

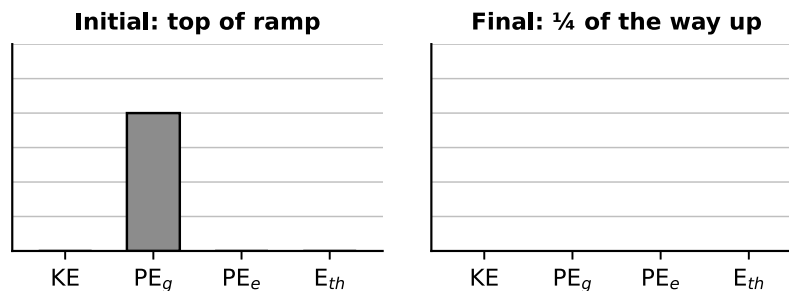


Part A: Energy Changes Form

Ignore friction and air resistance on this worksheet. Use $g = 9.8 \text{ m/s}^2$.

1. Nia swings on a playground swing. Describe the energy at each point using KE and PE_g .
 - a. at the highest point of the swing, where she stops for an instant
 - b. at the lowest point of the swing
 - c. halfway between them
 - d. Is her total mechanical energy bigger at any of these points? Explain.

2. A skateboarder starts from rest at the top of a ramp. The initial energy bar chart is shown. Complete the final bar chart for the moment she reaches a point one quarter of the way up from the bottom ($h = 0$ at the bottom). Explain how you chose the bar heights.



Part B: Using Conservation of Energy

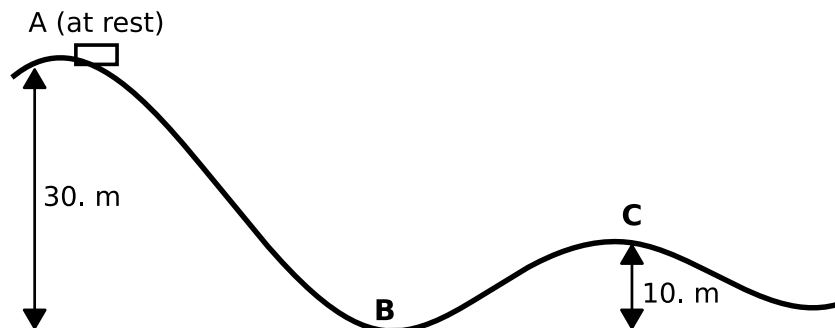
Pick initial and final points, write $TME_i = TME_f$, cross out zero terms, and solve.

3. Ethan's phone slips off a balcony railing 4.9 m above the ground. How fast is it moving just before it lands?

4. Gabi tosses her keys straight up at 4.2 m/s. How high above her hand do they rise?

Part C: Multi-Step Problems

5. A 600. kg roller coaster car starts from rest at point A and rolls along the track shown.



- Find the car's total mechanical energy at point A ($h = 0$ at the ground).
 - How fast is the car moving at point B, the bottom of the track?
 - How fast is the car moving at point C, the top of the 10. m hill?
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6. A toy launcher has a spring with $k = 500.$ N/m. It is squeezed 0.10 m and launches a 0.20 kg ball along a level floor. The ball then rolls up a ramp.
- How much elastic potential energy is stored in the squeezed spring?
 - How fast is the ball moving on the level floor after it leaves the spring?
 - How high up the ramp does the ball roll before it stops?