

## Unit 2

### Lesson 5—Literal Equations Lesson Plan

(One Day)

- I. **CCSS:**  
**A.CED.A.4.** Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations.
- II. **Learning Objective:**  
Learning Target 2.1: The learner can create and solve (linear) equations and use them to solve problems.
  - The learner can rewrite and use equations in both variables (3 out of 4 times for both  $\pi$  and  $h$  for volume and surface area of the two containers) by the end of the lesson.
- III. **Anticipatory Set:** Hand out the Pre-assessment/Post-assessment worksheet (see unit plan). Students should complete the Pre-assessment portion to the best of their ability. Remind them that this is simply to see what they already know about literal equations.
- IV. **Objective/Purpose:** “Today, we will be working with equations that have more than one variable—these are called literal equations. We will be measuring the dimensions of cylinders, calculating their volumes and surfaces areas, then checking our work by rewriting literal equations.”
- V. **Input**
  - a. **Task Analysis:**
    - i. Students should begin working on the anticipatory set at the start of class. (10 min)
    - ii. State the objective and purpose for the lesson. (1 min)
    - iii. As a class, solve the equation  $y + 2 = 4x - 6$  for  $x$  on the board. (3 min)
    - iv. Explain the Cylinder Activity. (3 min)
      1. Students should get into groups of three. Each group needs to select one cylinder to begin.
      2. Students need to measure the height and diameter of their cylinder. Then use the equation to calculate the volume and surface area.
      3. Students will complete these same steps for a second cylinder (groups may have to trade cylinders).
      4. Students check their work by solving the surface area and volume equations for  $\pi$  and  $h$  (students do not need to solve for  $r$ )

- v. Students will complete Cylinder Activity. Ask a couple groups to show their work for a particular cylinder. (25 min)
- vi. Summarize activity. Address any misconceptions students made during activity. (5 min)
- vii. Students should complete Post-assessment (see unit plan). If students do not finish during class, they should complete it for homework. (5 min)

**b. Thinking Levels**

- i. Application/Applying: Apply steps for solving one variable equations to rewrite equations with more than one variable. Solve/rewrite literal equations to find the value of a particular variable.
- ii. Evaluate: Justify the steps taken to solve the problem to group members.

**c. Learning Styles and/or Accommodations**

- i. Learning Styles
  - 1. Visual and kinesthetic learning: Students measure dimensions of cylinders and calculate their volume and surface areas to make the connection to literal equations.
  - 2. Intrapersonal and interpersonal: students work individually on pre and post assessment and in a group on the main activity of the lesson.
- ii. Extensions/Accommodations
  - 1. For the visually impaired, use the magnification camera and monitor in order to magnify what is displayed on the projector and drawn on the whiteboard. Always repeat directions and solution steps several times.
  - 2. Read directions/problems out loud to students. Have other students working in these students' groups read each question out loud and assist these students if they need help reading anything else.
  - 3. Ask students who have completed the activity to write a paragraph summarizing the steps for solving for a particular variable in a literal equation.

**d. Methods and Materials**

- i. Ways of presenting: Guided practice, group activity, individual work on pre and post assessment.
- ii. Materials Needed: Whiteboard and markers, projector, pre and post assessment worksheet, Cylinder Activity, 10 different-sized cylinders, 10 tape rulers.

**IV. Modeling**

- a. After students have completed pre-assessment, “think aloud” about approaching solving a literal equation so students have a model on how to approach these problems on their own.
- II. **Checking for Understanding**
- a. As students work in groups, listen to groups’ conversations, check their work, and help groups who may get stuck on a problem.
  - b. Questions to ask:
    - i. What step can you perform to isolate  $\pi$ ? What step can you perform to isolate  $h$ ?
    - ii. Does this answer make sense?
    - iii. How do you know your answer is correct?
  - c. Pre and Post assessment
- III. **Guided Practice**
- a. After students have completed Pre-assessment, solve  $y + 2 = 4x - 6$  for  $x$  on the board. Call randomly on students to offer suggestions on how to isolate  $x$ .
- IV. **Independent Practice**
- a. Students will be working alone on post-assessment. They will be applying what they learned from the group activity to the post-assessment problems.
- V. **Closure:**
- a. Summarize what the students have done during the lesson.
    - i. “Today, we have seen real-life examples of literal equations. We can take the same steps to rewrite these equations as the steps to solve equations with one variable.”
- VI. **Assessment:**
- a. Students should be able to plug in values for  $r$  and  $h$  to obtain surface area and volume.
  - b. Students should apply the properties of equality to rewrite each literal equation for the particular variable.
  - c. When observing students working on activity, ask probing questions to students who may have conducted an incorrect step in solving the “equation.” For students who are confident in their incorrect answers, ask them to check their answer.
  - d. The post-assessment results will help determine if reteaching needs to take place.
  - e. If students need more practice solving linear equations (and are not ready for the Lesson 2-1 through 2-5 Quiz, take an extra day to reteach/model solving particular equations, and have students complete the *Solving Equations Practice*—see *Review, More Practice* folder of Unit Plan).

- VII. **Reflection:** Reflect on the lesson and make necessary changes. Use the post-assessments to determine what needs to be recovered during the next lesson.
- a. Are the students ready to review lessons 1-5 for the Quiz?
  - b. How were the engagement levels of the students throughout the lesson? Did a hands-on activity engage those students who are not normally engaged during direct instruction (lecture)?

\*This lesson was adapted from “Don’t Take it so Literal,” by Russell Renfro, contributed by Volusia.

Link: <http://www.cpalms.org/Public/PreviewResourceLesson/Preview/46566>