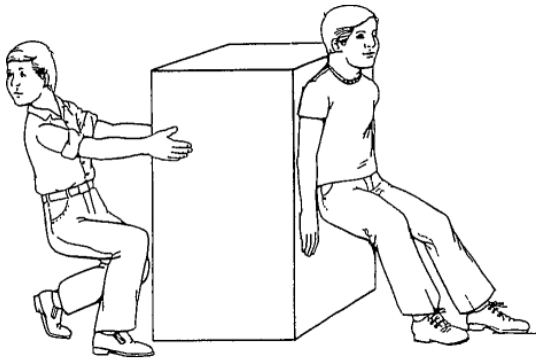
Forces

What is a force?

A force is a
push or pull

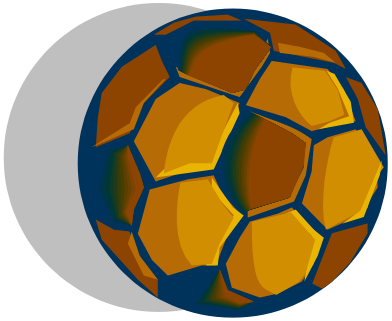
Forces



- Forces have size and direction and are expressed in Newtons (N)
- Force is always exerted by one object on another object
- Balanced forces produce no change in motion
- Unbalanced forces produce a change in motion

Forces

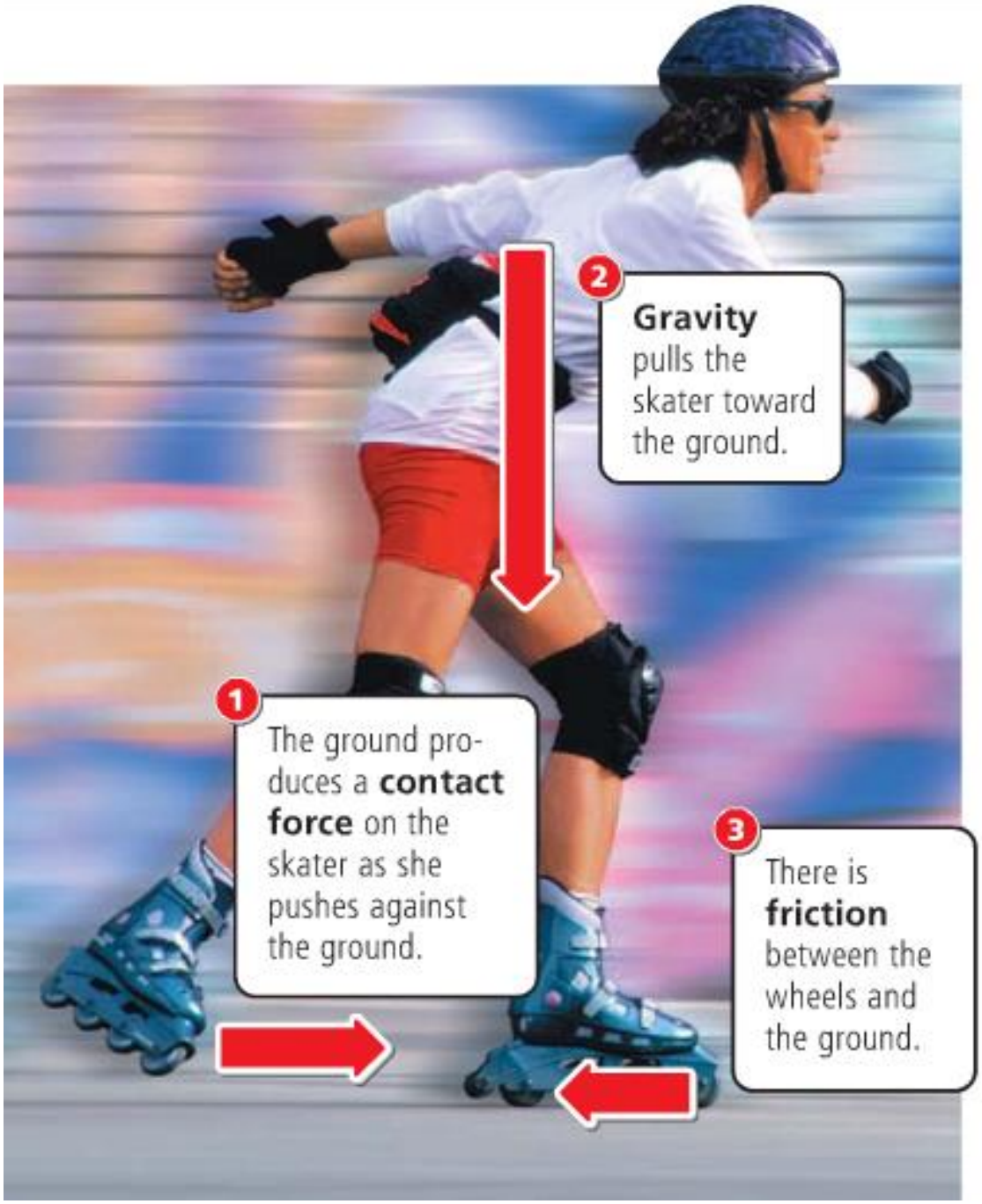
If you roll or kick a ball, what happens eventually?



