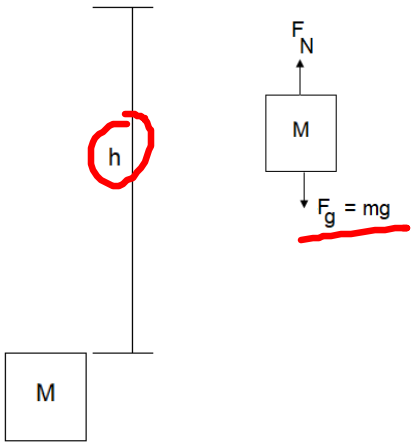
Work & Energy

Work, Energy, and the Work Energy Theorem

1. Consider a situation where a block of mass "m" is lifted to a height "h" calculate the work done on the block.



$W = F \cdot d$

$W = F_N \cdot h = F_g \cdot h$

$W = mgh$

$PE = mgh$

What is the relationship of the work done and the change in potential energy.

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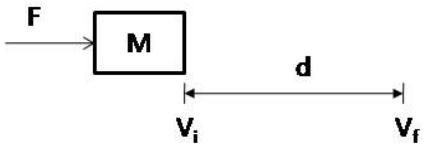
2. Consider another case where a box is accelerated by net force F, over a distance d starting with an initial velocity V_i to a final velocity V_f:



From Newton's Second Law, what is the acceleration of the box in terms of variables?

$a = \frac{F}{M}$

a) $KE_i = \frac{1}{2}MV_i^2$ $KE_f = \frac{1}{2}MV_f^2$

b) Using Kinematics we have V_i, V_f, d , a, & T is the unused variable, use equation #5

$V_f^2 = V_i^2 + 2ad$

$V_f^2 = V_i^2 + 2\frac{F}{M}d$

$\frac{M}{2}(V_f^2 - V_i^2) = \frac{2}{M}F \cdot d\left(\frac{M}{2}\right)$

$\frac{1}{2}mV_f^2 - \frac{1}{2}mV_i^2 = F \cdot d$

$KE_f - KE_i = W$

c) What is the relationship between work and kinetic energy?

$\Delta E = W$ for Both KE & PE

Work & Energy

1 The purpose of doing work in physics is to…..

Change or transfer Energy

Positive work done on an object INCREASES its total energy while negative work done on the object DECREASES its total energy.

2. The work energy theorem states that:

$$E_f = E_I + W$$

Therefore if no work is done on an object its energy is CONSTANT.