# Appendix G:
## Solving Word Problems Using Geometric Formulas

## TERMINOLOGY — APPENDIX G

For each of the following terms, 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.

### Circle

| | |
|---|---|
| **Your definition** | |
| **Formal definition** | |
| **Example** | |

### Equilateral Triangle

| | |
|---|---|
| **Your definition** | |
| **Formal definition** | |
| **Example** | |

### Isosceles Triangle

| | |
|---|---|
| **Your definition** | |
| **Formal definition** | |
| **Example** | |

Right Triangle

| | |
|---|---|
| **Your definition** | |
| **Formal definition** | |
| **Example** | |

## READING AND SELF-DISCOVERY QUESTION — APPENDIX G

1. Complete the following table, providing the perimeter and area formulas for common geometric shapes.

| | Formula for Perimeter | Formula for Area |
|---|---|---|
| **Parallelogram** | P = sum of the measures of all sides | A = bh |
| **Rectangle** | P = 2L + 2W | A = LW |
| **Square** | P = 4s | $A = s^2$ |
| **Trapezoid** | P = sum of the measures of all sides | A = 1/2(h(a+b))<br>A =1/2 × height × (top side + bottom side) |
| **Triangle** | P = sum of the measures of all sides | A = (bh)/2 |
| **Circle** | C = πd or 2πr | $A = \pi r^2$ |

## CRITICAL THINKING QUESTIONS — APPENDIX G

1. Suppose a square has an area of 16 square inches. If you divide the square into two equivalent triangles, what would the area of each triangle be? (Suggestion: draw a diagram.)

   **The areas of two equivalent triangles must be equivalent. Therefore, each triangle's area is half of the area of the square**

2. How does the measurement of diameter relate to the equation for the area of a circle?

**Because the diameter is twice the radius (d = 2r or r = d/2), we can rewrite the formula for the area of a circle using diameter: $A = \pi(d/2)^2$. If we know the radius, we always know the diameter and vice versa. This allows us to use either one for finding the circumference or area, as long as we are careful in what formula we use.**

3. If you divide a rectangle into two equivalent triangles, what kind of triangles must they be? Explain your answer.

**They must always be right triangles. The only way to divide a rectangle into triangles is by dividing corner-to-corner. This means that each triangle must always include one of the corners of the rectangle as its largest angle. And since a rectangle has 90-degree angles, each triangle must have a 90-degree angle as its largest angle -- the definition of a right triangle.**

4. Is the relationship between the diameter and circumference of *any* circle the same? Explain your answer.

**Taking the formula for the circumference of a circle, $C = \pi d$. If we rearrange this formula to create a proportion between C and d, we end up with: $\pi = C/d$. No matter value we choose for the circumference, when the diameter is divided into it, we ALWAYS get $\pi$ as the answer or value. This is true for any and every circle and will never change. (The only possible exceptions will be due to errors of measurement, if we are dealing with drawings or models of circles.)**

## DEMONSTRATE YOUR UNDERSTANDING — APPENDIX G

1. Rewrite the formula for the area of a rectangle to solve for length.

$$A = L \cdot W$$

$$\frac{A}{W} = L$$

$$L = \frac{A}{W}$$

2. Rewrite the formula for the area of a circle using diameter instead of radius.

$$A = \pi \cdot r^2$$

$$A = \pi \cdot \left(\frac{d}{2}\right)^2$$

$$A = \frac{\pi \cdot d^2}{4}$$

$$A = \frac{1}{4} \cdot \pi \cdot d^2$$

# IDENTIFY AND CORRECT THE ERRORS — APPENDIX G

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. Find the area of a circle with the given radius:<br>4 inches<br>**Worked Solution**<br>*(What is wrong here?)*<br>$A = 2\pi r$<br>$= 2\pi( 4\ in )$<br>$= \pi( 8\ in )$<br>$=$ **25.12 *in*** | **The student has incorrectly used the formula for finding the circumference of a circle when the formula for finding the area was needed.** | $A = \pi r^2$<br>$= \pi( 4\ in )^2$<br>$= \pi( 16\ in^2 )$<br>$=$ **50.27 $in^2$** |
| **Problem** | **Describe Error** | **Correct Process** |
| 2. Find the area of a rectangle with the following dimensions:<br>length = 3 cm<br>width = 4 cm<br>**Worked Solution**<br>*(What is wrong here?)*<br>A = 2(4 cm) + 2(3 cm)<br>A = 8 cm + 6 cm<br>**A = 14 cm** | **The student has incorrectly applied the formula for finding perimeter when the formula for area was needed.** | A = l • w<br>A = (3 cm) (4 cm)<br>**A = 12 $cm^2$** |