Grade 10 Mathematics Presentation Script

Area of Parallelograms

Pre-Class Preparation

Materials Checklist:

- Graph paper (one sheet per group)
- Scissors (one per group)
- Rulers (one per group)
- Colored pencils (one set per group)
- Parallelogram templates (one per group)
- Pair of compasses (one per group)
- Calculators (one per group)
- Chart paper for recording key takeaways
- Markers

Room Setup:

- Prepare board space for diagrams and formula derivation
- Arrange desks for group work
- Have extra materials available in case of breakage
- Prepare examples on chart paper for display

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

Opening Hook (2 minutes)

[DO] Display a picture of a parallelogram-shaped structure (floor, billboard, solar panel).

[SAY] "How could we find the area of this parallelogram-shaped structure?"

[WAIT] Expected: Various guesses.

[ASK] "What do we know about parallelograms?"

[WAIT] Expected: "Opposite sides are equal and parallel!"

[SAY] "Exactly! Today we will learn how to find the area of a parallelogram. We will discover the formula ourselves."

[SAY] "We will use graph paper to explore the area of a parallelogram."

Anchor Activity Launch (3 minutes)

[DO] Distribute graph paper, scissors, rulers, colored pencils, compasses, and parallelogram templates to each group.

[SAY] "Here is your challenge: You will draw a parallelogram, drop a perpendicular to find the height, and discover the formula for the area."

[SAY] "Here is what you will do:"

[SAY] "Step 1: Draw a parallelogram on graph paper. Label the vertices A, B, C and D."

[SAY] "Step 2: Use a pair of compasses to drop a perpendicular. Label the intersection point on line CD as H."

[SAY] "Step 3: Measure the base and height."

[SAY] "Step 4: Cut out the parallelogram and rearrange it to form a rectangle."

[SAY] "Step 5: Calculate the area of the rectangle and compare it to the area of the parallelogram."

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

Student Work Time (8 minutes)

[DO] Circulate among groups.

[ASK] To a group struggling with the perpendicular: "The perpendicular must be at a right angle to the base. Use your compass to draw it."

[WAIT] Expected: Students draw the perpendicular correctly.

[SAY] "Good! Now measure the base and height."

[ASK] To another group: "What shape do you get when you rearrange the parallelogram?"

[WAIT] Expected: "A rectangle!"

[SAY] "Correct! Now calculate the area of the rectangle."

[WAIT] Expected: "Area = base x height"

[SAY] "Excellent! How does the area of the parallelogram compare to the area of the rectangle?"

[WAIT] Expected: "They are the same!"

[DO] For struggling groups: "Let us draw the parallelogram together. The opposite sides are equal and parallel."

[DO] For early finishers: "Can you find a formula for the area of a parallelogram?"

Class Discussion (2 minutes)

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

[ASK] "What did you discover about the area of a parallelogram?"

[WAIT] Expected: "The area is base x height, just like a rectangle."

[SAY] "Excellent! Did everyone get the same formula?"

[WAIT] Check for understanding.

[SAY] "Today we will formalize this formula."

Phase 2: Structured Instruction (10 minutes)
Formalizing the Formula: Area = base x height (10 minutes)

[SAY] "Now that you have explored this, let us formalize the formula."

[WRITE] On the board: "Area of a Parallelogram"

[SAY] "A parallelogram is a quadrilateral whose opposite sides are equal and parallel."

[ASK] "Which other quadrilateral has similar characteristics?"

[WAIT] Expected: "Rectangle!"

[SAY] "Correct! A rectangle is a special type of parallelogram."

[WRITE] "Formula: Area = base x height"

[WRITE] "A = b x h"

[SAY] "where b is the base and h the perpendicular distance between the given pair of parallel sides."

[DO] Draw a parallelogram on the board with base and height labeled.

[SAY] "The height must be the perpendicular distance between parallel sides."

[SAY] "Let us try an example."

[WRITE] "Example: The area of a parallelogram given the base is 28 cm and the height 8 cm is:"

[WRITE] "A = b x h"

[WRITE] "A = 28 cm x 8 cm"

[WRITE] "A = 224 cm²"

[ASK] "Does everyone understand?"

[WAIT] Check for understanding.

Addressing Misconceptions:

[SAY] "Let me address some common mistakes:"

[SAY] "Mistake 1: Using the slant side as the height. The height must be the perpendicular distance between parallel sides."

[SAY] "Mistake 2: Thinking the formula is different from a rectangle. The formula is the same: base x height."

[SAY] "Mistake 3: Thinking you need all four sides to find the area. You only need the base and the perpendicular height."

[SAY] "Mistake 4: Thinking the height is always vertical. The height is perpendicular to the base, which can be horizontal or at an angle."

[ASK] "Does everyone understand when to use this formula?"

[WAIT] Check for nods or questions.

Phase 3: Practice and Application (10 minutes)
Worked Example (10 minutes)

[SAY] "Let us work through an example together."

[WRITE] "Example: A parallelogram PQRS is of sides 28 cm and 7 cm. If angle QRS is 75°. Find the height and area."

[DO] Draw a parallelogram on the board.

[SAY] "First, we need to find the height using the sine rule."

[SAY] "From Q drop a perpendicular to meet RS at T."

[WRITE] "Height (QT) = Hypotenuse(QR) x sin(angle)"

[WRITE] "QT = 7 sin 75°"

[WRITE] "QT = 6.76 cm"

[SAY] "Now we can find the area."

[WRITE] "Area of PQRS = RS x QT"

[WRITE] "= 28 x 7 sin 75°"

[WRITE] "= 189.32 cm²"

[SAY] "The area of the parallelogram is 189.32 cm²."

[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. Find the missing height of the parallelogram ABCD given the area is 24 cm² and base is 6 cm.

2. A construction company is building a parallelogram-shaped floor with a base of 10 meters and height of 6 meters. Find the area of the floor.

3. A billboard has a parallelogram shape with a base of 12 feet and a height of 5 feet. Find the area of the billboard.

Differentiation Notes

For Struggling Learners:

- Provide pre-drawn parallelograms with labels.
- Use simpler numbers for base and height.
- Pair with confident problem solvers.
- Provide step-by-step calculation templates.

For Advanced Learners:

- Challenge with deriving the formula themselves.
- Explore real-world applications: architecture, construction.
- Investigate the relationship between parallelogram and triangle areas.

Post-Lesson Reflection Prompts

- Did students successfully draw the parallelogram and drop the perpendicular?
- Were students able to derive the formula?
- What misconceptions emerged, and how were they addressed?
- Did students understand when to use the perpendicular height?
- What adjustments would improve this lesson?