Interrogation de mathématique – 10

(Révision – formules remarquables)

Développer, factoriser ou calculer à l'aide des formules remarquables :

1) $\left(1 - \dfrac{2}{5}x^2\right)^2 =$ 2) $(x - 2y^2 - 3z^3)^2 =$ 3) $(2x + 3)\,(4x^2 - 6x + 9) =$

4) $\left(3x^2 + 2\right)^3 =$ 5) $(3x - 2)\,(9x^2 - 12x + 4) =$ 6) $(-x + 4)\,(-x - 4) =$

7) $52^3 =$ 8) $(x^3 - x)\,(x^3 + x) =$ 9) $77 \cdot 83 =$

10) $x^6 - 1 =$ 11) $x^4 - 16$ 12) $(x - 14)^2 =$

13) $(x^2 - y^3)(x^2 + y^3) =$ 14) $(x^n + y^n)^2 =$

1) $\left(1-\frac{2}{5}x^2\right)^2 = 1 - 2\cdot1\cdot\frac{2}{5}x^2 + \frac{4}{25}x^4 = \frac{4}{25}x^4 - \frac{4}{5}x^2 + 1$

2) $\left(x - 2y^2 - 3z^3\right)^2 = x^2 + 4y^4 + 9z^6 - 4xy^2 - 6xz^3 + 12y^2z^3$

3) $(2x+3)(4x^2-6x+9) = (2x)^3 + 3^3 = 8x^3 + 27$

4) $(3x^2+2)^3 = (3x^2)^3 + 3\cdot(3x^2)^2\cdot2 + 3\cdot3x^2\cdot2^2 + 2^3$
$\qquad = 27x^6 + 54x^4 + 36x^2 + 8$

5) $(3x-2)(9x^2-12x+4) = (3x-2)(3x-2)^2 = (3x-2)^3$
$\qquad = 27x^3 - 54x^2 + 36x - 8$

6) $(-x+4)(-x-4) = (-x)^2 - 4^2 = x^2 - 16$

7) $52^3 = (50+2)^3 = 50^3 + 3\cdot50^2\cdot2 + 3\cdot50\cdot2^2 + 2^3$
$\qquad = 125\,000 + 6\cdot2500 + 12\cdot50 + 8$
$\qquad = 125\,000 + $ 15'000 + 600 + 8
$\qquad = $ 140'608

8) $(x^3-x)(x^3+x) = (x^3)^2 - x^2 = x^6 - x^2$

9) $77\cdot83 = (80-3)\cdot(80+3) = 80^2 - 3^2 = 6400 - 9 = 6391$

10) $x^6 - 1 = (x^3)^2 - 1^2 = (x^3-1)(x^3+1) = (x-1)(x^2+x+1)(x+1)(x^2-x+1)$

11) $x^4 - 16 = (x^2)^2 - 4^2 = (x^2-4)(x^2+4) = (x-2)(x+2)(x^2+4)$

12) $(x-14)^2 = x^2 - 28x + 14^2 = x^2 - 28x + 196$

$\qquad 14^2 = 14\cdot14$
$\qquad = (10+4)^2 = 100 + 80 + 16$
$\qquad = 196$

13) $(x^2-y^3)\cdot(x^2+y^3) = (x^2)^2 - (y^3)^2 = x^4 - y^6$

14) $(x^n+y^n)^2 = (x^n)^2 + 2x^ny^n + (y^n)^2 = x^{2n} + 2x^ny^n + y^{2n}$