4 = (5)(1)(y^4) = 5y^4$

PRACTICE SET 4

Simplify each expression.

1. $(c^5)(c)(c^2)$
2. $\dfrac{m^{15}}{m^3}$
3. $(k^4)^5$
4. d^0
5. $(p^4q^2)(p^7q^5)$
6. $\dfrac{45y^3z^{10}}{5y^3z}$
7. $(-t^7)^3$
8. $3f^3g^0$
9. $(4h^5k^3)(15k^2h^3)$
10. $\dfrac{12a^4b^6}{36ab^2c}$
11. $(3m^2n)^4$
12. $(12x^2y)^0$
13. $(-5a^2b)(2ab^2c)(-3b)$
14. $4x(2x^2y)^0$
15. $(3x^4y)(2y^2)^3$

D. Binomial Multiplication

I. Reviewing the Distributive Property

The distributive property is used when you want to multiply a single term by an expression.

Ex 1: $8(5x^2 - 9x)$

$8 \cdot 5x^2 + 8 \cdot (-9x)$

$40x^2 - 72x$

II. Multiplying Binomials – the FOIL method

When multiplying two binomials (an expression with <u>two</u> terms), we use the "FOIL" method. The "FOIL" method uses the distributive property <u>twice</u>!

FOIL is the order in which you will multiply your terms.

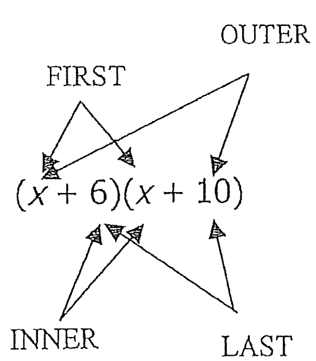
First

Outer

Inner

Last

Ex. 1: (x + 6)(x + 10)



First	$x \cdot x$ ------> x^2
Outer	$x \cdot 10$ -----> $10x$
Inner	$6 \cdot x$ ------> $6x$
Last	$6 \cdot 10$ -----> 60

$x^2 + 10x + 6x + 60$

$x^2 + 16x + 60$
(After combining like terms)

Recall: $4^2 = 4 \cdot 4$

$x^2 = x \cdot x$

Ex. $(x + 5)^2$

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

Now you can use the "FOIL" method to get a simplified expression.

PRACTICE SET 5

Multiply. Write your answer in simplest form.

1. $(x + 10)(x - 9)$
2. $(x + 7)(x - 12)$
3. $(x - 10)(x - 2)$
4. $(x - 8)(x + 81)$
5. $(2x - 1)(4x + 3)$
6. $(-2x + 10)(-9x + 5)$
7. $(-3x - 4)(2x + 4)$
8. $(x + 10)^2$
9. $(-x + 5)^2$
10. $(2x - 3)^2$

E. Factoring

I. Using the Greatest Common Factor (GCF) to Factor.

- Always determine whether there is a greatest common factor (GCF) first.

Ex. 1 $3x^4 - 33x^3 + 90x^2$

- In this example the GCF is $3x^2$.
- So when we factor, we have $3x^2(x^2 - 11x + 30)$.
- Now we need to look at the polynomial remaining in the parentheses. Can this trinomial be factored into two binomials? In order to determine this make a list of all of the factors of 30.

30			30	
1	30		-1	-30
2	15		-2	-15
3	10		-3	-10
5	6		-5	-6

Since $-5 + -6 = -11$ and $(-5)(-6) = 30$ we should choose -5 and -6 in order to factor the expression.

- The expression factors into $3x^2(x-5)(x-6)$

Note: Not all expressions will have a GCF. If a trinomial expression does not have a GCF, proceed by trying to factor the trinomial into two binomials.

II. Applying the difference of squares: $a^2 - b^2 = (a-b)(a+b)$

Ex. 2 $4x^3 - 100x$

$4x(x^2 - 25)$

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

Since x^2 and 25 are perfect squares separated by a subtraction sign, you can apply the difference of two squares formula.

PRACTICE SET 6

Factor each expression.

