

Claim-Evidence-Reasoning 1

Question: Does the battery-operated car move at constant speed or does it accelerate? If it moves at constant speed, what is its speed? If it accelerates, what is its acceleration?

Claim

When the battery operated car was placed on a track that was oriented to have no slope (flat) it kept a constant velocity of about 0.44m/s.

Evidence

The car was tested at multiple distances. From 15cm to 227cm (Δ 212.5cm) the car's velocity was 44 cm/s or 0.44 m/s. From 100cm to 227cm (Δ 127.5cm) the car's velocity was 44.7 cm/s or 0.447 m/s. The last distance tested was from 150cm to 227cm (Δ 77.5cm), where the car had a velocity of about 42.7 cm/s or 0.427 m/s. This means that the battery operated car ran at a constant speed between 0.43-0.44 m/s (when accounting for human error during timing). This data is graphed below.

Reasoning

When these different velocities recorded from different starting points are compared, it shows that the car has a relatively constant velocity. This makes sense because the car was traveling on a track with no slope, meaning it was not being affected by any outside forces like gravity. The car relied simply on its battery powered motor, which ran at a constant speed and only had one setting.

A Battery Operated Car Traveling on a Flat Surface Measuring 227.5 cm

From 15cm (Δ 212.5cm)			From 100cm (Δ 127.5cm)			From 150cm (Δ 77.5cm)		
1)	2)	3)	1)	2)	3)	1)	2)	3)
4.45s	4.52s	4.69s	2.61s	2.97s	2.85s	1.76s	1.78s	1.91s
4.66s	4.71s	4.92s	2.78s	3.07s	2.83s	1.72s	1.86s	1.94s
4.72s	4.87s	4.85s	2.92s	3.02s	2.68s	1.63s	1.91s	1.99s
45.1 cm/s	44.7 cm/s	42.4 cm/s	46.02 cm/s	42.2 cm/s	45.9 cm/s	45.6 cm/s	41.9 cm/s	40.7 cm/s
About 44 cm/s or 0.44m/s			About 44.7 cm/s or 0.447m/s			About 42.7 cm/s or 0.427m/s		
Considering human error, the velocity remained constant for all three tested distances								

Velocity of A Battery-Operated Car Moving on a Flat Surface



Claim-Evidence-Reasoning 2

Question: Does the cart move at constant speed or does it accelerate as it travels down the inclined track? If it moves at constant speed, what is its speed? If it accelerates, what is its acceleration?

Claim

When the cart was placed on a track with an incline it did not move at a constant speed. It accelerated at a rate of 0.22 m/s/s.

Evidence

The cart was tested at multiple distances. From 16cm to 227cm (Δ 211.5cm) the cart's velocity was 76 cm/s or 0.76 m/s. From 100cm to 227cm (Δ 127.5cm) the cart's velocity was 62.2 cm/s or 0.622 m/s. The last distance tested was from 150cm to 227cm (Δ 77.5cm), where the cart's velocity was about 46 cm/s or 0.46 m/s. The cart had an acceleration of 0.22 m/s/s

Reasoning

When the different values from different distances are compared, it becomes obvious that the cart is not moving at a constant velocity. When the car was traveling on a flat surface, the velocity remained constant at any distance it was placed at. However, when the cart was placed at different distances, the velocities changed. The shorter the distance the cart traveled, the slower the velocity was. This means that overtime the cart accelerates as it travels downhill.

A Cart Traveling on an Inclined Track Measuring 227.5 cm

From 16cm (Δ 211.5cm)			From 100cm (Δ 127.5cm)			From 150cm (Δ 77.5cm)		
1)	2)	3)	1)	2)	3)	1)	2)	3)
2.64s	2.53s	2.44s	1.73s	1.97s	1.93s	1.56	1.32	1.39
3.03s	3.02s	2.88s	2.08s	2.03s	2.06s	1.59	1.93	1.63
2.70s	2.88s	2.92s	1.98s	2.14s	2.44s	2.10	1.55	2.11
75.8 cm/s	75.3 cm/s	76.9 cm/s	66.1 cm/s	62.2 cm/s	59.6 cm/s	44.3 cm/s	48.4 cm/s	45.3 cm/s
About 76 cm/s or 0.76m/s			About 62.6 cm/s or 0.626m/s			About 46 cm/s or 0.46m/s		
The velocity did not remain constant at different distances, meaning the cart accelerated								

Velocity of A Cart Moving on An Inclined Surface

