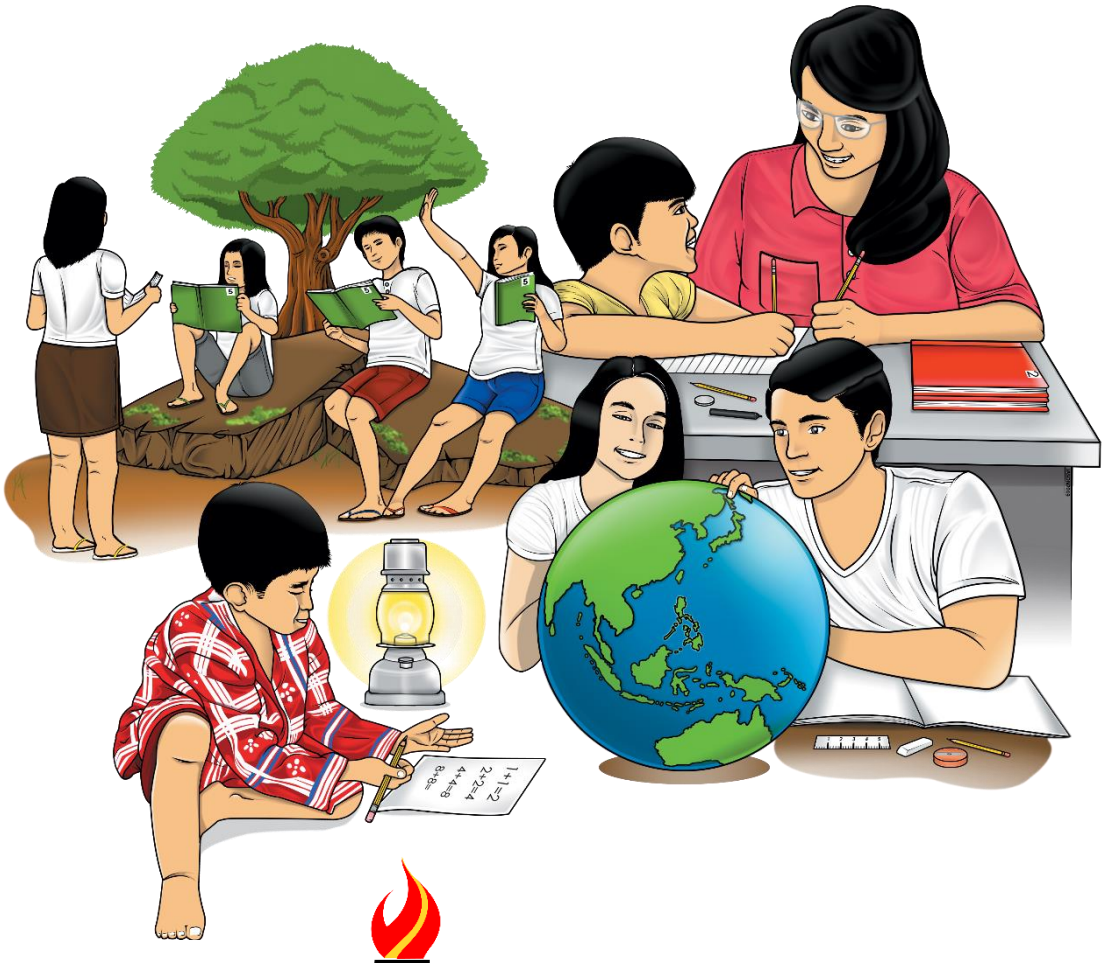
5

DepED
DEPARTMENT OF EDUCATION

Mathematics

Quarter 4 – Module 5: Converting Units of Measurement in Volume



ALTERNATIVE DELIVERY MODE
ADM

Mathematics – Grade 5
Alternative Delivery Mode
Quarter 4 – Module 5: Converting cu. cm to cu. m and vice versa; cu. cm to L and vice versa
First Edition, 2020

