Whole Numbers and Operations

Powers and Exponents

Complete the table below:

<table>
<thead>
<tr>
<th>EXPANDED FORM</th>
<th>EXPONENTIAL FORM</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. $7 \times 7 \times 7$</td>
<td>$7^3$</td>
</tr>
<tr>
<td>2. $12 \times 12 \times 12 \times 12 \times 12 \times 12 \times 12 \times 12$</td>
<td>$12^8$</td>
</tr>
<tr>
<td>3. $4 \times 4 \times 9 \times 9 \times 9 \times 9 \times 9$</td>
<td>$4^2 \times 9^5$</td>
</tr>
<tr>
<td>4. $25 \times 25 \times 25 \times 3 \times 3 \times 3 \times 3 \times 3$</td>
<td>$25^4 \times 3^6$</td>
</tr>
<tr>
<td>5. $1 \times 1 \times 1 \times 1 \times 1$</td>
<td>$1^5$</td>
</tr>
<tr>
<td>6. $16 \times 16 \times 16 \times 16 \times 16 \times 16 \times 16 \times 16$</td>
<td>$16^8$</td>
</tr>
<tr>
<td>7. $2 \times 2 \times 9 \times 9 \times 9 \times 9 \times 9 \times 9$</td>
<td>$2^3 \cdot 9^7$</td>
</tr>
<tr>
<td>8. $10 \times 10 \times 10 \times 10 \times 10 \times 28 \times 28$</td>
<td>$10^5 \cdot 28^2$</td>
</tr>
</tbody>
</table>

Find the value of each power:

9) $6^2 = 36$
10) $14^3 = 2744$
11) $8^4 = 4096$
12) $8^4 = 4096$
13) $2^3 \cdot 5^2 = 200$
14) $4^2 \cdot 3^3 = 3888$

Order of Operations

Simplify each expression: P E M D A S

15) $19 - 3 \times 4 = \frac{7}{19 - 12} = \frac{7}{7}$
16) $(24 + 16) \div 8 = \frac{5}{40 \div 8} = \frac{5}{5}$

17) $3^2 \cdot (37 - 8) = 261$
18) $25 + (6 + 1)^2 = 74$

19) $30 - 28 \div 4 \cdot 2 = 16$
20) $(14 - 5)^2 - 48 = 33$
21) \( \frac{4}{18} = \frac{7}{56} \)  
22) \( \frac{4}{3} = \frac{24}{16} \)  
23) \( \frac{2}{16} = \frac{24}{9} \)

**Prime Factorization**  
List all the factors of each number:

24) 8: 1, 2, 4, 8  
25) 20: 1, 2, 4, 5, 10, 20  
26) 54: 1, 2, 3, 6, 9, 18, 27  
27) 96: 1, 2, 3, 4, 6, 8, 12, 16, 24, 32, 48, 96

Write the prime factorization of each number:

28) 56  
29) 75  
30) 180  
31) 2,450

**Greatest Common Factor**  
Find the GCF of each set of numbers:

32) 60 and 36  
33) 15 and 45  
34) 30 and 84

**Least Common Multiple**  
Find the LCM of each set of numbers:

35) 2 and 9  
36) 16 and 24  
37) 12 and 40

**Integer Operations**  
**The Number Line**  
Graph each integer in the center of the number line. Label the rest of the number line to the left and right:

37) -15  
38) 1
Order each set of integers from least to greatest:

39) -17, 0, 2, 7, -14, -3
   -17, -14, -3, 0, 2, 7

40) 9, -11, -16, -4, 2, -17
   -17, -16, -11, -4, 2, 9

Adding and Subtracting Integers
Add the following integers:

41) -8 + (-6) = \boxed{14}
42) -3 + 18 = \boxed{15}
43) 11 + (-5) = \boxed{6}

44) 10 + (-14) = \boxed{-4}
45) 7 + (-7) = \boxed{0}
46) 11 + (-16) = \boxed{-5}

47) -2 + (-20) = \boxed{-22}
48) -6 + 8 = \boxed{2}
49) -14 + 15 = \boxed{1}

Subtract the following integers:

