

Mathematics

(Chapter - 10) (Algebraic Expressions) (Exercise 10.1) (Class - VII)

Question 1:

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 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 1:

- | | |
|-----------------|------------------------|
| (i) $y - z$ | (ii) $\frac{x + y}{2}$ |
| (iii) z^2 | (iv) $\frac{pq}{4}$ |
| (v) $x^2 + y^2$ | (vi) $3mn + 5$ |
| (vii) $10 - yz$ | (viii) $ab - (a + b)$ |

Question 2:

(i) Identify the terms and their factors in the following expressions, show the terms and factors by tree diagram:

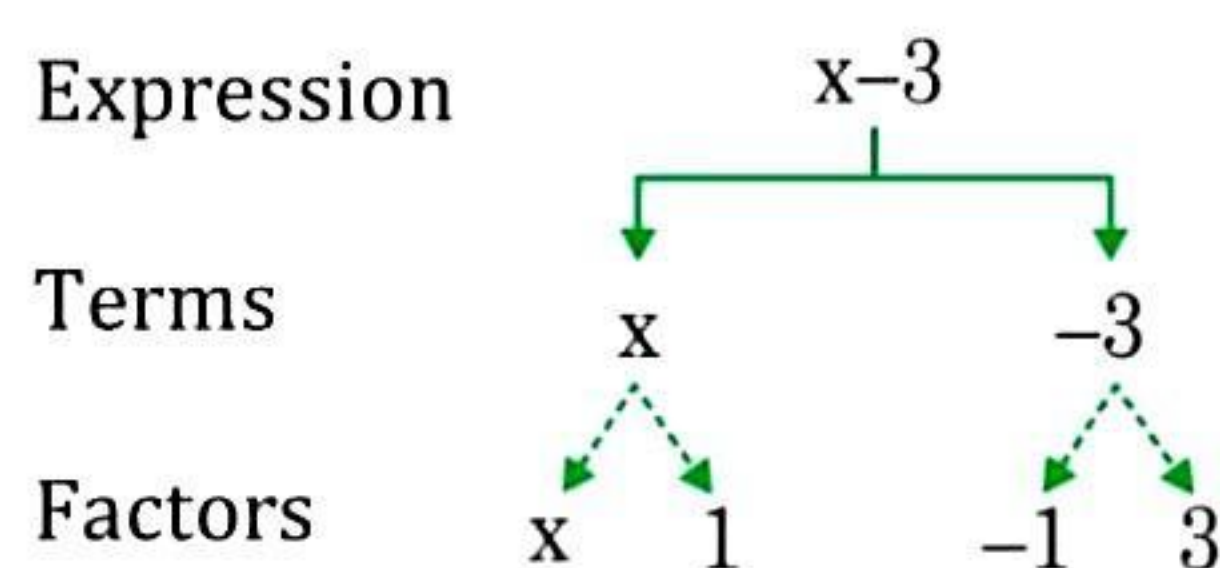
- (a) $x - 3$
- (b) $1 + x + x^2$
- (c) $y - y^3$
- (d) $5xy^2 + 7x^2y$
- (e) $-ab + 2b^2 - 3a^2$

(ii) Identify the 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) $1.2ab - 2.4b + 3.6a$
- (g) $\frac{3}{4}x + \frac{1}{4}$
- (h) $0.1p^2 + 0.2q^2$

Answer 2:

