Exercise 6.7

Q.1 Find the following products

(i) $(x+4)(x+7)$ $\{\because (x+a)(x+b) = x^2+(a+b)x+ab\}$

$= x^2+(4+7)x+(4\times7)$

$= x^2+11x+28$

(ii) $(x-11)(x+4)$

$= (x+4)\{x+(-11)\}$

$= x^2+(4-11)x+(4\times-11)$

$= x^2-7x-44$

(iii) $(x+7)(x-5)$ $\{\because (x+a)(x+b) = x^2+(a+b)x+ab\}$

$= x^2+(7-5)x+(7\times-5)$

$= x^2+2x-35$

(iv) $(x-3)(x-2)$

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

$= x^2-5x+6$

$= \cancel{(x-3)(x}$

(v) $(y^2-4)(y^2-3)$

$= \{y^2+(-4)\}\{y^2+(-3)\}$

$= (y^2)^2+(-4-3)y^2+(-4\times-3) = y^4-7y^2+12$

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(vi) $\left(x+\frac{4}{3}\right)\left(x+\frac{3}{4}\right)$

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

$= x^2+\left(\frac{16+9}{12}\right)x+1$

$= x^2+\frac{25}{12}x+1$

(vii) $(3x+5)(3x+11)$

$\Rightarrow (3x)^2+(5+11)(3x)+(5\times11)$

$= 9x^2+48x+55$

(viii) $(2x^2-3)(2x^2+5)$

$\Rightarrow \{2x^2+(-3)\}\{2x^2+5\}$

$= (2x^2)^2+(-3+5)(2x^2)+(-3\times5)$

$= 4x^4+4x^2-15$

(ix) $(z^2+2)(z^2-3) = (z^2+2)\{z^2+(-3)\}$

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

$= z^4-z^2-6$

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(x) $(3x-4y)(2x-4y)$

$\Rightarrow (-4y+3x)(-4y+2x)$

$\because (x+a)(x+b) = x^2+(a+b)x+ab$

$\Rightarrow (-4y)^2+(3x+2x)(-4y)+(3x\times 2x)$

$= 16y^2-20xy+6x^2$

(xi) $(3x^2-4xy)(3x^2-3xy)$

$\Rightarrow \{3x^2+(-4xy)\}\{3x^2+(-3xy)\}$

$= (3x^2)^2+(-4xy-3xy)(3x^2)+(-4xy\,x-3xy)$

$= 9x^4-21x^3y+12x^2y^2$

(xii) $\left(x+\frac{1}{5}\right)(x+5)$

$\Rightarrow x^2+\left(\frac{1}{5}+5\right)x+\left(\frac{1}{5}\times 5\right)$

$= x^2+\left(\frac{1+25}{5}\right)x+1$

$= x^2+\frac{26}{5}x+1$

(xiii) $\left(x+\frac{3}{4}\right)\left(x+\frac{4}{3}\right)$

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

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$\Rightarrow x^2 + \left(\frac{9+16}{12}\right)x + 1$

$= x^2 + \frac{25}{12}x + 1$

(xiv) $(x^2+4)(x^2+9)$

$\Rightarrow (x^2)^2 + (4+9)x^2 + (4\times 9)$

$= x^4 + 13x^2 + 36$

(xv) $(y^2+12)(y^2+6)$

$\Rightarrow (y^2)^2 + (12+6)y^2 + (12\times 6)$

$= y^4 + 18y^2 + 72$

(xvi) $\left(y^2+\frac{5}{7}\right)\left(y^2-\frac{14}{5}\right)$

$= (y^2)^2 + \left(\frac{5}{7}-\frac{14}{5}\right) + \left(\frac{5}{7}\times\frac{-14}{5}\right)$

$= y^4 + \left(\frac{25-98}{35}\right)y^2 + (-2)$

$= y^2 + \left(\frac{-73}{35}\right)y^2 - 2 \quad = \quad y^2 - \frac{73}{35}y^2 - 2$

(xvii) $(p^2+16)\left(p^2-\frac{1}{4}\right)$

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

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$$\Rightarrow \quad (p^2)^2 + \left(16 - \frac{1}{4}\right) p^2 + \left(16 \times -\frac{1}{4}\right)$$

$$= \quad p^4 + \frac{63}{4} p^2 - 4$$

Q.2 Evaluate the following:

(i) $102 \times 106 = (100+2)(100+6)$

$\because (x+a)(x+b) = x^2 + (a+b)x + ab$

$= (100)^2 + (2+6)(100) + (2 \times 6)$

$= 10000 + 800 + 12 = 10812$

(ii) $109 \times 107 = (100+9)(100+7)$

$= (100)^2 + (9+7)(100) + (9 \times 7)$

$= 10000 + 1600 + 63$

$= 11663$

(iii) $35 \times 37 = (30+5)(30+7)$

$= (30)^2 + (5+7)(30) + (5 \times 7)$

$= 900 + 360 + 35$

$= 1295$

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