Energy Conservation problems

1. Drop box at 10 m: mgh = ½ mv2 (25)(9.8)(5.2) = ½ (25) (v)2 10 = 10.1 m/s

at ground : mgh = ½ mv2 -> 25)(9.8)(15.2) = ½ (25) (v)2 = 17.3 m/s

1. mgh = ½ mv2 -> ½ (3)(5.75)2 = (3)(9.8)(h) h = 1.69 m
2. PE = mgh = (6.75)(9.8)(5) = 330.8 J

KE bot = ½ m(v)2 = ½ 6.75)(7.5)2 = 190 J

ΔKE = -140.8 J

1. on flat portion :190 J = μmg(x) --> 190J/μmg = x = 0.96
2. a) TE = mgh = 5)(9.8)(2) = 98 J

b) V bottom = 98 = ½ mv2 v = 6.28 m/s

c)KE lost = W*f* =  - (μmg)x --> 98/0.3)(5.0)(9.8) = x = 6.7 m

6. Total energy at the top must all be lost due to friction to stop the block.

Total energy is KE + PE = ½ mv2 + mgh0 = ½ (1.5)(2)2 + 1.5 (9.8)(LsinΘ)

L sinΘ = h0

When the block begins to slide down the ramp its potential energy will be converted/lost to friction. The net amount of work done on the block as it slides down the ramp is due to the forces involved. mgsinΘ is the component of weight pulling it down the ramp, and μmgcosΘ is the force of friction, *f*. *f* must be bigger than mgsinΘ because the block stops rather than moves faster.

W = μmgcosΘ (L) – mgsinΘ (L) n W*f*– WFll = Wnet

By setting these two equal we get:

½ (m)(2)2 + m (9.8)(LsinΘ) = –[ μmgcosΘ (L) – mgsinΘ (L)]

The mass should cancel here leaving

2 + 4.9 L = – 5.09 L + 4.9 L

2/5.09 = L = 0.39 m

(Net work is negative

7. a) TE = mgh = (2)(3)(9.8) = 58.8 J

b) vb = ½ mv2 --> 58.8 = ½ (2) (v)2 v = 7.67 m/s

c) ΔKE = W*f* = -(μmg)x = -(2)(9.8)(0.35)(1.5m) = - 10.3J

d) KE to climb = 58-5 – 10.3 = 48.5 J = mgh --> h = 2.47 m

8. W = ΔKE = (8.6)(1.5) = 12.9 J

W*f* = (μmg)(x) --> -12.9/(20)(9.8)(2.00m) = μ = 0.033