1. Julie earns $2,225 per month and spends $450 on rent. Thomas earns $2,500 per month and spends $475 per month on rent. What percent did each pay for rent and who paid the higher percent of their income on rent?

\[
\text{Julie: } p = \frac{450}{2225} \times 100 = 20\% \\
\text{Thomas: } p = \frac{475}{2500} \times 100 = 19\%
\]

2. A home worth $58,000 in Corvallis in 1976, sold for $195,000 in 1996. What was the percent of increase from 1976 to 1996?

\[
\text{percent increase} = \frac{\text{amount sold} - \text{original amount}}{\text{original amount}} \times 100 = \frac{195,000 - 58,000}{58,000} \times 100 = 234.2\%
\]

3. A recipe in a French cookbook calls for 140 grams of sugar and 360 grams of flour.

a. What is the ratio of flour to sugar?

\[
\frac{\text{flour}}{\text{sugar}} = \frac{360}{140} = \frac{18}{7}
\]

b. What is the ratio of sugar to flour?

\[
\frac{\text{sugar}}{\text{flour}} = \frac{7}{18}
\]
4. A building 14 stories high casts a shadow 40 feet long at 2 pm. How tall is a building in the same block that casts a shadow 60 feet long at the same time of day? (Hint: Illustrate the problem with two right triangles.)

\[
\frac{14 \text{ stories}}{X} = \frac{40 \text{ ft}}{60} \]

\[
14 \times 60 = X \times 40
\]

\[
\frac{14 \times 60}{40} = X \quad \text{21 stories}
\]

5. In my car I can travel 182 miles on a 12 gallon tank of gas.
   a. What is my fuel efficiency in miles per gallon? (round to 3 decimal places)

\[
\frac{\text{miles}}{\text{gal}} = \frac{182}{12} = 15.167 \text{ mpg}
\]

b. What is the rate of gallons used per mile? (round to 3 decimal places)

\[
\frac{\text{gal}}{\text{miles}} = \frac{12}{182} = 0.066 \text{ gal/mi}
\]

c. Why is a rate different from a ratio?

A rate is a ratio with different units.

6. Solve each proportion.

   a) \[ \frac{b}{9} = \frac{22}{5} \]

\[ \frac{8b}{5} = \frac{9.22}{5} \]

\[ b = 39.6 \]

   b) \[ \frac{2.1}{m} = \frac{3}{8} \]

\[ \frac{3m}{8} = 8(2.1) \]

\[ m = 5.6 \]
7. Determine whether, for each of the four problems, are the two variables, R and S, proportional? Explain your answer.

![Diagram](image)

a) 

<table>
<thead>
<tr>
<th>R</th>
<th>S</th>
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</thead>
<tbody>
<tr>
<td>1</td>
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<tr>
<td>2</td>
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Not prop

b) 

<table>
<thead>
<tr>
<th>R</th>
<th>S</th>
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<tr>
<td>1</td>
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<tr>
<td>4</td>
<td>8</td>
</tr>
</tbody>
</table>

prop

![Graph](image)

![Graph](image)

prop

Not prop

8. Simplify and combine like terms.

a) 

\[-3(3x - 2) - 3(3x + (-2)) = -9x + (-6)\]

\[-3 \cdot 3x - (-3)(-2) = -9x + (-6) - 9x + 6\]

b) 

\[5(y + 3) - 2(y - 3) = 5y + 15 + (-2y) + (-6)\]

\[3y + 2\]

\[c) \quad -3 - 2(2x + 4) - 5x\]

\[-3 - 2(2x + 4) - 5x = -9x - 11\]

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9. Solve each equation, show your work.

