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Exercise 19(B)

1. i) $3a + 4b + 7c$, $-5a + 3b + -6c$ and $4a - 2b - 4c$

$= (3a - 5a + 4a) + (4b + 3b - 2b) + (7c - 6c - 4c)$

$= (7a - 5a) + (7b - 2b) + (1c - 4c)$

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

ii) $(2x^2 + xy - y^2) + (-x^2 + 2xy + 3y^2) + (3x^2 - 10xy + 4y^2)$

$= 2x^2 + xy - y^2 - x^2 + 2xy + 3y^2 + 3x^2 - 10xy + 4y^2$

$= 2x^2 - x^2 + 3x^2 + xy + 2xy - 10xy - y^2 + 3y^2 + 4y^2$

$= 2x^2 + 3x^2 - x^2 + xy + 2xy - 10xy + 3y^2 + 4y^2 - y^2$

$= 4x^2 - 7xy + 6xy^2$

iii) $(x^2 - x + 1) + (-5x^2 + 2x - 2) + (3x^2 - 3x + 1)$

$= x^2 - x - 1 - 5x^2 + 2x - 2 + 3x^2 - 3x + 1$

$= x^2 - 5x^2 + 3x^2 - x + 2x - 3x - 1 - 2 + 1$

$= x^2 + 3x^2 - 5x^2 + 2x - x - 3x + 1 - 1 - 2$

$= -1x^2 - 2x - 2$

iv) $(a^2 - ab + bc) + (2ab + bc - 2a^2) + (-3bc + 3a^2 + ab)$

$= a^2 - ab + bc + 2ab + bc - 2a^2 - 3bc + 3a^2 + ab$

$= ab + 2ab + ab - bca - ab + a^2 - 2a^2 - 3bc + bc + bc - 3bc$

$= 2ab + ab - ab + a^2 - 2a^2 - 3a^2 + bc + bc - 3bc$

$= 2ab - 4a^2 - 1bc$

v) $(4x^2 + 7 - 3x) + (4x - x^2 + 8) + (-10 + 5x - 2x^2)$

$= 4x^2 + 7 - 3x + 4x - x^2 + 8 - 10 + 5x - 2x^2$

$= 4x^2 - x^2 - 2x^2 + 7 + 8 - 10 + 5x + 4x - 3x$

$= 1x^2 + 5 + 6x$

vi) $(3x + 4xy - y^2) + (xy - 4x + 2y^2) + (3y^2 - xy + 6x)$

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

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

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

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

2. i) $(-17x^2 - 2xy + 23y^2) + (-9y^2 + 15x^2 + 7xy) + (13x^2 + 3y^2 - 4xy)$

$= -17x^2 - 2xy + 23y^2 - 9y^2 + 15x^2 + 7xy + 13x^2 + 3y^2 - 4xy$

$= -17x^2 + 15x^2 + 13x^2 - 2xy + 7xy - 4xy + 23y^2 - 9y^2 + 3y^2$

$= 15x^2 + 13x^2 - 17x^2 + 7xy - 2xy - 4xy + 23y^2 + 3y^2 - 9y^2$

$= 11x^2 + 1xy + 17y^2$

ii) $(-x^2 - 3xy + 3y^2 + 8) + (3x^2 - 5y^2 - 3 + 4xy) + (-6xy + 2x^2 - 2 + y^2)$

$= -x^2 - 3xy + 3y^2 + 8 + 3x^2 - 5y^2 - 3 + 4xy - 6xy - 2x^2 - 2 + y^2$

$= -x^2 + 3x^2 - 2x^2 - 3xy + 4xy - 6xy + 3y^2 - 5y^2 + y^2 + 8 - 3 - 2$

$= 3x^2 - x^2 - 2x^2 + 4xy - 3xy - 6xy + 3y^2 + y^2 - 5y^2 + 8 - 3 - 2$

$= -5xy - 1y^2 + 3$

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

$= a^3 - 2b^3 + a + b^3 - 2a^3 + b - 2a + 2b^3 - 5a + 4a^3$

$= a^3 + 4a^3 - 2a^3 + 2b^3 + b^3 - 2b^3 + a - 5a + b - 2b$

$= 3a^3 + 1b^3 - 4a - 1b$

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

$= 3a - a - 2b$

$= 2a - 2b$

ii) $(5x-3y)-(x+y)$

$= 5x-3y-x-y$

$= 5x-x-3y-y$

$= 4x-2y$

iii) $(8a+15b)-(3b-7a)$

$= 8a+15b-3b+7a$

$= 8a+7a+15b-3b$

$= 15a+12b$

iv) $(8x+7y)-(4y-3x)$

$= 8x+7y-4y+3x$

$= 8x+3x+7y-4y$

$= 11x+3y$

v) $7-(4a-5)$

$= 7-4a+5$

$= 7+5-4a$

$= 12-4a$

vi) $(6y-13)-(4-7y)$

$= 6y-13-4+7y$

$= 6y+7y-13-4$

$= 13y-17$

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4. i) $5a-3b+2c$ from $a-4b-2c$

