

NCERT Solutions for Class 7 Maths Chapter 12

Algebraic Expressions Class 7

Chapter 12 Algebraic Expressions Exercise 12.1, 12.2, 12.3, 12.4 Solutions

Exercise 12.1 : Solutions of Questions on Page Number : 234

Q1 :

Get the algebraic expressions in the following cases using variables, constants and arithmetic operations.

- (i) Subtraction of z from y .
- (ii) One-half of the sum of numbers x and y .
- (iii) The number z multiplied by itself.
- (iv) One-fourth of the product of numbers p and q .
- (v) Numbers x and y both squared and added.
- (vi) Number 5 added to three times the product of number m and n .
- (vii) Product of numbers y and z subtracted from 10.
- (viii) Sum of numbers a and b subtracted from their product.

Answer :

(i) $y - z$

(ii) $\frac{1}{2}(x + y)$

(iii) z^2

(iv) $\frac{1}{4}(pq)$

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

(vi) $5 + 3(mn)$

(vii) $10 - yz$ (viii) $ab - (a + b)$

Q2 :

(i) Identify the terms and their factors in the following expressions

Show the terms and factors by tree diagrams.

(a) $x - 3$ (b) $1 + x + x^2$ (c) $y - y^2$

(d) $5xy^2 + 7x^2y$ (e) $-ab + 2b^2 - 3a^2$

(ii) Identify terms and factors in the expressions given below:

(a) $-4x + 5$ (b) $-4x + 5y$ (c) $5y + 3y^2$

(d) $xy + 2x^2y^2$ (e) $pq + q$

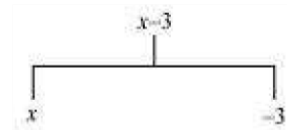
(f) $1.2 ab - 2.4 b + 3.6 a$ (g) $\frac{3}{4}x + \frac{1}{4}$

(h) $0.1p^2 + 0.2 q^2$

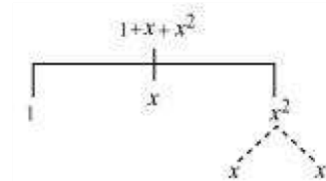
Answer :

(i)

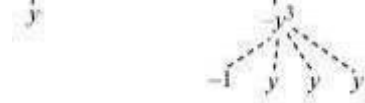
(a)



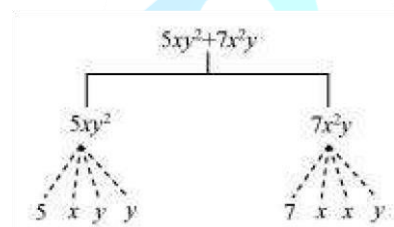
(b)



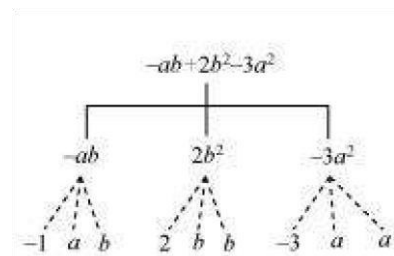
(c)



(d)



(e)



(ii)

(a)	$-4x + 5$	$-4x$ 5	$-4, x$ 5
(b)	$-4x + 5y$	$-4x$ $5y$	$-4, x$ $5, y$
(c)	$5y + 3y^2$	$5y$ $3y^2$	$5, y$ $3, y, y$
(d)	$xy + 2x^2y^2$	xy $2x^2y^2$	x, y $2, x, x, y, y$
(e)	$pq + q$	pq q	p, q q
(f)	$1.2ab - 2.4b + 3.6a$	$1.2ab$ $-2.4b$ $3.6a$	$1.2, a, b$ $-2.4, b$ $3.6, a$
(g)	$\frac{3}{4}x + \frac{1}{4}$	$\frac{3}{4}x$ $\frac{1}{4}$	$\frac{3}{4}, x$ $\frac{1}{4}$
(h)	$0.1p^2 + 0.2q^2$	$0.1p^2$ $0.2q^2$	$0.1, p, p$ $0.2, q, q$

Row	Expression	Terms	Factors
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Q3 :

Identify the numerical coefficients of terms (other than constants) in the following expressions:

