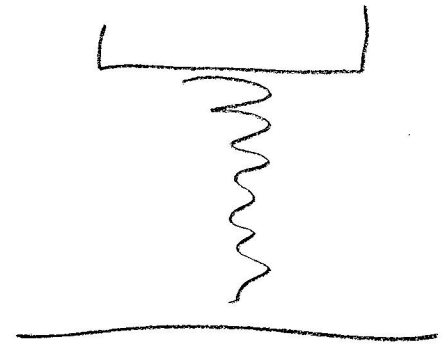


e-19-5-001

②



$$-kx_0 = 4mg$$

$$x_0 = -\frac{4mg}{k}$$

... ..
... ..

$$\frac{1}{2}mv^2 = mgh$$

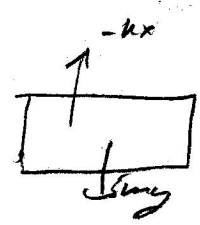
$$v = \sqrt{2gh}$$

... ..

$$mv = 5m\omega$$

$$\omega = \frac{\sqrt{2gh}}{5}$$

... ..
... ..



(x < 0)

... ..

$$-kx - 5mg = 5m\ddot{x}$$

$$\begin{cases} x = y - \frac{5mg}{k} \\ \ddot{x} = \ddot{y} \end{cases}$$

... ..

$$-k(y - \frac{5mg}{k}) - 5mg = -ky + 5mg - 5mg = -ky$$

$$-ky = 5m\ddot{y}$$

↓

$$\omega = \sqrt{\frac{k}{5m}}$$

$$y = A \cos(\omega t + \phi)$$

$$x(t) = A \cos(\omega t + \phi) - \frac{5mg}{k}$$

$$v(t) = -\omega A \sin(\omega t + \phi)$$

→ A, ϕ
 → ω

$$\begin{cases} x(0) = -\frac{4mg}{k} \\ v(0) = \frac{\sqrt{2gh}}{5} \end{cases}$$

$$A \cos \phi - \frac{5mg}{k} = -\frac{4mg}{k}$$

$$-\omega A \sin \phi = \frac{\sqrt{2gh}}{5}$$

→ ω

$$A \cos \phi = 0.098$$

$$\phi = -1.11$$

$$A \sin \phi = -0.198$$

$$A = 0.221$$

$$\begin{cases} x(t) = A \cos(\omega t + \phi) - \frac{5mg}{k} \\ v(t) = -\omega A \sin(\omega t + \phi) \end{cases}$$

→ A

→ ω

$$T = \frac{2\pi}{\omega} = 2\pi \cdot \sqrt{\frac{5m}{k}}$$

→ T

→ E

$$E = \frac{1}{2} 5m \cdot v_{\max}^2 = \frac{5}{2} m \cdot \omega^2 A^2 = \frac{1}{2} k A^2$$