Republic of the Philippines
Department of Education
NATIONAL CAPITAL REGION
Misamis Street, Bago-Bantay, Quezon City

UNIFIED SUPPLEMENTARY LEARNING MATERIALS
(USLeM)

MATHEMATICS 6

Quarter 4 Week 2

Development Team of the Module	
Writer & Illustrator:	Jesus Delos Reyes
Layout Artists:	Marvin DJ. Villafuerte, Project Development Officer II- LRMS
Content Editors:	Rogelio S. Junio, Education Program Supervisor -Mathematics Dr. Nora S. Pablo, Master Teacher I Loreta G. Petalcorin, Master Teacher II
Language Editors:	Diana Karren M. Raposas
Management Team:	Dr. Malcolm S. Garma, Regional Director - NCR Dr. Loreta B. Torrecampo, CESO V, SDS SDO-Pasay City Dr. Arturo A. Tolentino, OIC ASDS- Pasay City Dr. Genia V. Santos, CLMD Chief – NCR Librado F. Torres, CID Chief SDO-Pasay City Dennis M. Mendoza, LR EPS – NCR Nancy C. Mabunga, Librarian - NCR Dr. Normina B. Hadji Yunnos, LR EPS SDO Pasay City Dr. Bernadeth C. Daran, , Education Program Supervisor -Mathematics, SDO-Manila Dr. Remylinda T. Soriano , Education Program Supervisor -Mathematics, NCR Rogelio S. Junio, Education Program Supervisor -Mathematics Marvin DJ. Villafuerte, Project Development Officer II- LRMS

UNIFIED SUPPLEMENTARY LEARNING MATERIALS
Grade 6 MATHEMATICS

LESSON 1: FINDING THE VOLUME OF CYLINDERS, PRYRAMIDS, CONES, AND SPHERES.

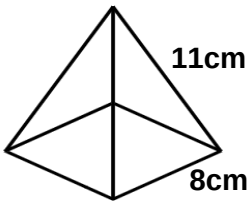
EXPECTATIONS

Specifically, this module will help you to find the volume of cylinders, pyramids, cones, and spheres.

PRE-TEST

Directions: Read the following problems carefully. Choose the letter of your answer.

1. Which of these formulas is used to measure the volume of a cone?
   A. $V = \pi r^2 h$
   B. $V = \frac{1}{3} Bh$
   C. $V = \frac{4}{3} \pi r^2 h$
   D. $V = \frac{1}{3} \pi r^2 h$
2. Find the volume of the figure below.



   A. 88.67 cm^3
   B. 234.67 cm^3
   C. 346.67 cm^3
   D. 704 cm^3
3. Kevin is playing with his ball toy. It has a radius of 4cm. Find its volume.
   A. 16.75 cm^3 B. 50.24cm^3 C. 200.96 cm^3 D. 267.95cm^3
4. An ice cream cone has a radius of 2.5cm and a height of 12cm. What is the volume of the cone?
   A. 235.5 cm^3 B. 78.50cm^3 C. 117.75 cm^3 D. 75cm^3
5. Ara has a tumbler with a height of 30cm and a radius of 3.5cm. How many liters of water does it contain?
   A. 1L B.1.15L C. 1.5L D. 1.9L

LOOKING BACK

Directions: Understand each item and write the letter of the correct answer on the space provided before the number.

1.) Which of the following tells how the volume of the sphere is related to the volume of the cylinder with equal radius?
   A. 1/3 of the volume of the cylinder.
   B. 2/3 of the volume of the cylinder.
   C. ½ of the volume of the cylinder
   D. 4/3 of the volume of a cylinder

2.) How many times greater is the volume of the cylinder compared to the volume of the cone having the same base and the same height?
   A. The same B. twice C. thrice D. five times

3.) How are the volumes of a cone and a pyramid related?
   A. Their volumes are measured 3/4 the area of the base times height.
   B. Both are measured by ½ the area of the base times the height.
   C. They are measured by 1/3 the area of the base times height.
   D. It is measured by 4/3 the area of the base times height.

4.) How many times greater is the volume of the prism than the volume of a pyramid, if both have the same base area and height?

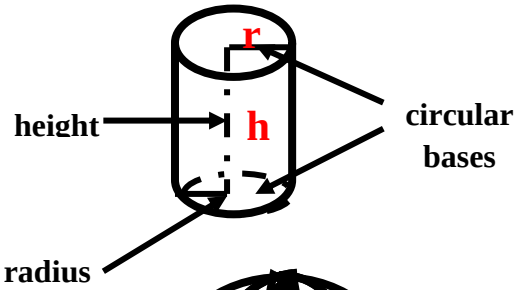
A. 2 B. 3 C. 4 D. 5

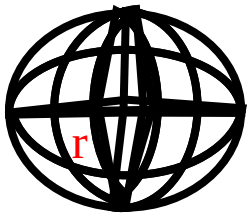
5.) Which of the following is true?

