BRONX COMMUNITY COLLEGE
of the City University of New York

DEPARTMENT OF MATHEMATICS AND COMPUTER SCIENCE

MATH 05   Exam 3
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Name: _____ $Answers$ _____

Directions: Write your answers in the provided space. To get full credit you *must* show all your work. Simplify your answers whenever possible. Be certain to indicate your final answer clearly. **Each problem is worth** 5 **points**

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1. Given $a = 2$ and $b = -3$, evaluate the expression given below.

$$a^2b + ab + b^2 = (2)^2(-3) + (2)(-3) + (-3)^2$$
$$= (4)(-3) + (2)(-3) + (9)$$
$$= -12 - 6 + 9 = -18 + 9 = -9$$

   A. -15 B. -9 C. 3   D. 27

2. Given $a = -4$, $b = -5$, and $c = -1$, evaluate the expression given below.

$$b^2 - 4ac = (-5)^2 - 4(-4)(-1)$$
$$= 25 - 4(-4)(-1)$$
$$= 25 - 16 = 9$$

   A. -9 B. 9   C. 41   D. -41

3. Solve for x:

   $LCD = 6$

   $\cancel{6}^2 \, \dfrac{2x}{3} + \cancel{6}^3 \dfrac{1}{2} = \dfrac{5}{6} \cancel{6} \iff 4x + 3 = 5$
   $\iff 4x = 5 - 3$
   $\iff \cancel{4}^1 x = \cancel{2}^1 \iff x = \dfrac{1}{2}$

   A. $x = \dfrac{1}{2}$ B. $x = \dfrac{2}{3}$ C. $x = \dfrac{3}{2}$ D. $x = 2$

4. Solve for x: $z = 5x + y \iff 5x = z - y \iff x = \dfrac{z-y}{5}$

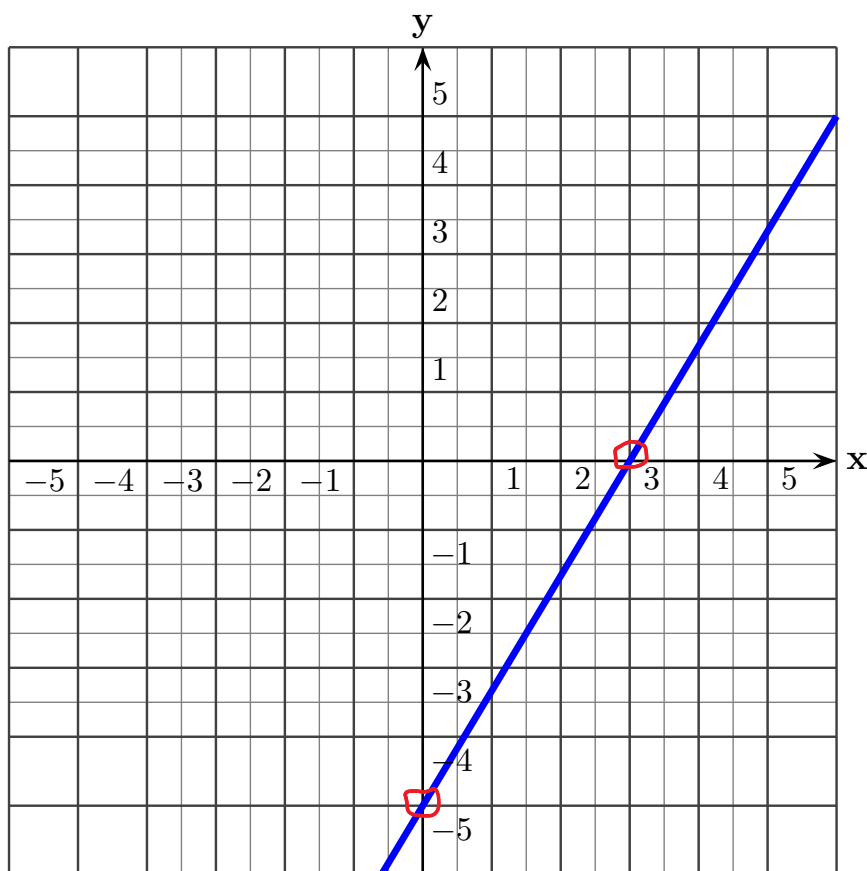   A. $x = \dfrac{z+y}{5}$ B. $x = \dfrac{z-y}{5}$ C. $x = \dfrac{z}{5} - y$ D. $x = 5(z - y)$

