

MATHEMATICS NOTES FOR 7TH CLASS (FOR ISLAMABAD)

Chapter 06

ALGEBRA

Exercise 6.1

1. Indicate whether each of the following expressions are polynomials or not.

(b) If it is a polynomial, find its degree and classify it by the number of terms.

(c) Identify the leading coefficient in the case of the polynomial.

(i) $6x + 4$

(ii) $x^2 - 2x + 1$

(iii) $y^2 - 2 + \frac{1}{y^2}$

(iv) $x - 3 + \frac{1}{x}$

(v) $\frac{5}{2}x^2 - 2x^4$

(vi) $6 + \frac{7}{y}$

(vii) $y + 6y^3$

(viii) $x + \frac{1}{x}$

(ix) $\frac{1}{x^2} + \frac{1}{x^3}$

(x) $\frac{3}{7} - 4x + 6x^3 - 3x^2$

Ans.

Expression	a	b		c
		D	T	
(i) $6x + 4$	Yes	One	Two-bino	6
(ii) $x^2 - 2x + 1$	Yes	Two	Three Trino	1
(iii) $y^2 - 2 + \frac{1}{y}$	No	-	-	-
(iv) $x - 3 + \frac{1}{x}$	No	-	-	-

(v) $\frac{5}{2}x^2 - 2x^4$	Yes	Four	Two Bino	- 2
(vi) $6 + \frac{7}{y}$	No	-	-	-
(vii) $y + 6y^3$	Yes	Three	Two Bino	6
(viii) $x + \frac{1}{x}$	No	-	-	-
(ix) $\frac{1}{x^2} + \frac{1}{x^3}$	No	-	-	-
(x) $\frac{3}{7} - 4x + 6x^3 - 3x^2$	Yes	Three	Four Terms	6

2. Categorize the following polynomials as monomial, binomial or trinomial.

(i) $7x$

(ii) $6x^2 + 3x + 2$

(iii) $6x^2 + x - 10x^3$

(iv) -10

(v) $x^3 - 10xy^2$

(vi) $6x + 7xy$

(vii) $y^2 - 6x^2y^2 + y^3$

(viii) $x^2yz + 5y^2z + 6x^2z^2$

(ix) $x^4 - 3$

(x) $3 - x^3 + 10x$

Ans.

	Monomial	Binomial	Trinomial
(i) $7x$	Monomial	-	-
(ii) $6x^2 + 3x + 2$	-	-	Trinomial
(iii) $6x^2 + x - 10x^3$	-	-	Trinomial
(iv) -10	Monomial	-	-
(v) $x^3 - 10xy^2$	-	Binomial	-
(vi) $6x + 7xy$	-	Binomial	-
(vii) $y^2 - 6x^2y^2 + y^3$	-	-	Trinomial
(viii) $x^2yz + 5y^2z + 6x^2z^2$	-	-	Trinomial
(ix) $x^4 - 3$	-	Binomial	-
(x) $3 - x^3 + 10x$	-	-	Trinomial

3. Find the sum of the following polynomials.

(i) $7x + 4, 9x - 3$

Ans. $7x + 4$

$9x - 3$

$\underline{\hspace{1cm}}$

$16x + 1$

(ii) $a^2 - 8, a^2 + 9$

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$$\text{Ans. } \frac{a^2 - 8}{a^2 + 9}$$

$$2a^2 + 1$$

$$(iii) \quad 9x^2 + x - 3, \quad 6x^2 - 3x + 4$$

$$\text{Ans. } \frac{9x^2 + x - 3}{6x^2 - 3x + 4}$$

$$15x^2 - 2x + 1$$

$$(iv) \quad a^2 + 2ab + b^2, \quad a^2 - 2ab + b^2$$

$$\text{Ans. } \frac{a^2 + 2ab + b^2}{a^2 - 2ab + b^2}$$

$$2a^2 + 2b^2$$

$$(v) \quad x^3 + 5x^2 - 6x + 7, \quad 2x^3 + 7x^2 - 10x + 7$$

$$\text{Ans. } \frac{x^3 + 5x^2 - 6x + 7}{2x^3 + 7x^2 - 10x + 7}$$

$$3x^2 + 12x^2 - 16x + 14$$

$$(vi) \quad 2a + 9b + c - 4d, \quad -a - 7b - 2c + 5d$$

$$\text{Ans. } \frac{2a + 9b + c - 4d}{-a - 7b - 2c + 5d}$$

$$a + 2b - c + d$$

$$(vii) \quad 4a^2 - 7b - 4b^2, \quad 2a^2 + 10b + 3b^2$$

$$\text{Ans. } \frac{4a^2 - 7b - 4b^2}{2a^2 + 10b + 3b^2}$$

$$6a^2 + 3b - b^2$$

$$(viii) \quad 3x^2 + x - 2, \quad 2x^2 - 2x + 3, \quad x^2 + 4x + 2$$

$$\text{Ans. } \frac{3x^2 + x - 2}{2x^2 - 2x + 3}$$

$$x^2 + 4x + 2$$

$$6x^2 + 3x + 3$$

$$(ix) \quad s^2 + 3t^2 + 4st, \quad 2s^2 + 4t^2 - 3st, \quad 4s^2 - 2t^2 + 9st$$

$$\text{Ans. } \frac{s^2 + 3t^2 + 4st}{2s^2 + 4t^2 - 3st}$$

$$4s^2 - 2t^2 + 9st$$

4. Find the perimeter of the rectangle.

$$(i) \quad \begin{array}{c} 11x \\ 8x - 10 \end{array} \quad \begin{array}{c} 8x - 10 \end{array}$$

$$11x$$

$$\text{Ans. } = 11x + 11x + 8x - 10 + 8x - 10 = 38x - 20$$

$$(ii) \quad \begin{array}{c} 3x \\ 3x + 6 \end{array}$$

$$\text{Ans. } 2(3x + 6 + 3x) = 2(6x + 6) = 12x + 12$$

$$(iii) \quad \begin{array}{c} 4x - 2 \\ 2x + 7 \end{array}$$

$$\text{Ans. } 2(4x - 2 + 2x + 7) = 2(6x + 5) = 12x + 10$$

5. Subtract.

$$(i) \quad a + b + c \text{ from } 2a + 2b - c$$

Ans.

$$\begin{array}{r} 2a + 2b - c \\ + \quad a + \quad b + \quad c \\ \hline 3a + 3b \end{array}$$

$$(ii) \quad 5x^2 + x - 9 \text{ from } 7x^2 - 2x + 10$$

Ans.