Published by the Department of Education
Secretary: Leonor Magtolis Briones
Undersecretary: Diosdado M. San Antonio

Development Team of the Module

Writer: Ma. Pamela G. Crieta

Editor: Niann L. Atis, Mary Meldred S. Normor

Reviewers: Renato S. Cagomoc, Joshua Sherwin T. Lim, Rolando M. Lacbo, Jovie M. Bido, Geraldine P. Pagunsan, Bayani B. Adona

Illustrator: Rose Ann M. Nazareno, Salvacion Sarmiento

Layout Artist: Noel E. Sagayap

Management Team: Ramir B. Uytico
Arnulfo R. Balane
Rosemarie M. Guino
Joy B. Bihag
Ryan R. Tiu
Sarah S. Cabaluna
Thelma Cabadsan-Quitalig
Elena S. De Luna
Renato S. Cagomoc
Noel E. Sagayap
Geraldine P. Sumbise
Joshua Sherwin T. Lim

Printed in the Philippines by
Department of Education – Region VIII
Office Address: DepEd Regional Office No. 8
Candahug, Palo, Leyte
Telefax: (053)-832- 2997
E-mail Address: region8@deped.gpv.ph

5

Mathematics

Quarter 4 – Module 5: Converting Units of Measurement in Volume

DepED
DEPARTMENT OF EDUCATION

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-by-step 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

Good day Mathletes! This module was designed and written to help you gain an understanding on converting cu.cm to cu. m and vice versa; and cubic cm to L and vice versa. Knowing the rules in converting smaller unit to bigger/higher unit and vice versa make it easy for you. So, what are you waiting for? Stay focused and start up!

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

- Convert cubic cm to cubic m and vice versa; cubic cm to L and vice versa.

Before going any further, let us check your understanding about converting cu. cm to cubic m and cu. cm to L and vice versa.

What I Know

Directions: Convert the following units. Choose the letter of the correct answer. Write the chosen letter on a separate sheet of paper.

1. How many cubic centimeters are there in 2 m^3?
   A. 200 cm^3 B. 2000 cm^3 C. 20 000 cm^3 D. 2 000 000 cm^3

2. If you get the equivalent of 45 m^3 to cm^3, what would the answer be?
   A. 45 000 000 cm^3 B. 450 000 cm^3 C. 45 000 cm^3 D. 4 500 cm^3

3. 35 000 000 cm^3 = _____ m^3
   A. 350 B. 35 C. 3.5 D. 0.35

4. If we convert 7 300 000 cm^3 to m^3, the answer is 73 m^3.
   A. True B. False C. Maybe D. Undecided

5. What is 25 cm^3 equal to in m^3?
   A. 250 B. 2500 C. 0.000025 D. 25 000 000

6. 50 cm^3 = _____L
   A. 5 B. 500 C. 0.05 D. 0.5

7. 650 L= _____ m^3

A. 6 500 000 B. 650 000 C. 6500 D. 0.65

8. If you convert 0.045 L to cm^3. How much would it be?

A. $45cm^3$ B. 0.45 cm^3 C. 4.5 cm^3 D. 450 cm^3

9. 20 cm^3 is equivalent to 0.02 L, true or not?

A. True B. False C. Maybe D. Undecided

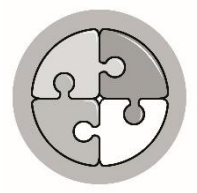
10. What is 96 cm^3 in liters?

A. 960 L B. 9.60 L C. 0.096 L D. 0.96L

Lesson 1 Converting Units of Measurement in Volume

In order to convert a measurement to a smaller or bigger value unit, you need to master the basic skills on simple conversion. In this module, you will learn how to convert cu. cm to cu. m and cu.cm to L and vice versa.

Are you ready?



What's In

In the previous lesson, you were able to learn and name the appropriate unit of measure for the volume of a cube and a rectangular prism. Volume is measured in cubic units such as cubic centimeters (cm^3), cubic meters (m^3), cubic millimeters (mm^3), and cubic decimeters (dm^3).

