5. Expansion Formulae

1. Simplify.

(i) $(2x + 7y)^3 + (2x - 7y)^3$

Solution : $(2x + 7y)^3 + (2x - 7y)^3$

$(a + b)^3 = a^3 + 3a^2b + 3ab^2 + b^3$

$(a - b)^3 = a^3 - 3a^2b + 3ab^2 - b^3$..... **[Formula]**

$= (2x)^3 + 3(2x)^2(7y) + 3(2x)(7y)^2 + (7y)^3 +$

$(2x)^3 - 3(2x)^2(7y) + 3(2x)(7y)^2 - (7y)^3$

$= 8x^3 + 21y \times 4x^2 + 6x \times 49y^2 + 343y^3 +$

$8x^3 - 21y \times 4x^2 + 6x \times 49y^2 - 343y^3$

$= 8x^2 + 84x^2y + 294xy^2 + 343y^3 + 8x^3 - 84x^2y$

$+ 294xy^2 - 343y^3$

$= 8x^3 + 8x^3 + 84x^2y - 84x^2y + 294xy^2 + 294xy^2$

$+ 343y^3 - 343y^3$

$= 16x^3 + 588xy^2$

(ii) $(5a + 6b)^3 - (5a - 6b)^3$

Solution : $(5a + 6b)^3 - (5a - 6b)^3$

$(a + b)^3 = a^3 + 3a^2b + 3ab^2 + b^3$

$(a - b)^3 = a^3 - 3a^2b + 3ab^2 - b^3$ ..... [Formula]

$= (5a)^3 + 3(5a)^2(6b) + 3(5a)(6b)^2 + (6b)^3 -$

$[(5a)^3 - 3(5a)^2(6b) + 3(5a)(6b)^2 - (6b)^3]$

$= 125a^3 - 18b \times 25a^2 + 15a \times 36b^2 + 216b^3 -$

$[125a^3 - 18b \times 25a^2 + 15a \times 36b^2 - 216b^3]$

$= \underline{125a^3} + \underline{450a^2b} + \underline{540ab^2} + 216b^3 - \underline{125a^3} +$

$\underline{450a^2b} - \underline{540ab^2} + 216b^3$

$= 125a^3 - 125a^3 + 450a^2b + 450a^2b + 540ab^2$

$-540ab^2 + 216b^3 + 216b^3$

$= 900a^2b + 432b^3$

(iii) $\left(\frac{m}{4} + \frac{n}{3}\right)^3 + \left(\frac{m}{4} - \frac{n}{3}\right)^3$

Solution : $\left(\frac{m}{4} + \frac{n}{3}\right)^3 + \left(\frac{m}{4} - \frac{n}{3}\right)^3$

$(a + b)^3 = a^3 + 3a^2b + 3ab^2 + b^3$ ..... [Formula]

$(a-b)^3 = a^3 - 3a^2b + 3ab^2 - b^3$ ..... [Formula]

$= \left(\frac{m}{4}\right)^3 + 3\left(\frac{m}{4}\right)^2\left(\frac{n}{3}\right) + 3\left(\frac{m}{4}\right)\left(\frac{n}{3}\right)^2 + \left(\frac{n}{3}\right)^3$

$+\left(\frac{m}{4}\right)^3 - 3\left(\frac{m}{4}\right)^2\left(\frac{n}{3}\right) + 3\left(\frac{m}{4}\right)\left(\frac{n}{3}\right)^2 - \left(\frac{n}{3}\right)^3$

$= \frac{m^3}{64} + 3 \times \frac{m^2}{16} \times \frac{n}{3} + 3 \times \frac{m}{4} \times \frac{n^2}{9} + \frac{n^3}{27} + \frac{m^3}{64} -$

$3 \times \frac{m^2}{16} \times \frac{n}{3} + 3 \times \frac{m}{4} \times \frac{n^2}{9} - \frac{n^3}{27}$