(i) $5 - 3t$ (ii) $1 + t + t^2 + t^3$ (iii) $x + 2xy + 3y$

(iv) $100m + 1000n$ (v) $-p^2q^2 + 7pq$ (vi) $1.2a + 0.8b$

(vii) $3.14r^2$ (viii) $2(l + b)$ (ix) $0.1y + 0.01y^2$

Answer :

Row	Expression	Terms	Coefficients
(i)	$5 - 3t$	$-3t$	-3

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(iii)	$x + 2xy + 3y$	x $2xy$ $3y$	1 2 3
(iv)	$100m + 1000n$	$100m$ $1000n$	100 1000
(v)	$-p^2q + 7pq$	$-p^2q$ $7pq$	-1 7
(vi)	$1.2a + 0.8b$	$1.2a$ $0.8b$	1.2 0.8
(vii)	$3.14r^2$	$3.14r^2$	3.14
(viii)	$2(l + b)$	$2l$ $2b$	2 2
(ix)	$0.1y + 0.01y^2$	$0.1y$ $0.01y^2$	0.1 0.01
(ii)	$1 + t + t^2 + t^3$	t t^2 t^3	1 1 1

Q4 :

(a) Identify terms which contain x and give the coefficient of x .

(i) $y^2x + y$ (ii) $13y^2 - 8yx$ (iii) $x + y + 2$

(iv) $5 + z + zx$ (v) $1 + x + xy$ (vi) $12xy^2 + 25$

(vii) $7x + xy^2$

(b) Identify terms which contain y^2 and give the coefficient of y^2 .

(i) $8 - xy^2$ (ii) $5y^2 + 7x$ (iii) $2x^2y - 15xy^2 + 7y^2$

Answer :

(a)

Row	Expression	Terms with x	Coefficient of x
(i)	$y^2x + y$	y^2x	y^2
(ii)	$13y^2 - 8yx$	$-8yx$	$-8y$
(iii)	$x + y + 2$	x	1

Row	Expression	Terms with y^2	Coefficient of y^2
(i)	$8 - xy^2$	$-xy^2$	$-x$
(ii)	$5y^2 + 7x$	$5y^2$	5
(iii)	$2xy + 7y^2$ $- 15xy^2$	$7y^2$ $- 15xy^2$	7 $- 15x$

(iv)	$5 + z + zx$	zx	z
(v)	$1 + x + xy$	$x \ xy$	$1 \ y$
(vi)	$12xy^2 + 25$	$12xy^2$	$12y^2$
(vii)	$7x + xy^2$	$7x \ xy^2$	$7 \ y^2$

(b)

Q5 :

Classify into monomials, binomials and trinomials.

(i) $4y - 7z$ (ii) y^2 (iii) $x + y - xy$

(iv) 100 (v) $ab - a - b$ (vi) $5 - 3t$

(vii) $4p^2q - 4pq^2$ (viii) $7mn$ (ix) $z^2 - 3z + 8$

(x) $a^2 + b^2$ (xi) $z^2 + z$ (xii) $1 + x + x^2$

Answer :

The monomials, binomials, and trinomials have 1, 2, and 3 unlike terms in it respectively.

(i) $4y - 7z$

Binomial

(ii) y^2

Monomial

(iii) $x + y - xy$

Trinomial

(iv) 100

Monomial

(v) $ab - a - b$

Trinomial

(vi) $5 - 3t$

Binomial

(vii) $4p^2q - 4pq^2$

Binomial

(viii) $7mn$

Monomial

(ix) $z^2 - 3z + 8$

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Trinomial

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

Binomial

(xi) $z^2 + z$

Binomial

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

Trinomial

Q6 :

State whether a given pair of terms is of like or unlike terms.

(i) 1, 100 (ii) $-7x, \frac{5}{2}x$ (iii) $-29x, -29y$

(iv) $14xy, 42yx$ (v) $4m^2p, 4mp^2$ (vi) $12xz, 12x^2z^2$

Answer :

The terms which have the same algebraic factors are called like terms. However, when the terms have different algebraic factors, these are called unlike terms.

