

EXERCISE 6.4

Find the following products:

1. $2a^3(3a + 5b)$

Solution:

Let us simplify the given expression

$$\begin{aligned} &2a^3(3a + 5b) \\ &(2a^3 \times 3a) + (2a^3 \times 5b) \\ &6a^{3+1} + 10a^3b \\ &6a^4 + 10a^3b \end{aligned}$$

2. $-11a(3a + 2b)$

Solution:

Let us simplify the given expression

$$\begin{aligned} &-11a(3a + 2b) \\ &(-11a \times 3a) + (-11a \times 2b) \\ &-33a^2 - 22ab \end{aligned}$$

3. $-5a(7a - 2b)$

Solution:

Let us simplify the given expression

$$\begin{aligned} &-5a(7a - 2b) \\ &(-5a \times 7a) - (-5a \times 2b) \\ &-35a^2 + 10ab \end{aligned}$$

4. $-11y^2(3y + 7)$

Solution:

Let us simplify the given expression

$$\begin{aligned} &-11y^2(3y + 7) \\ &(-11y^2 \times 3y) + (-11y^2 \times 7) \\ &-33y^3 - 77y^2 \end{aligned}$$

5. $6x/5(x^3 + y^3)$

Solution:

Let us simplify the given expression

$$\begin{aligned} &6/5x(x^3 + y^3) \\ &(6/5x \times x^3) + (6/5x \times y^3) \\ &6/5x^4 + 6/5xy^3 \end{aligned}$$

6. $xy(x^3 - y^3)$

Solution:

Let us simplify the given expression

$$\begin{aligned} & xy(x^3 - y^3) \\ & (xy \times x^3) - (xy \times y^3) \\ & x^4y - xy^4 \end{aligned}$$

7. $0.1y(0.1x^5 + 0.1y)$

Solution:

Let us simplify the given expression

$$\begin{aligned} & 0.1y(0.1x^5 + 0.1y) \\ & (0.1y \times 0.1x^5) + (0.1y \times 0.1y) \\ & 0.01x^5y + 0.01y^2 \end{aligned}$$

8. $(-7/4ab^2c - 6/25a^2c^2)(-50a^2b^2c^2)$

Solution:

Let us simplify the given expression

$$\begin{aligned} & (-7/4ab^2c - 6/25a^2c^2)(-50a^2b^2c^2) \\ & (-7/4ab^2c \times -50a^2b^2c^2) - (6/25a^2c^2 \times -50a^2b^2c^2) \\ & 350/4a^3b^4c^3 + 12a^4b^2c^4 \\ & 175/2a^3b^4c^3 + 12a^4b^2c^4 \end{aligned}$$

9. $-8/27xyz(3/2xyz^2 - 9/4xy^2z^3)$

Solution:

Let us simplify the given expression

$$\begin{aligned} & -8/27xyz(3/2xyz^2 - 9/4xy^2z^3) \\ & (-8/27xyz \times 3/2xyz^2) - (-8/27xyz \times 9/4xy^2z^3) \\ & -4/9x^2y^2z^3 + 2/3x^2y^3z^4 \end{aligned}$$

10. $-4/27xyz(9/2x^2yz - 3/4xyz^2)$

Solution:

Let us simplify the given expression

$$\begin{aligned} & -4/27xyz(9/2x^2yz - 3/4xyz^2) \\ & (-4/27xyz \times 9/2x^2yz) - (-4/27xyz \times 3/4xyz^2) \\ & -2/3x^3y^2z^2 + 1/9x^2y^2z^3 \end{aligned}$$

11. $1.5x(10x^2y - 100xy^2)$

Solution:

Let us simplify the given expression

$$1.5x (10x^2y - 100xy^2) \\ (1.5x \times 10x^2y) - (1.5x \times 100xy^2) \\ 15x^3y - 150x^2y^2$$

12. $4.1xy (1.1x - y)$

Solution:

Let us simplify the given expression

$$4.1xy (1.1x - y) \\ (4.1xy \times 1.1x) - (4.1xy \times y) \\ 4.51x^2y - 4.1xy^2$$

13. $250.5xy (xz + y/10)$

Solution:

Let us simplify the given expression

$$250.5xy (xz + y/10) \\ (250.5xy \times xz) + (250.5xy \times y/10) \\ 250.5x^2yz + 25.05xy^2$$

14. $7/5x^2y (3/5xy^2 + 2/5x)$

Solution:

Let us simplify the given expression

$$7/5x^2y (3/5xy^2 + 2/5x) \\ (7/5x^2y \times 3/5xy^2) + (7/5x^2y \times 2/5x) \\ 21/25x^3y^3 + 14/25x^3y$$

15. $4/3a (a^2 + b^2 - 3c^2)$

Solution:

