/81

**Physics 30 - Lesson 3C**

**Conservation of Energy**

1)

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The claim that less work is done is not valid. Work is the change in an object’s energy, in this case gravitational potential energy. Using a ramp or going straight up results in the same change in energy. However the amount of force required is less for the ramp since the distance is longer (W = Fd).

2)

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Assuming that the same friction force acts on each car, the car with the longer skid mark had twice the kinetic energy of the other car (W = E = Fd).

3)

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a. non-mechanical

b. mechanical (kinetic energy of air molecules)

c. mechanical (alternating gravitational potential and kinetic energies)

d. mechanical (there is spring potential in the mattress)

e. mechanical (the rocket has kinetic and gravitational potential energies)

4)

 /2

No it is not possible. The ball has gravitational potential energy when it is dropped. It can not gain energy some how in the act of falling and bouncing up. In fact, some energy will be lost as heat in the collision with the earth.



5)

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37o

30.0 m

x

x=30.0cos37o

x=23.959m

h=30.0 m – x

h=30.0m – 23.959m

h=6.041 m

6)

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a. from rest



b. starts at 4.00 m/s



7)

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a. frictional force b. stopping time

 

8)

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a. From the graph ~120 mJ.

9)

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b. From the graph Ek ~ 350 mJ



c. From the graph EP max = 600 mJ



10)

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vmax = 5.0 m/s

xmax = 0.110 m

11)

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First, find m Second, calculate the speed when x = 0.20 m

 



12)

 /9

 

 

13)

 /9

14)

 /6

a) no air resistance



Ep

Ek + WH

b) with air resistance



Since the collision between the bullet and the pendulum is inelastic kinetic energy is not conserved. Therefore the problem can be solved in two parts:

a. the swing up > energy

15)

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b. the collision > momentum

65 mm







16)

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