Write an algebraic expression for each verbal expression.

1. The ratio between $d$ and $t$

2. Twelve more than three times square of a number

Find each value.

3. $5^3$

4. $11^2$

Write a verbal expression for each algebraic expression.

5. $4x^2 - 3$

6. $2x - 5$

Evaluate the expression for the given value of the variable.

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

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

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

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

Graph each set of numbers.

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

12. $\left\{-\frac{3}{2}, -\frac{1}{2}, 0, \frac{1}{2}, 3\right\}$
Evaluate 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. $\frac{x}{7}[y + (7 - z)]$
18. $x \cdot \frac{2}{y} + z(2y + 4 - 5)$

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. $(-90) ÷ \left(-\frac{5}{6}\right)$
34. $\frac{-35}{70}$
35. $(75) ÷ \left(-\frac{3}{5}\right)$
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. \[ y = x + 11 \quad (3, -3) \]
48. \[ x - 3 = 6y \quad (9, 1) \]
49. \[ x - 3y = -2 \quad (5, 2) \]
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.

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

**Find each value.**

3. \(5^3 = 5 \cdot 5 \cdot 5 = 125\)
4. \(11^2 = 11 \cdot 11 = 121\)

**Write a verbal expression for each algebraic expression.**

5. \(4x^2 - 3\) = four times \(x\) squared minus three
6. \(2x - 5\) = two times \(x\) minus five

**Evaluate the expression for the given value of the variable.**

7. \(\frac{2^3 + 10 - 16}{x}\) when \(x = 2\)
   \[
   \frac{8 + 10 - 16}{2} = \frac{4}{2} = 2
   \]
   \(= -2\)

8. \(12 \div x - x^5\) when \(x = 2\)
   \[
   = 12 \div 2 - 2^5
   = 6 - 32
   = -26
   \]

9. \(\frac{x^5 + 4}{y(x^2 + 12)}\) when \(x = 2\) and \(y = 3\)
   \[
   = \frac{2^5 + 4}{2(2^2 + 12)}
   = \frac{32 + 4}{32 + 4}
   = \frac{36}{36}
   = 1
   \]

10. \(\frac{2(17 + 2x)}{y^2 - 11}\) when \(x = 4\) and \(y = 6\)
    \[
    = \frac{2(17 + 2(4))}{6^2 - 11}
    = \frac{2(17 + 8)}{36 - 11}
    = \frac{25}{25}
    = 3
    \]

**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 Guide

Evaluate each expression if \( z = -67 \).

13. \( 84 - |65 + z| \)
   \[ = 84 - |65 - 67| \]
   \[ = 84 - |-2| \]
   \[ = 82 \]

14. \( 47 - |z - 26| \)
   \[ = 47 - |-67 - 26| \]
   \[ = 47 - |-93| \]
   \[ = 47 - 93 \]
   \[ = -46 \]

15. \( |z| + (z + 33) \)
   \[ = |-(67)| + (-67 + 33) \]
   \[ = 67 - 34 \]
   \[ = 33 \]

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

16. \( 5(y \cdot 3 - 7) + z \cdot \frac{1}{x} \)
   \[ = 5(3 \cdot 3 - 7) + 4 \cdot \frac{1}{2} \]
   Substitute
   \[ = 5(9 - 7) + 2 \]
   Divide
   \[ = 5(2) + 2 \]
   Multiply
   \[ = 10 + 2 \]
   Subtract
   \[ = 12 \]
   Add

17. \( \frac{x}{7} [y \div (7 - z)] \)
   \[ = \frac{2}{7} [3 \div (7 - 4)] \]
   Substitution
   \[ = \frac{2}{7} [3 \div 3] \]
   Subtract (Grouping)
   \[ = \frac{2}{7} (1) \]
   Division
   \[ = \frac{2}{7} \]
   Multiplicative identity

18. \( x \cdot \frac{2}{y} + z(2y \div 4 - 5) \)
   \[ = 2 \cdot \frac{2}{3} + 4 \cdot \left(3 \div 4 - 5\right) \]
   Substitution
   \[ = \frac{4}{3} + 4 \cdot \left(\frac{3}{2} - 5\right) \]
   Multiply
   \[ = \frac{4}{3} + 4 \left(-\frac{7}{2}\right) \]
   Divide
   \[ = \frac{4}{3} - 14 \]
   Subtract
   \[ = -\frac{38}{3} \]
   Subtract
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Use a number line to find the sum.