Directions: Let us refresh your memory and try to answer the following exercises below by giving the appropriate unit of measure to be used in finding the volume of the object. Write your answer on your paper.

1. thumbtacks box _____
2. bottle of vinegar _____
3. cabinet _____
4. a die _____
5. gravel and sand truck _____

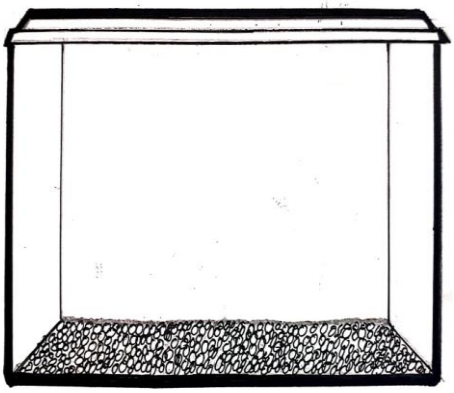
What's New

From the previous lesson, you were taught on how to name the appropriate unit of measure for the volume of a cube and a rectangular prism. The smaller the object, the smaller unit of measure is being used while the bigger the object, the bigger/larger unit of measure is being used.

In this lesson, you are going to deal with converting the unit of measure used such as cu. cm to cu. m and vice versa; cu. cm to L and vice versa.

Consider the problem and illustration below:

As the Covid-19 cases continue to rise Anna and Allan were getting bored at home. So, their father bought them a rectangular aquarium and different types of fish for them to enjoy while staying at home. The aquarium is 20 cm long, 15 cm wide and 20 cm high.



But first, the siblings need to fill up the aquarium with four liters of water. What is its equivalent value in cubic centimeters (cm^3)? How much water in cm^3 can the aquarium hold? Will the aquarium be able to hold the 4-liter water?

What Is It

The problem calls for the capacity of the aquarium and whether the amount of water to be poured in, is within the allowable volume limit. To compare two quantities, they have to be in the same unit of measurement. That is, when one object is given in cubic meter, the other should be in cubic meters as well. Otherwise, you need to convert.

Let's study the following examples:

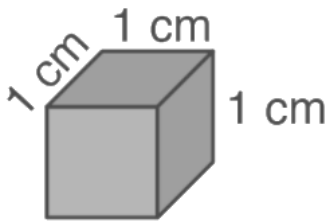
- Let's convert 1 cubic meter to cubic centimeters.

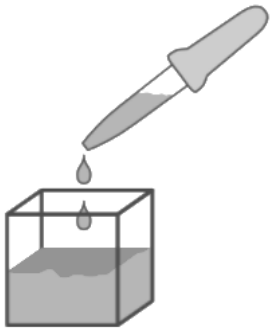
$$1\ m^3 = 1\ m^3 \times \left(\frac{100\ cm}{1\ m}\right)^3 = 1\ m^3 \times \frac{100^3\ cm^3}{1\ m^3} = 100^3\ cm^3 = 1\ 000\ 000\ cm^3$$

- Let's convert 1 cubic centimeter to cubic meter.

$$1\ cm^3 = 1\ cm^3 \times \left(\frac{1\ m}{100\ cm}\right)^3 = 1\ cm^3 \times \frac{1\ m^3}{100^3\ cm^3} = \frac{1}{1\ 000\ 000}\ m^3 = 0.000001\ m^3$$

Containers such as the aquarium can hold liquid such as water. Containers come in different sizes and shape. If they are in the shape of a cube or a rectangular prism, we can determine its volume by its dimensions length, width, and height, each of which can be measured in terms of unit lengths such as the metric units: millimeters, centimeters, decimeters, and meters. However, the volume of liquids is usually in milliliters and liters. So, we need to learn how to convert cubic centimeters and cubic meters into milliliters or liters.





1 cc = 1 ml

Each cubic centimeter (1 cc or 1 cm^3) is equal to 1 ml.