Let us simplify the given expression

$$4/3a (a^2 + b^2 - 3c^2) \\ (4/3a \times a^2) + (4/3a \times b^2) - (4/3a \times 3c^2) \\ 4/3a^3 + 4/3ab^2 - 4ac^2$$

16. Find the product $24x^2 (1-2x)$ and evaluate its value for $x = 3$

Solution:

Let us simplify the given expression

$$24x^2 (1 - 2x) \\ (24x^2 \times 1) - (24x^2 \times 2x) \\ 24x^2 - 48x^3$$

Now let us evaluate the expression when $x = 3$



$$\begin{aligned} &24x^2 - 48x^3 \\ &24 \times (3)^2 - 48 \times (3)^3 \\ &24 \times (9) - 48 \times (27) \\ &216 - 1296 \\ &-1080 \end{aligned}$$

17. Find the product $-3y(xy+y^2)$ and evaluate its value for $x = 4$ and $y = 5$

Solution:

Let us simplify the given expression

$$\begin{aligned} &-3y(xy+y^2) \\ &(-3y \times xy) + (-3y \times y^2) \\ &-3xy^2 - 3y^3 \end{aligned}$$

Now let us evaluate the expression when $x = 4$ and $y = 5$

$$\begin{aligned} &-3xy^2 - 3y^3 \\ &-3 \times (4) \times (5)^2 - 3 \times (5)^3 \\ &-300 - 375 \\ &-675 \end{aligned}$$

18. Multiply $-3/2x^2y^3$ by $(2x-y)$ and verify the answer for $x = 1$ and $y = 2$

Solution:

Let us simplify the given expression

$$\begin{aligned} &-3/2x^2y^3 \text{ by } (2x-y) \\ &(-3/2x^2y^3 \times 2x) - (-3/2x^2y^3 \times y) \\ &-3x^3y^3 + 3/2x^2y^4 \end{aligned}$$

Now let us evaluate the expression when $x = 1$ and $y = 2$

$$\begin{aligned} &-3x^3y^3 + 3/2x^2y^4 \\ &-3 \times (1)^4 \times (2)^3 + 3/2 \times (1)^2 \times (2)^4 \\ &-3 \times (8) + 3(8) \\ &-24+24 \\ &0 \end{aligned}$$

19. Multiply the monomial by the binomial and find the value of each for $x = -1$, $y = 0.25$ and $z = 0.005$:

- (i) $15y^2(2 - 3x)$
- (ii) $-3x(y^2 + z^2)$
- (iii) $z^2(x - y)$
- (iv) $xz(x^2 + y^2)$

Solution:

(i) $15y^2(2 - 3x)$

Let us simplify the given expression

$$30y^2 - 45xy^2$$

By evaluating the values in the expression $x = -1$, $y = 25/100$ and $z = 5/1000$

$$30 \times (25/100)^2 - 45 \times (-1) \times (25/100)^2$$

$$30 (1/16) + 45 (1/16)$$

$$15/8 + 45/16$$

$$(30+45)/16$$

$$75/16$$

(ii) $-3x(y^2 + z^2)$

Let us simplify the given expression

$$-3xy^2 + -3xz^2$$

By evaluating the values in the expression $x = -1$, $y = 25/100$ and $z = 5/1000$

$$-3 \times (-1) \times (25/100)^2 - 3 \times (-1) \times (5/1000)^2$$

$$(3 \times 25 \times 25/100 \times 100) + (3 \times 5 \times 5/1000 \times 1000)$$

$$3/16 + 3/40000$$

$$39/200$$

(iii) $z^2(x - y)$

Let us simplify the given expression

$$z^2x - z^2y$$

By evaluating the values in the expression $x = -1$, $y = 25/100$ and $z = 5/1000$

$$z^2(x - y)$$

$$(5/1000)^2 (-1 - 25/100)$$

$$(1/40000) (-100 - 25/100)$$

$$(1/40000) (-125/100)$$

$$(1/40000) (-5/4)$$

$$-5/160000$$

$$-1/32000$$

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

Let us simplify the given expression

$$x^3z + xzy^2$$

By evaluating the values in the expression $x = -1$, $y = 25/100$ and $z = 5/1000$

$$x^3z + xzy^2$$

$$(-1)^3 \times (5/1000) + (-1) \times (5/1000) \times (25/100)^2$$

$$-1/200 - 1/16 \times 1/200$$

$$-1/200 - 1/3200$$

By taking LCM as 3200

$$(-16 - 1)/3200$$

$$-17/3200$$

20. Simplify:

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

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

(iii) $3a^2 + 2(a+2) - 3a(2a+1)$

(iv) $x(x+4) + 3x(2x^2 - 1) + 4x^2 + 4$

(v) $a(b-c) - b(c-a) - c(a-b)$

(vi) $a(b-c) + b(c-a) + c(a-b)$

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

(viii) $x^2(x^2 + 1) - x^3(x + 1) - x(x^3 - x)$

(ix) $2a^2 + 3a(1 - 2a^3) + a(a + 1)$

(x) $a^2(2a - 1) + 3a + a^3 - 8$

(xi) $3/2x^2(x^2 - 1) + 1/4x^2(x^2 + x) - 3/4x(x^3 - 1)$

(xii) $a^2b(a-b^2) + ab^2(4ab - 2a^2) - a^3b(1-2b)$

(xiii) $a^2b(a^3 - a + 1) - ab(a^4 - 2a^2 + 2a) - b(a^3 - a^2 - 1)$

Solution:

