

St. Mary's School
6th Grade Summer Math Expectations 2019

Happy Summer Middle School Parents!

Like summer reading, ongoing math practice increases as student's ability to retain concepts, enhance their performance, and prepare them for the next grade level. The Summer Math Packet also gives students a better idea of what concepts they are expected to understand coming into 7th grade. Students should show their work and date each page as they complete it.

**The first third of the packet (all pages before the purple sheet of paper) should be completed and dropped off at the school by June 19. The pages can be dropped off at school M-W 7:30-3:30 or mailed to me at the address below.*

**The second third of the packet (up to the blue sheet) should be completed and dropped or mailed by July 17th.*

**The rest of the packet will be collected on the third day of school, August 8th.*

*The completed packet will be counted as the first math **Quiz Grade** of the 2019-2020 school year. Failure to submit this packet on time, with detailed work, will result in a grade of a **zero**.

All students are expected to complete this packet individually and to the best of their ability. This is not a group assignment. Students may **NOT** use a calculator until after the packet is completed to check student answers. You should ensure that your child does not procrastinate, but rather plans the gradual completion of it during the summer. I have included Help Pages at the back of the packet. I strongly encourage the use of these detailed notes.

Please join me as we work together to ensure your child's mathematical success. Do not hesitate to email me if you have concerns about your child's progress regarding summer math.

In His peace,

Carrie Templeton
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116 Chaho Road
Knoxville, TN 37934

Name: _____ Class: _____ Date: _____ ID: A

Summer Math Skills for 6th Grade going into 7th Grade

Give the place and value of the underlined digit. Then round the number to that place.

1. 4561.23

2. 875.43

3. 87.344

4. 91.8756

Order the numbers from least to greatest.

5. 4.3, 3.4, 4.5, 3.45

6. 0.71, 0.75, 0.7, 0.715

Perform the indicated operation.

7. $4.2 + 1.9$

8. $18.24 + 22.09$

9. $8.6 - 3.45$

10. $8.21 - 5.19$

11. 9.3×0.6

12. 15.2×7.1

13. $1.5 \div 0.3$

14. $18.25 \div 7.3$

Name: _____

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Write the mixed number as an improper fraction.

15. $5\frac{3}{4}$

16. $6\frac{4}{13}$

Write the improper fraction as a mixed number.

17. $\frac{23}{6}$

18. $\frac{27}{11}$

Find the product.

19. $8 \times \frac{3}{4}$

20. $\frac{5}{6} \times 30$

21. $4 \times \frac{7}{9}$

22. $\frac{4}{7} \times 9$

Name: _____

ID: A

Find the volume of the cube.

31.

32.

Copy and complete the statement using $<$, $>$, or $=$.

33. 1.5 tons ? 3100 lb

34. 6.7 kg ? 6700 g

35. 16 fl oz ? 2 c

36. 31,150 mL ? 3 L

Find the measure of the angle. Then classify the angle as *acute*, *right*, *obtuse*, or *straight*.

37. $m\angle AGC$

38. $m\angle CGF$

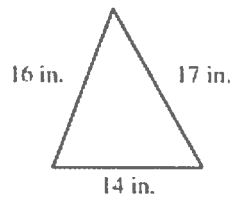
39. $m\angle DGF$

Name: _____

ID: A

40. $m\angle BGE$

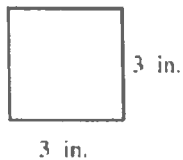
Find the perimeter. (The figure may not be drawn to scale.)



41.

- a. 119 in.
- b. 47 in.
- c. 116 in.
- d. 50 in.

42. What is the perimeter of the square?



43. The perimeter of a square is 32 feet. Find the area of the square.

- a. 64 ft^2
- b. 65 ft^2
- c. 9 ft^2
- d. 8 ft^2

Identify the property illustrated in the statement.

44. $5b(1) = 5b$

- a. Identity property of addition
- b. Identity property of multiplication
- c. Commutative property of multiplication
- d. Commutative property of addition

45. $-2(7x) = (-2 \cdot 7)x$

- a. Associative property of addition
- b. Commutative property of addition
- c. Associative property of multiplication
- d. Commutative property of multiplication

Name: _____

ID: A

Evaluate the expression when $x = 20$ and $y = -3$.

46. $3x + 2y + 2x$

- _____ 47. The recipe you are following calls for 3 quarts of water. You have 3 pints of water. Do you have enough water? If you have enough water, how much extra do you have? If you do not have enough, how much more do you need?
- a. Yes; 2 pt
 - b. Yes; 3 pt
 - c. No; 2 pt
 - d. No; 3 pt

48. The length of a college basketball court is 94 feet. Use a conversion factor to find the length in inches.

Perform the indicated operation.

_____ 49. $547.54 + (-18.2)$

- a. 565.74
- b. 54,572
- c. 529.34
- d. 365.54

_____ 50. $7.02 \div 0.009$

- a. 0.7
- b. 780
- c. 7.8
- d. 78

51. $-8(2.25)$

Solve the equation.

_____ 52. $\frac{d}{9} = 4.3$

- a. 38.7
- b. 39.8
- c. 37.6
- d. 30.6

53. $1.87 = x + 11.04$

54. $3.87 + f = 16.86$

Copy and complete the statement using $<$ or $>$.

55. $-2 \underline{?} -15$

Name: _____

ID: A

56. $25 \underline{?} - 52$

Tell whether the statement is *true* or *false*. Explain your reasoning.

57. $-54 < -56$

Order the integers from least to greatest.

58. $-265, 340, -180, 240, -325$

Complete the statement using $<$, $>$, or $=$.

____ 59. $|12| \underline{?} |-5|$

a. $<$

b. $>$

c. $=$

____ 60. Which of the following is a true statement?

a. $|-7| < |3|$

b. $|-7| > |3|$

c. $|-7| < |7|$

d. $0 > |-3|$

Find the absolute value of the number.

