

GRAVITATIONAL POTENTIAL ENERGY

April 3, 2017

Practice Questions

- ① Read & Understand.
- ② Plan and solve
- ③ look back and check!
... is your answer reasonable?

1. A football player throws a ball with a mass of 0.34 kg. What is the gravitational potential energy of the ball when it is 5.0 m above the ground?

$$GPE = mgh \quad GPE = (0.34 \text{ kg})(9.8 \text{ m/s}^2)(5 \text{ m})$$

$$m = 0.34 \text{ kg}$$
$$h = 5 \text{ m}$$

$$GPE = 16.66 \text{ J}$$

2. A 2.0-kg book is on a shelf that is 1.6 m high. What is the gravitational potential energy of the book relative to the ground?

$$GPE = mgh$$

$$m = 2.0 \text{ kg}$$

$$g = 9.8 \text{ m/s}^2$$

$$h = 1.6 \text{ m}$$

$$GPE = (2.0 \text{ kg})(9.8 \text{ m/s}^2)(1.6 \text{ m})$$

$$GPE = 31.36 \text{ J}$$

3. A 36-kg girl walks to the top of stairs that are 2.0-m high. How much gravitational potential energy does the girl gain?

$$GPE = mgh$$

$$m = 36 \text{ kg}$$

$$g = 9.8 \text{ m/s}^2$$

$$h = 2.0 \text{ m}$$

$$GPE = (36 \text{ kg})(9.8 \text{ m/s}^2)(2.0 \text{ m})$$

$$GPE = 705.6 \text{ J}$$

4. A can of soup has a mass of 0.35 kg. The can is moved from a shelf that is 1.2 m off the ground to a shelf that is 0.40 m off the ground. How does the gravitational potential energy of the can change?

$$\textcircled{1} GPE = mgh \quad GPE = (0.35 \text{ kg})(9.8 \text{ m/s}^2)(1.2 \text{ m})$$

$$m = 0.35 \text{ kg}$$
$$\textcircled{1} h = 1.2 \text{ m} \quad \left(\textcircled{1} GPE = 4.12 \text{ J} \right)$$

$$\textcircled{2} GPE = mgh \quad GPE = (0.35 \text{ kg})(9.8 \text{ m/s}^2)(0.4 \text{ m})$$

$$m = 0.35 \text{ kg}$$
$$h = 0.4 \text{ m} \quad \left(\textcircled{2} GPE = 1.37 \text{ J} \right)$$

$$\Delta \text{Energy} = GPE \textcircled{1} - GPE \textcircled{2}$$

$$\Delta \text{Energy} = 4.12 \text{ J} - 1.37 \text{ J}$$

$$\Delta \text{Energy} = 2.75 \text{ J}$$

$$\text{Change in GPE is } 2.75 \text{ J}$$