Let's convert 1 liter to cubic centimeters.

1 liter = 1 $\cancel{L}$ x $\frac{1000\ mL}{1\ \cancel{L}}$ = 1000 mL = 1000 cm^3

Now, it's your turn. Convert 1 cm^3 to liters by filling out the missing value that will make the equation true. Take note of the following:

a. In multiplying a whole number to a fraction, multiply the whole number to the numerator and copy the denominator. In multiplying two fractions, multiply the numerator to numerator and denominator to denominator.
   Example 5 x $\frac{1}{6} = \frac{5x1}{6} = \frac{5}{6}$
b. 1 liter = 1000 cm^3

Now, Convert 1 cm^3 to liters

1 cm^3 = 1 cm^3 x $\frac{\_\_\_\_\_}{1000\ cm^3}$ = $\frac{\_\_\_\_\_}{L}$ = _____ L

Let us study the relationship between some units of measurement below. Do you see any pattern?

1 cu. m (m^3) = 1,000,000 cu. cm (cm^3)
1 cu. cm (cm^3) = 0.000001 cu. m (m^3)
1 liter = 1000 cu. cm (cm^3)
1 cu. cm (cm^3) = 0.001 L

Example 1: Let's answer the problem presented in the previous part of the lesson.

What we need to know is the equivalent value of 4 L in cm^3? Which is larger a cubic centimeter or a liter? How many cubic centimeters are there in a liter (L) and vice versa?

We need to convert liters to cubic centimeters because the unit of measure used in the aquarium is in centimeters, so its volume is in cubic centimeters and to avoid waste of water it is important to be accurate as to the exact amount of water the aquarium can hold.

Since: 1 liter (L) = 1000 cu. cm (cm^3)

From the problem:

Since a cubic centimeter is smaller than a liter, we multiply by 1000 using the conversion shown above.

4 L = _____?_____cm^3

4 L = 4 x 1000 cm^3 = 4,000 cm^3

The water's volume is 4,000 cm^3.

The volume of water that the aquarium can hold is:

Length x width x height = 20 cm x 15 cm x 20 cm = 6 000 cm^3.

Since the amount of water they will pour into the aquarium is less than the maximum water the aquarium can hold: 4 000 cm^3 < 6 000 cm^3. The aquarium will be able to hold the 4,000 cm^3 of water the siblings will pour.

Example 2:

Consider the following and look for the pattern:

a. 0.002 m^3 = 2 000 cm^3 2 000 cm^3 = 0.002 m^3
b. 1.5 m^3 = 1 500 000 cm^3 1 500 000 cm^3 = 1.5 m^3
c. 5 m^3 = 5 000 L 5 000 L = 5 m^3
d. 3,200 cm^3 = 3.2 L 3.2 L = 3,200 cm^3
e. 25 000 cm^3 = 25 L 25 L = 25 000 cm^3

In converting from one cubic unit to another we can use the appropriate conversion factor. Study the following:

a. 2 000 cm^3 x $\frac{1\ m^3}{1{,}000{,}000\ cm^3}$ = 0.002 m^3

b. 1.5 m^3 x $\frac{1{,}000{,}000\ cm^3}{1\ m^3}$ = 1,500,000 cm^3

c. 5 m^3 x $\frac{1000\ L}{1\ m^3}$ = 5,000 L

d. $3{,}200\ \cancel{cm^3} \times \frac{1L}{1{,}000\ \cancel{cm^3}} = 3.2\ L$

e. $25\ \cancel{L} \times \frac{1{,}000\ cm^3}{1\ \cancel{L}} = 25{,}000\ cm^3$

Explain how to change and convert a smaller unit to a larger/bigger unit? From a higher unit to a smaller unit?

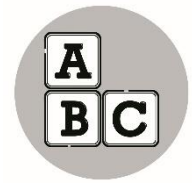
When converting from larger/bigger unit to a smaller unit, use multiplication. When converting from a smaller unit to a larger/bigger unit, use division. The mnemonic device below can help us go about the conversion.

