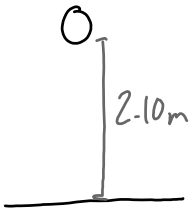
Worksheet 7.2 - Potential Energy

1. A 25.0 N object is held 2.10 m above the ground. What is the potential energy with respect to the ground?

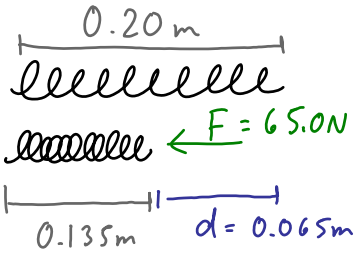


$m = \frac{F_g}{g} = \frac{25.0\,N}{9.8\,N/kg} = 2.551\,kg$

$E_p = mgh = (2.551\,kg)(9.8\,N/kg)(2.10\,m)$

$= \boxed{52.5\,J}$

2. An uncompressed spring is 20.0 cm in length. What is the potential energy of the spring when an average force of 65.0 N compresses it to a length of 13.5 cm?

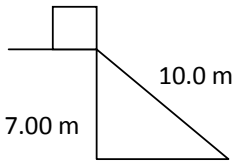


$W = \Delta E_p = Fd$

$= (65.0\,N)(0.065\,m)$

$= \boxed{4.23\,J}$

3.



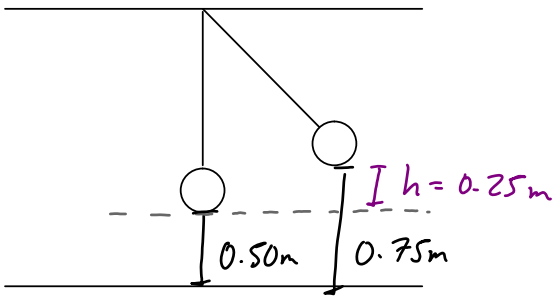
A 2.75 kg box is at the top of a frictionless incline as shown in the diagram. What is the potential energy with respect to the bottom of the incline?

$E_p = mgh$

$= (2.75\,kg)(9.8\,N/kg)(7.00\,m)$

$= \boxed{189\,J}$

4.



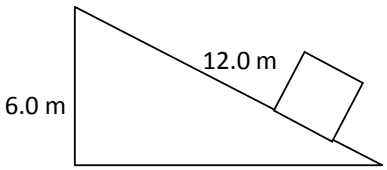
The bob of a pendulum has a mass of 2.0 kg and hangs 0.50 m above the floor. The bob is pulled sideways so that it is 0.75 m above the floor. What is its potential energy with respect to its equilibrium position?

$E_p = mgh$

$= (2.0\,kg)(9.8\,N/kg)(0.25\,m)$

$= \boxed{4.9\,J}$

5.



A 2.00 x10^3 kg crate is pushed to the top of an incline as shown. If the force applied along the incline is 12000 N, what is the potential energy of the object when it is at the top of the incline with respect to the bottom?
(Ok smartypants how much energy was wasted as heat?)

$E_p = mgh = (2.00\times10^3\,kg)(9.8\,N/kg)(6.0\,m)$

$= 117\,600\,J = \boxed{118\,000\,J}$

$W = Fd = (12000\,N)(12.0\,m)$

$= 144\,000\,J$

$W = E_p + E_H$

$E_H = W - E_p = 26\,000\,J$

1) 52.5 J 2) 4.23 J 3) 189 J 4) 4.9 J 5) 1.18x10^5 J (26000 J)