(i) 1, 100

Like

(ii) $-7x, \frac{5}{2}x$

Like

(iii) $-29x, -29y$

Unlike

(iv) $14xy, 42yx$

Like

(v) $4m^2p, 4mp^2$

Unlike

(vi) $12xz, 12x^2z^2$

Unlike

Q7 :

Identify like terms in the following:

(a) $-xy^2, -4yx^2, 8x^2, 2xy^2, 7y, -11x^2, -100x, -11yx, 20x^2y, -6x^2, y, 2xy, 3x$

(b) $10pq, 7p, 8q, -p^2q^2, -7qp, -100q, -23, 12q^2p^2, -5p^2, 41, 2405p, 78qp, 13p^2q, qp^2, 701p^2$

Answer :

(a) $-xy^2, 2xy^2$

$-4yx^2, 20x^2y$

$8x^2, -11x^2, -6x^2$

- $7y, y$
 $-100x, 3x$
 $-11xy, 2xy$
 (b) $10pq, -7qp, 78qp$
 $7p, 2405p$
 $8q, -100q$
 $-p^2q^2, 12p^2q^2$
 $-23, 41$
 $-5p^2, 701p^2$
 $13p^2q, qp^2$

Exercise 12.2 : Solutions of Questions on Page Number : 239

Q1 :

Simplify combining like terms:

- (i) $21b - 32 + 7b - 20b$
 (ii) $-z^2 + 13z^2 - 5z + 7z^2 - 15z$
 (iii) $p - (p - q) - q - (q - p)$
 (iv) $3a - 2b - ab - (a - b + ab) + 3ab + b - a$
 (v) $5x^2y - 5x^2 + 3yx^2 - 3y^2 + x^2 - y^2 + 8xy^2 - 3y^2$
 (vi) $(3y^2 + 5y - 4) - (8y - y^2 - 4)$

Answer :

- (i) $21b - 32 + 7b - 20b = 21b + 7b - 20b - 32$
 $= b(21 + 7 - 20) - 32$
 $= 8b - 32$
 (ii) $-z^2 + 13z^2 - 5z + 7z^2 - 15z = 7z^2 - z^2 + 13z^2 - 5z - 15z$
 $= 7z^2 + z^2(-1 + 13) + z(-5 - 15)$
 $= 7z^2 + 12z^2 - 20z$
 (iii) $p - (p - q) - q - (q - p) = p - p + q - q - q + p$
 $= p - q$
 (iv) $3a - 2b - ab - (a - b + ab) + 3ab + b - a$
 $= 3a - 2b - ab - a + b - ab + 3ab + b - a$
 $= 3a - a - a - 2b + b + b - ab - ab + 3ab$
 $= a(3 - 1 - 1) + b(-2 + 1 + 1) + ab(-1 - 1 + 3)$
 $= a + ab$
 (v) $5x^2y - 5x^2 + 3yx^2 - 3y^2 + x^2 - y^2 + 8xy^2 - 3y^2$
 $= 5x^2y + 3yx^2 - 5x^2 + x^2 - 3y^2 - y^2 - 3y^2 + 8xy^2$
 $= x^2y(5 + 3) + x^2(-5 + 1) + y^2(-3 - 1 - 3) + 8xy^2$
 $= 8x^2y - 4x^2 - 7y^2 + 8xy^2$

$$\begin{aligned}
 & \text{(vi) } (3y^2 + 5y - 4) - (8y - y^2 - 4) \\
 &= 3y^2 + 5y - 4 - 8y + y^2 + 4 \\
 &= 3y^2 + y^2 + 5y - 8y - 4 + 4 \\
 &= y^2(3 + 1) + y(5 - 8) + 4(1 - 1) \\
 &= 4y^2 - 3y
 \end{aligned}$$

Q2 :

Add:

- (i) $3mn, -5mn, 8mn, -4mn$
- (ii) $t - 8tz, 3tz - z, z - t$
- (iii) $-7mn + 5, 12mn + 2, 9mn - 8, -2mn - 3$
- (iv) $a + b - 3, b - a + 3, a - b + 3$
- (v) $14x + 10y - 12xy - 13, 18 - 7x - 10y + 8xy, 4xy$
- (vi) $5m - 7n, 3n - 4m + 2, 2m - 3mn - 5$
- (vii) $4x^2y, -3xy^2, -5xy^2, 5x^2y$
- (viii) $3p^2q^2 - 4pq + 5, -10p^2q^2, 15 + 9pq + 7p^2q^2$
- (ix) $ab - 4a, 4b - ab, 4a - 4b$
- (x) $x^2 - y^2 - 1, y^2 - 1 - x^2, 1 - x^2 - y^2$

