

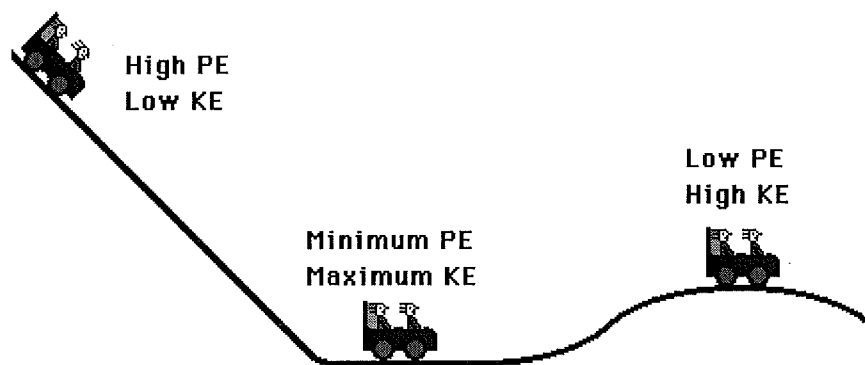
Conservation of Mechanical Energy

If only conservative forces are acting, the total mechanical energy of a system neither increases nor decreases in any process. It stays constant - it is conserved.

$$E = KE + PE$$

$$KE_1 + PE_1 = KE_2 + PE_2$$

The total mechanical energy E is equal to the sum of the kinetic and potential energies of a system.



As a coaster car loses height, it gains speed; PE is transformed into KE. As a coaster car gains height it loses speed; KE is transformed into PE. The sum of the KE and PE is a constant.

Example 6-8 page 160: If the original height of the stone in figure 6-17 is $h_1 = 3.0\text{m}$, calculate the stone's speed when it has fallen to 1.0m above the ground.

$$KE_1 + PE_1 = KE_2 + PE_2$$

$$\frac{1}{2} mv_1^2 + mgh_1 = \frac{1}{2} mv_2^2 + mgh_2$$

$$0 + mgh_1 = \frac{1}{2} mv_2^2 + mgh_2$$

m cancels

$$gh_1 = \frac{1}{2} v_2^2 + gh_2$$

Solve for v_2

$$2(gh_1 - gh_2) = v_2^2$$

$$\sqrt{2(gh_1 - gh_2)} = v_2$$

$$\sqrt{2(9.8\text{m/s}^2)(3.0\text{m}) - (9.8\text{m/s}^2)(1.0\text{m})} = v_2$$

$$v_2 = 6.3\text{m/s}$$

The Law of conservation of energy states:

The total energy is neither increased nor decreased in any process.

Energy can be transformed from one form to another, and transferred from one form to another, but the total remains constant.

Do # 35, 36, 37, 38, 39,40, 41,44 p 176