5. Find the graph of the solution to the inequality.

$$3x + 5 \geq 5x - 1 \iff 3x \geq 5x - 6$$
$$-5 \qquad -5 \qquad\qquad -5x \quad\quad -5x$$
$$\iff -2x \geq -6 \iff x \leq 3$$

   A)

   B)

   C)

   D)
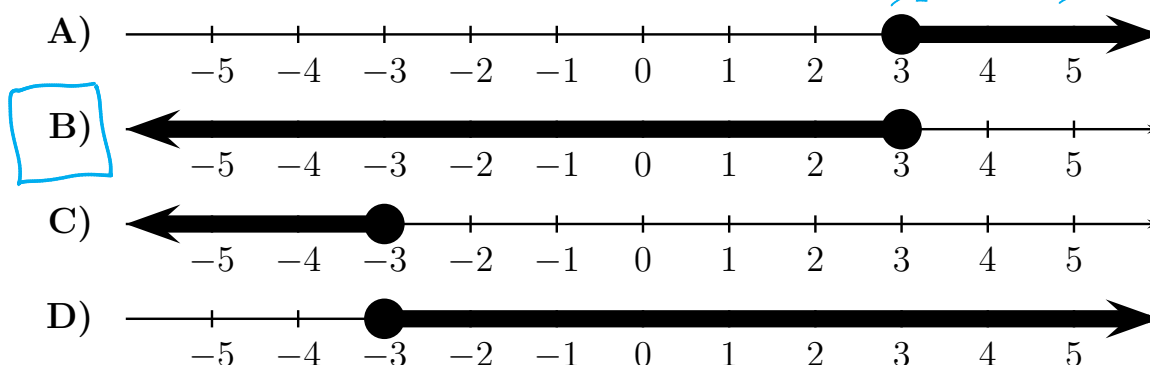
6. What is the slope of the line graphed below?

Two points

$(0, -5), (3, 0)$

$$M = \frac{(0) - (-5)}{(3) - (0)} = \frac{5}{3}$$

Slope is $m = \dfrac{5}{3}$

7. Find the slope and the $x-$ and $y-$intercepts of the line with equation $2x - 5y = 20$.

$2x - 5y = 20 \Longleftrightarrow -5y = -2x + 20$

$\dfrac{-5}{-5} \quad \dfrac{-2x}{-5} \quad \dfrac{+20}{-5}$

$\Longleftrightarrow y = \dfrac{2x}{5} - 4$

So slope is $\dfrac{2}{5}$

y-intercept is $(0, -4)$

When $y = 0$ we get

$\dfrac{2x}{2} = \dfrac{20}{2} \Longleftrightarrow x = 10$

So x-intercept is $(10, 0)$.

8. A line has slope $\dfrac{2}{3}$ and passes through the point $(0, -4)$. Find it's equation.

y-intercept

$y = \dfrac{2x}{3} - 4$

9. A line has slope -3 and passes through the point $(1, 7)$. Find its equation.

If b is the y-intercept then the equation is $y = -3x + b$

Since $(1, 7)$ lies in the line we have.

$$7 = -3(1) + b \iff -7 = -3 + b$$
$$\iff -7 + 3 = b$$
$$\iff -4 = b$$

So equation is $\boxed{y = -3x - 4}$

10. A line passes through the points with coordinates $(2, -3)$ and $(-1, 3)$. Find its equation.

We use the two points to find the slope

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

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

$$= \boxed{-2}$$

So if b is the y-intercept

$$y = -2x + b$$

Substituting $x = -1, y = 3$ we get

$$3 = -2(-1) + b \implies 3 = 2 + b$$
$$\iff 3 - 2 = b$$
$$\iff \underline{b = 1}$$