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$$\begin{array}{r} 7x^2 - 2x - 10 \\ 5x^2 + x - 9 \\ - \quad - \quad + \\ \hline 2x^2 - 3x + 19 \end{array}$$

(iii) $6a^2 - 10ab - b^2$ from $-2a^2 + 5ab - 3b^2$

Ans.

$$\begin{array}{r} -2a^2 + 5ab - 3b^2 \\ 6a^2 - 10ab - b^2 \\ - \quad + \quad + \\ \hline -8a^2 + 15ab - 2b^2 \end{array}$$

(iv) $4a^2 + 3b^2 - 4ab$ from $4a^2 + 3b^2 - 6ab$

Ans.

$$\begin{array}{r} 4a^2 + 3b^2 - 6ab \\ 4a^2 + 3b^2 - 4ab \\ - \quad - \quad + \\ \hline -2ab \end{array}$$

(v) $10x^3 - 8x^2 + 4x + 3$ from $8x^3 + 4x^2 - x + 5$

Ans.

$$\begin{array}{r} 8x^3 + 4x^2 - x + 5 \\ 10x^3 - 8x^2 + 4x + 3 \\ - \quad + \quad - \quad - \\ \hline -2x^3 + 12x^2 - 5x + 2 \end{array}$$

(vi) $x^2 + y^2 - xy$ from $3x^2 - 2y^2 + 4xy$

Ans.

$$\begin{array}{r} 3x^2 - 2y^2 + 4xy \\ x^2 + y^2 - xy \\ - \quad - \quad + \\ \hline 2x^2 - 3y^2 + 5xy \end{array}$$

Exercise 6.2

1. Find the product of the following:

(i) $3x, 9x^2$

Ans. $= (3x)(9x^2) = (3 \times 9)(x \times x^2) = 27x^3$

(ii) $6x, 4xy$

Ans. $= (6x)(4xy) = (6 \times 4)(x \times xy)$

$$= 24x^2y$$

(iii) $7x^2, 7x + 3$

Ans. $7x + 3$

$$7x^2$$

$$49x^3 + 21x^2$$

(iv) $-3x, 6x^2 + 4x$

Ans. $6x^2 + 4x$

$$-3x$$

$$-18x^3 - 12x^2$$

(v) $4x, 3x^2 + 7x - 6$

Ans. $3x^2 + 7x - 6$

$$4x$$

$$12x^3 + 28x^2 - 24x$$

2. Evaluate the following.

(i) $(2x - 3)(3x - 4)$

Ans. $2x(3x - 4) - 3(3x - 4)$

$$= 6x^2 - 8x - 9x + 12 = 6x^2 - 17x + 12$$

(ii) $(2x - 7)(4x + 8)$

Ans. $= 2x(4x + 8) - 7(4x + 8)$

$$= 8x^2 + 16x - 28x - 56 = 8x^2 - 12x - 56$$

(iii) $(6a - 2)(6a^2 + a - 5)$

Ans. $= 6a(6a^2 + a - 5) - 2(6a^2 + a - 5)$

$$= 36a^3 + 6a^2 - 30a - 12a^2 - 2a + 10$$

$$= 36a^3 + 6a^2 - 12a^2 - 30a - 2a + 10$$

$$= 36a^3 - 6a^2 - 32a + 10$$

(iv) $(4a^2 - 3a + 6)(2a + 5)$

Ans. $= 4a^2(2a + 5) - 3a(2a + 5) + 6(2a + 5)$

$$= 8a^3 + 20a^2 - 6a^2 - 15a + 12a + 30$$

$$= 8a^3 + 14a^2 - 3a + 30$$

(v) $(x + y)(x^2 - xy)$

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$$\begin{aligned} \text{Ans.} &= x(x^2 - xy) + y(x^2 - xy) \\ &= x^3 - x^2y + x^2y - xy^2 = x^3 - xy^2 \end{aligned}$$

$$(vi) \quad (x - y)(x^2 + xy + y^2)$$

$$\begin{aligned} \text{Ans.} &= x(x^2 + xy + y^2) - y(x^2 + xy + y^2) \\ &= x^3 + x^2y + xy^2 - x^2y - xy^2 - y^3 \\ &= x^3 - y^3 \end{aligned}$$

$$(vii) \quad (4x^3 + 6x^2 - 3x + 7)(x + 2)$$

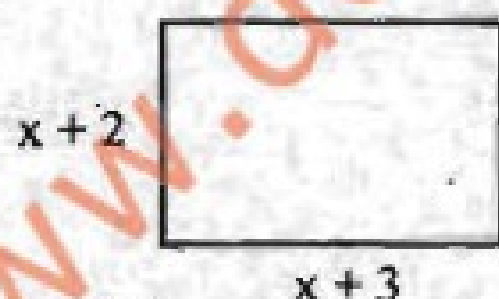
$$\begin{aligned} \text{Ans.} &= x(4x^3 + 6x^2 - 3x + 7) \\ &\quad + 2(4x^3 + 6x^2 - 3x + 7) \\ &= 4x^4 + 6x^3 - 3x^2 + 7x + 8x^3 + 12x^2 - 6x + 14 \\ &= 4x^4 + 6x^3 + 8x^3 - 3x^2 + 12x^2 + 7x - 6x + 14 \\ &= 4x^4 + 14x^3 + 9x^2 + x + 14 \end{aligned}$$

$$(viii) \quad (5x^2 - 6x + 8)(3x + 2)$$

$$\begin{aligned} \text{Ans.} &= 3x(5x^2 - 6x + 8) + 2(5x^2 - 6x + 8) \\ &= 15x^3 - 18x^2 + 24x + 10x^2 - 12x + 16 \\ &= 15x^3 - 18x^2 + 10x^2 + 24x - 12x + 16 \\ &= 15x^3 - 8x^2 + 12x + 16 \end{aligned}$$

3. The dimensions of a rectangle are $x + 3$ and $x + 2$. Find the area of the rectangle in term of x .

$$\begin{aligned} \text{Ans. Area} &= (x + 3)(x + 2) \\ &= x(x + 2) + 3(x + 2) \\ &= x^2 + 2x + 3x + 6 \\ &= x^2 + 5x + 6 \end{aligned}$$



4. Simplify:

$$(i) \quad (x + 2)(x - 5) + (3x + 1)(x - 3)$$

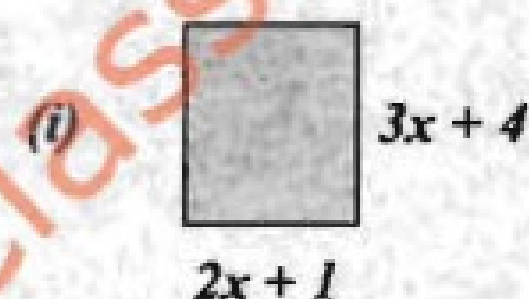
$$\begin{aligned} \text{Ans.} &= x(x - 5) + 2(x - 5) + 3x(x - 3) \\ &\quad + 1(x - 3) \\ &= (x^2 - 5x + 2x - 10) + (3x^2 - 9x + x - 3) \end{aligned}$$

$$\begin{aligned} &= (x^2 - 3x - 10) + (3x^2 - 8x - 3) \\ &= x^2 - 3x - 10 + 3x^2 - 8x - 3 \\ &= x^2 - 3x^2 - 3x - 8x - 10 - 3 \\ &= 4x^2 - 11x - 13 \end{aligned}$$

