



# **Mathematics**

# Quarter 4 – Module 7: **Estimating and Using Appropriate Units of Measure** for Volume



#### Mathematics – Grade 5 Alternative Delivery Mode Quarter 4 – Module 7: Estimating and Using Appropriate Units of Measure for Volume First Edition, 2020

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# **Mathematics**

Quarter 4 – Module 7: Estimating and Using Appropriate Units of Measure for Volume



### **Introductory Message**

This Self-Learning Module (SLM) is prepared so that you, our dear learners, can continue your studies and learn while at home. Activities, questions, directions, exercises, and discussions are carefully stated for you to understand each lesson.

Each SLM is composed of different parts. Each part shall guide you step-bystep as you discover and understand the lesson prepared for you.

Pre-tests are provided to measure your prior knowledge on lessons in each SLM. This will tell you if you need to proceed on completing this module or if you need to ask your facilitator or your teacher's assistance for better understanding of the lesson. At the end of each module, you need to answer the post-test to self-check your learning. Answer keys are provided for each activity and test. We trust that you will be honest in using these.

In addition to the material in the main text, Notes to the Teacher are also provided to our facilitators and parents for strategies and reminders on how they can best help you on your home-based learning.

Please use this module with care. Do not put unnecessary marks on any part of this SLM. Use a separate sheet of paper in answering the exercises and tests. And read the instructions carefully before performing each task.

If you have any questions in using this SLM or any difficulty in answering the tasks in this module, do not hesitate to consult your teacher or facilitator.

Thank you.



## What I Need to Know

Hi, Mathithinik!!! This module was made for you to gain knowledge and ideas on how to estimate and use appropriate units of measure for volume. There are units of measure which are used for large volumes and so are for small volumes. Knowing this lesson is very much important in our real-life. So, be ready and focus as we start our lesson.

At the end of this module, you are expected to be able to:

- identify the units of measure for large volumes and small-volumes; and
- estimate and use appropriate units of measure for volume.

Before we proceed to the main lesson, let us check what you know about estimating and using the appropriate units of measure for volume.



What I Know

(A) m<sup>3</sup>

(A) cm<sup>3</sup>

**Directions:** A. Select the appropriate unit of measure for the volume of each of the following objects. Write the letter of your answers on your answer sheet.

1. a sling bag



(B)  $in^3$  (C)  $mm^3$  (D)  $km^3$ 

2. a refrigerator



(B)  $mm^3$  (C)  $ft^3$  (D)  $km^3$ 

3. an ice bucket

and the second				
	(A) yd <sup>3</sup>	(B) m <sup>3</sup>	(C) cm <sup>3</sup>	(D) mm <sup>3</sup>

4. a van





- **Directions:** B. Read and understand the given. Choose the letter that corresponds to the correct answer. Write your solutions and the letters of your answers on a separate sheet of paper.
  - 6. Which of the following can be the volume of a standard die?



7. Which of the following can be the amount of space enclosed in a shoe box?



B. 60 km<sup>3</sup>

A. 10 cm<sup>3</sup>

C. 200 m<sup>3</sup>

D. 6 000 cm<sup>3</sup>

8. An aquarium is in the shape of rectangular prism. Its length, width and height are 2.8 m, 1.2 m and 0.75 m, respectively. Which of the following is the best estimate for the amount of space that is enclosed in the aquarium?

|--|

C. Between 2  $m^3$  and 3  $m^3$  D. More than 3  $m^3$ 

- 9. A wooden box is in the shape of a cube. If the length of the edge of the cube is 5.1 cm, which of the following is the best estimate for the volume of the box?
  - A. 5 m<sup>3</sup> B. 5 cm<sup>3</sup> C. 25 cm<sup>3</sup> D. 125 cm<sup>3</sup>
- 10. A cabinet is in the shape of rectangular prism. Its length, width and height are 1.6 m, 2.1 m and 0.75 m. Which of the following is the best estimate for the amount of space enclosed in the cabinet?

A. 1 m<sup>3</sup> B. 2 m<sup>3</sup> C. 4 m<sup>3</sup> D. 10 m<sup>3</sup>

Compare your answers with the Answer Key at the end of this module. If you got 9 or 10 correct answers, you may skip this module and proceed to the next. Otherwise, go to the next page to gain a better understanding of the concept of estimating and using appropriate units of measures for volume! Let's go!

# Lesson Estimating and Using Appropriate Units of Measure for Volume

In order to estimate and use appropriate units of measure for volume, you may need to determine if the object has large volume or small volume. It may help you understand the concept of the lesson.

Keep going!



In the previous lessons, you were able to learn the different units of measures. Also, you were able to learn on how to classify the different units of measure as to their uses.

Let us recall some of the different cubic units of measure in the metric system arranged from smallest to largest unit.

	$mm^3$	$cm^3$	$dm^3$	$m^3$	dam <sup>3</sup>	$hm^3$	$km^3$
Example:	<ol> <li>an encyclopedia unit of length: cm cubic unit: cu. cm or cm<sup>3</sup></li> </ol>		2) ice cube unit of length: mm cubic unit: cu.mm or mm <sup>3</sup>				
	3) wa un cu	ter tank it of lengtl bic unit: c	h: m u. m or n	1 <sup>3</sup>			

When estimating and using cubic unit for volume of an object, consider how big or small the object is. Refer to the different cubic units listed above.



