A Review of Some Rules

Courses for preservice elementary school teachers usually assume competence with whole number, fraction, and decimal arithmetic (addition, subtraction, multiplication, and division) and a previous exposure to elementary algebra. The courses themselves often focus on why the particular calculational procedures work rather than how to do them.

Experience shows that some students, however, are quite rusty with some of the rules (and there are a lot of them!). If you are such a student, these pages offer a quick review of a few topics, without any explanation of why the rules give correct answers, or even what addition, subtraction, multiplication, and division mean. You should not use a calculator for any calculation, to assure yourself that your basic facts and techniques with whole numbers are still in good working order. Here are the areas reviewed; sample from them as you need, or as your instructor suggests:

1. Fractions (including mixed numbers)
2. Decimals
3. Fraction, decimal, and percent conversions
4. Solving a proportion
5. Whole-number and negative exponents
6. Properties of operations
7. Order of operations
8. Signed number arithmetic

Final answers are given at the end.

F.1 Fractions (Including Mixed Numbers)

Equal (or Equivalent) Fractions

RULE: Multiply or divide the numerator and denominator by the same number (not zero) to get an equal fraction. (Terms: numerator, denominator)

EXAMPLES:
\[
\begin{align*}
\frac{2}{3} \cdot \frac{2}{3} &= \frac{14}{21} \\
\frac{60}{72} \div \frac{60}{2} &= \frac{30}{36} = \frac{30}{3} \div 3 = \frac{10}{12} = \frac{5}{6} \\
\frac{4\frac{1}{2}}{7} \times \frac{2}{2} &= \frac{9}{14} \\
\frac{17}{40} \div \frac{2\frac{1}{3}}{3} &= \frac{42\frac{1}{2}}{100}
\end{align*}
\]

PRACTICE:

1.1. Simplify as much as possible.
   
   a. \( \frac{126}{35} \)  
   b. \( \frac{96}{100} \)  
   c. \( \frac{42}{56} \)  
   d. \( \frac{196}{240} \)  
   e. \( \frac{168}{64} \)  
   f. \( \frac{72}{216} \)  
   g. \( \frac{7\frac{1}{6}}{10} \)  
   
   h. \( \frac{248}{120} \)  
   i. \( \frac{28}{36} \)  
   j. \( \frac{5\frac{2}{5}}{10} \)  
   k. \( \frac{588}{1000} \)  
   l. \( \frac{\frac{3}{9}}{5} \)  
   m. \( \frac{7\frac{1}{6}}{10} \)  
   n. \( \frac{384}{312} \)
Appendix F: A Review of Some Rules

1.2. Write a fraction equal to the given fraction, but with the designated numerator or denominator. (This skill is needed for adding or subtracting fractions.)

EXAMPLE: Write a fraction equal to $\frac{5}{16}$, but with the denominator 96. To get a denominator of 96, one must multiply by 6 (from $96 \div 16$, thinking "What times 16 will give 96"). So multiply the numerator and denominator by 6: $\frac{5 \times 6}{16 \times 6} = \frac{30}{96}$

a. $\frac{9}{10}$, with denominator 70  
b. $\frac{2}{5}$, with denominator 36  
c. $\frac{8}{15}$, with denominator 180  
d. $\frac{9}{11}$, with numerator 99  
e. $\frac{3}{8}$, with numerator 27  
f. $\frac{84}{96}$, with denominator 56 (Hint: Simplify first.)

1.3. In (a) and (b), write ten fractions equal to the given fraction.

a. $\frac{3}{12}$  
b. $\frac{8}{7}$

1.4. Do any of your fractions in 1.3 have a smaller or greater value than the original fraction in each case?

Rewriting Fractions Greater Than One as Mixed Numbers and Vice Versa

RULE: To change a fraction greater than 1 to a mixed (or whole) number, divide the numerator by the denominator. If the fraction can be simplified first, the division involves smaller numbers.

