ARALING SAGISAG KULTURA

Grade 6
Culture Based Lesson Exemplar in
Mathematics

VOLUME OF CYLINDER
Cultural Icon: **Kawayan**

by **Julius V. Sarabia**

Topic: **VOLUME OF CYLINDER**
Cultural Icon: **KAWAYAN**
Level: **ELEMENTARY (GRADE VI)**
Subject: **MATHEMATICS**
Sessions: **3 days**
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I. OBJECTIVES:

At the end of the 3-day sessions, the pupils are expected to:

Day 1—Competency: Tell the unit of volume of a cylinder

- Recognize the unit of measurement used for computing the volume of cylinders
- Convert one cubic unit of measurement to a larger or smaller unit
- Derive a formula for finding the volume of cylinders

Day 2—Competency: Application of the measurement of volume

- Express an equation or formula to solve the volume of cylinder
- Solve word problems involving measurement of volume of cylinder

Day 3

- Stage a mini exhibit of kawayan crafts and relate it to volume of cylinder

II. SUBJECT MATTER

A. LESSON: KAWAYAN

Topic: Volume of Cylinder

B. REFERENCES

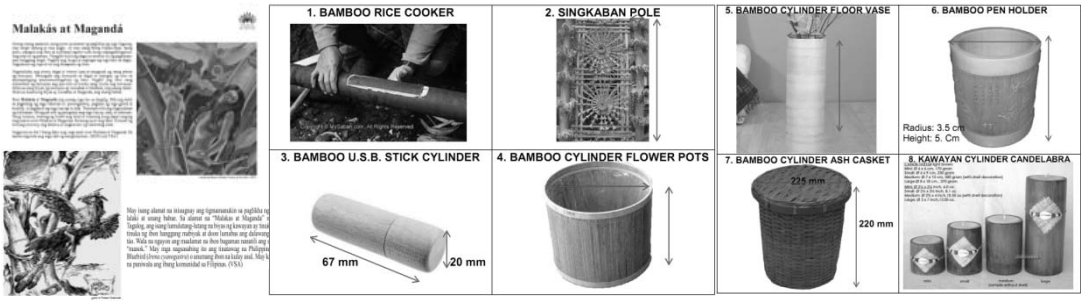
Sagisag Kultura ng Filipinas link: www.sagisagkultura.blogspot.com

PELC Mathematics VI

Malakas at Maganda (Filipino Story: First Man and Woman) March 22, 2013 by Evans Nanay; Video link:www.youtube.com/watch?v=wuTncnbzWQc

C. MATERIALS

Manila paper, scissors, scotch tape, tape measure, ruler, different pictures of kawayan products



D. VALUE: THRIFT, COOPERATION, RESILIENCY

III. LEARNING ACTIVITIES

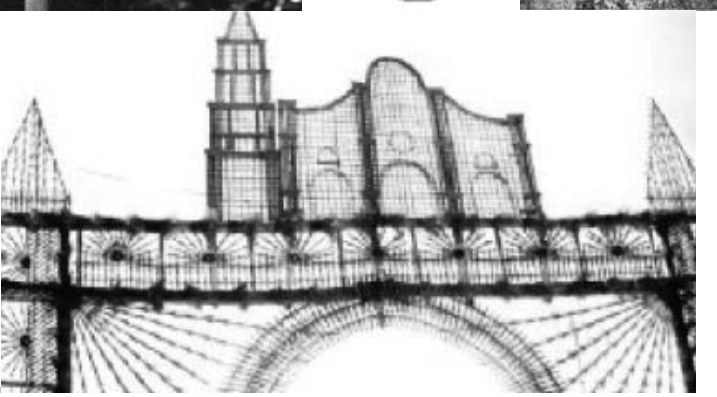
A. PREPARATORY ACTIVITIES (DAY 1)

REVIEW AND MOTIVATION
GROUP ACTIVITY (TIME FRAME: 5 MINUTES)

- Begin the lesson by singing the "Perimeter Area And Volume Song" by Linda Bolin (Tune: "Magtanim ay Di Biro"). The students will refresh their minds about the concepts of perimeter, area, and volume.
- Show different pictures of kawayan. (Bamboo Manalac, Kawayan, Buho, Bukawe, Singkaban)
- The class will be divided into five small groups. Each group will answer the following questions.





