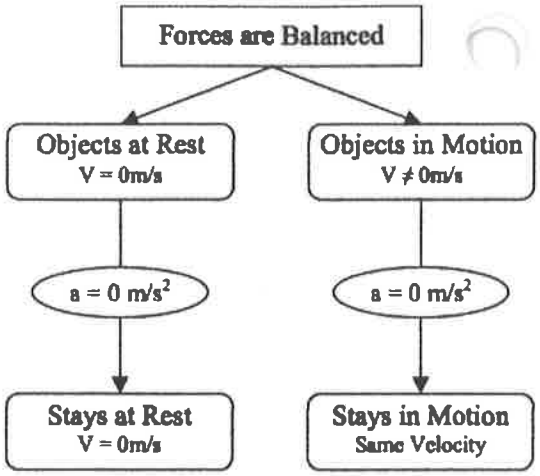
Another way to look at this is in terms of acceleration, which is illustrated in the chart below. Use the chart below to answer the following questions.



E1. If forces acting on an object are balanced, what is the resulting acceleration? Ø m/s² $\Sigma F = \emptyset N = ma$

E2. According to the scientific definition of acceleration. Acceleration is a change in:
speed and/or direction.

E3. If an object is at rest, the velocity is: Ø m/s

E4. If an object is at rest, the acceleration is: Ø m/s²

E5. If you apply an unbalanced force to this object it will _____. **Circle ALL that apply.**

change velocity accelerate change position

E7. A soccer ball is traveling through an area of space, where there is no friction, at a speed of 25 m/s. If no unbalanced forces act upon it, what is its velocity after 1 minute? 25 m/s

E8. If no unbalanced forces act upon it, what is its acceleration after 1 min? Ø m/s²

E9. Below, fill in the blanks to restate Newton's first law *in terms of acceleration*.

An object at rest does not move and an object in motion does not stop, unless an unbalanced force acts upon it.

Use the pictures of the shopping carts to the right to answer the following questions.

Inertia: the resistance an object has to a change in its state of motion

F1. Is it easier to turn a full shopping cart or an empty one?

F2. What quantity measures the amount of matter ("stuff") an object contains?

mass volume temperature

F3. The greater the mass of an object, the greater the inertia.

F4. Based on your answer to F2, why is harder to push the full cart?

more mass = more inertia = more force is required to move it

F5. Describe the relationship between inertia and mass below. **Circle one.**

Mass is directly or ~~indirectly~~ inversely related to inertia.

F6. Which has more inertia? **Circle one.** Explain why.

Sumo wrestler Gymnast

Discuss and review the key ideas of this session before attempting these questions. After reading each question, brainstorm ideas as a group before writing your final answer.

Critical Thinking/Application Questions

G1. Suppose you were in space (far away from any opposing forces – friction or gravity, for example) and you kicked a soccer ball. What would happen to the ball? Explain. Use grammatically correct sentences. Include and underline the words: force, acceleration, motion.

stay at same velocity w/ same speed + direction because no unbalanced forces are acting upon it after initial kick $\Sigma F = 0N$ $\vec{a} = 0 \frac{m}{s^2}$ (balanced forces)

G2. A 2.0 kg bowling ball is moving with a speed of 4.0 m/s. How much net force is required to keep the object moving at this velocity (assuming there is no friction)? $\vec{V}$ = (constant) 0 N

What is the bowling balls acceleration? 0 m/s^2. Explain. Use grammatically correct sentences. Include and underline the words: force, acceleration, motion.

No net force is required to keep the object moving in the same direction with the same speed.

G3. Ben Tooclose is being chased through the woods by a moose which he was trying to photograph. The enormous mass of the moose is extremely intimidating. Yet, if Ben makes a zigzag pattern through the woods, he will be able to use the large mass of the moose to his own advantage.

Explain this in terms of inertia and Newton's first law of motion. Use grammatically correct sentences. ~~Underline and include the words:~~ motion, change, direction, acceleration, inertia, and mass.

larger mass = more inertia = more force (and energy) for moose to change direction