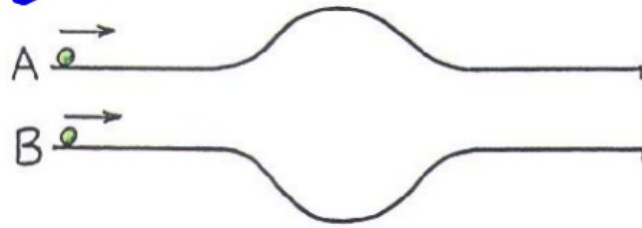# Bellwork 5/3



Two smooth tracks of equal length have "bumps"—A up
and B down, both of the same curvature. If two balls
start simultaneously with the same initial speed, the ball
to complete the journey first is along
a) Track A.   b) Track B.   c) ... both take the same time.

Both start with the same kinetic
Energy, but ball B also starts
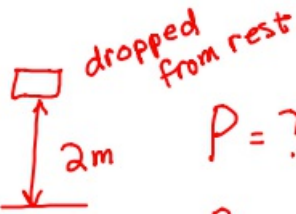with some potential energy

Ball A: $E = \underline{K_i} + \cancel{P_i}^{\;0}$

Ball B: $E = \underline{K_i} + P_i$   (more total energy)

---

At the end, both balls
have kinetic energy only.
Since B has more total energy
it will have a greater K, and
thus a greater v. So B
reaches the end first.

① a)

dropped from rest
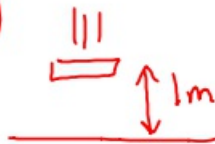
2m

*NOTE

20N = mg

↑ Weight is given (not mass)

$P = ?$

$P = mgh$

$P = (20N)(2m) = 40 N \cdot m$

$\boxed{P = 40J}$

At the top, the book has NO kinetic Energy since it is at rest. Therefore, the total energy of the book is 40J.

b)

↑↓ 1m

$K = ?$

$E = K + P$

different approach

E = K + P

|       | K    | P    | E    |
|-------|------|------|------|
| top   | 0    | 40J  | 40J  |
| @ 1m  | 20J  | 20J  | 40J  |

$40J = K + \underbrace{mgh}_{20N \quad 1m}$

$40J = K + 20J$

$20J = K$

part c

III

$E = K + P$

$40J = K + 0$

$40J = K$, find $v$

$40J = \frac{1}{2}mv^2$

$40J = \frac{1}{2}(2kg)v^2$

$\boxed{v = 6.32 \frac{m}{s}}$

Given weight

$F_g = 20N$

$mg = 20N$

$m = \dfrac{20N}{9.8 \frac{m}{s^2}}$

②

Initial

O

Given

1m

Final position

m = 0.5 kg

$V_i = 5 \frac{m}{s}$

h = 1m

$V_F = ?$
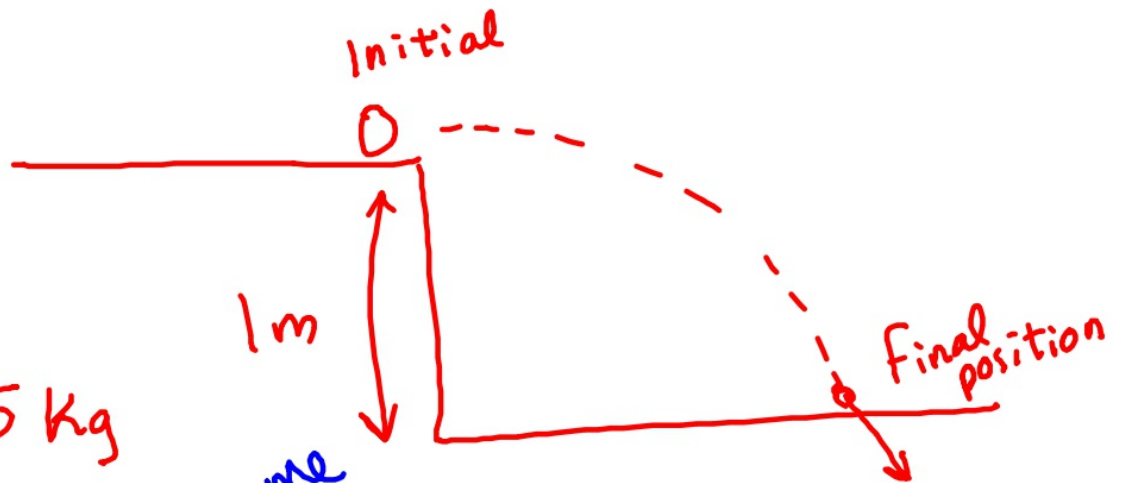
same

$E_i = K_i + P_i$

$E_f = K_f + P_f$

$E_i = \frac{1}{2}mV_i^2 + mgh$

Find $E_i$, then plug it in for $E_f$.
Solve for $K_f$, and then $V_f$.