

Multiply

$$\begin{aligned} 1. (5x+3)(7x+2) &= 5x(7x+2) + 3(7x+2) \\ &= 35x^2 + 10x + 21x + 6 \\ &= 35x^2 + 31x + 6 \end{aligned}$$

$$\begin{aligned} 2. (2x+8)(x-3) &= 2x(x-3) + 8(x-3) \\ &= 2x^2 - 6x + 8x - 24 \\ &= 2x^2 + 2x - 24 \end{aligned}$$

$$\begin{aligned} 3. (7x+y)(x+5y) &= 7x(x+5y) + y(x+5y) \\ &= 7x^2 + 35xy + xy + 5y^2 \\ &= 7x^2 + 36xy + 5y^2 \end{aligned}$$

$$\begin{aligned} 4. (a-1)(0.1a^2+3) &= a(0.1a^2+3) - 1(0.1a^2+3) \\ &= 0.1a^3 + 3a - 0.1a^2 - 3 \\ &= 0.1a^3 - 0.1a^2 + 3a - 3 \end{aligned}$$

$$\begin{aligned} 5. (3x^2+y^2)(2x^2+3y^2) &= 3x^2(2x^2+3y^2) + y^2(2x^2+3y^2) \\ &= 6x^4 + 9x^2y^2 + 2x^2y^2 + 3y^4 \\ &= 6x^4 + 11x^2y^2 + 3y^4 \end{aligned}$$

$$\begin{aligned}
 \textcircled{6} \quad \left(\frac{3}{5}x + \frac{1}{2}y\right)\left(\frac{5}{6}x + 4y\right) &= \frac{3}{5}x\left(\frac{5}{6}x + 4y\right) + \frac{1}{2}y\left(\frac{5}{6}x + 4y\right) \\
 &= \left(\frac{3}{5}x \times \frac{5}{6}x\right) + \left(\frac{3}{5}x \times 4y\right) + \left(\frac{1}{2}y \times \frac{5}{6}x\right) \\
 &\quad + \left(\frac{1}{2}y \times 4y\right) \\
 &= \frac{1}{2}x^2 + \left(\frac{12}{5}xy + \frac{5}{12}xy\right) + 2y^2 \\
 &= \frac{1}{2}x^2 + \left(\frac{144xy + 25xy}{60}\right) + 2y^2 \\
 &= \frac{1}{2}x^2 + \frac{169}{60}xy + 2y^2
 \end{aligned}$$

$$\begin{aligned}
 \textcircled{7} \quad (x^6 - y^6)(x^2 + y^2) &= x^6(x^2 + y^2) - y^6(x^2 + y^2) \\
 &= x^8 + x^6y^2 - x^2y^6 - y^8
 \end{aligned}$$

$$\begin{aligned}
 \textcircled{8} \quad (x^2 + y^2)(3a + 2b) &= x^2(3a + 2b) + y^2(3a + 2b) \\
 &= 3ax^2 + 2bx^2 + 3ay^2 + 2by^2
 \end{aligned}$$

$$\textcircled{9} \quad [-3d + (-7f)] \text{ by } (5d + f)$$

$$\begin{aligned}
 \Rightarrow (-3d - 7f)(5d + f) &= -3d(5d + f) - 7f(5d + f) \\
 &= -15d^2 - 3df - 35df - 7f^2 \\
 &= -15d^2 - 38fd - 7f^2
 \end{aligned}$$

Q10. $(0.8a - 0.5b) \times (1.5a - 3b)$

$$= 0.8a(1.5a - 3b) - 0.5b(1.5a - 3b)$$

$$= 1.2a^2 - 2.4ab - 0.75ab + 1.5b^2$$

$$= 1.2a^2 - 3.15ab + 1.5b^2$$

$$\begin{aligned} \textcircled{11} \quad (2x^2y^2 - 5xy^2)(x^2 - y^2) &= 2x^2y^2(x^2 - y^2) - 5xy^2(x^2 - y^2) \\ &= 2x^4y^2 - 2x^2y^4 - 5x^3y^2 + 5xy^4 \end{aligned}$$

