Grade 10 Mathematics Presentation Script

Volume of Cones

Pre-Class Preparation

Materials Checklist:

- Sheets of paper or cardboard (one per group)
- Scissors (one per group)
- Glue or tape
- Rulers (one per group)
- Cylinder (cup or bottle) for comparison (one per group)
- Empty ice cream cones (one per group)
- Water
- Calculators (one per group)
- Worksheets for recording observations and calculations

Room Setup:

- Prepare board space for formula derivation
- Arrange desks for group work
- Have extra materials available
- Prepare cone diagrams on chart paper for display
- Set up water station for pouring activity

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

Opening Hook (2 minutes)

[DO] Display pictures of cones (ice cream cones, traffic cones, funnels).

[SAY] Look at these shapes. What do you notice about them?

[WAIT] Expected: They are cones! They have circular bases and pointed tops!

[ASK] How would we find the volume of these cones?

[WAIT] Expected: We need a formula!

[SAY] Exactly! Today we will discover the formula for the volume of a cone.

[SAY] We will explore by constructing cones and pouring water.

Anchor Activity Launch (3 minutes)

[DO] Distribute paper, scissors, rulers, cones, cylinders, and water to each group.

[SAY] Here is your challenge: You will discover the volume formula for a cone.

[SAY] Here is what you will do:

[SAY] Method 1: Cut a circle from paper, cut out a sector, and roll it into a cone.

[SAY] Method 2: Fill the cone with water and pour it into the cylinder.

[SAY] Count: How many cones of water fill the cylinder?

[SAY] Discover: What is the relationship between the cone and the cylinder?

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

Student Work Time (8 minutes)

[DO] Circulate among groups.

[ASK] To a group struggling: How many cones have you poured so far?

[WAIT] Expected: Two cones!

[SAY] Good! Keep going. How many more do you need?

[WAIT] Expected: One more!

[ASK] To another group: How many cones fill the cylinder?

[WAIT] Expected: Three cones!

[SAY] Excellent! So the volume of the cone is one-third the volume of the cylinder.

[DO] For struggling groups: Let us count together as we pour.

[DO] For early finishers: How would the volume change if the radius doubled?

Class Discussion (2 minutes)

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

[ASK] What did you discover about the volume of a cone?

[WAIT] Expected: Three cones fill a cylinder with the same base and height!

[SAY] Excellent! What is the formula?

[WAIT] Expected: V = (1 / 3) times the volume of the cylinder!

[SAY] Today we will formalize this formula.

Phase 2: Structured Instruction (10 minutes)

Formalizing the Formula (10 minutes)

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

[WRITE] On the board: Volume of Cones

[SAY] A cone is a three-dimensional solid with a circular base and a curved surface that tapers to a point.

[DO] Draw a cone on the board.

[SAY] The volume of a cone is found using this formula:

[WRITE] V = (1 / 3) times π r squared times h

[SAY] Where r is the radius of the base and h is the height.

[SAY] Why (1 / 3)? Three cones fit exactly inside a cylinder with the same base and height.

[ASK] Does everyone understand this formula?

[WAIT] Check for nods or questions.

Addressing Misconceptions:

[SAY] Let me address some common mistakes:

[SAY] Mistake 1: A cone is the same as a cylinder. No, a cone tapers to a point.

[SAY] Mistake 2: The formula is π r squared h. No, you must multiply by (1 / 3).

[SAY] Mistake 3: The height is the slant height. No, the height is perpendicular from base to apex.

[SAY] Mistake 4: I can use the diameter. No, use the radius. Divide diameter by 2.

[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: Cone with radius 14 cm and height 28 cm.

[DO] Draw the diagram on the board.

[SAY] Step 1: Find the base area.

[WRITE] Area = π r squared = (22 / 7) times 14 times 14 = 616 cm squared.

[SAY] Step 2: Calculate the volume.

[WRITE] V = (1 / 3) times 616 times 28 = 5,749.3 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. Ice cream cone: radius 3 cm, height 8 cm. Find volume.

2. Two cones: same height 84 cm, radii 14 cm and 42 cm. Compare volumes.

Differentiation Notes

For Struggling Learners:

- Provide pre-made cone models.
- Use simple dimensions.
- Pair with confident problem solvers.
- Provide step-by-step calculation templates.
- Break down the formula into steps.

For Advanced Learners:

- Challenge with deriving the formula.
- Explore real-world applications: ice cream cones, funnels, traffic cones.
- Investigate relationship between dimensions and volume.
- Apply to hollow cones.

Post-Lesson Reflection Prompts

- Did students successfully construct cones and perform water pouring?
- Were students able to discover that 3 cones fill a cylinder?
- What misconceptions emerged, and how were they addressed?
- Did students understand the cone-cylinder relationship?
- What adjustments would improve this lesson?