



تمرين ① :

(1) - لنشر و نحسب ما يلي :

$$\begin{aligned} b &= (2 - \sqrt{5})(2 + \sqrt{5}) \\ &= 2^2 - \sqrt{5}^2 \\ &= 4 - 5 \\ &= -1 \end{aligned}$$

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

$$\begin{aligned} f &= -2\sqrt{14} - 2\sqrt{7} \\ &= -2\sqrt{7} \times \sqrt{2} - 2\sqrt{7} \\ &= -2\sqrt{7}(\sqrt{2} + 1) \end{aligned}$$

$$\begin{aligned} e &= \sqrt{6} + 2\sqrt{3} \\ &= \sqrt{3} \times \sqrt{2} + 2\sqrt{3} \\ &= \sqrt{3}(\sqrt{2} + 2) \end{aligned}$$

$$\begin{aligned} d &= (3 + 2\sqrt{7})^2 \\ &= 3^2 + 2 \times 3 \times 2\sqrt{7} + (2\sqrt{7})^2 \\ &= 9 + 12\sqrt{7} + 28 \\ &= 37 + 12\sqrt{7} \end{aligned}$$

$$\begin{aligned} c &= (\sqrt{8} - \sqrt{2})^2 \\ &= \sqrt{8}^2 - 2 \times \sqrt{8} \times \sqrt{2} + \sqrt{2}^2 \\ &= 8 - 2\sqrt{16} + 2 \\ &= 8 - 8 + 2 \\ &= 2 \end{aligned}$$

$$\begin{aligned} h &= \sqrt{15} - 2\sqrt{35} \\ &= \sqrt{5} \times \sqrt{3} - 2\sqrt{5} \times \sqrt{7} \\ &= \sqrt{5}(\sqrt{3} - 2\sqrt{7}) \end{aligned}$$

$$\begin{aligned} g &= 3 - \sqrt{2}^2 \\ &= \sqrt{3}^2 - \sqrt{2}^2 \\ &= (\sqrt{3} - \sqrt{2})(\sqrt{3} + \sqrt{2}) \end{aligned}$$

تمرين ② :

(1) - بسط ما يلي :

$$\begin{aligned} B &= 3x^3 - \left[ -(2x^3 - 4x^2 + x - 5) + (-2x^2 + x - 5) \right] - x^2 + 1 \\ &= 3x^3 - \left[ -2x^3 + 4x^2 - x + 5 - 2x^2 + x - 5 \right] - x^2 + 1 \\ &= 3x^3 + 2x^3 - 4x^2 + x - 5 + 2x^2 - x + 5 - x^2 + 1 \\ &= 5x^3 - 3x^2 + 1 \end{aligned}$$

$$\begin{aligned} A &= 2x^2 + 3x - 5 + \sqrt{2} - 5x + x^2\sqrt{5} - 7x + 1 \\ &= 2x^2 + x^2\sqrt{5} + 3x - 5x - 7x + 1 - 5 + \sqrt{2} \\ &= (2 + \sqrt{5})x^2 - 9x - 4 + \sqrt{2} \end{aligned}$$

(2) - لنشر ثم نبسط إذا كان ممكنا :

$$\begin{aligned} F &= (-5x - 1)(-x + 2) \\ &= 5x^2 - 10x + x - 2 \\ &= 5x^2 - 9x - 2 \end{aligned}$$

$$\begin{aligned} E &= 3x(1 - x) - 4\left(x + \frac{1}{4}\right) \\ &= 3x - 3x^2 - 4x - \frac{4}{4} \\ &= -x - 3x^2 - 1 \end{aligned}$$

$$\begin{aligned} D &= -\sqrt{2}(2x - \sqrt{2}) \\ &= -2\sqrt{2}x + \sqrt{2}^2 \\ &= -2\sqrt{2}x + 2 \end{aligned}$$

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

$$\begin{aligned} I &= (-\sqrt{5}x - 1)^2 \\ &= (-\sqrt{5}x)^2 - 2 \times (-\sqrt{5}x) \times 1 + 1^2 \\ &= 5x^2 + 2\sqrt{5}x + 1 \end{aligned}$$

$$\begin{aligned} H &= 2x(3x - 1)(-x + 4) \\ &= (6x^2 - 2x)(-x + 4) \\ &= -6x^3 + 24x^2 + 2x^2 - 8x \\ &= -6x^3 + 26x^2 - 8x \end{aligned}$$

