

$$1. (1) \vec{a} \cdot \vec{b} = -8 - 18 = -26$$

$$\cos \theta = \frac{-26}{\sqrt{13} \cdot 2\sqrt{13}} = -1 \text{ ㊦}$$

$$\underline{\theta = 180^\circ}$$

$$(2) \vec{a} \cdot \vec{b} = 2$$

$$\cos \theta = \frac{2}{\sqrt{2} \cdot 2\sqrt{2}} = \frac{1}{2} \text{ ㊦}$$

$$\underline{\theta = 60^\circ}$$

$$2. \vec{e} = (x, y) \text{ とおくと}$$

$$\vec{a} \cdot \vec{e} = 0 \text{ ㊦} \quad x - \sqrt{3}y = 0 \dots \textcircled{1}$$

$$|\vec{e}|^2 = 1 \text{ ㊦} \quad x^2 + y^2 = 1 \dots \textcircled{2}$$

$$\textcircled{1}, \textcircled{2} \text{ ㊦} \quad x = \frac{\sqrt{3}}{2}, y = \frac{1}{2} \text{ 又は } x = -\frac{\sqrt{3}}{2}, y = -\frac{1}{2}$$

$$\text{㊦} \vec{e} = \left( \frac{\sqrt{3}}{2}, \frac{1}{2} \right), \left( -\frac{\sqrt{3}}{2}, -\frac{1}{2} \right)$$

$$3. \vec{a} \cdot \vec{b} = 4 \cdot 5 \cdot \frac{1}{2} = 10$$

$$|2\vec{a} - 3\vec{b}|^2 = 4|\vec{a}|^2 - 12\vec{a} \cdot \vec{b} + 9|\vec{b}|^2 \quad \text{㊦} \vec{r}$$

$$= 64 - 120 + 225$$

$$= 169$$

$$|2\vec{a} - 3\vec{b}| = \sqrt{169}$$

$$= \underline{13}$$

$$4. (\vec{a} - 2\vec{b}) \cdot \vec{a} \quad |\vec{a} - 2\vec{b}|^2$$

$$= |\vec{a}|^2 - 2\vec{a} \cdot \vec{b} \quad = |\vec{a}|^2 - 4\vec{a} \cdot \vec{b} + 4|\vec{b}|^2 \quad \text{㊦} \vec{r}$$

$$= 4 - 10$$

$$= 4 - 20 + 52$$

$$|\vec{a} - 2\vec{b}| = 6$$

$$= -6$$

$$= 36$$

(㊦) ㊦

$$\cos \theta = \frac{(\vec{a} - 2\vec{b}) \cdot \vec{a}}{|\vec{a} - 2\vec{b}| \cdot |\vec{a}|} = \frac{-6}{6 \cdot 2} = -\frac{1}{2}$$

$$\underline{\theta = 120^\circ}$$

$$5. (\vec{a} + \vec{b}) \perp (\vec{a} + t\vec{b}) \text{ ㊦}$$

$$(\vec{a} + \vec{b}) \cdot (\vec{a} + t\vec{b}) = 0$$

$$|\vec{a}|^2 + (1+t)\vec{a} \cdot \vec{b} + t|\vec{b}|^2 = 0$$

$$4 - 2(1+t) + 4t = 0$$

$$2t + 2 = 0$$

$$\underline{t = -1}$$