PERIMETER, AREA AND VOLUME SONG
Linda Bolin

You measure along the lines,
You measure along the lines,
If you want to find the perimeter
You measure along the lines.

You cover it up with squares,
You cover it up with squares
If you want to find the area
You, cover it up with squares

You fill it up with cubes
You fill it up with cubes
If you want to find the volume
You, fill it up with cubes

Dimensions, there are three
So, three measures there must be
Units, squares, square units
cubic units
Measure the shapes you see.

a. Guide Questions

- What do you see in the pictures?
- How are they similar to each other? Can you give other examples of kawayan?
- What is its shape?
- What measurement do you think are we looking for?
- What unit of measurement will you use for the different pictures?

ACTIVITY 1-B: Whole Class Activity *(Time frame: 5 minutes)*

Instructions: Let the students watch a video clip about the "Alamat ni Malakas at Maganda." Lead them to the concept of volume of cylinder. A short discussion will follow that will be the springboard to the next activity.

Screenshot from Malakas at Maganda (Filipino Story: First Man and Woman, www.youtube watch?v=wuTncnbzWQc)

Note to the teacher: *In the absence of audio visual materials (LCD Projector, computer set, and internet connection), the teacher may opt to provide a copy of the full text of Sagisag Kultura entries of "Malakas at Maganda" and "Tigmamanukin".*

Malakás at Magandá

Noong unang panahon, sang-ayon sa alamat ng paglikha ng mga Tagalog, may langit lámang at may dagat. At may isang ibong lilipad-lipad. Isang araw, napagod ang ibon sa kalilipad ngunit wala itong mapagpahingahan. Nag-isip ito ng paraan. Pinagálit nitó ang dagat at umalon ito ng pagkataas-taas hanggang langit. Nagálit ang langit at naghagis ng mga bato sa dagat. Nagkaroon ng lupa at ito ang dinapuan ng ibon.

Nagmahalan ang simoy dagat at simoy lupa at nanganak ng isang piraso ng kawayan. Bumagsak ang kawayan sa dagat at tinangay ng alon sa dalampasigang pinamamahingahan ng ibon. Nagálit ang ibon nang matumbok ng kawayan ang paa nitó at tinuka nang tinuka ang kawayan. Mula sa isang biyas ng kawayan ay lumabas si Malakás, ang unang lalaki. Mula sa ikalawang biyas ay lumabas si Magandá, ang unang babae.

Sina **Malakás** at **Magandá** ang unang mga tao sa daigdig. Silá ang saksi sa pagsilang ng mga halaman at punongkahoy, pagtaas ng mga gulod at bundok, at pagdami ng mga hayop at isda. Tinamasa nilá ang kagandahan ng kalikasan. Binigyan nilá ng pangalan ang mga hayop, isda, at halaman. Nang lumaon, tinawag ng lindol ang lahat at tinanong kung dapat maging mag-asawa sina Malakas at Maganda. Sumang-ayon ang lahat. Ikinasal ng liwanag at simoy ang dalawa at nagkaroon ng maraming anak.

Nagpunta sa iba't ibang dako ang mga anak nina Malakas at Maganda. Sa kanila nagmula ang mga lahi ng sangkatauhan. (EGN) (ed VSA)

mula sa *Seven Golden Cities of the Sun* (1981)

guhit ni Nestor Redondo

May isang alamat na iniuugnay ang tigmamanukin sa paglikha ng unang lalaki at unang babae. Sa alamat na "Malakas at Maganda" ng mga Tagalog, ang isang lumulutang-lutang na biyas ng kawayan ay tinuka nang tinuka ng ibon hanggang mabiyak at doon lumabas ang dalawang unang táo. Wala na ngayon ang maalamat na ibon bagaman nanatili ang salitâng "manok." May mga nagsasabing ito ang tinatawag na Philippine Fairy Bluebird (*Irena cyanogastra*) o anumang ibon na kulay asul. May kahawig na paniwala ang ibang komunidad sa Filipinas. (VSA)

Additional Information:

Alamat is a folk literature designed to culturally inform, emphasize values, and entertain children and adults at home or in a communal gathering.

