Exercise 6.4

Q.1 Find the following products (1-15)

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

Sol = $(2a^3 \times 3a) + (2a^3 \times 5b)$

$= 6a^4 + 10a^3b$

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

$= (-11a \times 3a) + (-11a \times 2b)$

$= -33a^2 - 22ab$

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

$= (-5a \times 7a) - (-5a \times 2b)$

$= -35a^2 + 10ab$

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

$= (-11y^2 \times 3y) + (-11y^2 \times 7)$

$= -33y^3 - 77y^2$

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⑤ $\frac{6x}{5}(x^3+y^3) = \frac{6x}{5} \times x^3 + \frac{6x}{5} \times y^3$

$= \frac{6}{5}x^4 + \frac{6}{5}xy^3$

⑥ $xy(x^3-y^3) = (xy \times x^3) - (xy \times y^3)$

$= x^4y - xy^4$

⑦ $0.1y(0.1x^5+0.1y) = (0.1y \times 0.1x^5) + (0.1y \times 0.1y)$

$= 0.01x^5y + 0.01y^2$

⑧ $\left(-\frac{7}{4}ab^2c - \frac{6}{25}a^2c^2\right)(-50a^2b^2c^2)$

$= \left(-\frac{7}{4}ab^2c \times -50a^2b^2c^2\right) + \left(\frac{-6}{25}a^2c^2 \times -50a^2b^2c^2\right)$

$= \frac{175}{2}a^3b^4c^3 + 12a^4b^2c^4$

⑨ $-\frac{8}{27}xyz\left(\frac{3}{2}xyz^2 - \frac{9}{4}xy^2z^3\right)$

$= \left(\frac{-8}{27}xyz \times \frac{3}{2}xyz^2\right) + \left(\frac{-8}{27}xyz \times \frac{-9}{4}xy^2z^3\right)$

$= -\frac{4}{9}x^2y^2z^3 + \frac{2}{3}x^2y^3z^4$

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(10) $-\frac{4}{27}xyz\left(\frac{9}{2}x^2yz-\frac{3}{4}xyz^2\right)$

$=\left(\frac{-4}{27}xyz\times\frac{9}{2}x^2yz\right)+\left(\frac{-4}{27}xyz\times\frac{-3}{4}xyz^2\right)$

$=\frac{-2}{3}x^3y^2z^2+\frac{1}{9}x^2y^2z^3$

(11) $1.5x\left(10x^2y-100xy^2\right)$

$=(1.5x\times10x^2y)-(1.5x\times100xy^2)$

$=15x^3y-150x^2y^2$

(12) $4.1xy\left(1.1x-y\right)$

$=(4.1xy\times1.1x)+(4.1xy\times-y)$

$=4.51x^2y-4.1xy^2$

(13) $250.5xy\left(xz+\frac{y}{10}\right)$

$=(250.5xy\times xz)+\left(250.5xy\times\frac{y}{10}\right)$

$=250.5x^4yz+25.05xy^2$

(14) $\frac{7}{5}x^2y\left(\frac{3}{5}xy^2+\frac{2}{5}x\right)$

$=\left(\frac{7}{5}x^2y\times\frac{3}{5}xy^2\right)+\left(\frac{7}{5}x^2y\times\frac{2}{5}x\right)$

$=\frac{21}{25}x^3y^3+\frac{14}{25}x^3y$

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(15) $\frac{4}{3}a(a^2+b^2-3c^2)$

$= \frac{4}{3}a \times a^2 + \frac{4}{3}a \times b^2 - \frac{4}{3}a \times 3c^2$

$= \frac{4}{3}a^3 + \frac{4}{3}ab^2 - 4ac^2$

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

Sol: $24x^2(1-2x) = (24x^2 \times 1) - (24x^2 \times 2x)$

$= 24x^2 - 48x^3$

LHS: Putting $x=3$

$24x^2(1-2x) = 24(3)^2\{1-2(3)\}$

$= 24 \times 9\ (1-6)$

$= 24 \times 9 \times -5 = -1080$

RHS: $24x^2 - 48x^3 = 24(3)^2 - 48(3)^3$

$= 24 \times 9 - 48 \times 27$

$= 216 - 1296$

$= -1080$

$\therefore$ LHS = RHS

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

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Sol: $-3y(xy+y^2) = (-3y \times xy) + (-3y \times y^2)$