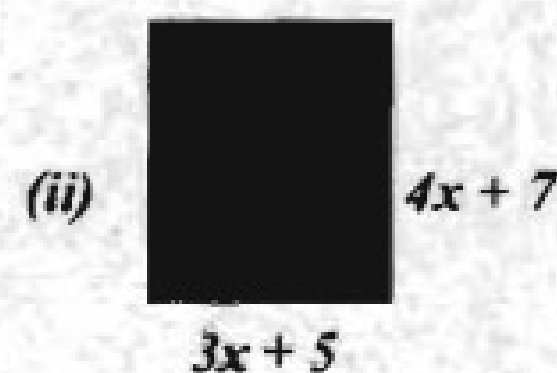
$$(ii) \quad (2x - 1)(x + 3) - (4x - 2)(6x + 4)$$

$$\begin{aligned} \text{Ans.} &= 2x(x + 3) - 1(x + 3) \\ &\quad - \{4x(6x + 4) - 2(6x + 4)\} \\ &= (2x^2 + 6x - x - 3) - \{24x^2 + 16x - 12x - 8\} \\ &= (2x^2 + 5x - 3) - (24x^2 + 4x - 8) \\ &= 2x^2 + 5x - 3 - 24x^2 - 4x + 8 \\ &= 2x^2 - 24x^2 + 5x - 4x - 3 + 8 \\ &= -22x^2 + x + 5 \end{aligned}$$

5. Find the area and the perimeter of the following figures.



$$\begin{aligned} \text{Ans. Area} &= \text{side} \times \text{side} \\ &= (2x + 1)(3x + 4) \\ &= 2x(3x + 4) + 1(3x + 4) \\ &= 6x^2 + 8x + 3x + 4 \\ &= 6x^2 + 11x + 4 \\ \text{Perimeter} &= 2(\text{side} + \text{side}) \\ &= 2[(2x + 1) + (3x + 4)] \\ &= 2(2x + 1 + 3x + 4) \\ &= 2(5x + 5) = 10x + 10 \end{aligned}$$

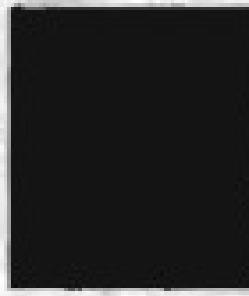


$$\begin{aligned} \text{Ans. Area} &= \text{side} \times \text{side} \\ &= (3x + 5)(4x + 7) \end{aligned}$$

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$$\begin{aligned}
 &= 3x(4x + 7) + 5(4x + 7) \\
 &= 12x^2 + 21x + 20x + 35 \\
 &= 12x^2 + 41x + 35
 \end{aligned}$$

$$\begin{aligned}
 \text{Perimeter} &= 2(\text{side} + \text{side}) \\
 &= 2[(3x + 5) + (4x + 7)] \\
 &= 2(3x + 5 + 4x + 7) \\
 &= 2(7x + 12) \\
 &= 14x + 24
 \end{aligned}$$

(iii)  $3x + 7$
 $4x - 2$

$$\begin{aligned}
 \text{Ans. Area} &= \text{side} \times \text{side} \\
 &= (4x - 2)(3x + 7) \\
 &= 4x(3x + 7) - 2(3x + 7) \\
 &= 12x^2 + 28x - 6x - 14 \\
 &= 12x^2 + 22x - 14
 \end{aligned}$$

$$\begin{aligned}
 \text{Perimeter} &= 2(\text{side} + \text{side}) \\
 &= 2[(4x - 2) + (3x + 7)] \\
 &= 2(4x - 2 + 3x + 7) \\
 &= 2(7x + 5) \\
 &= 14x + 10
 \end{aligned}$$

Exercise 6.3

I. Fill in the blanks.

(i) $(2a + b)^2$

$$\text{Ans. } (2a + b)^2 = (2a)^2 + 2(2a)(b) + (b)^2$$

(ii) $(4x + 6y)^2$

$$\text{Ans. } (4x + 6y)^2 = 16x^2 + (48)xy + 36y^2$$

(iii) $\left(x^2 + \frac{1}{x^2}\right)^2$

$$\text{Ans. } \left(x^2 + \frac{1}{x^2}\right)^2 = x^4 + \underline{2} + \frac{1}{x^4}$$

(iv) $\left(2a + \frac{1}{2b}\right)^2$

$$\text{Ans. } \left(2a + \frac{1}{2b}\right)^2 = 4a^2 + \frac{2a}{b} + \frac{1}{4b^2}$$

(v) $(2x - 3y)^2$

$$\text{Ans. } (2x - 3y)^2 = (2x)^2 - 2(2x)(3y) + (3y)^2$$

(vi) $(4a - 6b)^2$

$$\text{Ans. } (4a - 6b)^2 = (4a)^2 - 2(4a)(6b) + (6b)^2$$

(vii) $(2x - 4y)^2$

$$\text{Ans. } (2x - 4y)^2 = (2x)^2 - 16xy + (4y)^2$$

(viii) $(x - 5)^2$

$$\text{Ans. } (x - 5)^2 = x^2 - 10x + 25$$

2. Expand the following by using the appropriate formula.

(i) $(2a + 7)^2$

$$\begin{aligned} \text{Ans. } (2a + 7)^2 &= (2a)^2 + 2(2a)(7) + (7)^2 \\ &= 4a^2 + 28a + 49 \end{aligned}$$

(ii) $(3x + 1)^2$

$$\begin{aligned} \text{Ans. } (3x + 1)^2 &= (3x)^2 + 2(3x)(1) + (1)^2 \\ &= 9x^2 + 6x + 1 \end{aligned}$$

(iii) $(8a + 3b)^2$

$$\begin{aligned} \text{Ans. } (8a + 3b)^2 &= (8a)^2 + 2(8a)(3b) + (3b)^2 \\ &= 64a^2 + 48ab + 9b^2 \end{aligned}$$

(iv) $(x^2 + y^2)^2$

$$\begin{aligned} \text{Ans. } (x^2 + y^2)^2 &= (x^2)^2 + 2(x^2)(y^2) + (y^2)^2 \\ &= x^4 + 2x^2y^2 + y^4 \end{aligned}$$

(v) $(3x + 4y)^2$

$$\begin{aligned} \text{Ans. } (3x + 4y)^2 &= (3x)^2 + 2(3x)(4y) + (4y)^2 \\ &= 9x^2 + 24xy + 16y^2 \end{aligned}$$

(vi) $(7x + 8y)^2$

$$\begin{aligned} \text{Ans. } (7x + 8y)^2 &= (7x)^2 + 2(7x)(8y) + (8y)^2 \\ &= 49x^2 + 112xy + 64y^2 \end{aligned}$$

