Opposing Forces and Acceleration

Calculate the motion from two opposing forces

Name _____ Period _____ Date _____

Find the net force and predict the cart's velocity, then compare two different force pairs.

About 10 to 15 minutes | buildphysics.com/?experiment=newton-second-law-example

Calculate before running

Keep Mass at 4.0 kg. Set Rightward force to 20.0 N and Leftward force to 8.0 N. The cart starts from rest on a frictionless track. Right is positive.

$$\Sigma F_x = ma_x \quad v_{fx} = v_{0x} + a_x t$$

1. Draw the horizontal force diagram. Calculate the net force, acceleration, and velocity after 2.0 s.

Use the clock beside Run to auto-pause at 2.0 s. Select 4 kg cart in Properties and read Velocity and Acceleration in Live values.

Quantity	Prediction	Measurement
Acceleration (m/s²)		
Velocity after 2.0 s (m/s)		

Use a different force pair

2. Choose a different pair of opposing forces with the same net force. Record both forces and predict the velocity after 2.0 s.

Reset, enter your forces, and run to 2.0 s.

3. Compare the measured velocities. Explain why the acceleration depends on the net force rather than the larger force alone.