50) 7 - 9 = \boxed{-2}
51) 20 - (-8) = \boxed{28}
52) -11 - 11 = \boxed{-22}
   \(\text{or} \quad 20 + (-8)\)
   \(-11 + (-11)\)

53) -2 - (-15) = \boxed{13}
54) 4 - (-6) = \boxed{10}
55) -19 - (-13) = \boxed{-6}
   \(-2 + 15\)
   \(-4 + 6\)
   \(-19 + 13\)

56) 17 - 40 = \boxed{-23}
57) 16 - (-12) = \boxed{28}
58) -14 - 2 = \boxed{-16}
   \(17 + (-40) = \boxed{-23}\)
   \(16 + 12\)
   \(-14 + (-2)\)

Multiplying and Dividing Integers
Multiply the following integers:

59) -4 \times 7 = \boxed{-28}
60) -8 \div 5 = \boxed{40}
61) -1 \times (7) = \boxed{-7}

62) -13 \times 15 = \boxed{195}
63) -16(-3) = \boxed{48}
64) -14 \times 8 = \boxed{-112}

65) -12 \times 0 = \boxed{0}
66) -3 \div 2 = \boxed{0}
67) -9(-7) = \boxed{03}
Divide the following integers:

68) $-35 \div 7 = 5$  
69) $\frac{4}{2} = -3$  
70) $60 \div 5 = -12$

71) $\frac{2}{3} = -3$  
72) $\frac{7}{10} = -10$  
73) $\frac{3}{1} = 2$

74) $24 \div 8 = 3$  
75) $\frac{4}{9} = -3$  
76) $-14 \div 2 = 7$

Integer Applications:

77) Lizzie the elephant and her baby Mali live at the zoo. On a certain day, Lizzie ate 179 pounds of food and Mali ate 93 pounds of food. What was the change in zoo's elephant food supply that day?

$$-179 + (-93) = \boxed{-272 	ext{ pounds}}$$

78) Garrett answered the first question in a trivia game correctly and earned 320 points. He answered the second question incorrectly and lost 575 points. Find his score after two questions.

$$320 - 575 = 320 + (-575) = \boxed{-255 	ext{ pts}}$$

79) A movie-streaming service drafts $13 from Justin's bank account each month. Find the total changes to Justin's bank account in one year from this service.

$$-13(12) = \boxed{-156}$$

80) A football team lost 24 yards in 6 plays. Find the average number of yards lost each play.

$$-24 \div 6 = \boxed{-4 	ext{ yards}}$$

Order of Operations with integers
Simplify each expression:

81) $18 + 12 \div 4 = \boxed{21}$  
82) $-4 - 15 + 18 = \boxed{-1}$  
83) $-18 + 7 \cdot (-8) = \boxed{74}$

84) $-72 \div (-3) \cdot (-4) = \boxed{-96}$  
85) $(-6)^2 + (-3 - 1) = \boxed{-9}$  
86) $4(5 - 13) - (-3) = \boxed{-29}$

\[\sqrt{24 \cdot (-4)} = \boxed{-30 \div (-4)} = \boxed{3\sqrt{(-4)^2}} = \boxed{4(-8) \cdot (-3)} = \boxed{-32 - (-3)} = \boxed{-32 + 3} = 5\]
Rational Numbers
Adding and Subtracting Fractions

Add and subtract the following fractions:

86) \( \frac{5}{12} + 4 = \frac{5}{12} \)

87) \( \frac{1}{4} - \frac{3}{8} = \frac{1}{8} \)

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

89) \( \frac{7}{8} - \frac{1}{8} = \frac{3}{4} \)

90) \( \frac{2}{5} + \frac{2}{7} = \frac{1}{15} \)

91) \( \frac{4}{5} + \frac{3}{10} = \frac{3}{5} \)

92) \( \frac{7}{12} - \frac{1}{18} = \frac{6}{9} \)

93) \( \frac{4}{1} - \frac{8}{12} = \frac{13}{12} \)

