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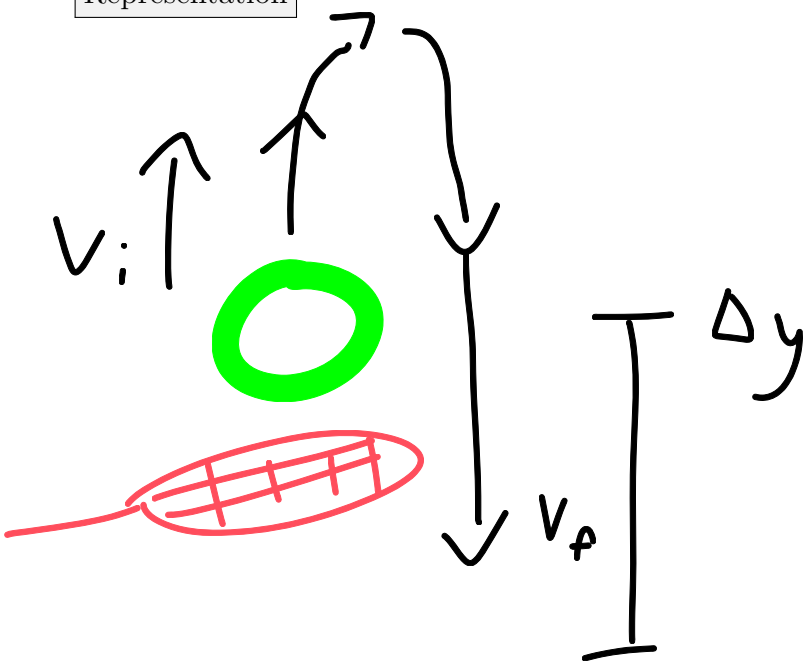
While warming up before the match, Serena Williams is gently bouncing a tennis ball up and down on her racket. She then gives it a powerful upward hit from an initial height of 0.80 m and sends it traveling perfectly vertically. After rising to its maximum height the ball falls back down to the court. Given that the ball was in the air for a total of 1.91 s, determine its velocity upon hitting the court.

Representation:	0	1	2
Physics Concept(s):	0	1	2
Initial Equation(s):	0	0.5	1
Symbolic Answer:	0		1
Units Check:	0	0.5	1
Limits Check:	0	0.5	1
Neatness:	-2	-1	0
Total:			
Correct Answer:	Y	N	

Representation



Physics Concept(s)

(1) One Dimensional kinematics

↓ Show Your Equation Work On Next Page ↓

Initial Equation(s)

① $\Delta y = V_i t + \frac{1}{2} a t^2$ | ② $V_f = V_i + at$

Algebra Work

$\Delta y = V_i t + \frac{1}{2} a t^2$

$V_i = \frac{\Delta y + \frac{1}{2} a t^2}{t}$

$V_f = \left(\frac{\Delta y + \frac{1}{2} a t^2}{t}\right) + at$

$\frac{0.8 + \frac{1}{2}(9.8)(1.91)^2}{1.91} + (9.8)(1.91)$

$9.778 + 18.718$

$V_f = -28.496 \text{ m/s}$

Symbolic Answer: $V_f = \left(\frac{\Delta y + \frac{1}{2} a t^2}{t}\right) + at$ Numerical Answer: -28.496 m/s

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Units Check

$m/s = \frac{m + (m/s^2)(s^2)}{s}$

$= m/s$

Limits Check

as $t \to \infty$ $V \to -\infty$

Because gravity is negative :)