The pupils will realize that the story is just a legend, and that there is no such bamboo as huge as depicted from the legend.

Let them point out that the kawayan resembles the shape of a cylinder which has an enclosed space where Malakas and Maganda came from. The volume of the kawayan is enough to occupy both of them.

B. DEVELOPMENTAL ACTIVITIES (DAY 1)

Presentation

Group Activity (Time frame 20 minutes)

AKO SI MALAKAS , IKAW SI MAGANDA NASAAN ANG KAWAYAN?

Optional: Background Music: "Lawiswis Kawayan" by Mabuhay Singers

Instructions:

1. After watching the video, the umalohokan of each group will get the activity card from the teacher and they will announce the next activity.
2. Each group will choose who will act as Malakas or Maganda. The other members will create their own kawayan which can accommodate two persons.
3. Each group will create a circle using manila paper/cartolina which can accommodate two standing persons. The height of the bamboo will be determined by measuring the height of the tallest pupil in each group.
4. Ask the pupils to measure the three dimensions of the KAWAYAN they made by choosing from among the cubic units of measure: (centimeter –cm; millimeter- mm; decimeter- dm;meter- m)
5. After determining the measurements, a group member will write on the designated wall the radius, diameter, circumference, and height of their "Kawayan."

Group Activity (Time frame: 15 minutes)

PAREHONG SUKAT

1. The umalohokan of each group will announce the next activity about looking for cylinder-like objects inside the room.
2. Other members will determined the best unit of measurement regarding the capacity of the objects found inside the room such as:
   - low ball glass or tumbler
   - plastic coin bank
   - cylindrical pencil case
3. Let them bring out their copy of the table of equivalence. Discuss the conversion of a larger unit of cubic measure to a smaller unit of cubic measure. (Principle: In cubic measure, 1,000 of any metric uni is equivalent to 1 of the next higher unit)

1000 mm^3	1cm^3	1 mL (milliliter)
10,000 mm^3	10 cm^3	1 cL (centiliter)
1,000,000 mm^3	100 cm^3	1 dL (deciliter)
1000 cm^3	1 dm^3	1 L (liter)
1000 dm^3	1 m^3	
1000 m^3	1dam^3	
1000 dam^3	1hm^3	
1000 hm^3	1km^3	

Practice Exercises: Sub-group Activity (Dyad)

Convert the following units into smaller or larger units.

1. Pepe bought a 500 ml of sukang Paombong. How much is that in cubic centimeters?
2. Tulali, a native flute of the Cordilleras can contain 38.59 cu. cm. of air if sealed. What is its volume in cubic millimeters?
3. Pilar prepared a 1500 cu. Cm. of buko juice. What is the value in liters?

Note to the teacher:

Prior to metric system we are using today, Filipino use body parts in measurement known as SUKAT such as dangkal, dipa, and hakbang.

PRELIMINARY ACTIVITIES (DAY 2)

A. DAY 2: SUB GROUP ACTIVITY (TIME FRAME: 15 MINUTES)

REVIEW AND MOTIVATION

SUKATIN ANG BILOG

Review of the circumference and area of a circle

Instructions:

1. The umalohokan of each group will announce the next activity.
2. The teacher will bring out the following objects: bao, bilao, bunot, and bistay. It will be arrange in a carousel style at the center of the room.
3. Each group will choose a tagasukat (a member who will make measurements) and a tagatala (a member who will record the measurements).
4. The tagasukat and tagatala of each group will have their designated objects. Once the teacher blows the whistle, the tagasukat will measure the distance around the object he/she is holding by winding the tape measure around the object. Let him/her also measure the diameter of the object. The tagatala will take note of the measurements.
5. After two minutes, the teacher will blow the whistle again for them to move clockwise to measure the next object.
6. After measuring the five objects, the tagatala will fill in the table of measurements.
7. Each group will present their findings and compare it to the other group. Ask them about their observations from the quotients or ratio derived from their measurements?"

