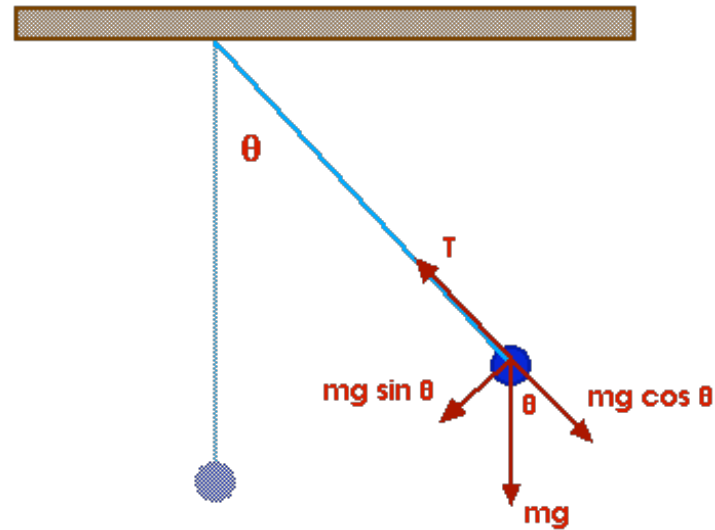# The Simple Pendulum

The Simple Pendulum

- Exhibits Simple Harmonic Motion (**SHM**) as it oscillates back and forth.
- What does the period (T) of the SHM depend on?
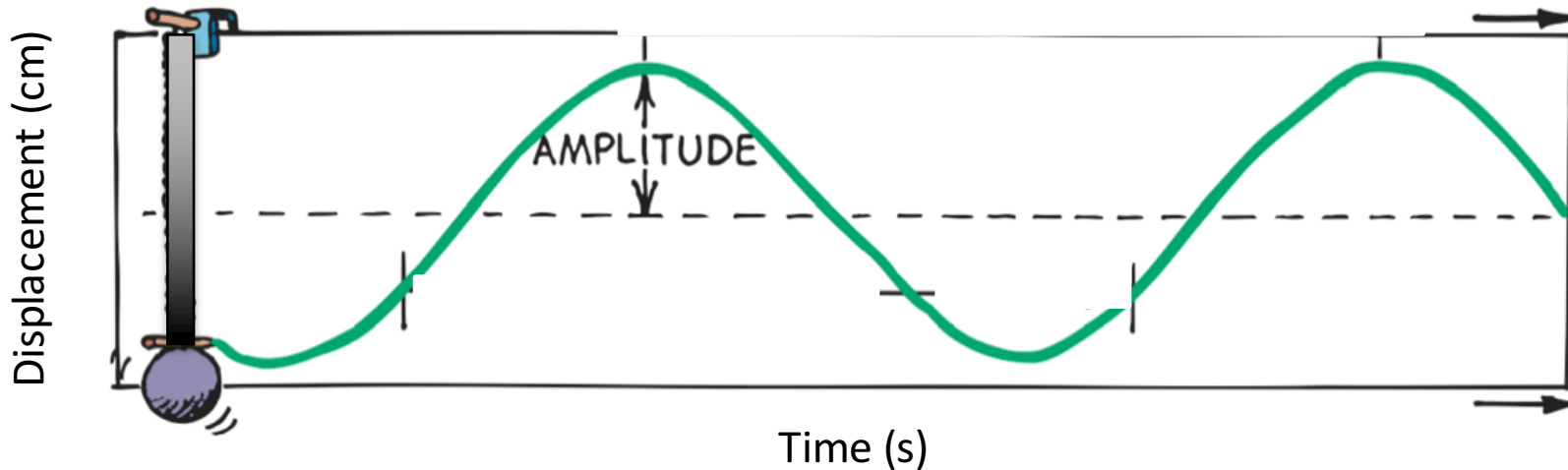
$$T = 2\pi\sqrt{\frac{L}{g}}$$

Ex1: A simple pendulum has a period of 6.5 s on Earth.

    (a) What is its frequency?

