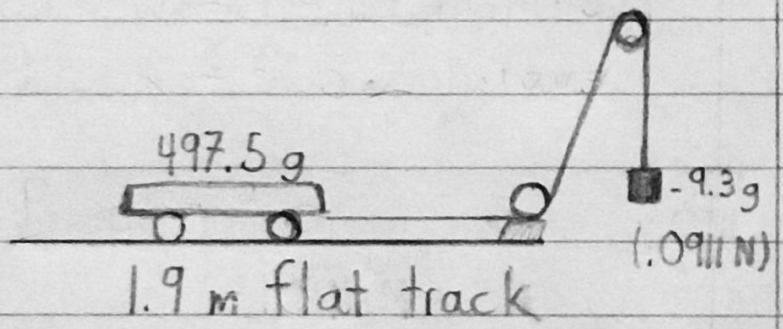
1st Part

Physics Lab

Joshua Guy, 11/19/20



Run 1 = 5.6 seconds
Run 2 = 5.3 seconds
Run 3 = 5.3 seconds
Run 4 = 5.3 seconds

5.3

(5.1 after WD40 on the cart, so I'm using 5.1)

(Cart weight = 497.5 g)
(Biner weight = 9.3 g)
(9.3 g = .0093 kg)

$F = ma$

$a = \frac{F}{\Sigma m} = \frac{.0911\ N}{.4975 + .0093} = \frac{.0911\ N}{.506} = 0.18\ m/s^2$

theoretical acceleration

$d = V_i + \frac{1}{2}at^2$

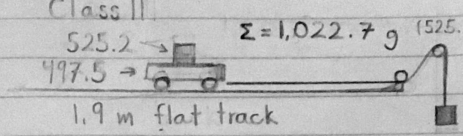
$a_{measured} = \frac{2d}{t^2} = \frac{(2)(1.9)}{(5.1)^2} = \frac{3.8}{26.01} = \boxed{.15\ m/s^2}$ actual measured

% error $\frac{.18-.15}{.18} = \boxed{17\%}$

Joshua Gay
11/19/20
AP Physics

Class 11

2nd Part



$F = \Sigma ma$

$a = \frac{F}{\Sigma m} = \frac{.0911\ N}{1.0227 + .0095} = \frac{.088\ m/s^2}{(1.0322)}$ theoretical acceleration

$d = \cancel{V_i t} + \frac{1}{2} a t^2$

$t = \sqrt{\frac{2d}{a}} = t\sqrt{\frac{(2)(1.9)}{(.088)}} = 6.6\ m/s^2$

Run 1 - 7.4
Run 2 - 7.2
Run 3 - 7.4
use 7.3

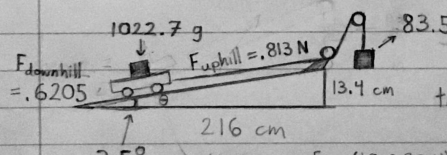
theoretical acceleration

$a_{measured} = \frac{2d}{t^2} = \frac{(2)(1.9)}{(7.3)^2} = \frac{3.8}{53.2} = \boxed{.071\ m/s^2}$ measured

---

3rd Part

(1.9 m track)



$\tan \frac{13.4}{216} = .0620$, $\tan^{-1} = 3.5410$

$10.020\ N = F_g$, $(10.020\ N)(\sin 3.55°)$

$F = ma$ $\quad a = \frac{\Sigma F}{\Sigma m} = \frac{F_{uphill} - F_{downhill}}{(1.0227 + .0835} = \frac{.8183N - .6205\ N}{1.1062} = \frac{.1978}{1.1062}$

$= 0.18$ theoretical acceleration

Run 1 - 5.2
Run 2 - 5.1
Run 3 - 5.3

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

$a = \frac{2d}{t^2} = \frac{(2)(1.9)}{(5.2)^2} = \frac{3.8}{27.04} = \boxed{0.141\ m/s^2}$ measured

$\%\ error = \frac{.18 - .141}{.18} = \frac{0.039}{.18} = \boxed{21.7\ \%}$

Reason: Unaccounted for friction in the cart's wheels and pulleys, and the pulleys were not perfectly lined up.