

$$\boxed{1} \quad (1) \quad (x+1)(x-2) + x(3x+1) = x^2 - x - 2 + 3x^2 + x = 4x^2 - 2$$

$$(2) \quad 4x^2 - 49y^2 = (2x+7y)(2x-7y)$$

$$(3) \quad x^2 - 4x - 6 = 0. \quad x = \frac{-(-4) \pm \sqrt{(-4)^2 - 4 \cdot (-6)}}{2} = 2 \pm \sqrt{10}$$

$$(4) \quad (\sqrt{5} - \sqrt{2})^2 = 5 - 2\sqrt{5}\sqrt{2} + 2 = 7 - 2\sqrt{10}$$

$$(5) \quad y = ax^2, \quad x = 4 \text{ のとき } y = -4 \text{ より } -4 = a \cdot 4^2. \text{ よって } a = -\frac{1}{4}. \quad y = -\frac{1}{4}x^2$$

$$\boxed{2} \quad (6) \quad x^2 = 3^2 + 2^2 = 13. \quad x = \sqrt{13}$$

$$(7) \quad 4 : x = 3 : 2 \text{ よって } 3x = 8 \quad x = \frac{8}{3}$$

$$(8) \quad (x+2)^3 = x^3 + 6x^2 + 12x + 8$$

$$(9) \quad x^2 + xy + x + y = (x+1)y + x^2 + x = (x+1)y + x(x+1) = (x+1)(x+y)$$

$$(10) \quad \frac{\sqrt{2}}{\sqrt{3} + \sqrt{2}} = \frac{\sqrt{2}(\sqrt{3} - \sqrt{2})}{(\sqrt{3} + \sqrt{2})(\sqrt{3} - \sqrt{2})} = \frac{\sqrt{6} - 2}{3 - 2} = \sqrt{6} - 2$$

$$\boxed{3} \quad (11) \quad y = -x^2 + 4x = -(x^2 - 4x) = -(x-2)^2 + 4. \text{ 頂点の座標は } (2, 4)$$

$$(12) \quad {}_5C_2 - {}_5C_1 = \frac{5 \cdot 4}{2 \cdot 1} - 5 = 10 - 5 = 5$$

$$(13) \quad x : 4 = 5 : 2 \text{ より } 2x = 20 \quad x = 10$$

$$(14) \quad \textcircled{1} \quad \cos^2 \theta + \sin^2 \theta = 1 \text{ より } \sin^2 \theta = 1 - \left(\frac{1}{5}\right)^2 = \frac{24}{25} \quad \sin \theta = \frac{\sqrt{24}}{5} = \frac{2\sqrt{6}}{5}$$

$$\textcircled{2} \quad \tan \theta = \frac{\sin \theta}{\cos \theta} = \frac{\frac{2\sqrt{6}}{5}}{\frac{1}{5}} = 2\sqrt{6}$$

$$(15) \quad \textcircled{1} \quad A \cap B = \{1, 2, 8\}$$

$$\textcircled{2} \quad A \cup B = \{1, 2, 3, 4, 5, 8, 16\} \quad \text{個数は 7 個}$$