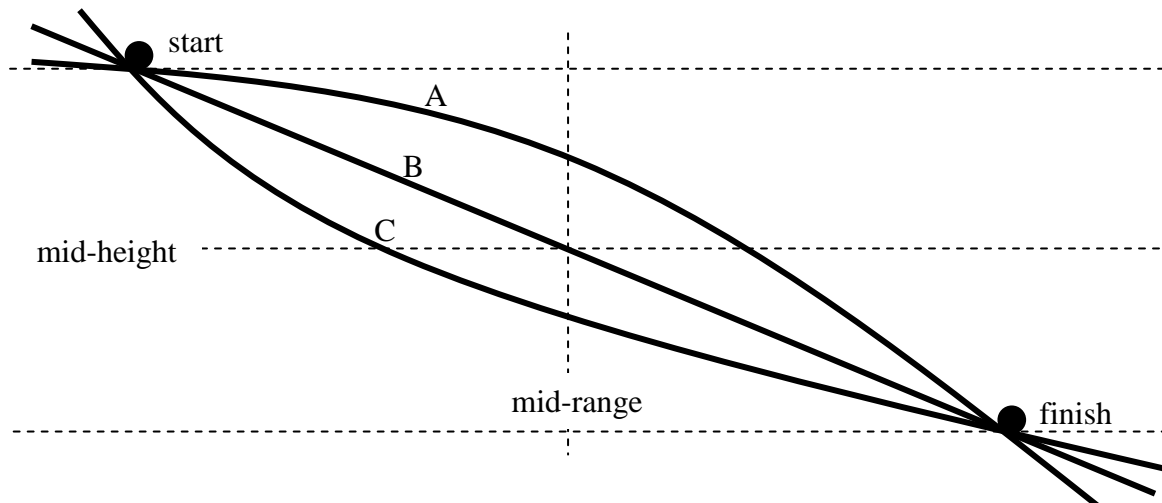


**Unit 8IB Review**

1. Three balls are rolled down three tracks starting from rest at the point marked “start.”



- Describe the acceleration of the ball traveling on track A.
- Describe the acceleration of the ball traveling on track B.
- Describe the acceleration of the ball traveling on track C.
- Describe the velocity of the ball traveling on track A.
- Describe the velocity of the ball traveling on track B.
- Describe the velocity of the ball traveling on track C.
- Rank the time needed for the balls to travel from start to finish. Explain your ranking.

shortest: \_\_\_\_\_ :longest

- h. Rank the instantaneous velocities of the balls at the mid-height line. Explain your ranking.

shortest: \_\_\_\_\_ :longest

- i. Rank the instantaneous velocities of the balls at the mid-range line. Explain your ranking.

shortest: \_\_\_\_\_ :longest

- j. Rank the instantaneous velocities of the balls at the finish point. Explain your ranking.

shortest: \_\_\_\_\_ :longest

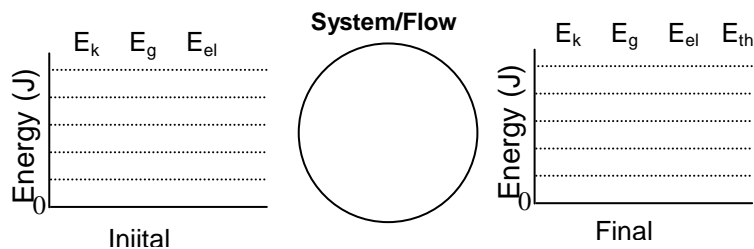
- k. If the start is 1.0 m higher than the finish, determine the heights at which A, B, and C will have half of their final kinetic energy.

- l. If the start is 1.0 m higher than the finish, determine the heights at which A, B, and C will have half of their final velocity.

2. A baseball ( $m = 140 \text{ g}$ ) traveling at  $30 \text{ m/s}$  moves a fielder's glove backward  $35 \text{ cm}$  when the ball is caught.

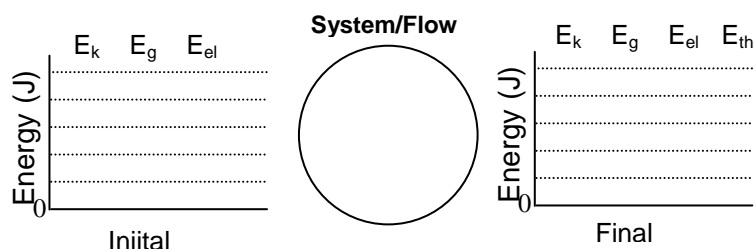
- a. Construct an energy bar graph of the situation, with only the ball and Earth in the system.

- b. How large is the average force exerted by the ball on the glove?



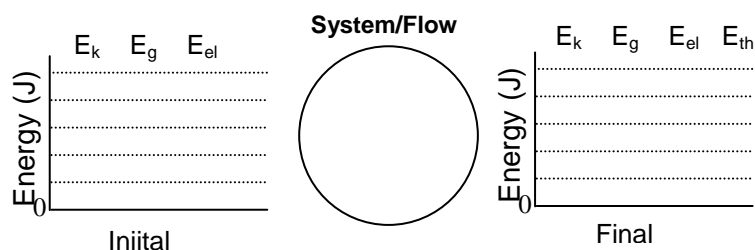
3. A spring whose spring constant is 850 N/m is compressed 0.40 m. What is the maximum speed it can give to a 500 g ball?

4. A bullet with a mass of ten grams is fired from a rifle with a barrel that is 85 cm long.  
a. Do an energy bar graph analysis of the situation.



- b. Assuming that the force exerted by the expanding gas to be a constant 5500 N, what speed would the bullet reach?

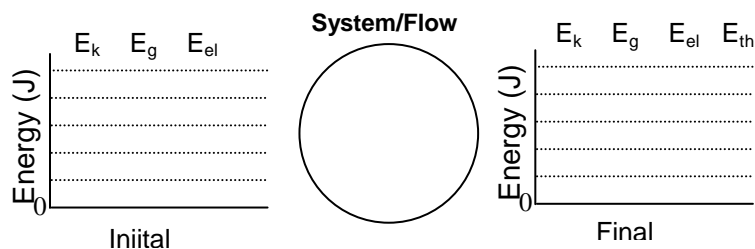
5. A 24 kg child descends a 5.0 m high slide and reaches the ground with a speed of 2.8 m/s.
- Do a bar graph analysis for this situation.



- How much energy was transferred to the thermal account due to friction in the process?

6. A 1500 kg car is traveling at 20 m/s.
- Calculate the  $E_k$  of the car relative to the road.

- If the average braking force applied to the car is 6000 N, how far would it travel before it came to a stop? (Draw an energy bar graph of the situation.)



- If this same average braking force were applied to the car moving at twice the speed, what would be the stopping distance?