(Circumference of the Circle / Diameter = Pi (π))
It is about 3 1/7 or 22/7 or a number very close to 3.14

The number 3.14 is usually used as the value for Pi (π)

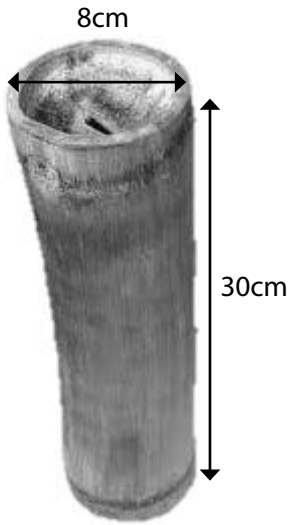
8. Once the diameter is measured, divide the diameter by 2 to get the radius.
9. The area of a circle is determined by multiplying the Pi (π) = 3.14 by the radius raised to the second power (r2) or simply $A = \pi r^2$.

B. DEVELOPMENTAL ACTIVITIES (DAY 2)

Presentation

Problem opener:

Pondo ng Pinoy is a fund raising drive of the Catholic Church to encourage every Filipino to share their twenty five centavos (P0.25). The catechists bring **alkansiyang kawayan** (coinbank) to Grade VI classes to give P0.25 donations. The alkansiyang kawayan measures 30 cm in height and 8 cm. in diameter.



- What did the catechists bring to Grade six classes?
- What is its shape?
- Why do we need to share some of our blessings?
- How can we help others?
- Why is saving money important?

Let a pupil from each group measure the height and diameter of the alkansiyang kawayan and write the measurements in their Show Me Board.

Reiterate to the class that the formula in finding the volume of a cylinder is similar to that of rectangular prism, where: Volume = b x h

Volume =l x w x h

Where b= area of base
Where h= height of prism
What is the base area of the cylinder?

Elicit the formula of the area of a circle: $A= \pi r^2$

Make the students understand that the area of a circle represents the base of the cylinder.

What is the formula in finding the volume of a cylinder? Volume= $\pi r^2 h$

Practice Exercises
ACTIVITY 1: SUB-GROUP ACTIVITY (TIME FRAME: 5 MINUTES)

1. The partners from yesterday's activity will pair again to find the volume of the kawayan they made.
2. Maganda will write the formula and equation in finding the volume of their kawayan cylinder.
3. Malakas will determine the volume of their kawayan cylinder.
4. Once the partners reveal the volume of their cylinders, they will shout "Ako si Malakas, ako si Maganda volume ng kawayan alam na!"
5. The first pair will get a token (kawayan keychain as prize.

APPLICATION
Individual Activity

Read and analyze the word problem and determine the volume of cylinder.

1. The Palawan Rain chime has an interior height of 43 cm and a diameter of 10 cm. What is its volume in cubic centimeters? How many cubic centimeters of small sigay shells can a quarter full of the chime hold?

Group Activity (Time Frame: 20 minutes)
PAREHAS NGA BA?

1. The umalohokan will announce the procedure:
   - Get two letter size papers. Using the first paper, in portrait orientation, connect the top and bottom to form a cylinder. The edges should meet by using scotch tape. Make sure that the edges don't overlap.
   - Then, with the second paper, in landscape orientation, connect the left and right edges to form another cylinder.
   - Place both cylinders on a table. These will be called Cylinder 1 and Cylinder 2.
   - Ask the following questions:
     How will you describe each cylinder?
     Will they hold the same amount of material or not?
     Which cylinder will hold more?
2. The group will determine the volume of cylinders using the formula: $A=\pi r^2$
3. The group leader will explain to the class the group's findings. The groups are expected to arrive at the conclusion that the cylinder with the greater diameter or radius will have the greater volume.

(OPTIONAL)

Once the pupils are finished with the activity, show the video "The Process of Making Singkaban Bamboo Arch ("Hiyas: Traditional Arts of Bulacan") to give them an idea for their "Other performance Output" – an artwork made from bamboo cylinders

For the next day's activity, each group will choose their bamboo cylinder projects like pen holder, coinbank, rainmaker, tumbler, or flower vase by drawing lots. They will be given instructions on how to make their artwork. Other group members will perform a dance number which uses a kawayan. Their performance output should be pre-assigned so that the group can prepare in advance.

