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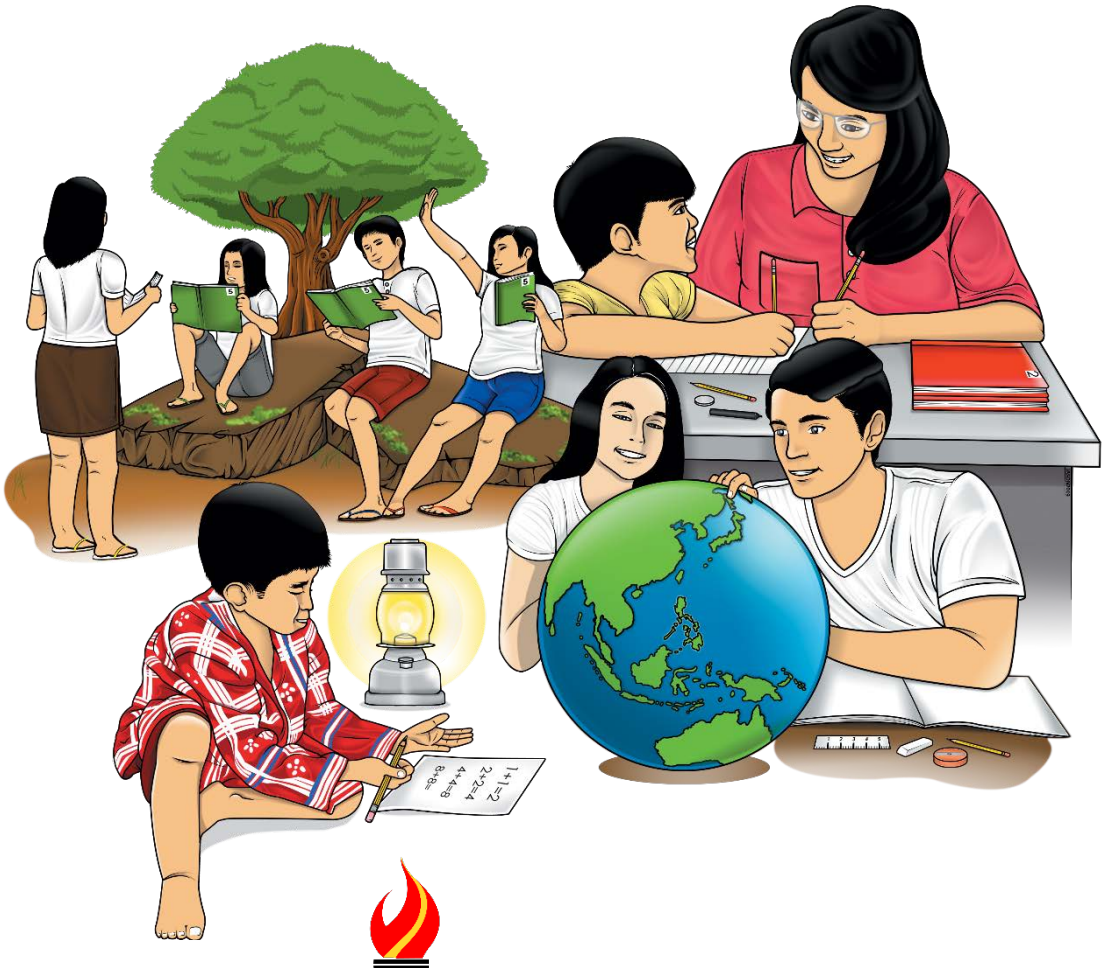
Mathematics

Quarter 4 – Module 4:
Volume of Rectangular Prism



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Mathematics

Quarter 4 – Module 4:
Volume of Rectangular Prism

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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

Do you enjoy making different kinds of artworks? If you do, you will have fun doing this module.

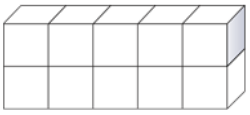
As you explore the lesson, you will learn about the volume of rectangular prisms. You will also learn about the applications of mathematics in the fields of art and architecture. Read on and explore how your knowledge in measurement could help you become a good artist or an architect.

