VOLUME AND CAPACITY

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Subject

Mathematics

Prepared By

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Grade Level

4

Overview

This lesson plan covers teaching content for;

1.Understanding capacity and volume
2. Differentiating between capacity and volume
3. Finding the relationship between litres and centiliters.
4.converting litres into cubic centimetres and compare various units of capacity.
5. Solving problems involving capacity

Objectives

Students should be able to;

1. Use cubes to find the volume of a cuboid and a cube
2. Pupils should be able to understand the meaning of capacity and how Pupils should be able to convert litres into cubic centmetres and also to compare various units of capacity.
3. Identify the difference between cubes and cuboids.
4. Find the relationship between litres and cubic centimetres
5. Identify the use of litres as a unit of capacity
6. Pupils should be able to convert litres into cubic centmetres and also to compare various units of capacity.

Activity Starter/Instruction

1. Gather the students together and show them your cup of water, tea, or coffee.
2. Ask the students to think-pair-share what the maximum amount of liquid your cup can hold is called.
3. Allow a few students to share their ideas with the rest of the class.
4. Explain to the students that the maximum amount of liquid your cup can hold is called its capacity.
5. Tell the students that today they will be comparing the capacity of different containers based on the container's attributes.
6. Collect cuboid-shaped empty containers and let the pupils fill them with cubic centimetre cubes.
7. Transparent, waterproof rigid containers are especially useful, as the cubes are visible and they can be filled with water, so that pupils can make the connection between litres and cubic centimetres

Teacher Guide

Day 1/ Lesson 1: 15 Mins

1. The teacher explains that Capacity is the amount a container can hold.
2. Explain to the students that
   1liter = 1000ml
   1liter = 100cl
3. For example, how many mL does 10L represent? Ans - 10 000 mL
4. How many L does 4000 mL represent? Ans- 4 L
5. The teacher also explains that Volume is the amount of space a container or object occupies.
6. In terms of differences, Capacity is the amount of water required to fill the fish tank (ml or L), **while** Volume is the space the tank and water take up.
7. The most common unit of volume is centimetres cubed (cm^3).
8. One centimetre cubed will hold one millilitre of fluid or another substance.
9. 1000 cm3 will hold one thousand millilitres of fluid or another substance.
   1000 mL = 1000 cm3 = 1 L

Materials Required

- Cube-shaped objects
- Cuboid-shaped objects/containers
- Whiteboard
- Cup
- Boxes

Additional Resources

- https://za.pearson.com/content/dam/region-growth/africa/TeacherResourceMaterial/9781447978428_m0
- http://www.learnalberta.ca/content/kes/pdf/or_cf_m
- https://www.instructables.com/id/How-do-one-cubic
- https://www.education.com/lesson-plan/capacity-co

Additional Notes

Guided Practice

Day 2/ Lesson 2: 25 Mins

1. Spend some time allowing the pupils to experiment with the cubes and boxes of different dimensions.
2. Allow them to compare the number of cubes with the capacity, and to see how many cubes fit along each of the dimensions.
3. Explain that 1 cm3 is equal to 1 ml and that 1 000 cm3 = 1ℓ.
4. If you have the time and the resources, pupils could prove this by filling a 200 ml or 250 ml container with centimetre cubes.
5. Four groups of pupils could each fill a 250 ml container, or five groups could each fill a 200 ml container, both of which equals 1ℓ.
6. Revise the properties of cubes and cuboids, showing the pupils some examples if available, for example cereal packets and dice. Allow the pupils to look into the empty containers to see the space inside, as you explain that volume is the space that an object takes up

Guided Practice

Day 3/ Lesson 3: 10 Mins

1. Show the pupils how to write cubic centimetres, explaining that the superscript 3 represents the third dimension, the height. Point out each dimension on the cuboids.
2. Turn the shapes around, so that the length becomes the height and name the dimensions again.
3. Revise the basic conversion facts: 1 000 ml = 1ℓ and 1ℓ = 1 000 ml.
4. Revise how to multiply and divide by 1 000 quickly.
5. Have five different-sized containers in the class. Write labels for each container, for example 1ℓ; 3 250 ml; 1 500 ml; 4.5ℓ and 2 500 ml.
6. Paste the labels on the containers. Have flash cards with the converted amounts written on them: 1 000 ml; 3.2ℓ; 1.5ℓ; 4 500 ml and 2.5ℓ.
7. Pupils need to match the flash card to the correct container.
8. Discuss with the pupils why it is necessary to be able to convert millilitres to litres and vice versa.

Guided Practice

Day 4/ Lesson 4: 15 Mins

1. Volume is commonly measured in cubic units, such as cm^3, because volume is a measure of an object's length, width and height as shown below.
2. Volume of a cube or rectangular prism = l × w × h = cm × cm × cm = cm3
3. Volume of a cylinder cm = $\pi \times r^2 \times h = \pi \times$ cm2 × cm = cm3 ($\pi = 3.14$)
4. For Example, Calculate the volume of a book that has a length of 10 cm, a width of 3.2 cm and a height of 15 cm.
   V = l × w × h =
   10 × 3.2 × 15 = 480 cm3
5. Another example, Calculate the volume of the box of length 12cm, width 8cm and height 6cm.
6. Volume = l x b x h
   = 12cm x 8cm x 6cm = $576cm^3$
7. How much space does the box take up? 576 cm3
8. The volume of the box is 576 cm^3.

Assessment Activity

Assessment Activity

1. Josh is cleaning under the kitchen sink. He found five 2-litre bottles of glass cleaner. None of the bottles is full. The bottles contain the following amounts.

   Bottle 1 – 375 ml

   Bottle 2 – 150 ml

   Bottle 3 – 190 ml

   Bottle 4 – 780 ml

   Bottle 5 – 630 ml

a) How many litres of glass cleaner do the five bottles contain?

b) If Josh combines all of the glass cleaners into as few bottles as possible, how many bottles will he use?

Assessment Activity

Perform the following conversions.

a) 250 mL = _____L

b) 1350 mL = ___L

c) 62 L = _____mL

d) 0.9 L = _____mL

e) 625 mL = _____L

f) 3.8 L = _____mL

Summary

Review and Summary

1. Assess whether pupils can use centimetre cubes to find the volume of a cuboid.
2. Pupils to think of real life situations where it would be important to know the volume of a cuboid, for example a container ship or when packing a lorry.