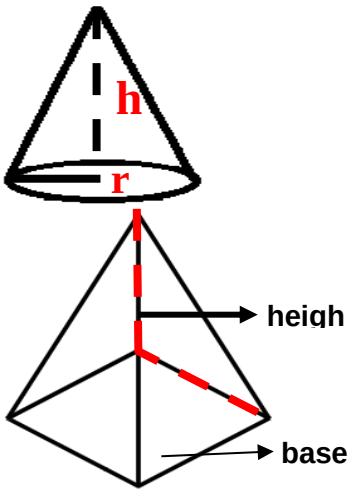
A. Volume of Sphere = $\frac{1}{2}$ Volume of Cube
B. Volume of Cylinder = $\frac{1}{3}$ Volume of Pyramid
C. Volume of Cone = $\frac{2}{3}$ Volume of Pyramid
D. Volume of Pyramid = $\frac{1}{3}$ Volume of Prism

BRIEF INTRODUCTION

Study the different solid figures.
How do you find the volume of each given solid figure?
What formula will you use to solve for the volume of each solid figure?







Volume of a Cylinder is $V = \pi r^2 h$

Where:
π = 3.14
r = radius(circular bases)
h = height
V= volume

Volume of Sphere is $V = \frac{4}{3}\pi r^3$

Where:
$\frac{4}{3}$ = constant
π = 3.14
r = radius
V = Volume

Volume of a Cone $V = \frac{1}{3}\pi r^2 h$

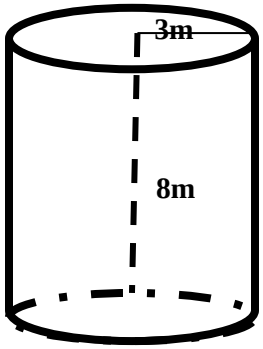
V = Volume
π = 3.14
r = radius/base
h = height

Volume of a Pyramid = $V = \frac{1}{3}$ B x h

V= Volume
B = Area of the base
h = height

Finding the Volume of Cylinder

As we have learned before, the volume of any prism is equal to the area of its base multiplied by the height, that is V= B x h.
Let us illustrate.



Step 1. Find the area of the base.

- What is the shape of the cylinder's base?
  The base is a circle.
- How do you find the area of the circle?
  $A = \pi r^2$

Solution:

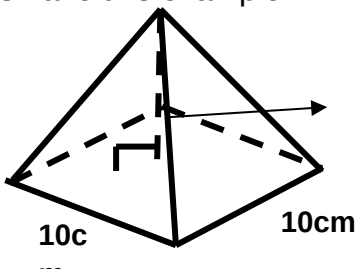
$A = \pi r^2$
$A = 3.14 \times 3m \times 3m$
$A = 3.14 \times 9m^2$
$A = 28.26m^2$

Step 2. Multiply the area in Step 1 by the height of the cylinder

$A = 28.26m^2$ $h = 8m$
$V = 28.26m^2 (8m)$
$V = 226.08m^3$ So, the volume is **$226.08m^3$.**

Finding the Volume of Pyramid

Let us have this example.



$V = \frac{Bh}{3}$ or $\frac{1}{3}$ Bh =

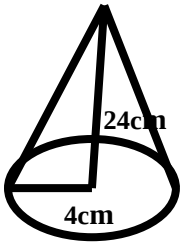
$= \frac{1x10cm \times 10cm \times 12cm}{3}$

$= \frac{1200cm^3}{3}$

$V = 400cm^3$

Finding the Volume of Cone

Find the volume of the cone using the illustration below.

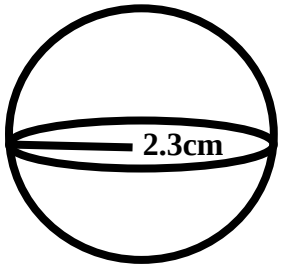


$V = \frac{1}{3}\pi r^2 h$
$V = (\frac{1}{3})(3.14)(4cm)(4cm)(24cm)$
$V = \frac{1}{3}(3.14)(16)(24cm)$
$V = \frac{1205.76}{3} cm^3$
$V = 401.92cm^3$

UNIFIED SUPPLEMENTARY LEARNING MATERIALS
Grade 6 MATHEMATICS

Finding the Volume of Sphere

Find the volume.