Screenshot from The Process of Making Singkaban Bamboo Arch
(Hiyas: Traditional Arts of Bulacan), Hiyas DVD , Produced by CCP , 2008)

Generalization

Groups will be asked the following:

- How do you convert a unit of measurement to its larger or smaller equivalent?
- What are the units of measurement used for measuring volume of cylinder?
- Explain the relevance of the circumference of a circle, area of a circle and height to volume of cylinder.
- How can you find the volume of a cylinder?

IV. EVALUATION

DAY 1:

A. Individual Activity

1. Jose Rizal in his exile in Dapitan, constructed a water system that supplied fresh water to the community using bamboo tubes. Supposed the bamboo tubes hold 2,000,000,000 cubic millimeters of water, how much is that in liters?
2. Tinubong is a native delicacy from Vigan, Ilocos Sur. It is a sticky, sweet delicacy made from flour, sugar, coconut milk, small strips of buko, with cheese and margarine inserted into a bamboo tube. If the volume of the delicacy inside the tube is 95.71 cm^3, what is its equivalent in cubic millimeter?
3. An albularyo collected sap from a balete tree and placed it inside a bamboo tumbler. The tumbler holds 1,995 cubic centimeter of rubber sap. Convert the volume into cubic milliliter.

B. Group Activity

Put a check mark on the best unit of measurement for the capacity of the following objects found inside the school grounds.

Objects	m^3	cm^3	dm^3	m^3
1. low ball glass/tumbler				
2. Coin bank				
3. Cylindrical pencil case				
4. Cylindrical trash bin				
5. Water tank				
6. Burnay pots				
7._____				
8._____				
9._____				
10._____				

DAY 2

A. Group Activity

Determine the equation in finding the volume of the given cylinder.

1. BAMBOO RICE COOKER
   Radius: 3.18 cm
   Height: 61cm

2. PALAWAN RAIN CHIMES
   Radius: 5.08 cm
   Height: 43.18 cm

3. BAMBOO U.S.B. STICK CYLINDER
   Diameter: 20 mm
   Height: 67 mm

4. BAMBOO CYLINDER FLOWER POTS
   Diameter: 30 cm
   Height: 33 cm

5. BAMBOO CYLINDER FLOOR VASE
   Diameter: 14 cm
   Height: 66 cm

6. BAMBOO PEN HOLDER
   Diameter: 11.43 cm
   Height: 15.24 cm

7. BAMBOO CYLINDER ASH CASKET
   Diameter: 225 mm.
   Height: 220 mm

8. KAWAYAN CANDELABRA (S)
   Diameter: 6cm
   Height: 6 cm

9. KAWAYAN CANDELABRA (M)
   Diameter: 7cm
   Height: 10 cm

10. KAWAYAN CANDELABRA (L)
    Diameter: 8cm
    Height: 18 cm

B. Individual Activity: Solving Word Problems

Solve the following word problems involving volume of cylinders. Each pair in the group is task to answer A-G-O-N-A (What is Asked, Given, Operation to be Used, Number Sentence, and Answer).

1. In JEST Survival Camp at Subic, Zambales there is a restaurant named Kawayan Kitchen where pieces of bamboo are used in cooking rice and some Filipino dishes. Supposed the bamboo measures 30.48 centimeters with a diameter of 6.35 centimeters, what is the capacity of the bamboo to hold cooked rice?
2. The Singkaban Festival in Bulacan also features the bamboo industry in the province. There are different bamboo crafts exhibited and sold at very affordable prices. A bamboo cylindrical flower vase is very popular. What is the volume of the vase if it measures 28 inches and 18 inches in diameter?

3. A bamboo cylinder ash was used by Mang Pepe to hold feeds for his native chicken. What is the volume of the case if it has a diameter of 92 cm and a height of 122 cm.

