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DepED
DEPARTMENT OF EDUCATION

Lesson Exemplar for Mathematics

Quarter 2
Lesson
6

Lesson Exemplar for Mathematics Grade 7
Quarter 2: Lesson 6 (Week 6)
SY 2024-2025

Development Team

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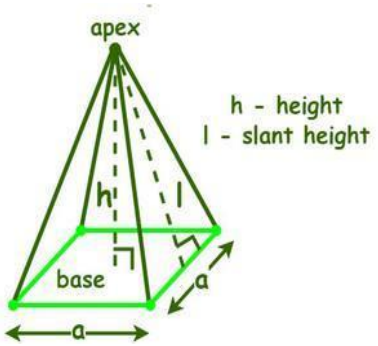
MATHEMATICS / QUARTER 2 / GRADE 7

I. CURRICULUM CONTENT, STANDARDS, AND LESSON COMPETENCIES	
A. Content Standards	The learners should have knowledge and understanding of 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 square and rectangular pyramid, leading to the identification of the formula. 2. find the volume of a square and rectangular pyramid. 3. solve problems involving the volumes of square and rectangular pyramids. ***Learning Objectives*** *At the end of this lesson, the learner should be able to:* 1. accurately determine the properties of square and rectangular pyramids; 2. accurately determine the relationship between a cube, rectangular prism and a pyramid; 3. correctly determine the volumes of square and rectangular pyramids; and 4. correctly solve word problems involving the volumes of square and rectangular pyramids.
D. Content	Deriving the Formula of the Volume of the Square Pyramid Estimate Volume of a Square Pyramid Solve Problems involving the Volume of Square Pyramids
E. Integration	Optional

II. LEARNING RESOURCES
Big Ideas Math. (n.d.). Volumes of Pyramids. https://www.bigideasmath.com/protected/content/ipe/grade%207/07/g7_07_03.pdf CueMath. (2023). Square Pyramid. https://www.cuemath.com/geometry/square-pyramid/ Math is Fun. (2017). Pyramids. https://www.mathsisfun.com/geometry/pyramids.html Math Worksheets 4 Kids. (2023). Volume of Rectangular Pyramid. https://www.mathworksheets4kids.com/volume/rectangular-pyramid-all.pdf Nagwa. (2024). Volume of Rectangular Pyramid. https://www.nagwa.com/en/presentations/576124795725/

SplashLearn. (n.d.). Rectangular Prism – Definition, Types, Properties, Examples, FAQs. https://www.splashlearn.com/math-vocabulary/geometry/rectangular-prism
Testbook. (2023). Rectangular Pyramid: Types, Formula, Properties, and Examples. https://testbook.com/maths/rectangular-pyramid
Third Space Learning. (2023). Square Pyramid. https://thirdspacelearning.com/us/math-resources/topic- guides/geometry/square-pyramid/

III. TEACHING AND LEARNING PROCEDURE		NOTES TO TEACHERS
A. Activating Prior Knowledge	**DAY 1** **1. Short Review** Let the learners answer the short activity by doing the following steps. • Draw the solid figure with measurements. • Answer the guide questions in complete sentences. • Show solutions in the space provided. 1. A rectangular pyramid has a length of 9 inches, a width of 6 inches, and a height of 4 inches. Find the volume of the pyramid. • What is asked in the problem? • What is the unit used in the problem? • What is the volume of the rectangular pyramid? 2. A rectangular pyramid has a width of 2 ft, a length of 6 ft, and a height of 10 ft. Find the volume of the pyramid. • What is asked in the problem? • What is the unit used in the problem? • What is the volume of the rectangular pyramid? 3. A rectangular pyramid has a base area of 90 ft^2 and a height of 12 ft. Find the volume of the pyramid. • What is asked in the problem? • What is the unit used in the problem? • What is the volume of the rectangular pyramid?	The teacher will unlock the main topic by activating the prior knowledge of learners. This lesson leads them to relate their prior knowledge to learn the new lesson. The teacher may also add more activities when it is necessary.

