CBC Grade 10 Mathematics

Step-by-Step Presentation Script

Volume of Prisms

Pre-Class Preparation

Before students arrive, ensure the following materials and setup are ready:

- Materials Needed:
- • Grid/graph paper (one per group)
- • Rulers
- • Paper-made unit cubes or square cut-outs
- • Calculators
- • Exit tickets (one per student)
- Classroom Setup:
- • Prepare board space for formulas and diagrams
- • Display key inquiry question: "How do we calculate the volume of prisms with different base shapes?"
- • Prepare formula reference chart
- • Have unit cubes ready for demonstration

Lesson Overview (40 Minutes)

Phase	Duration
Phase 1: Problem-Solving and Discovery	0-15 minutes
Phase 2: Structured Instruction	15-25 minutes
Phase 3: Practice and Application	25-37 minutes
Phase 4: Assessment (Exit Ticket)	37-40 minutes

Minute-by-Minute Presentation Guide

Minutes 0-2: Introduction and Engagement

[SAY] "Good morning, class! Today we explore how to calculate the volume of prisms. A prism is a solid with two identical parallel faces called bases. Think about boxes, buildings, bridges—many structures are prisms!"

[POINT] Show or draw examples of prisms: rectangular box, triangular roof support.

[ASK] "What do you think volume means?"

[LISTEN] Expected: Space inside, how much it holds, cubic units

[SAY] "Exactly! Volume is the amount of space a shape occupies, measured in cubic units like cm^3 or m^3. Today you'll discover a formula that works for ANY prism, no matter what shape the base is."

[WRITE] On the board: "Volume of Prisms"

[WRITE] Key inquiry question: "How do we calculate the volume of prisms with different base shapes?"

Minutes 2-17: Phase 1 - Anchor Activity (Discovery)
[SAY] "You will discover the volume formula by building prisms with unit cubes."

[DO] Organize students into groups of 2-3.

[DO] Distribute grid paper, rulers, and unit cubes.

[SAY] "First, draw a rectangular base that is 3 units by 2 units on your grid paper."

[DO] Allow 2 minutes for drawing (Minutes 2-4).

[SAY] "Task (a): Count the number of unit squares in the base."

[LISTEN] Expected: 6 squares

[SAY] "Task (b): Verify using multiplication. 3 times 2 equals 6. This is the base area."

[WRITE] "Base area = 3 × 2 = 6 units^2"

[SAY] "Now imagine stacking identical layers to form a prism of height 5 units. Task (c): How many layers are stacked?"

[LISTEN] Expected: 5 layers

[SAY] "Task (d): How many unit cubes are in the entire prism?"

[DO] Allow 5 minutes for counting and discussion (Minutes 4-9).

[DO] Circulate among groups asking probing questions.

[ASK] "How did you find the total number of cubes?"

[LISTEN] Expected: Counted all, or multiplied 6 × 5 = 30

[SAY] "Task (e): Verify using multiplication. 6 cubes per layer times 5 layers equals 30 cubes total."

[WRITE] "Total cubes = 6 × 5 = 30 units^3"

[SAY] "Task (f): What relationship do you observe between base area, height, and total cubes?"

[DO] Allow 6 minutes for group discussion and class sharing (Minutes 9-15).

[LISTEN] Expected: Total = base area × height, multiply them together

[SAY] "Excellent discovery! You found that Volume = Area of base × Height. This is the universal formula for ALL prisms!"

Minutes 17-25: Phase 2 - Structured Instruction

[SAY] "Let me formalize what you discovered. Volume is the amount of space a shape occupies, measured in cubic units."

[WRITE] "Volume = space occupied, measured in cm^3, m^3"

[SAY] "A prism has two identical parallel bases and flat connecting faces. The key principle: volume depends on base area and how deep that base extends."

[WRITE] "Prism: Two identical parallel bases + flat connecting faces"

[SAY] "The universal formula for ANY prism is: Volume equals Area of base times Height."

[WRITE] Large and clear: "Volume = Area of base × Height"

[SAY] "This works for rectangles, triangles, pentagons—ANY base shape! Let me show you specific examples."

[WRITE] Create table:

Prism Type	Base Area	Volume
Cuboid	l × w	V = l × w × h
Cube	$side^2$	V = $side^3$
Triangular	½ × b × h	V = (½bh) × H

[SAY] "Notice: The base shape changes, but the method stays the same—find base area, multiply by height."

[TEACHING TIP] Emphasize that the formula is universal

[SAY] "Units matter! Linear: cm, m. Area: cm^2, m^2. Volume: cm^3, m^3. Always use the same unit for all dimensions."

[WRITE] "Units: Linear (cm, m), Area (cm^2, m^2), Volume (cm^3, m^3)"

Minutes 25-37: Phase 3 - Practice and Application

[SAY] "Now let's apply the formula to different prisms."

[EXAMPLE] Example 1: Rectangular Prism

[WRITE] "Rectangular prism: base 6 × 4 units, height 8 units. Find volume."