94) \( \frac{4}{5} + \frac{3}{4} = \frac{2}{5} \)

95) Jordan made apple-cranberry juice by combining 1 \( \frac{2}{5} \) liters of apple juice with 1 \( \frac{2}{3} \) liters of cranberry juice. How many liters of apple cranberry juice does he have?

\[ \frac{2}{5} + \frac{2}{3} = \frac{12}{15} + \frac{10}{15} = \frac{22}{15} \]

96) Marissa is making a cake that calls for 2 \( \frac{3}{4} \) cups of sugar. If she has 1 \( \frac{4}{5} \) cups, how many more cups of sugar does she need?

\[ 2 \frac{3}{4} - \frac{1}{5} = \frac{11}{3} \]

Multiplying and Dividing Fractions

Multiply the following fractions:

97) \( \frac{3}{8} \times \frac{1}{2} = \frac{3}{16} \)

98) \( \frac{3}{4} \times \frac{5}{6} = \frac{15}{24} \)

99) \( \frac{2}{3} \times 4 = \frac{1}{2} \)

100) \( \frac{1}{4} \times 2 \frac{5}{8} = \frac{3}{2} \)

101) \( 2 \frac{3}{4} \times 1 \frac{1}{2} = \frac{4}{14} \)

102) \( 1 \frac{1}{2} \times 3 \frac{1}{8} = \frac{4}{5} \)

\[ \frac{4}{3} \times \frac{21}{8} = \frac{84}{24} = \frac{3}{12} = 3 \frac{3}{12} \]

\[ \frac{19}{8} \times \frac{12}{7} = \frac{228}{56} = \frac{4}{14} = 4 \frac{1}{14} \]

\[ \frac{5}{4} \times \frac{37}{10} = \frac{185}{40} = 4 \frac{1}{4} \]

\[ \frac{37}{8} = 4 \frac{5}{8} \]
103) Rachel has $2 \frac{3}{4}$ pounds of flour. If she uses $\frac{3}{4}$ of the bag for a recipe, how many pounds of flour are left in the bag?

\[ \frac{3}{4} \times 2 \frac{3}{4} = \frac{45}{16} \cdot \frac{2}{3} = \frac{90}{48} = \frac{45}{24} = \frac{21 \frac{3}{4}}{8} = \frac{7}{8} \text{ pounds} \]

104) The furthest Jack has run was 3 $\frac{7}{10}$ miles. If he runs 1 $\frac{1}{4}$ times further than his longest run, how far did he run?

\[ 3 \frac{7}{10} \times 1 \frac{1}{4} = \frac{52}{18} \cdot \frac{5}{4} = \frac{650}{72} = \frac{260}{28} = \frac{13}{3} = 4 \frac{1}{3} \text{ miles} \]

Divide the following fractions:

105) $\frac{1}{4} \div \frac{6}{5} = \frac{3}{10}$

106) $\frac{3}{4} \div \frac{1}{4} = \frac{14}{15}$

107) $\frac{2}{3} \div 1 \frac{4}{5} = \frac{2}{5}$

108) $1 \frac{1}{4} + 1 \frac{1}{8} = 1 \frac{9}{8}$

109) $\frac{3}{4} + \frac{1}{4} = \frac{5}{12}$

110) $1 \frac{1}{2} + 1 \frac{3}{4} = 1 \frac{7}{6}$

111) $3 \div 2 \frac{1}{4} = 1 \frac{4}{5}$

112) $3 \div 1 \frac{1}{4} = 4 \frac{4}{8}$

113) $2 \frac{1}{4} \div 6 \frac{4}{5} = \frac{7}{18}$

114) A container of juice contains 10 $\frac{3}{4}$ cups. If the serving size listed on the package is $\frac{1}{4}$ cup, how many servings are there?

\[ 10 \frac{3}{4} \div \frac{1}{4} = \frac{34}{8} \times \frac{4}{3} = \frac{348}{24} = \frac{116}{8} = \frac{29}{2} = 14 \frac{1}{2} \text{ servings} \]