1. $3x^2 + 6x$

2. $4a^2b^2 - 16ab^3 + 8ab^2c$

3. $x^2 - 25$

4. $n^2 + 8n + 15$

5. $g^2 - 9g + 20$

6. $d^2 + 3d - 28$

7. $z^2 - 7z - 30$

8. $m^2 + 18m + 81$

9. $4y^3 - 36y$

10. $5k^2 + 30k - 135$

F. Radicals

To simplify a radical, we need to find the greatest perfect square factor of the number under the radical sign (the radicand) and then take the square root of that number.

Ex. 1: $\sqrt{72}$

$\sqrt{36}\cdot\sqrt{2}$

$6\sqrt{2}$

Ex. 2: $4\sqrt{90}$

$4\cdot\sqrt{9}\cdot\sqrt{10}$

$4\cdot 3\cdot\sqrt{10}$

$12\sqrt{10}$

Ex. 3: $\sqrt{48}$

$\sqrt{16}\sqrt{3}$

$4\sqrt{3}$

OR

Ex. 3: $\sqrt{48}$

$\sqrt{4}\sqrt{12}$

$2\sqrt{12}$ ← This is not simplified completely because 12 is divisible by 4 (another perfect square)

$2\sqrt{4}\sqrt{3}$

$2\cdot 2\cdot\sqrt{3}$

$4\sqrt{3}$

PRACTICE SET 7

Simplify each radical.

1. $\sqrt{121}$
2. $\sqrt{90}$
3. $\sqrt{175}$
4. $\sqrt{288}$
5. $\sqrt{486}$
6. $2\sqrt{16}$
7. $6\sqrt{500}$
8. $3\sqrt{147}$
9. $8\sqrt{475}$
10. $\sqrt{\frac{125}{9}}$

G. Graphing Lines

I. Finding the Slope of the Line that Contains each Pair of Points.

Given two points with coordinates (x_1, y_1) and (x_2, y_2), the formula for the slope, m, of the line containing the points is $m = \dfrac{y_2 - y_1}{x_2 - x_1}$.

Ex. (2, 5) and (4, 1)

$$m = \frac{1-5}{4-2} = \frac{-4}{2} = -2$$

The slope is -2.

Ex. (-3, 2) and (2, 3)

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

The slope is $\frac{1}{5}$

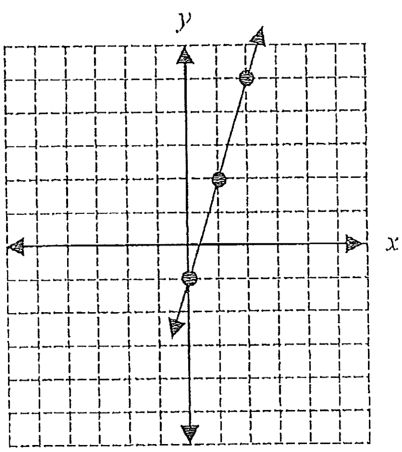
PRACTICE SET 8

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

II. Using the Slope – Intercept Form of the Equation of a Line.
The slope-intercept form for the equation of a line with slope m and y-intercept b is $y = mx + b$.

Ex. $y = 3x - 1$

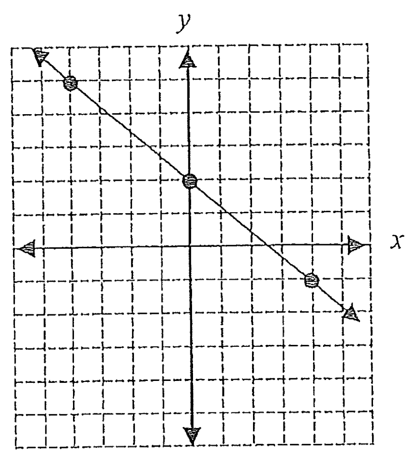
Slope: 3 y-intercept: -1



Place a point on the y-axis at -1.
Slope is 3 or 3/1, so travel up 3 on the y-axis and over 1 to the right.

