See the HiHW grading rubric posted on Carmen

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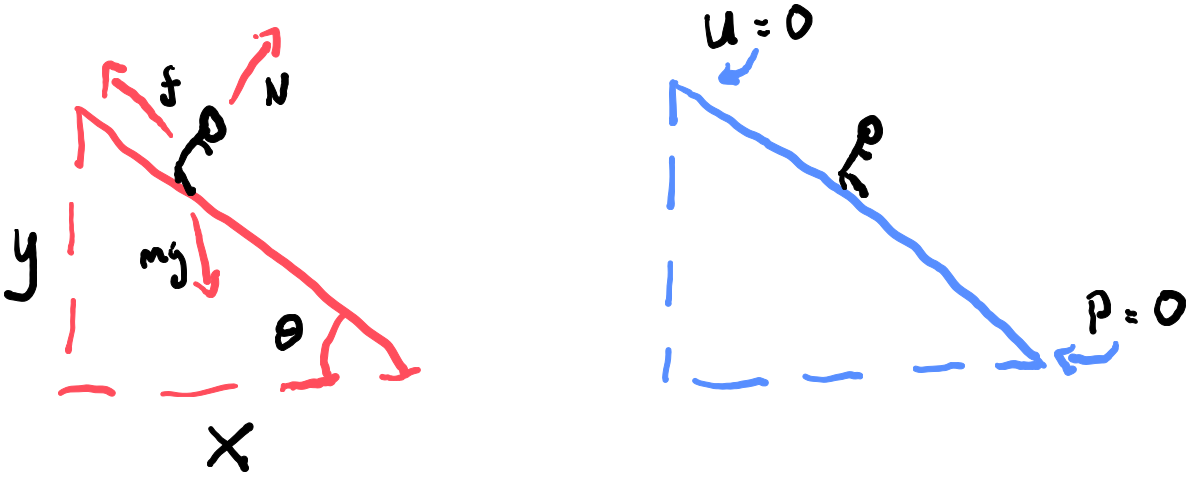
A child slides from rest down a playground slide. The top and bottom of the slide are separated by $\Delta y = 4.0\,\text{m}$ vertically and $\Delta x = 7.0\,\text{m}$ horizontally. A sheet of metal (straight, not curved) connects the two ends of the slide, and the coefficient of friction between the slide's surface and the child's clothes is $\mu_k = 0.22$. What is the child's speed v upon reaching the bottom of the slide? For the limits check, investigate what happens to v_f as the slide becomes dangerously steep ($\Delta x \to 0$). Note: you must use a work/energy approach rather than a kinematics approach to solve this problem.

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) (Refer to the list posted on Carmen)

(1) Work-Energy Theorem

Initial Equations

↓ Show Your Equation Work On Next Page ↓

Algebra Work (Symbols only. Don't plug in any numbers yet.)

$f = \mu mg\cos\theta$

$\tan\theta = \frac{y}{x}$

$\theta = \tan^{-1}\left(\frac{y}{x}\right)$

$mgh - \mu mg\cos\theta = \frac{1}{2}mv^2$

$v = \sqrt{2(gh - \mu g\cos\theta)}$

Symbolic Answer: $\sqrt{2(gh - \mu g\cos\theta)}$

Units Check

$\sqrt{m/s^2 - m/s^2}$

$\sqrt{m/s^2}$

m/s

Limits Check

a) As $\Delta x \to 0$, what limit does v approach? $\theta \to 90^\circ$

$v \to 8.85$ m/s

b) Why does the result make physical sense?

That is the speed the kid would be able to reach in free fall from 4 m high

Numerical Answer: (Obtain this by plugging numbers into your symbolic answer.)

$v = 8.64$ m/s