Preparation work for students entering Foundations of Algebra

Use Separate Sheets to Show Your Work

1. Evaluate: \(10(4 + 3 \cdot 2) + (2 \cdot 6 - 7)\)

2. Evaluate: \(\frac{2}{5} (16 - 9)\)

3. Evaluate when \(a = 2, \ b = 0.5, \ c = 3, \ d = \frac{4}{3}\)
\((cd)^3 + ab\)

4. The expression \(x(x + 3)\) is the same as:
   a.) \(2x + 3\)  b.) \(x^2 + 3\)  c.) \(2x + 3x\)  d.) \(x^2 + 3x\)

5. Which of these is NOT the same as \(2(3x)\)
   a.) \((2)(x)(3)\)  b.) \((x)(3)(2)\)  c.) \((3)(x^2)\)  d.) \(3x(2)\)

The chart below shows the monthly budgets (in dollars) of 5 people for 6 categories of expenses. Use the chart to answer questions 6-9

<table>
<thead>
<tr>
<th>CATEGORY</th>
<th>JIM</th>
<th>JOAN</th>
<th>JACK</th>
<th>JULIE</th>
<th>KATHY</th>
</tr>
</thead>
<tbody>
<tr>
<td>RENT</td>
<td>250</td>
<td>375</td>
<td>300</td>
<td>185</td>
<td>205</td>
</tr>
<tr>
<td>AUTO</td>
<td>150</td>
<td>275</td>
<td>180</td>
<td>320</td>
<td>250</td>
</tr>
<tr>
<td>FOOD</td>
<td>95</td>
<td>130</td>
<td>100</td>
<td>150</td>
<td>110</td>
</tr>
<tr>
<td>CLOTHES</td>
<td>75</td>
<td>50</td>
<td>110</td>
<td>80</td>
<td>175</td>
</tr>
<tr>
<td>RECREATION</td>
<td>20</td>
<td>30</td>
<td>40</td>
<td>15</td>
<td>50</td>
</tr>
<tr>
<td>SAVINGS</td>
<td>50</td>
<td>150</td>
<td>75</td>
<td>90</td>
<td>115</td>
</tr>
<tr>
<td>TOTAL</td>
<td>640</td>
<td>1010</td>
<td>805</td>
<td>840</td>
<td>905</td>
</tr>
</tbody>
</table>

6. What percent of Jim’s total budget goes for rent?

7. What is the average (mean) clothing budget for the 5 people?

8. Kathy’s total budget is what percent higher than Jack’s total budget?

9. What is the median amount budgeted for rent in the budgets of the 5 people?

10. Simplify \(9a^2 + 7a + 4a^2 + 2a\)
    A) \(22a^5\)  B) \(13a^4 + 9a^2\)  C) \(22a^3\)  D) \(13a^2 + 9a\)
Replace each blank with <, >, or = to make each sentence true.

11. \(-14 \underline{\quad} -15\)

12. \(\frac{9}{20} \underline{\quad} \frac{7}{15}\)

13. Simplify: \(\frac{4}{2} \underline{\quad} \frac{5}{5}\)

14. Evaluate: \(7 \div \frac{-2}{5}\)

15. Group the following numbers into rational or irrational categories:
   \(\frac{1}{11}, \pi, 11, \sqrt{11}, 0.\overline{1}, 0.12345678\)

16. Evaluate. Round to the nearest hundredth and grid your answer.
   \(\sqrt{c + d}\) if \(c = 23\) and \(d = 56\)

17. What fraction is equivalent to \(0.3\overline{4}\)? Show or explain how you found your answer.

18. Mark an X on the number line that best represents the location of \(\sqrt{23}\).

19. \(6^7 \underline{\quad} 6^{16}\)

20. \(\frac{2^3}{2^{-2}} = \underline{\quad}\)

21. Solve the equation \(x^2 = 9\). Show or explain how you found your answer.
22. Mrs. Barlowski made butterscotch pudding using \( \frac{1}{4} \) of a cup of water, \( \frac{1}{3} \) a cup of whipping cream, \( \frac{1}{5} \) a cup of nuts, and \( 2\% \) cups of milk. How many cups of ingredients did Mrs. Barlowski use in total?

23. Two-thirds of a number is eight-fifths. What is the number?

24. Solve for \( x \): \( 3(x + 5) = 8x + 18 \)

25. Solve for \( t \): \( \frac{t - 7}{4} = 11 \)

26. Farmer Fenster has two identical square fields with a combined area of 32 square kilometers. He wants to put up a fence on one side of one of the fields. How long a fence does he need?