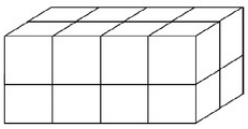
At the end of this module, you should be able to:

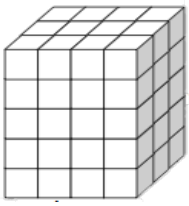
- visualize the volume of solid figures using unit cubes;
- derive the formula for finding the volume of rectangular prisms; and
- find the volume of a rectangular prism using cubic centimeter and cubic meter.

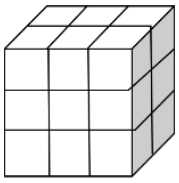
What I Know

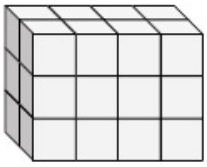
A. Find the volume of each rectangular prism using cubic units.

1. 

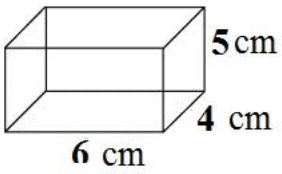
2. 

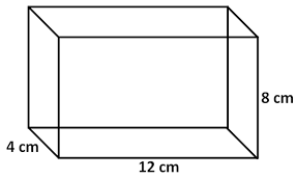
3. 

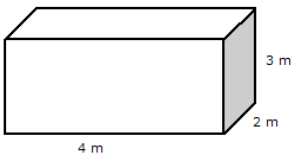
4. 

5. 

B. Find the volume of each rectangular prism using the formula.

1. 

2. 

3. 

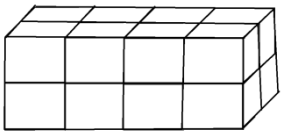
CONGRATULATIONS! If you got a score of 7 or 8, you should not have any difficulty studying the lesson in this module.

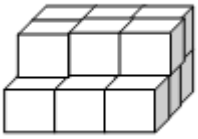
If you got a score of 6 or below, you may need to study the lesson more carefully and do all the given activities.

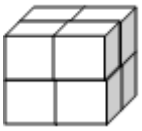
What's In

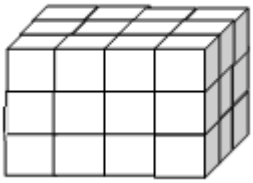
Find the volume of the following figures by counting the cubes and express your answers in cubic units.

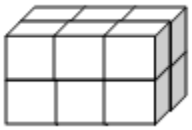
 = 1 cubic unit or cu.

1. 

2. 

3. 

4. 

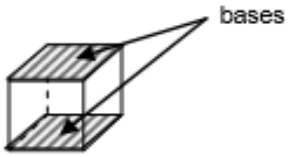
5. 

What's New

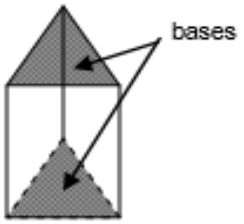
Before we explore the volume of a rectangular prism, let us recall what a prism is. A **prism** is a solid figure with two bases that are parallel and identical polygons. Other faces are parallelograms. Prisms may be named by the type of polygon at its bases. A square prism is a prism whose bases are squares. It is more commonly known as a cube. A rectangular prism has bases which are rectangles.

These are examples of prisms.

rectangular prism



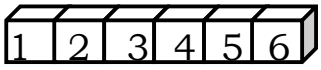
square prism or cube



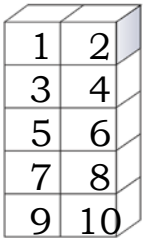
triangular prism

Volume is the space a three-dimensional figure occupies. It is expressed in cubic units. The number of unit cubes that is enclosed or contained in a figure is the measure of the volume of the figure.