So the equation is $\boxed{y = -2x + 1}$

11. A vertical line passes through the point $(-1, 3)$. Find it's equation.

$$\boxed{X = -1}$$

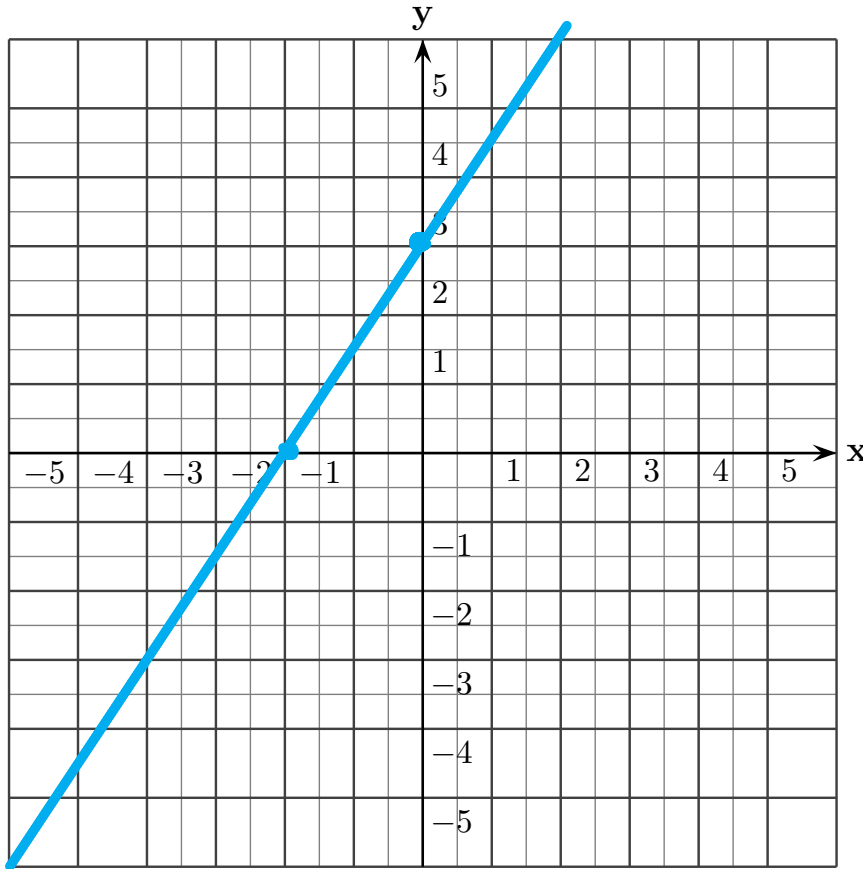12. A horizontal line passes through the point $(-6, -7)$. Find it's equation.