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$$(vii) \left(\frac{3}{4}x + \frac{4}{3x} \right)^2$$

$$\begin{aligned} \text{Ans. } \left(\frac{3}{4}x + \frac{4}{3x} \right)^2 &= \left(\frac{3}{4}x \right)^2 + 2 \left(\frac{3x}{4} \right) \left(\frac{4}{3x} \right) + \left(\frac{4}{3x} \right)^2 \\ &= \frac{9}{16}x^2 + 2 + \frac{16}{9x^2} \end{aligned}$$

$$(viii) \left(\frac{2}{3}a + \frac{3}{2}b \right)^2$$

$$\begin{aligned} \text{Ans. } \left(\frac{2}{3}a + \frac{3}{2}b \right)^2 &= \left(\frac{2a}{3} \right)^2 + 2 \left(\frac{2a}{3} \right) \left(\frac{3b}{2} \right) + \left(\frac{3b}{2} \right)^2 \\ &= \frac{4}{9}a^2 + 2ab + \frac{9b^2}{4} \end{aligned}$$

$$(ix) (3a - 7b)^2$$

$$\begin{aligned} \text{Ans. } (3a - 7b)^2 &= (3a)^2 - 2(3a)(7b) + (7b)^2 \\ &= 9a^2 - 42ab + 49b^2 \end{aligned}$$

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

$$\begin{aligned} \text{Ans. } \left(3a - \frac{1}{3a} \right)^2 &= (3a)^2 - 2(3a) \left(\frac{1}{3a} \right) + \left(\frac{1}{3a} \right)^2 \\ &= 9a^2 - 2 + \frac{1}{9a^2} \end{aligned}$$

$$(xi) (3x - 11y)^2$$

$$\begin{aligned} \text{Ans. } (3x - 11y)^2 &= (3x)^2 - 2(3x)(11y) + (11y)^2 \\ &= 9x^2 - 66xy + 121y^2 \end{aligned}$$

$$(xii) \left(\frac{5}{6}x - \frac{3}{4}y \right)^2$$

$$\text{Ans. } \left(\frac{5}{6}x - \frac{3}{4}y \right)^2$$

$$\begin{aligned} &= \left(\frac{5}{6}x \right)^2 - 2 \left(\frac{5}{6}x \right) \left(\frac{3}{4}y \right) + \left(\frac{3}{4}y \right)^2 \\ &= \frac{25}{36}x^2 - \frac{5}{4}xy + \frac{9}{16}y^2 \end{aligned}$$

$$(xiii) \left(\frac{x}{2} - \frac{3}{4}y \right)^2$$

$$\begin{aligned} \text{Ans. } \left(\frac{x}{2} - \frac{3}{4}y \right)^2 &= \left(\frac{x}{2} \right)^2 - 2 \left(\frac{x}{2} \right) \left(\frac{3y}{4} \right) + \left(\frac{3y}{4} \right)^2 \\ &= \frac{x^2}{4} - \frac{3xy}{4} + \frac{9}{16}y^2 \end{aligned}$$

$$(xiv) \left(\frac{2}{3}x - \frac{3}{2}y \right)^2$$

$$\begin{aligned} \text{Ans. } \left(\frac{2}{3}x - \frac{3}{2}y \right)^2 &= \left(\frac{2}{3}x \right)^2 - 2 \left(\frac{2x}{3} \right) \left(\frac{3}{2}y \right) + \left(\frac{3y}{2} \right)^2 \\ &= \frac{4}{9}x^2 - 2xy + \frac{9y^2}{4} \end{aligned}$$

3. Simplify the following:

$$(i) (a + b)^2 + (2a + 2b)^2$$

$$\begin{aligned} \text{Ans. } &= [(a)^2 + 2(a)(b) + (b)^2] \\ &\quad + [(2a)^2 + 2(2a)(2b) + (2b)^2] \\ &= (a^2 + 2ab + b^2) + (4a^2 + 8ab + 4b^2) \\ &= a^2 + 2ab + b^2 + 4a^2 + 8ab + 4b^2 \\ &= 5a^2 + 10ab + 5b^2 \end{aligned}$$

$$(ii) (2a + 4b)^2 - (a + 3b)^2$$

$$\begin{aligned} \text{Ans. } &= [(2a)^2 + 2(2a)(4b) + (4b)^2] \\ &\quad - [(a)^2 + 2(a)(3b) + (3b)^2] \\ &= (4a^2 + 16ab + 16b^2) - (a^2 + 6ab + 9b^2) \\ &= 4a^2 + 16ab + 16b^2 - a^2 - 6ab - 9b^2 \\ &= 3a^2 + 10ab + 7b^2 \end{aligned}$$

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$$= 3a^2 + 10ab + 7b^2$$

$$(iii) (3x + 4y)^2 - (2x + 3y)^2$$

$$\begin{aligned} \text{Ans.} &= [(3x)^2 + 2(3x)(4y) + (4y)^2] \\ &\quad - [(2x)^2 + 2(2x)(3y) + (3y)^2] \\ &= (9x^2 + 24xy + 16y^2) - (4x^2 + 12xy + 9y^2) \\ &= 9x^2 + 24xy + 16y^2 - 4x^2 - 12xy - 9y^2 \\ &= 9x^2 - 4x^2 + 24xy - 12xy + 16y^2 - 9y^2 \\ &= 5x^2 + 12xy + 7y^2 \end{aligned}$$

$$(iv) (3x - 4y)^2 + (2x - 3y)^2$$

$$\begin{aligned} \text{Ans.} &= [(3x)^2 - 2(3x)(4y) + (4y)^2] \\ &\quad + [(2x)^2 - 2(2x)(3y) + (3y)^2] \\ &= (9x^2 - 24xy + 16y^2) + (4x^2 - 12xy + 9y^2) \\ &= 9x^2 - 24xy + 16y^2 + 4x^2 - 12xy + 9y^2 \\ &= 9x^2 + 4x^2 - 24xy - 12xy + 16y^2 + 9y^2 \\ &= 13x^2 - 36xy + 25y^2 \end{aligned}$$

$$(v) (5x - 4y)^2 + (4y - 2y)^2$$

$$\begin{aligned} \text{Ans.} &= [(5x)^2 - 2(5x)(4y) + (4y)^2] \\ &\quad + [(4x)^2 - 2(4x)(2y) + (2y)^2] \\ &= (25x^2 - 40xy + 16y^2) + (16x^2 - 16xy + 4y^2) \\ &= 25x^2 - 40xy + 16y^2 + 16x^2 - 16xy + 4y^2 \\ &= 25x^2 + 16x^2 - 40xy - 16xy + 16y^2 + 4y^2 \\ &= 41x^2 - 56xy + 20y^2 \end{aligned}$$

$$(vi) (8x - 9y)^2 + (6x - 4y)^2$$

$$\begin{aligned} \text{Ans.} &= [(8x)^2 - 2(8x)(9y) + (9y)^2] \\ &\quad + [(6x)^2 - 2(6x)(4y) + (4y)^2] \\ &= (64x^2 - 144xy + 81y^2) + (36x^2 - 48xy + 16y^2) \\ &= 64x^2 - 144xy + 81y^2 + 36x^2 - 48xy + 16y^2 \\ &= 64x^2 + 36x^2 - 144xy - 48xy + 81y^2 + 16y^2 \\ &= 100x^2 - 192xy + 97y^2 \end{aligned}$$