[SAY] "Step 1: Find base area. 6 times 4 equals 24 square units."

[WRITE] "Base area = 6 × 4 = 24 units^2"

[SAY] "Step 2: Apply formula. Volume equals base area times height."

[WRITE] "V = 24 × 8 = 192 units^3"

[SAY] "Answer: 192 cubic units."

[EXAMPLE] Example 2: Triangular Prism

[WRITE] "Triangular prism: base triangle area 12 cm^2, height 10 cm. Find volume."

[SAY] "Step 1: Base area is given—12 square centimeters."

[SAY] "Step 2: V equals 12 times 10 equals 120 cubic centimeters."

[WRITE] "V = 12 × 10 = 120 cm^3"

[EXAMPLE] Example 3: Pentagonal Prism

[WRITE] "Pentagonal prism: base area 20 m^2, height 7 m. Find volume."

[SAY] "Notice: We don't need to know it's a pentagon! We just need base area."

[SAY] "V equals 20 times 7 equals 140 cubic meters."

[WRITE] "V = 20 × 7 = 140 m^3"

[EXAMPLE] Example 4: Cube

[WRITE] "Cube: side 5 cm. Find volume."

[SAY] "For a cube, base area equals side squared: 5 squared equals 25."

[SAY] "Height also equals 5. So V equals 25 times 5 equals 125."

[SAY] "Shortcut for cubes: V equals side cubed. 5 cubed equals 125."

[WRITE] "V = 5^3 = 125 cm^3"

[SAY] "Now try these individually:"

[WRITE] "Practice:"

1. 1. Rectangular prism: base 5 × 3, height 10. Volume?
2. 2. Triangular prism: base area 15 cm^2, height 9 cm. Volume?
3. 3. Cube: side 12 cm. Volume?

[DO] Give students 7 minutes (minutes 30-37) for individual practice.

[DO] Circulate to check understanding and provide hints.

[TEACHING TIP] Remind students: Step 1 = base area, Step 2 = multiply by height

Minutes 37-40: Phase 4 - Assessment (Exit Ticket)

[SAY] "Excellent work! Complete this exit ticket to show your understanding."

[DO] Distribute exit tickets.

[SAY] "You have 3 minutes."

[WRITE] Display questions:

Q1: Rectangular prism: base 8 × 2.5 m, height 6 m. Volume in m^3?

Q2: A prism has volume 200 cm^3 and height 10 cm. What is the base area?

Q3: Explain: Why does Volume = Base area × Height work for ANY prism?

[DO] Students work silently (minutes 37-40).

[DO] Collect exit tickets.

[SAY] "Great work! You now understand that volume of ANY prism equals base area times height. This formula works whether the base is a rectangle, triangle, pentagon, or any polygon. Remember: Find base area first, then multiply by height!"

Teaching Tips and Strategies

Emphasis Points:

- • Volume = "how many unit cubes fit inside"
- • The formula works for ANY base shape
- • Always find base area FIRST, then multiply by height
- • Units must be consistent (all cm or all m)
- • Volume is always in cubic units (cm^3, m^3)

Differentiation in Action:

- • For struggling learners: Physical unit cubes, grid paper, two-step process, formula cards
- • For advanced learners: Complex polygons, working backwards, scaling effects, real-world applications
- • Use visual diagrams showing base and height clearly
- • Connect to real structures (boxes, buildings, bridges)

Common Student Errors:

- • Confusing base area with base perimeter
- • Forgetting to calculate base area first
- • Using wrong units (mixing cm and m)

- • Writing answer without cubic units
- • Thinking formula only works for rectangles

Engagement Strategies:

- • Use physical unit cubes for hands-on discovery
- • Connect to real-world structures students recognize
- • Emphasize the "universal" nature of the formula
- • Celebrate student discovery of the relationship

Assessment Guidance

Exit Ticket Evaluation Criteria:

- • Correct base area calculation
- • Proper formula application
- • Accurate multiplication
- • Correct cubic units
- • Clear explanation of why formula is universal

Mastery Indicators:

- • Student calculates base area correctly
- • Student applies V = Base area × Height
- • Student uses correct cubic units
- • Student can work backwards (find base area from volume)
- • Student explains formula works for any base shape

Follow-Up for Students Who Struggle:

- • Provide physical unit cubes for manipulation
- • Use grid paper to visualize base area
- • Break into explicit two steps: 1) Base area, 2) Multiply by height
- • Focus on rectangular prisms only initially
- • Provide worked example template to follow

Post-Lesson Reflection Questions

After teaching this lesson, reflect on:

- • Did students successfully discover the Volume = Base area × Height relationship?
- • Were students able to apply the formula to different base shapes?
- • What misconceptions emerged about volume or units?
- • How engaged were students with the unit cube activity?
- • Did students understand the formula is universal?
- • What percentage demonstrated mastery on the exit ticket?
- • What adjustments would improve this lesson?