Period of a Pendulum

$F = mg\sin\theta$

When assuming θ is small, $\sin\beta$ is β itself, $\sin\beta \approx \beta$

$$\beta = \frac{s}{L}$$, s is arc length.

$$F = mg\sin\beta \approx mg\beta = \left(\frac{mg}{L}\right)s.$$

In the case of a mass on a spring, $F = kx$. If we let $x = s$

$$F = ks = k \cdot \frac{F \cdot L}{mg}$$

$$k = \frac{mg}{L}$$

Therefore, period, $T = 2\pi\sqrt{\frac{m}{k}} = 2\pi\sqrt{\frac{m}{mg/L}}$

※ T is independent of mass and amplitude

$$\boxed{T = 2\pi\sqrt{\frac{L}{g}}}$$

- A larger mass tends to move more slowly because of its inertia
- The larger mass the greater g force acting on it.

Period of a Physical Pendulum

$$T = 2\pi\sqrt{\frac{l}{g}}\left(\sqrt{\frac{I}{ml^2}}\right).$$

The moment of Inertia, $I = mL^2$.