

Name: Answer Key Per: _____
 Serafino · Algebra 2E

Date: _____
 M T W R F

1R

Foundations of Algebra: Expressions, Equations & Functions

Unit Review

Select all that are true:

1. Which of the following is an integer, but is not a whole number? (select all that apply)

- A -3 B 0 C $-\sqrt{12}$ D 7 E $15/3$

2. Which of the following is an irrational number? (select all that apply)

- A $-\sqrt{3}$ B 51 C $1/2$ D $-4/3$ E $\sqrt{25}$

3. Which of the following lists the numbers least to greatest? (select all that apply)

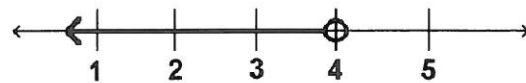
- A 0, -1, -2, -3 B -1, -3/2, 0, 1 C 0, 1, $\sqrt{2}$, $3/2$
 $-1, -1.5$

$4 - 8x - 10 + 2x + 5 - 4 - 16$
 $-20 - 6x + 9$

4. Which of the following is the simplest form of: $4(1 - 2x) - 2(5 - x) + 5 - 2(2 + 3)$

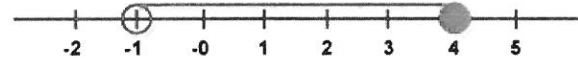
- A -11 B $-6x - 11$ C $-10x - 11$ D $-10x + 9$ E $-6x + 9$

5. Which of the following is represented by the graph:



- A $x \leq 4$ B $x \geq 4$ C $x < 4$

6. Which of the following is represented by the graph:



- A $-1 < x \leq 4$ B $-1 \leq x < 4$ C $x < -1$ or $x \leq 4$ D $x > -1$ or $x < 4$

Provide an expression with the following properties:

7. A quadratic binomial whose leading coefficient is a natural number.

$2x^2 + 3$

8. A linear monomial whose leading coefficient is irrational

$\sqrt{5}x$

9. A cubic trinomial whose leading coefficient is rational number, with a constant is an irrational number.

$\frac{4}{3}x^3 - 2x + \pi$

Perform the operations, and express the polynomials in standard form:

10. $2(4x-1)^2$

$$2(4x-1)(4x-1)$$

$$2(16x^2 - 8x + 1)$$

$$\boxed{32x^2 - 16x + 2}$$

12. $(5-3x) - (7x^2 + 8x - 4)$

$$\boxed{-7x^2 - 11x + 9}$$

14. $5 - 2(1+5)^2$

$$5 - 2(6)^2$$

$$\boxed{-67}$$

11. $(3x^2 - 2x)(4x^3 - x + 5)$

$$12x^5 - 3x^3 + 15x^2 - 10x$$

$$-8x^4 + 2x^2$$

$$\boxed{12x^5 - 8x^4 - 3x^3 + 17x^2 - 10x}$$

13. $-3^2 + (-2)^2 - 6^0$

$$-9 + 4 - 1 \quad \boxed{-6}$$

15. $\frac{1}{4} \left(\frac{2}{3} \right) \div \left(\frac{3}{12} x \right)$

$$\frac{1}{6} \cdot \frac{4}{x} = \boxed{\frac{2}{3x}}$$

Solve the following equations:

16. $4[x - (3 - 2x)] + 5 = 3(x + 11)$

$$4[x - 3 + 2x] + 5 = 3x + 33$$

$$4(3x - 3) + 5 = 3x + 33$$

$$12x - 12 + 5 = 3x + 33$$

$$12x - 7 = 3x + 33$$

$$9x = 40 \quad \boxed{x = \frac{40}{9}}$$

18. $-3(2x - 4) + 3 = 5(3 - 2x)$

$$-6x + 12 + 3 = 15 - 10x$$

$$-6x + 15 = -10x + 15$$

$$-6x = -10x$$

$$\boxed{x = 0}$$

17. $\frac{x+4}{6} = 2(3x-2)$

$$\frac{x+4}{6} = 6x - 4$$

$$x+4 = 36x - 24$$

$$\frac{28}{35} = \frac{35x}{35} \quad \boxed{x = \frac{4}{5}}$$

19. $2(4x - 5) - 3(2x - 4) = 2x + 2$

$$8x - 10 - 6x + 12 = 2x + 2$$

$$2x + 2 = 2x + 2$$

$$0 = 0$$

$$\boxed{x \in \mathbb{R}}$$

Solve the following inequalities.

20. $4x - 1 \leq 7$

$$\begin{aligned} &+1 \\ &4x \leq 8 \\ &\boxed{x \leq 2} \end{aligned}$$

21. $5(x - 6) \geq 20$

$$\begin{aligned} &(x - 6) \geq 4 \\ &\boxed{x \geq 10} \end{aligned}$$

22. $\frac{x-5}{7} \leq -3$

$$\begin{aligned} &x - 5 \leq -21 \\ &\boxed{x \leq -16} \end{aligned}$$

23. $\frac{x+2}{5} < \frac{2x}{3}$

$$\begin{aligned} &3(x+2) < 5(2x) \\ &3x+6 < 10x \\ &6 < 7x \\ &\frac{6}{7} < x \\ &\boxed{x > \frac{6}{7}} \end{aligned}$$