115) How many bracelets can be made using 10 $\frac{1}{2}$ feet of string if each bracelet requires $\frac{3}{4}$ feet of string?

\[ 10 \frac{1}{2} \div \frac{3}{4} = \frac{26}{8} \div \frac{3}{4} = \frac{26}{24} = \frac{13}{12} = 1 \frac{1}{12} \text{ bracelets} \]

**Adding and Subtracting Decimals**

Add and subtract the following decimals:

116) $16.749 + 0.826 = 17.575$

117) $23.4 - 18.9 = 4.5$

118) $6.25 + 11.952 = 18.302$

119) $15 - 9.48 = 5.52$

\[ 16.749 + 0.826 = 17.575 \]

\[ 11.952 + 0.350 = 12.302 \]

\[ -18.9 - 9.48 = -5.52 \]
120) $7.6 - 2.83 = \boxed{4.77}$

121) $11.6 - 2.573 + 4.05 = \boxed{\frac{13.07}{9.027}}$

122) If helium has an atomic weight of 4.0026 and oxygen has an atomic weight of 15.999, find the difference in their atomic weights.

\[15.999 - 4.0026 = \boxed{11.9964}\]

123) In the 100-meter freestyle, a swimmer swam the first half in 31.4 seconds and the second half in 32.68 seconds. If his previous record was 64.015 seconds, did he beat his record?

\[31.40 + 32.68 = \boxed{64.08} > 64.015\]

**Multiplying and Dividing Decimals**

Multiply the following decimals:

124) $7.65 \times 2 = \boxed{15.30}$

\[
17.30 \\
\times\bar{2} \\
\underline{16.60} \]

125) $2.178(15) = \boxed{32.870}$

\[
\frac{2.178}{15} \\
+ 111.90 \\
\underline{217.00} \\
\underline{128.890} \\
\]

126) $0.6(0.3) = \boxed{0.18}$

\[
1.8 \\
\times 0.03 \\
\underline{0.18} \]

127) $1.02 \times 0.8 = \boxed{0.816}$

\[
1.02 \\
\times 0.8 \\
\underline{0.816} \]

128) $0.005(0.04) = \boxed{0.00020}$

\[
0.00020 \\
\times 0.085 \\
\underline{0.00000000920} \]

129) $13.84 \times 0.97 = \boxed{13.4248}$

\[
\frac{13.84}{0.97} \\
+ 124.560 \\
\underline{134.248} \]

130) A plant is growing at about 0.65 inches each day. Find the change in the height of the plant in 12 days.

\[0.65 \times 12 = \boxed{7.80\text{ inches}}\]

131) Greg's car gets approximately 13.9 miles to the gallon. If he is trading in his car for a new car that gets 1.25 times this, how many miles per gallon does the new car get?

\[
13.9 \times \frac{12.5}{2.945} \\
+ \frac{3.780}{189.00} \\
\underline{23.625} \]

\[\boxed{23.625\text{ miles per gallon}}\]
132) Alana bought 2.45 pounds of oranges. If the oranges cost $1.39 per pound, find the total cost.

\[ \text{Cost} = 3.4055 \approx 3.41 \]

Divide the following decimals:

133) \( 26.6 \div 7 = 3.8 \)

\[ \begin{array}{c}
\text{Quotient} \\
\text{Remainder}
\end{array} \]

134) \( 12.8 \div 8 = 1.65 \)

\[ \begin{array}{c}
\text{Quotient} \\
\text{Remainder}
\end{array} \]

135) \( 40.28 \div 4 = 12.32 \)

\[ \begin{array}{c}
\text{Quotient} \\
\text{Remainder}
\end{array} \]

136) \( 32.4 \div 4.5 = 7.2 \)

\[ \begin{array}{c}
\text{Quotient} \\
\text{Remainder}
\end{array} \]

137) \( 18.2 \div 1.75 = 10.4 \)

\[ \begin{array}{c}
\text{Quotient} \\
\text{Remainder}
\end{array} \]

138) \( 15 \div 5 = 3.5 \)

\[ \begin{array}{c}
\text{Quotient} \\
\text{Remainder}
\end{array} \]

