

Potential Energy Problems

256

1. Find the potential energy of a light that has a mass of 13.0 kg and is 4.8 m above the ground.



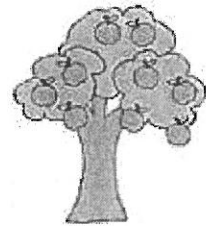
$$\begin{aligned}
 E_p &= mgh \\
 &= (13.0 \text{ kg})(9.8 \frac{\text{m}}{\text{s}^2})(4.8 \text{ m}) \\
 &= 610 \text{ J} \quad \text{of}
 \end{aligned}$$

2. An apple in a tree has a gravitational potential energy of 175 J and a mass of 115 g.

How high up is the apple?

$?$ = h

$$\begin{aligned}
 \frac{E_p}{mg} &= \frac{mgh}{mg} = \frac{175 \text{ J}}{(115 \text{ g} \times \frac{1 \text{ kg}}{1000 \text{ g}}) \cdot 9.8 \text{ m/s}^2} \\
 &= 155 \text{ m} \quad \text{wow!}
 \end{aligned}$$



3. A box with a mass of 12.5 kg sits on the floor. How high would you have to lift the box for it to develop a potential energy of 355 J?

$$\frac{E_p}{mg} = \frac{mgh}{mg}$$

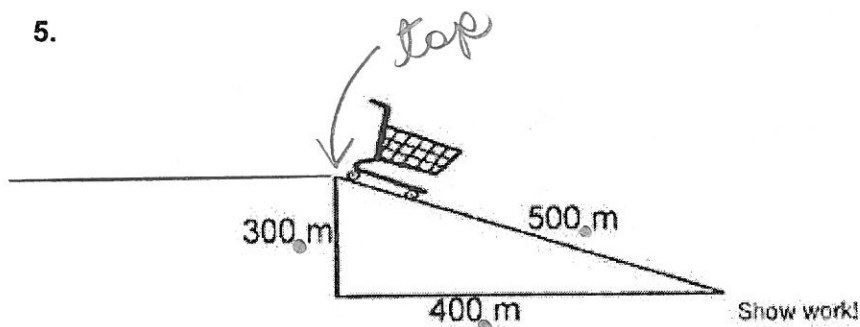
$$\frac{355 \text{ J}}{(12.5 \text{ kg})(9.8 \text{ m/s}^2)} = h = 2.90 \text{ m} \quad (\text{I'm too short to do this!})$$

4. A marble is on a table 240 cm above the ground. What is the mass of the marble if its potential energy is 568 J?

$$\frac{E_p}{gh} = \frac{mgh}{gh} = \frac{568 \text{ J}}{(9.8 \frac{\text{m}}{\text{s}^2})(240 \text{ cm} \times \frac{1 \text{ m}}{100 \text{ cm}})} = 24 \text{ kg marble!}$$

No way!

5.



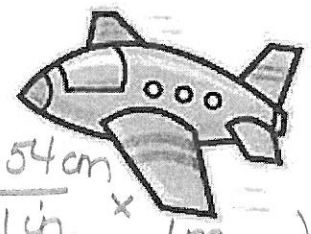
What is the PE of the 6.0 kg cart as it sits at the top of the incline?

$$\begin{aligned}
 E_p &= mgh \\
 &= (6.0 \text{ kg})(9.8 \text{ m/s}^2)(300 \text{ m}) \\
 &= 18000 \text{ J}
 \end{aligned}$$

What is the E_p of the cart at the bottom of the incline? Explain.

\emptyset E_p bec ground = reference level

6. If a 1.0×10^5 kg jet is flying at height of 35 000 ft what would be its E_p ?

$$\begin{aligned}
 E_p &= mgh \\
 &= (1.0 \times 10^5 \text{ kg})(9.8 \frac{\text{m}}{\text{s}^2}) \left(35000 \text{ ft} \times \frac{12 \text{ in}}{1 \text{ ft}} \times \frac{2.54 \text{ cm}}{1 \text{ in}} \times \frac{1 \text{ m}}{100 \text{ cm}} \right)
 \end{aligned}$$


$$= 1.0 \times 10^{10} \text{ J}$$

http://mrstakash.weebly.com/uploads/5/6/1/2/5612486/pe_and_ke

↑
not going to make you memorize these conversions But... you should!