$$\begin{aligned} \textcircled{12} \quad \left(\frac{x}{7} + \frac{x^2}{2}\right)\left(\frac{2}{5} + \frac{9x}{4}\right) &= \frac{x}{7}\left(\frac{2}{5} + \frac{9x}{4}\right) + \frac{x^2}{2}\left(\frac{2}{5} + \frac{9x}{4}\right) \\ &= \frac{2x}{35} + \left(\frac{9}{28}x^2 + \frac{3}{5}x^2\right) + \frac{9}{8}x^3 \\ &= \frac{9}{8}x^3 + \left(\frac{45 + 28}{140}\right)x^2 + \frac{2x}{35} \\ &= \frac{9}{8}x^3 + \frac{73}{140}x^2 + \frac{2x}{35} \end{aligned}$$

$$\begin{aligned} \textcircled{13} \quad \left(-\frac{a}{7} + \frac{a^2}{9}\right)\left(\frac{b}{2} - \frac{b^2}{3}\right) &= -\frac{a}{7}\left(\frac{b}{2} - \frac{b^2}{3}\right) + \frac{a^2}{9}\left(\frac{b}{2} - \frac{b^2}{3}\right) \\ &= -\frac{1}{14}ab + \frac{1}{21}ab^2 + \frac{1}{18}a^2b - \frac{1}{27}a^2b^2 \end{aligned}$$

$$\begin{aligned} \textcircled{14} \quad (3x^2y - 5xy^2)\left(\frac{1}{5}x^2 + \frac{1}{3}y^2\right) \\ &= 3x^2y\left(\frac{1}{5}x^2 + \frac{1}{3}y^2\right) - 5xy^2\left(\frac{1}{5}x^2 + \frac{1}{3}y^2\right) \end{aligned}$$

$$= \frac{3}{5} x^4 y + x^2 y^3 - x^3 y^2 - \frac{5}{3} x y^4$$

$$\begin{aligned} \textcircled{15} \quad (2x^2-1)(4x^3+5x^2) &= 2x^2(4x^3+5x^2) - 1(4x^3+5x^2) \\ &= 8x^5 + 10x^4 - 4x^3 - 5x^2 \end{aligned}$$

$$\begin{aligned} \textcircled{16} \quad (2xy+3y^2)(3y^2-2) \\ &= 2xy(3y^2-2) + 3y^2(3y^2-2) \\ &= 6xy^3 - 4xy + 9y^4 - 6y^2 \end{aligned}$$

Find the following products and verify the result for $x=-1$, $y=2$

$$\begin{aligned} \textcircled{17} \quad (3x-5y)(x+y) &= 3x(x+y) - 5y(x+y) \\ &= 3x^2 + 3xy - 5xy - 5y^2 \\ &= 3x^2 - 2xy - 5y^2 \end{aligned}$$

Verification

LHS: Putting $x=-1$, $y=2$

$$\begin{aligned} (3x-5y)(x+y) &= \{3(-1) - 5(2)\}(-1+2) \\ &= (-3-10)(1) = -13 \end{aligned}$$

$$\begin{aligned} \text{RHS} \quad 3x^2 - 2xy - 5y^2 &= 3(-1)^2 - 2(-1)(2) - 5(2)^2 \\ &= 3 - 4 - 20 \\ &= -11 \end{aligned}$$

$$\therefore \text{LHS} = \text{RHS}$$

$$\begin{aligned}
 \textcircled{18} \quad (x^2y-1)(3-2x^2y) &= x^2y(3-2x^2y)-1(3-2x^2y) \\
 &= 3x^2y-2x^4y^2-3+2x^2y \\
 &= 5x^2y-2x^4y^2-3
 \end{aligned}$$