139) Nine packs of crayons cost $21.51. Find the cost of each pack of crayons.

\[ \frac{21.51}{9} = 2.39 \text{ per pack} \]

140) Sound travels approximately 12.3 miles per minute. How many minutes will it take someone to hear thunder that strikes 85 miles away?

\[ \frac{85}{12.3} \approx 6.9105 \text{ minutes} \]
141) It cost $13.40 for 4.5 pounds of chicken. How much did it cost per pound? Round your answer to the nearest cent.

\[ \frac{13.40}{4.5} \approx 2.97 \]

\[ \text{\$2.98/lb} \]

**Converting Fractions and Decimals**

Write each decimal as a fraction or mixed number in simplest form:

142) 1.4

\[ 1 \frac{4}{10} = 1 \frac{2}{5} \]

143) 3.25

\[ 3 \frac{25}{100} = 3 \frac{1}{4} \]

144) 0.62

\[ \frac{62}{100} = \frac{31}{50} \]

145) 11.125

\[ 11 \frac{125}{1000} = 11 \frac{5}{40} = 11 \frac{1}{8} \]

Write each fraction or mixed number as a decimal:

146) \( \frac{3}{8} \)

\[ 0.375 \]

147) \( 3 \frac{7}{20} \)

\[ 3.35 \]

148) \( \frac{18}{4} \)

\[ 4.5 \]

149) \( 2 \frac{3}{4} \)

\[ 2.4 \]

**Negative Rational Numbers**

Compare the numbers by placing a <, >, or = symbol on the line

150) \( -\frac{2}{3} \quad \_ \quad -\frac{1}{2} \)

151) \(-7.17 \quad \underline{<} \quad -7.16 \)

152) \(-0.27 \quad \underline{>} \quad -\frac{9}{25} \)

**Expressions and Properties**

**Writing, Translating, and Evaluating Expressions**
Evaluate each expression using the variable replacement:

153) \(2x^3\), if \(x = 3\)
   \[a(3)^3 = a(27) = 54\]

154) \(3x + 7\), if \(x = 9\)
   \[3(9) + 7 = 27 + 7 = 34\]

155) \(s^2 - 18\), if \(s = 5\)
   \[(5)^2 - 18 = 25 - 18 = 7\]

156) \(\frac{c}{d} - 1\), if \(c = 21\) and \(d = 3\)
   \[\frac{21}{3} - 1 = 7 - 1 = 6\]

157) \(2(f + g^2)\), if \(f = 1\) and \(g = 6\)
   \[2(1 + 6^2) = 2(1 + 36) = 2(37) = 74\]

Translate each expression:

<table>
<thead>
<tr>
<th>Words</th>
<th>Expressions</th>
</tr>
</thead>
<tbody>
<tr>
<td>158) &quot;Twelve increased by a number&quot;</td>
<td>(12 + x)</td>
</tr>
<tr>
<td>159) &quot;The quotient of a number and negative seven&quot;</td>
<td>(x \div (-7))</td>
</tr>
<tr>
<td>160) &quot;A number decreased by four&quot;</td>
<td>(x - 4)</td>
</tr>
<tr>
<td>161) &quot;The product of a number and nine&quot;</td>
<td>(9x)</td>
</tr>
<tr>
<td>162) &quot;Three less than a number&quot;</td>
<td>(x - 3)</td>
</tr>
<tr>
<td>163) &quot;Four-fifths of a number&quot;</td>
<td>(\frac{4}{5}x)</td>
</tr>
</tbody>
</table>

For #164-165. Translate each real world description into an algebraic expression (a), then evaluate for the variable (b):