4. Evaluate by using formula:

$$(i) (48)^2$$

$$\text{Ans. } (48)^2 = (50 - 2)^2$$

$$\begin{aligned} &= (50)^2 - 2(50)(2) + (2)^2 \\ &= 2500 - 200 + 4 = 2304 \end{aligned}$$

$$(ii) (103)^2$$

$$\begin{aligned} \text{Ans. } (103)^2 &= (100 + 3)^2 \\ &= (100)^2 + 2(100)(3) + (3)^2 \\ &= 10000 + 600 + 9 = 10609 \end{aligned}$$

$$(iii) (196)^2$$

$$\begin{aligned} \text{Ans. } (196)^2 &= (200 - 4)^2 \\ &= (200)^2 - 2(200)(4) + (4)^2 \\ &= 40000 - 1600 + 16 \\ &= 38416 \end{aligned}$$

$$(iv) (504)^2$$

$$\begin{aligned} \text{Ans. } (504)^2 &= (500 + 4)^2 \\ &= (500)^2 + 2(500)(4) + (4)^2 \\ &= 250000 + 4000 + 16 \\ &= 254016 \end{aligned}$$

$$(v) (999)^2$$

$$\begin{aligned} \text{Ans. } (999)^2 &= (1000 - 1)^2 \\ &= (1000)^2 - 2(1000)(1) + (1)^2 \\ &= 1000000 - 2000 + 1 \\ &= 998001 \end{aligned}$$

$$(vi) (7.03)^2$$

$$\begin{aligned} \text{Ans. } (7.03)^2 &= (700 + 3)^2 \\ &= (700)^2 + 2(700)(3) + (3)^2 \\ &= 490000 + 4200 + 9 \\ &= 494209 = 49.4209 \end{aligned}$$

$$(vii) (5.2)^2$$

$$\begin{aligned} \text{Ans. } (5.2)^2 &= (5 + 0.2)^2 \\ &= (5)^2 + 2(5)(0.2) + (0.2)^2 \\ &= 25 + 2 + 0.04 \\ &= 27.04 \end{aligned}$$

$$(viii) (2.01)^2$$

$$\text{Ans. } (2.01)^2 = (2 + 0.1)^2$$

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$$\begin{aligned}
 &= (2)^2 + 2(2)(0.1) + (0.2)^2 \\
 &= 4 + 0.4 + 0.4 \\
 &= 4.08
 \end{aligned}$$

(ix) $(9.20)^2$

Ans. $(9.20)^2 = (9 + 0.2)^2$
 $= (9)^2 + 2(9)(0.2) + (0.2)^2$
 $= 81 + 3.6 + 0.04$
 $= 84.64$

Exercise 6.4

1. Find the following products by using the appropriate formula.

(i) $(x + 3)(x + 4)$

Ans. $(x + 3)(x + 4)$
 $= (x)^2 + (3 + 4)x + (3)(4)$
 $= x^2 + 7x + 12$

(ii) $(x + 5)(x + 7)$

Ans. $(x + 5)(x + 7)$
 $= (x)^2 + (5 + 7)x + (5)(7)$
 $= x^2 + 12x + 35$

(iii) $(p - 4)(p + 6)$

Ans. $(p - 4)(p + 6)$
 $= (p)^2 + (-4 + 6)p + (-4)(6)$
 $= p^2 + 2p - 24$

(iv) $(z + 7)(z + 9)$

Ans. $(z + 7)(z + 9)$
 $= (z)^2 + (7 + 9)z + (7)(9)$
 $= z^2 + 16z + 63$

(v) $(2x - 4)(2x + 5)$

Ans. $(2x - 4)(2x + 5)$
 $= (2x)^2 + (-4 + 5)2x + (-4)(5)$
 $= 4x^2 + 2x - 20$

(vi) $(3x + 7)(3x - 2)$

Ans. $(3x + 7)(3x - 2)$

$$\begin{aligned}
 &= (3x)^2 + (7 - 2)3x + (7)(-2) \\
 &= 9x^2 + 15x - 14
 \end{aligned}$$

2. Evaluate the following by using formula:

(i) 103×96

Ans. 103×96
 $= (100 + 3)(100 - 4)$
 $= (100)^2 + (3 - 4)100 + (3)(-4)$
 $= 10000 - 100 - 12 = 9888$

(ii) 104×105

Ans. 104×105
 $= (100 + 4)(100 + 5)$
 $= (100)^2 + (4 + 5)100 + (4)(5)$
 $= 10000 + 900 + 20 = 10920$

(iii) 998×1002

Ans. 998×1002
 $= (1000 - 2)(1000 + 2)$
 $= (1000)^2 + (-2 + 2)1000 + (-2)(2)$
 $= 1000000 + 0 - 4 = 999,996$

3. Find the product without actual multiplication.

(i) $(x + 4)(x - 4)$

Ans. $(x + 4)(x - 4) = (x)^2 - (4)^2 = x^2 - 16$

(ii) $(7x + 8)(7x - 8)$

Ans. $(7x + 8)(7x - 8)$
 $= (7x)^2 - (8)^2 = 49x^2 - 64$

(iii) $\left(6x + \frac{3}{8}\right)\left(6x - \frac{3}{8}\right)$

Ans. $\left(6x + \frac{3}{8}\right)\left(6x - \frac{3}{8}\right)$
 $= (6x)^2 - \left(\frac{3}{8}\right)^2 = 36x^2 - \frac{9}{64}$

(iv) $(x + 2y)(x - 2y)$

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

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(v) $(4x + 7y)(4x - 7y)$

Ans. $(4x + 7y)(4x - 7y)$
 $= (4x)^2 - (7y)^2 = 16x^2 - 49y^2$

(vi) $(2a + 9b)(2a - 9b)$

Ans. $(2a + 9b)(2a - 9b)$
 $= (2a)^2 - (9b)^2 = 4a^2 - 81b^2$

4. Find the continuous product of the following:

(i) $(a + b)(a - b)(a^2 + b^2)$

Ans. $(a + b)(a - b)(a^2 + b^2)$
 $= (a^2 - b^2)(a^2 + b^2)$
 $= (a^2)^2 - (b^2)^2$
 $= a^4 - b^4$

(ii) $(x + 2y)(x - 2y)(x^2 + 4y^2)$

Ans. $(x + 2y)(x - 2y)(x^2 + 4y^2)$
 $= (x^2 - (2y)^2)(x^2 + 4y^2)$
 $= (x^2 - 4y^2)(x^2 + 4y^2)$
 $= (x^2)^2 - (4y^2)^2$
 $= x^4 - 16y^4$

(iii) $(4a + b)(4a - b)(16a^2 + b^2)$

Ans. $(4a + b)(4a - b)(16a^2 + b^2)$
 $= (4a)^2 - (b)^2$
 $= (16a^2 - b^2)(16a^2 + b^2)$
 $= (16a^2)^2 - (b^2)^2$
 $= 256a^4 - b^4$

(iv) $(a + 3)(a - 3)(a^2 + 9)$

Ans. $(a + 3)(a - 3)(a^2 + 9)$
 $= (a^2 - (3)^2)(a^2 + 9)$
 $= (a^2 - 9)(a^2 + 9)$
 $= (a^2)^2 - (9)^2$
 $= a^4 - 81$