	4. The base area of a rectangular pyramid is 180 square feet. If its height is 9 feet, what is its volume? ● What is asked in the problem? ● What is the unit used in the problem? ● What is the volume of the rectangular pyramid? **2. Feedback (Optional)** To explain the answer to the activity, let the learners give their thoughts on how to solve the volume of the given solid figures. The learner should also explain how the properties of solid figures are useful in determining the dimensions of solid figures for them to apply the formula in solving their volumes. With this, the learner in this stage of the lesson can relate the short activity to the new lesson. **Ask the following essential questions for further discussion:** 1. How do you differentiate a rectangular prism from a rectangular pyramid? 2. How did you compute the volumes of the pyramids? 3. How is the volume of a rectangular pyramid related to the volume of a rectangular prism?	The teacher should give feedback after the learner answers the short activity. Students can do this on a separate worksheet provided.
B. Establishing Lesson Purpose	**1. Lesson Purpose** Now that you are comfortable finding the volume of a rectangular pyramid, finding the volume of a square pyramid should not be a problem since a square is a rectangle. **2. Unlocking Content Area Vocabulary** *Pyramids* are three-dimensional geometric shapes where the base is a polygon, and all other sides are triangles that meet at the apex or vertex. A r*ectangular pyramid* is a solid figure that has a rectangular base and four triangular faces joined at the top by a vertex. The bottom rectangles are called the base of the pyramid. Since a square is a rectangle with four equal sides, then a *square pyramid* is a rectangular pyramid with a square base, and four triangular faces joined at the top by a vertex.  	In this part, the teacher should explain the importance of the lesson to the students. Giving real-world examples of square pyramids is helpful in engaging them to learn the lesson.

	The *height of the square pyramid* is the *perpendicular height,* which is the distance from the apex or vertex to its base. The *slant height* is the perpendicular distance measured along a *lateral face* from the apex to the *base edge*.	
C. Developing and Deepening Understanding	**SUB-TOPIC: VOLUME OF SQUARE PYRAMID** **1. Explicitation** Recall that a r*ectangular pyramid* is a solid figure that has a rectangular base and four triangular faces joined at the top by a vertex. The bottom rectangles are called the base of the pyramid. Since a *square* is a rectangle with four equal sides, that is, its length and width are equal, it follows that the volume of a *square pyramid* where ***l*** = ***s*** units and ***w*** = ***s*** units is $V_{pyramid} = \frac{1}{3}(A_{base}\ x\ h)$ $V_{pyramid} = \frac{1}{3}(l\ x\ w\ x\ h)$ $V_{pyramid} = \frac{1}{3}(s\ x\ s\ x\ h)$ Thus, the volume of a square pyramid can be written in this form: $V_{pyramid} = \frac{1}{3}(s^2\ x\ h)$ **DAY 2** **2. Worked Example** **Example 1.** Find the volume of a square pyramid if its base edge is 9 meters and its height is 14 meters. Solution: • What is being asked in the problem? The volume of a square pyramid is asked. • What is the unit used in the problem? The unit used in the problem is **meters** (m). • What is the volume of the square pyramid? Using the formula of the volume of a square pyramid, we have $V_{pyramid} = \frac{1}{3}(s^2 \times h)$ Then, $V_{pyramid} = \frac{1}{3}((9\ m)^2 \times 14\ m)$ $V_{pyramid} = \frac{1}{3}(81\ m^2 \times 14\ m)$ $V_{pyramid} = 378\ m^3$	Make sure that students already learned volumes of cubes and rectangular prisms (Area of base times height or V = A_{base} x h). Note that by a "square pyramid", we only consider a *right* square pyramid. The teacher asks the questions while the students supply the answers. In this part, the teacher will employ interactive discussion.

Therefore, the volume of the square pyramid is $378\ m^3$.

Example 2. Find the volume of a square pyramid if its height is 12 inches and its base edge is 7 inches.
Solution:

- What is being asked in the problem?
  The volume of a square pyramid is asked.
- What is the unit used in the problem?
  The unit used in the problem is **inches** (in).
- What is the volume of the square pyramid?
  Using the formula of the volume of a square pyramid, we get

$$V_{pyramid} = \frac{1}{3}(s^2 \times h)$$

Then,

$$V_{pyramid} = \frac{1}{3}((7\ ft)^2 \times 12\ in)$$
$$V_{pyramid} = \frac{1}{3}(49\ ft^2 \times 12\ in)$$
$$V_{pyramid} = 196\ in^3$$

Thus, the volume of the square pyramid is $196\ in^3$.

Example 3. The roof of a house is in the form of a square pyramid. If its base edge is 6 feet and the volume is 120 cubic feet, how high is the roof?
Solution:

- What is being asked in the problem?
  The height of the roof is asked.
- What is the unit used in the problem?
  The unit used in the problem is **feet** (ft).
- What is the volume of the square pyramid?
  Using the formula of the volume of a square pyramid, we get

$$V_{pyramid} = \frac{1}{3}(s^2 \times h)$$

Then,

$$120\ ft^3 = \frac{1}{3}((6\ ft)^2 \times h)$$
$$120\ ft^3 = \frac{1}{3}(36\ ft^2 \times h)$$

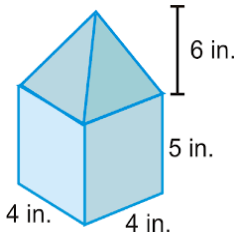
Multiplying 120 by 3, we have $360\ ft^3 = 36\ ft^2 \times h$
To get the height, we divide 360 by 36. This results to $h = 10\ ft$
Thus, the height of the roof is 10 feet.

