

P.S.S.4

~~Expansion~~ Expansion 4

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

1) $(2p+q+5)^2$

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

Here, $a = 2p$, $b = q$, $c = 5$

$$(2p+q+5)^2 = (2p)^2 + q^2 + (5)^2 + 2 \times 2p \times q + 2 \times q \times 5 + 2 \times 2p \times 5$$

$$= 4p^2 + q^2 + 25 + 4pq + 10q + 20p$$

$$\therefore (2p+q+5)^2 = 4p^2 + q^2 + 25 + 4pq + 10q + 20p$$



$$2) (m + 2n + 3r)^2$$

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

$$\text{Here, } a = m, b = 2n, c = 3r$$

$$(m + 2n + 3r)^2 = m^2 + (2n)^2 + (3r)^2 + 2 \times m \times 2n + 2 \times 2n \times 3r + 2 \times m \times 3r$$

$$= m^2 + 4n^2 + 9r^2 + 4mn + 12nr + 6mr$$

$$\therefore (m + 2n + 3r)^2 = m^2 + 4n^2 + 9r^2 + 4mn + 12nr + 6mr$$

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

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

$$\text{Here, } a = 3x, b = 4y, c = -5p$$

$$(3x + 4y - 5p)^2 = (3x)^2 + (4y)^2 + (-5p)^2 + 2 \times 3x \times 4y + 2 \times 4y \times (-5p) + 2 \times 3x \times (-5p)$$

$$= 9x^2 + 16y^2 +$$



$$ab + 2bc + 2ac$$

$$3r$$

$$2 \times m \times n +$$

$$+ 12nr + 6mr$$

$$4mr + 12nr + 6mr$$

$$c + 2ac$$

$$= 8p \times 5p$$

$$^2 + 2 \times 3x \times 4y +$$

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

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

Here, $a = 3x$, $b = 4y$, $c = (-5p)$

$$(3x + 4y - 5p)^2 = (3x)^2 + (4y)^2 + (-5p)^2 + 2 \times 3x \times 4y + 2 \times 4y \times (-5p) + 2 \times 3x \times (-5p)$$

$$= 9x^2 + 16y^2 + 25p^2 + 24xy + (-40py) + (-30px)$$

$$= 9x^2 + 16y^2 + 25p^2 + 24xy - 40py - 30px$$

$$\therefore (3x + 4y - 5p)^2 = 9x^2 + 16y^2 + 25p^2 + 24xy - 40py - 30px$$



4) $(7m - 3n - 4k)^2$

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

Here,

$$a = 7m, b = (-3n), c = (-4k)$$

$$\begin{aligned} (7m - 3n - 4k)^2 &= (7m)^2 + (-3n)^2 + (-4k)^2 \\ &+ 2 \times 7m \times (-3n) + 2 \times (-3n) \times (-4k) + 2 \times 7m \times (-4k) \end{aligned}$$

$$= 49m^2 + 9n^2 + 16k^2 + (-42mn) + 24nk + (-56mk)$$

$$= 49m^2 + 9n^2 + 16k^2 - 42mn + 24nk - 56mk$$

$$\therefore (7m - 3n - 4k)^2 = 49m^2 + 9n^2 + 16k^2 - 42mn + 24nk - 56mk$$



Q2. Simplify

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

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

$$= x^2 + 4y^2 + 9 + (-4xy) + (6x) + (-12y) + x^2 + 4y^2 + 9 + (4xy) + (-6x) + (12y)$$

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

$$= 2x^2 + 8y^2 + 18 - 24y$$

$$\therefore (x-2y+3)^2 + (x+2y-3)^2 = 2x^2 + 8y^2 + 18 - 24y$$



$$2) (3k - 4r - 2m)^2 - (3k + 4r - 2m)^2$$

$$\text{Ans } E = E(3k)^2 + (-4r)^2 + (-2m)^2 + 2 \times 3k \times (-4r) + 2 \times (-4r) \times (-2m) + 2 \times 3k \times (-2m) \\ - [E(3k)^2 + (4r)^2 + (-2m)^2 + 2 \times 3k \times 4r + 2 \times 4r \times (-2m) + 2 \times 3k \times (-2m)]$$

$$= [9k^2 + 16r^2 + 4m^2 + (-24kr) + 16rm + (-12km)] - [9k^2 + 16r^2 + 4m^2 + 24kr + (-16rm) + (-12km)]$$

$$= 9k^2 + 16r^2 + 4m^2 - 24kr + 16rm - 12km - 9k^2 - 16r^2 - 4m^2 - 24kr + 16rm + 12km$$