Have you ever measured the length, height and width of a book? Which of the following units of measure would be appropriate to use?

Explain your answers.





You already have an idea how big or small everyday objects are. You should have an idea of how big or small the different units of volume are so you can match these with the objects.

The common units of measure for lengths, width, and height are meter, centimeter, millimeter, foot, yard and inch. In our country, we are usually using the units in metric system like meters, kilometers, centimeters and millimeters. Other countries use the units in imperial system like feet, yards and inches. You may have seen people using feet, yards and inches for measuring lengths.

If we need to measure the dimensions of a small object, we can use centimeter, millimeter, decimeter, or inches. However, for bigger, longer or wider objects, the units that can be used are foot, yard, meter or kilometer.

You already know that volume is the amount of space that is enclosed in a 3-dimensional or solid figure. Since it is an amount of space, it has to be measured in cubes. For instance, if the dimensions of a solid figure are in meters, the volume would be measured in cubic meters or m<sup>3</sup>. If the 3-dimensional figure is measured in inches, the volume would be in cubic inches or in<sup>3</sup>.

Let's consider the example in the previous part of the lesson.



What do you think is an appropriate unit of measure to be used for finding the volume of the book?

A book may represent a solid figure. Its dimensions are small. Hence, the volume is also small.

Therefore, you may use inches or centimeters as units of measure for the length, width and height of the book. The volume of the book can be in cubic inches or cubic centimeters.

Read and study the examples below.

**Example 1** For the volume of the water in an aquarium, the appropriate units of measure to use are cubic centimeters (cm<sup>3</sup>) or cubic inches (in<sup>3</sup>).



**Example 2** The appropriate unit of measure for the amount of space enclosed in the tank is cubic meters or  $m^3$ .



**Example 3** Let the volume of Figure A be 100 cm<sup>3</sup>. We can estimate the volumes of the other figures.



Figure B is almost half of the size of Figure A.

Figure C is almost double the size of Figure A.

Figure D is about the same size of Figure A.

Thus, the volumes of Figures B, C and D are approximately 50 cm<sup>3</sup>, 200 cm<sup>3</sup>

and 100 cm<sup>3</sup>, respectively.

**Example 4** A box is in the shape of rectangular prism. Its length, width and height are 2.8 m, 1.1 m and 0.95 m. Multiplying the dimensions, rounded off to the nearest whole numbers, gives a good estimate of the volume of the prism.

Length: 2.8 m is rounded up to 3 m. Width: 1.1 m is rounded down to 1 m. Height: 0.95 m is rounded up to 1 m.

Approximate volume = length × width × height =  $3 \text{ m} \times 1 \text{ m} \times 1 \text{ m} = 3 \text{ m}^3$ 

Thus, an estimate for the volume of the box is  $3 \text{ m}^3$ . It could also between  $2 \text{ m}^3$  and  $3 \text{ m}^3$ .

**Example 5** A piece of wood is in the shape of a cube. If its edge is 0.21 m, estimate the volume of the piece of wood.

*Solution:* If we are going to estimate the volume of the piece of wood, it is not logical to round it off to the nearest whole number, as that would be zero. This would give us a zero cubic meter for volume.

Since rounding off to the nearest whole number is not a good strategy, we may do it another way. You already know that 1 m = 100 cm. It follows that

 $0.21 \text{ m} = 21 \text{ cm} \approx 21 \text{ cm}.$ 

Let us use 20 cm as our estimate.

Approximate volume =  $20 cm \times 20 cm \times 20 cm = 8000 cm^3$ 

Thus, an estimate for the volume of the wood is  $8\,000\,$  cm<sup>3</sup>. It must be less than a cubic meter.

You are now ready to estimate and use appropriate units of measure in finding the volume of a solid figure. Keep going!



What's More

#### Activity 1: Choose Me In!

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**Directions:** Select the appropriate unit of measure for the volumes of the following objects. Write your answers on a separate sheet of paper.

1.		4 km <sup>3</sup>	cm <sup>3</sup>	mm <sup>3</sup>
2.		km³	cm <sup>3</sup>	m <sup>3</sup>
3.	The second	km³	cm <sup>3</sup>	mm <sup>3</sup>
4.		km³	cm <sup>3</sup>	m <sup>3</sup>
5.		ft³	dm³	km³

#### Activity 2: Pair Me Up!

**Directions:** Match the items in column A with the units of measure in column B in finding the volume of the given objects. Write the letter of your answer on your answer sheet.



#### Activity 3: Don't Underestimate Me!

**Directions:** A. Let the volume of Figure A be 100 cm<sup>3</sup>. Estimate the volumes of the other figures shown below. Write your answers on your answer sheet.









Figure D

Figure A

Figure B

Figure C

B. A box is in the shape of rectangular prism. Its length, width and height are 1.95 m, 1.02 m and 0.97 m. Estimate of the volume of the box.

