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DepED
DEPARTMENT OF EDUCATION

Lesson Exemplar for Mathematics

Quarter 2
Lesson
4

Lesson Exemplar for Mathematics Grade 7
Quarter 2: Lesson 4 (Week 4)
SY 2024-2025

Development Team

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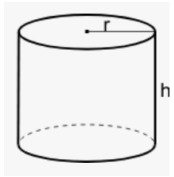
MATHEMATICS / QUARTER 2 / GRADE 7

I. CURRICULUM CONTENT, STANDARDS, AND LESSON COMPETENCIES	
A. Content Standards	The learners should have knowledge and understanding of the volume of square and rectangular pyramids, and cylinders.
B. Performance Standards	By the end of the quarter, the learners are able to find the volume of square and rectangular pyramids, and the volume of cylinders. (MG)
C. Learning Competencies and Objectives	***Learning Competency*** By the end of the lesson, the learners are able to … 1. explain inductively the volume of a cylinder using the area of a circle, leading to the identification of the formula. *a. correctly determine the dimension of a cylinder;* *b. correctly determine the relationship between the cylinder and the area of a circle; and* *c. correctly derive the formula for finding the volume of a cylinder.* 2. find the volume of a cylinder. 3. solve problems involving the volumes of cylinders.
D. Content	Derive the Formula of the Volume of the Cylinder using the Area of the Circle Calculate Volume of a Cylinder Solve Word Problems involving Volume of Cylinder
E. Integration	

II. LEARNING RESOURCES
Bernabe, J. G., & Dilao, S. J. (2009). Geometry. Philippines: SD Publications, Inc. Carasco, J. (2021). Volume of Solids. *Basic Mathematics.com.* https://www.basic-mathematics.com/volume-of-solids.html CueMath. (n.d.). Volume of a Cylinder. https://www.cuemath.com/measurement/volume-of-cylinder/ Math Worksheets 4 Kids. (2023). Volume of a Cylinder Worksheet. https://www.mathworksheets4kids.com/volume-cylinders.php Orines, F. B., Mercado, J. P., & Suzara, J. L. (2008) Geometry. Philippines: Phoenix Publishing House, Inc.

III. TEACHING AND LEARNING PROCEDURE		NOTES TO TEACHERS
A. Activating Prior Knowledge	**DAY 1** **1. Short Review** Let the learners answer the short activity worksheet. Teachers in this part will recall prior knowledge of learners to assess their understanding about the area of the circle and its concept before engaging them to the new lesson. **2. Feedback (Optional)** Review volume of Cube and Rectangular Prisms if needed.	If the teacher is not satisfied with the response of the learners to the short review activity, the teacher may add activities to cultivate the necessary knowledge. Students can do this in a separate worksheet provided.
B. Establishing Lesson Purpose	**1. Lesson Purpose** Consider the following scenario: The owner of a newly constructed house plans to install a cylindrical water tank with exactly 4 feet in diameter that can hold at least 50 cubic feet of water. At least how long/high should the tank be? **Essential Questions:** 1. How do we solve for an area of a circle, given its radius or diameter, to be the parallel base of the cylindrical tank? 2. How does the relationship between the cylinder and the area of the circle help us in determining the formula for the volume of the cylinder? 3. How do you know how much water a cylindrical water tank can occupy? To answer this problem, we need to learn the concept of *volume* and familiarize ourselves with the appropriate formulas. **2. Unlocking Content Area Vocabulary** *Volume* is the amount of space taken up or occupied by an object or that is enclosed within a container. The volume measures how much space an object occupies or the capacity of a container.	In this part, the teacher will explain the importance of learning the specific topic that involves the volume of a cylinder. The teacher may also use the essential questions to engage students on why it is important to learn the lesson.
C. Developing and Deepening Understanding	**DAY 2** **SUB-TOPIC 1: VOLUME OF CYLINDER** **1. Explicitation** A cylinder is a 3-dimensional figure having parallel circular bases as shown in the figure below. In our discussion, the bases of a cylinder are circles, and its height forms a right angle with the bases.	Make sure that students already mastered volumes of cubes and rectangular prisms. (Area of base times height or $V = A_{base} \times h$).

Similar to that of cubes and rectangular prisms, the formula for finding the volume of a cylinder is



$\boldsymbol{V_{cylinder} = A_{base} \cdot h}$ (area of the base times height).

Since the base is a circle (Re: $A_{circle} = \pi r^2$), the formula for the volume of cylinder is

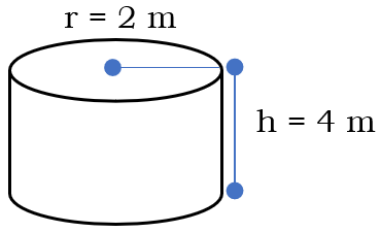
$$V_{cylinder} = A_{circle} \cdot h$$
$$V_{cylinder} = \pi r^2 \cdot h.$$

Note that by "cylinder", we only consider a right circular cylinder.

2. Worked Example

Example 1. Find the volume of a cylinder with radius measuring 2 meters (2 m) and height 4 meters (4 m).

