Grade 10 Mathematics Presentation Script

Area of Trapeziums

Pre-Class Preparation
Materials Checklist:

- Graph paper (one sheet per group)
- Rulers (one per group)
- Protractors (one per group)
- Pencils
- Scissors (optional, 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 trapezium-shaped objects (bridge, table, window).

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

[WAIT] Expected: They have four sides! They look different from rectangles!

[ASK] What makes these shapes special?

[WAIT] Expected: Some sides are parallel!

[SAY] Exactly! These are trapeziums. Today we will learn about the properties of trapeziums and how to find their area.

[SAY] We will explore trapeziums by drawing and reasoning algebraically.

Anchor Activity Launch (3 minutes)

[DO] Distribute graph paper, rulers, protractors, pencils, scissors, and calculators to each group.

[SAY] Here is your challenge: You will draw a trapezium, identify its parts, and discover the area formula.

[SAY] Here is what you will do:

[SAY] Step 1: Draw a trapezium with one pair of parallel sides. Label it ABCD.

[SAY] Step 2: Identify and label the bases (parallel sides), the legs (non-parallel sides), and the height (perpendicular distance between the bases).

[SAY] Step 3: Think algebraically: If we could transform the trapezium into a rectangle, what would be the area?

[SAY] Step 4: The average of the two bases gives us a representative length. Multiply this by the height to get the area.

[SAY] Step 5: Write the mathematical expression for the area.

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

Student Work Time (8 minutes)

[DO] Circulate among groups.

[ASK] To a group struggling with drawing: Remember, only one pair of sides should be parallel. Use your ruler to check.

[WAIT] Expected: Students draw the trapezium correctly.

[SAY] Good! Now identify the bases and the height.

[ASK] To another group: How can you find a representative length for the trapezium?

[WAIT] Expected: We can find the average of the two bases!

[SAY] Excellent! What is the formula for the average?

[WAIT] Expected: (Base1 + Base2) / 2

[SAY] Perfect! Now multiply this by the height.

[DO] For struggling groups: Let us draw the trapezium together. Only one pair of sides should be parallel.

[DO] For early finishers: Can you explain why the average of the bases gives us the area?

Class Discussion (2 minutes)

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

[ASK] What did you discover about the trapezium?

[WAIT] Expected: Only one pair of sides are parallel! The average of the bases gives us a representative length!

[SAY] Excellent! Did everyone discover the formula?

[WAIT] Check for understanding.

[SAY] Today we will formalize this formula and use it to solve problems.

Phase 2: Structured Instruction (10 minutes)
Formalizing the Formula: Area = (Base1 + Base2) / 2 x height (10 minutes)

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

[WRITE] On the board: Area of a Trapezium

[SAY] A trapezium is a four-sided polygon with one pair of opposite sides that are parallel.

[ASK] What are the parallel sides called?

[WAIT] Expected: The bases!

[SAY] Correct! The other two sides are called the legs.

[WRITE] Properties of a Trapezium:

[WRITE] 1. A trapezium looks like a bridge. Suggest other real-life examples.

[WRITE] 2. One pair of sides are parallel.

[WRITE] 3. The height is the perpendicular distance between the parallel sides.

[WRITE] 4. The angles inside add up to 360 degrees.

[WRITE] Formula: Area = (a + b) / 2 x h

[SAY] where a and b are the two parallel sides (bases) and h is the height.

[DO] Draw a trapezium on the board with both bases and height labeled.

[SAY] The average of the bases gives us a typical length for the trapezium.

[SAY] Let us try an example.

Addressing Misconceptions:

[SAY] Let me address some common mistakes:

[SAY] Mistake 1: Using any two sides. You must use the two parallel sides (bases).

[SAY] Mistake 2: Thinking the height is one of the legs. The height is the perpendicular distance between the bases.

[SAY] Mistake 3: Adding the bases and multiplying by the height without dividing by 2. You must find the average first.

[SAY] Mistake 4: Confusing a trapezium with a parallelogram. A trapezium has only one pair of parallel sides.

[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: Calculate the area of a trapezium with vertices A(-2, 3), B(2, 3), C(3, -1), D(-3, -1).

[DO] Draw the trapezium on the board with coordinates labeled.

[SAY] First, let us identify the parallel sides.

[SAY] AB and DC are parallel because they have the same y-coordinates.

[WRITE] Length of AB = |2 - (-2)| = 4 cm

[WRITE] Length of DC = |3 - (-3)| = 6 cm

[SAY] The height is the perpendicular distance between the bases.

[WRITE] Height = |3 - (-1)| = 4 cm

[SAY] Now let us use the formula.

[WRITE] Area = (1/2) x (Base1 + Base2) x Height

[WRITE] Area = (1/2) x (4 + 6) x 4

[WRITE] Area = (1/2) x 10 x 4

[WRITE] Area = 20 cm squared

[SAY] The area is 20 cm squared.

[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. A trapezium has a height of 5 cm, the top base is 8 cm and the bottom base is 14 cm. Find its area.

2. A trapezium-shaped farm has a shorter base of 150 m, a longer base of 300 m and a height of 200 m. Find the area.

3. A car window is shaped like a trapezium with a height of 50 cm, the top base is 60 cm and the bottom base is 80 cm. Find the area.

Differentiation Notes
For Struggling Learners:

- Provide pre-drawn trapeziums with bases and height already labeled.
- Use simpler numbers for base lengths and heights.
- Pair with confident problem solvers.
- Provide step-by-step calculation templates.

For Advanced Learners:

- Challenge with deriving the formula themselves.
- Explore real-world applications: civil engineering, architecture.
- Investigate the relationship between trapezium and other quadrilateral areas.

Post-Lesson Reflection Prompts

- Did students successfully draw the trapezium and identify the parallel sides?
- Were students able to discover the formula by thinking about the average of the bases?
- What misconceptions emerged, and how were they addressed?
- Did students understand when to use the trapezium formula versus other quadrilateral formulas?
- What adjustments would improve this lesson?