

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

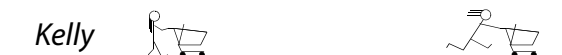
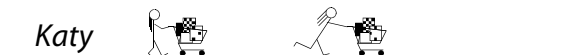
- a. The following is a statement of Newton's second law of motion (although it's not the one he stated in the *Principia*).

b. What is meant by "net force"?

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

INTERPRETING MOTION THROUGH THE SECOND LAW

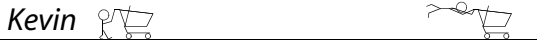
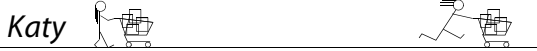
- Use the second law of motion to explain the following observations.
 - Twin dudettes Katy and Kelly have a grocery cart race. Katy pushes a loaded grocery cart; Kelly pushes an empty grocery cart. Kelly wins the race. Why?



- 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. 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 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 m/s^2 when acted upon by a 35 N force?