<table>
<thead>
<tr>
<th>Description</th>
<th>Expression</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jack weighs 13 more pounds than his brother Andy.</td>
<td>(a + 13) or (13 + a)</td>
<td></td>
</tr>
<tr>
<td>a) If (a) represents Andy's weight, write an expression to represent Jack's weight.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>b) Find Jack's weight if Andy weighs 78 pounds.</td>
<td>(78 + 13 = 91) pounds</td>
<td></td>
</tr>
<tr>
<td>Ebony is selling wreaths for a holiday fundraiser for $9 each.</td>
<td>(9w)</td>
<td></td>
</tr>
<tr>
<td>a) Write an expression to represent the total amount she will raise if she sells (w) wreaths.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>b) Find the total amount Ebony will raise if she sells 28 wreaths.</td>
<td>(9(28) = 72)</td>
<td></td>
</tr>
</tbody>
</table>

Combining Like Terms and Simplifying Expressions

For #166-169. Identify the variable terms, constant terms, and coefficients:
<table>
<thead>
<tr>
<th>Expression</th>
<th>Variable Terms</th>
<th>Coefficients</th>
<th>Constant Terms</th>
</tr>
</thead>
<tbody>
<tr>
<td>$4x + 9 - 7x$</td>
<td>$4x, -7x$</td>
<td>$4, -7$</td>
<td>$9$</td>
</tr>
<tr>
<td>$-7a - 1 + 16$</td>
<td>$-7a$</td>
<td>$-7$</td>
<td>$-1, 16$</td>
</tr>
<tr>
<td>$9 - 6k + 8k + 1$</td>
<td>$-6k, 8k$</td>
<td>$-6, 8$</td>
<td>$9, 1$</td>
</tr>
<tr>
<td>$r - 14 - 5 + 2r$</td>
<td>$r, 2r$</td>
<td>$1, 2$</td>
<td>$-14, -5$</td>
</tr>
</tbody>
</table>

Simplify each expression:

170) $\frac{9x + 4}{5x + 16}$

171) $\frac{-4r + 9r + 11}{5r + 11}$

172) $\frac{9 + 2k + 14 - 10k}{23 - 8k}$

173) $\frac{-7a - 1 + 16}{10}$

174) $\frac{-1 - 8 - 2w + 6w}{2}$

175) $\frac{10 - 2p - 3p + 2}{12 - 5p}$

176) $\frac{3y - 7 + 4y}{2y - 7}$

177) $\frac{1 + 8a - 7}{5 + 7}$

178) $\frac{9x + 7y - 3y + 2x}{11x + 4y}$

Distributive Property and Factoring Expressions

Simplify each expression using the distributive property:

179) $2(x + 5)$

180) $-10(k + 1)$

181) $9(w + 4v - 7)$

182) $5(x + 4) + 9$

183) $8a - 2a - 7$

184) $-4(w + 9) - w$

Factor each expression using the GCF:

185) $8x + 6$

186) $2x + 14$

187) $10m + 15$
188) \(6r + 27z = \frac{6r + 27s}{3} = \frac{3}{3}(2r + 9z) = 2r + 9z\)

189) \(9w - 45 = \frac{9w - 45}{9} = 9(w - 5)\)

190) \(32a - 24b = \frac{32a - 24b}{8} = \frac{8(4a - 3b)}{8}\)

**Equations**

**One-step equations**

Solve the following equations:

191) \(\frac{4x}{4} = \frac{28}{4}\)
\[
\begin{align*}
  x &= 7
\end{align*}
\]

192) \(\frac{25}{12} = k + 12\)
\[
\begin{align*}
  k &= -12
\end{align*}
\]

193) \(\frac{5}{5} = -2 \times 5\)
\[
\begin{align*}
  r &= -10
\end{align*}
\]

194) \(v - 14 = -5\)
\[
\begin{align*}
  v &= 9
\end{align*}
\]

195) \(-12 = \frac{7 + m}{7 - 3}\)
\[
\begin{align*}
  m &= -19
\end{align*}
\]

196) \(-8 = \frac{-8}{8}\)
\[
\begin{align*}
  p &= -2
\end{align*}
\]

197) \(-7 = \frac{-x}{6} x - \frac{16}{42} = w\)
\[
\begin{align*}
  x &= 96
\end{align*}
\]

198) \(\frac{7 + a}{-4} = 1\)
\[
\begin{align*}
  a &= -8
\end{align*}
\]