$= \frac{m^3}{64} + \frac{m^2n}{16} + \frac{mn^2}{12} + \frac{n^3}{27} + \frac{m^3}{64} - \frac{m^2n}{16} + \frac{mn^2}{12} - \frac{n^3}{27}$

$= \frac{m^3}{64} + \frac{m^3}{64} + \frac{m^2n}{16} - \frac{m^2n}{16} + \frac{mn^2}{12} + \frac{mn^2}{12} + \frac{n^3}{27} - \frac{n^3}{27}$

$= \frac{2m^3}{64} + \frac{2mn^2}{12}$

$= \frac{m^3}{32} + \frac{mn^2}{6}$

(iv) $\left(3p + \frac{1}{3p}\right)^3 - \left(3p - \frac{1}{3p}\right)^3$

Solution : $\left(3p + \frac{1}{3p}\right)^3 - \left(3p - \frac{1}{3p}\right)^3$

$(a+b)^3 = a^3 + 3a^2b + 3ab^2 + b^3$ ..... [Formula]

$(a-b)^3 = a^3 - 3a^2b + 3ab^2 - b^3$ ..... [Formula]

$= (3p)^3 + 3(3p)^2\left(\frac{1}{3p}\right) + 3(3p)\left(\frac{1}{3p}\right)^2 + \left(\frac{1}{3p}\right)^3$

$$-\left[(3p)^3 - 3(3p)^2\left(\frac{1}{3p}\right) + 3(3p)\left(\frac{1}{3p}\right)^2 - \left(\frac{1}{3p}\right)^3\right]$$

$$= 27p^3 + 3 \times 9p^2 \times \frac{1}{3p} + 9p \times \frac{1}{9p^2} + \frac{1}{27p^3}$$

$$- 27p^3 + 3 \times 9p^2 \times \frac{1}{3p} - 9p \times \frac{1}{9p^2} + \frac{1}{27p^3}$$

$$= 27p^3 + 9p + \frac{1}{p} + \frac{1}{27p^3} - 27p^3 + 9p - \frac{1}{p} + \frac{1}{27p^3}$$

$$= 27p^3 - 27p^3 + 9p + 9p + \frac{1}{p} - \frac{1}{p} + \frac{1}{27p^3} + \frac{1}{27p^3}$$

$$= 18p + \frac{2}{27p^3}$$

2. Simplify by using formulae.

(i) $(2a + 4b + 6)^2 + (2a - 4b + 6)^2$

Solution : $(2a + 4b + 6)^2 + (2a - 4b + 6)^2$

$(a + b + c)^2 = a^2 + b^2 + c^2 + 2ab + 2bc + 2ac$ **...[Formula]**

$$= [(2a)^2 + (4b)^2 + (6)^2 + 2 \times (2a) \times (4b) + 2 \times 4b \times 6 + 2 \times 2a \times 6] + [(2a)^2 + (-4b)^2 + (6)^2 + 2(2a)(-4b) + 2(-4b)(6) + 2(2a)(6)]$$

$$= 4a^2 + 16b^2 + 36 + 16ab + 48b + 24a + 4a^2 + 16b^2 + 36 - 16ab - 48b + 24a$$

$$= 4a^2 + 4a^2 + 16b^2 + 16b^2 + 36 + 36 + 16ab - 16ab + 48b - 48b + 24a + 24a$$

$$= 8a^2 + 32b^2 + 72 + 48a$$

(ii) $(6x - 5y - 4)^2 - (6x + 5y - 4)^2$

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

$(a + b + c)^2 = a^2 + b^2 + c^2 + 2ab + 2bc + 2ac$ **...[Formula]**

$$= [(6x)^2 + (-5y)^2 + (-4)^2 + 2(6x)(-5y) + 2(-5y)(-4) + 2(6x)(-4)] - [(6x)^2 + (5y)^2 + (4)^2 + 2(6x)(5y) + 2(5y)(-4) + 2(6x)(-4)]$$