Answer :

$$\begin{aligned}
 \text{(i) } & 3mn + (-5mn) + 8mn + (-4mn) = mn(3 - 5 + 8 - 4) \\
 &= 2mn \\
 \text{(ii) } & (t - 8tz) + (3tz - z) + (z - t) = t - 8tz + 3tz - z + z - t \\
 &= t - t - 8tz + 3tz - z + z \\
 &= t(1 - 1) + tz(-8 + 3) + z(-1 + 1) \\
 &= -5tz \\
 \text{(iii) } & (-7mn + 5) + (12mn + 2) + (9mn - 8) + (-2mn - 3) \\
 &= -7mn + 5 + 12mn + 2 + 9mn - 8 - 2mn - 3 \\
 &= -7mn + 12mn + 9mn - 2mn + 5 + 2 - 8 - 3 \\
 &= mn(-7 + 12 + 9 - 2) + (5 + 2 - 8 - 3) \\
 &= 12mn - 4 \\
 \text{(iv) } & (a + b - 3) + (b - a + 3) + (a - b + 3) \\
 &= a + b - 3 + b - a + 3 + a - b + 3
 \end{aligned}$$

$$= a - a + a + b + b - b - 3 + 3 + 3$$

$$= a(1 - 1 + 1) + b(1 + 1 - 1) + 3(-1 + 1 + 1)$$

$$= a + b + 3$$

$$(v) (14x + 10y - 12xy - 13) + (18 - 7x - 10y + 8yx) + 4xy$$

$$= 14x + 10y - 12xy - 13 + 18 - 7x - 10y + 8yx + 4xy$$

$$= 14x - 7x + 10y - 10y - 12xy + 8yx + 4xy - 13 + 18$$

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$$= x(14 - 7) + y(10 - 10) + xy(-12 + 8 + 4) - 13 + 18$$

$$= 7x + 5$$

$$(vi) (5m - 7n) + (3n - 4m + 2) + (2m - 3mn - 5)$$

$$= 5m - 7n + 3n - 4m + 2 + 2m - 3mn - 5$$

$$= 5m - 4m + 2m - 7n + 3n - 3mn + 2 - 5$$

$$= m(5 - 4 + 2) + n(-7 + 3) - 3mn + 2 - 5$$

$$= 3m - 4n - 3mn - 3$$

$$(vii) 4x^2y - 3xy^2 - 5xy^2 + 5x^2y = 4x^2y + 5x^2y - 3xy^2 - 5xy^2$$

$$= x^2y(4 + 5) + xy^2(-3 - 5)$$

$$= 9x^2y - 8xy^2$$

$$(viii) (3p^2q^2 - 4pq + 5) + (-10p^2q^2) + (15 + 9pq + 7p^2q^2)$$

$$= 3p^2q^2 - 4pq + 5 - 10p^2q^2 + 15 + 9pq + 7p^2q^2$$

$$= 3p^2q^2 - 10p^2q^2 + 7p^2q^2 - 4pq + 9pq + 5 + 15$$

$$= p^2q^2(3 - 10 + 7) + pq(-4 + 9) + 5 + 15$$

$$= 5pq + 20$$

$$(ix) (ab - 4a) + (4b - ab) + (4a - 4b)$$

$$= ab - 4a + 4b - ab + 4a - 4b$$

$$= ab - ab - 4a + 4a + 4b - 4b$$

$$= ab(1 - 1) + a(-4 + 4) + b(4 - 4)$$

$$= 0$$

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

$$= x^2 - y^2 - 1 + y^2 - 1 - x^2 + 1 - x^2 - y^2$$

$$= x^2 - x^2 - x^2 - y^2 + y^2 - y^2 - 1 - 1 + 1$$

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

$$= -x^2 - y^2 - 1$$

Q3 :

Subtract:

