

$$1. S = 5 + 8 + \dots + 89$$

$$89 = 5 + 4n - 4$$

$$\sum_{i=1}^{22} (5 + (i-1)4)$$

$$a_1 = 5 \quad a_n = a_1 + (n-1)d$$

$$n = \frac{89-5}{4} = 22$$

$$d = 4$$

$$89 = 5 + 4(n-1)$$

$$2. \sum_{k=3}^{15} (2k+1) ; i = k-2 \quad k = 2+i ; \sum_{i=1}^{13} (2(2+i)+1) = \sum_{i=1}^{13} (2i+5)$$

$$3. a_1 = 12 \quad a_n = a_{n-1} + d \quad a_{10} = 57 \quad 57 = 12 + 9d \quad 9d = 45 \quad d = 5$$

$$a_{25} = ?$$

$$a_{25} = 12 + 24 \cdot 5 = 132$$

$$4. a_1 = 105 \quad d = 7 \quad a_n = 984 \quad n = \frac{a_n - a_1}{d} + 1 = \frac{984 - 105}{7} + 1 = 128$$

$$S_n = \frac{n(a_1 + a_n)}{2} = \frac{125 \cdot 1089}{2} = 70336$$

$$5. S = \sum_{k=1}^n (3k+2) \quad S = 2650 \quad S = \frac{n(a_1 + a_n)}{2} = \frac{n(a_1 + 3n+2)}{2}$$

$$a_n = a_1 + (n-1)d = 3n+2$$

$$2S = a_1 n + 3n^2 + 2n$$

$$2 \cdot 2650 = 3n^2 + 7n$$

$$n \approx 40$$

$$6. a_5 = 20 \quad a_{15} = 60$$

$$a_5 = a_1 + 4d \quad a_{15} = a_1 + 14d \quad \begin{matrix} 20 = a_1 + 4d \\ 60 = a_1 + 14d \end{matrix}$$

$$a_1 = 20 - 16 = 4$$

$$40 = 10d \quad d = 4$$

$$a_1 = 4$$

$$d = 4$$

$$a_{10} = 4 + 9 \cdot 4 = 40$$

$$\frac{20+60}{2} = 40$$

$$7. 20 \text{ steps}$$

$$a_1 = 5$$

$$d = 0,5$$

$$a_n = 5 + 19 \cdot 0,5 = 5 + \frac{19}{2} = \frac{29}{2} = 14,5$$

$$S_n = \frac{20(5 + 14,5)}{2} = 10 \cdot 19,5 = 195$$

$$\text{p. } \begin{array}{l} a_1 = 11 \\ d = 3 \end{array} \quad S_n = 1000 \quad 1000 = \frac{n(a_1 + a_n)}{2}$$

$$a_n = a_1 + (n-1)d = 11 + (n-1) \cdot 3 = 11 + 3n - 3 = 8 + 3n$$

$$2000 = 11n + (8 + 3n)n = 11n + 8n + 3n^2 = 3n^2 + 19n$$

$$2000 = 3n^2 + 19n \quad 3n^2 + 19 - 2000 = 0$$

$$\Delta = 19^2 - 4 \cdot 3 \cdot (-2000) = 19^2 + 24000$$

$$x_{1,2} = \frac{-19 \pm \sqrt{19^2 + 24000}}{6}$$

$$x \approx 23$$

$$\text{p. } \begin{array}{l} a_2 = -6 \\ a_5 = 48 \end{array} \quad \begin{array}{l} a_2 = a_1 \cdot n \\ a_5 = a_1 \cdot n^4 \end{array} \quad \begin{array}{l} a_1 n = -6 \\ a_1 n^4 = 48 \end{array} \quad a_1 = \frac{-6}{-2} = 3$$

$$n^3 = -8 \quad n = -2$$

$$a_{10} = 3 \cdot (-2)^3 = -3 \cdot 8 = -24$$

$$10. \quad P(x) = x^5 - 4x^3 + x^2 - 7 \quad \text{degree: } 5$$

$$n \text{ of terms: } 4$$

$$11. \quad 24x^3y^2z^5$$

$$30x^5y^3z^2$$

$$\text{gcd: } 12x^3y^2z^2$$

$$\text{lcm: } 72x^5y^3z^5$$

$$\begin{array}{r}
 12. \quad 6x^3 + 11x^2 - 31x + 15 \quad | \quad 3x - 2 \\
 \underline{- 6x^3 - 4x^2} \qquad \qquad \qquad | \quad 2x^2 + 5x - 7 \\
 15x^2 - 31x + 15 \\
 \underline{- 15x^2 - 10x} \\
 -21x + 15 \\
 \underline{- 21x + 14} \\
 1
 \end{array}$$

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