Maths

~~~~ Activities ~~~~

A Work in groups to factorize a polynomial, say $2x^2 + 3x$.

◀ **Conceptual Understanding, Experiential Learning, Collaboration**

MATERIALS REQUIRED: One sheet of green chart paper, one sheet of red chart paper, a glue stick, a ruler and a pair of scissors

STEPS:

1. From the sheet of green chart paper, cut out two squares of size 4 cm × 4 cm (Fig. 1). Let 4 cm be x. So, the area of each square equals x^2.

2. From the sheet of red chart paper, cut out three rectangles of size 4 cm × 1 cm (Fig. 2). As 4 cm = x, the area of each rectangle equals x.

3. Join all the five cutouts to form a single rectangle (Fig. 3).
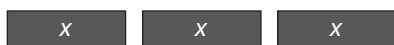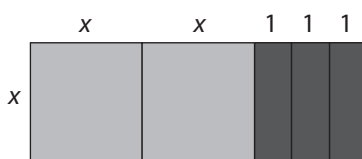
Fig. 1

Fig. 2

Fig. 3

CALCULATIONS:

From Figure 3, the sides of the rectangle are x and $2x + 3$.

So, the area of the rectangle $= x \times (2x + 3) = 2x^2 + 3x$

Thus, the factors of $2x^2 + 3x$ are x and $(2x + 3)$.

Repeat the activity to factorize some more polynomials.

B Verify Euler's formula by making different types of prisms and pyramids.

MATERIALS REQUIRED: A cardboard, a pair of scissors and Sellotape

STEPS:

1. Draw two identical equilateral triangles of any suitable side, say 5 cm, on the cardboard.

2. Draw three congruent rectangles whose breadth is the same as the side of the triangle. Here it is 5 cm. Choose the length of the rectangles of any suitable size, say 10 cm.

3. Cut out all triangles and rectangles.

4. Arrange the cutouts using sellotape to form a triangular prism as shown in Figure 1.

5. Similarly, draw and cut out four equilateral triangles and arrange them to form a triangular pyramid as shown in Figure 2.
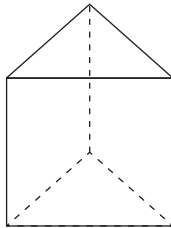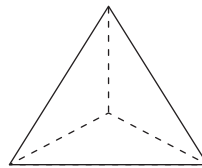

Fig. 1   Fig. 2

CALCULATIONS: In the triangular prism (Fig. 1):

Number of faces (F) = 5

Number of vertices (V) = 6

Number of edges (E) = 9

Thus, $F + V - E = 5 + 6 - 9 = 2$

In the triangular pyramid (Fig. 2):

Number of faces (F) = 4

Number of vertices (V) = 4

Number of edges (E) = 6

Thus, $F + V - E = 4 + 4 - 6 = 2$

Thus, Euler's formula is verified.

Similarly, you can make square, pentagonal and hexagonal prisms and pyramids. Check Euler's formula for the same and share your observations in the class.

C **To verify the algebraic identity $a^2 - b^2 = (a + b)(a - b)$**

◀ **Conceptual Understanding, Experiential Learning**

MATERIALS REQUIRED: A cardboard, one sheet of red chart paper, one sheet of blue chart paper, a glue stick, a ruler and a pair of scissors

STEPS:

1. From the sheet of red chart paper, cut out a square of side a units (Fig. 1). Here take $a = 5$ cm.

2. From the sheet of blue chart paper, cut out a square of side b units (Fig. 2). Here take $b = 3$ cm.

