

Putting the Force Before the Cart [Experiment]

This experiment allows students to develop Newton's second law ($a = F/m$) from direct, laboratory experience. First they find that the acceleration of an object is directly proportional to the net force acting on it. Next they find that the acceleration of an object is inversely proportional to the mass of the object. Newton's second law is the synthesis of these findings.

Answers to Procedure Questions

1. The graph has increasing slope (concave up). Uniform motion yields a straight-line (constant slope) graph.
2. Predictions typically call for greater acceleration.
3. Most observations confirm predictions.
4. Most predictions call for less acceleration.
5. Most observations confirm predictions.

Answers to Summing Up Questions

1. Greater force results in greater acceleration. Acceleration is directly proportional to force.
2. Greater cart mass results in less acceleration. Acceleration is inversely proportional to mass.
3. directly; inversely
4. b. $a = F/m$