

**Unit 1 - Foundations of Algebra** Review Guide

Write an algebraic expression for each verbal expression.

- The ratio between  $d$  and  $t$
- Twelve more than three times square of a number

Find each value.

- $5^3$
- $11^2$

Write a verbal expression for each algebraic expression.

- $4x^2 - 3$
- $2x - 5$

Evaluate the expression for the given value of the variable.

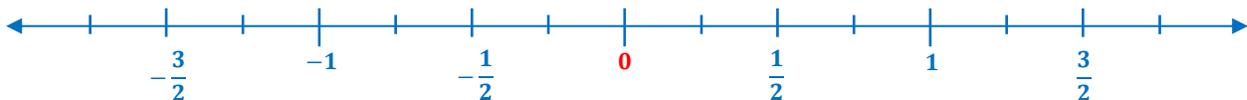
- $\frac{2^3}{x} + 10 - 16$  when  $x = 2$
- $12 \div x - x^5$  when  $x = 2$
- $\frac{x^5 + 4}{y(x^2 + 12)}$  when  $x = 2$  and  $y = 3$
- $\frac{2(17 + 2x)}{y^2 - 11}$  when  $x = 4$  and  $y = 6$

Graph each set of numbers.

- 11.
- $\{-1.5, -1, 1.5, 3, 5\}$



- 12.
- $\left\{-\frac{3}{2}, -\frac{1}{2}, 0, \frac{1}{2}, \frac{3}{2}\right\}$



**Unit 1 - Foundations of Algebra** Review GuideEvaluate each expression if  $z = -67$ .

13.  $84 - |65 + z|$

14.  $47 - |z - 26|$

15.  $|-z| + (z + 33)$

Evaluate each expression if  $x = 2$ ,  $y = 3$  and  $z = 4$ . (Name the property used in each step.)

16.  $5(y \cdot 3 - 7) + z \cdot \frac{1}{x}$

17.  $\frac{x}{7}[y \div (7 - z)]$

18.  $x \cdot \frac{2}{y} + z(2y \div 4 - 5)$

Use a number line to find the sum.

19.  $-3 + (-13)$



20.  $-4 + 11$



21.  $-1 + 8 + (-5)$



Find each sum.

22.  $-8.3 + (6.1)$

23.  $42.3 + (-5.4)$

24.  $-24.2 + 83.9$

25.  $7 + 14$

Find each difference

26.  $-58 - (-24)$

27.  $79.3 - (-14.1)$

28.  $4.31 - (-0.84)$

29.  $-3 - (-12) + 8$

Find the product.

30.  $(4)(-5)$

31.  $(-1)(-5)\left(\frac{6}{25}\right)$

32.  $(13)(-2)\left(-\frac{6}{7}\right)(21)$

Find the quotient.

33.  $(-90) \div \left(-\frac{5}{6}\right)$

34.  $\frac{-35}{70}$

35.  $(75) \div \left(-\frac{3}{5}\right)$

# Unit 1 - Foundations of Algebra Review Guide

Simplify the following expressions:

36.  $8 - 3(2x - 5)$

37.  $5(3x + 4) - 4$

38.  $2(5x + 4) - 3$

39.  $7(9) + 7(5)$

40. A total of 2000 people attended a benefit concert was held to raise money for a children foundation. Student ticket cost \$2 and an adult ticket cost \$3. If the organizer raises a total of \$5050, how many students attended the concert?

Tell whether each equation is true, false, or open. Explain.

41.  $10x + 4 = 6$

42.  $15 - 9 = 28 - 22$

43.  $-10 + 3 = -6 + 14$

Use a table to find two consecutive integers between which the solution lies.

44.  $4x - 15 = 20$

45.  $3x - 26 = 8$

46.  $8x + 7 = 86$

Tell whether the given equation has the ordered pair as a solution.

