



النشر و التعميل و المتطابقات الهامة



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I _ النشر و التعميل :

(1) - النشر :

(أ) -- قاعدة 1 :

$$\begin{aligned} a \text{ و } b \text{ و } c \text{ أعداد حقيقية.} \\ (b+c) \times a = ab + ac \quad a(b+c) = ab + ac \\ (b-c) \times a = ab - ac \quad \text{و} \quad a(b-c) = ab - ac \end{aligned}$$

* مثال :

$$\begin{aligned} B &= (-3x - 5) \times (-4x) \\ &= -4x \times (-3x) - (-4x) \times 5 \\ &= 12x^2 + 20x \end{aligned}$$

$$\begin{aligned} A &= 2x(x+4) \\ &= 2x \times x + 2x \times 4 \\ &= 2x^2 + 8x \end{aligned}$$

(ب) -- قاعدة 2 :

$$\begin{aligned} a \text{ و } b \text{ و } c \text{ و } d \text{ أعداد حقيقية.} \\ (a+b)(c+d) = a(c+d) + b(c+d) \\ = ac + ad + bc + bd \end{aligned}$$

* مثال :

$$\begin{aligned} D &= (-2x - 4)(-3 - x) \\ &= -2x(-3 - x) - 4(-3 - x) \\ &= 6x + 2x^2 + 12 + 4x \\ &= 2x^2 + 6x + 4x + 12 \\ &= 2x^2 + 10x + 12 \end{aligned}$$

$$\begin{aligned} C &= (2 - x)(3x + 1) \\ &= 2(3x + 1) - x(3x + 1) \\ &= 6x + 2 - 3x^2 - x \\ &= -3x^2 + 6x - x + 2 \\ &= -3x^2 + 5x + 2 \end{aligned}$$

* تمرين تطبيقي :

أنشر ثم بسط ما يلي :

$$A = 3x(2x + 1) + (3x - 2)(x + 7)$$

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

$$\begin{aligned} B &= 2\sqrt{3}(x + \sqrt{3}) - \sqrt{5}(\sqrt{5} - 2x) \\ &= 2x\sqrt{3} + 2\sqrt{3}^2 - \sqrt{5}^2 + 2x\sqrt{5} \\ &= 2x\sqrt{3} + 2x\sqrt{5} + 6 - 5 \\ &= 2x\sqrt{3} + 2x\sqrt{5} + 1 \end{aligned}$$

$$\begin{aligned} A &= 3x(2x + 1) + (3x - 2)(x + 7) \\ &= 6x^2 + 3x + 3x(x + 7) - 2(x + 7) \\ &= 6x^2 + 3x + 3x^2 + 21x - 2x - 14 \\ &= 6x^2 + 3x^2 + 3x + 21x - 2x - 14 \\ &= 9x^2 + 22x - 14 \end{aligned}$$

(2) - التعميل :

(أ) -- قاعدة :

$$\begin{aligned} a \text{ و } b \text{ و } c \text{ أعداد حقيقية .} \\ ab + ac = a(b + c) \\ ab - ac = a(b - c) \end{aligned}$$

(ب) -- مثال :

$$\begin{aligned} B &= 2x(x - 1) + (x - 1)(4x + 5) \\ &= (x - 1)[2x + (4x + 5)] \\ &= (x - 1)(2x + 4x + 5) \\ &= (x - 1)(6x + 5) \end{aligned}$$

$$\begin{aligned} A &= 2abc + 7ab - 11ac \\ &= a(2bc + 7b - 11c) \end{aligned}$$

* تمرين تطبيقي :

عمل ما يلي :

$$A = 8xy + 12x^2y - 4xy^2$$

$$B = (2x + 1)(5 - x) - (2x + 1)(7x + 3)$$

الحل :

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

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

(1) - قواعد :

 a و b عدنان حقيقيان .

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

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

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

(2) - تطبيقات :

* المتطابقات الهامة والنشر :

$$\begin{aligned} C &= (2\sqrt{2} + 3x)(2\sqrt{2} - 3x) \\ &= (2\sqrt{2})^2 - (3x)^2 \\ &= 8 - 9x^2 \end{aligned}$$

$$\begin{aligned} B &= (5 - 7x)^2 \\ &= 5^2 - 2 \times 5 \times 7x + (7x)^2 \\ &= 25 - 70x + 49x^2 \end{aligned}$$

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

* المتطابقات الهامة و التعميل :

$$\begin{aligned} F &= 144x^2 - 4 \\ &= (12x)^2 - 2^2 \\ &= (12x - 2)(12x + 2) \end{aligned}$$

$$\begin{aligned} E &= 16 - 56x + 49x^2 \\ &= (4)^2 - 2 \times 4 \times 7x + (7x)^2 \\ &= (4 - 7x)^2 \end{aligned}$$

$$\begin{aligned} D &= 25x^2 + 30x + 9 \\ &= (5x)^2 + 2 \times 5x \times 3 + 3^2 \\ &= (5x + 3)^2 \end{aligned}$$

* تمرين تطبيقي :

(1) - أنشر ثم بسط ما يلي :

$$A = (2x + 1)^2 - (3x + 5)(3x - 5)$$

$$B = (7 - 2x)^2 + 4x(1 - x)$$

(2) - عمل ما يلي :

$$C = 25x^2 - 4 + (5x - 2)(5x + 6)$$

$$D = 9x^2 - 6x + 1 + 5x(3x + 1)$$

(1) - النشر و التبسيط :

$$\begin{aligned}
 B &= (7 - 2x)^2 + 4x(1 - x) \\
 &= [7^2 - 2 \times 7 \times 2x + (2x)^2] + [4x - 4x^2] \\
 &= 49 - 28x + 4x^2 + 4x - 4x^2 \\
 &= 4x^2 - 4x^2 - 28x + 4x + 49 \\
 &= -24x + 49
 \end{aligned}$$

$$\begin{aligned}
 A &= (2x + 1)^2 - (3x + 5)(3x - 5) \\
 &= [(2x)^2 + 2 \times 2x \times 1 + 1^2] - [(3x)^2 - 5^2] \\
 &= [4x^2 + 4x + 1] - [9x^2 - 25] \\
 &= 4x^2 + 4x + 1 - 9x^2 + 25 \\
 &= 4x^2 - 9x^2 + 4x + 1 + 25 \\
 &= -5x^2 + 4x + 26
 \end{aligned}$$

(2) - التعميل :

$$\begin{aligned}
 D &= 9x^2 - 6x + 1 + 5x(3x + 1) \\
 &= (3x)^2 - 2 \times 3x \times 1 + 1^2 + 5x(3x + 1) \\
 &= (3x - 1)^2 + 5x(3x + 1) \\
 &= (3x - 1)(3x + 1) + 5x(3x + 1) \\
 &= (3x + 1)[(3x - 1) + 5x] \\
 &= (3x + 1)(3x - 1 + 5x) \\
 &= (3x + 1)(8x - 1)
 \end{aligned}$$

$$\begin{aligned}
 C &= 25x^2 - 4 + (5x - 2)(5x + 7) \\
 &= (5x)^2 - 2^2 + (5x - 2)(5x + 7) \\
 &= (5x - 2)(5x + 2) + (5x - 2)(5x + 7) \\
 &= (5x - 2)[(5x + 2) + (5x + 7)] \\
 &= (5x - 2)(5x + 2 + 5x + 7) \\
 &= (5x - 2)(10x + 9)
 \end{aligned}$$