

Chapter – 12

Algebraic Expressions

Exercise 12.3

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:

(i) $m - 2$

Put $m = 2$

$= 2 - 2$

$= 0$

(ii) $3m - 5$

Put $m = 2$

$= 3(2) - 5$

$= 6 - 5$

$= 1$

(iii) $9 - 5m$

Put $m = 2$

$= 9 - 5(2)$

$= 9 - 10$

$= -1$

(iv) $3m^2 - 2m - 7$

Put $m = 2$

$$= 3(2)^2 - 2(2) - 7$$

$$= 3(4) - 4 - 7$$

$$= 12 - 11$$

$$= 1$$

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

$$\text{Put } m = 2$$

$$= 5 - 4$$

$$= 1$$

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

$$(i) \quad 4p + 7$$

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

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

Answer:

$$(i) \quad 4p + 7$$

$$\text{Put } p = -2$$

$$= 4(-2) + 7$$

$$= -8 + 7$$

$$= -1$$

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

$$\text{Put } p = -2$$

$$= -3(-2)^2 + 4(-2) + 7$$

$$= -3(4) - 8 + 7$$

$$= -12 - 8 + 7$$

$$= -20 + 7$$

$$= -13$$

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

$$\text{Put } p = -2$$

$$= -2(-2)^3 - 3(-2)^2 + 4(-2) + 7$$

$$= -2(-8) - 3(4) - 8 + 7$$

$$= 16 - 12 - 8 + 7$$

$$= 4 - 1$$

$$= 3$$

3. Find the values of the following expressions when $x = -1$:

$$(i) 2x - 7$$

$$(ii) -x + 2$$

Answer:

$$(i) 2x - 7$$

$$\text{Put } x = -1$$

$$= 2(-1) - 7$$

$$= -2 - 7$$

$$= -9$$

$$(ii) -x + 2$$

$$\text{Put } x = -1$$

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

$$= 1 + 2$$

$$= 3$$

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

$$\text{Put } x = -1$$

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

$$= 1 - 2 + 1$$

$$= 2 - 2$$

$$= 0$$

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

$$\text{Put } x = -1$$

$$= 2(-1)^2 - (-1) - 2$$

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

$$= 2 + 1 - 2$$

$$= 3 - 2$$

$$= 1$$

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:

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

$$\text{Put } a = 2 \text{ and } b = -2$$

$$= 2^2 - (-2)^2$$

$$= 4 - 4$$

$$= 0$$

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

$$\text{Put } a = 2 \text{ and } b = -2$$

$$= (2)2 + 2(-2) + (-2)2$$

$$= 4 - 4 + 4$$

$$= 4$$

$$(iii) a^2 - b^2$$

we know that,

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

Put $a = 2$ and $b = -2$

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

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

$$a^2 - b^2 = 0 \cdot 4 = 0$$

$$a^2 - b^2 = 0$$

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

$$(i) \quad 2a + 2b$$

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

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

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

Answer:

$$(i) \quad 2a + 2b$$

Put $a = 0$ and $b = -1$

$$= 2(0) + 2(-1)$$

$$= 0 - 2$$

$$= -2$$

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

Put $a = 0$ and $b = -1$

$$= 2(0)2 + (-1)2 + 1$$

$$= 2(0) + 1 + 1$$

$$= 0 + 1 + 1$$

$$= 2$$

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

Put $a = 0$ and $b = -1$

$$= 2(0)2(-1) + 2(0)(-1)2 + 0(-1)$$

$$= 2(0)(-1) + 2(0)(1) + 0$$

$$= 0 + 0 + 0$$

$$= 0$$

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

Put $a = 0$ and $b = -1$

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

$$= 0 + 0 + 2$$

$$= 2$$

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:

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

Opening the brackets we get,

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

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

$$= 5x - 13$$

$$\text{Put } x = 2$$

$$= 5(2) - 13$$

$$= 10 - 13$$

$$= -3$$

$$\text{(ii)} 3(x+2) + 5x - 7$$

Opening the brackets we get,

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

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

$$= 8x - 1$$

$$\text{Put } x = 2$$

$$= 8^2 - 1$$

$$= 16 - 1$$

$$= 15$$

$$\text{(iii)} 6x + 5(x - 2)$$

Opening the brackets we get,

$$= 6x + 5x - 10$$

$$= 11x - 10$$

$$\text{Put } x = 2$$

$$= 11^2 - 10$$

$$= 22 - 10$$

$$= 12$$

$$\text{(iv)} 4(2x - 1) + 3x + 11$$

Opening the brackets we get,

$$= 8x - 4 + 3x + 11$$

$$= 8x + 3x - 4 + 11$$

$$= 11x + 7$$

$$\text{Put } x = 2$$

$$= 11^2 + 7$$

$$= 22 + 7$$

$$= 29$$

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:

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

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

$$= 2x - 5 + 9$$

$$= 2x + 4$$

$$\text{Put } x = 3$$

$$= 2(3) + 4$$

$$= 6 + 4$$

$$= 10 \text{ Ans.}$$

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

$$= -8x + 4x + 2 + 4$$

$$= -4x + 2 + 4$$

$$= -4x + 6$$

$$\text{Put } x = 3$$

$$= -4(3) + 6$$

$$= -12 + 6$$

$$= -6 \text{ Ans.}$$

$$\text{(iii) } 3a + 5 - 8a + 1$$

On rearranging the terms,

$$= 3a - 8a + 5 + 1$$

$$= -5a + 5 + 1$$

$$= -5a + 6$$

$$\text{Put } a = -1$$

$$= -5(-1) + 6$$

$$= 5 + 6$$

$$= 11 \text{ Ans.}$$

$$\text{(iv) } 10 - 3b - 4 - 5b$$

$$= 10 - 4 - 3b - 5b$$

$$= 6 - 3b - 5b$$

$$= 6 - 8b$$

$$\text{Put } b = -2$$

$$= 6 - 8(-2)$$

$$= 6 + 16$$

$$= 22 \text{ Ans.}$$

$$\text{(v) } 2a - 2b - 4 - 5 + a$$

On rearranging the terms,

$$= 2a + a - 2b - 4 - 5$$

$$= 3a - 2b - 4 - 5$$

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

Put $a = -1$ & $b = -2$

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

$$= -3 + 4 - 9$$

$$= -8 \text{ Ans.}$$

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

Answer:

$$z^3 - 3(z - 10)$$

$$\text{As } z = 10$$

$$z^3 - 3(z - 10)$$

$$= (10)^3 - 3(10 - 10)$$

$$= 1000 - 3(0)$$

$$= 1000 - 0$$

$$= 1000$$

9. If $p = -10$, find the value of $p^2 - 2p - 100$

Answer:

$$\text{As } p = -10$$

$$p^2 - 2p - 100$$

$$= (-10)^2 - 2(-10) - 100$$

$$= (-10)(-10) + 20 - 100$$

$$= 100 + 20 - 100$$

$$= 20$$

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

Answer:

$$\text{As } x = 0$$

And

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

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

$$2(0) - a = 5$$

$$0 - a = 5$$

$$-a = 5$$

$$a = -5$$

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

Answer:

To Simplify: $2(a^2 + ab) + 3 - ab$

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

Opening the brackets we get,

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

Taking like terms on one side we get,

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

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

Put $a = 5$ and $b = -3$

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

$$= 2(25) - 15 + 3$$

$$= 50 - 12$$

$$= 38$$