Summer Math Packet (for Upcoming Algebra Students)

Please show all work and try to use a calculator as little as possible. You will be responsible for knowing the rules for working with fractions, signed numbers, order of operations, etc.

What is an algebraic expression for the word phrase?

1. the quotient of $j$ and 8
   \[ \frac{j}{8} \]

2. 3 times the sum of $b$ and $f$
   \[ 3(b + f) \]

Write a word phrase can you use to represent the algebraic expression?

3. $3m$
   The product of 3 and $m$

4. $5x + 2$
   The sum of 2 and the product of 5 and $x$

What is the simplified form of each expression?

5. \[ 5(14 - 2)^2 \div 2 \]
   \[ 360 \]

6. \[ 4(20 + 12) + (4 - 3) \]
   \[ 128 \]

7. Evaluate \[ \frac{u}{z} + xy^2 \], for $u = 20$, $x = 4$, $y = 7$, and $z = 10$.
   \[ 198 \]
8. Evaluate $(ab)^2$ for $a = 4$ and $b = 3$.

\[144\]

9. A square field has an area of $479 \text{ ft}^2$. What is the approximate length of a side of the field? Give your answer to the nearest foot.

22 feet

For numbers 10 – 12 list all the subsets (Irrational, Rational, Integer, Whole, Natural) in which the real number belongs.

10. 1.68

Rational

11. 22

Natural, Whole, Integer, Rational

12. $\sqrt{42}$

Irrational

13. What is the order of $\sqrt{5}, -0.1, -\frac{5}{3}, 0.7, \sqrt{2}$ from least to greatest?

$-\frac{5}{3}, -0.1, 0.7, \sqrt{2}, \sqrt{5}$

14. What is the order of $\sqrt{\frac{9}{2}}, 0.5, \frac{1}{6}, 1.6, \sqrt{4}$ from least to greatest?

$\frac{1}{6}, 0.5, 1.6, \sqrt{4}, \sqrt{\frac{9}{2}}$
What property is illustrated by each statement?

15. \(-2.1 \times 1 = -2.1\)  
   Identity Property of Multiplication

16. \(0 + x = x\)  
   Identity Property of Addition

17. \(8 + 8.3 = 8.3 + 8\)  
   Commutative Property of Addition

18. \(7 + (4 + 4) = (7 + 4) + 4\)  
   Associative Property of Addition

19. \(2\left(-\frac{3}{9}\right) = \left(-\frac{3}{9}\right)2\)  
   Commutative Property of Multiplication

Simplify each expression.

20. \(-10(9n)\)  
   \(-90n\)

21. \(9 (-2k)\)  
   \(-18k\)

22. \(-4(-3)(2x)\)  
   \(24x\)

What is each sum?

23. \(-7 + 5\)  
   \(-2\)

24. \(-6 + (-3)\)  
   \(-9\)

25. \(-6.1 + 1.7\)  
   \(-4.4\)

26. \(\frac{7}{3} + \left(-\frac{3}{8}\right)\)  
   \(\frac{47}{24}\)
What is each difference?

27. \( \frac{9}{4} - \frac{1}{7} \)  
28. \(-1.8 - 3.9\)

\[
\frac{59}{28}
\]

\(-5.7\)

What is each product?

29. \(8(-1)\)  
30. \(4.3(-2.9)\)

\(-8\)

\(-12.47\)

31. \(\frac{5}{10} \cdot \frac{10}{3}\)  
32. \((-6.8)^2\)

\(\frac{5}{3}\)

46.24

What is the simplified form of each expression?

33. \(-\sqrt{196}\)

\(-14\)

34. \(\pm \sqrt{\frac{100}{49}}\)

\(\pm \frac{10}{7}\)

What is the simplified form of each expression?

35. \(\frac{1}{3}(21m + 27)\)  
36. \((2 - 9c)(-8)\)

\(7m + 9\)

\(-16 + 72c\)
What is the simplified form of each expression?

37. \[1.7m^2 + 6.5n - 4n + 2.5m^2 - n\]  
   \[4.2m^2 + 1.5n\]

38. \[2.5m^2 + 7.8n - 3.2n + 5.3m^2 - 5.9n\]  
   \[7.8m^2 - 1.3n\]

What sum or difference is equivalent to the expression?

39. \[\frac{3x + 2}{8}\]
   a. \[\frac{3}{8}x + \frac{1}{4}\]  
   b. \[\frac{1}{4}x + \frac{3}{8}\]  
   c. \[\frac{5}{8}x\]  
   d. \[\frac{1}{4}\]

40. \[\frac{3x - 2}{9}\]
   a. \[\frac{1}{3}x - \frac{2}{9}\]  
   b. \[\frac{2}{9}x - \frac{1}{3}\]  
   c. \[\frac{1}{9}x\]  
   d. \[\frac{2}{9}\]

Is the equation true, false, or open? Explain.

41. \[9p + 8 = 10p + 7\]
   a. Open; there is a variable.  
   b. True; the expressions are the same for all values of the variables.  
   c. False; the expressions are never the same.

