

NAME: _____ Score _____/100


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SHOW ALL YOUR WORK IN A NEAT AND ORGANIZED FASHION

Circle T or F, whichever is correct. 2 pts. each for 1 – 35. 3 pts. each for 36 – 43.

1. T F If any expression is added to both sides of an inequality the resulting inequality is equivalent to the original inequality.
2. T F If both sides of an inequality are multiplied by the same real number, the resulting inequality is equivalent to the original inequality.
3. T F The graph of an inequality in one variable is a point.
4. T F The graph of a linear equation in two variables is a non-vertical line.
5. T F The equation $y - y_1 = m(x - x_1)$ is called the slope-intercept form of the equation of a line.
6. ~~T F The graph of a linear equation in two variables may be a vertical line.~~
7. T F A horizontal line may be the graph of a linear equation in two variables.
8. T F If both sides of an equation are multiplied by the same algebraic expression, the resulting equation is equivalent to the original equation.
9. T F Every linear equation in two variables has exactly one solution.
10. T F Two lines are parallel if their slopes are negative reciprocals of each other.

Fill in each of the blanks to make the statements true.

11. Two inequalities are **equivalent** inequalities if they have the same solution sets.
12. If both sides of an inequality are multiplied by the same **negative** real number and the inequality symbol is **reversed**, the resulting inequality is equivalent to the original inequality.
13. Write the set $\{x | -3 < x < 6\}$ using interval notation **$(-3, 6)$** .
14. Write the interval $[2, 8)$ using set builder notation **$\{x | 2 \leq x < 8\}$** .
15. If any expression is added to both sides of an equation the resulting equation is **equivalent** to the original equation.
16. The solution set for $|3x - 2| = -7$ is **the empty set \emptyset** .
17. Use interval notation without the intersection symbol to write the set $\{x | 1 < x < 3\} \cap \{x | 2 < x < 6\}$ **$(2, 3)$** .
18. Sketch the graph of the set $\{x | 1 < x < 3\} \cap \{x | 2 < x < 6\}$. 

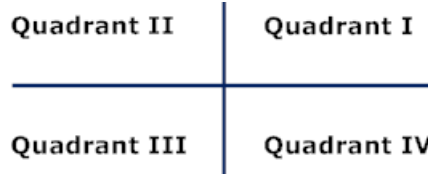
19. Sketch the graph of the set $(-2, 2]$



20. If the solution to an absolute value inequality $|ax + b| > c$ is $(-\infty, 4) \cup (5, +\infty)$ then the solution to the inequality $|ax + b| < c$ is **$(4, 5)$** .
21. If the solution to an absolute value inequality $|ax + b| > c$ is $(-\infty, 4) \cup (5, +\infty)$ then the solution to the equality $|ax + b| = c$ is **$\{4, 5\}$** .

Questions 22– 27 are about the Cartesian coordinate system.

22. A rectangular coordinate system (Cartesian coordinate system) consists of two perpendicular number lines. One number line is drawn **horizontally** and the other is drawn **vertically**.
23. The point where these number lines intersect is the **zero** point on each number line.
24. The horizontal number line is usually called the **x-axis**.
25. The vertical number line is usually called the **y-axis**.
26. The point of intersection of the two number lines is called the **origin** of the coordinate system.
27. Label the quadrants on the coordinate system.



28. The inequality $|3x - 5| < 2$ is equivalent to the compound inequality $-2 < 3x - 5 < 2$.

29. Complete the definition of absolute value $|x| = \begin{cases} x & \text{if } x \geq 0 \\ -x & \text{if } x < 0 \end{cases}$

30. A linear equation in two variables is an equation that can be written in the form $y = mx + b$ where m and b are real numbers.