Solution:



- What is asked in the problem?
  The volume of a cylinder.
- What is the unit used in the problem?
  The unit used is meters.
- What is the volume of the cylinder?
  The volume of the cylinder is $50.24\ m^3$

The teacher asks the questions. Students supply the answer.

Using $\pi = 3.14$ (approximate value) and the formula for the volume of cylinder, we have

$$V_{cylinder} = \pi r^2 \cdot h$$
$$V = (3.14)(2\ m)^2 \cdot (4\ m)$$
$$V = (3.14)(4\ m^2) \cdot (4\ m)$$
$$V = 12.56\ m^2 \cdot (4\ m)$$
$$V = 50.24\ m^3$$

Therefore, the volume of the cylinder is $V = 50.24\ m^3$.

The teacher may use other ways of solving the problem in which he/she can distinguish what solving strategy worked best.

Example 2. The diameter of a can of sardines is 5 cm, and the height is 8.5 cm. What is the volume of the tin can?

Solution:

- What is being asked in the problem?
  The volume of the tin can is asked.
- What is the unit used in the problem?
  The unit used in the problem is centimeter (cm).
- What is the volume of the tin can?
  The volume of the tin can of sardines is $166.81\ cm^3$.

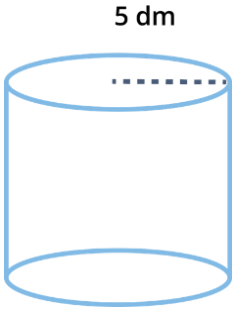
After Example 2, the teacher may proceed to Practice/Drill 1 in the worksheet.

By definition, the radius of a circle is just half of its diameter. Since the diameter is 5 cm, then the radius denoted as r is 2.5 cm. (r = 2.5 cm.). Note that 3.14 is the approximate value of π. Using the formula for finding the volume of a cylinder, we have

$$V_{cylinder} = \pi r^2 \cdot h$$
$$V = (3.14)(2.5\ cm)^2 \cdot (8.5\ cm)$$
$$V = (3.14)(6.25\ cm^2) \cdot (8.5\ cm)$$
$$V = 19.625\ cm^2 \cdot (8.5\ cm)$$
$$V = 166.8125\ cm^3 \approx 166.81\ cm^3$$

Therefore, the volume of the canned sardines is 166.81 cm^3.

Example 3: What is the height of a cylinder whose radius is 5 dm and has a volume of 471 dm³?



Solution:
Step 1: Analyze the given information.
The volume of a cylinder is expressed as $\boldsymbol{V = \pi \times r^2 \times h}$**.** Since the volume of the given figure is 471 dm³, it follows that

$$\boldsymbol{\pi \times r^2 \times h = 471\ dm^3.}$$

The radius of the circle base of the cylinder is 5 dm.

Step 2: *Solve for the height of the cylinder.*
Since $r = 5\ dm$, we can substitute this value to r in the formula. Let us also substitute π with 3.14. We have

$$\pi \times (5\ dm)^2 \times h = 471\ dm^3$$
$$3.14 \times 25\ dm^2 \times h = 471\ dm^3$$
$$78.5\ dm^2 \times h = 471\ dm^3$$

This equation tells us that the product of the measure of the height and 78.5 dm^2 is 471 dm^3. To determine the height of the figure, we can divide 471 dm^3 by 78.5 dm^2. That is

$$h = \frac{471\ dm^3}{78.5\ dm^2} = 6\ dm$$

Hence, the height of the cylinder is 6 dm.

After Example 3, students may proceed to Practice/Drill 2 in the worksheet provided.

Example 4. What is the radius of the cylinder whose height is 4 ft and volume of 50.24 ft³?

Solution:
Step 1: Analyze the given information.
The volume of a cylinder is expressed as $V = \pi \times r^2 \times h$.
Since the volume of the given figure is 50.24 ft³, it follows that

$$\pi \times r^2 \times h = 50.24 \text{ ft}^3.$$

The height h of the cylinder is 4 ft.

Step 2: Solve for the radius of the cylinder.
Since $h = 4\,ft$, we can substitute this value to h in the formula. Let us also substitute π with 3.14. We have

$$\pi \times r^2 \times h = 50.24\,ft^3$$
$$3.14 \times r^2 \times (4\,ft) = 50.24\,ft^3$$
$$12.56\,ft^2 \times r^2 = 50.24\,ft^3$$

This equation tells us that the product of the measure of the r^2 and $12.56\,ft^2$ is $50.24\,ft^3$. To determine the radius of the cylinder, we can divide $50.24\,ft^3$ by $12.56\,ft^2$ That is

$$r^2 = \frac{50.24\,ft^3}{12.56\,ft^2}$$
$$r^2 = 4\,ft^2$$
$$r = 2\,ft$$

By taking the positive square root, the radius of the cylinder is **2 ft**.

DAY 3

3. Lesson Activity

Practice/Drill 1.
Find the volume of the solid figure with the following measurements:
(Draw the solid figure with measurements)

1) A cylinder with diameter measuring 24 in and height 24 in.
   - What is asked in the problem?
   - What is the unit used in the problem?
   - What is the volume of the cylinder?

