

Grade 10 Mathematics Presentation Script

Volume of Composite Solids

Pre-Class Preparation

Materials Checklist:

- Building blocks or 3D shape cut-outs (foam, paper nets, toy blocks)
- Rulers or measuring tapes (one per group)
- Worksheets for drawings and calculations
- Volume formula sheet

Room Setup:

- Prepare board space for formula review
- Arrange desks for group work
- Have extra materials available
- Prepare composite solid diagrams on chart paper for display
- Set up building station with blocks and shapes

Phase 1: Problem-Solving and Discovery (15 minutes)

Opening Hook (2 minutes)

[DO] Display pictures of composite solids (lighthouse, ice cream cone, water tank).

[SAY] Look at these objects. What shapes do you see?

[WAIT] Expected: A cylinder and a cone! A cone and a hemisphere!

[ASK] What is a composite solid?

[WAIT] Expected: A shape made up of two or more simple solids!

[SAY] Exactly! Today we will discover how to find the volume of composite solids.

[SAY] We will explore by building real-world objects using building blocks.

Anchor Activity Launch (3 minutes)

[DO] Distribute building blocks, rulers, and worksheets to each group.

[SAY] Here is your challenge: You will build a composite solid and calculate its volume.

[SAY] Here is what you will do:

[SAY] Step 1: Review volume formulas for cube, cylinder, cone, sphere, hemisphere, prism, pyramid.

[SAY] Step 2: Work in groups of at least four members.

[SAY] Step 3: Build a structure using 2 to 3 shapes. For example: lighthouse, ice cream cone, mailbox, robot.

[SAY] Step 4: Draw the structure, label the parts, and measure dimensions.

[SAY] Step 5: Calculate the volume of each solid part.

[SAY] Step 6: Add all volumes to get the total.

[SAY] Work with your group. You have 10 minutes.

Student Work Time (8 minutes)

[DO] Circulate among groups.

[ASK] To a group struggling: What shapes did you use?

[WAIT] Expected: A cylinder and a cone!

[SAY] Good! What is the formula for each?

[ASK] To another group: How will you find the total volume?

[WAIT] Expected: Add the volumes together!

[SAY] Excellent! Why do we add?

[WAIT] Expected: Because the shapes are joined together!

[DO] For struggling groups: Let us identify the shapes together.

[DO] For early finishers: Can you build a structure with a hole?

Class Discussion (2 minutes)

[DO] Call on 2-3 groups to share their findings.

[ASK] What did you discover about composite solids?

[WAIT] Expected: They are made up of simple solids!

[SAY] Excellent! How do we find the volume?

[WAIT] Expected: Calculate each volume, then add or subtract!

[SAY] Today we will formalize this process.

Phase 2: Structured Instruction (10 minutes)

Formalizing the Process (10 minutes)

[SAY] Now that you have explored composite solids, let us formalize what we learned.

[WRITE] On the board: Volume of Composite Solids

[SAY] A composite solid is made up of two or more simple solids.

[DO] Draw a composite solid on the board.

[SAY] To find the volume, follow these steps:

[WRITE] Step 1: Identify the simple solids.

[WRITE] Step 2: Calculate the volume of each solid.

[WRITE] Step 3: Add or subtract the volumes.

[SAY] If solids are joined, add. If a part is removed, subtract.

[ASK] Does everyone understand?

[WAIT] Check for nods or questions.

Addressing Misconceptions:

[SAY] Let me address some common mistakes:

[SAY] Mistake 1: All composite solids require adding. No, if a part is removed, subtract.

[SAY] Mistake 2: I can use any formula. No, use the correct formula for each solid.

[SAY] Mistake 3: I only calculate one volume. No, calculate each solid separately.

[SAY] Mistake 4: Composite solids are too complex. No, break them into simpler solids.

[ASK] Does everyone understand?

[WAIT] Check for understanding.

Phase 3: Practice and Application (10 minutes)

Worked Example (10 minutes)

[SAY] Let us work through an example together.

[WRITE] Example: Rectangular prism with cylindrical hole.

[DO] Draw the diagram on the board.

[SAY] Step 1: Find volume of prism. $V = 10 \text{ times } 6 \text{ times } 15 = 900 \text{ cm cubed.}$

[SAY] Step 2: Find volume of hole. $V = \pi \text{ times } 2 \text{ squared times } 15 = 188.4 \text{ cm cubed.}$

[SAY] Step 3: Subtract. $V = 900 \text{ minus } 188.4 = 711.6 \text{ cm cubed.}$

[ASK] Does everyone understand?

[WAIT] Check for understanding.

Phase 4: Assessment (5 minutes)

Exit Ticket

[SAY] Before we finish, I want to check your understanding. Please complete the exit ticket individually.

[DO] Display questions on the board or distribute exit ticket.

[SAY] You have 5 minutes to complete the questions.

Exit Ticket Questions:

1. Sphere in cube: radius 6 cm. Find space inside cube but outside sphere.
2. Prism with pyramid on top: prism 10 by 6 by 15 cm, pyramid 10 by 10 base, 8 cm height. Find total volume.

Differentiation Notes

For Struggling Learners:

- Provide pre-built models with labeled dimensions.
- Use simple shapes for initial practice.
- Pair with confident problem solvers.
- Provide step-by-step templates.
- Break down the process into steps.

For Advanced Learners:

- Challenge with designing composite solids with specific volumes.
- Explore real-world applications: buildings, monuments.
- Investigate optimization problems.
- Apply to complex composite solids with 4+ shapes.

Post-Lesson Reflection Prompts

- Did students successfully build composite solids?
- Were students able to identify when to add vs. subtract?
- What misconceptions emerged, and how were they addressed?
- Did students understand how to break down complex shapes?
- What adjustments would improve this lesson?