

التمرين الأول

$$\begin{aligned} L &= 8y(2x-3) - 4x + 6 \\ &= 8y(2x-3) - 2(2x-3) \\ &= (2x-3)(8y-2) \\ M &= x^3 + x^2 + x + 1 \\ &= x^3 + x^2 + (x+1) \\ &= x^2(x+1) + 1 \times (x+1) \\ &= (x+1)(x^2+1) \end{aligned}$$

التمرين الثالث

I. لننشر و لنبسط ما يلي :

$$\begin{aligned} X &= (4x+5y)^2 \\ &= (4x)^2 + 2(4x)(5y) + (5y)^2 \\ &= 16x^2 + 40xy + 25y^2 \end{aligned}$$

$$\begin{aligned} Y &= \left(3x - \frac{y}{2}\right)^2 \\ &= (3x)^2 - 2(3x)\left(\frac{y}{2}\right) + \left(\frac{y}{2}\right)^2 \\ &= 9x^2 - 3xy + \frac{y^2}{4} \end{aligned}$$

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

II. لنعتبر العدد A بحيث $A = (3x+7y)^2 - (3x-7y)^2$

1. لننشر ونبسط A

الطريقة الأولى :

$$\begin{aligned} A &= (3x+7y)^2 - (3x-7y)^2 \\ A &= (3x)^2 + 2(3x)(7y) + (7y)^2 - ((3x)^2 - 2(3x)(7y) + (7y)^2) \\ A &= 9x^2 + 42xy + 49y^2 - 9x^2 + 42xy - 49y^2 \\ A &= 84xy \end{aligned}$$

الطريقة الثانية : لتبسط العدد A نستعمل المتطابقة :

$a^2 - b^2 = (a-b)(a+b)$ بحيث $a = 3x+7y$ و $b = 3x-7y$ إذن :

$$\begin{aligned} A &= (3x+7y)^2 - (3x-7y)^2 \\ A &= (3x+7y - (3x-7y))(3x+7y + (3x-7y)) \\ A &= (3x+7y - 3x+7y)(3x+7y + 3x-7y) \\ A &= 14y \times 6x \\ A &= 84xy \end{aligned}$$

$$A = 4(x+2) = 4 \times x + 4 \times 2 = 4x + 8$$

$$B = 5\left(\frac{x}{3} - \frac{7}{10}\right) = \frac{5x}{3} - 5 \times \frac{7}{10} = \frac{5x}{3} - \frac{35}{10} = \frac{5x}{3} - \frac{7}{2}$$

$$C = \left(6x - \frac{2}{3}\right) \times 2x = 6x \times 2x - \frac{2}{3} \times 2x = 12x^2 - \frac{4x}{3}$$

$$D = 2x(5x - 3x^2 - 4y) = 10x^2 - 6x^3 - 8xy$$

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

$$F = 5x^2y(3xy^2 - 2x^3y^4) = 15x^3y^3 - 10x^5y^5$$

$$G = (x-y)(2+3x) = 2x+3x^2-2y-3xy$$

$$\begin{aligned} H &= (3x^2 - 2y)(4y - 5x^2) = 12x^2y - 15x^4 - 8y^2 + 10x^2y \\ &= -15x^4 + 22x^2y - 8y^2 \end{aligned}$$

$$\begin{aligned} K &= (x^3 - 2y^2)(4y^2 - 5x^3 + 1) \\ &= 4x^3y^2 - 5x^6 + x^3 - 8y^4 + 10x^3y^2 - 2y^2 \\ &= -5x^6 + 14x^3y^2 - 8y^4 + x^3 - 2y^2 \end{aligned}$$

$$\begin{aligned} L &= (4x-5y)(3x+y^2) - (x^3-1)(2-3xy) \\ &= 12x^2 + 4xy^2 - 15xy - 5y^3 - (2x^3 - 3x^4y - 2 + 3xy) \\ &= 12x^2 + 4xy^2 - 15xy - 5y^3 - 2x^3 + 3x^4y + 2 - 3xy \\ &= 3x^4y - 2x^3 - 5y^3 + 4xy^2 + 12x^2 - 18xy + 2 \end{aligned}$$