27. Solve: \( 9x - 18 = 6x - 8 + x \)

28. Solve: \( \frac{3}{7} = \frac{x - 2}{21} \)

29. Solve for \( y \): \( 5y - 3 = 3x + y \)

The formula for finding degrees Celsius from degrees Fahrenheit is \( C = \frac{5}{9}(F - 32) \). Use this information for questions 30 and 31.

30. Solve the equation for \( F \).

31. If the temperature is currently 25 \( ^\circ \) Celsius, how many degrees Fahrenheit is this?

32. A store has 49 cartons of yogurt, some plain, some with blueberry flavoring. There are six times as many cartons of plain yogurt as blueberry. How many cartons of plain yogurt are there?
33. Ben was working for $10.50 per hour but was given a 20% pay increase. What is his new hourly rate? Grid in your answer.

34. If you can travel 320 miles on 12 gallons of gas, how many gallons of gas would you need to travel 715 miles? Round your answer to the nearest whole gallon. Grid in your answer.

35. Bill earned a 6% sales commission on a $7,500 sales transaction. How much commission did Bill earn? Grid in your answer.

36. Find the $x$- and $y$-intercepts of the equation $3x - 6y = 24$. Be sure to list your answers as ordered pairs.

37. What is the slope and $y$-intercept in the equation: $y = \frac{3}{4}x - 4$
38. Find the slope and $y$-intercept of the equation: $8x - 4y = -64$

39. Write the slope-intercept form ($y = mx + b$) of the equation for the line below.

40. Find the equation of the line that passes through the pair of points. You may use any method you prefer. $(-3, 2), (-5, 6)$

41. A rental car agency charges $20 per day plus 11 cents per mile to rent a certain car. Another agency charges $24 per day plus 6 cents per mile to rent the same car.
   a. Write an equation for each car agency to represent the cost as a function of the number of miles driven for one day.
   b. Find the number of miles for which the costs are the same for one day. Round your answer to the nearest tenth of a mile.

42. Lizette and Courtney enter a partnership. Lizette puts in $5,000 and Courtney puts in $4,000. Their profit is $1,200 after the first year. They will split the profit proportional to their contributions. How much does each get?

43. A coat you for which you paid $75 had been marked down 40%. What was the original cost of the coat?

44. Lincoln High School has 623 students. The ratio of girls to boys is approximately 2 girls to 3 boys. How many girls are enrolled in Lincoln Middle School? How many boys?
45. Graph \( y = -2x + 3 \)  

46. Graph \( 8x + 4y = 16 \)  

47. Rachel started making homemade cards to send to friends and family and to sell at the local craft fair. The scatter plot shows how many cards Rachel made each hour she worked. Predict the total number of cards Rachel can make in hour 24 by drawing a line of best fit and finding its equation.
48. On an upcoming field trip to the math and science museum, a bus will cost $450 for the trip and the admission to the exhibit is $7.00 per person.

   a. Create an equation (function) that would determine the total cost for any number of students going on the trip (you may assume the bus will hold any number of students).

   b. If the budget for the trip is $925, how many students would be able to go?

   c. How much would each student pay to cover the entire cost of the trip if 58 students go on the trip?

49. A regulation Little League baseball field is a square with bases exactly 60 feet apart. Use the Pythagorean Theorem to determine the distance from home plate to 2nd base on a Little League field.

50. A bag contains 15 red marbles, 10 white marbles, 25 blue marbles and 10 green marbles.

   a. If Fred Baxter takes a marble at random from the bag, what is the probability that it is green?

   b. If Fred gets a red marble, and doesn’t return it to the bag, what is the probability that Sgt. O’Malley will pick a white marble?

51. Simplify: \((3x^2 + 7x - 4) + (2x^2 - 3x - 9)\).

52. Sue’s bank charges $2.25 a month plus $0.10 per check. How many checks did she write if her bank fees were $3.65 last month?

53. Ray has scores of 75, 82, 94, and 77 on his first four science tests. What must he score on the next test to have an average of at least 85?