$V = \frac{4}{3}\pi r^3$

$V = \frac{4}{3}(3.14)(2.3cm)^3$

$V = \frac{4}{3}(3.14)(12.167cm^3)$

$V = \frac{4}{3}38.20438cm^3$

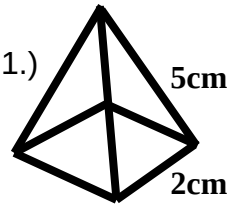
V = 50.94cm³

ACTIVITIES

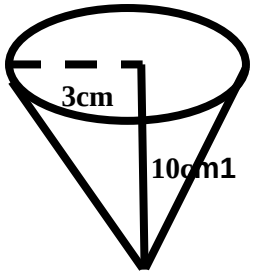
Activity 1: Practice

Directions: Find the volume of each figure. (Note: Use $\pi = 3.14$. Round your answer to the nearest 2-digit decimal number)

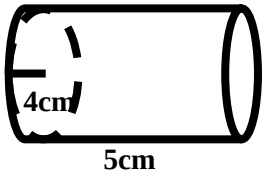
1.)



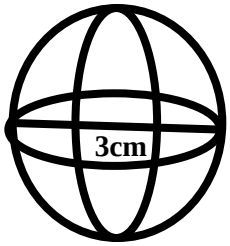
2.)



3.)



4.)



Activity 2: KEEP PRACTICING

Directions: Complete the table below. **(Note: Use $\pi = 3.14$. Round your answer to the nearest 2-digit decimal number)**

Figure	Radius/Base	Height	Volume
Cylinder	**3m**	**10m**	
Cone	**5cm**	**9cm**	
Pyramid	**100 cm²**	**10cm**	
Sphere	**6cm**		

REMEMBER

To find the volume of the following solid figures, use the formula below:

Volume of a cylinder $V = \pi r^2 h$ **Volume of a Sphere =** $V = \pi r^3$

Volume of a cone $V = \pi r^2 h$ **Volume of a Pyramid** $V = Bh$

CHECKING YOUR UNDERSTANDING

Directions: Solve each problem.

1.) Mrs. Luh has a square pyramid display on her table. It has a base with a side which measures 2.5cm and a height of 12cm. What is the volume of the pyramid?
2.) Dylan does his workout exercise everyday. He brings with him his cylindrical water jug that has a radius of 7cm and a height of 30cm. How much space does the jug occupy if he puts it inside his bag?
3.) A cone has a diameter of 14cm and a height of 30cm. What is its volume?
4.) A beach ball has a radius of 21cm. Find its volume.

POST-TEST

Directions: Read and understand the following problems carefully. Choose the letter of the correct answer.

1.) Which of these is the volume of the cylinder having a radius of 7cm and a height of 15cm?
A. $47.1cm^3$ B. $188.4cm^3$ C. $423.9cm^3$ D. $753.6cm^3$

2.) What is the volume of a square pyramid which has a 90cm height and a base area of 1225cm?
A. $36750cm^3$ B. $5037cm^3$ C. $65730cm^3$ D. $76530cm^3$

3.) Find the volume of a tennis ball which has a radius of 3.4cm.
A. $164.55cm^3$ B. $157.33cm^3$ C. $154.33cm^3$ D. $133.54cm^3$

4.) How many liters of water can a cylindrical container hold if it has a radius of 3.5cm and a height of 40cm? ($1{,}000\ cm^3 = 1\ L$)
A. 1.5386L B. 1.8536L C. 2.536L D. 3.156L

5.) What is the volume of an ice cream cone having a radius of 2.2cm and a height of 14cm?
A. $90.22cm^3$ B. $70.92cm^3$ C. $33.22cm^2$ D. $13.79cm^3$

LESSON 2: SOLVING ROUTINE AND NON-ROUTINE PROBLEMS INVOLVING VOLUME OF SOLIDS. (M6ME-IVc-98)

EXPECTATIONS

Specifically, this module will help you to solve routine and non-routine problems involving volume of solids.

PRE-TEST

Read each item carefully. Write the letter of the correct answer on your answer sheet.