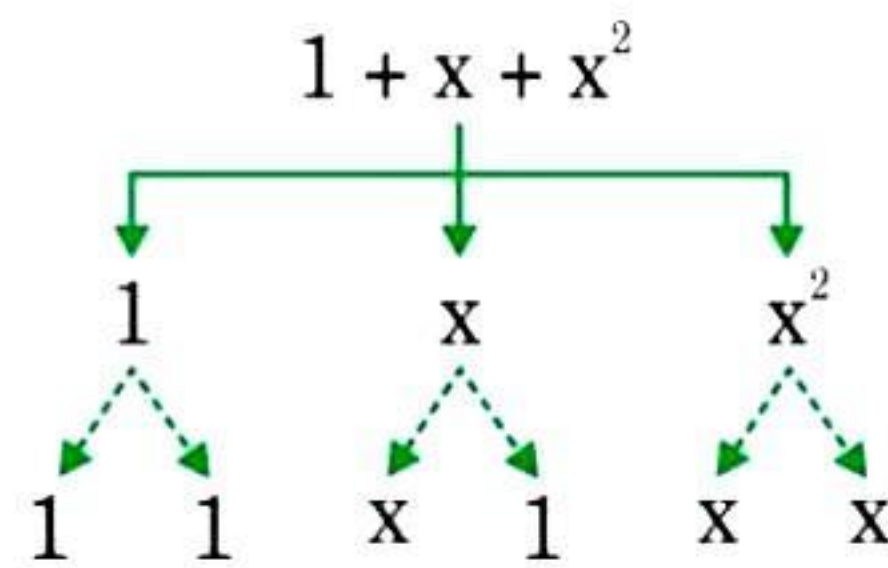
- (i) (a) $x - 3$



(b) $1+x+x^2$
Expression

Terms

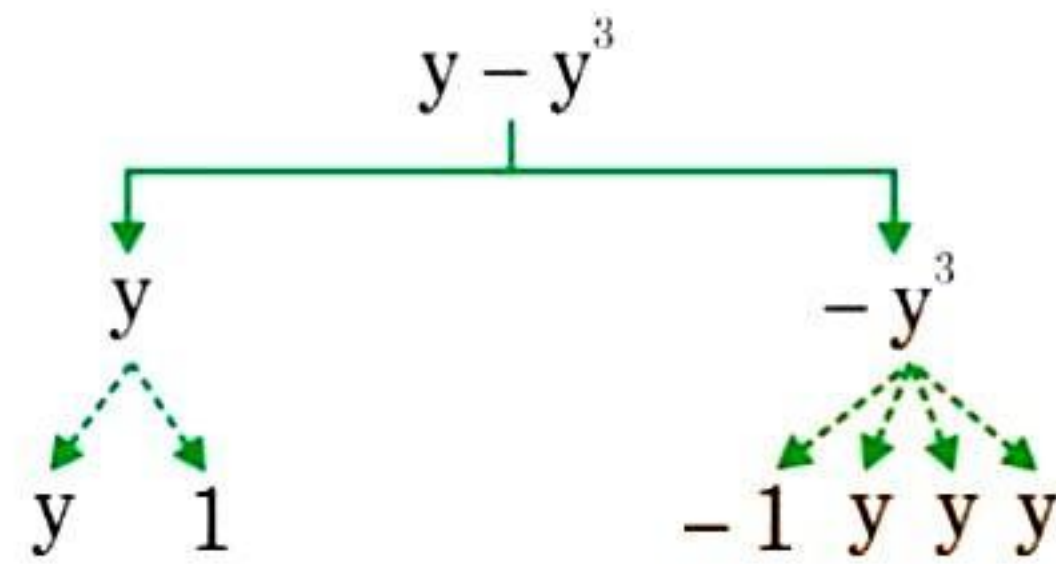
Factors



(c) $y-y^3$
Expression

Terms

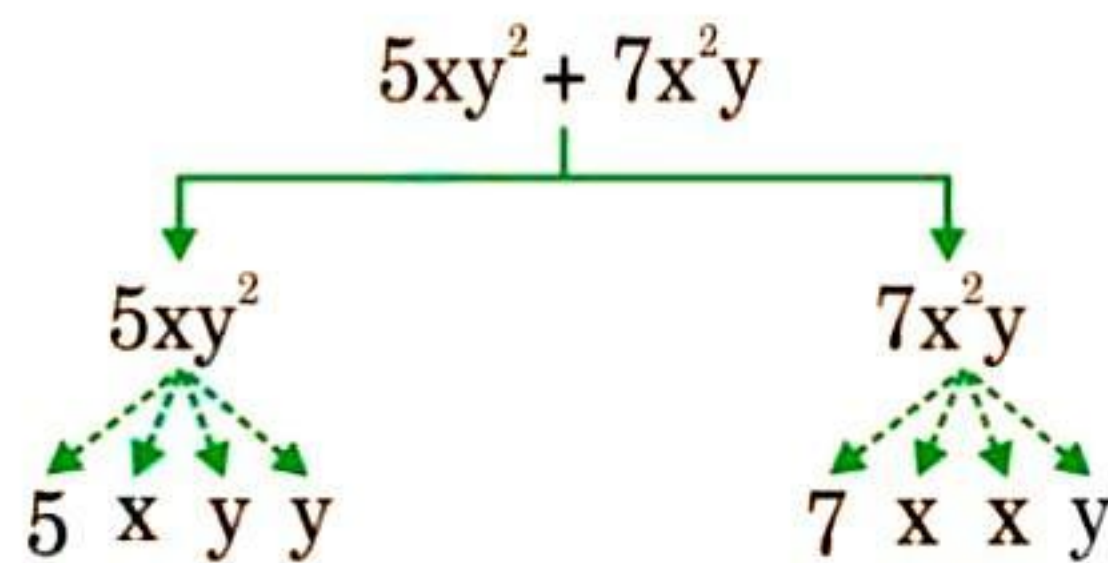
Factors



(d) $5xy^2+7x^2y$
Expression

Terms

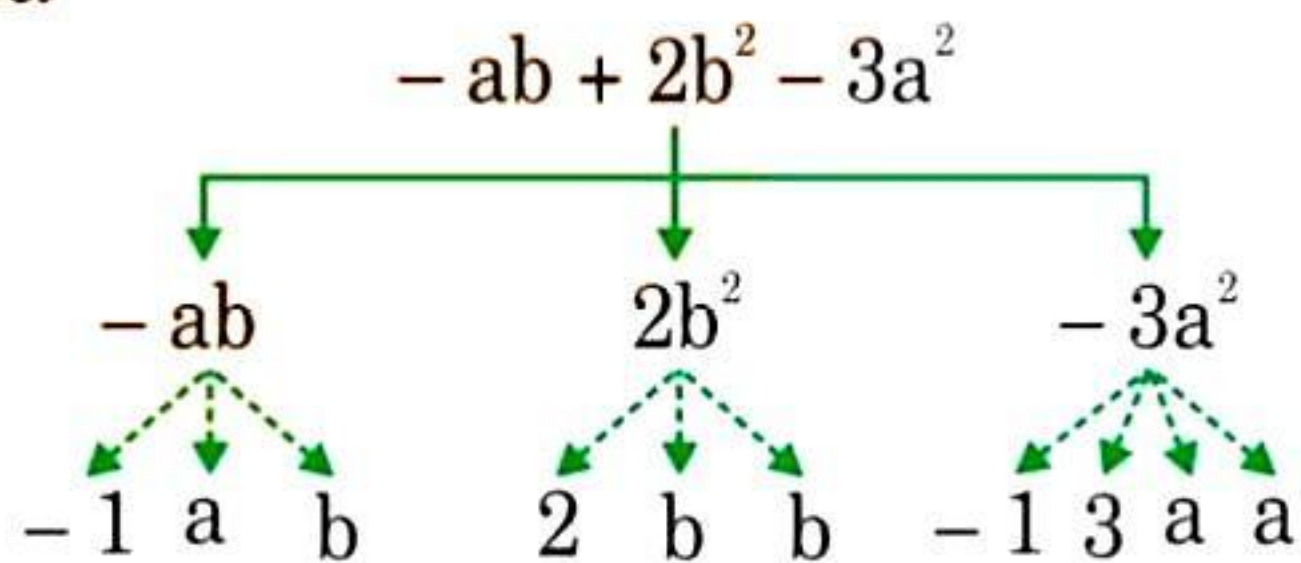
Factors



(e) $-ab+2b^2-3a^2$
Expression

Terms

Factors



(ii) **(a)** $-4x+5$
Terms: $-4x, 5$
Factors: $-4, x ; 5$

(c) $5y+3y^2$
Terms: $5y, 3y^2$
Factors: $5, y ; 3, y, y$

(e) $pq+q$
Terms: pq, q
Factors: $p, q ; q$

(g) $\frac{3}{4}x+\frac{1}{4}$
Terms: $\frac{3}{4}x, \frac{1}{4}$
Factors: $\frac{3}{4}, x ; \frac{1}{4}$

(b) $-4x+5y$
Terms: $-4x, 5y$
Factors: $-4, x ; 5, y$

(d) $xy+2x^2y^2$
Terms: $xy, 2x^2y^2$
Factors: $x, y ; 2x, x, y, y$

(f) $1.2ab-2.4b+3.6a$
Terms: $1.2ab, -2.4b, 3.6a$
Factors: $1.2, a, b ; -2.4, b ; 3.6, a$

(h) $0.1p^2+0.2q^2$
Terms: $0.1p^2, 0.2q^2$
Factors: $0.1, p, p ; 0.2, q, q$

Question 3:

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

- (i) $5 - 3t^2$
- (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 3:

