

Math 100
Midterm

Name _____

Section _____

Date _____

KEY

1. List all the elements of the set that are **rational numbers**. $-\sqrt{49}, 0, \frac{1}{2}, -2.19$

$$\{-\sqrt{49}, 0, \frac{1}{2}, -2.19, \sqrt{5}\}$$

5 points

2. Evaluate the expression if $a = -3$ and $b = -4$.

$$\underline{-41}$$

5 points

$$\frac{6a - 4b^2}{11 - a^2} = \frac{6(-3) - 4(-4)^2}{11 - (-3)^2} = \frac{-18 - 64}{11 - 9} = \frac{-82}{2} = -41$$

3. Which **property** justifies the statement?

$$3 + (4 + 5) = (3 + 4) + 5$$

b

3 points

- a) Distributive property b) Associative property
c) Identity property d) Commutative property

4. Solve the equation.

$$\frac{3t}{2} + \frac{4t}{7} = -5$$

$$\underline{\frac{-70}{29}}$$

4 points

$$\begin{aligned} 14\left(\frac{3t}{2}\right) + 14\left(\frac{4t}{7}\right) &= 14(-5) \\ 7(3t) + 2(4t) &= -70 \\ 21t + 8t &= -70 \\ 29t &= -70 \\ t &= \frac{-70}{29} \end{aligned}$$

5. Decide whether the equation is **conditional**, an **identity**, or a **contradiction**.

$$6t - 3(5 + 2t) + 3 = -12$$

identity

3 points

Give the **solution set**.

$$\begin{aligned} 6t - 15 - 6t + 3 &= -12 \\ -12 &= -12 \end{aligned}$$

Reals or $(-\infty, \infty)$

3 points

6. Solve the formula for A.

$$B = \frac{5}{7}(A - 32)$$

$$7B = 5A - 160$$

$$7B + 160 = 5A$$

$$\frac{7B + 160}{5} = A$$

$$\text{or } A = \frac{7}{5}B + 32$$

$$\underline{A = \frac{7}{5}B + 32}$$

4 points

7. Jack receives \$45.00 per month allowance. He spends \$13.50 each month for a haircut. What percent of his allowance does he have left to spend on other things?

$$\begin{array}{r} 45.00 \\ - 13.50 \\ \hline \$ 31.50 \text{ left} \end{array}$$

$$\frac{31.50}{45.00} = \frac{x}{100}$$

$$45x = 3150$$

$$x = 70$$

70%

5 points

8. Solve the inequality. Give the solution set in both interval and graph forms.

$$7 - 3(t - 2) \leq -(t + 1)$$

$$7 - 3t + 6 \leq -t - 1$$

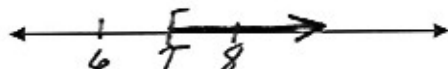
$$13 - 3t \leq -t - 1$$

$$-2t \leq -14$$

$$t \geq 7$$

$$\underline{[7, \infty)}$$

3 points



3 points

9. For the compound inequality, give the solution set in both interval and graph forms.

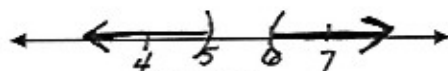
$$4t < 2t + 10 \text{ or } t - 3 > 3$$

$$2t < 10 \quad t > 6$$

$$t < 5 \text{ or } t > 6$$

$$\underline{(-\infty, 5) \cup (6, \infty)}$$

3 points



3 points

10. Let $A = \{1, 3, 5, 7, 9\}$ and $B = \{2, 4\}$.

a. Find $A \cup B$.

$$\underline{\{1, 2, 3, 4, 5, 7, 9\}}$$

3 points

b. Find $A \cap B$.

$$\underline{\{\} \text{ or } \emptyset}$$

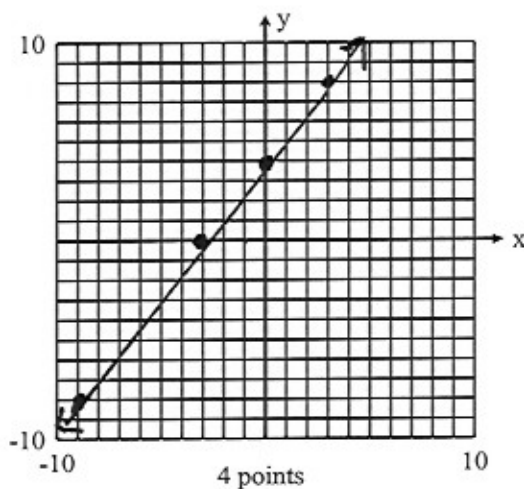
3 points

11. a. Complete the table of ordered pairs for the equation $4x - 3y = -12$.

x	y
0	4
-3	0
3	8
-9	-8

4 points

- b. Graph the equation.



12. a. Find the **slope** of the line $2x + y = 3$.

