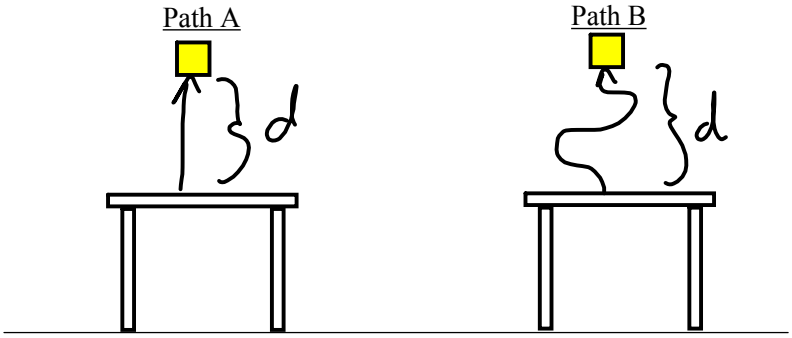
Chapter 7 - Conservation of Energy
(Page 278)

Two Classes of Forces

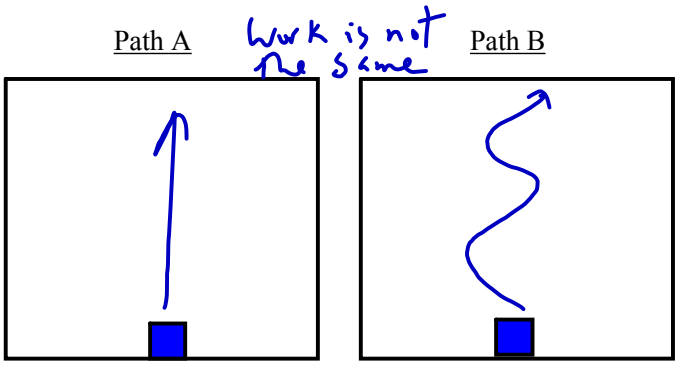
1. Conservative Force - A conservative force does work on an object in such a way that the amount of work done is independent of the path taken. It depends only on the initial and final positions of the object. If the initial and final positions of the object are the same, no net work is done on the object. The force of gravity is a conservative force.

Example: Lifting a box from the floor to a table.



2. Nonconservative Force - A nonconservative force does work that depends on the path taken. The force of friction is a nonconservative force.

Example: Pushing a box across a floor. Assume you are looking down on the box.



The Law of Conservation of Energy
(Page 282)

If all the work done throughout a process is done by **conservative forces**, the total mechanical energy of the system after the process is equal to the total mechanical energy of the system before the process.

$$E_{To} = E_{Tf}$$

E_{To} - total initial energy (J)
E_{Tf} - total final energy (J)

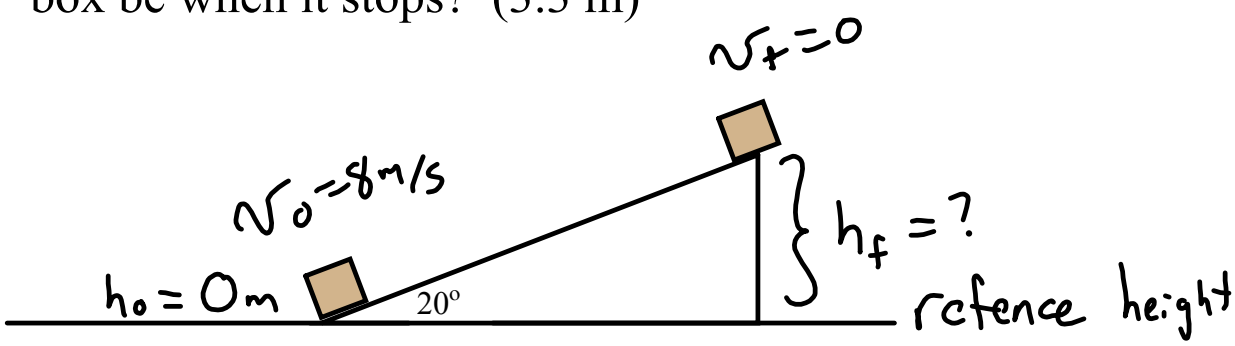
Remember: Mechanical energy is a combination of kinetic and potential energy.

$$E_{ko} + E_{go} + E_{eo} = E_{kf} + E_{gf} + E_{ef}$$

$$E_{To} = E_{Tf}$$

$$\Delta E_T = 0 \text{ J}$$

Example: A box is shot up a frictionless 20° incline with an initial speed of 8.0 m/s. How high above the floor will the box be when it stops? (3.3 m)



$$E_{Tf} = E_{T0}$$

$$E_{K0} + \cancel{E_{g0}}^{0} + \cancel{E_{e0}} = \cancel{E_{Kf}}^{0} + E_{gf} + \cancel{E_{ef}}$$

$$E_{K0} = E_{gf}$$

$$\frac{1}{2}\cancel{m}v_0^2 = \cancel{m}gh_f$$

$$\frac{1}{2}(8)^2 = (9.81)h_f$$

$$32 = 9.81\,h_f$$

$$\boxed{3.26\,m = h_f}$$