S.No.	Expression	Terms	Numerical Coefficient
(i)	$5 - 3t^2$	$-3t^2$	-3
(ii)	$1 + t + t^2 + t^3$	t	1
		t^2	1
		t^3	1
(iii)	$x + 2xy + 3y$	x	1
		$2xy$	2
		$3y$	3
(iv)	$100m + 1000n$	$100m$	100
		$1000n$	1000
(v)	$-p^2q^2 + 7pq$	$-p^2q^2$	-1
		$7pq$	7
(vi)	$1.2a + 0.8b$	$1.2a$	1.2
		$0.8b$	0.8
(vii)	$3.14r^2$	$3.14r^2$	3.14
(viii)	$2(l + b) = 2l + 2b$	$2l$	2
		$2b$	2
(ix)	$0.1y + 0.01y^2$	$0.1y$	0.1
		$0.01y^2$	0.01

Question 4:

(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 4:**(a)**

S.No.	Expression	Term with factor x	Coefficient of x
(i)	$y^2x + y$	y^2x	y^2
(ii)	$13y^2 - 8yx$	$-8yx$	$-8y$
(iii)	$x + y + 2$	x	1
(iv)	$5 + z + zx$	zx	z
(v)	$1 + x + xy$	x	1
		xy	y
(vi)	$12xy^2 + 25$	$12xy^2$	$12y^2$
(vii)	$7x + xy^2$	xy^2	y^2
		$7x$	7

(b)

S.No.	Expression	Term contains y^2	Coefficient of y^2
(i)	$8 - xy^2$	$-xy^2$	$-x$
(ii)	$5y^2 + 7x$	$5y^2$	5
(iii)	$2x^2y - 15xy^2 + 7y^2$	$-15xy^2$	$-15x$
		$7y^2$	7

Question 5:

Classify into monomials, binomials and trinomials:

(i) $4y - 7x$

(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 5:

S.No.	Expression	Type of Polynomial
(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)	$z^2 - 3z + 8$	Trinomial
(x)	$a^2 + b^2$	Binomial
(xi)	$z^2 + z$	Binomial
(xii)	$1 + x + x^2$	Trinomial

Question 6:

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 6:

S.No.	Pair of terms	Like / Unlike terms
(i)	1, 100	Like terms
(ii)	$-7x, \frac{5}{2}x$	Like terms
(iii)	$-29x, -29y$	Unlike terms
(iv)	$14xy, 42yx$	Like terms
(v)	$4m^2p, 4mp^2$	Unlike terms
(vi)	$12xz, 12x^2z^2$	Unlike terms

Question 7:

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 7:

(a) Like terms are:

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

(ii) $-4yx^2, 20x^2y$

(iii) $8x^2, -11x^2, -6x^2$

(iv) $7y, y$

(v) $-100x, 3x$

(vi) $-11yx, 2xy$

(b) Like terms are:

(i) $10pq, -7pq, 78pq$

(ii) $7p, 2405p$

(iii) $8q, -100q$

(iv) $-p^2q^2, 12p^2q^2$

(v) $-12, 41$

(vi) $-5p^2, 701p^2$

(vii) $13p^2q, qp^2$

Mathematics

(Chapter - 10) (Algebraic Expressions) (Exercise 10.2) (Class - VII)

Question 1:

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 1:

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

[Putting $m = 2$]

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

[Putting $m = 2$]

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

[Putting $m = 2$]

(iv) $3m^2 - 2m - 7 = 3(2)^2 - 2(2) - 7$
 $= 3 \times 4 - 2 \times 2 - 7$
 $= 12 - 4 - 7$
 $= 12 - 11 = 1$

[Putting $m = 2$]

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

[Putting $m = 2$]

Question 2:

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

(i) $4p + 7$

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

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

Answer 2:

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

[Putting $p = -2$]

(ii) $-3p^2 + 4p + 7 = -3(-2)^2 + 4(-2) + 7$
 $= -3 \times 4 - 8 + 7 = -12 - 8 + 7 = -20 + 7 = -13$

[Putting $p = -2$]

(iii) $-2p^3 - 3p^2 + 4p + 7 = -2(-2)^3 - 3(-2)^2 + 4(-2) + 7$
 $= -2 \times (-8) - 3 \times 4 - 8 + 7 = 16 - 12 - 8 + 7 = -20 + 23 = 3$

[Putting $p = -2$]

Question 3:

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 3:

(i) $2x - 7 = 2(-1) - 7$
 $= -2 - 7 = -9$

[Putting $x = -1$]

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

[Putting $x = -1$]

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

[Putting $x = -1$]

(iv) $2x^2 - x - 2 = 2(-1)^2 - (-1) - 2$
 $= 2 \times 1 + 1 - 2$
 $= 2 + 1 - 2$
 $= 3 - 2 = 1$

