

RAM Maths Circle

October 12, 2025

Nagpur

Introduction

Today's session was a guest lecture by Bhas Bhamre Sir on the theme "Playing with Geometry." Participants worked through three geometry puzzles and a physics problem, exploring how sharp observations such as symmetry, area-preserving folds and angle relations can often collapse a hard-looking problem into a neat one-line insight. We paired those observation-based solutions with more systematic approaches including coordinates, area computation and trigonometry so students could see when to hunt for a shortcut and when to rely on a dependable method. The physics problem stressed careful reading and timeline mapping to set up relative-speed equations correctly.

Problems

Problem 1: Folding triangle area

In a paper triangle a segment was drawn dividing its area in half, and then folded over this line. It turned out that the area "two-layer part" (shaded in the figure) is equal to the area "single-layer part" and 12 cm^2 less than the area of the original triangle. Find the area of the lower small triangle.

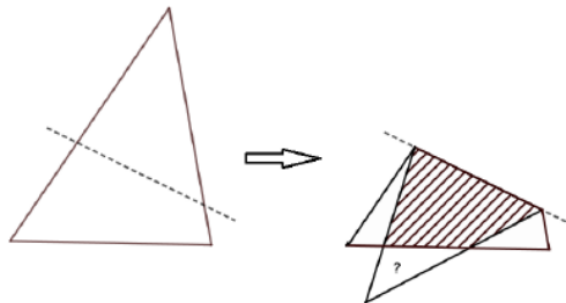


Figure 1: Diagram for Problem 1.

Problem 2: Equilateral triangle in a hexagon

An equilateral triangle is inscribed in a regular hexagon of area 96 square units as shown in the figure. Find the area of this triangle.

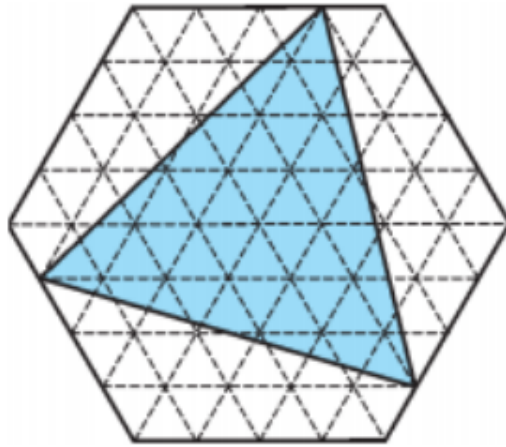


Figure 2: Diagram for Problem 2.

Problem 3: Angles in a configuration of equilateral triangles

Eight equilateral triangles are arranged as shown in the figure. Find the sum of the two marked angles.



Figure 3: Diagram for Problem 3.

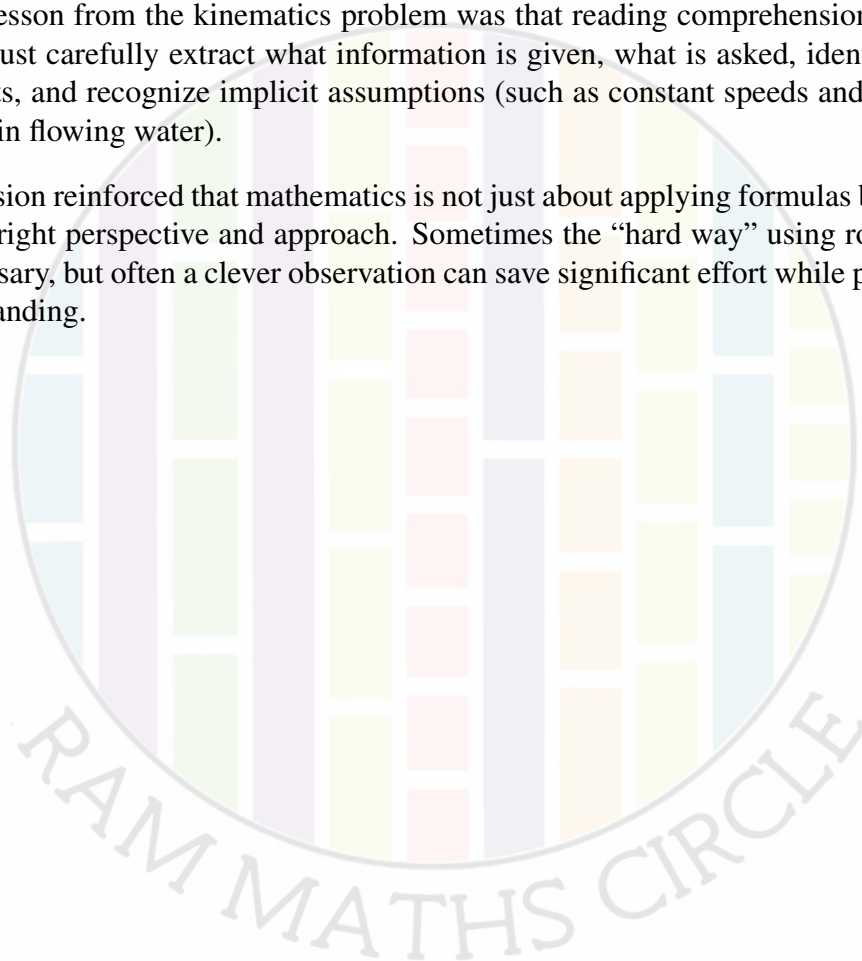
Playing with speed, time and distance (Physics)

Problem 4: Boat and current

A motor-boat travelling upstream met rafts floating downstream. One hour after this the engine of the boat stalled. It took 30 minutes to repair it, and during this time the boat freely floated downstream. When the engine was repaired, the boat travelled downstream with the same speed relative to the current as before and overtook the rafts at a distance of 9 km from the point where they had met the first time. Determine the velocity of the river current, assuming it is constant.

Exploration

- The geometry problems demonstrated how keen observation of symmetries, area relationships, and structural patterns can lead to elegant solutions without extensive calculations. Students practiced identifying when computational approaches are necessary versus when geometric insights provide shortcuts.
- For Problems 2 and 3 participants first suggested quick geometric observations (symmetry, angle chasing). The instructor then demonstrated a area-method to verify the answers, reinforcing that both approaches are valid.
- A key lesson from the kinematics problem was that reading comprehension is crucial: students must carefully extract what information is given, what is asked, identify the timeline of events, and recognize implicit assumptions (such as constant speeds and the behavior of objects in flowing water).
- The session reinforced that mathematics is not just about applying formulas but about choosing the right perspective and approach. Sometimes the “hard way” using robust machinery is necessary, but often a clever observation can save significant effort while providing deeper understanding.



References

- (1) Contest Problems around the world.
- (2) Problems in Physics.