31. The graph of the equation $y = \frac{\sqrt{7}}{3}x - \frac{11}{15}$ is a **line**.

32. State the Law of Trichotomy.

If a and b are real numbers then exactly one of the following must be true

i) $a < b$

ii) $a = b$

iii) $a > b$

33. Write the formula for the midpoint of the line segment joining (x_1, y_1) and (x_2, y_2) .

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

34. Write the formula for the length of the line segment joining (x_1, y_1) and (x_2, y_2) .

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

Write the formula for the slope of the line segment joining (x_1, y_1) and (x_2, y_2)

$m = \frac{y_1 - y_2}{x_1 - x_2}$

Show your work on exercises 36 – 42 inclusive unless otherwise directed. Words are good!

35. a. What is the solution set for $|3x + 5| < 7$.

$|3x + 5| < 7$ is equivalent to

$-7 < 3x + 5 < 7$

$-12 < 3x < 2$

$-4 < x < \frac{2}{3}$

The solution set is $\left(-4, \frac{2}{3}\right)$

b. What is the solution set for $|3x + 5| > 7$. NO work required.

The solution set is $(-\infty, -4) \cup \left(\frac{2}{3}, +\infty\right)$

c. What is the solution set for $|3x + 5| = 7$. NO work required.

The solution set is $\left\{-4, \frac{2}{3}\right\}$

36. Write the equation (in slope-intercept form) of the line with slope 5 and y-intercept $\frac{2}{3}$. (NO work required)

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

37. Write the equation (in slope-intercept form) of the line through $(2, -3)$ with slope 5.

Use $y - y_1 = m(x - x_1)$ to obtain

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

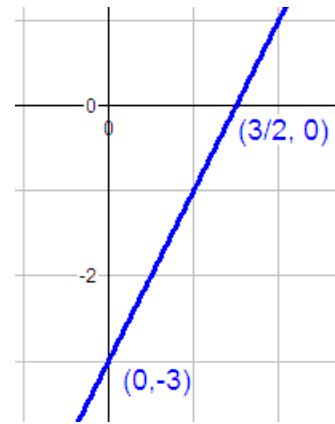
$y + 3 = 5x - 10$

$y = 5x - 13$

38. Sketch the graph of $y = 2x - 3$. Label the intercepts. Show your work.

If $y = 0$, then $x = \frac{3}{2}$. So $(\frac{3}{2}, 0)$ is the x-intercept.

If $x = 0$, then $y = -3$. So $(0, -3)$ is the y-intercept.



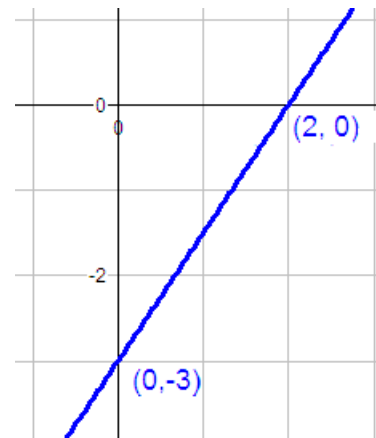
39. Sketch the graph of $3x - 2y = 6$. Label the intercepts. Show your work.

If $x = 0$, then $-2y = 6$ so that $y = -3$.

Therefore $(0, -3)$ is the y-intercept.

If $y = 0$, then $3x = 6$ so that $x = 2$.

Therefore $(2, 0)$ is the x-intercept.



40. Write $3x - 2y = 6$ in slope-intercept form. Show your work.

$$3x - 2y = 6$$

$$-2y = -3x + 6$$

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

41. What is the slope of the graph of the equation $5x - 7y = -4$. Show your work.

$$5x - 7y = -4$$

$$-7y = -5x - 4$$

$$y = \frac{5}{7}x + \frac{4}{7}$$

It is clear from this slope-intercept form of the equation of the line that the slope is $\frac{5}{7}$.

42. Describe the process for finding the equation of the line through two given points P_1 and P_2 .

1. Use the formula for the slope and the coordinates of P_1 and P_2 to compute the slope of the desired line.
2. Use the point-slope formula, the newly computed slope, and the coordinates of one of P_1 or P_2 to write the equation of the desired line.
3. Although not mandatory it is generally desirable to use the properties of equations to rewrite the newly derived equation in the slope-intercept.