61. -10

62. An elevator started on the 6th floor. It went up 8 floors, down 7 floors, up 7 floors, and down 2 floors. On what floor did the elevator finally stop?

Find the difference.

63. $6 - (-8)$

64. $7 - (-18)$

65. $1 - (-14)$

66. $9 - (-6)$

67. $3 - (-12)$

Name: _____

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68. $-14 - (-14)$

Find the product.

69. $-3(-92)$

70. $-8(3)(6)$

Solve the equation using mental math.

71. $6b = -42$

72. At noon the temperature was 14°C . If the temperature then dropped 4°C per hour, what was the temperature after 6 hours?

Find the quotient.

73. $-252 \div (-3)$

74. $-32 \div (4)$

Find the mean of the integers.

75. $-12, 7, -6, -15, 1$

Use the distributive property to write an equivalent expression. Check your answer.

76. $13(2 + 2)$

Name: _____

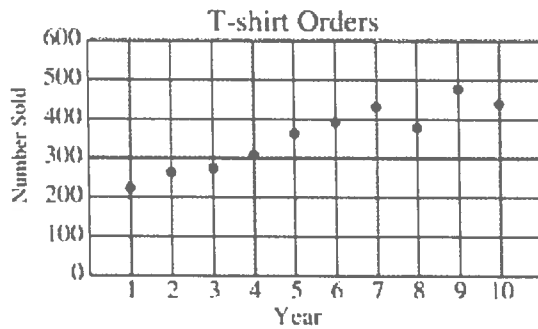
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Plot the point and describe its location.

77. $C(-6, 0)$

78. $D(-7, 3)$

- ____ 79. The scatter plot shows the number of T-shirts sold by a company during their first 10 years in business. Which conclusion is best supported by the graph?



- More T-shirts were sold in the sixth year than in the tenth year.
- The number of T-shirts sold doubled in the first 5 years.
- There was a steady decline in the number of T-shirts sold in the last 3 years.
- The company sold almost as many T-shirts in the fifth year as it did in the eighth year.

Name: _____

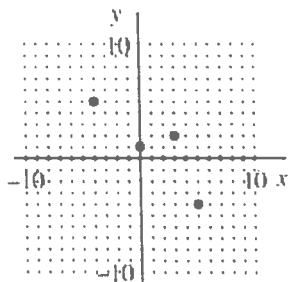
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80. Which of the following ordered pairs represents a point that lies within the circle?

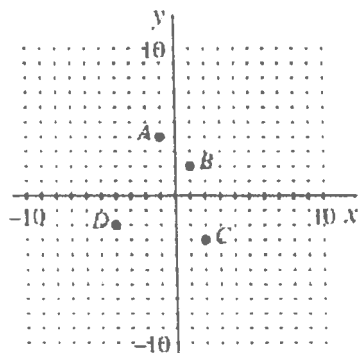
- a. $(2, 2)$
- b. $(2, -2)$
- c. $(-2, 3)$
- d. $(-2, -2)$

81. **GRIDDED RESPONSE** Grid the correct answer on a separate gridding sheet.

What is the x -coordinate of the point in quadrant 4?



82. Write the coordinates of the points A , B , C , and D .

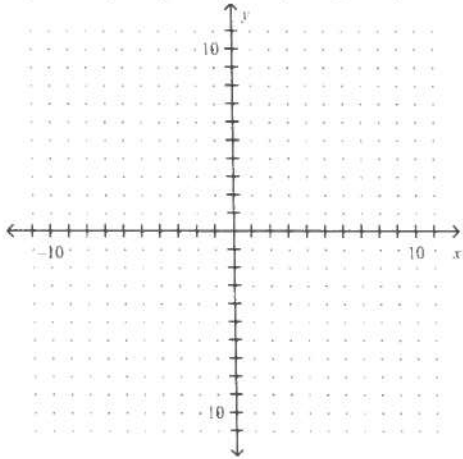


Name: _____

ID: A

Plot and connect the points to form a rectangle. Then find the length, width, and area of the rectangle.

83. $A(8, -3), B(8, 2), C(4, 2), D(4, -3)$



84. A company employee has recorded information on the size of the company over the last 8 years. The ordered pairs show the years in business and the number of employees. Make a scatter plot of the data. Then make a conclusion about the data.

$(1, 15), (2, 21), (3, 27), (4, 28), (5, 39), (6, 40), (7, 44), (8, 52)$

Name: _____

ID: A

85. The weights of ten Holstein calves of different ages are given in the table. Make a scatter plot of the data. Put age on the horizontal axis. Then describe any pattern that you see in the scatter plot.

| | | | | | | | | |
|-----------------|-----|-----|-----|-----|-----|-----|-----|-----|
| Age (months) | 2 | 2 | 3 | 4 | 5 | 6 | 7 | 7 |
| Weight (pounds) | 230 | 250 | 320 | 420 | 480 | 570 | 660 | 680 |

Evaluate the expression for the given value of the variable.

- _____ 86. $29 - x$ when $x = 9$
a. 19
b. 38
c. 20
d. 37
- _____ 87. $4a$ when $a = 2$
a. 16
b. 6
c. 8
d. 2
- _____ 88. $\frac{n}{4}$ when $n = 36$
a. 144
b. 36
c. 4
d. 9
89. $g - 1$ when $g = 18$
90. $\frac{10}{s}$ when $s = 2$

Name: _____

ID: A

Evaluate the expression when $w = 8$, $x = 15$, $y = 4$, and $z = 3$.

91. $\frac{x}{z}$

92. $w + y$

Write the product as a power.

93. $6 \cdot 6 \cdot 6 \cdot 6 \cdot 6 \cdot 6 \cdot 6$

Evaluate the power.