Verification: Putting $x=-1, y=-2$

$$\begin{aligned}
 \text{LHS} \\
 (x^2y-1)(3-2x^2y) &= [(-1)^2(-2)-1][3-2(-1)^2(-2)] \\
 &= (-2-1)(3-2(-2)) \\
 &= -3 \times 7 = -21
 \end{aligned}$$

$$\begin{aligned}
 \text{RHS} \quad 5x^2y-2x^4y^2-3 &= 5(-1)^2(-2)-2(-1)^4(-2)^2-3 \\
 &= -10-2(4)-3 \\
 &= -10-8-3 = -21
 \end{aligned}$$

$$\therefore \text{LHS} = \text{RHS}$$

$$\textcircled{19} \quad \left(\frac{1}{3}x - \frac{y^2}{5}\right)\left(\frac{1}{3}x + \frac{y^2}{5}\right)$$

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

$$\Rightarrow \left(\frac{1}{3}x\right)^2 - \left(\frac{y^2}{5}\right)^2$$

$$= \frac{x^2}{9} - \frac{y^4}{25}$$

Simplify

Q.20 $x^2(x+2y)(x-3y)$

Sol: $\{x^2(x+2y)\}(x-3y)$
 $= \{x^2 \times x + x^2 \times 2y\}(x-3y)$
 $= (x^3 + 2x^2y)(x-3y)$
 $= x^3(x-3y) + 2x^2y(x-3y)$
 $= x^4 - 3x^3y + 2x^3y - 6x^2y^2$
 $= x^4 - x^3y - 6x^2y^2$

Q.21 $(x^2-2y^2)(x+4y)x^2y^2$

Sol: $\{(x^2-2y^2)(x+4y)\}x^2y^2$
 $= \{x^2(x+4y) - 2y^2(x+4y)\}(x^2y^2)$
 $= \{x^3 + 4x^2y - 2xy^2 - 8y^3\}(x^2y^2)$
 $= x^5y^2 + 4x^4y^3 - 2x^3y^4 - 8x^2y^5$

Q.22 $a^2b^2(a+2b)(3a+b)$

Sol: $a^2b^2\{(a+2b)(3a+b)\}$
 $= a^2b^2\{a(3a+b) + 2b(3a+b)\}$
 $= a^2b^2\{3a^2 + ab + 6ab + 2b^2\}$
 $= a^2b^2(3a^2 + 7ab + 2b^2) = 3a^4b^2 + 7a^3b^3 + 2a^2b^4$

23 $x^2(x-y) y^2(x+2y)$

Sol: $x^2 y^2 (x-y)(x+2y)$ (By Associativity)