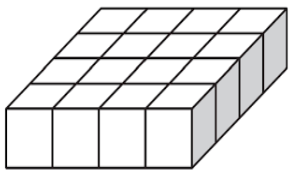
Let us visualize the volume of solid figures using unit cubes. Just count the number of unit cubes that form the figure to find its volume. The volume of a unit cube whose length, width and height are 1 unit each is 1 **cubic unit or cu.**



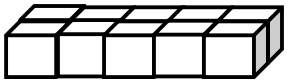
This figure is formed by 6 unit cubes. Its volume is **6 cubic units.**



V = 10 cubic units



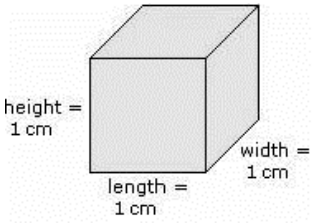
V = 16 cubic units



We can also break them apart in order to get the volume.

V = 10 cubic units

A cube has 3 dimensions: length, width, and height. The volume of a cube whose length, width and height are 1 cm is **1 cubic centimeter or 1 cm^3**. It is called a centimeter cube.

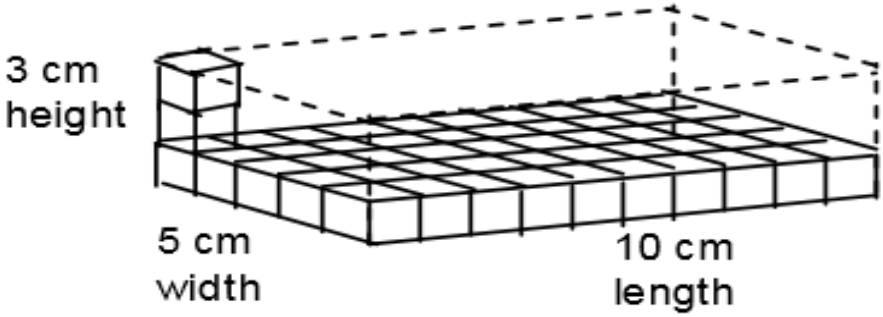


V = 1 cm^3

Let us work on a problem involving the volume of a rectangular prism.

A box is 10 cm long, 5 cm wide and 3 cm tall. What is its volume?

Let us visualize the box using centimeter cubes.



The figure above is a box which is 10 cm long, 5 cm wide and 3 cm high. To find its volume, we need to know the number of centimeter cubes in the whole figure.

We know that the bottom of the prism is 10 cm long and 5 cm wide and that the figure is **3** cm high.

To find the total number of **centimeter cubes**, we have to multiply the number of cubes in the bottom layer by the number of layers.

We multiply 10 by 5 by 3.

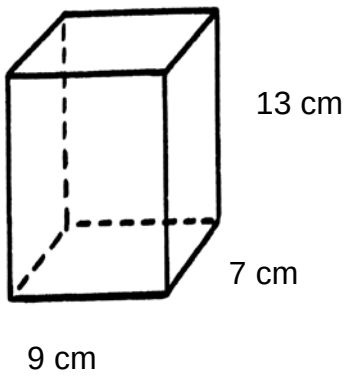
10 x 5 x 3 = 150 centimeter cubes
length width height

number of cubes at the bottom layer

number of layers

The volume of the box is 150 cm³.

Consider the next example. Find the volume of the prism below:



The general formula for finding the volume of a prism is **V = B x h**, where **B** is the area of the base and **h** is the height.

The base of the given prism is a rectangle that is 9 cm long and 7 cm wide. So, the base area is 9 x 7 or 63 cm^2. Its height is 13 cm.

Substitute 63 for B and 13 for h in the formula. Thus,

V= B x h
= 63 cm^2 x 13 cm
= 819 cm^3

The volume of the prism is 819 cm^3.

Remember: The volume of a rectangular prism can be computed using either of these formulas: **V = l x w x h** or **V = B x h.**

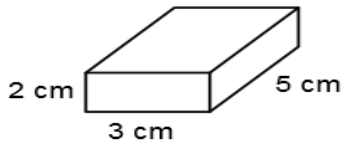
What is It

READ AND LEARN MORE

Let us take a look at some more examples.