19. \(-3 + (-13)\)
   - Move 13 units to the left

20. \(-4 + 11\)
   - Move 11 units to the right

21. \(-1 + 8 + (-5)\)
   - Move 5 units to the left
   - Move 8 units to the right

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. \(-58 - (-24)\) = \(-34\)
27. \(79.3 - (-14.1)\) = \(93.4\)
28. \(4.31 - (-0.84)\) = \(5.15\)
29. \(-3 - (-12) + 8\) = \(17\)

Find the product.

30. \((4)(-5)\) = \(-20\)
31. \((-1)(-5)\left(\frac{6}{25}\right)\) = \(\frac{6}{5}\)
32. \((13)(-2)\left(-\frac{6}{7}\right)\) = \((21)(3)\)

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. \((75) \div \left(-\frac{3}{5}\right)\)
   = \(75 \cdot \left(-\frac{5}{3}\right)\) = \(25(-5)\)
   = \(-125\)
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Simplify the following expressions:

36. \(8 - 3(2x - 5)\)
   \[= 8 - 6x + 15\]
   \[= -6x + 23\]

37. \(5(x + 4) - 4\)
   \[= 15x + 20 - 4\]
   \[= 15x + 16\]

38. \(2(5x + 4) - 3\)
   \[= 10x + 8 - 3\]
   \[= 10x + 5\]

39. \(7(9) + 7(5)\)
   \[= 63 + 35\]
   \[= 98\]

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?

\[x = \text{number of students}\]
\[950 = \text{number of students}\]
\[2000 - x = \text{number of adults}\]
\[950 = \text{number of students}\]

\[2000 - 950 = 1050 = \text{number of adults}\]
\[5050 = 2x + 3(2000 - x)\]
\[5050 = 2x + 6000 - 3x\]
\[5050 - 6000 = -x\]
\[-950 = -x\]
\[950 = x\]

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

41. \(10x + 4 = 6\)
   \[\text{variable } x\]
   \[\text{OPEN}\]

42. \(15 - 9 = 28 - 22\)
   \[6 = 6\]
   \[\text{TRUE}\]

43. \(-10 + 3 = -6 + 14\)
   \[-7 \neq 8\]
   \[\text{FALSE}\]

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

44. \(4x - 15 = 20\)
   \[x = 4x - 15\]
   \[8 = 4(8) - 15\]
   \[= 32 - 15\]
   \[= 17\]
   \[9 = 4(9) - 15\]
   \[= 36 - 15\]
   \[= 21\]
   \[10 = 4(10) - 15\]
   \[= 40 - 15\]
   \[= 25\]

\[8 < x < 9\]

45. \(3x - 26 = 8\)
   \[x = 3x - 26\]
   \[11 = 3(11) - 26\]
   \[= 33 - 26\]
   \[= 7\]
   \[12 = 3(12) - 26\]
   \[= 36 - 26\]
   \[= 10\]
   \[13 = 3(13) - 26\]
   \[= 39 - 26\]
   \[= 13\]

\[11 < x < 12\]

46. \(8x + 7 = 86\)
   \[x = 8x + 7\]
   \[9 = 8(9) + 7\]
   \[= 72 + 7\]
   \[= 79\]
   \[10 = 8(10) + 7\]
   \[= 80 + 7\]
   \[= 87\]
   \[11 = 8(11) + 7\]
   \[= 88 + 7\]
   \[= 95\]

\[9 < x < 10\]

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

47. \(y = x + 11\)
   \[(3, -3)\]
   \[-3 = 3 + 6\]
   \[-3 \neq 9\]

48. \(x - 3 = 6y\)
   \[(9, 1)\]
   \[9 - 3 = 6(1)\]
   \[6 = 6\]

49. \(x - 3y = -2\)
   \[(5, 2)\]
   \[5 - 3(2) = -2\]
   \[5 - 6 = -2\]
   \[-1 \neq -2\]
50. Anna is 5 years younger than her sister Elsa.

Where: \( E = \) Elsa’s age  
\( A = \) Anna’s age

\[ E = A + 5 \]

<table>
<thead>
<tr>
<th>( t ) (hour)</th>
<th>( p ) (pcs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>5</td>
</tr>
<tr>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td>2</td>
<td>7</td>
</tr>
<tr>
<td>3</td>
<td>8</td>
</tr>
<tr>
<td>4</td>
<td>9</td>
</tr>
</tbody>
</table>

\( t \) (hour) | Elsa’s age | Anna’s age
---|-------------|-------------
0 | 5           | 0           |
1 | 6           | 1           |
2 | 7           | 2           |
3 | 8           | 3           |
4 | 9           | 4           |