EXAMPLES: $\frac{13}{5} = 13 \div 5 = 2 \frac{3}{5}$  
$\frac{100}{12} = 100 \div 12 = 8 \frac{1}{3}$  
$\frac{368}{23} = 368 \div 23 = 16$

PRACTICE:

1.5. Write each as a mixed (or whole) number.

a. $\frac{493}{72}$  
b. $\frac{15}{8}$  
c. $\frac{52}{16}$  
d. $\frac{1000}{15}$  
e. $\frac{2400}{128}$  
f. $\frac{96}{9}$  
g. $\frac{360}{28}$  
h. $\frac{1010}{12}$

RULE: To change a mixed number to a fraction, multiply the denominator by the whole number, add the product to the numerator, and write the sum over the denominator. A whole number can be written as a fraction in many ways.

EXAMPLES: $4\frac{1}{2} = \frac{4 \times 2 + 1}{2} = \frac{14}{3}$  
$7\frac{5}{8} = \frac{7 \times 8 + 5}{8}$

9 $= \frac{9}{1} = \frac{18}{2} = \frac{27}{3} = \frac{144}{16} = \ldots$

PRACTICE:

1.6. Write each as a fraction.

a. $7\frac{1}{2}$  
b. $19\frac{1}{3}$  
c. $52\frac{1}{3}$  
d. 17  
e. $11\frac{9}{10}$

Adding or Subtracting Fractions and Mixed Numbers

RULE: If the fractions have the same denominator, then add/subtract the numerators, writing that answer over the original denominator. If the fractions do not have the same denominator, then replace them with equal fractions that do have a common denominator and proceed as in the first sentence. The common denominator need not be the least common denominator, but a least common denominator keeps the numbers smaller. It is customary to simplify the answer.
F.1 Fractions (Including Mixed Numbers)

If a mixed number is involved, there are two ways to proceed. The first way is to change each mixed number to a fraction first. The second way is to deal with the fraction parts and the whole number parts separately, perhaps renaming the first mixed number if necessary to do the fraction subtraction.

**EXAMPLES:**
\[
\frac{5}{14} + \frac{3}{14} = \frac{5+3}{14} = \frac{8}{14} = \frac{4}{7}
\]
\[
\frac{2}{3} + \frac{5}{6} - \frac{7}{12} = \frac{48}{72} + \frac{60}{72} - \frac{42}{72} = \frac{48+60-42}{72} = \frac{66}{72} = \frac{11}{12}
\]

<table>
<thead>
<tr>
<th>One way, with mixed numbers:</th>
<th>A second way, with mixed numbers:</th>
</tr>
</thead>
<tbody>
<tr>
<td>(12\frac{1}{2} - \frac{7}{8}) = (\frac{49}{4} - \frac{55}{8})</td>
<td>(12\frac{1}{4} = 11\frac{3}{4})</td>
</tr>
<tr>
<td>(-\frac{98}{8} - \frac{43}{8} = \frac{53}{8})</td>
<td>(-\frac{62}{8} - \frac{62}{8} = -\frac{53}{8})</td>
</tr>
</tbody>
</table>

**PRACTICE:**
1.7. Give the answers in simplest form (if the answer is a fraction greater than 1, give the mixed number).
   a. \(\frac{9}{16} + \frac{5}{12} + \frac{17}{24}\)
   b. \(\frac{2}{3} + \frac{6}{4} + \frac{21}{2} - \frac{5}{4}\)
   c. \(\frac{19}{36} + \frac{3}{3} - \frac{1}{12}\)
   d. \(120\frac{1}{2} - 3\frac{16}{10} + 2\frac{1}{10}\)
   e. \(600 - 60\frac{1}{2}\)
   f. \(3\frac{1}{2} + 1\frac{5}{6} - \frac{3}{4}\)

**Multiplying Fractions (and Mixed Numbers)**

**RULE:** To multiply two fractions, write the product (i.e., the result of multiplication) of the numerators over the product of the denominators. It is customary to simplify the answer. Mixed numbers should be changed to fractions before multiplying.