_____ 94. 1^4
a. 1 b. 8 c. 4 d. 2

95. 0^5

Copy and complete the statement using $<$, $>$, or $=$.

_____ 96. 3^6 ? 6^3
a. $>$ b. $=$ c. $<$

_____ 97. 100 ? 2^7
a. $>$ b. $<$ c. $=$

Evaluate the expression for the given value of the variable.

_____ 98. a^3 when $a = 4$
a. 16 b. 12 c. 32 d. 64

Write the power in words.

99. 8^4

100. What is 4 written as a power?

Name: _____

ID: A

Evaluate the expression when $x = 5$, $y = 30$, and $z = 6$.

_____ 101. $\frac{x^3 - y}{x}$
a. 19 b. 119 c. 3 d. 9

102. $4y - z^2$

Evaluate the expression.

_____ 103. $8(8 + 5) + 2$
a. 208 b. 120 c. 71 d. 106

_____ 104. $2(22 - 8 + 2)$
a. 24 b. 42 c. 44 d. 32

_____ 105. $\frac{46 - 11}{5}$
a. 5 b. 8 c. 6 d. 7

106. $27 \div 3 - 3$

107. $4 \div 2 \cdot 2 + 9 - 5$

108. $7(2 + 5) - 5$

109. $4^2 + 5(3 - 1)$

_____ 110. What is the value of the expression $(3 + 2)^3$?
a. 9 b. 35 c. 15 d. 125

_____ 111. Evaluate the expression $6 + (11 - 3)^2$.
a. 112 b. 8 c. 70 d. 118

_____ 112. Evaluate the expression $74 + 4^2 \div 2$.
a. 45 b. 53 c. 106 d. 82

Name: _____

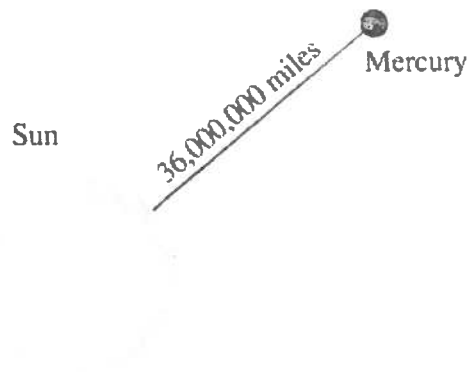
ID: A

Complete the statement using $<$, $>$, or $=$.

- ___ 113. 1.45×10^{15} ? 8.97×10^{14}
- a. $<$
 - b. $=$
 - c. $>$

- ___ 114. Which of the following shows the numbers in order from **least** to **greatest**?
- a. $7.6 \times 10^5, 7.6 \times 10^4, 6.7 \times 10^5$
 - b. $7.6 \times 10^4, 7.6 \times 10^5, 6.7 \times 10^5$
 - c. $6.7 \times 10^5, 7.6 \times 10^4, 7.6 \times 10^5$
 - d. $7.6 \times 10^4, 6.7 \times 10^5, 7.6 \times 10^5$

___ 115.



Which choice is equal to the distance from Mars to the Sun?

- a. 3.6×10^7 miles
 - b. 3.6×10^6 miles
 - c. 36×10^8 miles
 - d. thirty-six hundred thousand miles
- ___ 116. What is 380,000 written in scientific notation?
- a. 3.8×10^6
 - b. 3.8×10^5
 - c. 3.8×10^{-5}
 - d. 3.8×10^{-4}

Write the number in scientific notation.

117. 22,900

Name: _____

ID: A

118. 358.5

Write the number in standard form.

119. 4.8302×10^6

120. 4.61×10^4

Order the numbers from least to greatest.

121. 4.13×10^8 4.7×10^7 4.63×10^7 5.82×10^6

Choose the letter of the most reasonable measurement.

- _____ 122. What is the amount of milk in a full jug?
- a. 40 L
 - b. 296 mL
 - c. 1 L
 - d. 3750 mL

- _____ 123. The length of a pen is ?.
- a. 16 cm
 - b. 16 mm
 - c. 16 km
 - d. 16 m

Copy and complete using the appropriate metric measurement.

124. The mass of a cat is 7 ?.
125. The mass of a banana is 90 ?.
126. Would a refrigerator be about 2 centimeters tall?

Copy and complete the statement.

- _____ 127. $1461 \text{ mm} = \underline{?} \text{ cm}$
- a. 146.1
 - b. 146,100
 - c. 14.61
 - d. 14,610

Name: _____

ID: A

- ____ 128. $47.9 \text{ mm} = \underline{\quad ? \quad} \text{ cm}$
- a. 479
 - b. 4790
 - c. 0.479
 - d. 4.79

Copy and complete the statement.

- ____ 129. $4727 \text{ mg} = \underline{\quad ? \quad} \text{ g}$
- a. 0.473
 - b. 4.727
 - c. 47.27
 - d. 472.7

130. $7,620,000 \text{ mL} = \underline{\quad ? \quad} \text{ L}$

131. $1793 \text{ g} = \underline{\quad ? \quad} \text{ kg}$

132. $3.42 \text{ kg} = \underline{\quad ? \quad} \text{ mg}$

Complete the statement with $<$, $>$, or $=$.

- ____ 133. $46.5 \text{ cm} \underline{\quad ? \quad} 0.00465 \text{ m}$
- a. $<$
 - b. $>$
 - c. $=$

134. $5.1 \text{ km} \underline{\quad ? \quad} 5100 \text{ m}$

Order the measurements from least to greatest.

135. 360 mg, 3.5 g, 0.35 g, 0.35 kg, 3400 g
- ____ 136. A bag of pretzels weighs 37.5 grams. That amount is more than which of the following amounts?
- a. 3 kg
 - b. 38 g
 - c. 3750 mg
 - d. 39 kg

Name: _____

ID: A

- _____ 137. A statue stands 66.2 centimeters high. How many meters is this?
- a. 66.2
 - b. 6.62
 - c. 0.0662
 - d. 0.662

Find the sum. Write your answer using the smaller unit of measurement.

