Algebraic Expressions: Exercise 12.3

Q.1 If $m = 2$, find the value of:
(i) $m - 2$ (ii) $3m - 5$ (iii) $9 - 5m$
(iv) $3m^2 - 2m - 7$ (v) $(5m/2) - 4$
Sol: Since, $m = 2$, we will substitute the value of m in expression.
(a) Given: $m - 2 = (2) - 2$
$= 0$

(b) Given: $3m - 5 = 3(2) - 5$
$= 6 - 5$
$= 1$

(c) Given: $9 - 5m = 9 - 5(2)$
$= 9 - 10$
$= -1$

(d) Given: $3m^2 - 2m - 7 = 3(2)^2 - 2(2) - 7$
$= 12 - 4 - 7$
$= 12 - 11$
$= 1$

(e) Given: $(5m/2) - 4 = \{(5 \times 2)/2\} - 4$
$= (10/2) - 4$
$= 5 - 4$
$= 1$

Q.2 If $p = -2$, find the value of:
(i) $4p + 7$ (ii) $-3p^2 + 4p + 7$ (iii) $-2p^3 - 3p^2 + 4p + 7$
Sol: Since, $p = -2$, we will substitute the value of p in expression.

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

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

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

Q.3 Find the value of the following expressions, when $x = -1$:
(i) $2x - 7$ (ii) $-x + 2$ (iii) $x^2 + 2x + 1$ (iv) $2x^2 - x - 2$
Sol:
Since, $x = -1$, we will substitute the value of x in expression.
(i) Given: $2x - 7 = 2(-1) - 7$
$= -2 - 7$
$= -9$

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

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

(iv) Given: $2x^2 - x - 2 = 2(-1)^2 - (-1) - 2$
$= 2 + 1 - 2$
$= 1$

Q.4 If $a = 2$, $b = -2$, find the value of:
(i) $a^2 + b^2$ (ii) $a^2 + ab + b^2$ (iii) $a^2 - b^2$
Sol: Since, $a = 2$ and $b = -2$ we will substitute the value of ***a*** and ***b*** in expression.

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

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

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

Q.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) $a^2 + ab + 2$
Sol: Since, $a = 0$ and $b = -1$ we will substitute the value of ***a*** and ***b*** in expression.

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

(ii) Given: $2a^2 + b^2 + 1 = 2(0)^2 + (-1)^2 + 1$
$= 0 + 1 + 1$
$= 2$

(iii) Given: $2a^2b + 2ab^2 + ab = 2(0)^2 \times (-1) + 2(0) \times (-1)^2 + (0) \times (-1)$
$= 0 + 0 + 0$
$= 0$

(iv) Given: $a^2 + ab + 2 = (0)^2 + (0) \times (-1) + 2$
$= 0 + 0 + 2$
$= 0$

Q.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) $4(2x - 1) + 3x + 11$

Sol:
(i) Given: $x + 7 + 4\,(x - 5)$

Firstly, we simplify the given expression,
$= x + 7 + 4x - 20$
$= 5x + 7 - 20$
Now, we substitute the value of x = 2 in the given expression.
$= (5 \times 2) + 7 - 20$
$= 10 + 7 - 20$
$= -3$

(ii) Given: $3\,(x + 2) + 5x - 7$
Firstly, we simplify the given expression,
$= 3x + 6 + 5x - 7$
$= 8x - 1$
Now, we substitute the value of x = 2 in the given expression.
$= (8 \times 2) - 1$
$= 16 - 1$
$= 15$

(iii) Given: $6x + 5\,(x - 2)$
Firstly, we simplify the given expression,
$= 6x + 5x - 10$
$= 11x - 10$
Now, we substitute the value of x = 2 in the given expression.
$= (11 \times 2) - 10$
$= 22 - 10$
$= 12$

(iv) Given: $4(2x - 1) + 3x + 11$
Firstly, we simplify the given expression,
$= 8x - 4 + 3x + 11$
$= 11x + 7$
Now, we substitute the value of x = 2 in the given expression.
$= (11 \times 2) + 7$
$= 22 + 7$
$= 29$

Q.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) $2a - 2b - 4 - 5 + a$**
Sol:
(i) Given: $3x - 5 - x + 9$
Firstly, we simplify the given expression,
$= 3x - x - 5 + 9$
$= 2x + 4$
Now, we substitute the value of $x = 3$ in the given expression.
$= (2 \times 3) + 4$
$= 6 + 4$
$= 10$

(ii) Given: $2 - 8x + 4x + 4$
Firstly, we simplify the given expression,
$= 2 + 4 - 8x + 4x$
$= 6 - 4x$
Now, we substitute the value of $x = 3$ in the given expression.

= 6 – (4 × 3)
= 6 – 12
= – 6

(iii) Given: $3a + 5 - 8a + 1$
Firstly, we simplify the given expression,
= 3a – 8a + 5 + 1
= – 5a + 6
Now, we substitute the value of $a = -1$ in the given expression.
= – {5 × (-1)} + 6
= – (-5) + 6
= 5 + 6
= 11

(iv) Given: $10 - 3b - 4 - 5b$
Firstly, we simplify the given expression,
10 – 4 – 3b – 5b
= 6 – 8b
Now, we substitute the value of $b = -2$ in the given expression.
= 6 – (8 × (-2))
= 6 + 16
= 22

(v) Given: $2a - 2b - 4 - 5 + a$
Firstly, we simplify the given expression,
= 2a + a – 2b – 4 – 5
= 3a – 2b – 9
Now, we substitute the values of $a = -1$ and $b = -2$ in the given expression.
= (3 × (-1)) – (2 × (-2)) – 9
= -3 – (-4) – 9
= – 3 + 4 – 9
= -12 + 4
= -8

Q.8 (i) If $z = 10$, find the value of $z^3 - 3(z - 10)$.
(ii) If $p = -10$, find the value of $p^2 - 2p - 100$.
Sol:
(i) Given: $z^3 - 3(z - 10)$
Firstly, we simplify the given expression,
$z^3 - 3z + 30$
Now, we substitute the values of $z = 10$ in the given expression.
$= (10)^3 - (3 \times 10) + 30$
= 1000 – 30 + 30
= 1000

(ii) Given: $p^2 - 2p - 100$.
Firstly, we simplify the given expression,
$p^2 - 2p - 100$
Now, we substitute the values of $p = -10$ in the given expression.
$= (-10)^2 - (2 \times (-10)) - 100$
= 100 + 20 – 100
= 20

Q.9 What should be the value of a if the value of $2x^2 + x - a$ equals to 5, when $x = 0$?

Sol: Since, $2x^2 + x - a$ equals to 5.

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

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

Now, we substitute the values of $x = 0$ in the given equation.

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

$a = 0 + 0 - 5$

$a = -5$

Thus, $a = -5$ when $x = 0$.

Q.10 Simplify the expression and find its value when $a = 5$ and $b = -3$.

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

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

Firstly, we simplify the given expression,

$2a^2 + ab + 3$

Now, we substitute the values of $a = 5$ and $b = -3$ in the given equation.

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

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

$= 50 - 15 + 3$

$= 38$