**EXAMPLES:**
\(\frac{2}{3} \times \frac{7}{8} = \frac{2 \times 7}{3 \times 8} = \frac{14}{24} = \frac{7}{12}\)
\(2\frac{1}{2} \times 3\frac{5}{10} = \frac{5}{2} \times \frac{39}{10} = \frac{195}{20} = \frac{39}{4} = 9\frac{3}{4}\)
\(\frac{3}{2} \times 24 \times \frac{15}{16} = \frac{2}{3} \times \frac{24}{1} \times \frac{15}{16} = \frac{48}{3} \times 15 = 16 \times 15 = 16 \times 15 = 15\)

**PRACTICE:**
1.8. Find the products (multiply).
   a. \(\frac{3}{4} \times \frac{7}{8}\)
   b. \(\frac{5}{8} \times 120\)
   c. \(\frac{2}{3} \times \frac{5}{6} \times \frac{9}{8}\)
   d. \(3\frac{1}{2} \times 92\)
   e. \(5\frac{1}{2} \times 7\frac{1}{2}\)
   f. \(\frac{11}{12} \times \frac{2}{3} \times \frac{4}{5} \times \frac{10}{11}\)

**Dividing Fractions**

**RULE:** To divide by a fraction, invert the fraction and multiply. If mixed numbers are involved, change them to fractions first.

**EXAMPLES:**
\(7 + \frac{2}{3} = \frac{7 \times 3}{2} = \frac{21}{2} = 10\frac{1}{2}\)
\(9 + \frac{3}{5} = \frac{9 \times 5}{3} = \frac{45}{30} = \frac{15}{10} = 1\frac{5}{10}\)
\(1\frac{1}{4} + 2\frac{1}{2} = \frac{17}{4} + \frac{5}{2} = \frac{17}{4} \times \frac{2}{2} = \frac{34}{20} = 1\frac{7}{10}\)

**PRACTICE:**
1.9. Find the quotients (divide).
   a. \(\frac{3}{4} \div \frac{1}{2}\)
   b. \(\frac{1}{2} \div \frac{3}{4}\)
   c. \(\frac{21}{32} \div \frac{1}{8}\)
   d. \(21\frac{1}{2} \div 3\)
   e. \(11 \div \frac{2}{3}\)
   f. \(\frac{49}{1000} \div \frac{31}{2}\)
Appendix F: A Review of Some Rules

F.2 Decimals

Equal Decimals

RULE: Annexing zeros to the last digit to the right of the decimal point gives an equal decimal. Removing zeros on the right end of a decimal gives an equal decimal.

EXAMPLES: 0.4 = 0.40 = 0.400000  2.073 = 2.07300  4 = 4.0  8.750 = 8.75
          0.08 = 0.080   73.200 = 73.2   19.00 = 19

PRACTICE:
2.1. Write two decimals that are equal to each given number.
   a. 435.06   b. 1.4   c. 927.0400   d. 17   e. 0.680

Adding and Subtracting Decimals

RULE: Write in vertical form, with the decimal points aligned. Then add or subtract as though they were whole numbers, aligning the decimal point in the answer with the other decimal points.

EXAMPLES: 34.2 − 7.6 → 34.2  200 − 63.08 → 200.00
          −7.6     −63.08
          26.6      136.92

PRACTICE: (Notice that you can make up exercises, do them, and then check with a calculator.)
2.2. Calculate by hand.
   a. 0.05 + 1.9   b. 175.3 − 11.94   c. 68.3 + 4 + 19.84 − 72.756

Multiplying Decimals

RULE: To multiply two decimals, multiply as though they were whole numbers, count the total number of decimal places in the numbers being multiplied (the factors), and then place the decimal point that many places from the right end of the answer.