[Putting $x = -1$]

Question 4:

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 4:

(i) $a^2 + b^2 = (2)^2 + (-2)^2 = 4 + 4 = 8$

[Putting $a=2, b=-2$]

(ii) $a^2 + ab + b^2 = (2)^2 + (2)(-2) + (-2)^2$
 $= 4 - 4 + 4 = 4$

[Putting $a=2, b=-2$]

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

[Putting $a=2, b=-2$]

Question 5:

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 5:

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

[Putting $a=0, b=-1$]

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

[Putting $a=0, b=-1$]

(iii) $2a^2b + 2ab^2 + ab = 2(0)^2(-1) + 2(0)(-1)^2 + (0)(-1)$
 $= 0 + 0 + 0 = 0$

[Putting $a=0, b=-1$]

(iv) $a^2 + ab + 2 = (0)^2 + (0)(-1) + 2 = 0 + 0 + 2 = 2$

[Putting $a=0, b=-1$]

Question 6:

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 6:

(i) $x + 7 + 4(x - 5) = x + 7 + 4x - 20 = x + 4x + 7 - 20 = 5x - 13 = 5 \times 2 - 13$ [Putting $x=2$]
 $= 10 - 13 = -3$

(ii) $3(x + 2) + 5x - 7 = 3x + 6 + 5x - 7 = 3x + 5x + 6 - 7 = 8x - 1 = 8 \times 2 - 1$ [Putting $x=2$]
 $= 16 - 1 = 15$

(iii) $6x + 5(x - 2) = 6x + 5x - 10 = 11x - 10 = 11 \times 2 - 10 = 22 - 10 = 12$ [Putting $x=2$]

(iv) $4(2x - 1) + 3x + 11 = 8x - 4 + 3x + 11 = 8x + 3x - 4 + 11$
 $= 11x + 7 = 11 \times 2 + 7$ [Putting $x=2$]
 $= 22 + 7 = 29$

Question 7:

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

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

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

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

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

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

Answer 7:

$$\begin{aligned} \text{(i)} \quad 3x-5-x+9 &= 3x-x-5+9 = 2x+4 = 2 \times 3+4 \\ &= 6+4 = 10 \end{aligned}$$

[Putting $x=3$]

$$\begin{aligned} \text{(ii)} \quad 2-8x+4x+4 &= -8x+4x+2+4 = -4x+6 = -4 \times 3+6 \\ &= -12+6 = -12 \end{aligned}$$

[Putting $x=3$]

$$\begin{aligned} \text{(iii)} \quad 3a+5-8a+1 &= 3a-8a+5+1 = -5a+6 = -5(-1)+6 \\ &= 5+6 = 11 \end{aligned}$$

[Putting $a=-1$]

$$\begin{aligned} \text{(iv)} \quad 10-3b-4-5b &= -3b-5b+10-4 = -8b+6 = -8(-2)+6 \\ &= 16+6 = 22 \end{aligned}$$

[Putting $b=-2$]

$$\begin{aligned} \text{(v)} \quad 2a-2b-4-5+a &= 2a+a-2b-4-5 = 3a-2b-9 \\ &= 3(-1)-2(-2)-9 \\ &= -3+4-9 = -8 \end{aligned}$$

[Putting $a=-1, b=-2$]**Question 8:**

(i) If $z=10$, find the value of $z^3-3(z-10)$.

(ii) If $p=-10$, find the value of $p^2-2p-100$.

Answer 8:

$$\begin{aligned} \text{(i)} \quad z^3-3(z-10) &= (10)^3-3(10-10) \\ &= 1000-3 \times 0 = 1000-0 \\ &= 1000 \end{aligned}$$

[Putting $z=10$]

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

[Putting $p=-10$]**Question 9:**

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

Answer 9:

Given: $2x^2+x-a=5$

$\Rightarrow 2(0)^2+0-a=5$

[Putting $x=0$]

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

Hence, the value of a is -5 .**Question 10:**

Simplify the expression and find its value when $a=5$ and $b=-3$: $2(a^2+ab)+3-ab$

Answer 10:

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

$\Rightarrow 2a^2+2ab+3-ab$

$\Rightarrow 2a^2+2ab-ab+3$

$\Rightarrow 2a^2+ab+3$

$\Rightarrow 2(5)^2+(5)(-3)+3$

[Putting $a=5, b=-3$]

$\Rightarrow 2 \times 25 - 15 + 3$

$\Rightarrow 50 - 15 + 3 \Rightarrow 38$