DAY 3
Group Activity: KAWAYAN MINI-EXHIBIT

1. The class will mount a mini-exhibit where pre- assigned Kawayan cylinders will be exhibited at designated areas in the room.
2. Each group will also prepare a song or dance presentation using kawayan as an image or props. (20 minutes)
3. Every after presentation, the other groups will be given 5 minutes to view and measure the diameter and height of the five bamboo crafts to determine its volume. Likewise, they will listen to the exhibitor as the process of making the artwork is explained. (25 minutes)
4. After the exhibit tour, the class will have an open forum where students can ask questions. (10 minutes)
   Example of questions:
   - Why is it necessary to find the volume of solid figures?
   - What is the relevance of volume to our lives?
   - Give some practical applications of volume of cylinder to our daily lives.
   - Explain the salawikain: "Kapag puno na ang salop, dapat nang kalusin"
   - Relate the salawikain to the concept of volume.
5. The teacher will synthesize the answers of the pupils. They will also be given rubrics to evaluate output and performances.

V. Assignment /Agreement

1. Bring an alkansiyang kawayan. Measure its height, and area of its base. (Day 1)
2. Prepare for the "other performance output" of the group (kawayan crafts and song or dance number) using kawayan cylinder as image and props. (Day 2)
3. Give examples of objects that are conical in shape. (Day 3)

SUGGESTED RUBRICS FOR GRADING THE ARTWORK

POINTS	CREATIVITY AND ORIGINALITY	EFFORT/ PERSEVERANCE	CRAFTSMANSHIP SKILL CONSISTENCY	GROUP COOPERATION ATTITUDE
5	The group explored several options before selecting one; generated many ideas; tried unusual combinations or made changes on several ideas; made connections to previous knowledge; demonstrated problem solving skills	The project was pursued until it was completed; exerted effort far beyond what is required	A: The artwork was beautiful and patiently done; it was as good as hard work could make it.	A: The group worked toward group goals; members effectively performed a variety of roles in group work, and were sensitive to the feelings and knowledge level of others.
4	The group tried few ideas before for selecting one; the group based their work on the ideas of other people; made decisions after referring to one source; solve the problem in a logical way	The group worked hard and completed the project, but with more effort, the project might have been outstanding.	B: With a little more effort, the work could have been outstanding; lacks the finishing touches.	B: The members participated enthusiastically, followed through with commitments, performed more than adequately, assisted in the preparation and clean-up.
3	The group tried an idea, but it lacked originality; substituted "symbols" for personal observation; might have copied work	The group finished the project, but it could have been improved with more effort; chose an easy project and did it indifferently.	C: The group showed average craftsmanship; adequate, but not as good as it could have been; a bit careless.	C: The group members mostly allowed others in the group to make all the decisions, did his or her share of work adequately, assisted in preparation and cleanup when asked.
2	The group fulfilled the artwork requirement, but gave no evidence of trying anything unusual	The project was completed with minimum effort.	D: The group showed below average craftsmanship.	D: The group members allowed others to do most of the work; participated minimally.
1	The student showed no evidence of original thought.	The group did not finish the work adequately.	F: The group showed poor craftsmanship; there is evidence of laziness or lack of understanding.	F: The group members were part of the group, but did almost nothing toward group goals; did minimal amount of preparation and cleanup.

(www.zimmerworks.com/rubric.htm)

SUGGESTED RUBRICS FOR GROUP DANCE/SONG PRESENTATION

CRITERIA	4	3	2	1
ORGANIZATION	Presentation was very organized and was very easy to follow.	Presentation was fairly organized and pretty followable.	Presentation was not clearly organized.	Presentation lacked organization. Presentation lacked order and very difficult to follow.
TEAMWORK/ PARTICIPATION	The group members worked very well with each other; the presentation was shared equally among the group members	The group members worked well with each other and communicated well. Some members participated slightly more than others	Group communicated relatively well with a few lapses in the presentation; some pupils dominated the presentation and others did not participate much.	Group members did not work well. There were obvious mis-comminications and lapses in the presentation
CONTENT	Group members had a stronghold on the content was thoroughly addressed.	Most of the group members had a solid understanding of the content.	Group members had only superficial understanding of the content. Several mistakes were made during the presentation	Group members had little understanding of the content.
SERIOUSNESS	All group members took their performance seriously	Most group members were serious during presentation	A few of the group members were serious during presentation	Group members were not serious during the presentation
TIME	Groups used 4-5 minutes for their presentation	Group used 3 minutes for their presentation	Group used 2 minutes for their presentation	Group used 1 minute or less for their presentation

Credit:www.rcampus.com/rubricshowc.cfm?sp=yes&code=Z67B7A)

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