3. Paste both the squares on the cardboard as shown (Fig. 3).
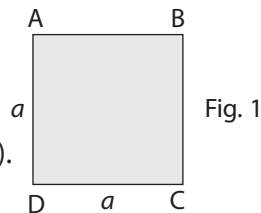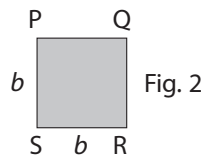
4. Join R and C.

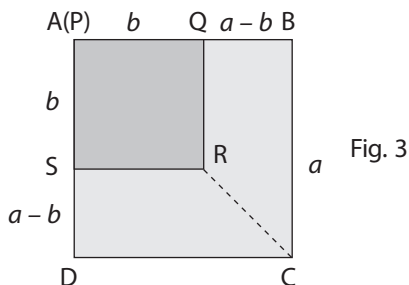
Fig. 1

Fig. 2

Fig. 3

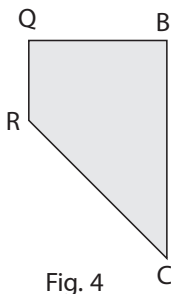5. Cut out the congruent trapeziums QBCR (Fig. 4) and SRCD (Fig. 5).

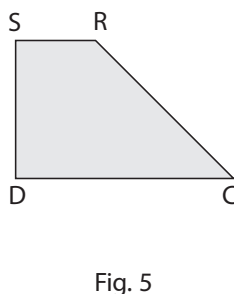Fig. 4   Fig. 5

6. Arrange the trapeziums as shown in Figure 6.
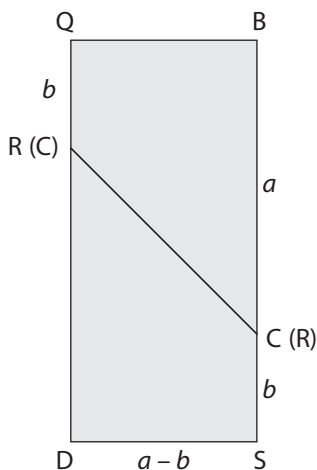

Fig. 6

CALCULATIONS:

The area of square ABCD = a^2 = (5 cm)^2 = 25 cm^2

The area of square PQRS = b^2 = (3 cm)^2 = 9 cm^2

Area of square ABCD − Area of square PQRS

= $a^2 - b^2$ = 25 cm^2 − 9 cm^2 = 16 cm^2

Area of trapezium QBCR + Area of trapezium SRCD

= Area of rectangle QBSD = $(a + b)(a - b)$ = (5 + 3)(5 − 3) cm^2

= 8 × 2 cm^2 = 16 cm^2

Thus, $a^2 - b^2 = (a + b)(a - b)$

Projects ~~~~~

Work in pairs to collect and interpret data and calculate probability.

◀ **Conceptual Understanding, Experiential Learning, Collaboration, Critical Thinking**

1. **Collect data:** Draw a table as shown.

Number of Rolls	Numbers that appeared at each roll					
	1	2	3	4	5	6
1						
2						
3						
4						
5						
6						
7						
8						

Take turns to roll a dice eight times and tick the columns for the numbers that appeared on the dice. After the last roll of the dice, look at the results in the table.
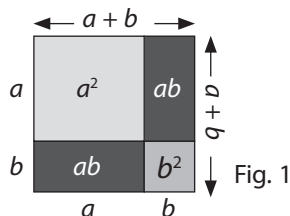
Read the data to answer these questions.

- Which number appeared the most number of times?
- Which number appeared the least number of times?
- Which number did not appear at all?

2. Calculate the probability based on the data collected.

3. Share the data along with your result in the class.

B **Geometrical representation of square numbers**

◀ **Conceptual Understanding, Experiential Learning**

Recall the identity $(a + b)^2 = a^2 + 2ab + b^2$. This identity can be represented geometrically as shown (Fig. 1).

Fig. 1

Take any square number, say 16. Split it into two numbers, for example, 9 and 7. So, $16^2 = (9 + 7)^2 = 9^2 + 2(9 \times 7) + 7^2$

$= 81 + 126 + 49 = 256$

Geometrically, the square number 256 can be represented as shown in Figure 2.

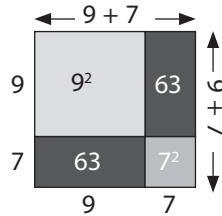Similarly, represent other square numbers and show them in your class.

Fig. 2

C **Use a model to make a pie chart.**

Conduct a class survey on the favourite TV channels of your classmates and write the data in the table.