An unbalanced force is needed to change the speed of a moving object. So, what force is stopping the ball?

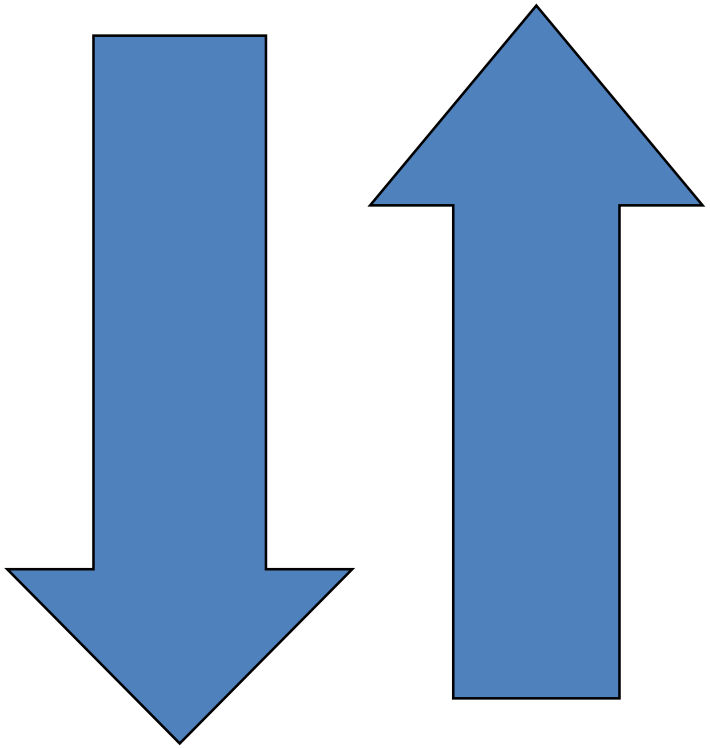
Forces Review

- There are many different forces which act on objects such as gravity and friction.
- If forces are balanced the object doesn't move
- If forces are unbalanced the object will do one of the following things:
  - Begin to move
  - Stop moving
  - Change direction
  - Speed up
  - Slow down


2
Gravity pulls the skater toward the ground.
1
The ground produces a contact force on the skater as she pushes against the ground.
3
There is friction between the wheels and the ground.