54. Find the amount time between finishing this packet and the first day of school. Express your answer in days and hours. Show work.
Algebra I Summer Packet
Answer Key

1. \(10(4+6) \div (12-7)\)
   \(10(10) \div (5)\)
   \(100 \div 5 = \boxed{20}\)

2. \(\frac{2}{5} \div \frac{7}{1} = \frac{\frac{2}{5} \times \frac{1}{7}}{\frac{1}{7}} = \frac{\frac{2}{5}}{1} = \boxed{\frac{2}{5} \text{ or } 2\frac{2}{5} \text{ or } 0.4}\)

3. \((3 \cdot \frac{4}{3})^3 + (2)(0.5)\)
   \((4)^3 + 1 = 64 + 1 = \boxed{65}\)

4. \(x(x+3) = x^2 + 3x\)

5. \(\boxed{\text{C.}\} \quad 3x^2 \text{ is not the same as } 2(3x)}\)

6. \(\frac{250}{640} \approx 0.391 \approx \boxed{39.1\%}\)

7. \((75 + 50 + 110 + 80 + 175) \div 5 = \boxed{98}\)

8. \((905 - 805) \div 805 \approx 0.124 \approx \boxed{12.4\%}\)

9. 185, 205, 125, 300, 375
   \text{Median} = \boxed{125}\)

10. D. 13a^2 + 9a

11. -14 \(\geq\) -15

12. \(\frac{27}{60} \geq \frac{24}{60}\)

13. \(\frac{1}{4} \div \frac{1}{5} = \frac{1}{4} \cdot \frac{5}{1} = \boxed{\frac{5}{4}}\)
14. $7 \cdot \frac{-5}{2} = \frac{7}{1} \cdot \frac{-5}{2} = \boxed{-\frac{35}{2} = -17.5}$

15. $\text{Random} = \frac{1}{11}, 11, 0, 1, 0, 1, 2, 3, 4, 5, 6, 7, 8$

$\text{Expected} = 7 \cdot \sqrt{11}$

16. $\sqrt{23 + 5^2} = \sqrt{73} \approx 8.54$

17. $0.3\bar{4}$

$10 \cdot x = 3.4$

$100 \cdot x = 34.4$

$90 \cdot x = 31$

$x = \boxed{31/9}$

18. $\sqrt{22} \approx 4.7$

19. $(2^2) (6^5) = 6^3 = \boxed{216}$

20. $\frac{2^3}{2^{12}} = 2^{3-12} = 2^{-9} = \boxed{\frac{1}{512}}$

21. $x = \pm 3$

22. $\frac{1}{4} + \frac{3}{5} + \frac{2}{3} + 2 \frac{5}{8}$

$= \frac{6}{24} + \frac{18}{24} + \frac{16}{24} + 2 \frac{5}{8} = 3 \frac{11}{8} = \boxed{3 \frac{13}{8}}$

23. $\frac{2}{3} x = \frac{8}{5}$

$x = \frac{8}{5} \cdot \frac{3}{2} = \boxed{\frac{12}{5} = 2 \frac{2}{5}}$
24. \(3(x+5) = 5x + 18\)
\[3x + 15 = 5x + 18\]
\[-3 = 5x\]
\[-\frac{3}{5} = x\]

Check:
\[3\left(-\frac{3}{5} + 5\right) = 8\left(-\frac{3}{5}\right) + 18\]
\[13.2 = 13.2\] \(\checkmark\)

25. \(\frac{t - 2}{4} = 11\)
\[t - 2 = 44\]
\[t = 46\]

Check:
\[\frac{46 - 2}{4} = 11\]
\[11 = 11\] \(\checkmark\)

26. \(\frac{x}{x} - \frac{x^2}{x} = \frac{x}{x}\)
\[\text{Solve for } x\]
\[x = -4, \text{K.M.}\]

27. \(9x - 18 = 6x - 8 + x\)
\[9x - 18 = 7x - 8\]
\[2x = 10\]
\[x = 5\]

Check:
\[9(5) - 18 = 6(5) - 8 + 5\]
\[27 = 27\]

28. \(\frac{3}{7} = \frac{x - 2}{21}\)
\[
\frac{9}{21} = \frac{x - 2}{21}\]
\[9 = x - 2\]
\[x = 11\]

Check:
\[\frac{3}{7} = \frac{11 - 2}{21}\]
\[\frac{3}{7} = \frac{9}{21}\]
\[\frac{3}{7} = \frac{3}{7}\] \(\checkmark\)

29. \(5y - 3 = 3x + y\)
\[4y - 3 = 3x\]
\[4y = 3x + 3\]
\[y = \frac{3}{4}x + \frac{3}{4}\]
30. \( C = \frac{5}{9}(F - 32) \)
    \[
    \frac{5}{9}C = (F - 32)
    \]
    \[
    \frac{5}{9}C + 32 = F
    \]