$$\boxed{y = -7}$$

13. Find the slope and the y intercept of the graph of the equation $3x + 4y = 8$

$\Rightarrow \frac{4y}{4} = \frac{-3x}{4} + \frac{8}{4}$

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

A. slope= $-\dfrac{3}{4}$ and y-intercept $(0, 2)$

B. slope= $\dfrac{4}{3}$ and y-intercept $(0, 8)$

C. slope= $\dfrac{3}{4}$ and y-intercept $(0, 2)$

D. slope= $-\dfrac{3}{3}$ and y-intercept $(0, 8)$

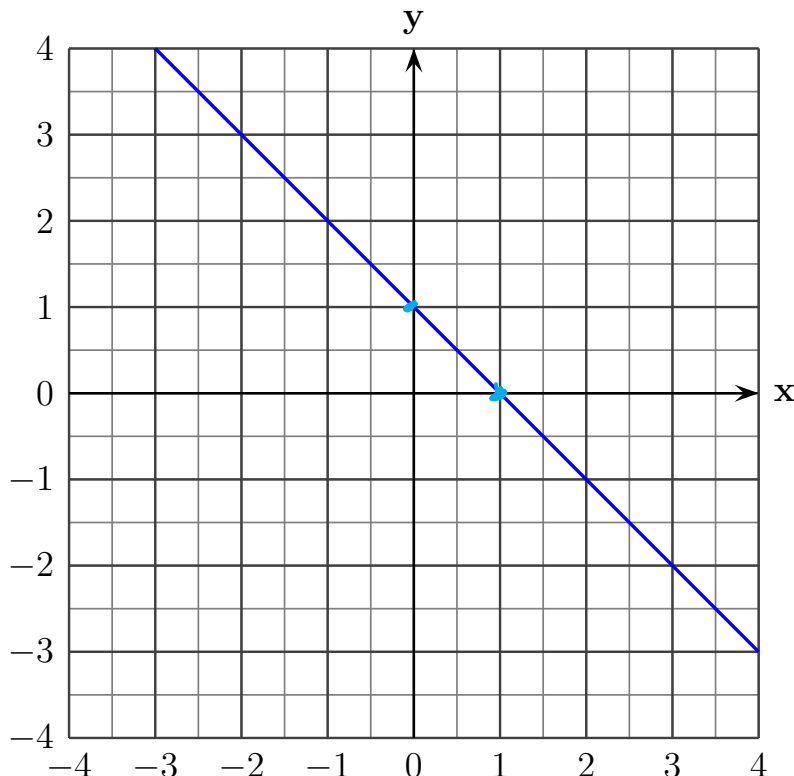14. Graph the line with equation $-3x + 2y = 6$ in the following grid.

$y = 0 \Rightarrow \dfrac{-3x}{-3} = \dfrac{6}{-3} \Rightarrow x = -2$

$x = 0 \Rightarrow \dfrac{2y}{2} = \dfrac{6}{2} \Rightarrow y = 3$

x	y
-2	0
0	3

15. Choose the correct equation for the line whose graph is shown below:

$(0, 1), (1, 0)$

$m = \dfrac{(0) - 1}{(1) - 0} = -1$

A. $x - y = 1$ $\Leftrightarrow y = x - 1$

B. $x + y = 1$ $\Leftrightarrow y = -x + 1$

C. $x + y = -1$ $\Leftrightarrow y = -x - 1$

D. $x - y = -1$ $\Leftrightarrow y = x + 1$

16. Complete the following table of solutions for the equation $6x - 5y = 30$.

$x = 0 \Rightarrow -5y = \dfrac{30}{-5} \Rightarrow y = -6$

$y = 0 \Rightarrow 6x = \dfrac{30}{6} \Rightarrow x = 5$

$x = 1 \Rightarrow 6 \cdot 1 - 5y = 30 \Rightarrow -5y = 24$
$\Rightarrow y = -\dfrac{24}{5}$

$x = -1 \Rightarrow 6 \cdot (-1) - 5y = 30$
$\Rightarrow -6 - 5y = 30$
$\Rightarrow -5y = 36 \Rightarrow y = -\dfrac{36}{5}$

x	y
0	-6
5	0
1	$-\dfrac{24}{5}$
-1	$-\dfrac{36}{5}$
$\dfrac{35}{6}$	1

$y = 1 \Rightarrow 6x - 5 \cdot 1 = 30$
$\Rightarrow 6x = 35$
$\Rightarrow x = \dfrac{35}{6}$

17. Which of the following is the graph of the equation?

$3x - 2y = -6$

Intercepts $\quad x = 0 \Rightarrow \dfrac{-2y}{-2} = \dfrac{-6}{-2} \Rightarrow y = 3$

