

1

問 1

(1)

$$\frac{v^2}{\sqrt{l^2 - h^2}}$$

(2)

水平成分: $m \frac{v^2}{\sqrt{l^2 - h^2}} = F_1 \frac{\sqrt{l^2 - h^2}}{l}$

鉛直成分: $0 = \frac{F_1 h}{l} + F_2 - mg$

(3)

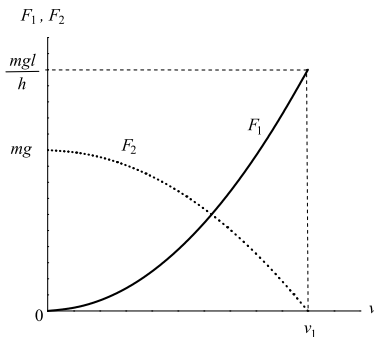
$$F_1 = \frac{mlv^2}{l^2 - h^2}$$

$$F_2 = mg - \frac{mhv^2}{l^2 - h^2}$$

(4)

$$v_1 = \sqrt{\frac{g(l^2 - h^2)}{h}}$$

(5)



(6)

$$v_2 = \sqrt{\frac{g(l^2 - h^2)}{3h}}$$

(7)

$$v_3 = \sqrt{\frac{2g(l^2 - \frac{h^2}{4})}{h}}$$

(8)

$$\sqrt{\frac{h}{g}}$$

(9)

$$\sqrt{3l^2 + \frac{h^2}{4}}$$

2

問 1

(1)

電位差: 1 倍

電気量: $\frac{1}{2}$ 倍

電場: $\frac{1}{2}$ 倍

エネルギー: $\frac{1}{2}$ 倍

(2)

電位差: 2 倍

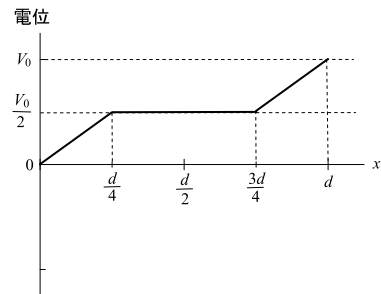
電気量: 1 倍

電場: 1 倍

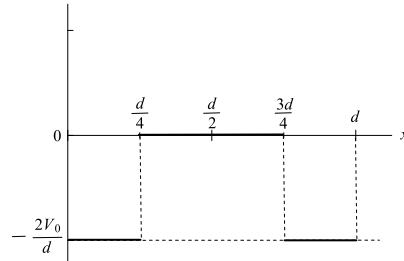
エネルギー: 2 倍

問 2

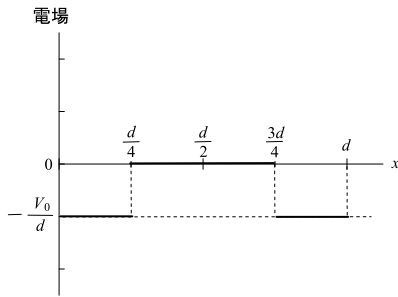
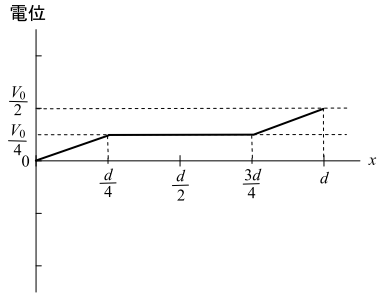
(1)



電場



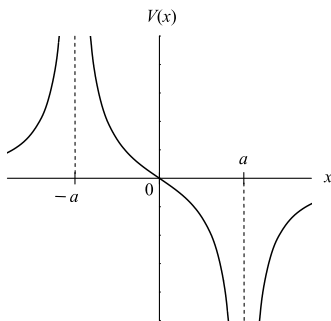
(2)



問3

(1)

$$V(x) = \frac{kq}{|x+a|} - \frac{kq}{|x-a|}$$



(2)

$$E_x = \frac{2akq}{(a^2 + y^2)^{3/2}}$$

$$E_y = 0$$

(3)

$$\text{電位} : -\frac{2axkq}{(x^2 + y^2)^{3/2}}$$

(4)

$$\text{式} : (x - \frac{5}{3}a)^2 + y^2 = (\frac{4}{3}a)^2$$

説明 : 中心 $(\frac{5}{3}a, 0)$, 半径 $\frac{4}{3}a$ の円

問4

(1)

$$E(r) = \begin{cases} 0 & (0 < r < R) \\ \frac{kQ}{r^2} & (r > R) \end{cases}$$

(2)

$$E(r) = \begin{cases} \frac{8kQ}{R^3}r & (0 < r < \frac{R}{2}) \\ \frac{kQ}{r^2} & (\frac{R}{2} < r < R) \\ 0 & (r > R) \end{cases}$$

