Solution of few problems of Exercise - 2.5

A) i) $(x+2y+4z)^2$

$= (x)^2 + (2y)^2 + (4z)^2 + 2.x.2y + 2.2y.4z + 2.4z.x$

$\left[\because (x+y+z)^2 = x^2+y^2+z^2+2xy+2yz+2zx\right]$

$= x^2 + 4y^2 + 16z^2 + 4xy + 16yz + 8xz$

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iv) $(3a-7b-c)^2$

$= (3a)^2 + (-7b)^2 + (-c)^2 + 2.3a.(-7b) + 2.(-7b)(-c) + 2.(-c)3a$

$= 9a^2 + 49b^2 + c^2 - 42ab + 14bc - 6ac$

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vi) $\left[\frac{1}{4}a - \frac{1}{2}b + 1\right]^2$

$= \left(\frac{1}{4}a\right)^2 + \left(-\frac{1}{2}b\right)^2 + (1)^2 + 2.\frac{1}{4}a.\left(-\frac{1}{2}b\right) + 2.\left(-\frac{1}{2}b\right).1 + 2.1.\frac{1}{4}a$

$\left[\because (x+y+z)^2 = x^2+y^2+z^2+2xy+2yz+2zx\right]$

$= \frac{1}{16}a^2 + \frac{1}{4}b^2 + 1 - \frac{1}{4}ab - b + \frac{1}{2}a$

$= \frac{a^2}{16} + \frac{b^2}{4} + 1 - \frac{ab}{4} - b + \frac{a}{2}.$

5) ii) $2x^2+y^2+8z^2-2\sqrt{2}xy+4\sqrt{2}yz-8xz$

$=(-\sqrt{2}x)^2+(y)^2+(2\sqrt{2}z)^2+2(-\sqrt{2}x)y+2\cdot y\cdot(2\sqrt{2}z)+2\cdot(2\sqrt{2}z)\cdot(-\sqrt{2}x)$

[Expanding in the form $x^2+y^2+z^2+2xy+2yz+2zx$ as in $-2\sqrt{2}xy$ & $-8xy$, negative(-) sign is present and 'x' is common so '−' will go with 'x'

$=(-\sqrt{2}x+y+2\sqrt{2}z)^2$ $\left[\because x^2+y^2+z^2+2xy+2yz+2zx = (x+y+z)^2\right]$]

$=(-\sqrt{2}x+y+2\sqrt{2}z)(-\sqrt{2}x+y+2\sqrt{2}z)$ Ans

$=+(\sqrt{2}x-y-2\sqrt{2}z)(\sqrt{2}x-y-2\sqrt{2}z)$ Ans (Taking '+' common from both brackets)

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6) i) $(2x+1)^3$

$=(2x)^3+3\cdot(2x)^2\cdot 1+3\cdot 2x\cdot(1)^2+(1)^3$

$\left[\because (a+b)^3=a^3+3a^2b+3ab^2+b^3\right]$

$=8x^3+12x^2+6x+1$

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iv) $\left(x-\frac{2}{3}y\right)^3$

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

$\left[\because (a-b)^3=a^3-3a^2b+3ab^2-b^3\right]$

$=x^3-3\cdot x^2\cdot\frac{2}{3}y+3\cdot x\cdot\frac{4}{3}y-\frac{8}{27}y^3$

$=x^3-2x^2y+\frac{4}{3}xy-\frac{8}{27}y^3$

8) iii) $27 - 125a^3 - 135a + 225a^2$

$= (3)^3 - (5a)^3 - 3.(3)^2(5a) + 3.3.(5a)^2$

[Clearly $3^3 = 27$, $(5a)^3 = 125a^3$,
$3.9.5a = 135a$, $3.3.25 = 225$]

$= (3-5a)^3$ [$\because a^3 - b^3 - 3a^2b + 3ab^2 = (a-b)^3$]

$= (3-5a)(3-5a)(3-5a)$

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iv) $64a^3 - 27b^3 - 144a^2b + 108ab^2$

$= (4a)^3 - (3b)^3 - 3.(4a)^2.3b + 3.4a.(3b)^2$

[$(4a)^3 = 64a^3$, $(3b)^3 = 27b^3$, $3.16a^2.3b = 144a^2b$, $3.4a.9b^2 = 108ab^2$]

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

$= (4a-3b)(4a-3b)(4a-3b)$

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v) $27p^3 - \frac{1}{216} - \frac{9}{2}p^2 + \frac{1}{4}p$

$= (3p)^3 - \left(\frac{1}{6}\right)^3 - 3.(3p)^2.\frac{1}{6} + 3.3p.\left(\frac{1}{6}\right)^2$

[$\because (3p)^3 = 27p^3$, $\left(\frac{1}{6}\right)^3 = \frac{1}{216}$, $3.(3p)^2.\frac{1}{6} = \cancel{3}.9p^2.\frac{1}{\cancel{6}_2} = \frac{9p^2}{2}$

and $3.3p.\left(\frac{1}{6}\right)^2 = \cancel{3}.3p.\frac{1}{\cancel{36}_{12}} = \frac{p}{4}$]

$= \left(3p - \frac{1}{6}\right)^3$ [$\because a^3 - b^3 - 3a^2b + 3ab^2 = (a-b)^3$]

$= \left(3p - \frac{1}{6}\right)\left(3p - \frac{1}{6}\right)\left(3p - \frac{1}{6}\right)$

10) ii) $27y^3 + 125z^3$

$= (3y)^3 + (5z)^3$

$= (3y+5z)\{(3y)^2 - 3y.5z + (5z)^2\}$

$[\because a^3+b^3 = (a+b)(a^2-ab+b^2)]$

$= (3y+5z)(9y^2 - 15yz + 25z^2)$ Ans

ii) $64m^3 - 343n^3$

$= (4m)^3 - (7n)^3$

$= (4m-7n)\{(4m)^2 + 4m.7n + (7n)^2\}$ $[\because a^3-b^3 = (a-b)(a^2+ab+b^2)]$

$= (4m-7n)(16m^2 + 28mn + 49n^2)$ Ans

15) i) Area $= 25a^2 - 35a + 12$

$= 25a^2 - (15+20)a + 12$

$= 25a^2 - 15a - 20a + 12$

$= 5a(5a-3) - 4(5a-3)$

$= (5a-3)(5a-4)$

$25 \times 12 = 300$

$3 | 300$
$5 | 100$
$5 | 20$
$2 | 4$
2

$300 = 15 \times 20$

Now $15+20 = 35$

we know, Area = length × breadth

$= (5a-3) \times (5a-4)$

$\therefore$ Length $= (5a-3)$ and breadth $= (5a-4)$

Same type of remaining problems solved earlier in my vedio class.