

Exercise 6 D

Find each of the following products.

Question 1.

Solution:

$$\begin{aligned}(5x + 7)(3x + 4) &= 5x(3x + 4) + 7(3x + 4) \\ &= 5x \times 3x + 5x \times 4 + 7 \times 3x + 7 \times 4 \\ &= 15x^2 + 20x + 21x + 28 \\ &= 15x^2 + 41x + 28\end{aligned}$$

Question 2.

Solution:

$$\begin{aligned}(4x - 3)(2x + 5) &= 4x(2x + 5) - 3(2x + 5) \\ &= 4x \times 2x + 4x \times 5 - 3 \times 2x - 3 \times 5 \\ &= 8x^2 + 20x - 6x - 15 \\ &= 8x^2 + 14x - 15\end{aligned}$$

Question 3.

Solution:

$$\begin{aligned}(x - 6)(4x + 9) &= x(4x + 9) - 6(4x + 9) \\ &= x \times 4x + x \times 9 - 6 \times 4x - 6 \times 9 \\ &= 4x^2 + 9x - 24x - 54 \\ &= 4x^2 - 15x - 54\end{aligned}$$

Question 4.

Solution:

$$\begin{aligned}(5y - 1)(3y - 8) &= 5y \times 3y - 5y \times 8 - 1 \times 3y - 8 \times (-1) \\ &= 15y^2 - 40y - 3y + 8 \\ &= 15y^2 - 43y + 8\end{aligned}$$

Question 5.

Solution:

$$\begin{aligned}(7x + 2y)(x + 4y) &= 7x(x + 4y) + 2y(x + 4y) \\ &= 7x \times x + 7x \times 4y + 2y \times x + 2y \times 4y \\ &= 7x^2 + 28xy + 2xy + 8y^2 \\ &= 7x^2 + 30xy + 8y^2\end{aligned}$$

Question 6.

Solution:

$$\begin{aligned}(9x + 5y)(4x + 3y) &= 9x(4x + 3y) + 5y(4x + 3y)\end{aligned}$$

$$\begin{aligned}
&= 9x \times 4x + 9x \times 3y + 5y \times 4x + 5y \times 3y \\
&= 36x^2 + 27xy + 20xy + 15y^2 \\
&= 36x^2 + 47xy + 15y^2
\end{aligned}$$

Question 7.

Solution:

$$\begin{aligned}
&(3m - 4n)(2m - 3n) \\
&= 3m(2m - 3n) - 4n(2m - 3n) \\
&= 3m \times 2m - 3m \times 3n - 4n \times 2m - 4n \times (-3n) \\
&= 6m^2 - 9mn - 8mn + 12n^2 \\
&= 6m^2 - 17mn + 12n^2
\end{aligned}$$

Question 8.

Solution:

$$\begin{aligned}
&(0.8x - 0.5y)(1.5x - 3y) \\
&= 0.8x(1.5x - 3y) - 0.5y(1.5x - 3y) \\
&= 0.8x \times 1.5x - 0.8x \times 3y - 0.5y \times 1.5x - 0.5y \times (-3y) \\
&= 1.20x^2 - 2.4xy - 0.75xy + 1.5y^2 \\
&= 1.2x^2 - 3.15xy + 1.5y^2
\end{aligned}$$

Question 9.

Solution:

$$\begin{aligned}
&\left(\frac{1}{5}x + 2y\right)\left(\frac{2}{3}x - y\right) \\
&= \frac{1}{5}x\left(\frac{2}{3}x - y\right) + 2y\left(\frac{2}{3}x - y\right) \\
&= \frac{1}{5}x \times \frac{2}{3}x - \frac{1}{5}x \times y + 2y \times \frac{2}{3}x - 2y \times y \\
&= \frac{2}{15}x^2 - \frac{1}{5}xy + \frac{4}{3}xy - 2y^2 \\
&= \frac{2}{15}x^2 + xy\left(\frac{-1}{5} + \frac{4}{3}\right) - 2y^2 \\
&= \frac{2}{15}x^2 + xy\left(\frac{-3 + 20}{15}\right) - 2y^2 \\
&= \frac{2}{15}x^2 + \frac{17}{15}xy - 2y^2
\end{aligned}$$

Question 10.