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

$$L = (2\sqrt{2}x - \sqrt{3})(2\sqrt{2}x + \sqrt{3})(8x^2 + 3)$$

$$= \left( (2\sqrt{2}x)^2 - \sqrt{3}^2 \right) (8x^2 + 3)$$

$$= (8x^2 - 3)(8x^2 + 3)$$

$$= (8x^2)^2 - 3^2$$

$$= 64x^4 - 9$$

$$K = (2\sqrt{2}x - \sqrt{2})^2$$

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

$$= 8x^2 - 4\sqrt{2}^2x + 2$$

$$= 8x^2 - 8x + 2$$

$$J = (3x - \sqrt{7})(3x + \sqrt{7})$$

$$= (3x)^2 - \sqrt{7}^2$$

$$= 9x^2 - 7$$

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

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

$$= 9x^2 - 6x + 1 - 4x^2 + 4x - 3x + 3$$

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

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

$$= 3x - \left( (5x)^2 - \sqrt{2}^2 \right)$$

$$= 3x - 25x^2 + 2$$

$$M = 4x(2x - 1)(2x + 1)$$

$$= 4x \left( (2x)^2 - 1^2 \right)$$

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

$$= 16x^3 - 4x$$

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

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

$$= x^2 - 6x + 9 - x^2 + 9 - x^2 - 6x - 9$$

$$= -x^2 - 12x + 9$$

$$P = (\sqrt{2}x - \sqrt{5})(\sqrt{2}x + \sqrt{5}) - (1 + x)^2$$

$$= (\sqrt{2}x)^2 - \sqrt{5}^2 - (1^2 + 2 \times 1 \times x + x^2)$$

$$= 2x^2 - 5 - 1 - 2x - x^2$$

$$= x^2 - 2x - 6$$

لتصليح ③

لنعمل ما يلي :

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

$$= 2x[(3x + 4) - (x + 1) + 1]$$

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

$$= 2x(2x + 4)$$

$$= 2x \times 2(x + 2)$$

$$= 4x(x + 2)$$

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

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

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

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

$$a = 25abc^2 - 15ab^2c - 10a^2bc$$

$$= 5abc(5c - 3b - 2a)$$

$$f = 4x^2 - 7$$

$$= (2x)^2 - \sqrt{7}^2$$

$$= (2x + \sqrt{7})(2x - \sqrt{7})$$

$$e = (2x + 5)^2 - (x - 1)^2$$

$$= [(2x + 5) - (x - 1)][(2x + 5) + (x - 1)]$$

$$= (2x + 5 - x + 1)(2x + 5 + x - 1)$$

$$= (x + 6)(3x + 4)$$

$$d = 4x^2 - 9 + (2x - 3)(5x + 11)$$

$$= (2x)^2 - 3^2 + (2x - 3)(5x + 11)$$

$$= (2x + 3)(2x - 3) + (2x - 3)(5x + 11)$$

$$= (2x - 3)[(2x + 3) + (5x + 11)]$$

$$= (2x - 3)(2x + 3 + 5x + 11)$$

$$= (2x - 3)(7x + 14)$$

$$= (2x - 3) \times 7(x + 2)$$

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

$$\begin{aligned}
h &= 27x^2 - 12 + (3x-2)^2 \\
&= 3(9x^2 - 4) + (3x-2)^2 \\
&= 3((3x)^2 - 2^2) + (3x-2)^2 \\
&= 3(3x-2)(3x+2) + (3x-2)^2 \\
&= (3x-2)[3(3x+2) + (3x-2)] \\
&= (3x-2)(9x+6+3x-2) \\
&= (3x-2)(12x+4) \\
&= (3x-2) \times 4(3x+1) \\
&= 4(3x-2)(3x+1)
\end{aligned}$$

$$\begin{aligned}
g &= 9x^2 + 12x + 4 - (3x+2)(x+4) \\
&= (3x)^2 + 2 \times 3x \times 2 + 2^2 - (3x+2)(x+4) \\
&= (3x+2)^2 - (3x+2)(x+4) \\
&= (3x+2)[(3x+2) - (x+4)] \\
&= (3x+2)(3x+2-x-4) \\
&= (3x+2)(2x-2) \\
&= (3x+2) \times 2(x-1) \\
&= 2(3x+2)(x-1)
\end{aligned}$$

$$\begin{aligned}
i &= 3x^2 - 11 \\
&= (\sqrt{3}x)^2 - \sqrt{11}^2 \\
&= (\sqrt{3}x + \sqrt{11})(\sqrt{3}x - \sqrt{11})
\end{aligned}$$

$$\begin{aligned}
k &= x^2 - 5 + (x + \sqrt{5}) \\
&= x^2 - \sqrt{5}^2 + (x + \sqrt{5}) \\
&= (x + \sqrt{5})(x - \sqrt{5}) + (x + \sqrt{5}) \\
&= (x + \sqrt{5})[(x - \sqrt{5}) + 1] \\
&= (x + \sqrt{5})(x - \sqrt{5} + 1)
\end{aligned}$$