The teacher may use Think, Pair, Share (TPS) and other strategies to engage learners in deepening the lesson.

	3. Lesson Activity **Activity No. 1** Find the volume of the solid figures described by doing the following steps. • Draw the solid figure with measurements. • Answer the guide questions in complete sentences. • Show solutions in the space provided. 1. A square pyramid has a base edge of 7 inches and height of 5 inches. Find the volume of the square pyramid. • What is asked in the problem? • What is the unit used in the problem? • What is the volume of the square pyramid? 2. A square pyramid has a height of 20 ft and a base width of 5 ft. What is the volume of the pyramid? • What is asked in the problem? • What is the unit used in the problem? • What is the volume of the square pyramid? 3. A square pyramid has a base area of 121 ft^2 and a height of 9 ft. Determine the volume of the pyramid. • What is asked in the problem? • What is the unit used in the problem? • What is the volume of the square pyramid? 4. The Louvre Pyramid in Paris, France has a height of 71 ft. Its square base has sides of 34 meters. Find the volume of the pyramid. • What is asked in the problem? • What is the unit used in the problem? • What is the volume of the Louvre Pyramid? 5. The roof of a house is in the form of a square pyramid. If its volume is 256 cubic feet and the base edge is 8 feet, how high is the roof? • What is asked in the problem? • What is the unit used in the problem? • What is the height of the roof?	The teacher should use collaborative and individual implementation of the activity to assess and evaluate the learning of students in two aspects of learning styles. Students can do this on a separate worksheet provided.

DAY 3

Example 4. Find the volume of the composite solid shown.



Solution:

The composite solid is composed of a rectangular prism and a rectangular pyramid on top. To find its volume, we need to add the volumes of the prism and the pyramid.

Thus,

$V_{prism} = A_{base} \times h$ and $V_{pyramid} = \frac{1}{3}(s^2 \times h)$

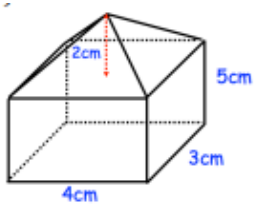
$V_{prism} = l \times w \times h$ $V_{pyramid} = \frac{1}{3}((4\ in)^2 \times 6\ in)$

$V_{prism} = 4\ in \times 4\ in \times 5\ in$ $V_{pyramid} = \frac{1}{3}(16\ in \times 6\ in)$

$V_{prism} = 80\ in^3$ $V_{pyramid} = \frac{1}{3}(96\ in^3) = 32\ in^3$

Therefore, **the volume of the composite solid V_{total} = 80 in³ + 32 in³ = 112 in³.**

Example 5. Find the volume of the composite solid shown.



Solution:

The composite solid is composed of a rectangular prism and a rectangular pyramid on top. To find its volume, we need to add the volumes of the prism and the pyramid.

Thus,

$V_{prism} = A_{base} \times h$ and $V_{pyramid} = \frac{1}{3}(A_{base} \times h)$

$V_{prism} = l \times w \times h$ $V_{pyramid} = \frac{1}{3}(l \times w \times h)$

$V_{prism} = 4\ cm \times 3\ cm \times 5\ cm$ $V_{pyramid} = \frac{1}{3}(4\ cm \times 3\ cm \times 2\ cm)$

$V_{prism} = 60\ cm^3$ $V_{pyramid} = \frac{1}{3}(24\ cm^3) = 8\ cm^3$

Thus, **the volume of the composite solid V_{total} = 60 cm³ + 8 cm³ = 68 cm³.**

Exercise No. 2

Solve the following problems completely by following the steps below.

- Draw the solid figure (except for number 1) with measurements.
- Show solutions in the space provided.
- Write the final answers in sentence form.

To further the discussion, the teacher may add more learning activities.

Be guided by the rubric.

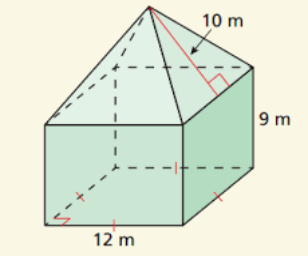
Criteria	Points	Accumulated Points
Accuracy of solution	5	
Correct diagram	3	
Proper use of mathematics symbols	2	
Correct final answer	5	
Total	15	

1. Lina received a gift from her parents. The package of the gift is in the form of a square pyramid. The base edge of the pyramid is 20 cm while its height is 8 cm. Find the volume of the package of the gift.