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

Slope: $-\frac{3}{4}$ y-intercept: 2

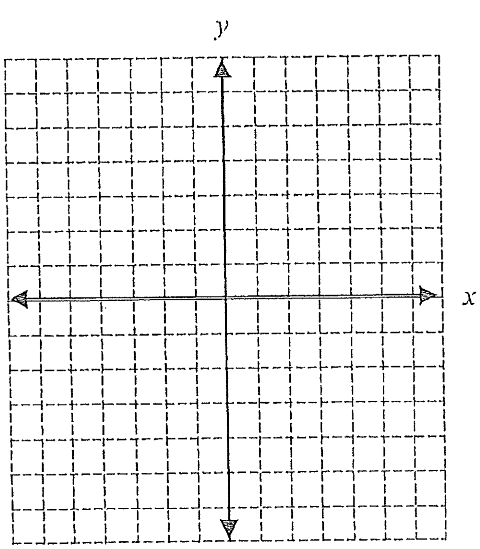


Place a point on the y-axis at 2.
Slope is -3/4 so travel down 3 on the y-axis and over 4 to the right. Or travel up 3 on the y-axis and over 4 to the left.

PRACTICE SET 9

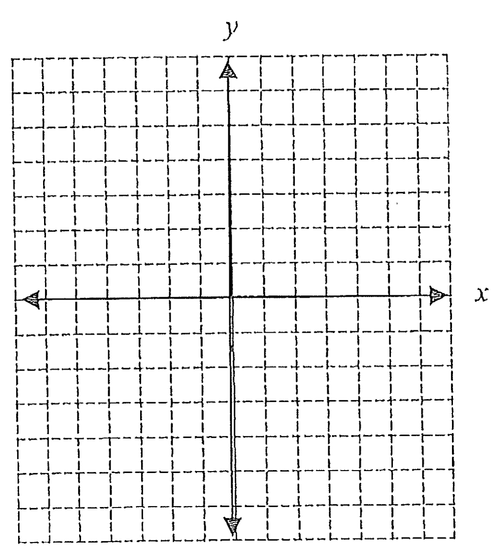
1. $y = 2x + 5$

Slope: ______ y-intercept: ______



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

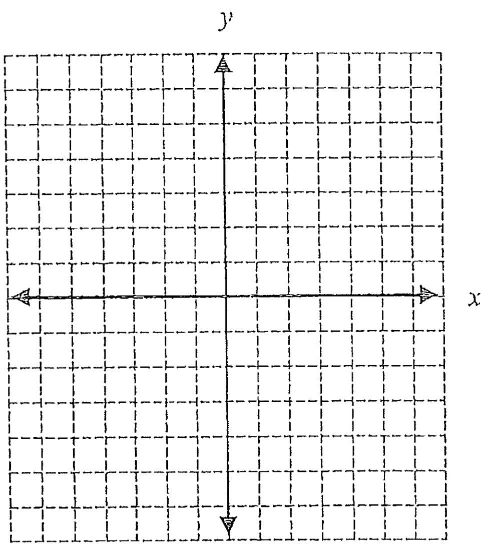
Slope: ______ y-intercept: ______



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

Slope: ____________

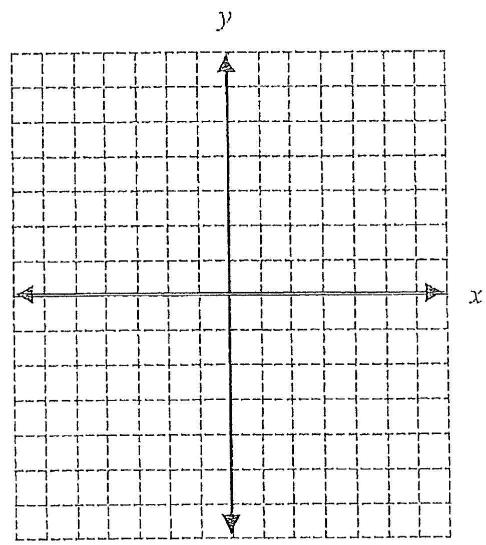
y-intercept: ____________



4. $y = -3x$

Slope: ____________

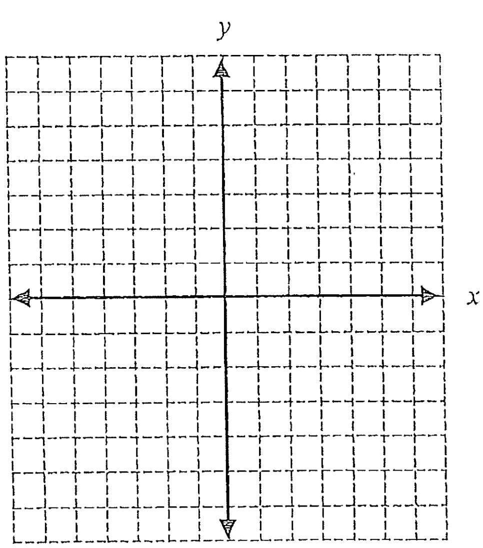
y-intercept ____________



5. $y = -x + 2$

Slope: ____________

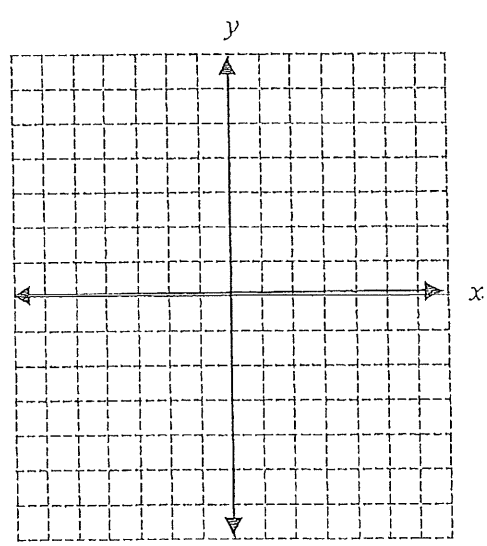
y-intercept: ____________



6. $y = x$

Slope: ____________

y-intercept ____________



III. Using Standard Form to Graph a Line.

