Class 9-Mathematics

Instructions for students: The notes provided must be copied to the Maths copy and then do the homework in the same copy.

Chapter 4

FACTORISATION (Continued)

Difference of two Squares

Factorisation by using the Identity $a^2 - b^2 = (a + b)(a - b)$

Examples:

$$4x^2 - 25y^2 = (2x)^2 - (5y)^2$$

$$= (2x + 5y)(2x - 5y)$$

$$9x^2 - 1 = (3x)^2 - 1^2$$

$$= (3x + 1)(3x - 1)$$

Exercise 4.3 (Factorise the Following)

2. i) $150 - 6a^2 = 6(25 - a^2)$ **[Taking out 6]**

$$= 6(5^2 - a^2)$$ **[Difference of two squares]**

$$= 6(5 + a)(5 - a) \text{ Ans.}$$

6. i) $108a^2 - 3(b - c)^2 = 3(36a^2 - (b - c)^2)$ [**Taking out 3**]

$$= 3((6a)^2 - (b - c)^2)$$ **[Difference of two squares]**

$$= 3(6a + b - c)(6a - (b - c))$$

$$= 3(6a + b - c)(6a - b + c) \text{ Ans.}$$

8. i) $x - 2y - x^2 + 4y^2 = x - 2y - (x^2 - 4y^2)$

$$= \underline{x - 2y} - \underline{(x + 2y)(x - 2y)}$$ **[Grouping]**

$$= x - 2y[1 - (x + 2y)]$$ **[Taking out x – 2y from each group]**

$$= (x - 2y)(1 - x - 2y) \text{ Ans.}$$

11. i) $9x^4 - x^2 - 12x - 36$ $= 9x^4 - (x^2 + 12x + 36)$ **[a²+2 a b + b² = (a + b)²]**

$= (3x^2)^2 - (x + 6)^2$ **[Difference of two squares]**

$= (3x^2 + x + 6)(3x^2 - (x + 6))$

$= (3x^2 + x + 6)(3x^2 - x - 6)$ Ans.

14. i) $(a + b)^3 - a - b$ $= (a + b)^3 - (a + b)$

$= (a + b)((a + b)^2 - 1)$

$= (a + b)(a + b + 1)(a + b - 1)$ Ans.

16. i) $x^2 + \frac{1}{x^2} - 11$ $= x^2 + \frac{1}{x^2} - 2 - 11 + 2$ **[Adding and subtracting 2)**

$= \left(x - \frac{1}{x}\right)^2 - 9$

$= \left(x - \frac{1}{x}\right)^2 - 3^2$

$= \left(x - \frac{1}{x} + 3\right)\left(x - \frac{1}{x} - 3\right)$

18. ii) Express $(x^2 - 5x + 7)(x^2 - 5x - 7)$ as a difference of two squares.

$(x^2 - 5x + 7)(x^2 - 5x - 7) = [(x^2 - 5x) + 7][(x^2 - 5x) - 7]$

$= (x^2 - 5x)^2 - 7^2$ Ans.

19. ii) Evaluate $(99.9)^2 - (0.1)^2$ using factors

$(99.9)^2 - (0.1)^2 = (99.9 + 0.1)(99.9 - 0.1)$

$= 100 \times 99.8$

$= 9980$ Ans.

Home work: Complete exercise 4.3 in the Maths copy.

Points to remember .

*Read and understand the experiment.

*In the Maths Practical Copy write down AIM, MATERIAL REQUIRED , METHODOLOGY , TABULAR COLUMN and CONCLUSION on the ruled page. DIAGRAM and CALCULATION on the plane page.

*Follow the PROCEDURE properly to get the correct conclusion.

*All the Maths practicals must be done in the same Maths Lab copy.

*MATHS PRACTICAL COPY must be a soft cover Lab copy with atleast 50 to 60 pages

AIM: To determine the effect on the area of convex polygons, with a constant perimeter, when the number of sides of the polygon increases under the condition (*).

MATERIAL REQUIRED: 1)A plastic straw   2) Ruler & Pencil   3) Setsquares.

METHODOLOGY: Area of a triangle = $\frac{1}{2}bh$

Perimeter of a figure = sum of all the sides.

PROCEDURE AND CALCULATIONS: Follow all the steps below in order.

Step 1.polygon having three sides (Triangle)

  Fold the straw so that it will form a triangle. Place the triangle on the white sheet and mark down its vertices . Join the vertices by using ruler and pencil. Draw its altitude by using setsquares or by a compass. Measure its base and height ,hence calculate area.

Base=--   height=---------------   Area= -------- Perimeter=--------

Step 2.Polygon is having four sides. (Quadrilateral)

 Fold any one side of the above formed triangle towards outside without changing the length of other two sides so that it will form a quadrilateral. Place the quadrilateral on a white sheet and mark down its vertices. Join the vertices by using ruler and pencil. Draw one of its diagonal (AC) and measure its length. Draw the altitudes (DM & BN) to the diagonal from the opposite vertices by using setsquares and measure its length. Calculate the area of each triangle and hence find the area of the quadrilateral.
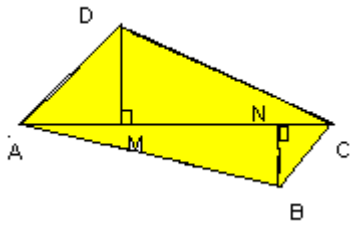
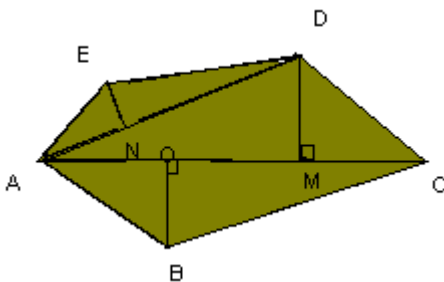$$\text{Area of } ADC = \frac{1}{2} \times AC \times DM$$

$$= \text{-------}$$

$$\text{Area of } ABC = \frac{1}{2} \times AC \times BN$$

$$= \text{-----------}$$

∴ Area of quadrilateral ABCD= ------- , Perimeter=----

Step 3. Polygon is having five sides (Pentagon).

Fold any one side of the above formed quadrilateral towards outside without changing the length of other three sides so that it will form a pentagon . Place it on a white sheet and mark its vertices . Join the vertices by using ruler and pencil .Draw two diagonals from a vertex (AD & AC) and measure its length . Draw the altitudes (EN , DM & BO) from the vertices by using setsquares and then measure its length. Calculate the area of each triangle and hence calculate the area of the pentagon.

1) Area of ΔAED = $\frac{1}{2}$ x AD x EN   2) Area of ΔADC= $\frac{1}{2}$ x AC x DM

$$= \text{------}$$ $$= \text{------}$$

3) Area of ΔABC= $\frac{1}{2}$ x AC x BO

$$= \text{---------}$$

∴ Area of pentagon ABCDE = ------ , Perimeter=--------

OBSERVATION TABLE:

Trial no.	Name of the polygon	No. of sides	Perimeter(cm)	Area(cm^2)
1	Triangle	3		
2	Quadrilateral	4		
3	Pentagon	5		

CONCLUSION : 1) For all the polygons perimeter is constant but areas are different.

2) For convex polygons having constant perimeter , when the number of sides increases under the condition (*) , area   -----(decreases/ increases/ remains same) .

(*) **Fold any one side of the previous figure towards outside**