138. $6.19 \text{ km} + 2500 \text{ cm}$

139. What is the difference in height between a plant that is 13 cm tall and a seedling that measures 44 mm tall?

Find the value of x that makes the mean the given number.

140. $34, 45, 32, 38, 47, x$; mean = 37

141. Terry recorded the weights of the first ten fish he caught and released at Hag Lake this season. The weights were 20 pounds, 5 pounds, 14 pounds, 3 pounds, 21 pounds, 8 pounds, 16 pounds, 10 pounds, 17 pounds, and 21 pounds.
- a. Find the mean, median, and mode.
 - b. Terry wants to predict how big the next fish he catches will be. Which measure is most useful for describing the data?

- _____ 142. The stem-and-leaf plot below shows the number of calendars each student sold to raise money for the school band. How many students sold more than 7 calendars?

Number of Calendars Sold

| | | | | | | |
|---|--|---|---|---|---|---|
| 0 | | 4 | 7 | 8 | 9 | |
| 1 | | 0 | 2 | 6 | 7 | 9 |
| 2 | | 7 | 8 | | | |

Key: $1 | 0 = 10$

- a. 10
- b. 8
- c. 9
- d. 11

Make an ordered stem-and-leaf plot of the data.

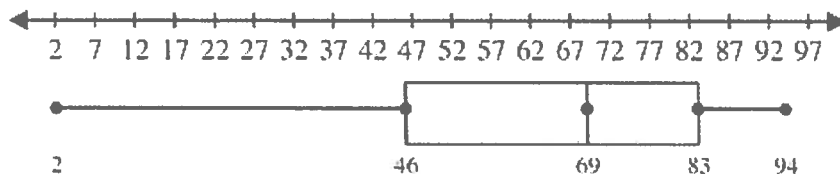
143. Ages of committee members: 28, 47, 20, 36, 54, 39, 43, 52, 35, 51, 39, 53, 35, 54, 51

144. Hours spent sleeping: 7.5, 7.8, 8.3, 6.7, 8.9, 7.6, 8.3, 6.4, 7.4, 9.2, 7.7, 7.8

Name: _____

ID: A

145. Ms. Alison drew a box-and-whisker plot to represent her students' scores on a mid-term test.



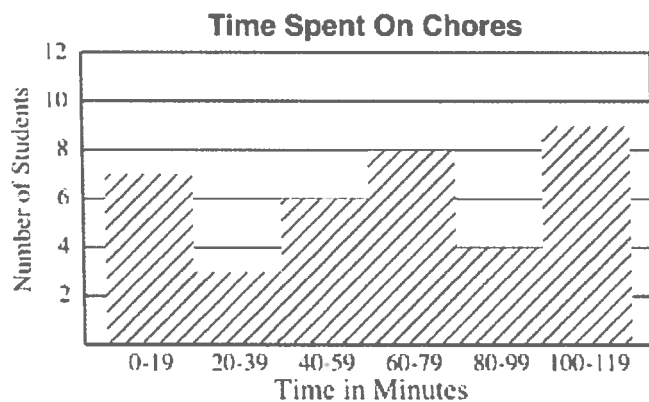
Jose earned 46 on the test. Describe how his score compares with those of his classmates.

- a. about 50% scored higher; about 50% scored lower
- b. about 75% scored higher; about 25% scored lower
- c. about 25% scored higher; about 75% scored lower
- d. about 75% scored higher; about 50% scored lower

Make a box-and-whisker plot of the data.

146. 41, 30, 28, 29, 27, 41, 34, 32, 27, 36, 32, 38, 39, 29, 29

147. The histogram shows the number of minutes students at Montrose Junior High typically spend on household chores each day. About how many students spend 20-39 minutes on chores?



- a. 9 students
- b. 4 students
- c. 3 students
- d. 8 students

Name: _____

ID: A

Copy and complete the frequency table using the data.

148. **Average minutes spent on daily homework:**
25, 35, 40, 15, 30, 85, 90, 100, 110, 15, 35, 64, 60

| Interval | Tally | Frequency |
|----------|-------|-----------|
| ? | ? | ? |
| ? | ? | ? |
| 61-90 | ? | ? |
| 91-120 | ? | ? |

149. **Heights of plants in inches:**
4, 13, 12, 3, 5, 8, 11, 6, 8, 4

| Interval | Tally | Frequency |
|----------|-------|-----------|
| 3-5 | ? | ? |
| ? | ? | ? |
| ? | ? | ? |
| 12-14 | ? | ? |

150. Use the data below. It shows the number of hits made by 30 leading hitters in a Middle School Softball League.
108, 60, 76, 74, 116, 88, 68, 74, 108, 76, 78, 93, 116, 108, 96, 68, 88, 108, 60, 74, 68, 88, 78, 76, 108, 116, 84, 106, 96, 93

- a. Make a frequency table and histogram of the data.
b. Make a conclusion from the data.

- ____ 151. Which of the following numbers is *not* composite?

- a. 9
b. 15
c. 21
d. 7

- ____ 152. Which of the following numbers is prime?

- a. 35
b. 15
c. 47
d. 25

Name: _____

ID: A

Write the prime factorization of the number.

____ 153. 170

- a. $2^2 \times 5^2$
- b. $2 \times 5 \times 17$
- c. $2^2 \times 17$
- d. $5^2 \times 17$

154. 108

155. 1872

____ 156. Write the prime factorization of 300.

- a. $2 \times 3 \times 5^2$
- b. $2^2 \times 3^2 \times 5^2$
- c. $2^2 \times 3 \times 5^2$
- d. $2^2 \times 3 \times 5$

157. List all the factors of 36.

158. Make a factor tree for 230.

Find the greatest common factor of the numbers by listing factors.

