***Name*_____**

Mechanical Equivalent of Heat

Introduction

When water flows over a waterfall, energy is exchanged between gravitational potential energy and kinetic energy. Pe_g decreases as KE increases. Eventually, as the water crashes at the bottom of the waterfall the KE becomes heat.
In equation form:

$$\Delta PE_g = Q$$

$$\Rightarrow mgh = mc\Delta T$$

Assuming the heat capacity of water is 4184 J/kg °C, the change in temperature (ΔT) can be solved for.

Procedure

Solve for ΔT assuming various heights as indicated in the table.

h (m)	***ΔT(° C)***
1	
10^2	
10^3	
10^4	

Sample Calculations:

Table 1: Calculating Temperature Change of a Waterfall

1. *If you put room temperature water in a blender for a few minutes, what would happen in terms of energy? How could you detect a change in the system?*

***Name*_____**

A water balloon is dropped from the top of the Science building. Assume the balloon does not break when it strikes the ground.

(a) What is the maximum temperature rise of the water balloon due to its being dropped? Assume it falls a distance of 21 m.

(b) Is there anything in the physics we have discussed so far that prohibits the water balloon from suddenly cooling off to its original temperature and leaping 21 m into the air? (hint: From the random nature of thermal energy, can you think of why we never see this happen?)