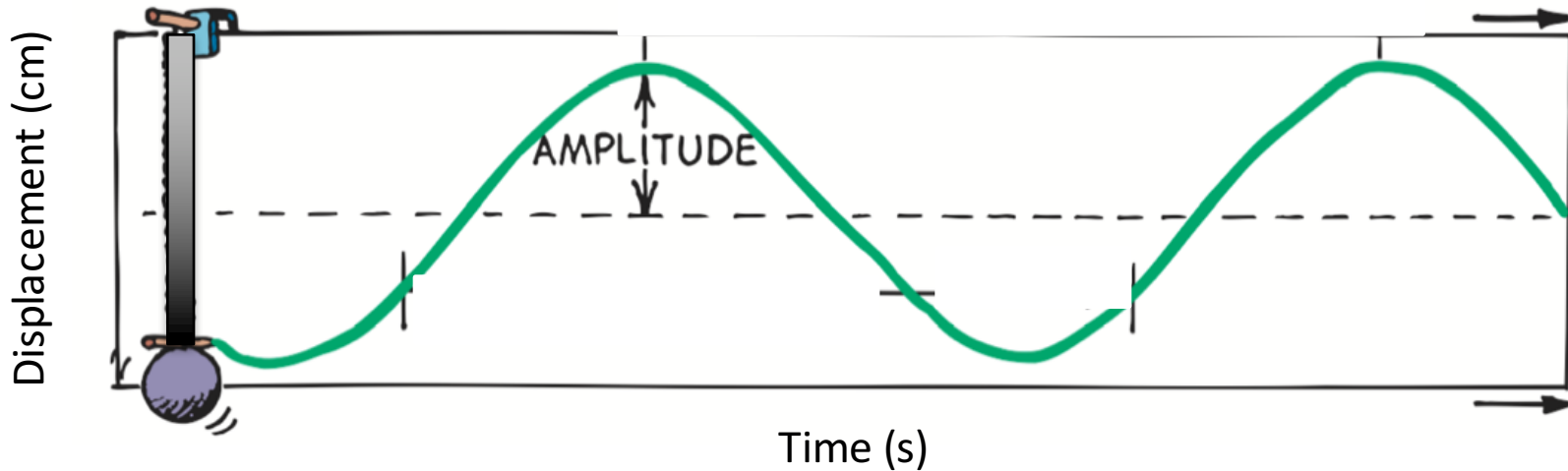   (b) What is its length?

Simple Harmonic Motion: SHM

- From the graph of SHM, we can find:
  - Amplitude (A)
  - Period (T)
  - Frequency (f)

- We can also express the frequency as an ***angular frequency*** in radians per second.
        1 cycle = 2π rad
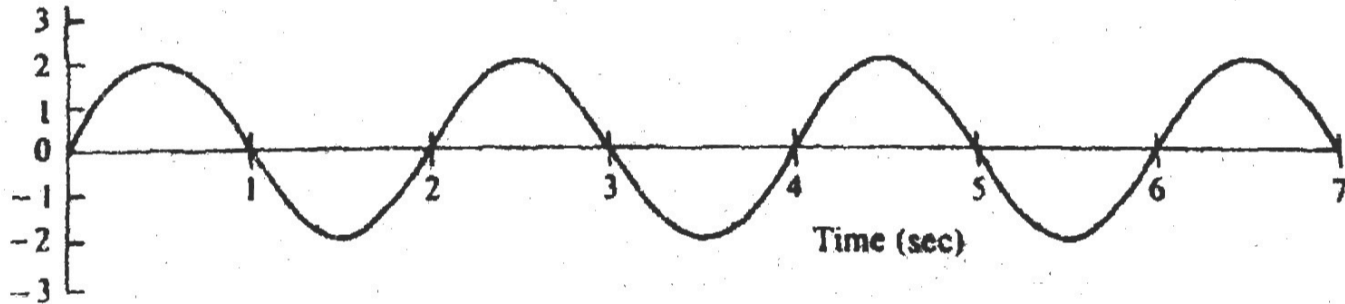
$$\omega = 2\pi f$$

Simple Harmonic Motion: SHM

- We can write an equation for the object's displacement as a function if time.
  - What type of graph does this look like?

$$x = A\sin(\omega t)$$

$$x = A\cos(\omega t)$$

$$\omega = 2\pi f$$

A = Amplitude

Ex2: The graph shows an object's displacement as a function of time.

(a) What is its period of motion?

(b) What is the frequency?

(c) What is the angular frequency?

(d) What is the amplitude?

(e) Write a displacement equation for the motion above.

(f) What is the object's displacement at 4.5 s?