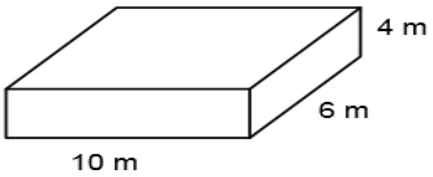
Study the figure below.

1)



$V = l \times w \times h$
$= 5 \text{ cm} \times 3 \text{ cm} \times 2 \text{ cm}$
$= 30 \text{ cm}^3$

2)



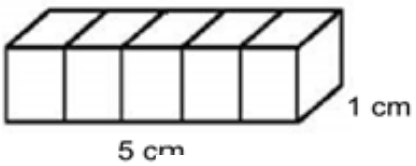
$V = B \times h$
$= (10 \text{ m} \times 6 \text{ m}) \times 4 \text{ m}$
$= 240 \text{ m}^3$

The solid figure in numbers 1 and 2 are both rectangular prisms. Hence, we use the formula: $V = l \times w \times h$ or $V = B \times h$.

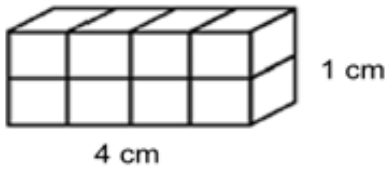
What's More

Find the volume.

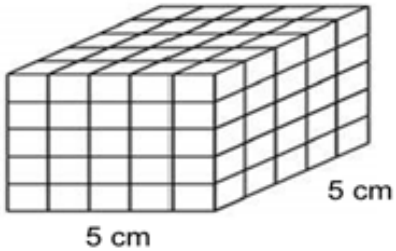
1. 1 cm

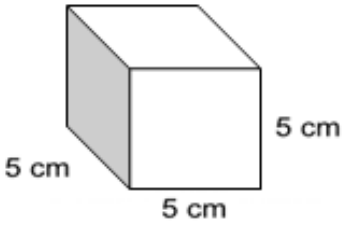


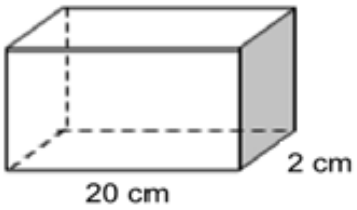
2. 2 cm



3. 5 cm



4. 

5. 

What I Have Learned

Prism – a solid figure with two bases that are parallel and identical polygons. Its sides are parallelograms.

Cubic unit – the unit used to find the volume of a solid

Volume - is the space a three-dimensional figure occupies. It is the number of cubic units needed to make or fill a solid figure.

The formula for finding the volume of a rectangular prism is:

V = l x w x h

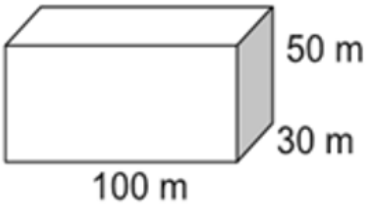
where l = length, w = width, and h = height

The General Volume Formula for any prism is: V = B x h, where B stands for the area of the base and h stands for the height.

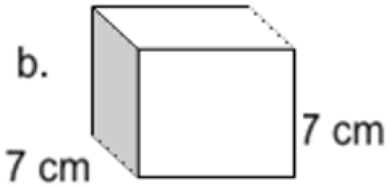
What I Can Do

Find the volume of the following prisms.

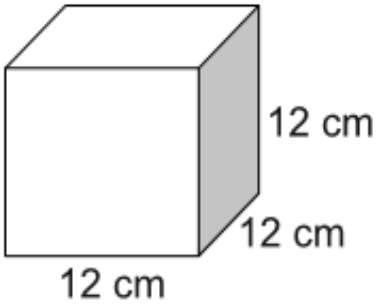
a.



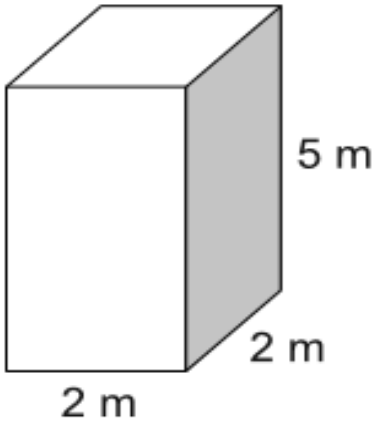
b.