EXAMPLES: 0.2 × 0.49 → 2 × 49 = 98, 3 total decimal places in 0.2 and 0.49 → 0.098
          1.52 × 0.075 → 152 × 75 = 11,400, 5 total decimal places → 0.11400 = 0.114

PRACTICE: (Notice that you can make up exercises, do them, and then check with a calculator; keep in mind that calculators usually do not show unnecessary zeros.)
2.3. Find the products.
   a. 0.2 × 0.3   b. 4.8 × 75   c. 12.39 × 0.14   d. 19.88 × 4.23

Dividing Decimals

Terms and notation: Dividend ÷ divisor = quotient; in working form,

\[ \frac{\text{quotient}}{\text{divisor}} \div \text{dividend} \]

RULE: To divide two decimals, move the decimal point in the divisor to make the divisor a whole number, and move the decimal point the same number of places in the dividend (you may have to annex 0's). Do the division as though
the numbers were whole numbers, keeping digits carefully aligned, and put the
decimal point in the answer (the quotient) right above its new location in
the dividend.

**EXAMPLES:**

<table>
<thead>
<tr>
<th>Calculation</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.2 ÷ 0.28</td>
<td>40</td>
</tr>
<tr>
<td>11.256 ÷ 0.28</td>
<td>40.2</td>
</tr>
<tr>
<td>336.4 ÷ 2.32</td>
<td>145</td>
</tr>
<tr>
<td>0.69336 ÷ 9.63</td>
<td>0.072</td>
</tr>
<tr>
<td>100 ÷ 6.3</td>
<td>approximately 15.873016</td>
</tr>
</tbody>
</table>

**PRACTICE:** (Again notice that you can make up exercises, do them, and then check with
a calculator.)

2.4. Find the quotients. If there does not seem to be an exact answer, give the quotient to
six decimal places.

<table>
<thead>
<tr>
<th>a. 120 ÷ 2.5</th>
<th>b. 36.344 ÷ 15.4</th>
<th>c. 3.6344 ÷ 15.4</th>
<th>d. 3.782 ÷ 0.0775</th>
</tr>
</thead>
<tbody>
<tr>
<td>e. 14 ÷ 200</td>
<td>f. 27 ÷ 0.04</td>
<td>g. 0.008 ÷ 0.2</td>
<td></td>
</tr>
</tbody>
</table>

### F.3 Fraction, Decimal, and Percent Conversions

You likely know that \( \frac{1}{4} = 0.25 = 25\% \). These three forms—fraction, decimal, and
percent—are "dialects" for the same number. Viewed as dialects that require "translation,"
there are six translations, as indicated in the drawing below. You should be able to start
with any form and translate into the other two forms.

![Diagram of fraction, decimal, and percent conversions]

#### Fraction to Decimal

**RULE:** Divide the numerator by the denominator. Annex a decimal point and zeros as
needed. Many times the quotient (the answer) is not exact, but the last decimal
place given is possibly rounded, depending on the value in the next place.

**EXAMPLES:**

\[
\frac{7}{16} = 7 \div 16 = \ldots = 0.4375
\]

\[
\frac{9}{11} = 9 \div 11 = \ldots = 0.81818181\ldots \text{ (forever)}
\]

**PRACTICE:**

3.1. Write each fraction as a decimal. If the decimal appears to go on forever, give eight
decimal places.

<table>
<thead>
<tr>
<th>a. ( \frac{3}{8} )</th>
<th>b. ( \frac{1}{16} )</th>
<th>c. ( \frac{3}{16} )</th>
<th>d. ( \frac{1}{7} )</th>
</tr>
</thead>
<tbody>
<tr>
<td>e. ( \frac{2}{7} )</td>
<td>f. ( \frac{1}{9} )</td>
<td>g. ( \frac{7}{9} )</td>
<td>h. ( \frac{1}{12} )</td>
</tr>
<tr>
<td>i. ( \frac{1}{6} )</td>
<td>j. ( \frac{12}{7} )</td>
<td>k. ( \frac{1}{23} )</td>
<td>l. ( \frac{27}{25} )</td>
</tr>
<tr>
<td>m. ( \frac{23}{7} )</td>
<td>n. ( \frac{1}{13} )</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Decimal to Fraction