$$= [36x^2 + 25y^2 + 16 - 60xy + 40y - 48x] - [36x^2 + 25y^2 + 16 + 60xy - 40y - 48x]$$

$$= \underline{36x^2 - 36x^2} + \underline{25y^2 - 25y^2} + \underline{16 - 16} - \underline{60xy - 60xy} + \underline{40y + 40y} - 48x + 48x$$

$$= -120xy + 80y$$

(iii) $(5x - 4y + 3z)^2 - (5x + 4y - 3z)^2$

Solution : $(5x - 4y + 3z)^2 - (5x + 4y - 3z)^2$

$(a + b + c)^2 = a^2 + b^2 + c^2 + 2ab + 2bc + 2ac$ **...[Formula]**

$$= [(5x)^2 + (-4y)^2 + (3z)^2 + 2(5x)(-4y) + 2(-4y)(3z) + 2(5x)(3z)] - [(5x)^2 + (4y)^2 + (-3z)^2 + 2(5x)(4y) + 2(4y)(-3z) + 2(5x)(-3z)]$$

$$= 25x^2 + 16y^2 + 9z^2 - 40xy - 24yz + 30xz - [25x^2 + 16y^2 + 9z^2 + 40xy - 24yz - 30xz]$$

$$= 25x^2 - 25x^2 + 16y^2 - 16y^2 + 9z^2 - 9z^2 - 40xy - 40xy - 24yz + 24yz + 30xz + 30xz$$

$$= -80xy + 30xz$$

(iv) $\left(\frac{1}{p} + \frac{1}{2q} + 3\right)^2 - \left(\frac{1}{p} + \frac{1}{2q} - 3\right)^2$

Solution : $\left(\frac{1}{p} + \frac{1}{2q} + 3\right)^2 - \left(\frac{1}{p} + \frac{1}{2q} - 3\right)^2$

$(a+b+c)^2 = a^2 + b^2 + c^2 + 2ab + 2bc + 2ac$ **...[Formula]**

$$= \left[\left(\frac{1}{p}\right)^2 + \left(\frac{1}{2q}\right)^2 + (3)^2 + 2 \times \left(\frac{1}{p}\right)\left(\frac{1}{2q}\right) + 2 \times \left(\frac{1}{2q}\right) \times 3 + 2 \times \left(\frac{1}{p}\right) \times 3\right] - \left[\left(\frac{1}{p}\right)^2 + \left(\frac{1}{2q}\right)^2 + (-3)^2 + 2 \times \left(\frac{1}{p}\right)\left(\frac{1}{2q}\right) + 2 \times \left(\frac{1}{2q}\right) \times (-3) + 2 \times \left(\frac{1}{p}\right)(-3)\right]$$

$$= \left[\frac{1}{p^2} + \frac{1}{4q^2} + 9 + \frac{1}{pq} + \frac{3}{q} + \frac{6}{p}\right]$$

$$- \left[\frac{1}{p^2} + \frac{1}{4q^2} + 9 + \frac{1}{pq} - \frac{3}{q} - \frac{6}{p}\right]$$

$$= \frac{1}{p^2} - \frac{1}{p^2} + \frac{1}{4q^2} - \frac{1}{4q^2} + 9 - 9 + \frac{1}{pq} - \frac{1}{pq} + \frac{3}{q} + \frac{3}{q} +$$