Solution:

$$\begin{aligned}& \left(\frac{2}{5}x - \frac{1}{2}y\right)(10x - 8y) \\&= \frac{2}{5}x(10x - 8y) - \frac{1}{2}y(10x - 8y) \\&= 4x^2 - \frac{16}{5}xy - 5xy + 4y^2 \\&= 4x^2 - xy\left(\frac{16}{5} + 5\right) + 4y^2 \\&= 4x^2 - xy\left(\frac{16 + 25}{5}\right) + 4y^2 \\&= 4x^2 - xy \times \frac{41}{5} + 4y^2 \\&= 4x^2 - \frac{41}{5}xy + 4y^2\end{aligned}$$

Question 11.

Solution:

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$$\begin{aligned}
& \left(\frac{3}{4}a + \frac{2}{3}b \right) (4a + 3b) \\
&= \frac{3}{4}a(4a + 3b) + \frac{2}{3}b(4a + 3b) \\
&= \frac{3}{4}a \times 4a + \frac{3}{4}a \times 3b + \frac{2}{3}b \times 4a + \frac{2}{3}b \times 3b \\
&= 3a^2 + \frac{9}{4}ab + \frac{8}{3}ab + 2b^2 \\
&= 3a^2 + ab \left(\frac{9}{4} + \frac{8}{3} \right) + 2b^2 \\
&= 3a^2 + ab \left(\frac{27 + 32}{12} \right) + 2b^2 \\
&= 3a^2 + ab \times \frac{59}{12} + 2b^2 \\
&= 3a^2 + \frac{59}{12}ab + 2b^2
\end{aligned}$$

Question 12.

Solution:

$$\begin{aligned}
& (x^2 - a^2)(x - a) \\
&= x^2(x - a) - a^2(x - a) \\
&= x^2 \times x - x^2 \times a - a^2 \times x - a^2(-a) \\
&= x^3 - x^2a - xa^2 + a^3
\end{aligned}$$

Question 13.

Solution:

$$\begin{aligned}
& (3p^2 + q^2)(2p^2 - 3q^2) \\
&= 3p^2(2p^2 - 3q^2) + q^2(2p^2 - 3q^2) \\
&= 3p^2 \times 2p^2 - 3p^2 \times 3q^2 + q^2 \times 2p^2 - q^2 \times 3q^2 \\
&= 6p^4 - 9p^2q^2 + 2p^2q^2 - 3q^4 \\
&= 6p^4 - 7p^2q^2 - 3q^4
\end{aligned}$$

Question 14.

Solution:

$$\begin{aligned}
& (2x^2 - 5y^2)(x^2 + 3y^2) \\
&= 2x^2(x^2 + 3y^2) - 5y^2(x^2 + 3y^2) \\
&= 2x^2 \times x^2 + 2x^2 \times 3y^2 - 5y^2 \times x^2 - 5y^2 \times 3y^2 \\
&= 2x^4 + 6x^2y^2 - 5x^2y^2 - 15y^4 \\
&= 2x^4 + x^2y^2 - 15y^4
\end{aligned}$$

Question 15.**Solution:**

$$\begin{aligned}
& (x^3 - y^3)(x^2 + y^2) \\
&= x^3(x^2 + y^2) - y^3(x^2 + y^2) \\
&= x^3 \times x^2 + x^3 \times y^2 - y^3 \times x^2 - y^3 \times y^2 \\
&= x^5 + x^3y^2 - x^2y^3 - y^5
\end{aligned}$$

Question 16.**Solution:**

$$\begin{aligned}
& (x^4 + y^4)(x^2 - y^2) \\
&= x^4(x^2 - y^2) + y^4(x^2 - y^2) \\
&= x^4 \times x^2 - x^4 \times y^2 + y^4 \times x^2 - y^4 \times y^2 \\
&= x^6 - x^4y^2 + x^2y^4 - y^6
\end{aligned}$$

