

Exercise 2H

Question 1:

We know:

$$(a + b + c)^2 = a^2 + b^2 + c^2 + 2ab + 2bc + 2ca$$

(i)
$$(a + 2b + 5c)^2$$

$$= (a)^{2} + (2b)^{2} + (5c)^{2} + 2(a)(2b) + 2(2b)(5c) + 2(5c)(a)$$

$$= a^2 + 4b^2 + 25c^2 + 4ab + 20bc + 10ac$$

(ii)
$$(2a - b + c)^2$$

$$= (2a)^2 + (-b)^2 + (c)^2 + 2(2a)(-b) + 2(-b)(c) + 2(c)(2a)$$

$$= 4a^2 + b^2 + c^2 - 4ab - 2bc + 4ac.$$

(iii)
$$(a - 2b - 3c)^2$$

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

$$= a^2 + 4b^2 + 9c^2 - 4ab + 12bc - 6ac$$

Question 2:

We know:

$$(a + b + c)^2 = a^2 + b^2 + c^2 + 2ab + 2bc + 2ca$$

(i)
$$(2a - 5b - 7c)^2$$

=
$$(2\alpha)^2 + (-5b)^2 + (-7c)^2 + 2(2\alpha)(-5b) + 2(-5b)(-7c) + 2(-7c)(2\alpha)$$

$$= 4a^2 + 25b^2 + 49c^2 - 20ab + 70bc - 28ac.$$

(ii)
$$(-3a + 4b - 5c)^2$$

$$=(-3a)^2+(4b)^2+(-5c)^2+2(-3a)(4b)+2(4b)(-5c)+2(-5c)(-3a)$$

$$= 9a^2 + 16b^2 + 25c^2 - 24ab - 40bc + 30ac.$$

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

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

Question 3:

$$4x^2 + 9y^2 + 16z^2 + 12xy - 24yz - 16xz$$

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

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

********* END *******