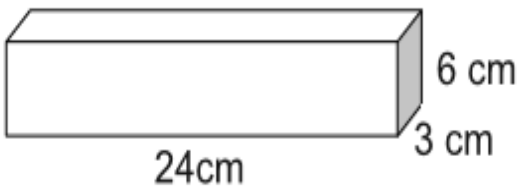
c.



d.

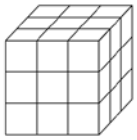


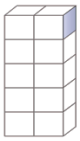
e.

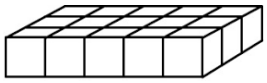


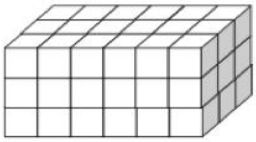
Assessment

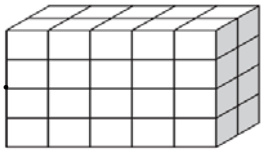
A. Find the volume of each figure using cubic units.

1. 

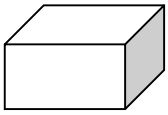
2. 

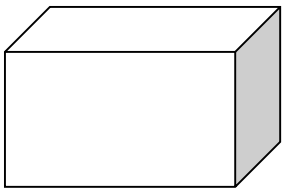
3. 

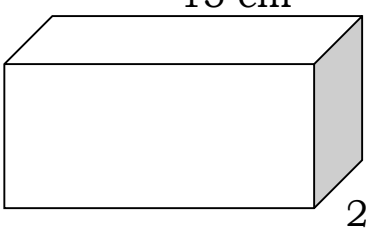
4. 

5. 

B. Find the volume of each rectangular prism.

1) 

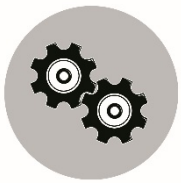
2) 

3) 

4) l = 9 m
w = 3 m
h = 2 m

5) l = 6 m
w = 10 m
h = 4 m

Got a score of 8-10? CONGRATULATIONS! Job well done. See you in the next module. If below 8, you may have to go over the lessons and the exercises again.



Additional Activities

A. Draw a figure with the given dimensions and find its volume.

1. Length = 12 cm
   Width = 4 cm
   Height = 6 cm

2. Length = 5 cm
   Width = 3 cm
   Height = 3 cm

B. Solve the following word problems.

1. A container is 15 m tall, 3 m wide and 4 m long. What is the
   volume of the container?

2. The toy cabinet has a dimension of 4 cm x 6 cm x 8 cm. What is the volume of the cabinet?

Answer Key

What I Know

A. 1. 10 cubic units 4. 18 cubic units
2. 16 cubic units 5. 24 cubic units
3. 60 cubic units

B. 1. 120 cm^3
2. 384 cm^3
3. 24 m^3

What's In

1. 16 cu. cm
2. 15 cu. cm
3. 8 cu. cm
4. 36 cu. cm
5. 12 cu. cm

What's More

1. 5 cm^3
2. 8 cm^3
3. 125 cm^3
4. 125 cm^3
5. 400 cm^3

What I Can Do!

A. 150, 000 m^3
B. 343 cm^3
C. 1, 728 cm^3
D. 20 m^3
E. 432 cm^3

Assessment

A. 1. 27 cubic units
2. 10 cubic units
3. 15 cubic units
4. 54 cubic units
5. 40 cubic units

B.

1. 45 cm^3
2. 300 cm^3
3. 180 cm^3
4. 54 m^3
5. 240 m^3

Additional Activity

A.
1. 12 cm, 6 cm, 4 cm, V = 288 cm^3
2. 5 cm, 3 cm, 3 cm, V = 45 cm^3

B.
1. 180 m^3
2. 192 cm^3

References

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https://www.youtube.com/watch?v=qJwecTgce6c

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