199) \(g - (-4) = 21\)
\[
\begin{align*}
  g &= 17
\end{align*}
\]

200) \(6m = 72\)
\[
\begin{align*}
  m &= 12
\end{align*}
\]

201) \(\frac{-4}{5} = 4 \times (-4)\)
\[
\begin{align*}
  c &= -16
\end{align*}
\]

Solve the following real-world one-step equations:

203) There were 16 golfers eliminated from a tournament after the first round. If there are 38 golfers remaining, write and solve an equation to find the initial number of golfers.

\[
\begin{align*}
  g - 16 &= 38 \\
  g &= 54
\end{align*}
\]

There were 54 golfers initially.

204) Manny got a puppy for his birthday. After one year, the puppy gained 28 pounds and now weighs 71 pounds. Write an equation to find how much the puppy weighed when Manny got him.

\[
\begin{align*}
  w &= \text{weight of puppy at start} \\
  w + 28 &= 71 \\
  w &= 43
\end{align*}
\]

The puppy weighed 43 pounds when Manny got it.

205) Jordan and Alex are playing a video game. Alex scored three times as many points than Jordan did. If Jordan scored 87 points, how many points did Alex score?

\[
\begin{align*}
  \frac{p}{3} &= 87 \times 3 \\
  p &= 261
\end{align*}
\]

Alex scored 261 points.
Proportional Relationships and Percents

Ratios

206) The ratio of the number of students to the number of chaperones on a field trip is 15:2. If there are 60 students, how many chaperones are there?

\[
\frac{S}{C} = \frac{15}{2} \times \frac{60}{C} \quad \frac{15S}{2} = \frac{60}{15} \quad \frac{C}{15} = \frac{8}{2} \quad C = 8 \text{ chaperones}
\]

207) Corina makes $27 for every 2 hours that she works. If she worked 36 hours this week, how much money did she make?

\[
\frac{\$27}{2 \text{ hours}} = \frac{x}{36} \quad 2x = 972 \quad x = \frac{972}{2} \quad x = \$486
\]

Find the missing values in the ratio tables:

208) 

<table>
<thead>
<tr>
<th>Hot Dogs</th>
<th>Hamburger</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>7</td>
</tr>
<tr>
<td>9</td>
<td>21</td>
</tr>
<tr>
<td>24</td>
<td>56</td>
</tr>
</tbody>
</table>

209) 

<table>
<thead>
<tr>
<th>Roses</th>
<th>Carnations</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>8</td>
<td>12</td>
</tr>
<tr>
<td>40</td>
<td>60</td>
</tr>
</tbody>
</table>

Rates

Write each rate as a unit rate:

210) 75 miles driven in 3 hours

\[
\frac{75}{3} \rightarrow \frac{25}{1} \rightarrow 25 \text{ mi/hr}
\]

211) 40 bicycles sold in 8 hours

\[
\text{40/8 = 5 bicycles/hr}
\]

212) 228 students on 6 buses

\[
\frac{228}{6} \rightarrow \frac{38}{1} \rightarrow 38 \text{ students/bus}
\]

213) 144 words typed in 3 minutes

\[
\frac{144}{3} \rightarrow \frac{48}{1} \rightarrow 48 \text{ words/min}
\]
214) $36 for 9 books

\[
\begin{array}{c}
9 \frac{36}{36} = \frac{4}{4} \text{ / book}
\end{array}
\]

215) $20 to mail an 8-pound package

\[
\begin{array}{c}
8 \frac{2.5}{20} = \frac{5}{10} \text{ / lb}
\end{array}
\]

216) 30 bottles of water for $8

\[
\begin{array}{c}
30 \frac{0.266}{0.069} = 0.27 \text{ / bottle}
\end{array}
\]

217) $3 for 20 ounces of dish soap

\[
\begin{array}{c}
20 \frac{0.5}{30} = 0.09 \text{ / oz}
\end{array}
\]

218) Car A traveled 208 miles in 4 hours. Car B traveled 245 miles in 5 hours. Which car traveled at a faster rate?

