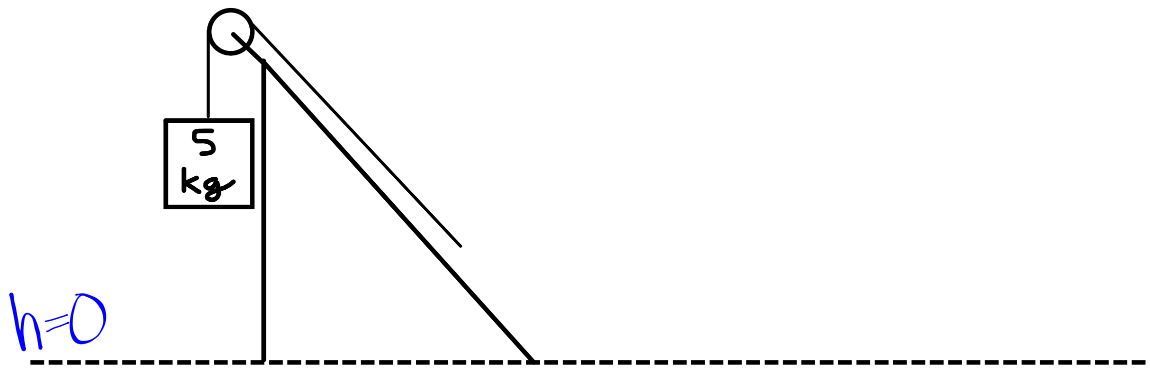
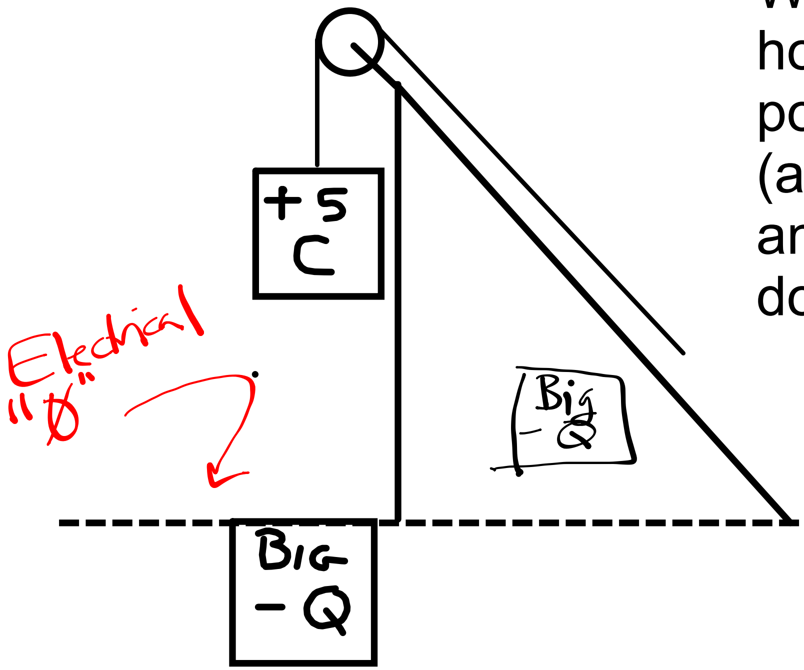


This mass, due to its position relative to the earth, and the fact that all mass attracts all other mass, has GPE.

If the string is cut, GPE gets converted to KE and ultimately the falling mass can do work.



We can see how this is similar, and how we might be able to talk about the potential energy associated with charge (and the KE the charge can acquire and therefore the work it can ultimately do).