The teacher may use Think, Pair, Share and other strategies.

Students will do this in a separate worksheet provided.

	2) A cylinder whose radius measures 40 cm and height 30 cm. • What is asked in the problem? • What is the unit used in the problem? • What is the volume of the cylinder? 3) A can of paint whose diameter is 6.5 in and height of 8 in. • What is asked in the problem? • What is the unit used in the problem? • What is the volume of the can of paint? **Practice/Drill 2.** 1) Find the height of a cylinder with volume 10,851.84 in^3 and radius of 12 in. • What is asked in the problem? • What is the unit used in the problem? • What is the height of the cylinder? 2) Find the radius of a cylinder whose volume is 150,720 cm^3 and height 30 cm. • What is asked in the problem? • What is the unit used in the problem? • What is the radius of the cylinder? 3) Find the area of the base of a can of paint whose volume is 265.33 m^3 and height of 8 m. • What is asked in the problem? • What is the unit used in the problem? • What is the area of the base of the can of paint?	The teacher may use Think, Pair, Share and other strategies. Students will do this in a separate worksheet provided.
D. Making Generalizations	**1. Learners' Takeaways** **A. Generalization Questions** 1) How do you determine the volume of a cylinder? 2) Why do you think cylinders are usually used for water containers instead of prisms? 3) Why do you think cylinders are usually used for packing canned goods instead of prisms?	The teacher may ask questions that lead to abstractions of the lesson.

	B. Generalization Activities Solve the following problems with accuracy. 1) If a cylindrical can has a volume of 342.16 cm^3 and a radius of 5 cm, what is the measure of its height? 2) Working alone, it takes Dina eight hours to dig a 10 ft by 10 ft hole. Kiray can dig the same hole in nine hours. How long would it take them if they worked together? 3) Which is the "better buy" for you? Please explain your answer. a) To buy 1 pizza with 10 inches in diameter (worth P400)? Or b) To buy 2 pizzas with 5 inches in diameter (worth P400)? *(Pizzas are of the same thickness)* **C. Generalization Statements** *Volume* is the measure of space taken up by a solid figure or an object. The *volume* of a solid measures how much space an object takes up. The *capacity* of a container is basically equal to its *volume*. The *volume of a cylinder* is equal to the area of the base (circle) times its height. $V_{cylinder} = \pi r^2 \cdot h$ **2. Reflection on Learning** Are there any challenges and misconceptions you encountered while studying the lesson? What are those?	The teacher may give activities to emphasize generalization of the lesson. Recall the lesson activity for them to answer the problems based on their understanding of the lesson activity. The teacher may ask students to give a generalization statement. In this part, students may write a reflection about the importance of the lesson in real-life representation.

IV. EVALUATING LEARNING: FORMATIVE ASSESSMENT AND TEACHER'S REFLECTION		**NOTES TO TEACHERS**
A. Evaluating Learning	**DAY 4** **1. Formative Assessment** Solve the following problems. Use $\pi = 3.14$. 1. Find the volume of a cylinder having a radius of 7 inches and a height of 10 inches. 2. What is the radius of a cylinder having a height of 5 meters and a volume of 141.3 cubic meters? 3. What is the height of a cylinder having a volume of 549.5 square feet and a radius of 5 feet?	Collaborative activity Students can do this in a separate Worksheet 4 provided.

<table>
<tr><td></td><td colspan="3">4. How many liters of water are needed to fill a circular swimming pool of a diameter of 21 feet and a depth of 8 feet? (1 cu. ft. ≈ 28.32 liters)
5. The owner of a newly constructed house plans to install a cylindrical water tank with exactly 4 feet in diameter that can hold at least 50 cubic feet of water. At least how long/high should the tank be?

2. Homework (Optional)
The teacher may give homework for mastery</td><td></td></tr>
<tr><td rowspan="5">B. Teacher's Remarks</td><td>Note observations on any of the following areas:</td><td>Effective Practices</td><td>Problems Encountered</td><td rowspan="5">The teacher may take note of some observations related to the effective practices and problems encountered after utilizing the different strategies, materials used, learner engagement, and other related stuff.

Teachers may also suggest ways to improve the different activities explored/lesson exemplar.</td></tr>
<tr><td>strategies explored</td><td></td><td></td></tr>
<tr><td>materials used</td><td></td><td></td></tr>
<tr><td>learner engagement/ interaction</td><td></td><td></td></tr>
<tr><td>others</td><td></td><td></td></tr>
<tr><td>C. Teacher's Reflection</td><td colspan="3">Reflection guide or prompt can be on:
• <u>principles behind the teaching</u>
What principles and beliefs informed my lesson?
Why did I teach the lesson the way I did?

• <u>students</u>
What roles did my students play in my lesson?
What did my students learn? How did they learn?

• <u>ways forward</u>
What could I have done differently?
What can I explore in the next lesson?</td><td>Teacher's reflection in every lesson conducted/facilitated is essential and necessary to improve practice. You may also consider this as an input for the LAC/Collab sessions.</td></tr>
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