47.  $y = x + 11$        $(3, -3)$

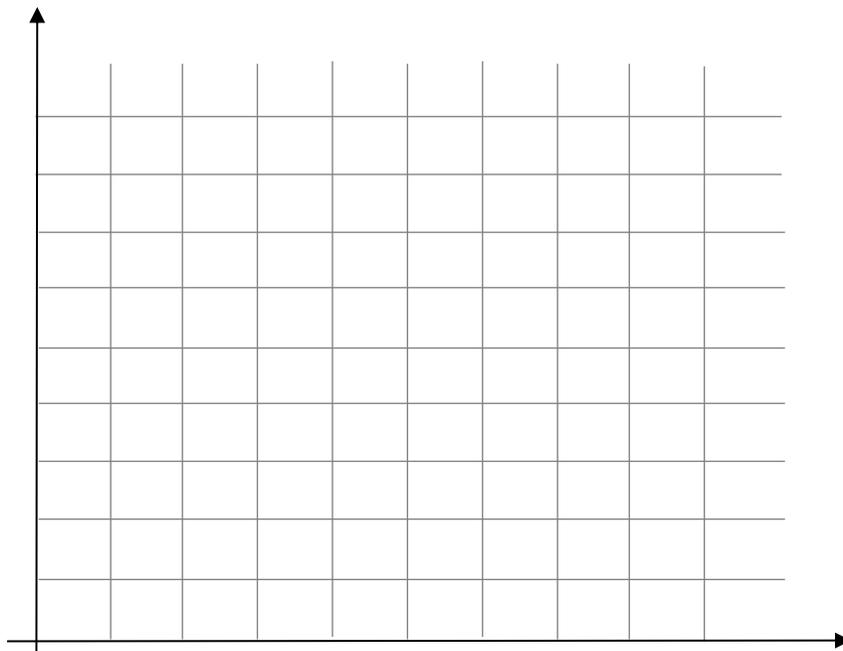
48.  $x - 3 = 6y$        $(9, 1)$

49.  $x - 3y = -2$        $(5, 2)$

# Unit 1 - Foundations of Algebra Review Guide

Use a table, an equation, and a graph to represent the relationship.

50. Anna is 5 years younger than her sister Elsa.



# Unit 1 - Foundations of Algebra Review Guide

**ANSWER** | Write an algebraic expression for each verbal expression.

- The ratio between  $d$  and  $t$   $= \frac{d}{t}$
- Twelve more than three times square of a number  $= 12 + 3x^2$

Find each value.

- $5^3 = 5 \cdot 5 \cdot 5 = 125$
- $11^2 = 11 \cdot 11 = 121$

Write a verbal expression for each algebraic expression.

- $4x^2 - 3$  = four times  $x$  squared minus three
- $2x - 5$  = two times  $x$  minus five

Evaluate the expression for the given value of the variable.