____ 159. 20, 24, 44

- a. 4
- b. 12
- c. 8
- d. 44

160. 30, 12

Find the greatest common factor of the numbers using prime factorization. Then tell whether the numbers are relatively prime.

____ 161. 30, 35

- a. 1; relatively prime
- b. 1; not relatively prime
- c. 5; relatively prime
- d. 5; not relatively prime

Name: _____

ID: A

162. 95, 57

- _____ 163. A teacher has 20 notebooks, 50 erasers, and 100 pencils. He wants to divide them so that each portion has an equal number of notebooks, an equal number of erasers, and an equal number of pencils. What is the maximum number of portions he can make?
- a. 2
 - b. 5
 - c. 20
 - d. 10

- _____ 164. Which three fractions in the group of four fractions below are equivalent?

$$\frac{16}{20}, \frac{32}{40}, \frac{18}{20}, \frac{4}{5}$$

a. $\frac{4}{5}, \frac{16}{20}, \frac{32}{40}$

c. $\frac{4}{5}, \frac{16}{20}, \frac{18}{20}$

b. $\frac{18}{20}, \frac{16}{20}, \frac{32}{40}$

d. $\frac{4}{5}, \frac{18}{20}, \frac{32}{40}$

Write the fractions in simplest form. Tell whether they are equivalent.

165. $\frac{48}{84}, \frac{140}{245}$

166. $\frac{126}{273}, \frac{48}{112}$

Find the LCM by listing multiples.

167. 18, 42

Find the LCM using prime factorization.

168. 6, 15, 20

169. 12, 30

Find the GCF and the LCM of the numbers using prime factorization.

170. 25, 135

171. 15, 40

Name: _____

ID: A

Write the mixed number as an improper fraction.

172. $8\frac{1}{13}$

Write the improper fraction as a mixed number.

____ 173. $\frac{27}{8}$

- a. $3\frac{3}{8}$
- b. $27\frac{1}{8}$
- c. $1\frac{8}{19}$
- d. $\frac{3}{8}$

174. $\frac{48}{7}$

Order the numbers from least to greatest.

175. $1\frac{1}{3}, \frac{13}{3}, \frac{79}{6}, 2\frac{3}{4}$

176. Jim measured his book as $7\frac{2}{5}$ inches long. Don measured it as $7\frac{7}{20}$ inches long. Which measurement is greater?

Write the fraction or mixed number as a decimal.

____ 177. $\frac{3}{8}$

- a. 0.375
- b. 2.66667
- c. 0.83
- d. 3.08

Name: _____

ID: A

____ 178. $3\frac{5}{12}$

- a. 3.45
- b. $3.\overline{416}$
- c. $3.4\overline{16}$
- d. $3.4\overline{1\overline{6}}$

Write the decimal as a fraction or mixed number.

____ 179. 3.45

- a. $3\frac{9}{20}$
- b. $3\frac{69}{200}$
- c. $3\frac{3}{5}$
- d. $3\frac{9}{10}$

____ 180. 2.4

- a. $2\frac{1}{25}$
- b. $2\frac{2}{5}$
- c. $\frac{2}{5}$
- d. $2\frac{4}{5}$

____ 181. 0.015

- a. $\frac{3}{2}$
- b. $\frac{15}{10,000}$
- c. $66\frac{2}{3}$
- d. $\frac{3}{200}$

182. 0.59

Name: _____

ID: A

Write the fraction or mixed number as a decimal. Then tell whether the decimal is a *terminating decimal* or *repeating decimal*.

183. $\frac{23}{33}$

184. $3\frac{3}{20}$

Find the sum or difference.

_____ 185. $8\frac{1}{7} - 3\frac{1}{9}$

a. $5\frac{2}{63}$

b. 7

c. $\frac{4}{191}$

d. $6\frac{2}{63}$

Evaluate the expression when $x = 4\frac{2}{3}$, $y = 5\frac{3}{5}$, and $z = 6\frac{3}{4}$.

_____ 186. $x + y - z$

a. $4\frac{29}{60}$

b. $3\frac{29}{60}$

c. $4\frac{31}{60}$

d. $3\frac{31}{60}$

187. $x + z$

188. Sandra had $6\frac{11}{12}$ yards of fabric. She used $2\frac{5}{12}$ yards to make a banner. How much fabric does she have left?

Find the product. Simplify if possible.

189. $\frac{2}{49} \times 7$

190. $9\frac{3}{7} \times 2\frac{1}{5}$

Find the quotient.

191. $2\frac{1}{2} \div 3$

Name: _____

ID: A

192. $6\frac{1}{3} \div 9\frac{1}{4}$

Evaluate the expression.

____ 193. $\left(2\frac{1}{4} \div 3\frac{3}{8}\right) \times 4\frac{1}{5}$

a. $\frac{3}{5}$

b. $2\frac{4}{5}$

c. $\frac{10}{63}$

d. $\frac{224}{405}$

194. $\left(4\frac{1}{3} - 2\frac{1}{4}\right) \div 5\frac{5}{8}$

Complete the statement.

____ 195. 38 cups = ? quarts ? cups

a. 19, 0

b. 4, 6

c. 7, 4

d. 9, 2

196. $5\frac{1}{3}$ yd = _____ ft

197. 28 oz = _____ lb _____ oz

Find the sum or difference.

198. 6 yd 2 ft

+ 7 yd 2 ft

____ 199. The Stuarts bought a new couch that measures 5 feet long. The Stuarts' end tables are each 19 inches wide. How much space (length) is needed for one couch and two end tables?

a. 9 ft 1 in.

b. 7 ft 2 in.

c. 6 ft 1 in.

d. 8 ft 2 in.