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

$$= x^2 y^2 \{ x^2 + 2xy - xy - 2y^2 \}$$

$$= x^2 y^2 (x^2 + xy - 2y^2)$$

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

24 ~~x^3~~ $(x^3 - 2x^2 + 5x - 7)(2x - 3)$

Sol: $x^3(2x-3) - 2x^2(2x-3) + 5x(2x-3) - 7(2x-3)$

$$= 2x^4 - 3x^3 - 4x^3 + 6x^2 + 10x^2 - 15x - 14x + 21$$

$$= 2x^4 + (-3x^3 - 4x^3) + (6x^2 + 10x^2) + (-15x - 14x) + 21$$

$$= 2x^4 - 7x^3 + 16x^2 - 29x + 21$$

25 $(5x+3)(x-1)(3x-2)$

Sol: $\{ (5x+3)(x-1) \} (3x-2)$

$$= \{ 5x(x-1) + 3(x-1) \} (3x-2)$$

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

$$= (5x^2 - 2x - 3) (3x-2)$$

$$= 5x^2(3x-2) - 2x(3x-2) - 3(3x-2)$$

$$= 15x^3 - 10x^2 - 6x^2 + 4x - 9x + 6$$

$$= 15x^3 - 16x^2 - 5x + 6$$

$$(26) (5-x)(6-5x)(2-x)$$

$$\text{Sol: } \{ (5-x)(6-5x) \} (2-x)$$

$$= \{ 5(6-5x) - x(6-5x) \} (2-x)$$

$$= (30 - 25x - 6x + 5x^2) (2-x)$$

$$= (5x^2 - 31x + 30) (2-x)$$

$$= 5x^2(2-x) - 31x(2-x) + 30(2-x)$$

$$= 10x^2 - 5x^3 - 62x + 31x^2 + 60 - 30x$$

$$= -5x^3 + (10x^2 + 31x^2) + (-62x - 30x) + 60$$

$$= -5x^3 + 41x^2 - 92x + 60$$

$$(27) (2x^2 + 3x - 5) (3x^2 - 5x + 4)$$

$$= 2x^2(3x^2 - 5x + 4) + 3x(3x^2 - 5x + 4) - 5(3x^2 - 5x + 4)$$

$$= 6x^4 - 10x^3 + 8x^2 + 9x^3 - 15x^2 + 12x - 15x^2 + 25x - 20$$

$$= 6x^4 + (-10x^3 + 9x^3) + (8x^2 - 15x^2 - 15x^2) + (12x + 25x) - 20$$

$$= 6x^4 - x^3 - 22x^2 + 37x - 20$$

$$28 (3x-2)(2x-3) + (5x-3)(x+1)$$

$$\text{Sol: } 3x(2x-3) - 2(2x-3) + 5x(x+1) - 3(x+1)$$

$$= 6x^2 - 9x - 4x + 6 + 5x^2 + 5x - 3x - 3$$

$$\Rightarrow (6x^2 + 5x^2) + (-9x - 4x + 5x + 3x) + (6 - 3)$$

$$= 11x^2 - 11x + 3$$

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$$\textcircled{29} (5x-3)(x+2) - (2x+5)(4x-3)$$

$$= 5x(x+2) - 3(x+2) - 2x(4x-3) - 5(4x-3)$$

$$= 5x^2 + 10x - 3x - 6 - 8x^2 + 6x - 20x + 15$$

$$= (5x^2 - 8x^2) + (10x - 3x + 6x - 20x) + (-6 + 15)$$

$$= -3x^2 - 7x + 9$$

$$\textcircled{30} (3x+2y)(4x+3y) - (2x-y)(7x-3y)$$

$$\text{Sol: } 3x(4x+3y) + 2y(4x+3y) - 2x(7x-3y) + y(7x-3y)$$

$$= 12x^2 + 9xy + 8xy + 6y^2 - 14x^2 + 6xy + 7xy - 3y^2$$

$$= (12x^2 - 14x^2) + (6y^2 - 3y^2) + (9xy + 8xy + 6xy + 7xy)$$

$$= -2x^2 + 3y^2 + 30xy$$

$$\textcircled{31} (x^2-3x+2)(5x-2) - (3x^2+4x-5)(2x-1)$$

$$\text{Sol: } x^2(5x-2) - 3x(5x-2) + 2(5x-2)$$

$$- 3x^2(2x-1) - 4x(2x-1) + 5(2x-1)$$

$$= 5x^3 - 2x^2 - 15x^2 + 6x + 10x - 4 - 6x^3 + 3x^2 - 8x^2 + 4x$$

$$+ 10x - 5$$

$$= (5x^3 - 6x^3) + (-2x^2 - 15x^2 + 3x^2 - 8x^2) + (6x + 10x + 4x + 10x) + (-4 - 5)$$

$$= -x^3 - 22x^2 + 20x - 9$$

Q.32 $(x^3 - 2x^2 + 3x - 4)(x - 1) - (2x - 3)(x^2 - x + 1)$

Sol: $\therefore (x^3 - 2x^2 + 3x - 4)(x - 1)$

$$= x^3(x - 1) - 2x^2(x - 1) + 3x(x - 1) - 4(x - 1)$$

$$= x^4 - x^3 - 2x^3 + 2x^2 + 3x^2 - 3x - 4x + 4$$

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

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

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

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

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

Now $(x^4 - 3x^3 + 5x^2 - 7x + 4) - (2x^3 - 5x^2 + 5x - 3)$

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

$$= x^4 + (-3x^3 - 2x^3) + (5x^2 + 5x^2) + (-7x - 5x) + (4 + 3)$$

$$= x^4 - 5x^3 + 10x^2 - 12x + 7$$