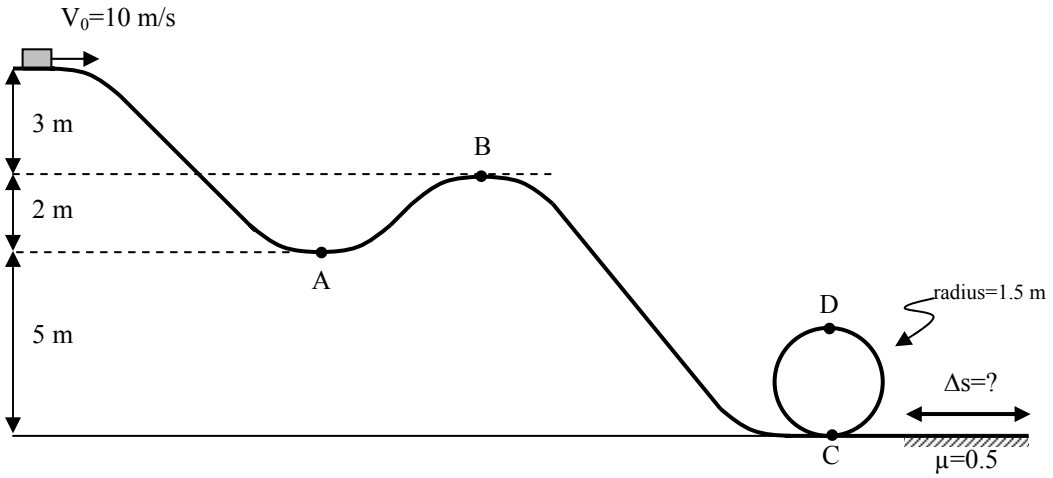
W6.02

Energy

Solve Using Energy Methods



1. A 5-kg block starts at a speed of 10 m/s at the top of a "roller-coaster" as shown above.
   a. What is its KE at the top?

   b. What is its GPE at the top (relative to the ground)?

   c. What is the block's <u>total</u> energy at the top?

2. If the track is completely frictionless and there is no air resistance, the block will not lose any energy until it reaches the level surface were μ=0.5 and the frictional force "takes away" energy.
   a. Find the GPE at point A and then calculate how much of the block's total energy must be in the form of KE. Also find the speed at point A.

   b. Repeat the above for points B, C and D.

3. After the block exits the loop-the-loop, it encounters a horizontal, rough surface (μ = 0.5) and comes to a stop.
   a. How much total energy does the block have just as it exits the loop-the-loop?

   b. How much energy does the frictional force "take away" in bringing the block to a stop?

   c. How large is the frictional force acting on the block?

   d. How far does the block slid before coming to a stop?

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1. a) 250 joules
   b) 500 joules
   c) 750 joules

2. GPE_A=250 J

   KE_A=500 J [Total - GPE_A]

   v_A=14.14 m/s [$KE_A=1/2m(v)^2$]

   GPE_B=350 J

   KE_B=400 J [Total – GPE_B]

   v_B=12.65 m/s [$KE_B=1/2m(v)^2$]

   GPE_C=0 J

   KE_C=750 J [Total – GPE_C]

   v_C=17.32 m/s [$KE_C=1/2m(v)^2$]

   GPE_D=150 J

   KE_D=600 J [Total – GPE_D]

   v_D=15.5 m/s [$KE_D=1/2m(v)^2$]

3. a) 750J
   b) 750 J
   c) 25 N
   d) 30 meters