7.  $\frac{2^3}{x} + 10 - 16$  when  $x = 2$

$$= \frac{8}{2} + 10 - 16$$

$$= 4 - 6$$

$$= -2$$

8.  $12 \div x - x^5$  when  $x = 2$

$$= 12 \div 2 - 2^5$$

$$= \frac{12}{2} - 32$$

$$= 6 - 32$$

$$= -26$$

9.  $\frac{x^5 + 4}{y(x^2 + 12)}$  when  $x = 2$  and  $y = 3$

$$= \frac{2^5 + 4}{3(2^2 + 12)}$$

$$= \frac{32 + 4}{3(4 + 12)}$$

$$= \frac{36}{36}$$

$$= \frac{3(16)}{36}$$

$$= \frac{1(16)}{12}$$

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

10.  $\frac{2(17 + 2x)}{y^2 - 11}$  when  $x = 4$  and  $y = 6$

$$= \frac{2(17 + 2(4))}{6^2 - 11}$$

$$= \frac{2(17 + 8)}{36 - 11}$$

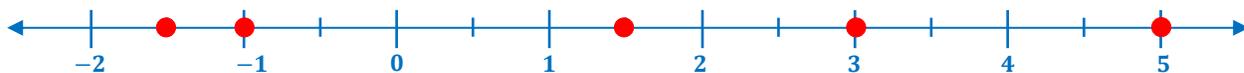
$$= \frac{36 - 11}{3(25)}$$

$$= \frac{25}{25}$$

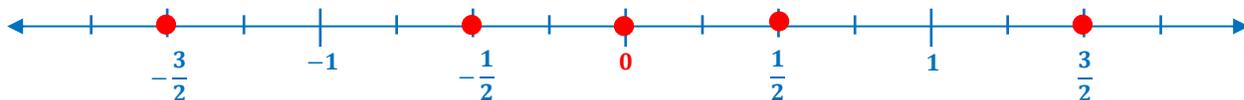
$$= 3$$

Graph each set of numbers.

11.  $\{-1.5, -1, 1.5, 3, 5\}$



12.  $\{-\frac{3}{2}, -\frac{1}{2}, 0, \frac{1}{2}, \frac{3}{2}\}$



**Unit 1 - Foundations of Algebra** Review GuideEvaluate each expression if  $z = -67$ .

$$\begin{aligned}
 13. \quad & 84 - |65 + z| \\
 & = 84 - |65 - 67| \\
 & = 84 - |-2| \\
 & = 84 - 2 \\
 & = \mathbf{82}
 \end{aligned}$$

$$\begin{aligned}
 14. \quad & 47 - |z - 26| \\
 & = 47 - |-67 - 26| \\
 & = 47 - |-93| \\
 & = 47 - 93 \\
 & = \mathbf{-46}
 \end{aligned}$$

$$\begin{aligned}
 15. \quad & |-z| + (z + 33) \\
 & = | -(-67) | + (-67 + 33) \\
 & = |67| + (-34) \\
 & = 67 - 34 \\
 & = \mathbf{33}
 \end{aligned}$$

Evaluate each expression if  $x = 2$ ,  $y = 3$  and  $z = 4$ . (Name the property used in each step.)

$$\begin{aligned}
 16. \quad & 5(y \cdot 3 - 7) + z \cdot \frac{1}{x} = 5(3 \cdot 3 - 7) + 4 \cdot \frac{1}{2} && \text{Substitute} \\
 & = 5(3 \cdot 3 - 7) + 2 && \text{Divide} \\
 & = 5(9 - 7) + 2 && \text{Multiply} \\
 & = 5(2) + 2 && \text{Subtract} \\
 & = 10 + 2 && \text{Multiply} \\
 & = \mathbf{12} && \text{Add}
 \end{aligned}$$

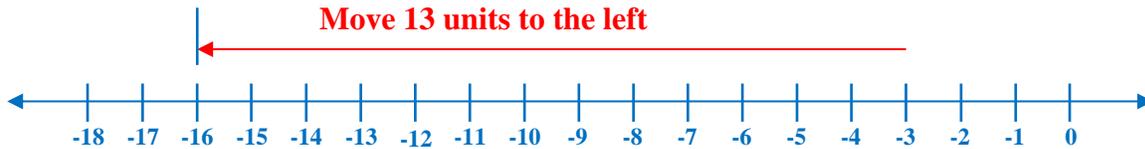
$$\begin{aligned}
 17. \quad & \frac{x}{7}[y \div (7 - z)] = \frac{2}{7}[3 \div (7 - 4)] && \text{Substitution} \\
 & = \frac{2}{7}[3 \div 3] && \text{Subtraction (Grouping)} \\
 & = \frac{2}{7}(1) && \text{Division} \\
 & = \mathbf{\frac{2}{7}} && \text{Multiplicative identity}
 \end{aligned}$$

$$\begin{aligned}
 18. \quad & x \cdot \frac{2}{y} + z(2y \div 4 - 5) = 2 \cdot \frac{2}{3} + 4(2(3) \div 4 - 5) && \text{Substitution} \\
 & = \frac{4}{3} + 4(6 \div 4 - 5) && \text{Multiply} \\
 & = \frac{4}{3} + 4\left(\frac{3}{2} - 5\right) && \text{Divide} \\
 & = \frac{4}{3} + 4\left(-\frac{7}{2}\right) && \text{Subtract} \\
 & = \frac{4}{3} - 14 && \text{Multiply} \\
 & = \mathbf{-\frac{38}{3}} && \text{Subtract}
 \end{aligned}$$