**RULE:** Write a fraction that has as its numerator the same digits as the decimal but no
decimal point, and a denominator that suggests the smallest place value in the
decimal (e.g., if the smallest place value is hundredths, write 100 in the denomina-
tor). The place values, going to the right from the decimal point, are tenths, hun-
dredths, thousandths, ten-thousandths, hundred-thousandths, millionths, and so
on. Many times the resulting fraction can be simplified.
Appendix F: A Review of Some Rules

EXAMPLES:  \[ \frac{1.35}{100} = \frac{125}{100} \] (The smallest place value is hundredths, so use denominator 100.)  
And, if desired, \[ \frac{135}{100} = \frac{27}{20} = \frac{13}{20}. \]  
\[ 0.7421 = \frac{7421}{10,000} \quad 2.1674932 \times 10^5 = \frac{21,674,932}{10,000,000} \] (Can be simplified.)

PRACTICE:
3.2. Write a fraction and then simplify it as much as possible.
   a. 3.75  b. 0.092  c. 0.0004  d. 4.68

Decimal to Percent

RULE: Move the decimal point two places to the right, and put the % sign on the end. You may have to annex a zero or two to the original number. You do not usually write the decimal point in the percent expression unless there are more digits to the right.

EXAMPLES: \[ 1.07 = 107\% \quad 0.2 = 0.20 = 20\% \quad 3 = 3.00 = 300\% \quad 1.5 = 150\% \] \[ 0.0067 = 0.67\% \]

PRACTICE:
3.3. Write each as a percent.
   a. 4.25  b. 3.146  c. 1  d. 0.62  e. 0.045  f. 0.00003

Percent to Decimal

RULE: Move the decimal point two places to the left, and remove the % sign. You may have to insert one or more zeros.

EXAMPLES: \[ 34\% = 0.34 \quad 110\% = 1.1 \quad 7.75\% = 0.0775 \] \[ 0.12\% = 0.0012 \]

PRACTICE:
3.4. Write each percent as a decimal.
   a. 88\%  b. 33.3\%  c. 105\%  d. 1.5\%  e. 500\%  f. 5.5\%

Fraction to Percent

RULE: Change the fraction to a decimal, as earlier, and then change the decimal to a percent, as above.

EXAMPLES: \[ \frac{5}{6} = 0.8333 \ldots = 83.333 \ldots \% \quad \frac{33}{40} = 0.825 = 82.5\% \] \[ \frac{15}{8} = 1.875 = 187.5\% \]

PRACTICE:
3.5. Write each fraction as a percent.
   a. \( \frac{8}{5} \)  b. \( \frac{5}{8} \)  c. \( \frac{17}{20} \)  d. \( \frac{952}{1140} \)  e. \( \frac{113}{125} \)  f. \( \frac{140}{32} \)

Percent to Fraction

RULE: Write the percent as a decimal, as earlier, and then write the decimal as a fraction, as above. The fraction often can be simplified.
F.5 Whole-Number and Negative Exponents

EXAMPLES: 32.5% = 0.325 = \frac{325}{1000} = \frac{13}{40} \quad 0.72\% = 0.0072 = \frac{72}{10000} = \frac{9}{1250}

PRACTICE:
3.6. Write each percent as a fraction. Simplify the fraction if you need practice.
   a. 40\%   b. 66\%\%   c. 165\%   d. 11.5\%   e. 0.25\%

MIXED PRACTICE:
3.7. Write each of the given fractions, decimals, or percents in the other two forms.
   a. \frac{9}{10}   b. 2.3   c. 56\%   d. \frac{18}{15}   e. 0.8   f. 1.58\%

F.4 Solving a proportion

A proportion is an equation like \frac{24}{36} = \frac{6}{9} (occasionally written as 24:36 = 6:9). Often there is an unknown value to find in a proportion, as in \frac{2}{3} = \frac{6}{9}. We will review two ways to find the missing value. The first approach involves noticing multiplication or division (but not addition or subtraction) relationships among the values. Look at the following examples. Notice that one arrow ends at the unknown and suggests the relationship to look for between the other two numbers.