Forces occur in pairs and they can be either balanced or unbalanced

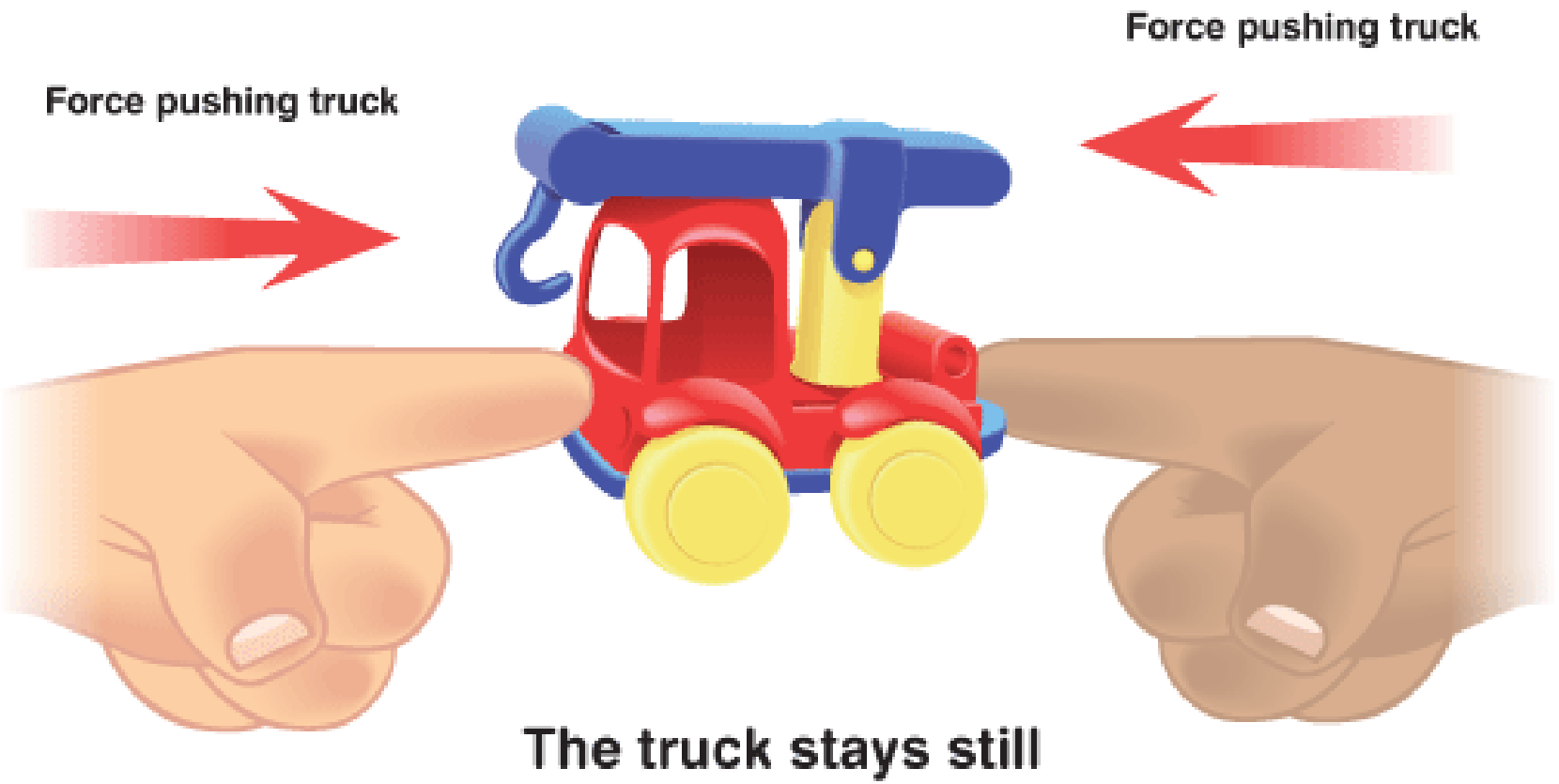
Balanced Forces



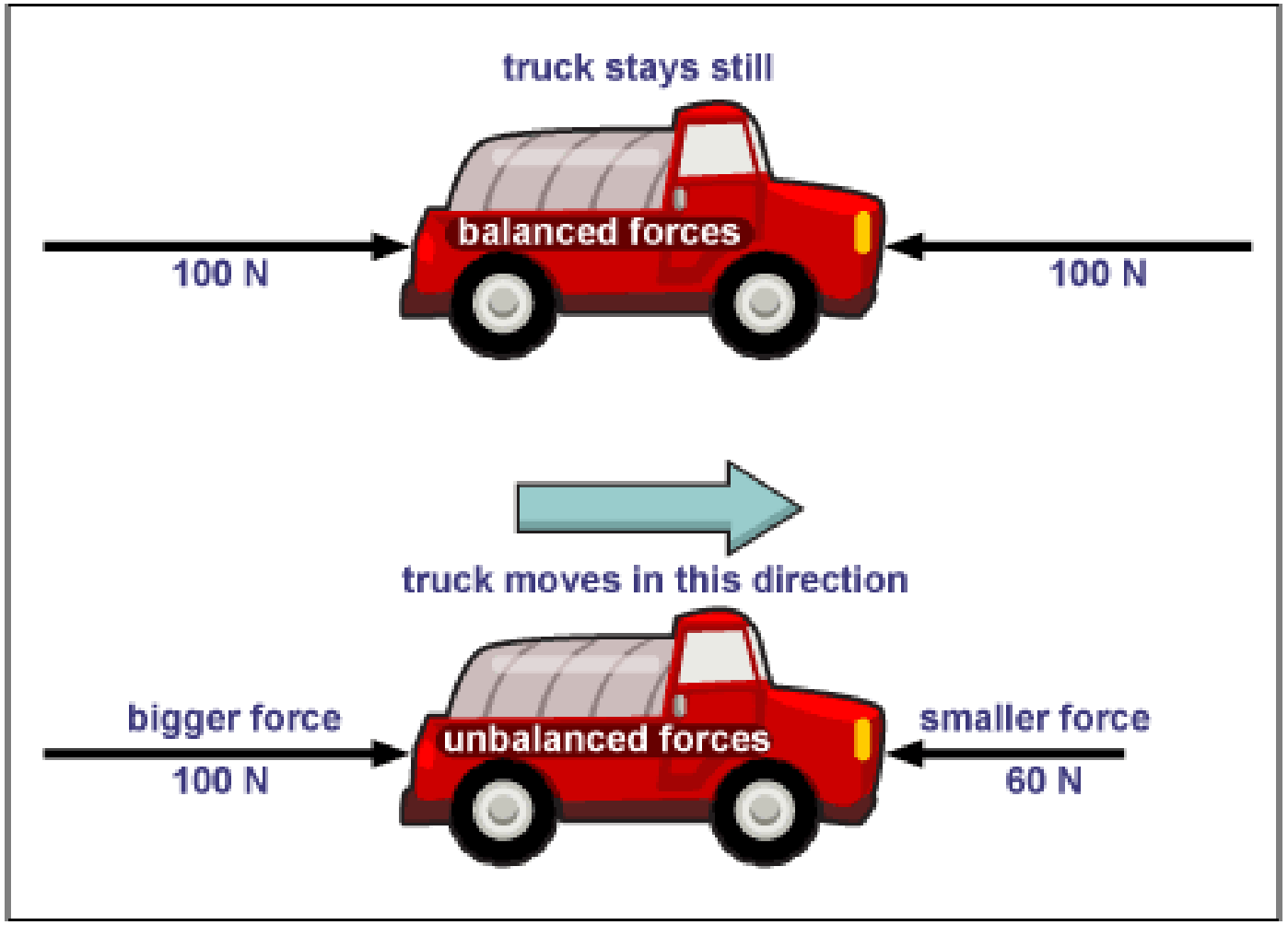
When two forces acting on an object are equal in size, but are opposite in direction, we say the forces are balanced.