التمرين الثاني

$$A = 10x + 30 = 10x + 10 \times 3 = 10(x+3)$$

$$B = 6x^2 - 4x = 2x \times 3x - 2x \times 2 = 2x(3x-2)$$

$$C = 21x^2 - 7x = 7x \times 3x - 7x \times 1 = 7x(3x-1)$$

$$D = xy - 2y = y(x-2)$$

$$E = 3x^2y + 6xy = 3xy \times x + 3xy \times 2 = 3xy(x+2)$$

$$\begin{aligned} F &= 16x^3y^2 - 4x^2y^3 = 4x^2y^2 \times 4x - 4x^2y^2 \times y \\ &= 4x^2y^2(4x-y) \end{aligned}$$

$$\begin{aligned} G &= 28x^5y^4 - 35x^4y^6 = 7x^4y^4 \times 4x - 7x^4y^4 \times 5y^2 \\ &= 7x^4y^4(4x-5y^2) \end{aligned}$$

$$H = 3x(x+7) + 5(x+7) = (x+7)(3x+5)$$

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

$$\begin{aligned} U &= (x+5)^2 - (3x+4)^2 \\ &= (x+5 - (3x+4))(x+5 + (3x+4)) \\ &= (x+5 - 3x-4)(x+5 + 3x+4) \\ &= (-2x+1)(4x+9) \end{aligned}$$

التمرين الخامس

1. لنحسب العدد A

$$\begin{aligned} A &= 978654^2 - (978653 \times 978655) \\ A &= 978654^2 - [(978654 - 1)(978654 + 1)] \\ A &= 978654^2 - (978654^2 - 1) \\ A &= 978654^2 - 978654^2 + 1 \\ A &= 1 \end{aligned}$$

2. لدينا $x + y = 1$ و $x^2 + y^2 = 2$

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$$\begin{aligned} (x+y)^2 &= x^2 + 2xy + y^2 \\ (x+y)^2 &= x^2 + y^2 + 2xy & \text{يعني أن} \\ 1^2 &= 2 + 2xy & \text{يعني أن} \\ -1 &= 2xy & \text{يعني أن} \\ xy &= -\frac{1}{2} & \text{يعني أن} \end{aligned}$$

ب. لنحسب $x^4 + y^4$ لدينا :

$$\begin{aligned} (x^2 + y^2)^2 &= x^4 + 2x^2y^2 + y^4 \\ &= x^4 + y^4 + 2(xy)^2 \\ x^4 + y^4 &= (x^2 + y^2)^2 - 2(xy)^2 \\ &= 2^2 - 2 \times \left(-\frac{1}{2}\right)^2 \\ &= 4 - \frac{2}{4} = 4 - \frac{1}{2} = \frac{8}{2} - \frac{1}{2} = \frac{7}{2} \end{aligned}$$

$$x^4 + y^4 = \frac{7}{2}$$

إذن

2. $x = 0,5$ و $y = \frac{-1}{6}$

إذن $A = 84 \times 0,5 \times \frac{-1}{6} = -7$

III. لنعتبر العدد B بحيث $B = (2x+3y)^2 + (2x-3y)^2$
1. لننشر ونبسط B

$$\begin{aligned} B &= (2x+3y)^2 + (2x-3y)^2 \\ B &= 4x^2 + 12xy + 9y^2 + 4x^2 - 12xy + 9y^2 \\ B &= 8x^2 + 18y^2 \\ B &= 2(4x^2 + 9y^2) \end{aligned}$$

2. لنحسب B

$$B = 2(4x^2 + 9y^2) = 2 \times 36 = 72$$

التمرين الرابع لنعمل ما يلي :

$$\begin{aligned} P &= 4x^2 + 16x + 16 \\ P &= (2x)^2 + 2 \times (2x) \times 4 + (4)^2 \\ P &= (2x+4)^2 \end{aligned}$$

$$\begin{aligned} Q &= \frac{x^2}{4} + x + 1 \\ Q &= \left(\frac{x}{2}\right)^2 + 2 \times \frac{x}{2} \times 1 + 1^2 \\ Q &= \left(\frac{x}{2} + 1\right)^2 \end{aligned}$$

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$$\begin{aligned} R &= 2x^2 - 28x + 98 \\ R &= 2(x^2 - 14x + 49) \\ R &= 2(x^2 - 2 \times 7 \times x + 7^2) \\ R &= 2(x-7)^2 \end{aligned}$$

أي

$$T = x^2 - 25 = x^2 - 5^2 = (x-5)(x+5)$$

$$\begin{aligned} S &= (2x-5)^2 - 64 \\ &= (2x-5)^2 - 8^2 \\ &= (2x-5-8)(2x-5+8) \\ &= (2x-13)(2x+3) \end{aligned}$$