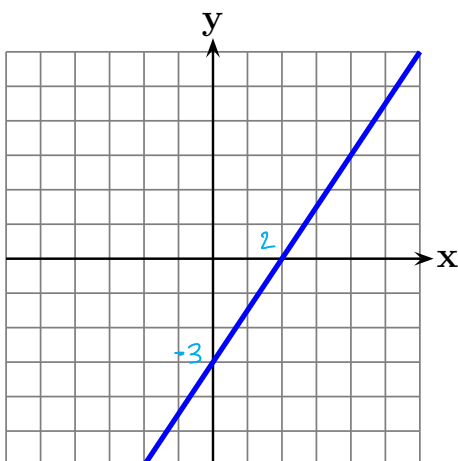| x	y
0	3
-2	0

$y = 0 \Rightarrow \dfrac{3x}{3} = \dfrac{-6}{3} \Rightarrow x = -2$
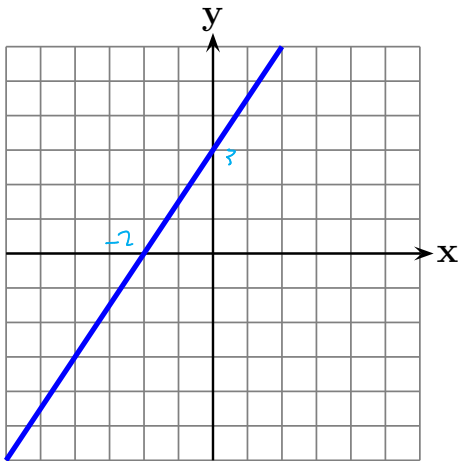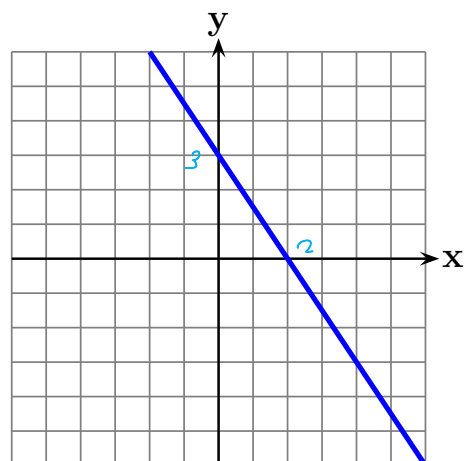
(A)
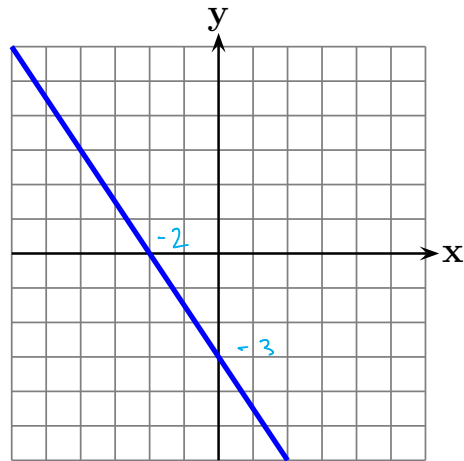
(B)

(C)

(D)

18. What is the value of the y-coordinate of the solution to the following system of equations?

$\times 3 \begin{cases} x + 3y = 2 \\ -3x - 8y = 4 \end{cases}$

$3x + 9y = 6$
$-3x - 8y = 4$
_____
$y = 10$

A. $y = -2$ B. $y = 10$ C. $y = 6$ D. $y = -10$

19. What is the value of the x-coordinate of the solution to the following system of equations?

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

$4x + 2y = 6$
$-5x - 2y = 4$
_____
$-x = 10 \Rightarrow x = -10$

A. $x = 2$ B. $x = -10$ C. $x = 10$ D. $x = -7$

20. Solve the system: $\begin{array}{c} 2 \\ 3 \end{array} \begin{cases} 2x - 3y = -10 \\ 3x + 2y = -2 \end{cases}$ $\begin{array}{l} \times 3 \\ \times -2 \end{array} \Longrightarrow$ $\begin{cases} 4x - 6y = -20 \\ 9x + 6y = -6 \end{cases}$

$\frac{13x}{13} = \frac{-26}{13} \Rightarrow x = -2$

$\begin{cases} 6x - 9y = -30 \\ -6x - 4y = 4 \end{cases}$
_____
$\frac{-13y}{-13} = \frac{-26}{-13} \Rightarrow y = 2$

So the solution is $x = -2, y = 2$ or $(-2, 2)$