An equation in standard form can be graphed using several different methods. Two methods are explained below.

a. Re-write the equation in $y = mx + b$ form, identify the y-intercept and slope, then graph as in Part II above.

b. Solve for the x- and y- intercepts. To find the x-intercept, let $y = 0$ and solve for x. To find the y-intercept, let $x = 0$ and solve for y. Then plot these points on the appropriate axes and connect them with a line.

Ex. $2x - 3y = 10$

a. Solve for y.

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

$$y = \frac{-2x+10}{-3}$$

$$y = \frac{2}{3}x - \frac{10}{3}$$

OR

b. Find the intercepts:

let $y = 0$:

$$2x - 3(0) = 10$$

$$2x = 10$$

$$x = 5$$

So x-intercept is $(5, 0)$

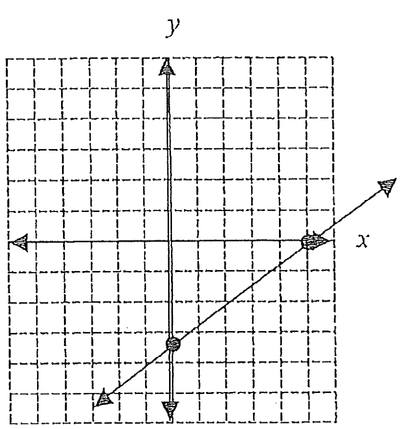
let $x = 0$:

$$2(0) - 3y = 10$$

$$-3y = 10$$

$$y = -\frac{10}{3}$$

So y-intercept is $\left(0, -\frac{10}{3}\right)$



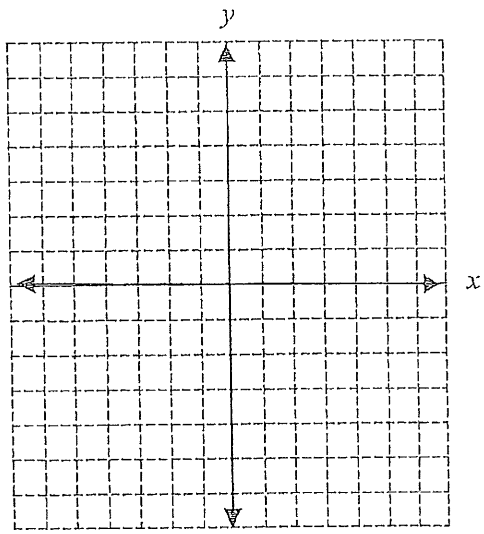
On the x-axis place a point at 5.

