



SATISH CHANDRA MEMORIAL SCHOOL
CASE STUDY BASED EXAMINATION
STD-VIII

D.O.E.-01/09/2026
MM 14

Case Study: The Mathematics Adventure Park

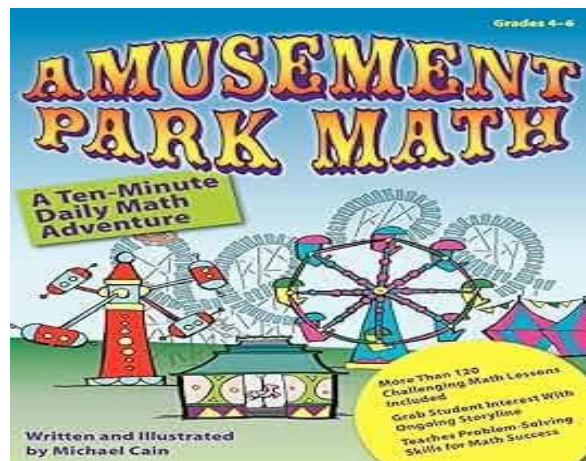
Class 8 students are redesigning a Mathematics Adventure Park in their school. The park has several zones where students can learn mathematics through games and activities.

The main Puzzle Zone is a square with side $(x+8)$ m. Inside it, a square Thinking Zone has side $(x-8)$ m. The space between the two squares is used for mathematical displays.

A rectangular Science Zone has dimensions $(2x+3)$ m and $(3x+4)$ m. Near it, a square Number Garden has side $(2x+5)$ m.

For a new activity, the school plans to increase the side of the Thinking Zone from $(x-8)$ m to $(x-3)$ m. The students must determine how the changes affect the available space.

The teacher asks them to use algebraic identities wherever possible and to justify why a particular identity is more efficient.



Questions

1. Without full expansion, find the area of the Puzzle Zone.
2. Find the area of the Thinking Zone using a suitable identity.
3. Find the area between the two squares without separately finding their areas.
4. Find the area of the Science Zone.
5. A student claims: $(2x + 5)^2 - (2x - 5)^2 = 20x^2$. Do you agree? Justify without expanding.
6. The Thinking Zone changes from $(x-8)$ m to $(x-3)$ m. Find the increase in area using an identity.
7. The teacher gives two expressions: $(3x + 7)^2 - (3x - 7)^2$ and $(3x + 7)(3x - 7)$. Can they have the same value? Explain and find the correct expressions' values.

Case Study: Mathematics Carnival at School

The students of Class 8 are organising a **Mathematics Carnival** in their school. The carnival has different stalls for mathematical games, puzzles, quizzes, and experiments. There are **72 students** participating, and they are divided into equal teams. Each team is given some cards and coloured sheets for preparing activities.

The number of cards given to each team is represented by the expression $(4x+3)$, where (x) is the number of teams. During the preparation, students use fractions of their materials and maintain a record of the remaining materials.

The organisers also record the number of visitors during six-time intervals. The numbers are **35, 50, 65, 80, 70 and 60**. The school initially spends **₹4,000** on materials. Later, the cost increases by **10%**, while a sponsor provides a discount of **5%** on the increased amount.

For one puzzle stall, students arrange **196 cards** in a square pattern. Another stall uses a machine that doubles the number of points earned in every round. The students are asked to analyse all this information and make logical decisions for the successful organisation of the carnival.



Questions

1. If 72 students are divided equally into teams of 8, find the number of teams. If each team gets $(4x+3)$ cards, find the number of cards per team.
2. A team uses $\frac{2}{5}$ of its cards in one activity and $\frac{1}{4}$ of the remaining cards in another. What fraction of the original cards is left?
3. If the number of teams is represented by (x) , write an expression for the total number of cards given to all teams. Find its value for the number of teams obtained in Question 1.
4. The material cost of ₹4,000 increases by 10% and then receives a 5% discount. Is the final cost ₹4,000? Calculate and justify your answer.
5. The visitor numbers are 35, 50, 65, 80, 70 and 60. Find the mean. If the organisers expect 20% more visitors next year than the mean, approximately how many visitors should they plan for?
6. The puzzle stall has 196 cards. They are arranged equally in rows and columns. Find the number of cards in each row. If 29 more cards are added, can they still form a perfect square? Give a reason.
7. A game doubles the points after every round. If a player starts with 2 points, express the points after 6 rounds using powers of 2. How does this help the organisers calculate scores quickly?