5. Evaluate with the help of formula:

(i) 102×98

Ans. $102 \times 98 = (100 + 2)(100 - 2)$
 $= (100)^2 - (2)^2$
 $= 10000 - 4 = 9996$

(ii) 65×55

Ans. $65 \times 55 = (60 + 5)(60 - 5)$
 $= (60)^2 - (5)^2$
 $= 3600 - 25 = 3575$

(iii) $(1.01) \times (0.99)$

Ans. $(1.01) \times (0.99) = (1 + 0.01)(1 - 0.01)$
 $= (1)^2 - (0.01)^2$
 $= 1 - 0.0001$
 $= 0.9999$

(iv) 202×198

Ans. $202 \times 198 = (200 + 2)(200 - 2)$
 $= (200)^2 - (2)^2$
 $= 40000 - 4 = 39996$

6. Simplify the following:

(i) $(x + 2)(x - 2) + (x + 2)^2$

Ans. $= (x)^2 - (2)^2 + [(x)^2 + 2(x)(2) + (2)^2]$
 $= x^2 - 4 + (x^2 + 4x + 4)$
 $= x^2 - 4 + x^2 + 4x + 4$
 $= x^2 + x^2 + 4x - 4 + 4$
 $= 2x^2 + 4x$

(ii) $(3a - 2)(3a + 2) - (a - 4)^2$

Ans. $= (3a)^2 - (2)^2 - [(a)^2 - 2(a)(4) + (4)^2]$
 $= (9a^2 - 4) - (a^2 - 8a + 16)$
 $= 9a^2 - 4 - a^2 + 8a - 16$
 $= 9a^2 - a^2 + 8a - 4 - 16$
 $= 8a^2 + 8a - 20$

(iii) $(2x - y)(2x + y) - (x + 2y)(x - 2y)$

MATHEMATICS NOTES FOR 7TH CLASS (FOR ISLAMABAD)

$$\begin{aligned} \text{Ans.} &= [(2x)^2 - (y)^2] - [(x)^2 - (2y)^2] \\ &= (4x^2 - y^2) - (x^2 - 4y^2) \\ &= 4x^2 - y^2 - x^2 + 4y^2 \\ &= 4y^2 - x^2 - y^2 + 4y^2 \\ &= 3x^2 + 3y^2 \end{aligned}$$

Exercise 6.5

Factorize:

1. $x^2 + x$

Ans. $x(x + 1)$

2. $x^3 + x^2$

Ans. $x^2(x + 1)$

3. $2y^3 + 4y$

Ans. $2y(y^2 + 2)$

4. $4a^4 - 20a^2$

Ans. $4a^2(a^2 - 5)$

5. $2y^3 + 7y^2 + y$

Ans. $y(2y^2 + 7y + 1)$

6. $5a^4 - 4a^2 + 3a$

Ans. $a(5a^3 - 4a + 3)$

7. $xy - yz^2 + x^2y^2z^2$

Ans. $y(x - z^2 + x^2yz^2)$

8. $7a - 7a^3 + 14a^4$

Ans. $7a(1 - a^2 + 2a^3)$

9. $x^2y - 2x^2y + x^3y^2$

Ans. $xy(x - 2x + x^2y)$

10. $2x^2y^3 - 6x^2y^2 + 2xy^3$

Ans. $2xy(xy^2 - 3xy + y^2)$

11. $2x^3y^3z^4 - 4x^2y^2z^3 + 3x^3y^2z^4$

Ans. $x^2y^2z^2(2xyz^2 - 4z + 3xz^2)$

12. $a^2 + ab + ac + bc$

Ans. $a(a + b) + a(a + b)$
 $(a + b)(a + c)$

13. $x^3 - x^2y^2 - x^3y$

Ans. $x^2(x - y^2 - xy)$

14. $t^2 + 4t - st - 4s$

Ans. $t(t + 4) - s(t + 4)$
 $(t - s)(t + 4)$

15. $x^2(x - y) - y^2(x - y) + z^2(x - y)$

Ans. $(x^2 - y^2 + z^2)(x - y)$

16. $5x^2(x + y) + 10xy(x + y)$
 $+ 25xy^2(x + y)$

Ans. $(5x^2 + 10y + 25xy^2)(x + y)$

17. A designer preparing to paint a wall found that its area is $3m(m + 7) + k(m + 7)$. Find the length and width of the rectangle.

Ans. Area = $3m(m + 7) + k(m + 7)$
 $= (3m + k)(m + 7)$
Length = $3m + k$
Width = $m + 7$

18. Area of the rectangle is $24a^2b - 18ab^2$.

Find its length and width.

Ans. Area of rectangle = $24a^2b - 18ab^2$
 $24a^2b - 18ab^2$
 $6ab(4a - 3b)$
= Length = $6ab$
= Width = $4a - 3b$

Exercise 6.6

Factorize:

1. $x^2 + 9x + 18$

Ans. $x^2 + 6x + 3x + 18$
 $= x(x + 6) + 3(x + 6)$
 $= (x + 3)(x + 6)$

2. $x^2 - 9x + 8$

Ans. $= x^2 - 8x - x + 8$

MATHEMATICS NOTES FOR 7TH CLASS (FOR ISLAMABAD)

$$= x(x-8) - 1(x-8)$$

$$= (x-1)(x-8)$$

3. $x^2 - 5x - 6$

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

$$= x(x-6) + 1(x-6)$$

$$= (x+1)(x-6)$$

4. $x^2 - 12x + 35$

Ans. $= x^2 - 7x - 5x + 35$

$$= x(x-7) - 5(x-7)$$

$$= (x-5)(x-7)$$

5. $x^2 + 10x + 21$

Ans. $= x^2 + 7x + 3x + 21$

$$= x(x+7) + 1(x+7)$$

$$= (x+1)(x+7)$$

6. $2a^2 - 4a - 6$

Ans. $= 2(a^2 - 2a - 3)$

$$= 2(a^2 - 3a + a - 3)$$

$$= 2[a(a-3) + 1(a-3)]$$

$$= 2[(a+1)(a-3)]$$

7. $x^2 - 21x + 90$

Ans. $= x^2 - 15x - 6x + 90$

$$= x(x-15) - 6(x-15)$$

$$= (x-6)(x-15)$$

8. $x^2 + x - 2$

Ans. $= x^2 + 2x - x - 2$

$$= x(x+2) - 1(x+2)$$

$$= (x-1)(x+2)$$

9. $t^2 + 12t + 35$

Ans. $= t^2 + 7t + 5t + 35$

$$= t(t+7) + 5(t+7) = (t+5)(t+7)$$

10. $3y^2 + 5y + 2$

Ans. $= 3y^2 + 3y + 2y + 2$

$$= 3y(y+1) + 2(y+1)$$

$$= (3y+2)(y+1)$$

Exercise 6.7

1. Describe the pattern in each sequence then find the next three terms.

(i) 7, 14, 21, 28, 35, 42, ...