$$\begin{aligned}
j &= (2x+1)^2 - 16 \\
&= (2x+1)^2 - 4^2 \\
&= [(2x+1) - 4][(2x+1) + 4] \\
&= (2x+1-4)(2x+1+4) \\
&= (2x-3)(2x+5)
\end{aligned}$$

$$\begin{aligned}
l &= 9x^2 + 6\sqrt{2}x + 2 \\
&= (3x)^2 + 2 \times 3x \times \sqrt{2} + \sqrt{2}^2 \\
&= (3x + \sqrt{2})^2
\end{aligned}$$

$$\begin{aligned}
n &= 4x^2 - 12x + 8 \\
&= (4x^2 - 12x + 9) - 1 \\
&= [(2x)^2 - 2 \times 2x \times 3 + 3^2] - 1 \\
&= (2x-3)^2 - 1^2 \\
&= (2x-3-1)(2x-3+1) \\
&= (2x-4)(2x-2) \\
&= 2(x-2) \times 2(x-1) \\
&= 4(x-2)(x-1)
\end{aligned}$$

$$\begin{aligned}
m &= 2x^2 - 2\sqrt{6}x + 3 \\
&= (\sqrt{2}x)^2 - 2 \times \sqrt{2}x \times \sqrt{3} + \sqrt{3}^2 \\
&= (\sqrt{2}x - \sqrt{3})^2
\end{aligned}$$

$$\begin{aligned}
p &= 4x^2 - 6x + 2 \\
&= 4x^2 - 4x - 2x + 1 + 1 \\
&= (4x^2 - 4x + 1) - 2x + 1 \\
&= ((2x)^2 - 2 \times 2x \times 1 + 1^2) - (2x-1) \\
&= (2x-1)^2 - (2x-1) \\
&= (2x-1)(2x-1-1) \\
&= (2x-1)(2x-2) \\
&= 2(2x-1)(x-1)
\end{aligned}$$

(2) - لتعمل  $M$  :

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

تصليح ④ :

المسألة الأولى :

(1) - لنشر ثم نسط  $M$  :

$$\begin{aligned}
M &= (2x-5)(x-9) + 4x^2 - 25 - (2x-5)^2 \\
&= 2x^2 - 18x - 5x + 45 + 4x^2 - 25 - 4x^2 + 20x - 25 \\
&= 2x^2 - 3x - 5
\end{aligned}$$

(3) - لنحسب  $M$  من أجل  $x = -2\sqrt{3}$  :

$$M = 2x^2 - 3x - 5 \quad \text{لدينا}$$

أبي :

$$\begin{aligned} M &= 2(-2\sqrt{3})^2 - 3(-2\sqrt{3} - 5) \\ &= 24 + 6\sqrt{3} + 15 \\ &= 39 + 6\sqrt{3} \end{aligned}$$

(4) - لنحل المعادلة :  $M = 0$  :

لدينا المعادلة  $M = 0$  تكافئ على التوالي :

$$(2x - 5)(x + 1) = 0$$

$$x + 1 = 0 \quad \text{أو} \quad 2x - 5 = 0$$

$$2x = 5$$

$$x = -1$$

$$x = \frac{5}{2}$$

إذن هذه المعادلة تقبل حلين هما :  $-1$  و  $\frac{5}{2}$  .

المسألة الثانية :

(1) - لنعمل  $B$  :

لدينا :

$$\begin{aligned} B &= (2x - 5)^2 - 36 \\ &= (2x - 5)^2 - 6^2 \\ &= (2x - 5 - 6)(2x - 5 + 6) \\ &= (2x - 11)(2x + 1) \end{aligned}$$

(2) - لنبين أن :  $B - 2A = 3(2x + 1)$  :

$$B - 2A = (2x - 5)^2 - 36 - 2(2x^2 - 13x - 7)$$

$$= 4x^2 - 20x + 25 - 36 - 2x^2 + 26x + 14 \quad \text{لدينا}$$

$$= 6x + 3$$

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

إذن :  $B - 2A = 3(2x + 1)$

(3) - لنستنتج تعميلا للعدد  $A$  :

لدينا :  $B - 2A = 3(2x + 1)$  يعني أن :

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

$$= 3(2x + 1) - (2x - 11)(2x + 1)$$

$$= (2x + 1)[3 - (2x - 11)]$$

$$= (2x + 1)(3 - 2x + 11)$$

$$= (2x + 1)(-2x + 14)$$

$$= (2x + 1) \times 2(-x + 7)$$

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

و منه فإن :

$$A = \frac{2(2x + 1)(-x + 7)}{-2}$$

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

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