$$\frac{6}{p} + \frac{6}{p}$$

$$= \frac{6}{q} + \frac{12}{p}$$

3. Expand.

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

Solution : $(x - 2y - 3z)^2$

$$(a + b + c)^2 = a^2 + b^2 + c^2 + 2ab + 2bc + 2ac$$ **...[Formula]**

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

$$= x^2 + 4y^2 + 9z^2 - 4xy + 12yz - 6xz$$

(ii) $(3a - 7b + 5c)^2$

Solution : $(3a - 7b + 5c)^2$

$$(a + b + c)^2 = a^2 + b^2 + c^2 + 2ab + 2bc + 2ac$$ **...[Formula]**

$= (3a)^2 + (-7b)^2 + (5c)^2 + 2(3a)(-7b) +$

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

$= 9a^2 + 49b^2 + 25c^2 - 42ab - 70bc + 30ac$

(iii) $(6m + 5n - 4s)^2$

Solution : $(6m + 5n - 4s)^2$

$(a + b + c)^2 = a^2 + b^2 + c^2 + 2ab + 2bc + 2ac$ **...[Formula]**

$= (6m)^2 + (5n)^2 + (-4s)^2 + 2(6m)(5n)$

$+ 2(5n)(-4s) + 2(6m)(-4s)$

$= 36m^2 + 25n^2 + 16s^2 + 60mn - 40ns - 48ms$

(iv) $(3p + 4q + 5)^2$

Solution : $(3p + 4q + 5)^2$

$(a + b + c)^2 = a^2 + b^2 + c^2 + 2ab + 2bc + 2ac$ **...[Formula]**

$= (3p)^2 + (4q)^2 + (5)^2 + 2(3p)(4q) + 2(4q)(5) +$

$2(3p)(5)$

$= 9p^2 + 16q^2 + 25 + 24pq + 40q + 30p$

(v) $(2m - 3n - 6p)^2$

Solution : $(2m - 3n - 6p)^2$

$(a + b + c)^2 = a^2 + b^2 + c^2 + 2ab + 2bc + 2ac$ **...[Formula]**

$$= (2m)^2 + (-3n)^2 + (-6p)^2 + 2(2m)(-3n) + 2(-3n)(-6p) + 2(2m)(-6p)$$

$$= 4m^2 + 9n^2 + 36p^2 - 12mn + 36np - 24mp$$

(vi) $(7p - 5q + 6r)^2$

Solution : $(7p - 5q + 6r)^2$

$(a + b + c)^2 = a^2 + b^2 + c^2 + 2ab + 2bc + 2ac$ **...[Formula]**

$$= (7p)^2 + (5q)^2 + (6r)^2 + 2(7p)(-5q) + 2(-5q)(6r) + 2(7p)(6r)$$

$$= 49p^2 + 25q^2 + 36r^2 - 70pq - 60qr + 84pr$$

4. Expand by using formulae.

(i) $(m + 5)^3$

Solution : $(m + 5)^3$

$(a + b)^3 = a^3 + 3a^2b + 3ab^2 + b^3$ **.... [Formula]**

$$= m^3 + [3 \times (m)^2 \times 5] + [3 \times m \times (5)^2] + (5)^3$$

$$= m^3 + 15m^2 + 3m \times 25 + 125$$

$$= m^3 + 15m^2 + 75m + 125$$

(ii) $(32)^3$

Solution : $(32)^3$

$= (30 + 2)^3$

$(a + b)^3 = a^3 + 3a^2b + 3ab^2 + b^3$.... **[Formula]**

$= (30)^3 + [3 \times (30)^2 \times 2] + [3 \times 30 \times (2)^2] + (2)^3$

$= 27000 + [6 \times 900] + [90 \times 4] + 8$

$= 27000 + 5400 + 360 + 8$

$= 32768$

(iii) $\left(x + \frac{1}{2}\right)^3$

Solution : $\left(x + \frac{1}{2}\right)^3$

$(a + b)^3 = a^3 + 3a^2b + 3ab^2 + b^3$.... **[Formula]**

$= (x)^3 + \left[3 \times x^2 \times \frac{1}{2}\right] + \left[3 \times x \times \left(\frac{1}{2}\right)^2\right] + \left(\frac{1}{2}\right)^3$