(i) $-5y^2$ from y^2

(ii) $6xy$ from $-12xy$

(iii) $(a - b)$ from $(a + b)$

(iv) $a(b - 5)$ from $b(5 - a)$

(v) $-m^2 + 5mn$ from $4m^2 - 3mn + 8$

(vi) $-x^2 + 10x - 5$ from $5x - 10$

(vii) $5a^2 - 7ab + 5b^2$ from $3ab - 2a^2 - 2b^2$

(viii) $4pq - 5q^2 - 3p^2$ from $5p^2 + 3q^2 - pq$

Answer :

(i) $y^2 - (-5y^2) = y^2 + 5y^2 = 6y^2$
 (ii) $-12xy - (6xy) = -18xy$
 (iii) $(a + b) - (a - b) = a + b - a + b = 2b$
 (iv) $b(5 - a) - a(b - 5) = 5b - ab - ab + 5a$
 $= 5a + 5b - 2ab$
 (v) $(4m^2 - 3mn + 8) - (-m^2 + 5mn) = 4m^2 - 3mn + 8 + m^2 - 5mn$
 $= 4m^2 + m^2 - 3mn - 5mn + 8$
 $= 5m^2 - 8mn + 8$
 (vi) $(5x - 10) - (-x^2 + 10x - 5) = 5x - 10 + x^2 - 10x + 5$
 $= x^2 + 5x - 10x - 10 + 5$
 $= x^2 - 5x - 5$
 (vii) $(3ab - 2a^2 - 2b^2) - (5a^2 - 7ab + 5b^2)$
 $= 3ab - 2a^2 - 2b^2 - 5a^2 + 7ab - 5b^2$
 $= 3ab + 7ab - 2a^2 - 5a^2 - 2b^2 - 5b^2$
 $= 10ab - 7a^2 - 7b^2$
 (viii) $4pq - 5q^2 - 3p^2$ from $5p^2 + 3q^2 - pq$
 $(5p^2 + 3q^2 - pq) - (4pq - 5q^2 - 3p^2)$
 $= 5p^2 + 3q^2 - pq - 4pq + 5q^2 + 3p^2$
 $= 5p^2 + 3p^2 + 3q^2 + 5q^2 - pq - 4pq$
 $= 8p^2 + 8q^2 - 5pq$

Q4 :

- (a) What should be added to $x^2 + xy + y^2$ to obtain $2x^2 + 3xy$?
 (b) What should be subtracted from $2a + 8b + 10$ to get $-3a + 7b + 16$?

Answer :

(a) Let a be the required term.

$$a + (x^2 + y^2 + xy) = 2x^2 + 3xy$$

$$a = 2x^2 + 3xy - (x^2 + y^2 + xy)$$

$$a = 2x^2 + 3xy - x^2 - y^2 - xy$$

$$= 2x^2 - x^2 - y^2 + 3xy - xy$$

$$= x^2 - y^2 + 2xy$$

(b) Let p be the required term.

$$(2a + 8b + 10) - p = -3a + 7b + 16$$

$$p = 2a + 8b + 10 - (-3a + 7b + 16)$$

$$= 2a + 8b + 10 + 3a - 7b - 16$$

$$= 2a + 3a + 8b - 7b + 10 - 16$$

$$= 5a + b - 6$$

Q5 :

What should be taken away from $3x^2 - 4y^2 + 5xy + 20$ to obtain

$$-x^2 - y^2 + 6xy + 20?$$

Answer :

Let p be the required term.

$$(3x^2 - 4y^2 + 5xy + 20) - p = -x^2 - y^2 + 6xy + 20$$

$$= (3x^2 - 4y^2 + 5xy + 20) - (-x^2 - y^2 + 6xy + 20) =$$

$$3x^2 - 4y^2 + 5xy + 20 + x^2 + y^2 - 6xy - 20 = 3x^2 +$$

$$x^2 - 4y^2 + y^2 + 5xy - 6xy + 20 - 20$$

$$= 4x^2 - 3y^2 - xy$$

Q6 :

(a) From the sum of $3x - y + 11$ and $-y - 11$, subtract $3x - y - 11$.

(b) From the sum of $4 + 3x$ and $5 - 4x + 2x^2$, subtract the sum of $3x^2 - 5x$ and $-x^2 + 2x + 5$.