EXAMPLES:

\[
\begin{align*}
\times \frac{6}{9} = \frac{x}{36} \quad &\text{so} \times \frac{x}{36} = \frac{8}{40} = \frac{50}{75} = \frac{50}{75} \\
\times \frac{9}{36} \times 4 = \frac{40}{40} = \frac{75}{75} \\
\text{so} \times 5 &= \frac{50}{50} = \frac{50}{50} \\
\text{so} + 2 &= \frac{75}{75} = \frac{75}{75} \\
x &= \frac{1}{3} \times 36 = 24 \\
x &= \frac{6}{4} \times 4 = 24 \\
y &= 47 \times 5 = 235 \\
&\text{or } x = 44 \\
\end{align*}
\]

Often there is no obvious relationship among the numbers. But we have a second approach. A rule follows from this observation: In \frac{24}{36} = \frac{6}{9}, notice that 24 \times 9 = 216 and 36 \times 6 = 216, so 24 \times 9 = 36 \times 6. In \frac{24}{36} = \frac{6}{9} you go in the 6, you make an X-shaped "cross." This "cross-multiplying" gives 24 \times 9 = 36 \times 6, and leads to this rule for solving a proportion.

RULE: To solve a proportion, cross-multiply and solve the resulting equation. The unknown value can be in any position in the proportion.

EXAMPLE: Solve \frac{18}{x} = \frac{28}{x}. Cross-multiply to get 18x = 45 \times 28, or 18x = 1260.

Then divide both sides of the equation by 18 to get x = 70.

PRACTICE:
4.1. Solve each proportion. Use your knowledge of multiplication or division relationships when you can [as in parts (a–c)]. Cross-multiply to solve when you do not see any relationships.
   a. \frac{48}{100} = \frac{x}{25} \\
b. \frac{x}{120} = \frac{27}{40} \\
c. \frac{x}{150} = \frac{16}{75} \\
d. \frac{15}{38} = \frac{9}{x} \\
e. \frac{25.2}{x} = \frac{18}{35}

F.5 Whole-Number and Negative Exponents

Exponents are used a lot in mathematics, because they provide an excellent shorthand for a repeated multiplication. For example, expressions like \text{x}^3 for \text{x} \cdot \text{x} \cdot \text{x} or \text{2}^4 for \text{2} \cdot \text{2} \cdot \text{2} \cdot \text{2} obviously save time. When there is no exponent visible, it is understood to be 1, if needed.
Answers for Appendix F

F.1 Fractions (Including Mixed Numbers)

1.1 a. $\frac{18}{5}$  b. $\frac{24}{25}$  c. $\frac{3}{4}$  d. $\frac{49}{60}$  e. $\frac{21}{8}$  f. $\frac{1}{3}$  g. $\frac{11}{15}$  h. $\frac{31}{15}$  i. $\frac{7}{9}$

j. $\frac{13}{25}$  k. $\frac{147}{250}$  l. $\frac{3}{36} = \frac{1}{12}$  m. $\frac{3}{40}$  n. $\frac{3}{4}$

1.2 a. $\frac{63}{70}$  b. $\frac{24}{36}$  c. $\frac{96}{180}$  d. $\frac{99}{121}$  e. $\frac{27}{72}$  f. $\frac{49}{56}$