$= x^3 + \frac{3x^2}{2} + \frac{3x}{4} + \frac{1}{8}$

(iv) $\left(\frac{4x}{3} + \frac{3}{2x}\right)^3$

Solution : $\left(\frac{4x}{3} + \frac{3}{2x}\right)^3$

$(a + b)^3 = a^3 + 3a^2b + 3ab^2 + b^3$.... [Formula]

$= \left(\frac{4x}{3}\right)^3 + \left[3 \times \left(\frac{4x}{3}\right)^2 \left(\frac{3}{2x}\right)\right] + \left[3 \times \left(\frac{4x}{3}\right) \left(\frac{3}{2x}\right)^2\right] + \left(\frac{3}{2x}\right)^3$

$= \frac{64x^3}{27} + \left[3 \times \frac{16x^2}{9} \times \frac{3}{2x}\right] + \left[3 \times \frac{4x}{3} \times \frac{9}{4x^2}\right] + \frac{27}{8x^3}$

$= \frac{64x^3}{27} + \frac{16x^2}{2x} + \frac{9}{x} + \frac{27}{8x^3}$

$= \frac{64x^3}{27} + 8x + \frac{9}{x} + \frac{27}{8x^3}$

(v) $(13 - x)^3$

Solution : $(13 - x)^3$

$(a - b)^3 = a^3 - 3a^2b + 3ab^2 - b^3$.... [Formula]

$= (13)^3 - [3 \times (13)^2 \times x] + [3 \times (13) \times x^2] - (x)^3$

$= 2197 - [3x \times 169] + 39x^2 - x^3$

$= 2197 - 507x + 39x^2 - x^3$

(vi) $(78)^3$

Solution : $(78)^3$

$= (80 - 2)^3$

$(a - b)^3 = a^3 - 3a^2b + 3ab^2 - b^3$.... [Formula]

$= (80)^3 - [3 \times (80)^2 \times (2)] + [3 \times 80 \times (2)^2] - (2)^3$

$= 512000 - [6 \times 6400] + [240 \times 4] - 8$

$= 512000 - 38400 + 960 - 8$

$= [512000 + 960] - [38400 + 8]$

$= 512960 - 38408$

$= 474,552$

(vii) $\left(5x - \frac{1}{5x}\right)^3$

Solution : $\left(5x - \frac{1}{5x}\right)^3$

$(a - b)^3 = a^3 - 3a^2b + 3ab^2 - b^3$.... **[Formula]**

$= (5x)^3 - \left[3 \times (5x)^2 \times \frac{1}{5x}\right] + \left[3 \times 5x \times \left(\frac{1}{5x}\right)^2\right] - \left(\frac{1}{5x}\right)^3$

$= 125x^3 - \left[3 \times 25x^2 \times \frac{1}{5x}\right] + \left[3 \times 5x \times \frac{1}{25x^2}\right] - \frac{1}{125x^3}$

$= 125x^3 - 15x + \frac{3}{5x} - \frac{1}{125x^3}$

(viii) $\left(\frac{3p}{5q} - \frac{5q}{3p}\right)^3$

Solution : $\left(\frac{3p}{5q} - \frac{5q}{3p}\right)^3$

$(a - b)^3 = a^3 - 3a^2b + 3ab^2 - b^3$.... **[Formula]**

$$= \left(\frac{3p}{5q}\right)^3 - \left[3 \times \left(\frac{3p}{5q}\right)^2 \times \left(\frac{5q}{3p}\right)\right] + \left[3 \left(\frac{3p}{5q}\right) \times \left(\frac{5q}{3p}\right)^2\right] - \left(\frac{5q}{3p}\right)^3$$

$$= \frac{27p^3}{125q^3} - \left[3 \times \frac{9p^2}{25q^2} \times \frac{5q}{3p}\right] + \left[3 \times \frac{3p}{5q} \times \frac{25q^2}{9p^2}\right] - \frac{125q^3}{27p^3}$$

$$= \frac{27p^3}{125q^3} - \frac{9p}{5q} + \frac{5q}{p} - \frac{125q^3}{27p^3}$$

5. Expand.

(i) $(q + 5)(q - 4)$

Solution : $(q + 5)(q - 4)$

$$= q^2 + (5 - 4)q + (5) \times (-4)$$

$$= q^2 + q - 20$$

(ii) $(3x + 6y)(3x - 4y)$

Solution : $(3x + 6y)(3x - 4y)$

$(x + a)(x + b) = x^2 + (a + b)x + ab$ .... [Formula]