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

Let us simplify the given expression

$$2x^5 - 2x^3 - 3x^5 - 6x^2 - 2x^4 + 6x^2$$

By grouping similar expressions we get,

$$2x^5 - 3x^5 - 2x^3 - 2x^4 - 6x^2 + 6x^2$$

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

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

Let us simplify the given expression

$$x^5y - 2x^4y + 2x^4y - 2x^5y$$

By grouping similar expressions we get,

$$-x^5y - 2x^5y$$

$$-3x^5y$$

(iii) $3a^2 + 2(a+2) - 3a(2a+1)$

Let us simplify the given expression

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

By grouping similar expressions we get,

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

$$-3a^2 - a + 4$$

(iv) $x(x+4) + 3x(2x^2 - 1) + 4x^2 + 4$

Let us simplify the given expression

$$x^2 + 4x + 6x^3 - 3x + 4x^2 + 4$$

By grouping similar expressions we get,

$$6x^3 + 5x^2 + x + 4$$

(v) $a(b-c) - b(c-a) - c(a-b)$

Let us simplify the given expression

$$ab - ac - bc + ab - ca + bc$$

By grouping similar expressions we get,

$$2ab - 2ac$$

(vi) $a(b-c) + b(c-a) + c(a-b)$

Let us simplify the given expression

$$ab - ac + bc - ab + ac - bc$$

By grouping similar expressions we get,

$$0$$

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

Let us simplify the given expression

$$4a^2b - 4ab^2 - 6a^2b + 6a^2b^2 - 6a^2b^2 + 3ab^2 + 2ab^2 - 2a^2b$$

By grouping similar expressions we get,

$$4a^2b - 6a^2b - 2a^2b - 4ab^2 + 3ab^2 + 2ab^2 + 6a^2b^2 - 6a^2b^2 - 4a^2b + ab^2$$

(viii) $x^2(x^2 + 1) - x^3(x + 1) - x(x^3 - x)$

Let us simplify the given expression

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

By grouping similar expressions we get,

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

(ix) $2a^2 + 3a(1 - 2a^3) + a(a + 1)$

Let us simplify the given expression

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

By grouping similar expressions we get,

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

(x) $a^2(2a - 1) + 3a + a^3 - 8$

Let us simplify the given expression

$$2a^3 - a^2 + 3a + a^3 - 8$$

By grouping similar expressions we get,

$$3a^3 - a^2 + 3a - 8$$

(xi) $\frac{3}{2}x^2(x^2 - 1) + \frac{1}{4}x^2(x^2 + x) - \frac{3}{4}x(x^3 - 1)$

Let us simplify the given expression

$$\frac{3}{2}x^4 - \frac{3}{2}x^2 + \frac{1}{4}x^4 + \frac{1}{4}x^3 - \frac{3}{4}x^4 + \frac{3}{4}x$$

By grouping similar expressions we get,

$$\frac{3}{2}x^4 + \frac{1}{4}x^4 - \frac{3}{4}x^4 - \frac{3}{2}x^2 + \frac{1}{4}x^3 + \frac{3}{4}x$$

$$\frac{4}{4}x^4 + \frac{1}{4}x^3 - \frac{3}{2}x^2 + \frac{3}{4}x$$

$$x^4 + \frac{1}{4}x^3 - \frac{3}{2}x^2 + \frac{3}{4}x$$

(xii) $a^2b(a-b^2) + ab^2(4ab - 2a^2) - a^3b(1-2b)$

Let us simplify the given expression

$$a^3b - a^2b^3 + 4a^2b^3 - 2a^3b^2 - a^3b + 2a^3b^2$$

By grouping similar expressions we get,

$$-a^2b^3 + 4a^2b^3$$

$$3a^2b^3$$

(xiii) $a^2b(a^3 - a + 1) - ab(a^4 - 2a^2 + 2a) - b(a^3 - a^2 - 1)$

Let us simplify the given expression

$$a^5b - a^3b + a^2b - a^5b + 2a^3b - 2a^2b - ba^3 + a^2b + b$$

By grouping similar expressions we get,

$$a^5b - a^5b - a^3b + 2a^3b - ba^3 + a^2b - 2a^2b + a^2b + b$$

$$b$$