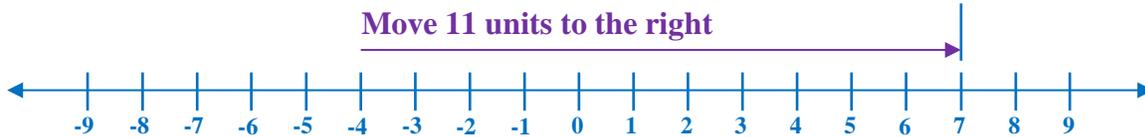
# Unit 1 - Foundations of Algebra Review Guide

Use a number line to find the sum.

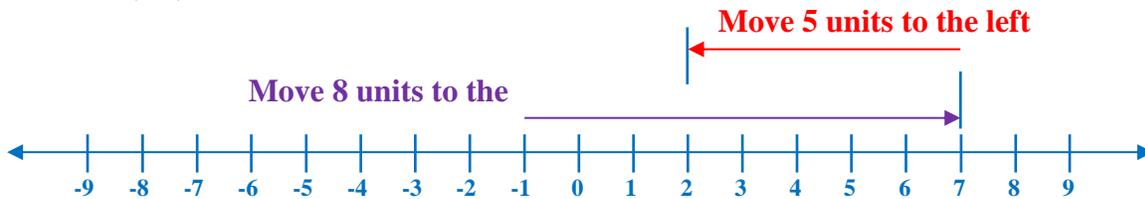
19.  $-3 + (-13)$



20.  $-4 + 11$



21.  $-1 + 8 + (-5)$



Find each sum.

22.  $-8.3 + (6.1)$   
 $= -2.2$

23.  $42.3 + (-5.4)$   
 $= 36.9$

24.  $-24.2 + 83.9$   
 $= 59.7$

25.  $7 + 14$   
 $= 21$

Find each difference

26.  $-58 - (-24)$   
 $= -58 + 24$   
 $= -34$

27.  $79.3 - (-14.1)$   
 $= 79.3 + 14.1$   
 $= 93.4$

28.  $4.31 - (-0.84)$   
 $= 4.31 + 0.84$   
 $= 5.15$

29.  $-3 - (-12) + 8$   
 $= -3 + 12 + 8$   
 $= -3 + 20$   
 $= 17$

Find the product.

30.  $(4)(-5) = -20$

31.  $(-1)(-5)\left(\frac{6}{25}\right)$   
 $= (-1)(-1)\left(\frac{6}{5}\right) = \frac{6}{5}$

32.  $(13)(-2)\left(-\frac{6}{7}\right)(21)$   
 $= (13)(-2)\left(-\frac{6}{1}\right)(3)$   
 $= (-26)(-6)(3)$   
 $= 156(3) = 468$

Find the quotient.

33.  $(-90) \div \left(-\frac{5}{6}\right)$   
 $= -90 \cdot \left(-\frac{6}{5}\right)$   
 $= -18 \cdot (-6) = 108$

34.  $\frac{-35}{70} = -\frac{1}{2}$

35.  $(75) \div \left(-\frac{3}{5}\right)$   
 $= 75 \cdot \left(-\frac{5}{3}\right) = 25(-5)$   
 $= -125$

# Unit 1 - Foundations of Algebra Review Guide

Simplify the following expressions:

$$\begin{aligned}
 36. \quad & 8 - 3(2x - 5) \\
 & = 8 - 6x + 15 \\
 & = -6x + 23
 \end{aligned}$$

$$\begin{aligned}
 38. \quad & 2(5x + 4) - 3 \\
 & = 10x + 8 - 3 \\
 & = 10x + 5
 \end{aligned}$$

