

# Gravitational ACT



- If the book is raised 10 meters above the surface of the earth, the gravitational force on the book will
  - A) 100 times stronger
  - B) 10 times stronger
  - C) **Nearly the same**
  - D) 10 times weaker
  - E) 100 times weaker

$$\begin{aligned} F &= G M m / r^2 \\ &= (6.7 \times 10^{-11} \text{ m}^3 / (\text{kg s}^2)) (6 \times 10^{24} \text{ kg}) (3 \text{ kg}) / (6.4 \times 10^6 + 10)^2 \text{ m}^2 \\ &= 29.4 \text{ kg m/s}^2 \end{aligned}$$

**Near surface of earth**  $r = 6.4 \times 10^6 \text{ m}$

$$|F| = m (G M / r^2) = m (9.8 \text{ m/s}^2)$$