a. \(-3d + 9d - 10 = 8\)
   \[\begin{align*}
   6d - 10 &= 8 \\
   6d &= 18 \\
   d &= 3
   \end{align*}\]

b. \(8 - 3y = -7 - 6y\)
   \[\begin{align*}
   8 + 3y &= -7 \\
   3y &= -15 \\
   y &= -5
   \end{align*}\]

c. \(-4t - 4 + 2t = 3 + 7t + 2\)
   \[\begin{align*}
   -2t - 4 &= 7t + 5 \\
   -2t &= 11t + 9 \\
   t &= -1
   \end{align*}\]

d. \(15x - 4 - 4(3x) = -7\)
   \[\begin{align*}
   15x - 4 - 12x &= -7 \\
   3x &= -3 \\
   x &= -1
   \end{align*}\]

e. \(-12 = 3(2 + 6x)\)
   \[\begin{align*}
   -12 &= 6 + 18x \\
   -18 &= 18x \\
   x &= -1
   \end{align*}\]

f. \(18x - 5 - 2(6x - 4) = 27\)
   \[\begin{align*}
   18x - 5 - 12x + 8 &= 27 \\
   6x + 3 &= 27 \\
   x &= 4
   \end{align*}\]
10. Solve each equation by first clearing fractions.

\[
\begin{align*}
\frac{3}{4} + \frac{1}{2} &= \frac{5}{6} \\
\frac{2x + 1}{5} &= \frac{5x - 2}{1} \\
-5y &= -5x \\
\frac{2x + 1}{6} &= \frac{5}{6} \\
\frac{2}{3}c &= \frac{4}{5} \\
4c - 2a &= 5 \\
\frac{4c + 19}{4} &= \frac{3}{4}
\end{align*}
\]

11. The price of a 4-drawer file cabinet is $55 more than the price of a 2-drawer file cabinet.

a. Choose a variable for the price of a 2-drawer file cabinet:

\[ x = \text{price of a 2-drawer file cabinet} \]

b. Write an expression for the price of a 4-drawer file cabinet:

\[ x + 55 = \text{price of a 4-drawer file cabinet} \]

c. Write an expression for the total cost of purchasing a 2-drawer file cabinet and a 4-drawer file cabinet:

\[ x + x + 55 \Rightarrow 2x + 55 \]
12. A soda and a hamburger together cost $2.54. The hamburger costs $.64 more than the soda. How much did the soda cost?

a) Use a single variable to identify all the unknowns.

\[ x = \text{cost of one soda} \]

b) Write an algebraic equation and solve.

\[ x + 0.64 = \text{cost of hamburger} \]
\[ x + x + 0.64 = 2.54 \]
\[ 2x + 0.64 = 2.54 \]

(c) Answer the question using a complete sentence. Include the correct units in your answer.

\[ \angle F = 25' \]

13. In the figures below, \( \angle BAC = \angle EDF \). Explain why the triangles are similar. Also, use your protractor to measure \( \angle E \).

Given \( AC = 5 \text{ in.}, BC = 4 \text{ in.}, \text{ and } \overline{ED} = 2 \text{ in.} \), find \( FE \).
14. \( \triangle ABC \sim \triangle DEF \). Find EF

\[
\frac{8}{12} = \frac{6}{x}
\]

15. \( \triangle ABC \sim \triangle DEF \). Find DF

\[
\frac{9}{5} = \frac{x}{4}
\]
Use dimensional analysis to solve the following problems. Show the procedure that you used, including all of your unit fractions. If an answer is not exact, round to two decimal places. Answer each question in a complete sentence.

16. Owen’s dog Carrie weighs 412 ounces.
   a. How many pounds does his dog weigh?
      \[
      \frac{412 \text{ oz}}{1} \cdot \frac{1 \text{ lb}}{16 \text{ oz}} = 25.75 \text{ lb}
      \]
   
   b. How many kilograms does Carrie weigh?

17. Convert 233 cm$^3$ to ft$^3$.
   \[
   \frac{233 \text{ cm}^3}{1} \cdot \frac{1 \text{ in}^3}{254 \text{ cm}^3} \cdot \frac{1 \text{ ft}^3}{12^3 \text{ in}^3} = 0.0032 \text{ ft}^3
   \]

18. My dining room is 16 feet by 8 feet.
   How many square yards of carpet will I need to carpet the dining room?