Answer :

$$(a) (3x - y + 11) + (-y - 11)$$

$$= 3x - y + 11 - y - 11$$

$$= 3x - y - y + 11 - 11$$

$$= 3x - 2y$$

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

$$= 3x - 2y - 3x + y + 11$$

$$= 3x - 3x - 2y + y + 11$$

$$= -y + 11$$

$$(b) (4 + 3x) + (5 - 4x + 2x^2) = 4 + 3x + 5 - 4x + 2x^2$$

$$= 3x - 4x + 2x^2 + 4 + 5$$

$$= -x + 2x^2 + 9$$

$$(3x^2 - 5x) + (-x^2 + 2x + 5) = 3x^2 - 5x - x^2 + 2x + 5$$

$$= 3x^2 - x^2 - 5x + 2x + 5$$

$$= 2x^2 - 3x + 5$$

$$(-x + 2x^2 + 9) - (2x^2 - 3x + 5)$$

$$= -x + 2x^2 + 9 - 2x^2 + 3x - 5$$

$$= -x + 3x + 2x^2 - 2x^2 + 9 - 5$$

$$= 2x + 4$$

Exercise 12.3 : Solutions of Questions on Page Number : 242

PreponGo

Q1 :

If $m = 2$, find the value of:

(i) $m - 2$ (ii) $3m - 5$ (iii) $9 - 5m$

(iv) $3m^2 - 2m - 7$ (v) $\frac{5m}{2} - 4$

Answer :

(i) $m - 2 = 2 - 2 = 0$

(ii) $3m - 5 = (3 \times 2) - 5 = 6 - 5 = 1$

(iii) $9 - 5m = 9 - (5 \times 2) = 9 - 10 = -1$

(iv) $3m^2 - 2m - 7 = 3 \times (2 \times 2) - (2 \times 2) - 7$
 $= 12 - 4 - 7 = 1$

(v) $\frac{5m}{2} - 4 = \left(\frac{5 \times 2}{2}\right) - 4 = 1$

Q2 :

If $p = -2$, find the value of:

(i) $4p + 7$

(ii) $-3p^2 + 4p + 7$

(iii) $-2p^3 - 3p^2 + 4p + 7$

Answer :

(i) $4p + 7 = 4 \times (-2) + 7 = -8 + 7 = -1$

(ii) $-3p^2 + 4p + 7 = -3(-2) \times (-2) + 4 \times (-2) + 7$
 $= -12 - 8 + 7 = -13$

(iii) $-2p^3 - 3p^2 + 4p + 7$
 $= -2(-2) \times (-2) \times (-2) - 3(-2) \times (-2) + 4 \times (-2) + 7$
 $= 16 - 12 - 8 + 7 = 3$

Q3 :

Find the value of the following expressions, when $x = -1$:

(i) $2x - 7$ (ii) $-x + 2$ (iii) $x^2 + 2x + 1$

(iv) $2x^2 - x - 2$

Answer :

(i) $2x - 7$

$= 2 \times (-1) - 7 = -9$

(ii) $-x + 2 = -(-1) + 2 = 1 + 2 = 3$

(iii) $x^2 + 2x + 1 = (-1) \times (-1) + 2 \times (-1) + 1$
 $= 1 - 2 + 1 = 0$

PreponGo

$$(iv) 2x^2 - x - 2 = 2(-1) \times (-1) - (-1) - 2$$

$$= 2 + 1 - 2 = 1$$

Q4 :

If $a = 2$, $b = -2$, find the value of:

(i) $a^2 + b^2$ (ii) $a^2 + ab + b^2$ (iii) $a^2 - b^2$

Answer :

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

$$= (2)^2 + (-2)^2 = 4 + 4 = 8$$

(ii) $a^2 + ab + b^2$

$$= (2 \times 2) + 2 \times (-2) + (-2) \times (-2)$$

$$= 4 - 4 + 4 = 4$$

(iii) $a^2 - b^2 = (2)^2 - (-2)^2 = 4 - 4 = 0$

Q5 :

When $a = 0$, $b = -1$, find the value of the given expressions:

