

# PHYZ SPRINGBOARD: NEWTON'S SECOND LAW



## LIMITATIONS OF THE FIRST LAW

- a. Newton's first law of motion describes motion that can occur under what specific conditions?
- b. It therefore fails to describe motion that occurs when...

## THE SECOND LAW

2. a. The following is a statement of Newton's second law of motion (although it's not the one he stated in the *Principia*).

b. What is meant by "net force"?

3. How can Newton's second law be abbreviated using symbols?

## INTERPRETING MOTION THROUGH THE SECOND LAW

4. Use the second law of motion to explain the following observations.

a. Twin dudettes Katy and Kelly have a grocery cart race. Katy pushes a loaded grocery cart; Kelly pushes an empty grocery cart. Kelly wins the race. Why?



b. Kelly and her little brother Kevin have a grocery cart race. Both carts are empty. Kelly wins the race. Why?



c. Katy and her little brother Kevin have a grocery cart race. Katy's cart is loaded; Kevin's cart is empty. They tie. Why?



### **NEWTON'S EXPLANATION OF GALILEO'S DESCRIPTION**

5. One of Galileo's surprising findings was that heavy bodies and light bodies fall with the same acceleration. How does Newton's second law explain that observation?

### **UNITS**

6. a. To avoid division bars, Newton's second law of motion is often written in the form...

b. Identify the SI (metric) units for each quantity in the expression above.

### **PRACTICE WITH THE EQUATION AND UNITS**

7. a. What net force is needed to cause a 3 kg body to accelerate at  $4 \text{ m/s}^2$ ?

b. What is the acceleration of an 8 kg mass acted on by a 24 N net force?

c. What is the mass of a body that undergoes an acceleration of  $5 \text{ m/s}^2$  when acted upon by a 35 N force?