On the y-axis place a point at $-\frac{10}{3} = -3\frac{1}{3}$

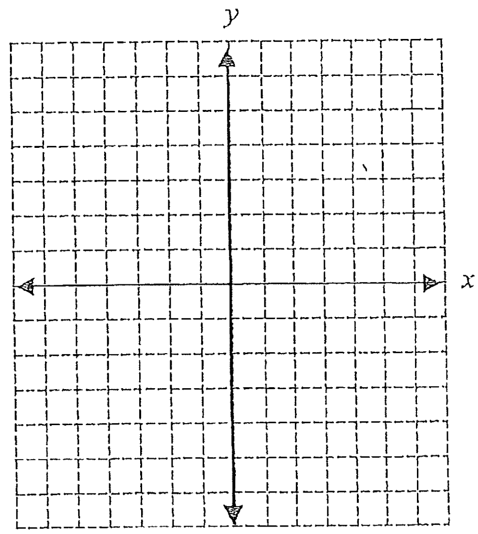
Connect the points with the line.

PRACTICE SET 10

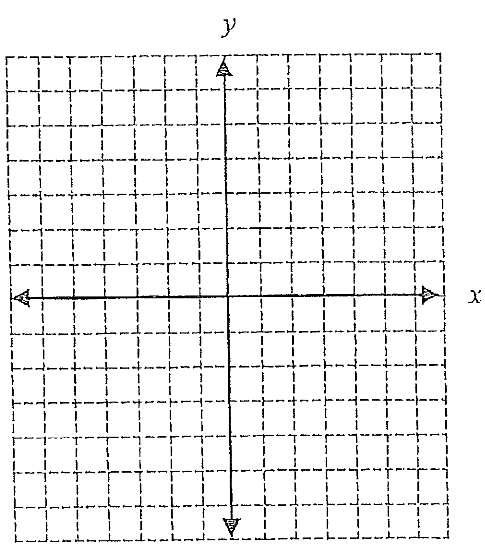
1. $3x + y = 3$



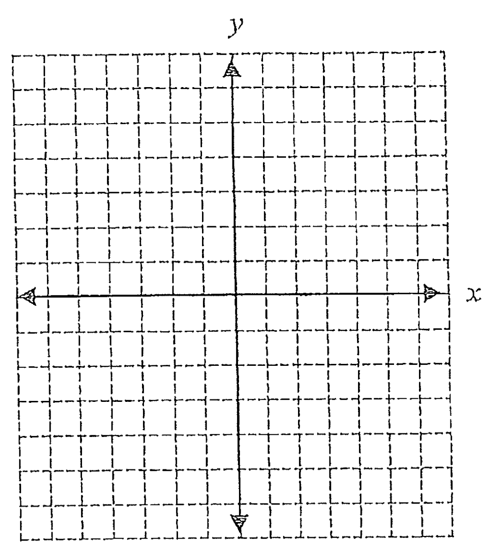
2. $5x + 2y = 10$



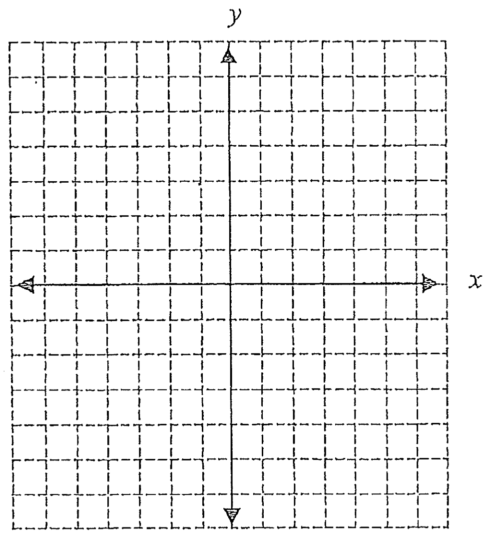
3. $y = 4$



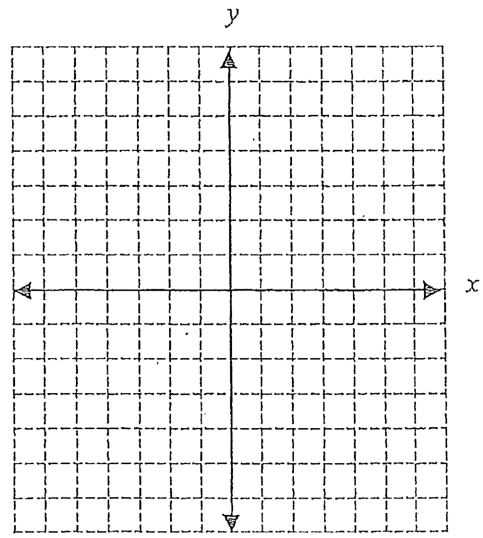
4. $4x - 3y = 9$



5. $-2x+6y=12$



6. $x=-3$



Algebra II Summer Work Answer Sheet

Practice Set #1

1. ______________________

2. ______________________

3. ______________________

4. ______________________

5. ______________________

6. ______________________

7. ______________________

8. ______________________

9. ______________________

10. ______________________

Practice Set #2

1. ______________________

2. ______________________

3. ______________________

4. ______________________

5. ______________________

6. ______________________

7. ______________________

8. ______________________

9. ______________________

10. ______________________

Practice Set #3

1. ______________________

2. ______________________

3. ______________________

4. ______________________

5. ______________________

6. ______________________

Practice Set #4

1. ____________________

2. ____________________

3. ____________________

4. ____________________

