**BELLMORE-MERRICK CENTRAL HIGH SCHOOL DISTRICT**

*S. H. Calhoun High School & W. C. Mepham High School*

*Ms. Nigro*

*Regents Physics*

*Energy Unit*

**WORK AGAINST GRAVITY**

A special case for work is the work done against gravity. The force needed to lift an object of mass *m* is equal to its weight, *mg.* so, for work done against gravity we use the equation:

*Wg = Fg d = mgh Wg = Work done against gravity (J)*

 *m = mass being lifted (kg)*

 *g = acceleration due to gravity (m/s2)*

 *h = height lifted (m)*

**Example 1:**

How much work is required to lift a 2 kg object, 3m from the ground?

**Example 2:**

How much work is required to move a 4 kg object that is 1 m from the ground, to a height of 5 m from the ground?

**Example 3:**

Which path up a mountain requires more work?

C

B

A

10 m

0 m

**POWER**

Power is the rate at which work is done. In other words, power is the work done per unit time. A very powerful source can do a lot of work in very little time. Power is measured in *Watts*.

**

*P = Power (W) F = Force (N)*

*W = Work (J) d = displacement (m)*

*t = time (s) v = velocity (m/s)*

**Example 1:**

An 80 kg student does 7000 J of work by running up three flights of stairs in 10 seconds. What is the power developed by this student?

**Example 2:**

A constant horizontal force of 6 N to the left is applied to a box on a counter to overcome friction. Calculate the power dissipated in moving the box 3 m to the left along the counter in 1.5 s.

**Example 3:**

What is the weight of an object that takes 18 W of power to lift vertically at a speed of 2 m/s?