$W = F \cdot d \qquad F = k\frac{Qq}{r^2}$

$d = r$

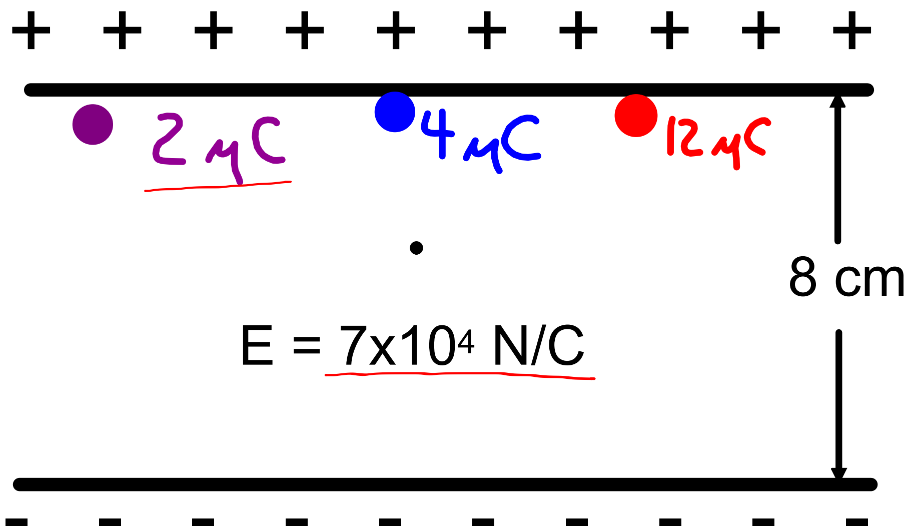
How do we properly refer to this situation?

What if the lower charge was positive? How should refer to this?

First, let's consider a new situation of charge distribution -- two parallel conducting plates with equal and opposite charge distributed upon them. What happens between these plates?

3D physic applet and demo of a uniform electric field between charged plates; the field becomes uniform when the plates are relatively large and close together.
http://www.falstad.com/vector3de/

WARM-UP: Assume three charges (as shown) are moved from the positive to the negative plate through the uniform electric field between the plates. How much work is done on each charge?



$W = F \cdot d$

$= .14\ N \cdot 0.08\ m$

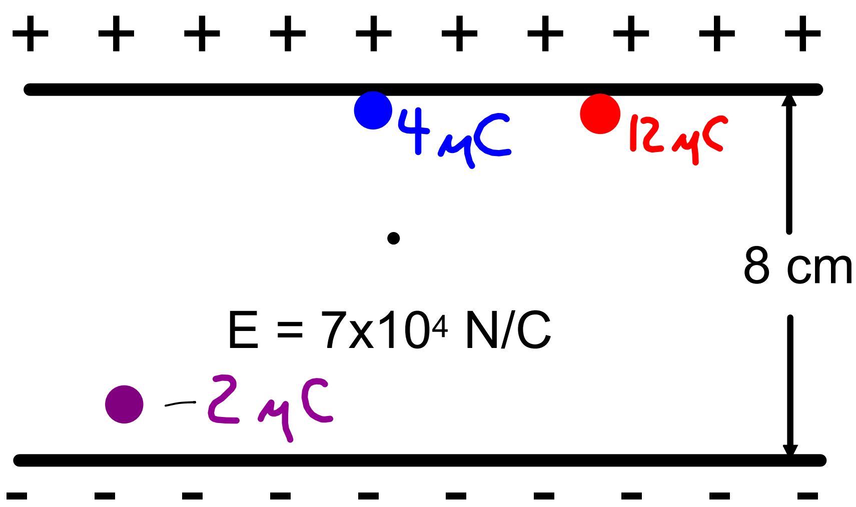
$\boxed{= 0.0112\ J}$

$E = \frac{F}{q}$

$F_E = E \cdot q = (7\times10^4)(2\times10^{-6})$

$F_E = 0.14\ N$

WARM-UP: Assume three charges (as shown) are moved from the positive to the negative plate through the uniform electric field between the plates. How much work is done on each charge?



$$W_2 = F \cdot d = Eq \cdot d = (7\times10^4)(2\times10^{-6})(.08) = .0112\ \text{J}$$

$$W_4 = \text{"} = \text{"} = (7\times10^4)(4\times10^{-6})(.08) = .0224\ \text{J}$$

$$W_{12} = \text{"} = \text{"} = (7\times10^4)(12\times10^{-6})(.08) = .0672\ \text{J}$$

Each charge, upon reaching the negative plate, will have the calculated amount of energy in the form of KE.

What happens if we determine the work on a per-charge (coulomb) basis? For each case, determine the work done / charge being moved:

$$\frac{W_2}{q} = \frac{.0112\ J}{2\times10^{-6}\ C} =$$

$$\frac{W_4}{q} = \frac{.0224\ J}{4\times10^{-6}\ C} =$$

$$\frac{W_{12}}{q} = \frac{.0672\ J}{12\times10^{-6}\ C} =$$