Ans. Multiplies of 7

$$42, 49, 56, 63$$

(ii) 2, 6, 18, 54, ...

Ans. Coming figure in multiplied by 3

$$18 \times 3 = 54$$

$$54 \times 3 = 162$$

$$162 \times 3 = 486$$

$$486 \times 3 = 1458$$

(iii) 0, 1, 3, 6, 10, 15, ...

Ans. Natural numbers are added in each proceeding number

$$0 + 1 = 1$$

$$1 + 2 = 3$$

$$3 + 3 = 6$$

$$6 + 4 = 10$$

$$10 + 5 = 15$$

$$15 + 6 = 21$$

$$21 + 7 = 28$$

$$28 + 8 = 36$$

(iv) 15, 30, 45, 60, ...

Ans. Multiplies of 15

$$15 \times 4 = 60$$

$$15 \times 5 = 75$$

$$15 \times 6 = 90$$

$$15 \times 7 = 105$$

(v) 9, 3, 1, $\frac{1}{3}$, $\frac{1}{9}$, ...

Ans. Each proceeding number is divided by 3

$$\frac{1}{3} \div 3 = \frac{1}{9}$$

MATHEMATICS NOTES FOR 7TH CLASS (FOR ISLAMABAD)

$$\frac{1}{9} \div 3 = \frac{1}{27}$$

$$\frac{1}{27} \div 3 = \frac{1}{81}$$

$$\frac{1}{81} \div 3 = \frac{1}{243}$$

(vi) **15, 17, 19, ...**

Ans. 2 is added to each proceeding number

$$17 + 2 = 19$$

$$19 + 2 = 21$$

$$21 + 2 = 23$$

$$23 + 2 = 25$$

(vii) **87, 82, 77, ...**

Ans. Each proceeding figure is reduced by 5 (subject - 5)

$$87 - 5 = 82$$

$$82 - 5 = 77$$

$$77 - 5 = 72$$

$$72 - 5 = 67$$

$$67 - 5 = 62$$

$$62 - 5 = 57$$

(viii) **88, 44, 22, ...**

Ans. Each proceeding number is divide by 2

$$44 \div 2 = 22$$

$$22 \div 2 = 11$$

$$11 \div 2 = \frac{11}{2}$$

$$\frac{11}{2} \div 2 = \frac{11}{4}$$

$$\frac{11}{4} \div 2 = \frac{11}{8}$$

(ix) **3200, 32, 0.32, ...**

Ans. Each proceeding figure is divided by 100

$$0.32 \div 100 = 0.0032$$

$$0.0032 \div 100 = 0.000032$$

$$0.000032 \div 100 = 0.00000032$$

(x) **100, 89, 78, ...**

Ans. Each proceeding number is reduced by 11 (- 11)

$$89 - 11 = 78$$

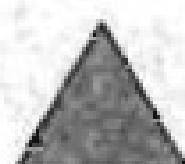
$$78 - 11 = 67$$

$$67 - 11 = 56$$

$$56 - 11 = 45$$

$$45 - 11 = 34$$

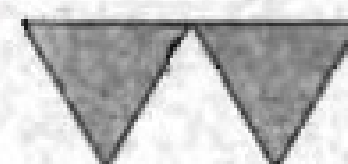
2. **Identify the following triangular patterns and complete the table below:**



1 Line
1 Triangles



2 Lines
2 Triangles



3 Lines
3 Triangles

number of triangle = T	1	2	3	4	5
number of lines = L					

(a) **Write the rule in words.**

(b) **Write the rule as formula.**

(c) **Find number of lines required to construct 100 triangles.**

Ans.

(a) number of lines is equal to two times number of triangles plus one.

(b) $L = 2T + 1$

(c) 201

3. **Select a number of your choice and create a sequence using each of the following rules.**

(i) **Add 3 to each term.**

(ii) **Multiply each term by $\frac{1}{3}$.**

(iii) **Subject - 2 from each term.**

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(iv) Divide each term by 2.

(v) Add 0.1 to 1st term, add 0.2 to the 2nd term, add 0.3 to third term and so on.

Ans. (i) $6 + 3 = 9$

$$3 + 3 = 12$$

$$12 + 3 = 15$$

(ii) $6 \times \frac{1}{3} = 2$

$$2 \times \frac{1}{3} = \frac{3}{2}$$

$$\frac{3}{2} \times \frac{1}{3} = \frac{1}{2}$$

$$\frac{1}{2} \times \frac{1}{3} = \frac{1}{6}$$

(iii) $6 - 2 = 4$

$$4 - 2 = 2$$

$$2 - 2 = 0$$

$$0 - 2 = -2$$

$$-4 - 2 = -6$$

(iv) $6 \div 2 = 3$

$$3 \div 2 = \frac{3}{2}$$

$$\frac{3}{2} \div 2 = \frac{3}{4}$$

$$\frac{3}{4} \div 2 = \frac{3}{8}$$

(v) $6 + 0.01 = 6.01$

$$6.01 + 0.02 = 6.03$$

$$6.03 + 0.03 = 6.06$$

$$6.06 + 0.04 = 6.1$$

4. Create a sequence by using the following rules, starting with the given number.

(i) Add 0.6 to each term; start with 10.

(ii) Square consecutive odd integer; start with 1.

(iii) Add $\frac{1}{2}$ times to each term; start with 12.

(iv) Cube consecutive even integer, start with 2.

(v) Divide each term by 4; start with 4.

Ans. (i) $10 + 0.6 = 10.06$

$$10.06 + 0.6 = 10.66$$

$$10.66 + 0.6 = 11.26$$

(ii) $(1)^2 = 1$

$$(3)^2 = 9$$

$$(5)^2 = 25$$

$$(7)^2 = 49$$

(iii) $12 + \left(\frac{12}{2}\right) = 12 + 6 = 18$

$$18 + \left(\frac{18}{2}\right) = 18 + 9 = 27$$

$$27 + \left(\frac{27}{2}\right) = 27 + 13.5 = 40.5$$

(iv) $(2)^3 = 8$

$$(4)^3 = 64$$

$$(6)^3 = 216$$

(v) $4 \div 4 = 1$

$$1 \div 4 = \frac{1}{4}$$

$$\frac{1}{4} \div 4 = \frac{1}{16}$$

$$\frac{1}{16} \div 4 = \frac{1}{64}$$

5. Find first five terms of sequence when its general term is:

(i) $2n + 1$

(ii) $x^2 - 1$

Ans. (i) $2n + 1$

$$2(1) + 1 = 3$$

MATHEMATICS NOTES FOR 7TH CLASS (FOR ISLAMABAD)

- $2(2) + 1 = 5$
 $2(3) + 1 = 7$
 $2(4) + 1 = 9$
 $2(5) + 1 = 11$
 (ii) $x^2 - 1 = ?$
 $(1)^2 - 1 = 0$
 $(2)^2 - 1 = 3$
 $(3)^2 - 1 = 8$
 $(4)^2 - 1 = 15$
 $(5)^2 - 1 = 24$