$$= -24kr + 16rm - 24kr + 16rm$$

$$= -48kr + 32rm$$

$$\therefore (3k - 4r - 2m)^2 - (3k + 4r - 2m)^2 = -48kr + 32rm$$



6. Factorisation of Algebraic expressions

P.S.6.1

$$\begin{aligned} 1) \quad & x^2 + 9x + 18 \\ & x^2 + 6x + 3x + 18 \\ & x(x+6) + 3(x+6) \\ & (x+6)(x+3) \end{aligned}$$

$$\begin{array}{c} 18 \\ \swarrow \searrow \\ +6 \quad +3 \end{array}$$

$$\begin{aligned} 2) \quad & x^2 - 10x + 9 \\ & x^2 - 9x - x + 9 \\ & x(x-9) - 1(x-9) \\ & (x-9)(x-1) \end{aligned}$$

$$\begin{array}{c} 9 \\ \swarrow \searrow \\ +9 \quad -1 \end{array}$$

$$\begin{aligned} 3) \quad & y^2 + 24y + 144 \\ & y^2 + 12y + 12y + 144 \\ & y(y+12) + 12(y+12) \\ & (y+12)(y+12) \end{aligned}$$

$$\begin{array}{c} 144 \\ \swarrow \searrow \\ +12 \quad +12 \end{array}$$

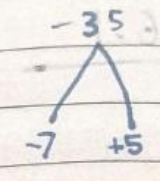
$$\begin{aligned} 4) \quad & 5y^2 + 5y - 10 \\ & 5y^2 + 10y - 5y - 10 \\ & 5y(y+2) - 5(y+2) \\ & (y+2)(5y-5) \end{aligned}$$

$$\begin{array}{c} 10 \quad -5 \\ \swarrow \searrow \\ +10 \quad -5 \end{array}$$

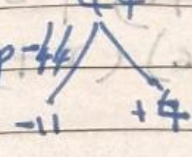
$$\begin{aligned} & (y+2) \cdot 5(y-1) \\ & 5(y+2)(y-1) \end{aligned}$$



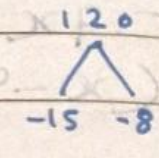
5) $p^2 - 2p - 35$
 $p^2 - 7p + 5p - 35$
 $p(p-7) + 5(p-7)$
 $(p-7)(p+5)$



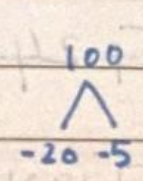
6) $p^2 - 7p - 44$
 ~~$p^2 - 11p + 4p - 44$~~
 $p(p-11) + 4(p-11)$
 $(p-11)(p+4)$



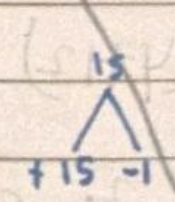
7) $m^2 - 23m + 120$
 $m^2 - 15m - 8m + 120$
 $m(m-15) - 8(m-15)$
 $(m-15)(m-8)$



8) $m^2 - 25m + 100$
 $m^2 - 20m - 5m + 100$
 $m(m-20) - 5(m-20)$
 $(m-20)(m-5)$



9) $3x^2 + 14x + 15$
 $3x^2 + 15x - 1x + 15$
 $3x(x+5) - 1(x+5)$



9) $3x^2 + 14x + 15$

$3x^2 + 9x + 5x + 15$

$3x(x+3) + 5(x+3)$

$(x+3)(3x+5)$

$\begin{array}{c} 45 \\ \swarrow \quad \searrow \\ 1 \quad +9 \quad +5 \end{array}$

10) $2x^2 + x - 45$

$2x^2 + 10x - 9x - 45$

$2x(x+5) - 9(x+5)$

$(x+5)(2x-9)$

$\begin{array}{c} -90 \\ \swarrow \quad \searrow \\ +10 \quad -9 \end{array}$

11) $20x^2 - 26x + 8$

$20x^2 - 16x - 10x + 8$

~~$20x(x+)$~~

$4x(5x-4) - 2(5x-4)$

$(5x-4)(4x-2)$

$(5x-4)2(2x-1)$

$2(5x-4)(2x-1)$

$\begin{array}{c} 160 \\ \swarrow \quad \searrow \\ -416 \quad -10 \end{array}$



12) $44x^2 - x - 3$ $21 + x + 11$ 132 (1)
 $44x^2 - 12x + 11x - 3$ $x^2 + x + 1$ 132
 $(11x - 3) + 1(11x - 3)$ $(x^2 + x + 1)$ 132
 $(11x - 3)(4x + 1)$ $(x^2 + x + 1)$

of - $21 + x + 11$ (01)
 $21 + x + 11$ 132
 $(2 + x)1 - (2 + x)x$ 132
 $(1 - x)(2 + x)$ 132

of $8 + x + 8$ (11)
 $8 + x + 8$ 132
 $(1 - x)(2 + x)$ 132

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