1.) A conical tent has a base radius of 3m and a height of 4m. How much space does it contain?
A. $113.04m^3$ B. $1103.34m^3$ C. $38.67m^3$ D. $37.68m^3$

2.) A pyramid has a square base whose side measures 23 dm. If the height is 14.5 dm, what is its volume?
A. $529\ dm^3$ B. $2556.83\ dm^3$ C. $5113.67\ dm^3$ D. $7670.5\ dm^3$

3.) A cylindrical granary has a base radius of 3.5m and a height of 5m. If a cavan of palay measures about $75dm^3$, how many cavans of palay (to the nearest cavan) can be stored in it?
A. 2564 B. 2500 C. 2464 D. 1564

4.) The ball has a diameter of 15cm, what is its volume?
A. 1324.69cm^3 B. 1766.25cm^3 C. 1987.03cm^3 D. 5298.75cm^3

5.) Which of these cylinders has the larger volume? Cylinder A with a height of 12cm and a diameter of 8cm or Cylinder B with a radius of 4cm and a height of 12cm?
A. Cylinder A because it has a diameter of 8cm.
B. Cylinder B since it has a height of 12cm.
C. Cylinder A because it has a volume of 9216cm^3.
D. Both have the same volume.

BRIEF INTRODUCTION

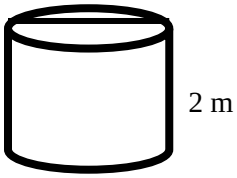
Solving Routine Problems Involving Volume of Solid Figures

In solving routine problems, simply follow the steps using Polya's Problem Solving Technique: Understand, Plan, Solve, then Check and Look Back.

Read and solve the problem.

A water tank is in the shape of a cylinder with a diameter of 1 meter and a height of 2 meters. What is its volume?

Let us illustrate the problem to find the volume of this cylinder.



Understand - Asked: The volume of the cylindrical water tank
Given: cylindrical tank with a diameter of 1 m; height of 2 m
Plan - Process: Multiplication; V = πr^{2}h
Solve - Number Sentence: V = 3.14 x 0.5m x 0.5m x 2m = N
Solution: V = 3.14 x 0.5 x 0.5 x 2 = 1.57m^3
V = 1.57 m^3
Check – Did you follow the correct formula?
Did you use the correct operation?
Did you write the correct unit?

Read the problem and solve.

Find the volume of a pyramid with a square base whose side is 13 m, and the height is 18m.

Understand

Asked: Volume of a pyramid
Given: side of square base= 13m; height = 18m

Plan

V = $\frac{1}{3}Bh$ or $\frac{Bh}{3}$ where B = s x s because the base is a square

Solve

S = 13m h = 18m

V = $\frac{13m \times 13m \times 18m}{3}$ = $\frac{169m^2 \times 18m}{3}$ = $\frac{3042m^3}{3}$

V = 1014m^3

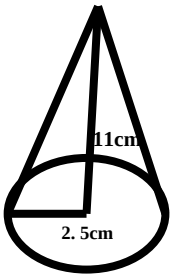
Look Back

Did you follow the formula correctly?
Did you use the correct operation?
Did you write the correct unit?

Analyze and solve the problem.

Arjay bought an ice cream in a grocery store. What is the volume of the ice cream cone if it has a radius of 2.5cm and a height of 11cm.?

Let us solve.



$V = \frac{1}{3}\pi r^2 h$

$V = (\frac{1}{3})(3.14)(2.5cm)(2.5cm)(11cm)$

$V = \frac{(3.14)\ x\ (6.25)(11cm)}{3}$

$V = \frac{215.875}{3} cm^3$

$V = 71.96 cm^3$

So, the volume of the ice cream cone is $71.96 cm^3$

Let us have this problem for a sphere.

A basketball has a radius of 13cm. What is its volume?

To solve this problem, use the formula $V = \frac{4}{3}\pi r^3$

Substitute the values:

$V = \frac{4}{3}\pi r^3$

$= \frac{4}{3}$ (3.14) (13cm) (13cm) (13cm)

$= \frac{4}{3}(3.14)\ (2197cm^3)$

$= \frac{4}{3}(6898.58cm^3)$

$= \frac{27594.32}{3} cm^3$

$V = 9{,}198.11 cm^3$

Solving Non-Routine Problems involving volume of solids.

Study the problem.

Boxes of woods are to be placed in a trailer van. If each box measures 4m by 2m by 3m and there are 100 boxes, what should be the minimum capacity of the trailer van?

Understand:

What is asked in the problem?

The minimum capacity of the trailer van

What are the given facts?

A box measuring 4m x 2m x 3m, 100 boxes

Plan:

Finding the total volume of the 100 boxes

V = B x h

Total Volume = B x h x 100

Solve:

Total Volume = 4 x 2 x 3 x 100 = N

= **2, 400 cubic meters**

A trailer van should have a volume of at least 2,400 cubic meters.

Check and Look Back:

Did you follow the formula correctly?

Did you write the correct unit?

UNIFIED SUPPLEMENTARY LEARNING MATERIALS
Grade 6 MATHEMATICS

ACTIVITY
Solve the problems.

