HW Feb 12, Johannes Byle

4.53 (a)

$$\frac{ke^2}{r^2} = \frac{mv^2}{r}$$

$$\frac{ke^2}{r} = mv^2$$

$$KE = \frac{1}{2}mv^2 = \frac{ke^2}{2r}$$

$$PE = \int \frac{ke^2}{r^2} dr = -\frac{ke^2}{r}$$

Thus

$$\frac{1}{2}PE = -KE$$

(b)

$$E_{e_1} = PE_1 + KE_1 = \frac{1}{2}mv^2 - \frac{ke^2}{r}$$

$$E_{e_2} = PE_2 + KE_2 = T_2 - \frac{ke^2}{r}$$

$$E_p = PE_3 = -\frac{ke^2}{r}$$

(c) Before:

$$E_{e_1} = PE_1 + KE_1 = \frac{1}{2}mv^2 - \frac{ke^2}{r}$$

$$E_{e_2} = PE_2 + KE_2 = T_2$$

$$E_p = PE_3 = -\frac{ke^2}{r}$$

After:

$$E_{e_1} = PE_1 + KE_1 = \frac{1}{2}mv^2$$

$$E_{e_2} = PE_2 + KE_2 = \frac{1}{2}mv^2 - \frac{ke^2}{r'}$$

$$E_p = PE_3 = -\frac{ke^2}{r}$$