$= (3x)^2 + [(6y) + (-4y)]\, 3x + [(6y) \times (-4y)]$

$= 9x^2 + 2y \times 3x - 24y^2$

$= 9x^2 + 6xy - 24y^2$

(iii) $(5a + 7b)\,(5a + 9b)$

Solution : $(5a + 7b)(5a + 9b)$

$(x + a)(x + b) = x^2 + (a + b)x + ab$ .... [Formula]

$= (5a)^2 + [7b + 9b]\, 5a + [(7b) \times (9b)]$

$= 25a^2 + 16b \times 5a + 63b^2$

$= 25a^2 + 80ab + 63b^2$

(iv) $(p - 5)\,(p - 7)$

Solution : $(p - 5)\,(p - 7)$

$(x + a)(x + b) = x^2 + (a + b)x + ab$ .... [Formula]

$= p^2 + [-5 - 7]\, p + [(-5) \times (-7)]$

$= p^2 - 12p + 35$

(v) $\left(a + \frac{1}{3}\right)\left(a - \frac{2}{3}\right)$

Solution : $\left(a + \frac{1}{3}\right)\left(a - \frac{2}{3}\right)$

$(x + a)(x + b) = x^2 + (a + b)x + ab$ .... [Formula]

$= a^2 + \left[\frac{1}{3} + \left(-\frac{2}{3}\right)\right] a + \left[\left(\frac{1}{3}\right) \times \left(-\frac{2}{3}\right)\right]$

$= a^2 + \left[\frac{1}{3} - \frac{2}{3}\right] a - \frac{2}{9}$

$= a^2 - \frac{1}{3} a - \frac{2}{9}$

(vi) $(11 + x)(11 - x)$

Solution : $(11 + x)(11 - x)$

$(x + a)(x + b) = x^2 + (a + b)x + ab$ .... [Formula]

$= (11)^2 + [x + (-x)] 11 + [x \times (-x)]$

$= 121 + [x - x] 11 - x^2$

$= 121 + 0 - x^2$

$= 121 - x^2$

6. Complete the following activity.

$\left(m + \frac{1}{m}\right)\left(m + \frac{1}{m}\right)$

$= m^2 + [\square + \square] m + \square \times \square$

$= m^2 + \square m + \square$

$= m^2 + \square + \square$

Solution : $\left(m+\frac{1}{m}\right)\left(m+\frac{1}{m}\right)$

$= m^2 + \left[\boxed{\frac{1}{m}} + \boxed{\frac{1}{m}}\right] m + \boxed{\frac{1}{m}} \times \boxed{\frac{1}{m}}$

$= m^2 + \boxed{\frac{2}{m}}\, m + \boxed{\frac{1}{m^2}}$

$= m^2 + \boxed{2} + \boxed{\frac{1}{m^2}}$

7. Complete the following activity.

$(2p + 3q)^3$

$= \square^3 + [3 \times \square \times \square] + [3 \times \square \times \square] + (3q)^3$