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

LHS: Putting $x=4, y=5$

$-3y(xy+y^2) = (-3\times5)\{4\times5 + (5)^2\}$

$= -15[20+25] = -15 \times 45$

$= -675$

RHS $-3xy^2 - 3y^3 = -3\times4\times(5)^2 - 3(5)^3$

$= -3\times4\times25 - 3\times125$

$= -300 - 375 = -675$

$\therefore$ LHS = RHS

Q.18 Multiply $-\frac{3}{2}x^2y^3$ by $(2x-y)$ and verify the answers for $x=1$ and $y=2$

Solution: $-\frac{3}{2}x^2y^3 \times (2x-y) = (-\frac{3}{2}x^2y^3 \times 2x) + (-\frac{3}{2}x^2y^3 \times -y)$

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

LHS: Putting $x=1, y=2$

$-\frac{3}{2}(1)^2(2)^3\{2(1)-2\}$

$= \frac{-3}{2}\times8\times(2-2) = -12\times0$

$= 0$

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RHS : $-3x^3y^3 + \frac{3}{2}x^2y^4$

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

$= -3 \times 8 + \frac{3}{2} \times 16$

$= -24 + 24 = 0$

Q.19 : Multiply the monomial by the binomial and find the value of each for $x = -1, y = 0.25, z = 0.05$

(i) $15y^2(2-3x) = 15y^2 \times 2 - 15y^2 \times 3x$

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

putting values of x, y, z

$= 30(0.25)^2 - 45(-1)(0.25)$

$= \frac{30}{16} + \frac{45}{16} = \frac{30+45}{16} = \frac{75}{16}$

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

$= -3(-1)(0.25)^2 - 3(-1)(0.05)^2$

$= \frac{3}{16} + \frac{3}{40000} = \frac{39}{200}$

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

$= (0.05)^2(-1) - (0.05)^2(0.25)$

$= \left(\frac{1}{20}\right)^2 \times -1 - \left(\frac{1}{20}\right)^2 \times \frac{25}{100} = \frac{-1}{400} - \frac{1}{400} \times \frac{25}{100}$

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$= -\frac{1}{400} - \frac{1}{1600} =$

$= \frac{-4-1}{1600} = \frac{-5}{1600} = \frac{-1}{320}$

(iv) $xz(x^2+y^2) = xz \times x^2 + xz \times y^2$

$= x^3z + xy^2z$

$= (-1)^3 \times (0.05) + (-1)(0.25)^2 \times (0.05)$

$= -\frac{1}{20} + -\frac{1}{16} \times \frac{1}{20}$

$= -\frac{1}{20} - \frac{1}{320} = \frac{-16-1}{320} = \frac{-17}{320}.$

Q.20 Simplify

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

Solution: $2x^5 - 2x^3 - 3x^5 - (x^2 - 2x^4 + 6x^2$

Collecting like terms.

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

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

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

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

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

$= -x^5y$

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

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

$\Rightarrow (3a^2-6a^2)+(2a-3a)+4$

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

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

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

$= (x^2+4x^2)+6x^3+(4x-3x)+4$

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

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

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

$= (ab+ab)+(-ac-ac)+(-bc+bc)$

$= 2ab-2ac$

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

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

$= (ab-ab)+(bc-bc)+(ac-ac)$

$= 0+0+0$

$= 0$

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

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

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

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

$= -4a^2b + ab^2$

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

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

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

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

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

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

$= -6a^4 + (2a^2 + a^2) + (3a + a)$

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

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

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

$= (2a^3 + a^3) + (-a^2) + 3a - 8$

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

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

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

$=\left(\frac{3}{2}x^4+\frac{1}{4}x^4-\frac{3}{4}x^4\right)+\frac{1}{4}x^3+\left(-\frac{3}{2}x^2\right)+\frac{3}{4}x$

$=\left(\frac{6x^4+x^4-3x^4}{4}\right)+\frac{1}{4}x^3-\frac{3}{2}x^2+\frac{3}{4}x$

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

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

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

$=(a^3b-a^3b)+(-a^2b^3+4a^2b^3)+(-2a^3b^2+2a^3b^2)$

$=0+3a^2b^3+0=3a^2b^3$

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

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

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

$=0+0+0+b$

$=b$

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