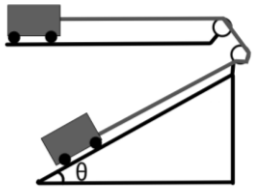
Question: How does angle impact acceleration?

Hypothesis: As θ increases, the carts will accelerate. The two will be related through the equation $4.9Sin\theta=a$, the equation that comes from combining $mgSin\theta-F_t=ma$ and $F_t=ma$ (the equations of the individual carts).

Strategy

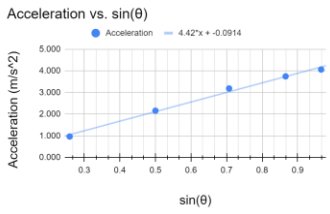


- A modified Atwood's Machine can be created by angling the lower track. The angle of the second track can be changed and the acceleration of the top cart can be calculated using data from the velocity vs. time graph created in the Vernier software.
- The positions of release, distance between pulleys, angle of the top track, and masses of the carts were all kept constant.

Calculations

The equation $4.9Sin\theta=a$ can be reached by combining the equations $mgSin\theta - F(t) = ma$ and $F(t) = ma$. $mgSin\theta - F(t) = ma$ comes from the inclined track and the equation $F(t) = ma$ comes from the flat track.

Data



The graph to the left depicts the relationship between $Sin\theta$ and acceleration. If the relationship is defined by $4.9Sin\theta=a$, then 4.9 should be the slope, $Sin\theta$ should be the x-coordinate, and a should be the y-coordinate to comply with $y = mx + b$ form. In the graph, the slope is 4.42. The smaller slope indicates that there may have been some friction between the wheels and the cart, reducing the acceleration and resulting in a smaller slope. The angle may also have been smaller than was measured, so the acceleration was smaller than expected.