5. ____________________

6. ____________________

7. ____________________

8. ____________________

9. ____________________

10. ____________________

11. ____________________

12. ____________________

13. ____________________

14. ____________________

15. ____________________

Practice Set #5

1. ____________________

2. ____________________

3. ____________________

4. ____________________

5. ____________________

6. ____________________

7. ____________________

8. ____________________

9. ____________________

10. ____________________

Practice Set #6

1. ____________________

2. ____________________

3. ____________________

4. ____________________

5. ____________________

6. ____________________

7. ____________________

8. ____________________

9. ____________________

10. ____________________

Practice Set #7

1. ____________________

2. ____________________

3. ____________________

4. ____________________

5. ____________________

6. ____________________

7. ____________________

8. ____________________

9. ____________________

10. ____________________

Practice Set #8

1. ____________________

2. ____________________

3. ____________________

4. ____________________

5. ____________________

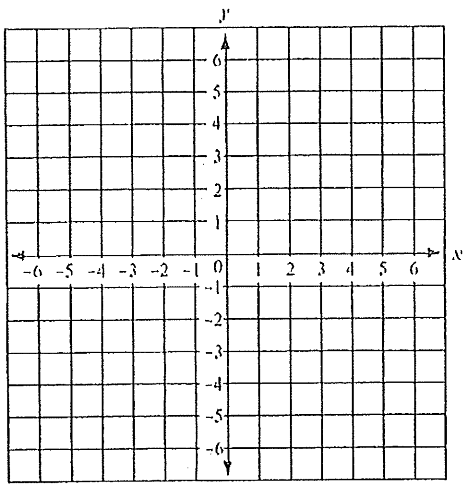
6. ____________________

Practice Set #9

1.