6. Given that $3y + 4$ is general term of a sequence. Find its:

- (i) 7th term
 (ii) 10th term

Ans. $3y + 4$

- $3(1) + 4 = 7$
 $3(2) + 4 = 10$
 $3(3) + 4 = 13$
 $3(4) + 4 = 16$
 $3(5) + 4 = 19$
 $3(6) + 4 = 22$
 $3(7) + 4 = 25$
 $3(8) + 4 = 28$
 $3(9) + 4 = 31$
 $3(10) + 4 = 34$
 So Ans. = 25, 24

Review Exercise 6

1. Encircle the correct option in the following statements.

- (i) 8 is a polynomial of degree:
 ✓(a) 0 (b) 1
 (c) 2 (d) 4
 (ii) $(x^2 + 3)(x^2 - 6)$ is a polynomial of degree
 ✓(a) 4 (b) 2

- (c) 3 (d) 4
 (iii) 0 is a polynomial of:
 (a) degree 1 (b) degree 2
 ✓(c) degree 0 (d) No degree
 (iv) $3x^3 + 2x^2 + 1$ is polynomial of degree.
 (a) 2 ✓(b) 3
 (c) 1 (d) 4
 (v) The product $(\sqrt{a} + \sqrt{b})(\sqrt{a} - \sqrt{b})$ is
 (a) $a + b$ (b) $a^2 - b^2$
 (c) $a^2 + b^2$ ✓(d) $a - b$
 (vi) The square of $x + 2y$ is
 (a) $x^2 + 4y^2$ ✓(b) $x^2 + 4y^2 + 4xy$
 (c) $x^2 + 4y^2 - 4xy$ (d) $x^2 - 4y^2$
 (vii) The square of $y - 2x$ is
 ✓(a) $y^2 + 4x^2 - 4xy$ (b) $y^2 + 4x^2 + 4xy$
 (c) $y^2 + 4x^2$ (d) $y^2 - 4x^2$
 (viii) The product of $2x + 3$ and x is
 (a) $2x^2 + 3$ ✓(b) $2x^2 - 3x$
 (c) $2x^2 - 6$ (d) $2x^2 + 3x + 6$
 (ix) The simplified form of $(a + b) - (a - b)$ is
 (a) $4ab$ (b) $2a + 2b$
 ✓(c) $2b$ (d) $2a$
 (x) $3, 1, \frac{1}{3}, \frac{1}{9}, \dots$ the next term of the sequence is:
 (a) $\frac{1}{21}$ ✓(b) $\frac{1}{27}$
 (c) $\frac{1}{81}$ (d) $\frac{1}{243}$
 2. Find the perimeter of a square of side $x + y$.
 Ans. Perimeter of a square = $4 \times \text{side}$

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$$= 4(x + y) = 4x + 4y$$

3. Find the area of a square of side $4a - b$.

$$\begin{aligned} \text{Ans. Area of square} &= \text{side} \times \text{side} \\ &= (4a - b)(4a - b) \\ &= (4a - b)^2 \\ &= (4a)^2 - 2(4a)(b) + (b)^2 \\ &= 16a^2 - 8ab + b^2 \end{aligned}$$

4. Find the area and perimeter of the rectangle.

$$\begin{aligned} \text{Ans. Area of rectangle} &= l \times w \\ &= (5x + 1)(5x - 1) \\ &= (5x)^2 - (1)^2 \\ &= 25x^2 - 1 \end{aligned}$$



$$\begin{aligned} \text{Perimeter of rectangle} &= 2[l + w] \\ &= 2[(5x + 1) + (5x - 1)] \\ &= 2(5x + 1 + 5x - 1) \\ &= 2(10x) \\ &= 20x \end{aligned}$$

5. Simplify:

$$(2x + 1)(2x - 1) - (2x - 1)^2$$

$$\begin{aligned} \text{Ans.} &= (2x + 1)(2x - 1) - (2x - 1)^2 \\ &= (2x + 1)(2x - 1) - (2x - 1)(2x - 1) \\ &= (2x + 1)(2x - 1) - (2x - 1)(2x - 1) \\ &= 2(2x - 1) = 4x - 2 \end{aligned}$$

6. Simplify: $60(a + b)^2 - 45(a - b)^2$

$$\begin{aligned} \text{Ans.} &= 15[4(a^2 + 2ab + b^2) - 3(a^2 - 2ab + b^2)] \\ &= 15[4a^2 + 8ab + 4b^2 - 3a^2 + 6ab - 3b^2] \\ &= 15[4a^2 - 3a^2 + 8ab + 6ab + 4b^2 - 3b^2] \\ &= 15(a^2 + 14ab + b^2) \end{aligned}$$

7. Simplify: $(y - z)^2 - (y + z)^2$

$$\begin{aligned} \text{Ans.} &= [(y - z) + (y + z)][(y - z) - (y + z)] \\ &= (y - z + y + z)(y - z - y - z) \\ &= (2y)(-2z) \\ &= -4yz \end{aligned}$$

8. Select a number of your choice and create a sequence by multiplying each term by $\frac{1}{2}$.

$$\text{Ans. } 8 \times \frac{1}{2} = 4$$

$$4 \times \frac{1}{2} = 2$$

$$2 \times \frac{1}{2} = 1$$

$$1 \times \frac{1}{2} = \frac{1}{2}$$

9. Given the sequence 2, 5, 8, 11, ...

- (i) Find its general term.

- (ii) Find 100th term using general term.

$$\text{Ans. Adding subject + 3}$$

$$2 + 3 = 5$$

$$5 + 3 = 8$$

$$8 + 3 = 11$$

$$11 + 3 = 14$$

$$14 + 3 = 17$$

$$\text{OR } 3x - 1$$

$$3(2) - 1 = 5$$

$$3(3) - 1 = 8$$

$$3(4) - 1 = 11$$

$$3(5) - 1 = 14$$

$$3(100) - 1 = 300 - 1 = 299$$

10. Find the 7th term of sequence 1, 3, 7, 15, ...

$$\text{Ans. Rule } 2x + 1$$

$$1 \times 2 + 1 = 3$$

$$3 \times 2 + 1 = 7$$

MATHEMATICS NOTES FOR 7TH CLASS (FOR ISLAMABAD)

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$$7 \times 2 + 1 = 15$$

$$15 \times 2 + 1 = 31$$

$$31 \times 2 + 1 = 63$$

$$63 \times 2 + 1 = 127$$

11. *Abid deposited Rs. 1000 in the bank in January. Next month, he deposited Rs. 1250 and continued to deposited in the same ratio each month.*

- (i) *Find the amount deposited in the month of August.*
- (ii) *Find total amount deposited in his account.*

Ans. Deposited in January = 1000
Deposited February = 1250
Increment = $1250 - 1000 = 250$
March = $1250 + 250 = 1500$
April = $1500 + 250 = 1750$
May = $1750 + 250 = 2050$
June = $2250 + 250 = 2250$
July = $2250 + 250 = 2500$
August = $2500 + 250 = 2750$
Total amount deposited = Rs. 14100