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

$= a-4b-2c-5a+3b-2c$

$= a-5a+3b-4b-2c-2c$

$= -4a-1b-4c$

iii) $5-a-4b+4c$ from $5a-7b+2c$

$= 5a-7b+2c - (5-a-4b+4c)$

$= 5a-7b+2c - 5+a+4b-4c$

$= 5a+a+4b-7b+2c-4c-5$

$= 6a-3b-2c-5$

iv) $-8x-12y+17z$ from $x-y-z$

$= x-y-z - (-8x-12y+17z)$

$= x-y-z+8x+12y-17z$

$= 8x+x+12y-y-17z-z$

$= 9x+11y-18z$

ii) $4x-6y+3z$ from $12x+7y-21z$

$= 12x+7y-21z - (4x-6y+3z)$

$= 12x+7y-21z-4x+6y-3z$

$= 12x-4x+7y+6y-21z-3z$

$= 8x+13y-24z$

5. i) $-ab + bc - ca$ from $bc - ca + ab$

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

$= bc - ca + ab + ab - bc + ca$

$= bc - bc + ca - ca + ab + ab$

$= 2ab$

ii) $5x + 6y - 3z$ from $3x + 5y - 4z$

$= 3x + 5y - 4z - (5x + 6y - 3z)$

$= 3x + 5y - 4z - 5x - 6y + 3z$

$= 3x - 5x + 5y - 6y + 3z - 4z$

$= -2x - 1y - 1z$

iii) $-\frac{3}{2}p + q - r$ from $\frac{1}{2}p - \frac{1}{3}q - \frac{3}{2}r$

$= \frac{1}{2}p - \frac{1}{3}q - \frac{3}{2}r - (-\frac{3}{2}p + q - r)$

$= \frac{1}{2}p - \frac{1}{3}q - \frac{3}{2}r + \frac{3}{2}p - q + r$

$= \frac{1}{2}p + \frac{3}{2}p - \frac{1}{3}q - q + r - \frac{3}{2}r$

$= \frac{4}{2}p - \left[\frac{3+1}{3}\right]q + \left[\frac{2-3}{2}\right]r$

$= 2p - \frac{4}{3}q - \frac{1}{2}r$

iv) $1-a+a^2$ from a^2+a+1

$= a^2+a+1 - (1-a+a^2)$

$= a^2+a+1 - 1+a-a^2$

$= a^2-a^2+a+a+1-1$

$= 2a$

6. Sum of $x+y-2z$ and $2x-y+z$

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

$= x+y-2z + 2x-y+z$

$= x+2x+y-y+z-2z$

$= 3x-1z$

Subtract $x+y+z$ from $3x-1z$

$= 3x-1z - (x+y+z)$

$= 3x-1z-x-y-z$

$= 3x-x-1z-z-y$

$= ~~2x-y~~ \; 2x-2z-y$

7. Sum of $3a-2b+4c$ and $3b-2c$

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

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

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

$=3a+1b+2c$

~~Difference~~

Subtract $a-b-c$ from $3a+1b+2c$

$=3a+1b+2c-(a-b-c)$

$=3a+1b+2c-a+b+c$

$=3a-a+1b+b+2c+c$

$=2a+2b+3c$

8. Sum of $3x-y+z$ and $x+y-3z$

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

$=3x-y+z+x+y-3z$

$=3x+x+y-y+z-3z$

$=4x-2z$

Subtract $x-2y-z$ from $4x-2z$

$= 4x-2z-(x-2y-z)$

$= 4x-2z-x+2y+z$

$= 4x-x+2z-2z+2y$

$= 3x-1z+2y$

9. Sum of $x+y$ and $x-z$

$= (x+y)+(x-z)$

$= x+y+x-z$

$= x+x+y-z$

$= 2x+y-z$

Sum of $x-2z$ and $x+y+z$

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

$= x-2z+x+y+z$

$= x+x+y+z-2z$

$= 2x+y-1z$

Subtract $2x+y-z$ from $2x+y-1z$

$= 2x+y-1z-(2x+y-z)$

$= 2x+y-1z-2x-y+z$

$= 2x-2x+y-y+z-1z$

$= 0$