Level 4: Energy Questions

#16 Block on ramp question:
A 7 kg block is given an initial velocity of 8.0 m/s going up an incline of 30 degrees.  If the coefficient of friction between the block and the ramp is 0.3, what is the velocity of the block when it returns to the bottom of the ramp?

#17 Acrobat on skis question:
An acrobat on skis starts from rest 50.0 m above the ground on a frictionless track and flies off the track at a 45 degree angle above the horizontal and at a height of 10.0 m.  Disregard air resistance.
a) find the skier's speed when she leaves the track
b) find the maximum height attained
c) find the range (horizontal  displacement) of the skier

Note:  this is neither a cliff nor a golf ball problem since there is a delta Y AND a a launch angle.  You will have to use the quadratic formula to solve kinematic #2.

Names: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ CoE and Work Challenge (Level 4 #18)

*Instructions: only answers will be graded. Units must be included for full credit. Hints cost 5 points each.*

Use information in the drawing to answer the questions below. Assume no friction unless stated. It is worth noting that the drawing is not drawn to scale.

m = 0.800 kg

crazy ideal loopy part

4 m

D

F = ?

CoEk

k = 200.0 N/m

A

B

Friction Surface

5 m

6 m

1 m

10 m

E

C

1. At point ‘C’, the CoEk can is moving 18 m/s. How fast is the CoEk can moving when it reaches point ‘D’ ?

2. How much force must you apply to the CoEk can from point ‘A’ to point ‘B’ so that it is moving 18 m/s at point ‘C’ ?

3. What is the coefficient of friction required for the friction surface to slow the CoEk can to 9 m/s by point ‘E’?

4. After the crazy ideal loopy part, what is the maximum amount that the CoEk can compresses the spring?

\*\*\*The questions below are independent of the system above\*\*\*

5. What amount of power is needed to lift a 60 kg bucket of concrete 20 meters in 3 minutes?

6. How much work is needed to accelerate a 1000 kg truck from 10 mph to 30 mph?