Section 5.3 Multiplication with Decimals; Circumference and Area of a Circle

1. **Rule for Multiplying Decimals:** To multiply two decimal numbers:
   - Multiply as you would if the decimal point was not there. Arrange the two numbers one under the other and lined up on the right hand side.
   - Place the decimal point in the answer so that the number of digits to its right is equal to the total number of digits to the right of the decimal points in the original two numbers in the problem.

   Example 1: Simplify each of the following.

   a. $7.8 \bullet 3.02$

   b. $-4.5(2.04)$

2. **Estimating:** Round each decimal to a whole number, then perform the computations. Your answer will be an estimate for the true result.

   Example 2: Estimate the answer.

   a. $7.8 \bullet 3.02$

   b. $8.04 + 17.2$

3. Combined Operations: Use the order of operations agreement and the rules for operations on decimal numbers to simplify expressions involving decimals numbers and addition, subtraction, and multiplication.

Example 3: Simplify.

a. $4.04(0.05\text{-}6.6)$

b. $3.6+(2.1)^2$

4. Applied Problems: Decide whether to add, subtract or multiply to solve the given problem, and then apply the appropriate rule for adding, subtracting, or multiplying decimal numbers. . Show your work in algebraic format: identify the quantity that your variable represents, write an equation, solve your equation, and write your answer in English words.

Example 4: Solve. Show all steps in algebraic format.

If I cup of regular coffee contains 105 milligrams of caffeine how much caffeine is contained in 3.5 cups of coffee?

5. Circumference and Area of a Circle: The circumference of a circle is the distance around the circle. The area of a circle is a measure of the space enclosed by the circle. The diameter of a circle is the distance from one side to the other, through the center. The radius is one-half of the diameter. Formulas for circumference, area and radius are:

$$C = 2\pi r \quad \text{or} \quad C = \pi d$$

$$A = \pi r^2$$

$$r = \frac{1}{2}d$$

where A is the area, C is the circumference, r is the radius and d is the diameter.

When solving geometry problems use the following format:
- Write the formula.
- Plug in the known values.
- Solve for the requested quantity. Use the appropriate units with your answer.
- You may use your calculator for these problems. Round your answers to the nearest hundredth. Use the value 3.14 for π.

Example 5: Solve the following geometry problem:
a. Find the circumference of a circle of diameter 3.12 feet.

b. Find the area of the given circle.

2.07"
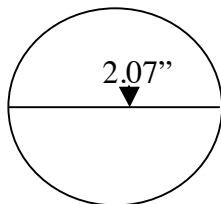
6. Volume of a Right Circular Cylinder: The volume of a right circular cylinder is given by the formula $V = \pi r^2 h$, where r is the radius of the circular top or bottom, and h is the height of the cylinder.

Example 6: Solve the following geometry problems. Use the proper format:

- Write the formula.
- Plug in the known values.
- Solve for the requested quantity. Use the appropriate units with your answer.

You may use your calculator. Round your answers to the nearest hundredth.

a. Find the volume.

8.26 m

2.67 m.
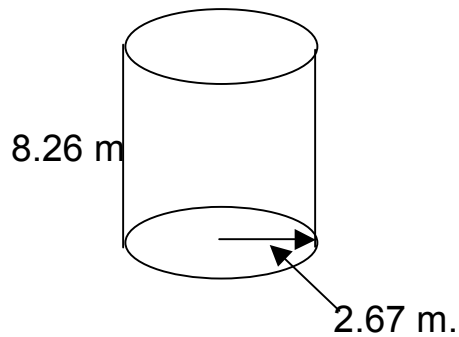
Practice Problems

Simplify:

a. $8.04 \bullet 17.2$

b. $-3.21(-6.2)$

Estimate:

c. $-3.21 - 3.62$

d. $-4.5(2.04)$

Simplify:

e. $(9.6\text{-}0.5)(9.6 + 0.5)$

Solve the following applied and geometry problems. Use the proper format:

- Write the formula.
- Plug in the known values.
- Solve for the requested quantity. Use the appropriate units with your answer.

You may use your calculator. Round your answers to the nearest hundredth.

f. Suppose it costs $20 per day and $0.08 per mile to rent a car. What is the total bill if the car is rented for 2 days and is driven 120 miles?

g. Find the area of a circle of radius 4.07 yards.

h. Find the volume of a cylinder with a base of radius 4.32 feet and a height of 7.2 feet.

Answers to Practice Problems:
a. 138.288; b. 19.902; c. –7; d. –10; e. 91.91; f. $49.60; g. 52.01 yd^2
h. 421.92 ft^3