____ 200. One bag of Chock Full of Chips cookies weighs $6\frac{1}{4}$ ounces. How many pounds will a dozen bags weigh?

a. 7 lb 5 oz

b. 6 lb 3 oz

c. 4 lb 11 oz

d. 4 lb 12 oz

GRADE 6 & 7 HELP PAGES

ADDING DECIMALS

Adding with decimals is the same as adding with whole numbers except that it is necessary to use the decimal point to line up the numbers, and a decimal point must appear in the answer.

Example: $3.13 + 3.87$

1st
Step

$$\begin{array}{r} 3.13 \\ + 3.87 \\ \hline \end{array}$$

Line up decimal points.

2nd
Step

$$\begin{array}{r} 1 \\ 3.13 \\ + 3.87 \\ \hline .0 \end{array}$$

Add the hundredths. Trade if needed.

3rd
Step

$$\begin{array}{r} 1\ 1 \\ 3.13 \\ + 3.87 \\ \hline .00 \end{array}$$

Add the tenths. Trade if needed.

4th
Step

$$\begin{array}{r} 1\ 1 \\ 3.13 \\ + 3.87 \\ \hline 7.00 \end{array}$$

Add the whole numbers.

SUBTRACTION WITH REGROUPING (Borrowing)

Before subtracting, decide if a trade is necessary. You need to trade if there aren't enough ones, tens, hundreds, etc.

Example: $315,422 - 6,567$

1st
Step

$$\begin{array}{r} 315,422 \\ - 6,567 \\ \hline \end{array}$$

Put in vertical form. Line up the digits according to place value (see "periods" on previous page)

2nd Step
3rd Step
4th Step
5th Step
6th Step
7th Step

Since $7 > 2$, make a trade. Subtract the ones.
 $6 > 1$, make a trade. Subtract the tens.
 $5 > 3$, make a trade. Subtract the hundreds.
 $6 > 4$, make a trade. Subtract the thousands.
 No trade needed. Subtract the ten thousands. 0 holds the place.
 Subtract the hundred thousands. 0 holds the place.

The problem should look like this:

$$\begin{array}{r} 14\ 13\ 11 \\ 0\ \cancel{4}\ \cancel{2}\ \cancel{2} \\ 3\ \cancel{5},\ \cancel{4}\ \cancel{2} \\ - 6,567 \\ \hline 308,855 \end{array}$$

The difference is 308,855

MULTIPLICATION OF FOUR-DIGITS BY TWO-DIGITS

Students should know multiplication facts and be able to multiply by one and two-digit multipliers. When multiplying larger numbers, the procedure is the same. Multiply by ones; multiply by tens; then add the partial products.

Example:

| | | |
|--------|---|------------------|
| 1,232 | ← | multiplicand |
| x 32 | ← | multiplier |
| 12,464 | ← | partial products |
| 36,960 | ← | |
| 39,424 | ← | product |

MULTIPLICATION OF LARGER NUMBERS WITH A THREE-DIGIT MULTIPLIER

Example:

| |
|-------|
| 2,366 |
| x 148 |

| | |
|-------|--------|
| 2 5 4 | 2,366 |
| x 148 | 18,928 |

Multiply the ones:
 $8 \times 6 = 48$, trade the 4
 $8 \times 6 = 48$ plus 4 = 52, trade the 5
 $8 \times 3 = 24$ plus 5 = 29, trade the 2
 $8 \times 2 = 16$ plus 2 = 18, trade the 1

| | |
|---------|---------|
| 1 2 2 | 2,366 |
| 2 5 4 | x 148 |
| 2,366 | 18,928 |
| x 148 | 94 640 |
| 18,928 | 236 600 |
| 94 640 | 350,168 |
| 236 600 | |
| 350,168 | |

Multiply the tens:
 0 is the place holder
 $4 \times 6 = 24$, trade the 2
 $4 \times 6 = 24$ plus 2 = 26, trade the 2
 $4 \times 3 = 12 + 2 = 14$, trade the 1
 $4 \times 2 = 8 + 1 = 9$

Multiply the hundreds:
 zeros hold the places
 $1 \times 6 = 6$
 $1 \times 6 = 6$
 $1 \times 3 = 3$
 $1 \times 2 = 2$

Now add the partial products.

The product is 350,168

GRADE 6 & 7 HELP PAGES

3rd Step

$$\begin{array}{r} 2 \\ 75 \overline{)2083} \\ \underline{-150} \\ 58 \end{array}$$

Subtract and compare the remainder and the divisor. If the remainder is greater than the divisor, the quotient tried is too small; try a larger quotient.

4th Step

$$\begin{array}{r} 27 \\ 75 \overline{)2083} \\ \underline{-150} \\ 583 \end{array}$$

Pull down the next digit from the dividend (3) and repeat the estimation and subtraction process. (How many times can 80 go into 583?) The answer is 7 times.

5th Step

$$\begin{array}{r} 27 \\ 75 \overline{)2083} \\ \underline{-150} \\ 583 \\ \underline{525} \\ 58 \end{array}$$

Multiply the divisor (7 x 75), subtract the product from the dividend, and compare.

6th Step

75 is larger than 58, so the number left over is called the *remainder*. The *remainder* should be written as a fraction or decimal.

Example: As a fraction

$$\begin{array}{r} 27 \\ 75 \overline{)2083} \\ \underline{-150} \\ 583 \\ \underline{525} \\ 58 \end{array} \quad \frac{58}{75} \longrightarrow 27 \frac{58}{75}$$

Use the divisor as the denominator. Always reduce to lowest terms.

Example: As a decimal

$$\begin{array}{r} 27.773 \\ 75 \overline{)2083.000} \\ \underline{-150} \\ 583 \\ \underline{525} \\ 580 \\ \underline{525} \\ 550 \\ \underline{525} \\ 250 \\ \underline{225} \end{array} \longrightarrow 27.77$$

Divide to the thousandths place. Round that number to the hundredths place.