$= \square + [\square \times \square] + [\square \times \square] + 27q^3$

$= \square + \square + \square + 27q^3$

Solution : $(2p + 3q)^3$

$= \boxed{(2p)}^3 + \left[3 \times \boxed{(2p)^2} \times \boxed{3q}\right] + \left[3 \times \boxed{2p} \times \boxed{(3q)^2} + (3q)^3\right]$

$$= \boxed{8p^3} + \left[\boxed{9q} \times \boxed{4p^2}\right] + \left[\boxed{6p} \times \boxed{9q^2}\right] + 27q^3$$

$$= \boxed{8p^3} + \boxed{36p^2q} + \boxed{54pq^2} + 27q^3$$

8. Complete the following activity.

$$(6x + 7y + 8z)^2$$

$$= (6x)^2 + (7y)^2 + \square + 2 \times 6x \times 7y + 2 \times \square \times 8z +$$

$$2 \times \square \times \square$$

$$= \square + 49y^2 + \square + 84xy + \square + \square$$

Solution : $(6x + 7y + 8z)^2$

$$= (6x)^2 + (7y)^2 + \boxed{(8z)^2} + 2 \times 6x \times 7y +$$

$$2 \times \boxed{7y} \times 8z + 2 \times \boxed{6x} \times \boxed{8z}$$

$$= \boxed{36x^2} + 49y^2 + \boxed{64z^2} + 84xy + \boxed{112yz} + \boxed{96xz}$$

9. Write the following expansion true or false.

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

Ans : True

Explanation :

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

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

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

(2) $(x + 6)^3 = x^3 + 18x + 108x^2 + 216$

Ans : False

Explanation :

$(x + 6)^3$

$(a + b)^3 = a^3 + 3a^2b + 3ab^2 + b^3$ ..... **(Formula)**

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

$= x^3 + 18x^2 + 3x \times 36 + 216$

$= x^3 + 18x^2 + 108x + 216$

(3) $(4am - 3bn)^3 = 64a^3m^3 - 144ab^2m^2n - 108a^2bm^2n - 27b^3n^3$

Ans : False

Explanation :

$(4am - 3bn)^3$

$(a - b)^3 = a^3 - 3a^2b + 3ab^2 - b^3$ ..... **(Formula)**

$= (4am)^3 - 3 \times (4am)^2 \times (3bn) + 3(4am) \times (3bn)^2 - (3bn)^3$

$= 64a^3m^3 - 3 \times 16a^2m^2 \times 3bn + 12am \times 9b^2n^2 - 27b^3n^3$

$= 64a^3m^3 - 144a^2bm^2n + 108ab^2mn^2 - 27b^3n^3$

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

Ans : True

Explanation :

$(x^2 + y^2)^3$

$(a + b)^3 = a^3 + 3a^2b + 3ab^2 + b^3$ ..... **(Formula)**

$= (x^2)^3 + 3(x^2)^2(y^2) + 3(x^2)(y^2)^2 + (y^2)^3$

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

(5) $(2x + 3y)(2x + 5y) = 4x^2 + 16xy + 15y^2$

Ans : True

Explanation :

$(2x + 3y)(2x + 5y)$

$(x + a)(x + b) = x^2 + (a + b)x + ab$ ..... **(Formula)**

$= (2x)^2 + (3y + 5y) \times 2x + (3y) \times (5y)$

$= 4x^2 + 8y \times 2x + 15y^2$

$= 4x^2 + 16xy + 15y^2$

10. Match the following pairs.

Group 'A'	Group 'B'
(i) $(a + b)^3$	(a) $(a + b + c)^2$
(ii) $x^2 + (a + b)x + ab$	(b) $a^3 + b^3 + 3ab(a + b)$
(iii) $(a - b)^3$	(c) $(x + a)(x + b)$
(iv) $a^2 + b^2 + c^2 + 2ab + 2bc + 2ac$	(d) $a^3 - b^3 - 3ab(a - b)$

Ans :

Group 'A'	Group 'B'
(i) $(a+b)^3$	(b) $a^3+b^3+3ab(a+b)$
(ii) $x^2+(a+b)x+ab$	(c) $(x+a)(x+b)$
(iii) $(a-b)^3$	(d) $a^3-b^3-3ab(a-b)$
(iv) $a^2+b^2+c^2+2ab+2bc+2ac$	(a) $(a+b+c)^2$

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