42. Is \(x = 1\) a solution of the equation \(2 - 8x = -6\)?
   yes

43. Which ordered pair is a solution of the equation \(y = 3x\)?
   a. \((-2, -9)\)  
   b. \((-8, -18)\)  
   c. \((-8, -3)\)  
   d. \((-10, -30)\)

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44. Bob and his best friend Bill have the same birthday, but Bob is 3 years older than Bill. Let the variable \( x \) represent Bob’s age and \( y \) represent Bill’s age. Write an equation models the relationship between Bill’s age and Bob’s age?

\[
x - 3 = y
\]

45. Mike and his best friend Dan have the same birthday, but Mike is 3 years older than Dan. Let the variable \( x \) represent Mike’s age and \( y \) represent Dan’s age. Which graph models the relationship between Dan’s age and Mike’s age?

a. [Graph image]

b. [Graph image]

c. [Graph image]

d. [Graph image]
46. The graph of \( y = x - 3 \) is shown below. Which ordered pair is NOT a solution of the equation \( y = x - 3 \)?

![Graph of \( y = x - 3 \)](image)

a. \((2, -1)\)  
b. \((-3, -6)\)  
c. \((3, 0)\)  
d. \((-4, -6)\)  

47. The formula \( F = \frac{9}{5}C + 32 \) changes a temperature reading from the Celsius scale \( C \) to the Fahrenheit scale \( F \). What is the temperature measured in degrees Fahrenheit when the Celsius temperature is \( 10^\circ C \)?

\[ F = 50^\circ \]

48. A plane descends by 4500 ft. in 5 minutes. What is the change in the plane’s elevation each minute?

\[ 900 \text{ ft./min.} \]
What is the solution of the equation?

49. \[16 = -d + 6\]
   \[d = -10\]

50. \[\frac{6}{7}x - 8 = 7\]
   \[x = \frac{35}{2}\]

51. \[16 = \frac{-5 + z}{4}\]
   \[z = 69\]

52. \[\frac{b + 6}{5} = 10\]
   \[b = 44\]

53. \[5d - d - 2d + 8 - 3d = 0\]
   \[d = 8\]

54. \[-6y + 14 + 4y = 32\]
   \[y = -9\]

55. \[3(y - 5) + 2 = 5\]
   \[y = 6\]

56. \[70 = -7(-2 - 2z)\]
   \[z = 4\]

57. \[\frac{4p}{6} + 27 = 39\]
   \[p = 18\]

58. \[2.4x + 2.6 = 17\]
   \[x = 6\]

59. \[6x - 3 = 5x - 5\]
   \[x = -2\]

60. \[-4x - 9 = -5 - 6x\]
   \[x = 2\]

61. \[5(10x - 10) = -5(-4x + 4)\]
   \[x = 1\]

62. \[-6p + 7 = 3(2p - 3) - 4(-10 + 4p)\]
   \[p = 6\]

63. \[2(h - 8) - h = h - 16\]
   \[\text{Infinitely Many; True}\]

64. \[2 + 3z = 5 + 3z\]
   \[\text{No Solution; False}\]

65. Nina wants to download games for her video game console. Older games cost 500 points and new releases cost 2000 points. Nina has 20,000 points to use. The equation \[500a + 2000b = 20,000\], where \(a\) is the number of older games and \(b\) is the number of new releases, models the situation. How many older games can she download if she downloads one new game? four new games?
   - 36 older games if one new game downloaded
   - 24 older games if 4 new games downloaded

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Complete 3 of the 4 Tasks

**Task 1: School Lunch**

<table>
<thead>
<tr>
<th>Answers</th>
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<tbody>
<tr>
<td>1. $3; P = 3x - 150$</td>
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<tr>
<td>2. 50; $-150$; The school breaks even when 50 lunches are sold; There is a loss of $150 when no lunches are sold.</td>
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<tr>
<td>3. $150$</td>
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<tr>
<td>4. $R = 3x$; <em>Sample answer:</em> Passes through the origin and has a slope of 3; The price per lunch is $3.</td>
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<td>5. <em>Sample answer:</em> It becomes steeper; To make a profit selling less lunches, the price per lunch (slope) must increase.</td>
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**Task 2: Part-Time Job**

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<tr>
<td>1. $20d + 15.5d + 17d + 22.5d = 75d$</td>
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<tr>
<td>2. $d + 0.04d$; $1.04d$</td>
</tr>
<tr>
<td>3. $75(1.04d) = 78d$</td>
</tr>
<tr>
<td>4. $78d - 75d = 3d$</td>
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<tr>
<td>5. $1147.50$; <em>Sample answer:</em> $75d + 78d = 153d$; $153(7.5) = 1147.5$</td>
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Task 3: Gas Stations

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<tbody>
<tr>
<td>1. Station A; $0.10 per gallon &gt; $0.05 cents per gallon</td>
</tr>
<tr>
<td>2. $0.60</td>
</tr>
<tr>
<td>3. $2.30</td>
</tr>
<tr>
<td>4. $3.42</td>
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Task 4: Gasoline Prices

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<tr>
<td>1. a. about $0.05 per year</td>
</tr>
<tr>
<td>b. about $0.20 per year</td>
</tr>
<tr>
<td>c. about $0.13 per year</td>
</tr>
<tr>
<td>2. 1998; $0.94; Student can make a table that shows the price per gallon for each year in the bar graph.</td>
</tr>
<tr>
<td>3. about 2.5 times greater</td>
</tr>
</tbody>
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The following websites may be utilized to further review the skills in this packet.

www.purplemath.com

www.khanacademy.com

www.youtube.com