C. A coffee pod is in the shape of a cube. If its edge is 19.2 cm, estimate the volume of the pod in cubic centimeters.



## What I Have Learned

- A. In your own words, explain how to estimate the volume of a given solid. You may give examples in your explanation.
- B. Give at least 3 examples of units of measure for small volumes.
- C. Give at least 3 examples of units of measure for large volumes.



**Directions:** Write on a separate piece of paper the appropriate unit of measure used for volumes of the following items in our kitchen. Estimate the volume of each.





#### Assessment

**Directions:** Read and understand the given. Choose the letter that corresponds to the correct answer. Write your solutions and the letters of your answers on a separate sheet of paper.

- 1. Which of the following is an appropriate unit of measure for the volume of a book?
  - A. mm<sup>3</sup> B. cm<sup>3</sup> C. m<sup>3</sup> D. km<sup>3</sup>
- 2. Which of the following is an appropriate unit of measure for the amount of space occupied by the planet Mercury?
  - A. mm<sup>3</sup> B. cm<sup>3</sup> C. m<sup>3</sup> D. km<sup>3</sup>
- 3. Which of the following is an appropriate unit of measure for the volume of the water an Olympic swimming pool?
  A. mm<sup>3</sup>
  B. cm<sup>3</sup>
  C. m<sup>3</sup>
  D. km<sup>3</sup>
- 4. Which of the following can be the volume of a standard die?
  - A. 8 cm<sup>3</sup> B. 8 m<sup>3</sup> C. 8 ft<sup>3</sup>
- 5. Which of the following can be the volume of a shoe box?



D. 6 000 cm<sup>3</sup>

D. 8

For items 6 and 8, let the volume of Figure A be  $20 \text{ cm}^3$ .



Figure A Figure B

A. 10 cm<sup>3</sup>



Figure C

- 6. Which of the following can be the best estimate for Figure B's volume? A. 10 cm<sup>3</sup> B. 20 cm<sup>3</sup> C. 40 cm<sup>3</sup> D. 100 cm<sup>3</sup>
- 7. Which of the following can be the best estimate for Figure C's volume? A. 10 cm<sup>3</sup> B. 20 cm<sup>3</sup> C. 40 cm<sup>3</sup> D. 80 cm<sup>3</sup>
- 8. An aquarium is in the shape of rectangular prism. Its length, width and height are 2.9 m, 1.13 m and 0.94 m, respectively. Which of the following is the best estimate for the volume of water that the aquarium can hold?
  A. Less than 1 m<sup>3</sup>
  B. Between 1 m<sup>3</sup> and 2 m<sup>3</sup>
  C. Between 2 m<sup>3</sup> and 3 m<sup>3</sup>
  D. More than 3 m<sup>3</sup>

9. A container is in the shape of a cube. The length of the edge of the cube is 2.1 m. Which of the following is the best estimate for the volume of the box?

A. 2 m<sup>3</sup>
B. 3 m<sup>3</sup>
C. 8 m<sup>3</sup>
D. 21 m<sup>3</sup>
10. A cabinet is in the shape of rectangular prism. Its length, width and height are 1.7 m, 2.05 m and 0.96 m. Which of the following is the best estimate for the volume of the cabinet?
A. 1 m<sup>3</sup>
B. 2 m<sup>3</sup>
C. 4 m<sup>3</sup>
D. 10 m<sup>3</sup>



Awesome!!! You have reached this far. Keep going!

**Directions:** A. Name at least 5 objects of different shapes and sizes. For each object, state an appropriate unit of measure to express their volumes. Estimate their volumes. On your answer sheet, copy and complete the table below.

Object	Unit of Measure for Volume	Estimated volume

B. As shown below, the edge length of each cube that the prism is made up of is 0.49 cm. Estimate the volume of the prism. What is the exact volume of the prism? You may use a calculator. Write your solution and your answer on a separate sheet of paper.



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	]		
C. 8 000 cm		5. dorf	9' IL <sub>2</sub>
B. 2 m <sup>3</sup>		4. d	4. cm <sup>3</sup>
		в. З	3. cm <sup>3</sup>
Figure D = $100 \text{ cm}^3$		ъ. с	2. m <sup>3</sup>
A. Figure B = $200 \text{ cm}^3$		<b>Me Upi</b> L b or d	I. cm <sup>3</sup>
Activity 3: Do not under estimate me!	Татсћ	What's More M :2 Vivity 2: M	What's More

Additional Activities		tnəmzzəzzA
A. Answers vary.	A .3	1. B
B. Let the edge of a cube be 0.5	2. C	2. D
cm. The approximate volume of the	8. C	3' C
prism is 24 cubic centimeters.	9. C	4. A
is exact volume of a cube is $0.49 \text{ cm} \times 0.49 \text{ cm}^3$ $= 0.117649 \text{ cm}^3$	10. C	2' D
1 ne exact volume of the prism is $4 \times 6 \times 8 \times 0.117649$ cm <sup>3</sup> =22.588608 cm <sup>3</sup>		



Answer Key

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