24. $3x - (2x + 2) \leq 7$

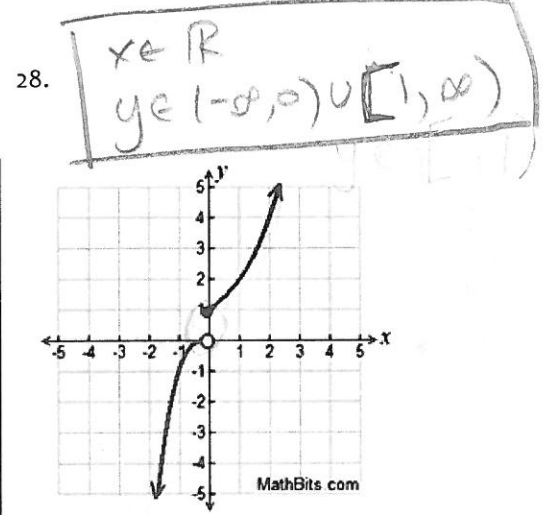
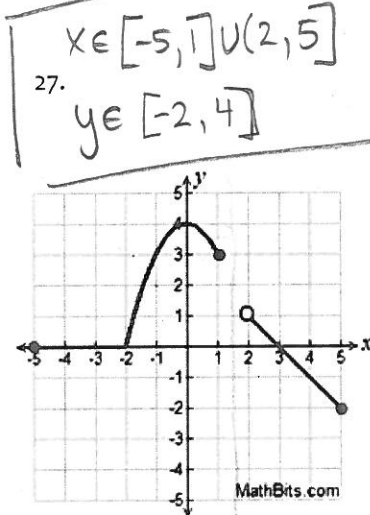
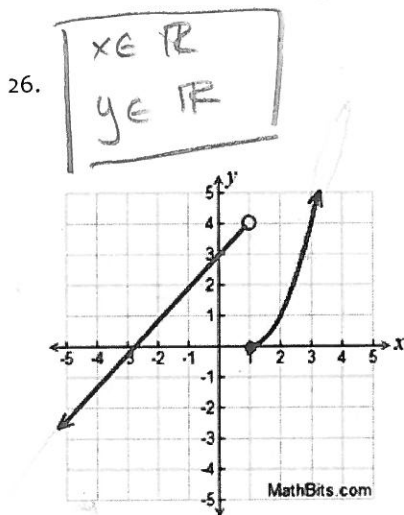
$$\begin{aligned} &3x - 2x - 2 \leq 7 \\ &\boxed{x \leq 9} \end{aligned}$$

25. Complete the table:

← same as inequality notation

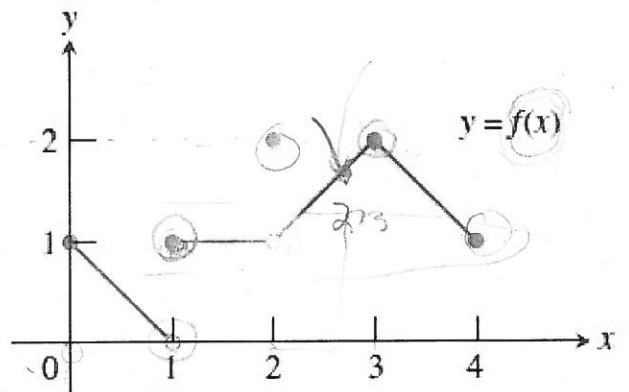
	Set-builder Notation	Interval Notation	Graph
a.	$\{x \in \mathbb{R} \mid x < 3 \text{ or } x \geq 5\}$	$x \in (-\infty, 3) \cup [5, \infty)$	
b.	$-4 < x < 0 \text{ or } x > 1$	$x \in (-4, 0) \cup (1, \infty)$	
c.	$4 \leq x \leq -2$	$x \in [-4, -2]$	
d.	$\{x \in \mathbb{R} \mid -5 \leq x < 4\}$	$x \in [-5, 4)$	
e.	$x \neq 2$	$x \in (-\infty, 2) \cup (2, \infty)$	
f.	$-1 \leq x < 1 \text{ or } x = 2$	$x \in [-1, 1) \cup \{2\}$	
g.	$\{x \in \mathbb{R} \mid x < -3 \text{ or } -2 \leq x \leq 3\}$	$x \in (-\infty, -3) \cup [-2, 3]$	
h.	$x \leq -4 \text{ or } x > -2$	$x \in (-\infty, -4] \cup (-2, \infty)$	
i.	$-1 \leq x \leq 0 \text{ or } 1 < x \leq 2$	$x \in [-1, 0] \cup (1, 2]$	
j.	$\{x \in \mathbb{R} \mid x \leq -2 \text{ or } -1 < x < 4\}$	$x \in (-\infty, -2] \cup (-1, 4)$	

State the Domain & Range of the following:



29. Analyze the graph, giving answers in set or interval notation.

- a. Domain: $x \in [0, 4]$ Range: $y \in (0, 2]$
- b. $f(0) = 1$
- c. $f(2) = 2$
- d. For which x values is $f(x) = 2$? $x = 2, 3$
 $x \in \{2, 3\}$
- e. For which x values is $f(x) = 1$?
 $x \in \{0\} \cup (1, 2) \cup \{4\}$
- f. For which x values is $f(x) > 1$?
 $x \in (2, 4)$
- g. For which x values is $f(x)$ decreasing?
 $x \in (0, 1) \cup (3, 4)$
- h. For which values is $f(x)$ constant?
 $x \in (1, 2)$
- i. What is the average rate of change on the interval $x \in [0, 1]$?



$(0, 1) (1, 0) = \frac{-1}{1} = \boxed{-1}$

j. What is the average rate of change on the interval $x \in [1, 3]$?

$\boxed{1/2}$

k. What is the average rate of change on the interval $x \in [2, 4]$?

$\boxed{-1/2}$