Larger Unit				Smaller Unit
m^3	→ x 1000	L	→ x 1 000	mL, cm^3, or cc

Smaller Unit				Larger Unit
mL, cm^3, or cc	→ ÷ 1000	L	→ ÷ 1 000	m^3

From the examples above you can understand now how to convert unit of measurement into smaller or bigger unit and vice versa.

You can try it now. Good luck! ☺



What's More

Activity 1: Change Me!

Directions: Change to the required unit measure. Write the letter of your answer in the blank before the number. The first item is done for you as your guide.

__A__ 1. 25 cm^3 = ____ L	A. 0.025	B. 25 000
_____ 2. 89 m^3 = ____ cm^3	A. 8.9	B. 89 000 000
_____ 3. 57 cm^3 = ____ L	A. 0.057	B. 570
_____ 4. 126 m^3 = ____ L	A. 1260	B. 126 000
_____ 5. 50 L = _____ cm^3	A. 5 000	B. 50 000

Activity 2: Happy or Sad!

Directions: Write ☺ if the conversion is correct and ☹ if it is incorrect.

_____ 1. 7 cm^3 = 7 000 m^3
_____ 2. 5 000 m^3 = 50 L
_____ 3. 5 m^3 = 500 000 L
_____ 4. 20 000 cm^3 = 0.02 m^3
_____ 5. 17 m^3 = 17 000 L

Activity 3: Supply Me!

Directions: Convert the volume of the following object to a larger or smaller unit.

1. 50 m^3 of water in the swimming pool = _____L
2. 2 L of soft drinks = _____m^3
3. A box of toy with 30 cm^3 = _____m^3
4. 10 L of gasoline in the container = _____cm^3
5. A 25 000 cm^3 of liquid in the jar = _____ L

What I Have Learned

Let's see what you have learned. Answer the following questions:

1. Why is it possible to convert volume of cubic units measurement to liters or milliliters and vice versa?
2. How do you convert from a bigger/larger unit to a smaller unit of measurement?
3. How do you convert from a smaller unit to a bigger/larger unit of measurement?

What I Can Do

In our daily lives we are surrounded with things which have volume, so we should learn how to convert its volume from a smaller to bigger unit of measurement, or vice versa. Answer the problem below.

Look for one grocery item you have at home that is in tetra pack. Find out if the label correctly displays the volume by measuring the rectangular prism's length, width, and height, and converting the computed volume in cubic units to milliliters or liters.

Assessment

Directions: Convert the following units. Choose the letter of the correct answer. Write the chosen letter on a separate sheet of paper.

1. 198 cm^3 = _____ m^3
   A. 19.08 B. 1.0098 C. 0.000198

2. 1 200 000 m^3 = _____ L
   A. 1 200 000 000 B. 1 200 C. 12

3. Find its conversion: _____ cm^3 = 35 m^3
   A. 35 000 000 B. 3 500 C. 350

4. Is 25 000 cm^3 the correct conversion of 25 dm^3?
   A. Yes B. No C. Maybe

5. What is 89 m^3 equal to in _____cm^3?
   A. 890 B. 8 900 C. 89 000 000

6. The conversion of 1.5 L to m^3 is 0.015. True or False?
   A. True B. False C. Maybe

7. If we convert 1.5 m^3 to cm^3, then the answer would be?
   A. 1 500 000 cm^3 B. 1500 cm^3 C. 150 cm^3

8. 4000 cm^3 is equivalent to 4 L, true or not?
   A. True B. False C. Maybe

9. What is 8 900 L in cubic centimeters?
   A. 8 900 000 cm^3 B. 89 000 cm^3 C. 8900 cm^3

10. Find the conversion of 264 cubic meters in liters.
    A. 26.4 L B. 264 000 L C. 0.264 L

Additional Activities

Finally, you are in the last activity. Answer it correctly so you could get your reward.