40. A total of 2000 people attended a benefit concert was held to raise money for a children foundation. Student ticket cost \$2 and an adult ticket cost \$3. If the organizer raises a total of \$5050, how many students attended the concert?

$$\begin{aligned}
 37. \quad & 5(3x + 4) - 4 \\
 & = 15x + 20 - 4 \\
 & = 15x + 16
 \end{aligned}$$

$$\begin{aligned}
 39. \quad & 7(9) + 7(5) \\
 & = 63 + 35 \\
 & = 98
 \end{aligned}$$

$$\begin{aligned}
 x &= \text{number of students} \\
 950 &= \text{number of students}
 \end{aligned}$$

$$\begin{aligned}
 2000 - x &= \text{number of adults} \\
 2000 - 950 &= 1050 = \text{number of adults} \\
 5050 &= 2x + 3(2000 - x) \\
 5050 &= 2x + 6000 - 3x \\
 5050 - 6000 &= -x \\
 -950 &= -x \\
 950 &= x
 \end{aligned}$$

Tell whether each equation is true, false, or open. Explain.

$$\begin{aligned}
 41. \quad & 10x + 4 = 6 \\
 & \text{variable } x \\
 & \text{OPEN}
 \end{aligned}$$

$$\begin{aligned}
 42. \quad & 15 - 9 = 28 - 22 \\
 & 6 = 6 \\
 & \text{TRUE}
 \end{aligned}$$

$$\begin{aligned}
 43. \quad & -10 + 3 = -6 + 14 \\
 & -7 \neq 8 \\
 & \text{FALSE}
 \end{aligned}$$

Use a table to find two consecutive integers between which the solution lies.

$$44. \quad 4x - 15 = 20$$

$x$	$= 4x - 15$
8	$= 4(8) - 15$ $= 32 - 15$ $= 17$
9	$= 4(9) - 15$ $= 36 - 15$ $= 21$
10	$= 4(10) - 15$ $= 40 - 15$ $= 25$
$8 < x < 9$	

$$45. \quad 3x - 26 = 8$$

$x$	$= 3x - 26$
11	$= 3(11) - 26$ $= 33 - 26$ $= 7$
12	$= 3(12) - 26$ $= 36 - 26$ $= 10$
13	$= 3(13) - 26$ $= 39 - 26$ $= 13$
$11 < x < 12$	

$$46. \quad 8x + 7 = 86$$

$x$	$= 8x + 7$
9	$= 8(9) + 7$ $= 72 + 7$ $= 79$
10	$= 8(10) + 7$ $= 80 + 7$ $= 87$
11	$= 8(11) + 7$ $= 88 + 7$ $= 95$
$9 < x < 10$	

Tell whether the given equation has the ordered pair as a solution.

$$\begin{aligned}
 47. \quad & y = x + 11 \quad (3, -3) \\
 & -3 = 3 + 6 \\
 & -3 \neq 9
 \end{aligned}$$

$$\begin{aligned}
 48. \quad & x - 3 = 6y \quad (9, 1) \\
 & 9 - 3 = 6(1) \\
 & 6 = 6
 \end{aligned}$$

$$\begin{aligned}
 49. \quad & x - 3y = -2 \quad (5, 2) \\
 & 5 - 3(2) = -2 \\
 & 5 - 6 = -2 \\
 & -1 \neq -2
 \end{aligned}$$

# Unit 1 - Foundations of Algebra Review Guide

Use a table, an equation, and a graph to represent the relationship.

50. Anna is 5 years younger than her sister Elsa.

$$E = A + 5$$

Where:  $E$  = Elsa's age  
 $A$  = Anna's age

$t$ (hour)	$p$ (pcs)
0	5
1	6
2	7
3	8
4	9

