Grade 10 Mathematics Presentation Script

Area of Irregular Polygons

Pre-Class Preparation

Materials Checklist:

- Graph paper (preferably colored) - one sheet per group
- Scissors (one per group)
- Glue or tape
- Rulers (one per group)
- Measuring tape (optional)
- A variety of irregular polygons (either printed or hand-drawn)
- 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 pictures of irregular shapes in real life (farm land, city parks, building sites).

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

[WAIT] Expected: They are not regular! The sides are different!

[ASK] How would we find the area of these shapes?

[WAIT] Expected: We do not have a formula for these!

[SAY] Exactly! These are irregular polygons. Today we will learn a method to find their area.

[SAY] We will explore by dividing irregular polygons into smaller shapes.

Anchor Activity Launch (3 minutes)

[DO] Distribute graph paper, scissors, rulers, and irregular polygons to each group.

[SAY] Here is your challenge: You will divide an irregular polygon into smaller shapes and find its total area.

[SAY] Here is what you will do:

[SAY] Step 1: Divide the irregular polygon into smaller shapes like triangles, rectangles, or trapeziums.

[SAY] Step 2: Measure the necessary dimensions for each smaller shape.

[SAY] Step 3: Calculate the area of each smaller shape.

[SAY] Step 4: Add all the areas together to find the total 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 division: Where could you draw a line to create two triangles?

[WAIT] Expected: Students draw a diagonal.

[SAY] Good! Now measure the base and height of each triangle.

[ASK] To another group: How many shapes did you create?

[WAIT] Expected: Three triangles!

[SAY] Excellent! Now calculate the area of each one.

[WAIT] Expected: Students calculate the areas.

[SAY] Perfect! Now add them together.

[DO] For struggling groups: Let us try dividing this polygon into two triangles first. Can you see where to draw the line?

[DO] For early finishers: Can you find a different way to divide the same polygon? Do you get the same total area?

Class Discussion (2 minutes)

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

[ASK] What did you discover about finding the area of irregular polygons?

[WAIT] Expected: We divided it into smaller shapes! We added the areas!

[SAY] Excellent! Did everyone divide their polygon the same way?

[WAIT] Check for understanding.

[SAY] Today we will formalize this method.

Phase 2: Structured Instruction (10 minutes)

Formalizing the Method (10 minutes)

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

[WRITE] On the board: Area of Irregular Polygons

[SAY] An irregular polygon has at least two sides or angles that are not the same.

[ASK] What makes a polygon irregular?

[WAIT] Expected: Different sides! Different angles!

[SAY] Correct! Now, how do we find the area?

[SAY] We divide the irregular polygon into smaller, familiar shapes.

[DO] Draw an irregular polygon on the board and divide it into triangles.

[SAY] Step 1: Divide into smaller shapes.

[SAY] Step 2: Measure the necessary dimensions.

[SAY] Step 3: Calculate the area of each shape.

[SAY] Step 4: Add all the areas together.

[WRITE] Method: Divide, Measure, Calculate, Add

[SAY] Let us try an example.

Addressing Misconceptions:

[SAY] Let me address some common mistakes:

[SAY] Mistake 1: I can use a formula directly for irregular polygons. There is no single formula. You must divide it first.

[SAY] Mistake 2: There is only one correct way to divide the polygon. There are multiple ways. As long as you divide it completely, you will get the same total area.

[SAY] Mistake 3: I need to find all the interior angles first. You only need the dimensions of the smaller shapes.

[ASK] Does everyone understand this method?

[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 farmer has land shaped like an irregular quadrilateral with sides measuring 50m, 60m, 40m and 30m. If the land is divided into two triangles for calculation, estimate its total area.

[DO] Draw the quadrilateral on the board.

[SAY] Step 1: Divide the quadrilateral into two triangles by drawing a diagonal.

[DO] Draw a diagonal on the board.

[SAY] Step 2: For Triangle 1, assume base = 50m and height = 24m.

[WRITE] Area of Triangle 1 = (1/2) times 50 times 24 = 600 m squared

[SAY] Step 3: For Triangle 2, assume base = 60m and height = 20m.

[WRITE] Area of Triangle 2 = (1/2) times 60 times 20 = 600 m squared

[SAY] Step 4: Total Area = 600 + 600 = 1,200 m squared

[SAY] The total area of the land is 1,200 m 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 garden is shaped like an irregular hexagon with side lengths 4m, 6m, 5m, 7m, 8m and 3m. Calculate its perimeter.

2. A farmer has land shaped like an irregular quadrilateral with sides measuring 50m, 60m, 40m and 30m. If the land is divided into two triangles for calculation, estimate its total area.

3. An office space has an irregular pentagonal shape. The flooring cost is calculated based on the total area. If the room is divided into three triangles for estimation, find the approximate flooring cost given a rate of $25 per square meter. (Assume total area is 120 m squared)

Differentiation Notes

For Struggling Learners:

- Provide pre-divided polygons with shapes already outlined.
- Use simpler polygons that divide into only 2-3 shapes.
- Pair with confident problem solvers.
- Provide step-by-step calculation templates.

For Advanced Learners:

- Challenge with creating their own irregular polygons and calculating the area.
- Explore real-world applications: land surveying, architecture, urban planning.
- Investigate the relationship between different division strategies and efficiency.
- Apply coordinate geometry to find areas of irregular polygons on a coordinate plane.

Post-Lesson Reflection Prompts

- Did students successfully divide the irregular polygons into smaller shapes?
- Were students able to discover that different division strategies yield the same total area?
- What misconceptions emerged, and how were they addressed?
- Did students understand when to use which formula for each smaller shape?
- What adjustments would improve this lesson?