Directions: You need to fill up an Erlenmeyer flask with water in the lesser number of pours and without spilling it over. The Erlenmeyer flask or known as a conical flask can hold 8.2 m^3 of liquid. If you have three glasses that contains different amount of water as your choices. How many glasses and amount of water do you need to fill up the flask without spilling? Then, find the conversion of 8.2 m^3 in liters and cubic centimeters.

2.10 m^3

1.5 m^3

0.4 m^3

Congratulations! You made it!

Answer Key

What I Know

1.	D	6.	C
2.	A	7.	D
3.	B	8.	A
4.	B	9.	A
5.	C	10.	C

What's More

Activity 1: Change Me!

1. A
2. B
3. A
4. B
5. B

Activity 2: Happy or Sad!

1. ☹
2. ☹
3. ☺
4. ☺
5. ☺

Activity 3: Supply Me!

1. 50 000
2. 0.002
3. 0.00003
4. 10,000
5. 25

What's In

Note: Answers will vary

1. mm^3
2. L
3. m^3
4. mm^3
5. m^3

Assessment

1.	C	6.	B
2.	A	7.	A
3.	A	8.	A
4.	A	9.	A
5.	C	10.	B

Additional Activities

(Answer may vary. A sample is given below)

3 glasses of 2.10 m^3
1 glass of 1.5 m^3
1 glass of 0.4 m^3

So, 5 glasses only to fill up the conical flask without spilling the water.

8.2 m^3 = 8 200 000 cm^3
8.2 m^3 = 8 200 L

What I Have Learned

(Students' answer may vary but the main ideas are the ff.)
1. It is possible to convert volume of cubic units of measurement to liters or milliliters and vice versa because 1 cubic centimeter is equal to 1 milliliter.
2. To convert from a bigger/larger unit to a smaller unit of measurement, we use multiplication and the conversion factors: 1000L=1m^3 and 1000 cm^3 = 1L. Alternative answer: we multiply 1000 as we go from m^3 to L, and L to cm^3.
3. To convert from a smaller unit to a bigger/larger unit of measurement, we use division and the conversion factors: 1000L = 1m^3 and 1000 cm^3 = 1L Alternative answer: we divide 1000 as we go from cm^3 to L and L to m^3 .

What I Can Do

(Students' answer may vary but the main ideas are the ff.)
1. It is possible to convert volume of cubic units of measurement to liters or milliliters and vice versa because 1 cubic centimeter is equal to 1 milliliter.
2. To convert from a bigger/larger unit to a smaller unit of measurement, we use multiplication and the conversion factors: 1000L=1m^3 and 1000 cm^3 = 1L. Alternative answer: we multiply 1000 as we go from m^3 to L, and L to cm^3.
3. To convert from a smaller unit to a bigger/larger unit of measurement, we use division and the conversion factors: 1000L = 1m^3 and 1000 cm^3 = 1L Alternative answer: we divide 1000 as we go from cm^3 to L and L to m^3 .

References

Ursua, Alvin C. and Angeline P. Lumbre. 2016. *21st Century Mathletes Textbook.* Quezon City: Vibal Group Inc.

Coronel, Carmelita C. and Bamba, Nelia D. 2010. *Mathematics for a Better Life Textbook.* Quezon City: SD Publications, Inc.

Grade 5 Teacher's Guide

Prnksokhal, n.d. *1 Cubic Centimeter 1 Ml , Free Transparent Clipart - ClipartKey.* [online] clipartkey.com. Available at: <https://www.clipartkey.com/view/ihoRoRb_1-cubic-centimeter-1-ml/> [Accessed 10 April 2021].

For inquiries or feedback, please write or call:

Department of Education - Bureau of Learning Resources (DepEd-BLR)

Ground Floor, Bonifacio Bldg., DepEd Complex
Meralco Avenue, Pasig City, Philippines 1600

Telefax: (632) 8634-1072; 8634-1054; 8631-4985

Email Address: blr.lrqad@deped.gov.ph * blr.lrpd@deped.gov.ph