## CASE STUDY 01

Rahul and his sister, Ananya, are making fruit juice for their family. They use different fruit concentrates mixed with water in specific ratios. While preparing the drinks, they compare the fractions to check if they are using equivalent proportions.

Q1. Rahul mixed $\frac{4}{6}$ of a glass of orange concentrate with water, while Ananya mixed $\frac{2}{3}$ of a glass. Are their mixtures equivalent?

Q2. Rahul wants to express $\frac{4}{6}$ in another equivalent form with a denominator of **9**. What will be the new fraction?

Q3. Their mother asked them to prepare another batch using an equivalent ratio of $\frac{2}{5}$. Suggest two different equivalent fractions they can use while maintaining the same proportion.

Q4. If Ananya mixed $\frac{3}{8}$ of a glass of orange concentrate with water and

## CASE STUDY 02

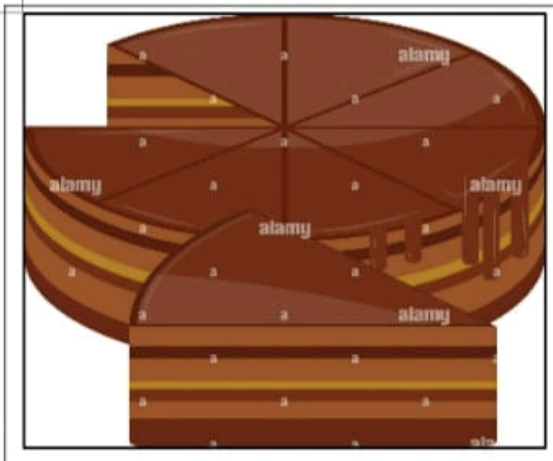
Riya and her brother Aman baked a chocolate cake and decided to share it with their friends. Riya ate $2\frac{1}{4}$ slices, while Aman ate $3\frac{2}{5}$ slices. Later, their friend Ananya joined and ate $1\frac{3}{4}$ slices. They now want to figure out how many slices have been eaten and how many are left from the **10** slices they initially baked.

Q1. How many slices did Riya and Aman eat together?

Q2. How many slices have been eaten in total?

Q3. How many slices are left from the original 10?

Q4. If they decide to divide the remaining slices equally among the three of them, how much will each person get?



Q1. Assertion(A): The rational number $\frac{3}{4}$ is greater than the rational number $\frac{2}{3}$.

**Reason(R)**: When the denominators are the same, the rational number with the greater numerator is greater.

Q2. **Assertion(A)**: The rational number $\frac{5}{0}$ is undefined.

Reason(R): Division by zero is allowed in rational numbers.

Q3. **Assertion(A)**: The rational number $-\frac{3}{4}$ is less than the rational number $\frac{3}{4}$.

Reason(R): Rational numbers with the same denominator are compared by comparing their numerators.

Q4. **Assertion(A)**:The rational numbers $\frac{3}{18}, \frac{5}{36}, \frac{14}{72}$ lie between $\frac{1}{9}$ and $\frac{2}{9}$.

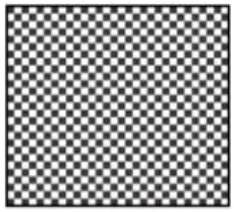
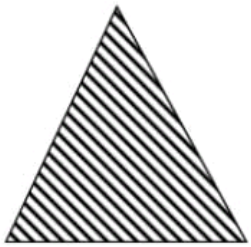
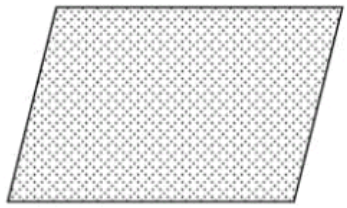
**Reason(R)**: Between any two rational numbers we can find infinite number of rational numbers.

Q5. **Assertion(A)**:The product of $-\frac{5}{6}$ and $-\frac{3}{4}$ is greater than $-\frac{5}{6}$.

**Reason(R)**: Multiplication of two negative rational numbers results in a number greater than both original factors.

## CASE STUDY 01

A group of students is participating in an art competition where they are tasked with creating symmetrical designs. They are given various shapes and patterns to work with and are required to identify and create both line and rotational symmetries.

Q1. One of the students, Maya, is working with a square shape. How many lines of symmetry does a square have, and can it have rotational symmetry?

Q2. Another student, Anirban, is creating a design using a triangle. He has drawn a triangle with one side of 4 cm and the other two sides of 6 cm each. Determine whether Anirban's triangle has rotational symmetry? Justify your answer with constructing proper figure.

Q3. The art teacher introduces a new shape to the students called a parallelogram. Priya, one of the students, claims that all parallelograms have at least one line of symmetry. Do you agree with Priya's statement? Justify your answer.

## CASE STUDY 02

A **starfish** is an example of **natural symmetry** found in marine life. Most starfish have **five arms**, which create a symmetrical shape. This shape exhibits both **line symmetry** and **rotational symmetry**. The study of symmetry in natural objects helps us understand geometric properties in real-world scenarios.

Q1. Explain the concept of line symmetry. How many lines of symmetry does a five-armed starfish have? Draw a diagram to support your answer.

Q2. Determine the order of rotational symmetry of a starfish with five equal arms and justify your answer.

Q3. If a starfish had six equal arms instead of five, how would the number of lines of symmetry and the order of rotational symmetry change? Explain mathematically.

Q4. Compare the symmetry of a starfish with that of a square. How is their rotational symmetry similar or different?

Q5. Give another example of an object that exhibits both line and rotational symmetry. Describe its symmetry properties.

## Assertion - Reason Based Questions

**INSTRUCTIONS:** All the questions given below are **Assertion**(A) and **Reason(R)** based questions. Two statements are given, one labelled as **Assertion(A)** and the other is labelled as **Reason(R)**. Select the correct options from the codes (a), (b), (c), (d)as given below.

(a) Both **Assertion**(A) and **Reason**(R) are correct and **Reason**(R) is the correct explanation of **Assertion(A)**.

(b) Both **Assertion**(A) and Reason(R)are correct but **Reason(R)** is not the correct explanation of **Assertion(A)**.

(c) **Assertion**(A) is true but **Reason(R)** is false.

(d) **Assertion**(A) is false but **Reason(R)** is true.

Q1. **Assertion(A)**: The letter "A" has line symmetry.

**Reason(R)**: A figure has line symmetry if it can be divided into two identical parts by a line.

Q2. **Assertion(A)**: A square has rotational symmetry of order 4.

**Reason(R)**: A figure has rotational symmetry of order 'n' if it looks the same after a rotation of $\frac{360°}{n}$.

Q3. **Assertion**(A): An isosceles triangle has both line symmetry and rotational symmetry.

Reason(R): Regular polygons have multiple lines of symmetry and rotational symmetry of order equal to the number of sides.

Q4. **Assertion(A)**: Square is a regular polygon with four sides.

Reason(R): Regular polygons are those polygons which have equal no. of lines of symmetry and order of rotational symmetry.

Q5. **Assertion**(A): A circle has infinite **lines of symmetry**.

Reason(R): A figure has line **symmetry** if it can be divided into two equal halves by a line.