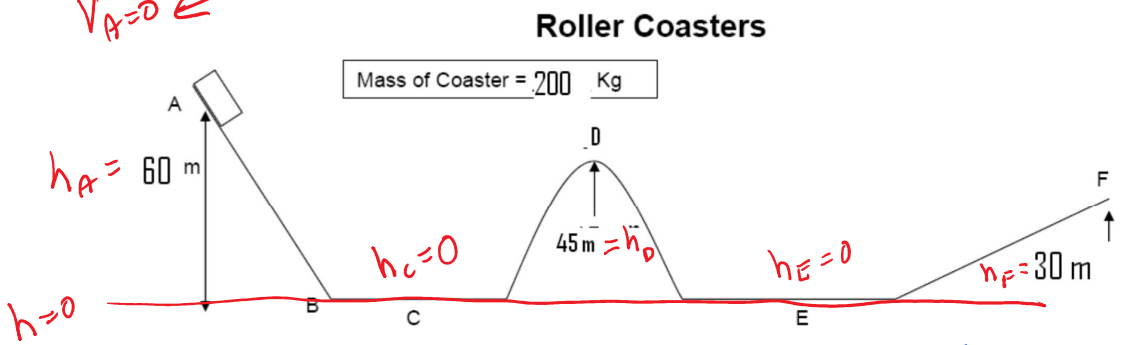
CONSERVATION OF ENERGY WORKSHEET 1

Use the picture and information below to answer the following questions. **Assume that the coaster starts at rest and the track is frictionless.**

$v_A = 0$



1. If the coaster starts at rest, what type of energy does it have at the beginning? GRAVITATIONAL POTENTIAL ENERGY

2. What happens to its kinetic, potential, and mechanical energy as it moves from A → C?

ME = KE + PE ← Mechanical: RTS Potential: ↓ (h↓) Kinetic: ↑ (v↑)

3. Calculate the amount of kinetic energy the cart has at position C.

$h_A = 60m$, $v_A = 0$ | $h_C = 0m$

$KE_A^{\,0} + PE_A = KE_C + PE_C^{\,0}$

$mgh_A = KE_C$

$KE_C = mgh_A = (200kg)(9.81m/s^2)(60m)$

$KE_C = 117,720J$

4. Calculate the speed of the cart at position C.

$v_C = ?$ $\quad KE_C = \frac{1}{2}mv_C^2$

$v_C = \sqrt{\frac{2KE_C}{m}} = \sqrt{\frac{2(117,720J)}{200kg}} = 34.3m/s$

5. What happens to its kinetic, potential, and mechanical energy as it moves from C → D?

ME = KE + PE → Mechanical: RTS Potential: ↑ (h↑) Kinetic: ↓ (↓v)

6. Calculate the amount of kinetic energy the cart has at position D.

$h_D = 45m$

$KE_A^{\,0} + PE_A = KE_D + PE_D$

$mgh_A = KE_D + mgh_D$

$(200kg)(9.81m/s^2)(60m) = KE_D + (200kg)(9.81m/s^2)(45m) \rightarrow KE_D = 29,430J$

7. Calculate the speed of the cart at position D.

$v_D = ?$ $\quad KE_D = \frac{1}{2}mv_D^2 \rightarrow v_D = \sqrt{\frac{2KE_D}{m}} = \sqrt{\frac{2(29,430J)}{200kg}} = 17.2m/s$

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