2. Bitoy is constructing a container in the shape of a square pyramid for a project. He wants the base of the pyramid to measure 6 inches by 6 inches and the height of the pyramid to be 15 inches. How many cubic inches could the pyramid hold?

3. On a trip to Egypt, Kiray bought a small stone in the shape of a square pyramid as a souvenir. This has a height of 2 in and a base area of 2.25 in^2. Determine the volume of the stone.

4. Find the volume of the composite solid shown.



D. Making Generalizations

1. Learners' Takeaways

A. Generalization Questions

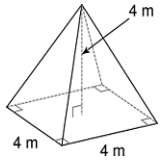
1. How do you determine the volume of a square pyramid?
2. How are the volumes of a cube and a square pyramid related?
3. Why do you think pyramid shapes are usually used for roofs of most houses instead of a simple slope or single slant?

The teacher may ask questions that lead to abstractions of the lesson.

	B. General Statements The **Square Pyramid** is a three-dimensional geometric shape consisting of four triangular sides connected at a vertex and a square base. A square foundation and four triangles joined to a vertex make up a square pyramid. Its side faces are triangles with a shared vertex, while its base is square. The volume of a square pyramid is $V_{pyramid} = \frac{1}{3}(s^2 \times h) = \frac{1}{3}s^2h$ A square is a *rectangle* with four equal sides. A rectangular pyramid is a three-dimensional figure that has triangles as surfaces and a rectangle as its base. Three rectangular pyramids fill one rectangular prism with the same base and height. **C. Generalization Activity** Carlo is constructing a container in the shape of a square pyramid for a project to be presented in class. His teacher also said that every pyramid should represent a real-life example to make the project meaningful. He wants the base of the pyramid to measure 5 inches by 5 inches and the height of the pyramid to be 8 inches. How many cubic inches could the pyramid hold? What steps should Julio use to determine the volume of the constructed square pyramid? **2. Reflection on Learning** Let students share their reflections.	The teacher may ask students to give a generalization statement. The teacher may give this generalization activity as homework. 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** **A. Multiple Choice** Directions: Read each problem carefully. Encircle the letter of the correct answer. 1. Find the volume of a pyramid with a base area of 24 square centimeters and a height of 12 centimeters. a. 36 cm^3 b. 56 cm^3 c. 96 cm3 d. 288 cm^3	The teacher should assess learners collaboratively and individually on the last three days of this lessons. Students can do this in the separate worksheet provided.

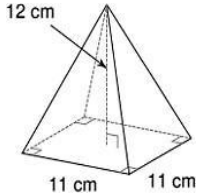
2. Given the figure below, solve for the volume.



a. 64/3 m^3 b. 32/3 m^3 c. 64/3 m^2 d. 32/3 m^2

3. Find the volume of a square pyramid that has a side length of 3ft, a width of 2ft, and a height of 5ft.
   a. 60 ft^3 b. 45 ft^3 c. 20 ft d. 15 ft

4. Given the pyramid below, what is its volume?



a. 626 cm^3 b. 484 cm^3 c. 131 cm^3 d. 121 cm^3

B. Problem-solving. Solve the following problems completely.

- Draw the solid figure with measurements.
- Show solutions in the space provided.
- Write the final answers in sentence form.

1. A planter in the shape of a square pyramid is being filled with soil. The pyramid has a base length of 10 inches and a height of 12 inches. Soil costs Php 1.50 per cubic inch. What is the volume of the planter? How much (in Php) is the cost of the soil in the planter?
2. A paperweight made of glass is sold as a souvenir at a tourist center. The height of the pyramid paperweight is 4 inches, and its base area is 9 square inches. How much glass, in cubic inches, is needed to manufacture 200 paperweights?

Answer Key:

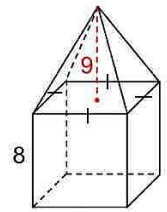
1. 96 cm3
2. 64/3 m^3
3. 15 ft
4. 484 cm^3

Answer Key:

1. V = 400 ft^3, Cost = 600 Php

2. Glass = V x 200 = 12 x 200 = 2,400 cubic inches

3. V = V of the cube + V of the square pyramid = 512 + 192 = 704 cubic centimeters

<table>
<tr><td></td><td colspan="3">3. Find the volume of the composite solid shown in cubic centimeters.
 

2. Homework (Optional)</td><td>The teacher may give homework to students who still have difficulty understanding the lesson and mastery.</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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