31. \( \frac{9}{5} \times (25^\circ) + 32 = F \)
    \[
    45 + 32 = F
    \]
    \[
    187^\circ = F
    \]

32. \( 49 = p + 8 \)
    \[
    68 = 1p
    \]
    \[
    49 = 68 + 8 \quad 8 = 7
    \]
    \[
    \text{Plain } = 49 - 7 = \text{ #2 Plain Yogurt}
    \]

33. \( 10.5 \times (1.20) = \left[ \frac{32}{2}.60 \right] \)

34. \( \frac{320 \text{ miles}}{12 \text{ gallons}} = \frac{715 \text{ miles}}{18 \text{ gallons}} \)
    \[
    320 \times 2 = 85 \times 20
    \]
    \[
    \frac{2}{2} = 26.81
    \]
    \[
    \frac{2}{2} \approx 27 \text{ gallons of gas}
    \]

35. \( (7500)(0.06) = \$450 \)

36. \( \text{x-intercept is when } y = 0 \)
    \[
    3x + 6(0) = 24
    \]
    \[
    \frac{(8, 0)}{2 \text{-int.}}
    \]
    \[
    \text{y-intercept is when } x = 0
    \]
    \[
    3(0) - 6y = 24 \quad -6y = 24 \quad y = -4
    \]
    \[
    \frac{(0, -4)}{2 \text{-int.}}
    \]

37. \( \text{slope} = \frac{3}{4} \)
    \[
    y \text{-intercept: } (0, -4)
    \]

38. \( 8x - 4y = -64 \)
    \[
    8x + 64 = 4y
    \]
    \[
    2x + 16 = y
    \]
    \[
    \text{y-intercept } (0, 16) \quad \text{slope } = 2
    \]
39. \( y = mx + b \)  
   \( m = 2 \)  
   \( y = 2x + 5 \)

40. \( \text{slope} = \frac{6 - 2}{-5 - 3} = \frac{-4}{-8} = \frac{1}{2} \)
   \( y = -2x + b \)  
   \( 6 = -2(-5) + b \)  
   \( b = -4 \)
   \( y = -2x - 4 \)

41. a) \( T = 20 + 0.11m \)  
   \( T = \text{cost per day} \)
   \( T = 24 + 0.06m \)  
   \( m = \text{miles} \)

   b) \( 20 + 0.11m = 24 + 0.06m \)
   \( 0.05m = 4 \)
   \( m = 80 \text{ miles} \)

42. Lizette: \( \frac{5000}{9000}(1200) = 666.67 \)
   Courtley: \( \frac{7000}{9000}(1200) = 933.33 \)
   Total: \( 12,000,00 \)

43. \( \frac{75}{100} = \frac{60}{T} \)
   \( 60T = 7500 \)
   \( T = \frac{75}{7500} \)  
   \( T = 125 \text{ original cost} \)

44. \( \frac{2}{5} = \frac{G}{623} \)
   \( 5G = 1246 \)
   \( G = 249.2 \text{ or 249 girls} \)

45. Plot graph \( y = -2x + 3 \)
46. Plot graph \( 8x + 4y = 16 \)
47. Roughly 3 cards per hour. Answers will vary. 
   One example: \( 24 \times 3 \times 3 = 72 \text{ cards} \)
48. a) \( T = 150 + 7p \)  
\( T = \text{cost}, \ p = \text{persons} \)

b) 925 = 150 + 7p

475 = 7p

67.9 = p  

167 people can go (round down for people)

c) \( T = 150 + 7(58) \)

\[
\frac{T}{58} = \frac{856}{58} = 14.76 \text{ per person}
\]

49.

\[
\begin{align*}
\frac{60^2 + 60^2}{2} & = x^2 \\
300 + 300 & = x^2 \\
600 & = x^2 \\
x & \approx 84.9 \text{ feet}
\end{align*}
\]

50. a) \( p(x) = \frac{10}{6} \) or \( \frac{1}{6} \) or 0.17 or 17% 

b) \( \frac{10 \text{ weeks}}{59 \text{ meters}} = 0.17 \) or 17% 

51. \( 5x^2 + 4x - 13 \)

52. 3.65 = 2.25 + 0.10c

1.40 = 0.10c

\[ c = 14 \text{ checks} \]

53. \[ \frac{328 + k}{5} = 85 \]

\[ 328 + k = 425 \]

\[ k = 97 \]

54. Venus