\[
\begin{array}{c}
\text{Car A} : \frac{58}{10} \text{ mi/hr} \\
\text{Car B} : \frac{49}{9} \text{ mi/hr}
\end{array}
\]

219) Max and JoJo are two Saint Bernard puppies. Max gained 28 pounds in 8 months. JoJo gained 21 pounds in 5 months. Which puppy is gaining weight at a faster rate?

\[
\begin{array}{c}
\text{Max} : \frac{3.5}{8} \text{ lbs/month} \\
\text{JoJo} : \frac{4.2}{5} \text{ lbs/month}
\end{array}
\]

Proportions
Determine whether the quantities in each table or graph represent a proportional relationship or not. If yes, give the constant of proportionality, k:

220) NO

<table>
<thead>
<tr>
<th>Bags of Skittles</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Red Skittles</td>
<td>9</td>
<td>18</td>
<td>23</td>
<td>32</td>
</tr>
</tbody>
</table>

221) yes, \( k = 13 \)

<table>
<thead>
<tr>
<th>Years</th>
<th>3</th>
<th>5</th>
<th>9</th>
<th>12</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tree Growth (in)</td>
<td>39</td>
<td>65</td>
<td>117</td>
<td>186</td>
</tr>
</tbody>
</table>

222) 223)
Complete the table then graph the relationship:

224) Each bag of sand weighs 5 pounds

<table>
<thead>
<tr>
<th>Bags of Sand</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weight (lbs)</td>
<td>5</td>
<td>10</td>
<td>15</td>
<td>20</td>
</tr>
</tbody>
</table>

Find each missing value:

225) A cyclist is riding his bike at 22 feet per second. How far will the cyclist travel in 15 seconds?

\[
\frac{22 \times x}{15} = x = 22 \times (15) \\
x = 330 \text{ ft}
\]

226) Dale earned $60 for washing 8 cars. At this rate, how much will he earn for washing 14 cars?

\[
\frac{b}{c} = \frac{60}{8} = \frac{x}{14} \\
\frac{8x = 840}{8} \\
x = \frac{105}{1} 
\]
227) Complete the chart below:

<table>
<thead>
<tr>
<th>Fraction</th>
<th>Decimal</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\frac{17}{20} \times \frac{6}{5}$</td>
<td>$\frac{86}{100}$</td>
<td>0.86</td>
</tr>
<tr>
<td>$\frac{53}{100}$</td>
<td></td>
<td>0.53</td>
</tr>
<tr>
<td>$\frac{1 \frac{25}{100}}{\frac{3}{4}}$</td>
<td>1.75</td>
<td>175%</td>
</tr>
<tr>
<td>$\frac{19}{40}$</td>
<td></td>
<td>0.475</td>
</tr>
<tr>
<td>$\frac{9}{10} = \frac{9}{9}$</td>
<td></td>
<td>1.60</td>
</tr>
<tr>
<td>$\frac{2}{25}$</td>
<td></td>
<td>0.08</td>
</tr>
<tr>
<td>$\frac{18}{100} = \frac{9}{50}$</td>
<td></td>
<td>0.18</td>
</tr>
<tr>
<td>$\frac{225}{1000} = \frac{9}{200}$</td>
<td></td>
<td>0.285</td>
</tr>
<tr>
<td>$\frac{14}{16}$</td>
<td></td>
<td>0.875</td>
</tr>
</tbody>
</table>

Find the percent of each number:

228) 40% of 35

$0.4 \times (35) = \boxed{14}$

229) 64% of 20

$0.64 \times (20) = \boxed{12.8}$

230) 85% of 42

$0.85 \times (42) = \boxed{35.7}$

231) In a recent survey of 140 students, 65% said they buy their lunch. Of the students surveyed, how many buy their lunch?

$0.65 \times (140) = \boxed{91 \text{ students}}$

232) Of the 180 days of school last year, Evan was absent 5% of them. How many days was he present?

$0.05 \times (180) = 9 \text{ days absent}$

$\frac{180 \times 9}{180} = \boxed{171 \text{ days present}}$