1.) A conical tent has a diameter of 12m and a height of 4m. Find the capacity of the tent.
2.) A pentel pen is to be packed in a box with a capacity of 120cm^3. If a pentel pen has a radius of 0.5cm and 14cm long, how many pentel pens can be packed in a box?
3.) Square tents are used in the triage facilities for suspected COVID-19 patients. It has a base whose side measures 6m and a height of 3.5m. What is the volume of the tent?
4.) An inflated swimming pool has a volume of 3600m^3. The pool will be filled with water balls; how many of these can you put in the pool if each water ball has a diameter of 2m?

REMEMBER

To solve routine and non-routine problems involving volume of solid figures

Understand	- Know what is asked and what is given.
Plan	- Write the operation and the number sentence.
Carry out the plan	- Solve the problem and interpret the answer.
Look back	- Check if the answer is correct.

CHECKING YOUR UNDERSTANDING
Write the number sentence then solve the problems.

1.) How much air is enclosed in a basketball if its radius is 25.6cm?
2.) What is the volume of an ice cream cone if the diameter on top is 3cm and the height is 7cm?
3.) Nena went to a moviehouse and on her way, she saw two stores selling popcorns. Store A put the popcorn in a cubical container with 12cm on one edge and at Store B, popcorns were put in a cylindrical container having a diameter of 24cm and a height of 30cm. These popcorns were sold at the same price. Which container can fill more popcorns, and from which store will she buy popcorns?

POST-TEST
Directions: Read and understand each problem. Write the letter of your answer on your answer sheet.

1.) A can of powdered milk has a radius of 9cm and a height of 22cm. What is the volume of the can?
A. 5995.48cm^3 B. 5595.48cm^3 C. 5095.48cm^3 D. 5008.98cm^3

2.) A square pyramidal circus tent has a base whose side measures 20m. The height from the floor to the roof is 9m. How much air does it enclose?
A. 1000m^3 B. 1002m^3 C. 1200m^3 D. 2100m^3

3.) A closed cylindrical water tank in a subdivision is made of concrete. Its radius is 3.2m and a height of 8m. How many liters of water are needed to fill up the tank?
A. 722,258.8 B. 582,228.8 C. 282,258.8 D. 257,228.8

4.) A gift shop sells candy balls of different flavors. Each candy ball has a diameter of 2cm. How many of these can you put inside a cylindrical jar with a volume of 450cm^3?
A. 130 B. 120 C. 115 D. 107

5.) Can a van having a capacity of 3m^3 hold an inflated balloon with an approximate volume of 7000cm^3? If yes, how many balloons can be put in it?
A. 500 B. 400 C. 300 D. 200

KEY TO CORRECTIONS

LESSON 1.
PRE-TEST

1.) D
2.) B
3.) D
4.) B
5.) B

LOOKING BACK

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

ACTIVITY 1

1.) V = 6.67cm³
2.) V = 94.2cm³
3.) V= 251.2cm³
4.) V = 113.04cm³

Lesson 1
ACTIVITY 2

1.) 282.6cm³
2.) 235.5cm³
3.) 333.33cm³
4.) 904.32cm³

CHECKING YOUR UNDERSTANDING

1.) 25cm³
2.) 18463.2cm³
3.) 1538.60cm³
4.) 38772.72cm³

POST TEST

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

LESSON 2.
PRE-TEST

1.) D
2.) B
3.) A
4.) C
5.) D

ACTIVITY 1

1.) V = 150.72m³
2.) 11
3.) V=42m³
4.) 4

CHECKING YOUR UNDERSTANDING

70,240.61c m³
16.49cm³
Store B,
with a
cylindrical
container

References:

21st Century MATHletes 6. Textbook, Marjoseph H. Perez, Donnel P. Placer, Jaime R. Burgos, Arsenio S. Dimaranan. Department of Education. Vibal Group Inc. 2016 Pp. 288-299.

Geometry Based on the 2002 BEC. Sr. Iluminada C. Coronel, F.M.M., Antonio C. Coronel, The bookmark Inc. 264-Pablo Ocampo Sr. Avenue San Antonio Village, 1203 Makati City. 2012. Pp. 61-68

Our World of Math 6, Nelson C. Cajandab, Nino Jose P. De Guzman, Roldann G. Tabayoyong, and Juanito D. Yusingco. Vibal Publishing House, Inc. 1253 G. Araneta Ave. Quezon City. 2013. Pp. 316-323**.**

Soaring 21st Century Mathematics 6. Elmer M. Apistar, Elenita T. Boo, Esther Jane Y. Uy, Genesis G. Camarista, Jose L. Caberte, Ph.D. Phoenix Publishing House Inc., 927 Quezon Avenue, Quezon City 2005. Pp. 275-284