Slope ________________

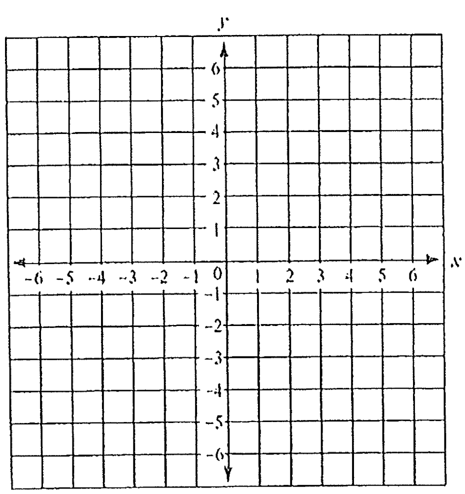
y-intercept ________________



2.

Slope ________________

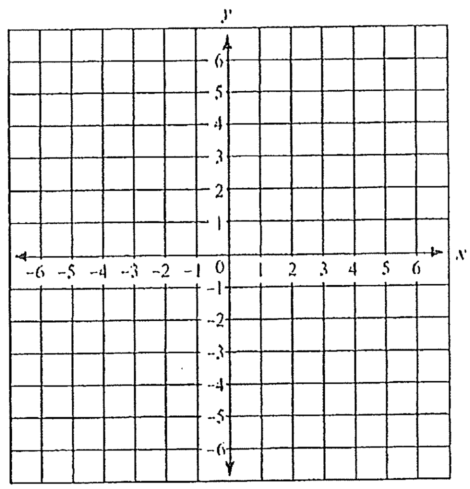
y-intercept ________________



3.

Slope ________________

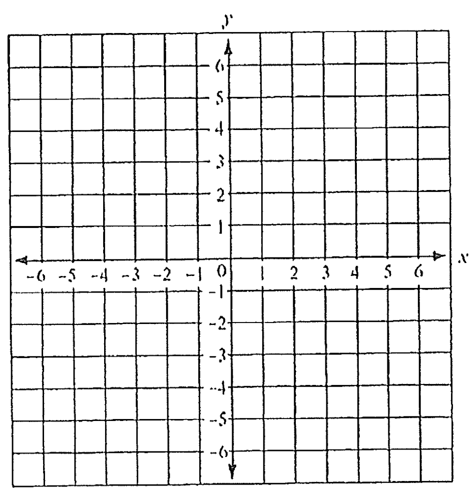
y-intercept ________________



4.

Slope ________________

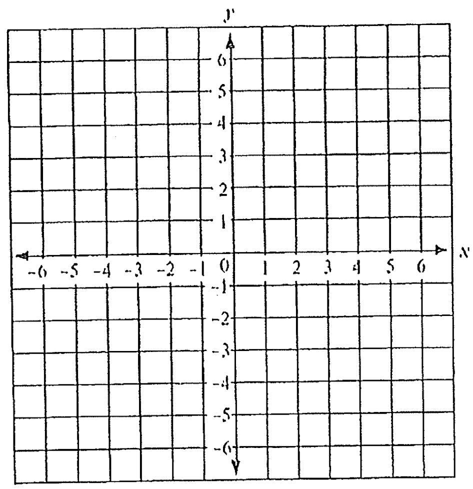
y-intercept ________________



5.

Slope ________________

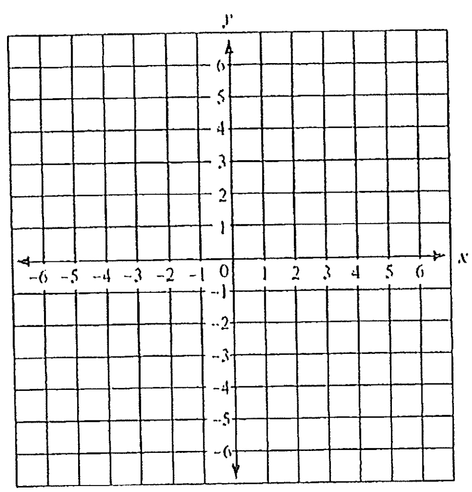
y-intercept ________________



6.

