Appendix J:
Formulas and Literal Equations

READING AND SELF-DISCOVERY QUESTIONS — APPENDIX J

1. A formula with specified variables is called a literal equation. If you are asked to solve a literal equation, how do you know what variable to solve for?

   The variable will be specified in the problem.

2. Solving a literal equation requires you to use the Order of Operations in the same way you do when solving an equation. What are the seven steps in the procedure for solving a literal equation?

   1. **Remove the parentheses, if any exist.**
   2. **If fractions exist, multiply all terms on both sides by the LCD of all the fractions.**
   3. **Combine like terms on each side, if possible.**
   4. **Add or subtract terms on both sides of the equation to get all terms with the desired variable on one side of the equation.**
   5. **Add or subtract the appropriate quantities to get all terms that do not have the desired variable on the other side of the equation.**
   6. **Divide both sides of the equation by the coefficient of the desired variable.**
   7. **Simplify, if possible.**

CRITICAL THINKING QUESTION — APPENDIX J

1. How would you explain to another student the relationship between making a change to the radius of a circle and how that change affects the area?

   Making a change to the radius of a circle changes the area of the circle in terms of the square of the radius. Changes in the radius are reflected in larger changes in the area.

DEMONSTRATE YOUR UNDERSTANDING — APPENDIX J

1. Convert 20 °C to °F, using the formula $C = \frac{5}{9}(F - 32)$. What would be an alternative way to approach this same problem?

$$20 = \frac{5}{9}(F - 32)$$
$$180 = 5F - 160$$
$$180 + 160 = 5F$$
$$340 = 5F$$
$$68 = F$$

$$C = \frac{5}{9}(F - 32)$$
$$\frac{9}{5} \bullet C = F - 32$$
$$\frac{9}{5} \bullet C + 32 = F$$
$$F = \frac{9}{5} \bullet C + 32$$
$$F = \frac{9}{5} \bullet 20 + 32$$
$$F = 36 + 32$$
$$F = 68$$

The formula has been converted in the second equation.

In either method, 20° C is 68° F.

2. Sketch a diagram of a geometric figure and demonstrate, with that figure, how to apply a geometric formula in order to calculate perimeter, area, or volume. Do this with two different figures and/or formulas (i.e., a square and area, a circle and circumference).

a)

Student answers will vary. Students should label the figure with the measurements needed to calculate the required data (perimeter, area, volume).

Geometric Formula: ______________________________

b)

Student answers will vary. Students should label the figure with the measurements needed to calculate the required data (perimeter, area, volume).

Geometric Formula: ______________________________

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

Problem	Describe Error	Correct Process
1. Using the formula $A = \frac{1}{2}b(h)$, find the height of a triangle with an area of 120 in^2 and a base of 2 ft. **Worked Solution** *(What is wrong here?)* $120\text{ in}^2 = \frac{1}{2}(2\text{ ft})\text{ h}$ $120\text{ in}^2 = (1\text{ ft})\text{ h}$ $\mathbf{120\text{ in}^2 = h}$	**Student did not change all the units to the same unit.**	$120\ in^2 = \frac{1}{2} \bullet (24\ in) \bullet h$ $120\ in^2 = 12\ in \bullet h$ $10\ in = h$ The height is 10 inches.
2. Solve for b: ax + by = c **Worked Solution** *(What is wrong here?)* $ax + by = c$ $\underline{-ax \qquad -ax}$ $by = -ax + c$ $\frac{b\cancel{y}}{\cancel{y}} = \frac{-ax}{y} + c$ $\boldsymbol{b = \frac{-ax}{y} + c}$	**Student did not use the Distributive Property when dividing by *y*.**	$\frac{by}{y} = \frac{-ax + c}{y}$ $b = \frac{-ax + c}{y}$ or $b = \frac{c}{y} - \frac{ax}{y}$