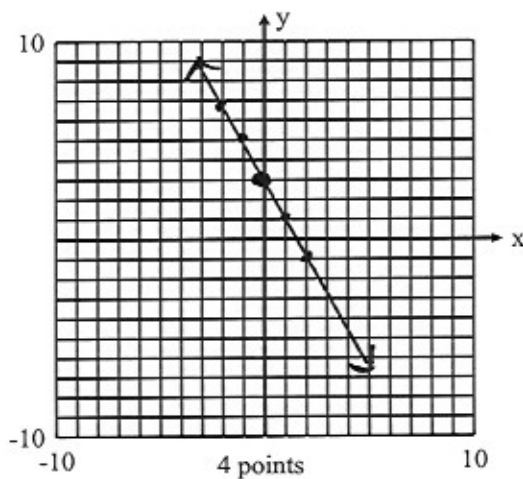
$$y = -2x + 3$$

slope: $\frac{-2}{1}$
2 points

- b. Find the **y-intercept**.

y-intercept: $(0, 3)$
2 points

- c. **Graph** the equation.



13. Write the equation of the line through the point $(-2, 4)$ and with a slope of 3. Write the equation in **standard form**.

$$y - 4 = 3(x - (-2))$$

$$y - 4 = 3x + 6$$

$$-3x + y = 10$$

$$3x - y = -10$$

$$\underline{3x - y = -10}$$

5 points

14. Write an equation of the line through the point $(9, 8)$ that is perpendicular to $3x - 4y = 0$. Write the equation in **slope-intercept form**.

$$-4y = -3x$$

$$y = \frac{3}{4}x$$

$$(9, 8)$$

$$m = -\frac{4}{3}$$

$$y - 8 = -\frac{4}{3}(x - 9)$$

$$y - 8 = -\frac{4}{3}x + 12$$

$$y = -\frac{4}{3}x + 20$$

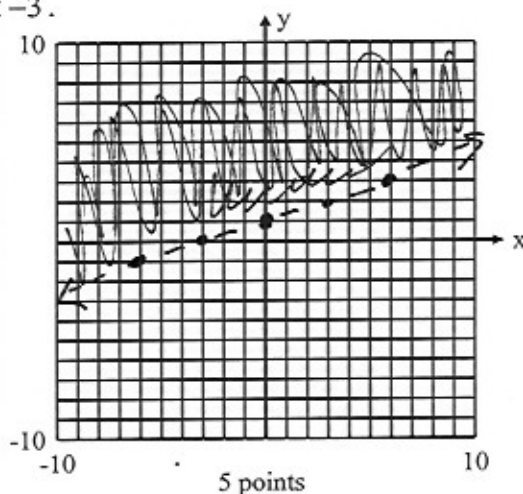
$$\underline{y = -\frac{4}{3}x + 20}$$

5 points

15. Graph the inequality $x - 3y < -3$.

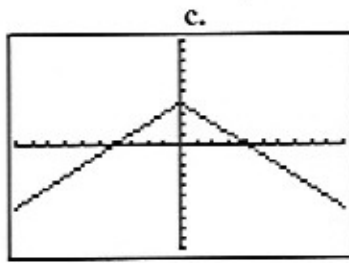
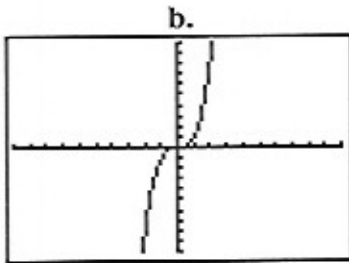
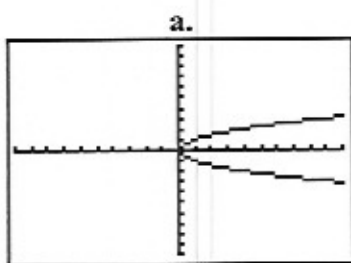
$$-3y < -x - 3$$

$$y > \frac{1}{3}x + 1$$



16. Which of the following is **not** the graph of a function?

a
3 points



17. For $f(x) = -x^2 - 3x - 7$, find each.

a. $f(-2) = -(-2)^2 - 3(-2) - 7$
 $= -4 + 6 - 7 = -5$

 -5
3 points

b. $f(3b) = -(3b)^2 - 3(3b) - 7$
 $= -9b^2 - 9b - 7$

 -9b² - 9b - 7
3 points

18 Solve the system and write the solution in the form (x, y).

$m_4 \begin{cases} 5x - y = 2 \\ -3x + 4y = 26 \end{cases}$

$20x - 4y = 8$
 $-3x + 4y = 26$

$17x = 34$

$x = 2$

$5(2) - y = 2$

$10 - y = 2$

$-y = -8$

$y = 8$

 (2, 8)
5 points

19. Jack invested \$40,000, part at 4% and the rest at 6%. The total annual return from the two investments is \$1740, how much is invested at each rate?

$x = \text{amount at } 4\%$

$y = \text{amount at } 6\%$

$m_{-4} \quad x + y = 40,000$

$m_{100} \quad .04x + .06y = 1740$

$4x + 6y = 174,000$
 $-4x - 4y = -160,000$

$2y = 14,000$

$y = 7,000$

$x + 7000 = 40,000$

$x = 33,000$

 \$33,000 @ 4%
 \$7,000 @ 6%

5 points