Section 4.6

TERMINOLOGY 4.6

For the following term, provide 1) a definition in your own words, 2) the formal definition (as provided by your text or instructor), and 3) an example of the term using a drawing or problem. A sample filled-out form is available in the Introduction.

Proportion

Your definition	
Formal definition	
Example	

READING AND SELF-DISCOVERY QUESTIONS 4.6

1. If we call two fractions *proportional*, what do we mean?

   We mean that the two fractions are equal.

2. How can you determine if two fractions are equivalent and, therefore, proportional?

   Two fractions are equal if the product of the means and the product of the extremes are equal. For example, if $ad = bc$, then $\frac{a}{b} = \frac{c}{d}$.

3. If you are given a proportion with one of the four numbers missing, how would you determine the value of that number?

   Make the missing number *x*, then solve the proportion by cross-multiplying.

4. If a proportion is used to solve an application problem, is it important that the two fractions consistently use the same units of measure in both numerators, and the same units in both denominators?

   For example, if you set up one half of your proportion as: $\frac{\text{Miles}}{\text{Gallon of gas}} = \frac{\quad}{\quad}$ how should the rest of the proportion be labeled?

   $\frac{\text{Miles}}{\text{Gallons of gas}}$

CRITICAL THINKING QUESTIONS 4.6

1. What does the equal sign with the question mark over it ($\stackrel{?}{=}$) mean? Why do we use this symbol and not *only* an equal sign *or* a question mark?

   The symbol means that we are not sure that the left side of an equation is equal to the right side of the equation when we are checking the solution to an equation.

2. If the cross-products of two fractions are not equal, what do we know about the two fractions?

   If the cross-products of two fractions are not equal, then the fractions are not equal.

3. How do you ensure that a solution for a missing number in a proportion is correct?

   You can ensure that a solution for a missing number in a proportion is correct by inserting the missing number you have computed and comparing the cross-products. If they are equal, then the missing number is correct.

4. Can two unit rates be proportional to one another? Explain your answer.

   Yes, two unit rates can be proportional if the constant of proportionality is 1. In a problem, the unit rates for the speeds of two runners can be the same (in miles per hour).

DEMONSTRATE YOUR UNDERSTANDING 4.6

1. The ratio for how often each letter of an alphabet is used in printed language, such as a newspaper, is unique to each language. In the English language, the letter L is used 4 times for every 100 letters written. In Language X, the letter L is used 2 times for every 60 letters. In Language Y, the letter L is used 7 times for every 175 letters. Which one of these languages (X or Y) is English? Show your work.

$$\text{English: } \frac{4}{100}=\frac{1}{25} \quad \text{X: } \frac{2}{60}=\frac{1}{30} \quad \text{Y: } \frac{7}{175}=\frac{1}{25} \quad \text{Language Y is English.}$$

IDENTIFY AND CORRECT THE ERRORS 4.6

In the second column, identify the error(s) you find in the following worked solution. Describe the error made in the second column. Solve the problem correctly in the third column.

Problem	Describe Error	Correct Process
Is the statement a proportion? $\frac{12}{18} \stackrel{?}{=} \frac{4}{6}$ **Worked Solution** *(What is wrong here?)* $12 \cdot 4 \stackrel{?}{=} 18 \cdot 6$ $48 \neq 108$ **NO**	**The student has not used the cross products, but has, instead, multiplied the numerator by the numerator and the denominator by the denominator.**	**$12 \cdot 6 \quad 18 \cdot 4$** **$72 = 72$** **YES**