Question 17.**Solution:**

$$\begin{aligned}
& \left(x^4 + \frac{1}{x^4}\right)\left(x + \frac{1}{x}\right) \\
&= x^4\left(x + \frac{1}{x}\right) + \frac{1}{x^4}\left(x + \frac{1}{x}\right) \\
&= x^4 \times x + x^4 \times \frac{1}{x} + \frac{1}{x^4} \times x + \frac{1}{x^4} \times \frac{1}{x} \\
&= x^5 + x^{4-1} + \frac{1}{x^{4-1}} + \frac{1}{x^{4+1}} \\
&= x^5 + x^3 + \frac{1}{x^3} + \frac{1}{x^5}
\end{aligned}$$

Question 18.**Solution:**

$$\begin{aligned}
& (x^2 - y^2)(x + 2y) \\
&= x^2(x + 2y) - y^2(x + 2y) \\
&= x^2 \times x + x^2 \times 2y - y^2 \times x - y^2 \times 2y \\
&= x^3 + 2x^2y - xy^2 - 2y^3
\end{aligned}$$

Question 19.**Solution:**

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

Question 20.**Solution:**

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

Question 21.**Solution:**

$$\begin{aligned}
& (x^2 - 3x + 7)(2x + 3) \\
&= x^2(2x + 3) - 3x(2x + 3) + 7(2x + 3) \\
&= x^2 \times 2x + x^2 \times 3 - 3x \times 2x - 3x \times 3 + 7 \times 2x + 7 \times 3 \\
&= 2x^3 + 3x^2 - 6x^2 - 9x + 14x + 21 \\
&= 2x^3 - 3x^2 + 5x + 21
\end{aligned}$$

Question 22.**Solution:**

$$\begin{aligned}
& (3x^2 + 5x - 9)(3x - 9) \\
&= 3x^2(3x - 9) + 5x(3x - 9) - 9(3x - 9) \\
&= 3x^2 \times 3x - 3x^2 \times 9 + 5x \times 3x + 5x \times (-9) - 9 \times 3x - 9 \times (-9) \\
&= 9x^3 - 27x^2 + 15x^2 - 45x - 27x + 81 \\
&= 9x^3 - 12x^2 - 72x + 81
\end{aligned}$$

Question 23.**Solution:**

$$\begin{aligned}
& (9x^2 - x + 15)(x^2 - 3) \\
&= 9x^2(x^2 - 3) - x(x^2 - 3) + 15(x^2 - 3) \\
&= 9x^2 \times x^2 - 9x^2 \times 3 - x \times x^2 + x \times 3 + 15 \times x^2 - 15 \times 3 \\
&= 9x^4 - 27x^2 - x^3 + 3x + 15x^2 - 45 \\
&= 9x^4 - x^3 - 12x^2 + 3x - 45
\end{aligned}$$

Question 24.**Solution:**

$$\begin{aligned}
& (x^2 + xy + y^2)(x - y) \\
&= x^2(x - y) + xy(x - y) + y^2(x - y) \\
&= x^2 \times x - x^2 \times y + xy \times x - xy \times y + y^2 \times x - y^2 \times y \\
&= x^3 - x^2y + x^2y - xy^2 + xy^2 - y^3 \\
&= x^3 - y^3
\end{aligned}$$

Question 25.**Solution:**

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

Question 26.**Solution:**

$$\begin{aligned}
& (x^2 - 5x + 8)(x^2 + 2) \\
&= x^2(x^2 + 2) - 5x(x^2 + 2) + 8(x^2 + 2) \\
&= x^2 \times x^2 + x^2 \times 2 - 5x \times x^2 - 5x \times 2 + 8 \times x^2 + 8 \times 2 \\
&= x^4 + 2x^2 - 5x^3 - 10x + 8x^2 + 16 \\
&= x^4 - 5x^3 + 2x^2 + 8x^2 - 10x + 16 \\
&= x^4 - 5x^3 + 10x^2 - 10x + 16
\end{aligned}$$

Simplify:**Question 27.****Solution:**

$$\begin{aligned}
& (3x + 4)(2x - 3) + (5x - 4)(x + 2) \\
&= [3x(2x - 3) + 4(2x - 3)] + [5x(x + 2) - 4(x + 2)] \\
&= [3x \times 2x - 3x \times 3 + 4 \times 2x - 4 \times 3] + [5x \times x + 5x \times 2 - 4 \times x - 4 \times 2] \\
&= [6x^2 - 9x + 8x - 12] + [5x^2 + 10x - 4x - 8] \\
&= (6x^2 - x - 12) + (5x^2 + 6x - 8) \\
&= 6x^2 - x - 12 + 5x^2 + 6x - 8 \\
&= 6x^2 + 5x^2 - x + 6x - 12 - 8 \\
&= 11x^2 + 5x - 20
\end{aligned}$$