Slope ________________

y-intercept ________________

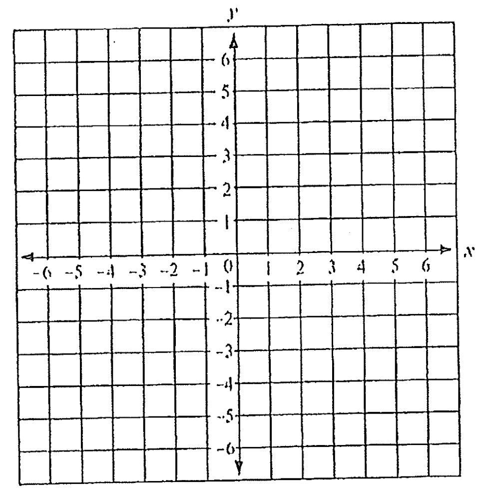


Practice Set #10

1.

Slope ________________

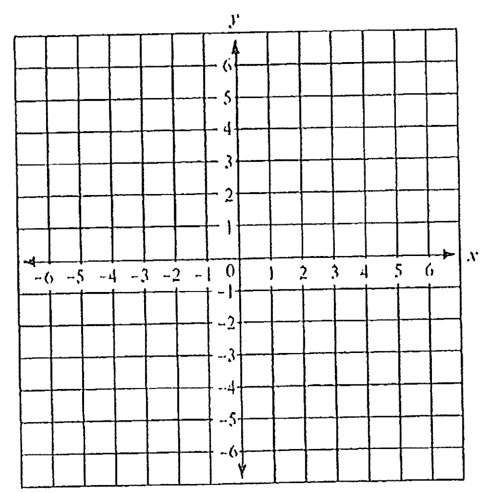
y-intercept ________________



2.

Slope ________________

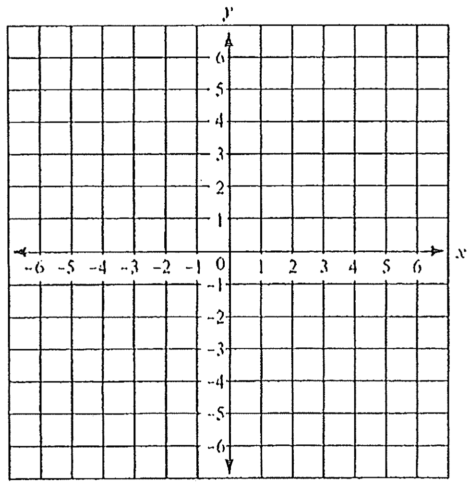
y-intercept ________________



3.

Slope ________________

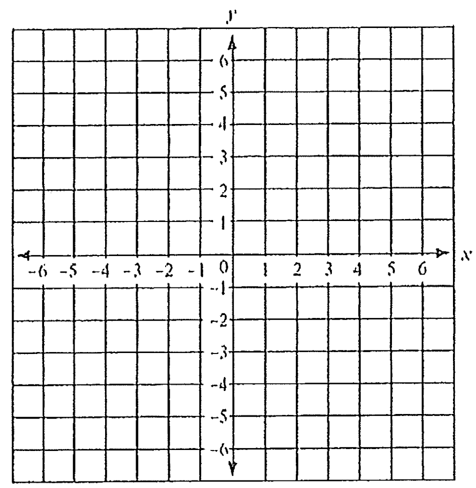
y-intercept ________________



5.

Slope ________________

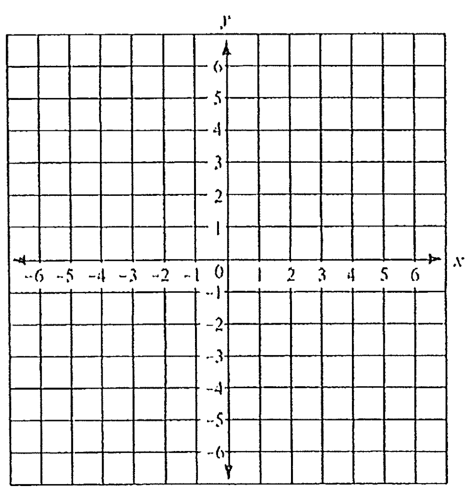
y-intercept ________________



4.

Slope ________________

y-intercept ________________



6.

Slope ________________

y-intercept ________________