The quotient is $27\frac{58}{75}$ or 27.77

GRADE 6 & 7 HELP PAGES

| | | | |
|-------------|--|---|--|
| 2nd Step | $\begin{array}{r} 0.\underline{3}22 \\ 0.\underline{2}24 \\ 0.\underline{3}14 \end{array}$ | $0.3 > 0.2$, so 0.224 is the least. | Begin at the left. Find the first place where the digits are different. Compare. |
| 3rd Step | $\begin{array}{r} 0.3\underline{2}2 \\ 0.31\underline{4} \end{array}$ | $0.0\underline{2} > 0.0\underline{1}$, so $0.3\underline{2}2 > 0.3\underline{1}4$ | Compare the remaining digits. |
| 4th Step | Order from least to greatest: $0.224 \longrightarrow 0.314 \longrightarrow 0.322$ | | |

FRACTIONS

To work with fractions, you must be familiar with the terminology.

FACTORS – Factors are two numbers that when multiplied together form a product.

Example:

$$\begin{array}{ccccccc} 3 & \times & 2 & = & 6 & & \\ \uparrow & & \uparrow & & \uparrow & & \\ \text{Factor} & & \text{Factor} & & \text{Product} & & \end{array}$$

Every number except 1 has at least two factors: 1 and itself.

Example: 3 has only two factors: 3 and 1
 6 has only four factors: 6, 1, 2 and 3

The *common factors* of two numbers are factors that they share.

Example:

| | |
|---|--|
| Common Factors of 6 and 18 (1, 2, 3 and 6) | $\textcircled{1} \times \textcircled{6} = 6$ |
| | $\textcircled{2} \times \textcircled{3} = 6$ |
| | $\textcircled{1} \times \textcircled{18} = 18$ |
| | $\textcircled{2} \times \textcircled{9} = 18$ |
| | $\textcircled{3} \times \textcircled{6} = 18$ |

The *greatest common factor* of two numbers is the common factor with the highest value.

Example: Find the *greatest common factor* of 12 and 36.

Factors of 12: 1, 2, 3, 4, 6, $\textcircled{12}$

Factors of 36: 1, 2, 3, 4, 6, 9, $\textcircled{12}$, 18, 36

12 is the greatest common factor

LEAST COMMON DENOMINATOR (LCD)

When fractions have the same denominator it is called a *common denominator*.

To add, subtract or compare fractions, you must first find their *least common denominator*. This is the same as finding the *least common multiple* of the denominators.

Example: We already know that the *least common multiple* of 2 and 3 is 6 (see previous page). Therefore, the *LCD* of $\frac{1}{2}$ and $\frac{2}{3}$ is 6.

Now rewrite the fractions to make the denominators 6.

$$\begin{array}{l} \frac{1}{2} = \frac{?}{6} \quad \begin{array}{l} \uparrow \\ 6 \div 2 = \textcircled{3} \\ \uparrow \end{array} \quad \frac{3 \times 1}{3 \times 2} = \textcircled{\frac{3}{6}} \\ \frac{2}{3} = \frac{?}{6} \quad \begin{array}{l} \uparrow \\ 6 \div 3 = \textcircled{2} \\ \uparrow \end{array} \quad \frac{2 \times 2}{2 \times 3} = \textcircled{\frac{4}{6}} \end{array}$$

The fractions $\frac{3}{6}$ and $\frac{4}{6}$ can now be compared, added or subtracted.

IMPROPER FRACTIONS

When the numerator of a fraction is larger than or equal to the denominator, the fraction is called an *improper fraction*.

The value of an *improper fraction* is always greater than or equal to one.

Examples: $\frac{4}{3}$ $\frac{6}{5}$ $\frac{8}{8}$

Renaming

When solving problems involving fractions, the answer is never expressed as an improper fraction. Whether it be a sum, difference, product or quotient, the answer must be expressed as a whole or mixed number. This is called *renaming*.

Example: $\frac{4}{3} = 1\frac{1}{3}$ $\frac{6}{5} = 1\frac{1}{5}$ $\frac{8}{8} = 1$

GRADE 6 & 7 HELP PAGES

With Unlike Denominators

When comparing fractions that have *unlike denominators*, find the *least common denominator*. Then make equivalent fractions with the same denominator and compare.

Example: $\frac{2}{3}$ compared to $\frac{3}{4}$

1st Step Multiples of 3: 3, 6, 9, (12) Find the least common denominator.
Multiples of 4: 4, 8, (12)

The least common denominator is 12.

2nd Step

| | | |
|------------------------------|-------------------|---|
| $\frac{2}{3} = \frac{?}{12}$ | $12 \div 3 = (4)$ | $\frac{4 \times 2}{4 \times 3} = \left(\frac{8}{12}\right)$ |
| $\frac{3}{4} = \frac{?}{12}$ | $12 \div 4 = (3)$ | $\frac{3 \times 3}{3 \times 4} = \left(\frac{9}{12}\right)$ |

3rd Step $\frac{8}{12} < \frac{9}{12}$ so $\frac{2}{3} < \frac{3}{4}$ Now compare.

Comparing Mixed Numbers

To compare *mixed numbers*, first compare the whole numbers. If they are the same, compare the fractions.

Example: Compare $2\frac{2}{3}$ and $2\frac{3}{4}$

Now compare. $2\frac{2}{3} < 2\frac{3}{4}$ because $\frac{2}{3} < \frac{3}{4}$ (see above)

ADDING MIXED NUMBERS WITH LIKE DENOMINATORS

ADDITION:

Add the fraction; then add the whole numbers.