(i) $2a + 2b$ (ii) $2a^2 + b^2 + 1$

(iii) $2a^2b + 2ab^2 + ab$ (iv) $a^2 + ab + 2$

Answer :

(i) $2a + 2b = 2 \times (0) + 2 \times (-1) = 0 - 2 = -2$

(ii) $2a^2 + b^2 + 1$

$$= 2 \times (0)^2 + (-1) \times (-1) + 1$$

$$= 0 + 1 + 1 = 2$$

(iii) $2a^2b + 2ab^2 + ab$

$$= 2 \times (0)^2 \times (-1) + 2 \times (0) \times (-1) \times (-1) + 0 \times (-1)$$

$$= 0 + 0 + 0 = 0$$

(iv) $a^2 + ab + 2$

$$= (0)^2 + 0 \times (-1) + 2$$

$$= 0 + 0 + 2 = 2$$

Q6 :

Simplify the expressions and find the value if x is equal to 2

(i) $x + 7 + 4(x - 5)$ (ii) $3(x + 2) + 5x - 7$

(iii) $6x + 5(x - 2)$ (iv) $4(2x - 1) + 3x + 11$

Answer :

(i) $x + 7 + 4(x - 5) = x + 7 + 4x - 20$

$$= x + 4x + 7 - 20$$

$$= 5x - 13$$

$$= (5 \times 2) - 13$$

$$= 10 - 13 = -3$$

$$(ii) 3(x + 2) + 5x - 7 = 3x + 6 + 5x - 7$$

$$= 3x + 5x + 6 - 7 = 8x - 1$$

$$= (8 \times 2) - 1 = 16 - 1 = 15$$

$$(iii) 6x + 5(x - 2) = 6x + 5x - 10$$

$$= 11x - 10$$

$$= (11 \times 2) - 10 = 22 - 10 = 12$$

$$(iv) 4(2x - 1) + 3x + 11 = 8x - 4 + 3x + 11$$

$$= 11x + 7$$

$$= (11 \times 2) + 7 =$$

$$22 + 7 = 29$$

Q7 :

Simplify these expressions and find their values if $x = 3$, $a = -1$, $b = -2$.

$$(i) 3x - 5 - x + 9 \quad (ii) 2 - 8x + 4x + 4$$

$$(iii) 3a + 5 - 8a + 1 \quad (iv) 10 - 3b - 4 - 5b$$

$$(v) 2a - 2b - 4 - 5 + a$$

Answer :

$$(i) 3x - 5 - x + 9 = 3x - x - 5 + 9$$

$$= 2x + 4 = (2 \times 3) + 4 = 10$$

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

$$= 6 - 4x = 6 - (4 \times 3) = 6 - 12 = -6$$

$$(iii) 3a + 5 - 8a + 1 = 3a - 8a + 5 + 1$$

$$= -5a + 6 = -5 \times (-1) + 6$$

$$= 5 + 6 = 11$$

$$(iv) 10 - 3b - 4 - 5b = 10 - 4 - 3b - 5b$$

$$= 6 - 8b = 6 - 8 \times (-2)$$

$$= 6 + 16 = 22$$

$$(v) 2a - 2b - 4 - 5 + a = 2a + a - 2b - 4 - 5$$

$$= 3a - 2b - 9$$

$$= 3 \times (-1) - 2 \times (-2) - 9$$

$$= -3 + 4 - 9 = -8$$

Q8 :

$$(i) \text{ If } z = 10, \text{ find the value of } z^2 - 3(z - 10).$$

$$(ii) \text{ If } p = -10, \text{ find the value of } p^2 - 2p - 100$$

Answer :

$$(i) z^2 - 3(z - 10) = z^2 - 3z + 30$$

$$\begin{aligned}
 &= (10 \times 10 \times 10) - (3 \times 10) + 30 \\
 &= 1000 - 30 + 30 = 1000 \\
 \text{(ii) } &p^2 - 2p - 100 \\
 &= (-10) \times (-10) - 2(-10) - 100 \\
 &= 100 + 20 - 100 = 20
 \end{aligned}$$

Q9 :

What should be the value of a if the value of $2x^2 + x - a$ equals to 5, when $x = 0$?