Question 28.**Solution:**

$$\begin{aligned}
& (5x - 3)(x + 4) - (2x + 5)(3x - 4) \\
&= [5x \times x + 5x \times 4 - 3 \times x - 3 \times 4] - [2x \times 3x + 2x \times (-4) + 5 \times 3x + 5 \times (-4)] \\
&= [5x^2 + 20x - 3x - 12] - [6x^2 - 8x + 15x - 20] \\
&= (5x^2 + 17x - 12) - (6x^2 + 7x - 20) \\
&= 5x^2 + 17x - 12 - 6x^2 - 7x + 20 \\
&= 5x^2 - 6x^2 + 17x - 7x - 12 + 20 \\
&= -x^2 + 10x + 8
\end{aligned}$$

Question 29.**Solution:**

$$\begin{aligned}
& (9x - 7)(2x - 5) - (3x - 8)(5x - 3) \\
&= [9x(2x - 5) - 7(2x - 5)] - [3x(5x - 3) - 8(5x - 3)] \\
&= [9x \times 2x - 9x \times 5 - 7 \times 2x - 7 \times (-5)] - [3x \times 5x - 3x \times 3 - 8 \times 5x - 8 \times (-3)] \\
&= [18x^2 - 45x - 14x + 35] - [15x^2 - 9x - 40x + 24] \\
&= 18x^2 - 45x - 14x + 35 - 15x^2 + 9x + 40x - 24 \\
&= 18x^2 - 15x^2 - 45x - 14x + 9x + 40x + 35 - 24 \\
&= 3x^2 - 59x + 49x + 11 \\
&= 3x^2 - 10x + 11
\end{aligned}$$

Question 30.**Solution:**

$$\begin{aligned}
& (2x + 5y)(3x + 4y) - (7x + 3y)(2x + y) \\
&= [2x(3x + 4y) + 5y(3x + 4y)] - [7x(2x + y) + 3y(2x + y)] \\
&= [2x \times 3x + 2x \times 4y + 5y \times 3x + 5y \times 4y] - [7x \times 2x + 7x \times y + 3y \times 2x + 3y \times y]
\end{aligned}$$

$$\begin{aligned}
&= [6x^2 + 8xy + 15xy + 20y^2] - [14x^2 + 7xy + 6xy + 3y^2] \\
&= [6x^2 + 23xy + 20y^2] - [14x^2 + 13xy + 3y^2] \\
&= 6x^2 + 23xy + 20y^2 - 14x^2 - 13xy - 3y^2 \\
&= 6x^2 - 14x^2 + 23xy - 13xy + 20y^2 - 3y^2 \\
&= -8x^2 + 10xy + 11y^2
\end{aligned}$$

Question 31.

Solution:

$$\begin{aligned}
&(3x^2 + 5x - 7)(x - 1) - (x^2 - 2x + 3)(x + 4) \\
&= [3x^2(x - 1) + 5x(x - 1) - 7(x - 1)] - [x^2(x + 4) - 2x(x + 4) + 3(x + 4)] \\
&= [3x^2 \times x - 3x^2 \times 1 + 5x \times x - 5x \times (-1) - 7 \times x - 7 \times (-1)] - [x^2 \times x + x^2 \times 4 - 2x \times x - 2x \times 4 \\
&\quad + 3 \times x + 3 \times 4] \\
&= [3x^3 - 3x^2 + 5x^2 - 5x - 7x + 7] - [x^3 + 4x^2 - 2x^2 - 8x + 3x + 12] \\
&= [3x^3 + 2x^2 - 12x + 7] - [x^3 + 2x^2 - 5x + 12] \\
&= 3x^3 + 2x^2 - 12x + 7 - x^3 - 2x^2 + 5x - 12 \\
&= 3x^3 - x^3 + 2x^2 - 2x^2 - 12x + 5x - 12 + 7 \\
&= 2x^3 - 7x - 5
\end{aligned}$$