Example:

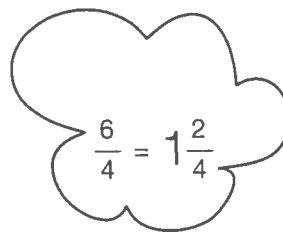
$$2 \frac{3}{4}$$

$$+ 2 \frac{3}{4}$$

$$4 \frac{6}{4}$$

Rename if needed

$$5 \frac{2}{4}$$



Write in lowest terms

$$5 \frac{2}{4} = \boxed{5 \frac{1}{2}}$$

ADDING MIXED NUMBERS WITH UNLIKE DENOMINATORS

Example:

$$2 \frac{1}{3} + 3 \frac{3}{4}$$

1st Step

$$2 \frac{1}{3} = 2 \frac{4}{12}$$

Write equivalent fractions with a common denominator.
(See page 13)

$$+ 3 \frac{3}{4} = 3 \frac{9}{12}$$

2nd Step

$$2 \frac{4}{12}$$

Add the fractions. Add the whole numbers.

$$+ 3 \frac{9}{12}$$

$$5 \frac{13}{12}$$

Rename if needed

$$5 \frac{13}{12} = 6 \frac{1}{12}$$

Therefore, there is a relationship among percents, decimals and fractions.

Example: $30\% = .30 = \frac{30}{100}$

$$17\% = .17 = \frac{17}{100}$$

To Change a Fraction to a Percent

Divide the numerator by the denominator.

Example: $\frac{2}{5} = 5/\overline{2.00}$

40%

Then change the decimal to a percent.

To Change a Percent to a Fraction

Express it as a fraction and reduce.

Example: 40%

$$40\% = \frac{40}{100} = \frac{4}{10} = \frac{2}{5}$$

To Compare Fractions, Decimals and Percents

Change them all to decimals.

Example: Put the following in order least to greatest; $\frac{1}{2}$, .25, 35%

1st Step $\frac{1}{2} = 2/\overline{1.00}$ Change fraction and percent to decimals.

$$35\% = .35$$

2nd Step Now compare; .50 .35 .25 Compare the decimals.

3rd Step Least to greatest; .25 < .35 < .50 Order.
so

4th Step .25 < 35% < $\frac{1}{2}$ Put in original form. Order.

Dividing a Mixed Number by Another Mixed Number

Example: $2\frac{1}{2} \div 2\frac{1}{4}$

1st Step $2\frac{1}{2} = \left(\frac{5}{2}\right)$ and $2\frac{1}{4} = \left(\frac{9}{4}\right)$ Change both mixed numbers to improper fractions.

2nd Step $\frac{5}{2} \div \frac{9}{4}$ ← divisor Rewrite the problem. Locate the divisor and invert.

$$\frac{9}{4} \text{ becomes } \frac{4}{9}$$

3rd Step $\frac{5}{2} \times \frac{4}{9} = \frac{20}{18}$ Multiply the numerators and denominators.

4th Step $\frac{20}{18} = 1\frac{2}{18} = 1\frac{1}{9}$ Rename and simplify (reduce).

More About Dividing Fractions:

You know the algorithm for dividing fractions. Let's look at why it works. Consider the problem $20 \div 5$. You are asking the question, how many groups of 5 are there in 20? $20 \div 5 = 4$. Answer, there are 4 groups.

Now, look at $1 \div \frac{1}{4}$. You are asking how many groups of $\frac{1}{4}$ are in 1.

$1 \div \frac{1}{4} = 1 \times 4 = 4$, but why? If this were a pie and each slice were $\frac{1}{4}$ of the pie, there would be 4 slices.

Suppose only $\frac{1}{2}$ of a pie is left. How many $\frac{1}{4}$ slices would there be?

$\frac{1}{2} \div \frac{1}{4} = \frac{1}{2} \times 4 = 2$. There are 2 slices.

2nd
Step

$$\frac{3}{2} \times \frac{7}{3} = \frac{21}{6}$$

Multiply numerators. Multiply denominators.

3rd
Step

$$\frac{21}{6} = 3 \frac{3}{6} = 3 \frac{1}{2}$$

Rename and simplify (reduce).

DIVIDING FRACTIONS

Dividing a Fraction by a Fraction

Example: $\frac{1}{2} \div \frac{1}{3}$

1st
Step

$$\frac{1}{2} \div \frac{1}{3} \quad \leftarrow \text{divisor}$$

Locate the *divisor*. In a number sentence, the divisor comes after the division sign.

2nd
Step

$$\frac{1}{3} \text{ inverted becomes } \frac{3}{1}$$

The divisor must be *inverted*. To *invert* simply means to turn the fraction upside down.

3rd
Step

$$\frac{1}{2} \times \frac{3}{1} = \frac{3}{2}$$

Multiply the two fractions.

4th
Step

$$\frac{3}{2} = 1 \frac{1}{2}$$

Rename.

The *quotient* is $1\frac{1}{2}$

SUBTRACTING MIXED NUMBERS WITH UNLIKE DENOMINATORS

Example: $16\frac{9}{10} - 4\frac{1}{2}$

1st Step $16\frac{9}{10} = 16\frac{9}{10}$

Write equivalent fractions with the same denominator.

$$- 4\frac{1}{2} = 4\frac{5}{10}$$

2nd Step
$$\begin{array}{r} 16\frac{9}{10} \\ - 4\frac{5}{10} \\ \hline 12\frac{4}{10} \end{array}$$

Subtract the fractions. Subtract the whole numbers.

3rd Step $12\frac{4}{10} = 12\frac{2}{5}$

Simplify (reduce).

MULTIPLYING FRACTIONS

- When multiplying two fractions: Multiply the numerators to find the product's numerator.
- Multiply the denominators to find the product's denominator.

Example:

$$\frac{1}{2} \times \frac{1}{3} = \frac{1 \times 1}{2 \times 3} = \frac{1}{6}$$

↙ multiply the numerators
↘ multiply the denominators

*It does not matter if the denominators are like or unlike.