1.3 a. $\frac{3}{12} = \frac{3 \times 2}{12 \times 2} = \frac{6}{24}$; or $\frac{3}{12} = \frac{3 \times 3}{12 \times 3} = \frac{9}{36}$; similarly $\frac{12}{48} = \frac{15}{60} = \ldots ;$

also $\frac{1}{4} = \frac{2}{8} = \frac{3}{12} = \frac{4}{16}$. There are many other possibilities.

b. Similarly, $\frac{8}{7} = \frac{16}{14} = \frac{24}{21} = \frac{32}{28} = \ldots = \frac{800}{700}$

1.4 None should be greater than, or less than, the given fraction. This question is to make certain that you realize that your answers are indeed equal to the given fraction (and to each other).
Appendix F: A Review of Some Rules

1.5. a. $\frac{61}{3}$  b. $\frac{1}{12}$  c. $\frac{3}{4}$  (It is customary to simplify the fraction.)  d. $\frac{61}{3}$  e. $\frac{15}{3}$  f. $\frac{10}{5}$  g. $\frac{12}{9}$  h. $\frac{84}{6}$

1.6. a. $\frac{15}{2}$  b. $\frac{58}{3}$  c. $\frac{423}{8}$  d. $\frac{17}{1}$  e. $\frac{119}{10}$

1.7. a. $\frac{41}{48}$  b. $\frac{10}{24}$  c. $\frac{1}{4}$  d. $\frac{113}{6}$  e. $\frac{539}{8}$  f. $\frac{4}{12}$

1.8. a. $\frac{21}{32}$  b. $\frac{75}{3}$  c. $\frac{45}{24} = \frac{15}{8}$  d. $\frac{306}{5}$  e. $\frac{36}{2}$  f. $\frac{4}{9}$

1.9. a. $\frac{1}{3}$  b. $\frac{5}{3}$  c. $\frac{5}{4}$  d. $\frac{7}{12}$  e. $\frac{16}{2}$  f. $\frac{7}{50}$

F.2 Decimals

2.1. a. For example, 435.060 and 435.0600  b. For example, 1.40 and 1.4000  c. For example, 927.04 and 927.040 and 927.0400  d. For example, 17.00 and 17.000  e. For example, 0.68 and 0.6800

2.2. a. 1.95  b. 163.36  c. 19.384

2.3. a. 0.06  b. 360  c. 1.7346  d. 84.0924

2.4. a. 48  b. 2.36  c. 0.236  d. 48.8  e. 0.07  f. 675  g. 0.04

F.3 Fraction, Decimal, and Percent Conversions

3.1. Some of the answers here are given to more than eight decimal places.

3.2. a. $\frac{15}{4} = 3.75$  b. $\frac{92}{100} = 0.92$  c. $\frac{4}{10,000} = 0.0004$  d. $\frac{468}{100} - \frac{117}{25} = 2.17$

3.3. a. 425%  b. 314.6%  c. 100%  d. 62%  e. 4.5%  f. 0.003%

3.4. a. 0.88  b. 0.333  c. 1.05  d. 0.015  e. 5  f. 0.055

3.5. a. 1.6 = 160%  b. 0.625 = 62.5%  c. 0.85 = 85%

3.6. a. $\frac{0.40}{5} = \frac{2}{5}$  b. $\frac{0.60}{3} = \frac{60}{3} = 20$  c. $\frac{1.65}{100} = \frac{165}{100} = \frac{33}{20} = 1.65$

3.7. a. 0.9, 90%  b. $\frac{23}{10} = 2.3$  c. 0.56, 56%  d. $\frac{14}{25}$

F.4 Solving a Proportion

4.1. a. $25 = \frac{100}{4}, x = 48 \div 4 \times 12$. The equation from cross multiplying is $48 \times 25 = 100x$, or $1200 = 100x$, which gives $x = 12$ by dividing both sides of the equation by 100.

b. $x = 81$  c. $x = 32$  d. $x = 22\frac{4}{5}$  e. $x = 49$