Answer :

$$2x^2 + x - a = 5, \text{ when } x = 0$$

$$(2 \times 0) + 0 - a = 5$$

$$0 - a = 5 \quad a = -5$$

Q10 :

Simplify the expression and find its value when $a = 5$ and $b = -3$.

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

Answer :

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

$$= 2a^2 + 2ab - ab + 3$$

$$= 2a^2 + ab + 3$$

$$= 2 \times (5 \times 5) + 5 \times (-3) + 3$$

$$= 50 - 15 + 3 = 38$$

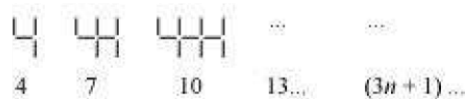
Exercise 12.4 : Solutions of Questions on Page Number : 246

Q1 :

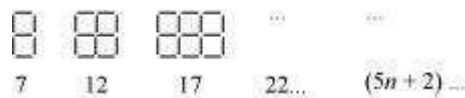
Observe the patterns of digits made from line segments of equal length. You will find such segmented digits on the display of electronic watches or calculators. (a)



(b)



(c)



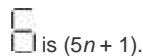
If the number of digits formed is taken to be n , the number of segments required to form n digits is given by the algebraic expression appearing on the right of each pattern.

How many segments are required to form 5, 10, 100 digits of the kind -



Answer :

(a) It is given that the number of segments required to form n digits of the kind



$$\begin{aligned} \text{Number of segments required to form 5 digits} &= (5 \times 5 + 1) \\ &= 25 + 1 = 26 \end{aligned}$$

$$\begin{aligned} \text{Number of segments required to form 10 digits} &= (5 \times 10 + 1) \\ &= 50 + 1 = 51 \end{aligned}$$

$$\begin{aligned} \text{Number of segments required to form 100 digits} &= (5 \times 100 + 1) \\ &= 500 + 1 = 501 \end{aligned}$$

(b) It is given that the number of segments required to form n digits of the kind 4 = $500 + 2 = 502$

$$\begin{aligned} \text{Number of segments required to form 5 digits} &= (3 \times 5 + 1) \\ &= 15 + 1 = 16 \end{aligned}$$

$$\begin{aligned} \text{Number of segments required to form 10 digits} &= (3 \times 10 + 1) \\ &= 30 + 1 = 31 \end{aligned}$$

$$\begin{aligned} \text{Number of segments required to form 100 digits} &= (3 \times 100 + 1) \\ &= 300 + 1 = 301 \end{aligned}$$

(c) It is given that the number of segments required to form n digits of the kind 8

$$\begin{aligned} \text{Number of segments required to form 5 digits} &= (5 \times 5 + 2) \\ &= 25 + 2 = 27 \end{aligned}$$

$$\begin{aligned} \text{Number of segments required to form 10 digits} &= (5 \times 10 + 2) \\ &= 50 + 2 = 52 \end{aligned}$$

$$\text{Number of segments required to form 100 digits} = (5 \times 100 + 2)$$

is $(5n + 2)$.

Q2 :

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S. No	Expression	Terms									
		1 st	2 nd	3 rd	4 th	5 th	...	10 th	...	100 th	...
(i)	$2n - 1$	1	3	5	7	9	-	19	-	-	-
(ii)	$3n + 2$	2	5	8	11	-	-	-	-	-	-
(iii)	$4n + 1$	5	9	13	17	-	-	-	-	-	-
(iv)	$7n + 20$	27	34	41	48	-	-	-	-	-	-
(v)	$n^2 + 1$	2	5	10	17	-	-	-	-	10,001	-

Use the given algebraic expression to complete the table of number patterns.

Answer: The given table can be completed as follows.

S.No.	Expression	Terms									
		1 st	2 nd	3 rd	4 th	5 th	...	10 th	...	100 th	...
(i)	$2n - 1$	1	3	5	7	9	-	19	-	199	-
(ii)	$3n + 2$	2	5	8	11	17	-	32	-	302	-
(iii)	$4n + 1$	5	9	13	17	21	-	41	-	401	-
(iv)	$7n + 20$	27	34	41	48	55	-	90	-	720	-
(v)	$n^2 + 1$	2	5	10	17	26	-	101	-	10,001	-

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