Favourite TV channels	News	Movies	Sports	Cartoons	History and Nature
Number of students					

Take a strip of thick chart paper 1 cm wide. Divide it into equal-sized rectangles that equal the total number of your classmates. Colour the entire strip using different colours for each choice. For example, if 5 students voted for News, colour the first 5 rectangles red. If 8 choose Movies, colour the next 8 rectangles green and so on (Fig. 1). Join both the ends of your strip to form a loop with the coloured rectangles inside (Fig. 2).
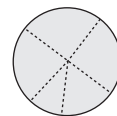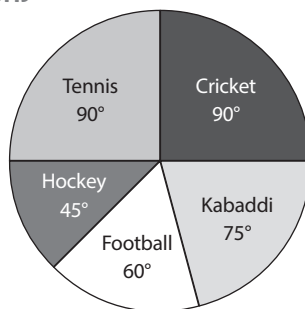

Fig. 1

Fig. 2

Draw an outline around the loop to make a circle. On the edge of the circle, mark the points where each colour begins and ends. Remove the loop and use a ruler to connect each mark to the centre of the circle. Your pie chart is ready.

A A survey was made to find different sports that children of a neighbourhood like. The given pie chart shows the result of the survey. Read it and answer the questions.

1. Which sport is the least popular?
   a. cricket ☐
   b. football ☐
   c. tennis ☐
   d. hockey ☐

2. Which two sports are equally popular?
   a. hockey and tennis ☐
   b. cricket and tennis ☐
   c. kabaddi and tennis ☐
   d. football and cricket ☐

3. If the survey sample is 120 children, how many of this number like tennis?
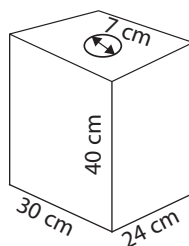   a. 80 ☐
   b. 60 ☐
   c. 30 ☐
   d. 20 ☐

4. What percentage of children like hockey?
   a. 12.5% ☐
   b. 16.67% ☐
   c. 25% ☐
   d. 27.5% ☐

B Rahul made a block with a cylindrical hole as shown. Look at the block and answer the questions.
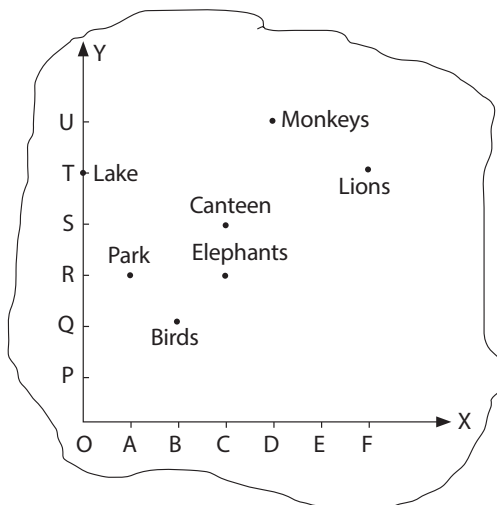
1. What is the volume of the block?
   a. 7200 cm^3 ☐
   b. 14400 cm^3 ☐
   c. 28800 cm^3 ☐
   d. 57600 cm^3 ☐

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CBA sample test papers available on request.

2. If Rahul paints its outer surface, what area will he cover?

   a. 2872 cm^2 ☐ b. 3810.5 cm^2 ☐

   c. 5760 cm^2 ☐ d. 5721.5 cm^2 ☐

3. If the cost of painting the outer surface of the block is ₹50 per 100 cm^2, what amount does Rahul have to pay?

   a. ₹1430.75 ☐ b. ₹2860.75 ☐

   c. ₹2180.50 ☐ d. ₹5721.50 ☐

C Study the given map of a zoo and answer the questions.

1. What is the location of lions in the zoo?

   a. (D, V) ☐ b. (B, Q) ☐

   c. (O, T) ☐ d. (F, T) ☐

2. The location of which animals in the zoo is represented by (C, R)?

   a. Monkeys ☐ b. Birds ☐

   c. Elephants ☐ d. Lions ☐

3. Where is the park located?

   a. (A, R) ☐ b. (D, Q) ☐

   c. (F, T) ☐ d. (O, T) ☐