Balanced forces do not cause a change in motion.

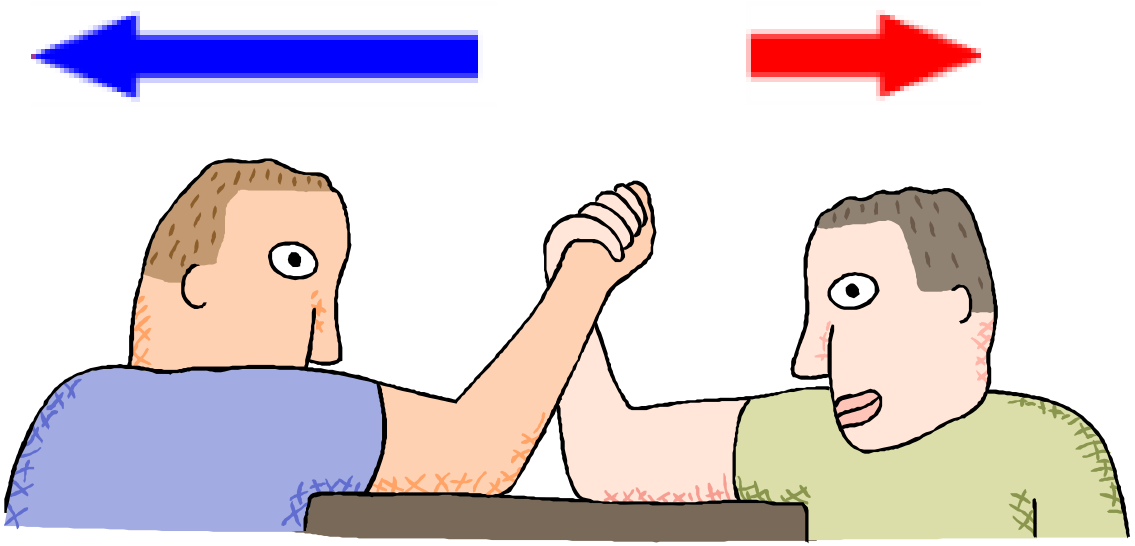
Balanced Forces



Force Diagrams



Unbalanced Forces



Based on the forces shown:
Which arm wrestler will likely win?
Which direction will both arms move?

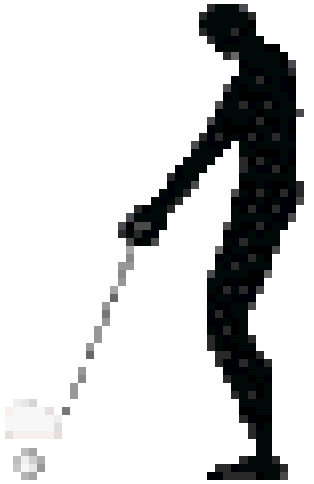
Unbalanced Forces

Which direction will the ball roll?

Law of Inertia

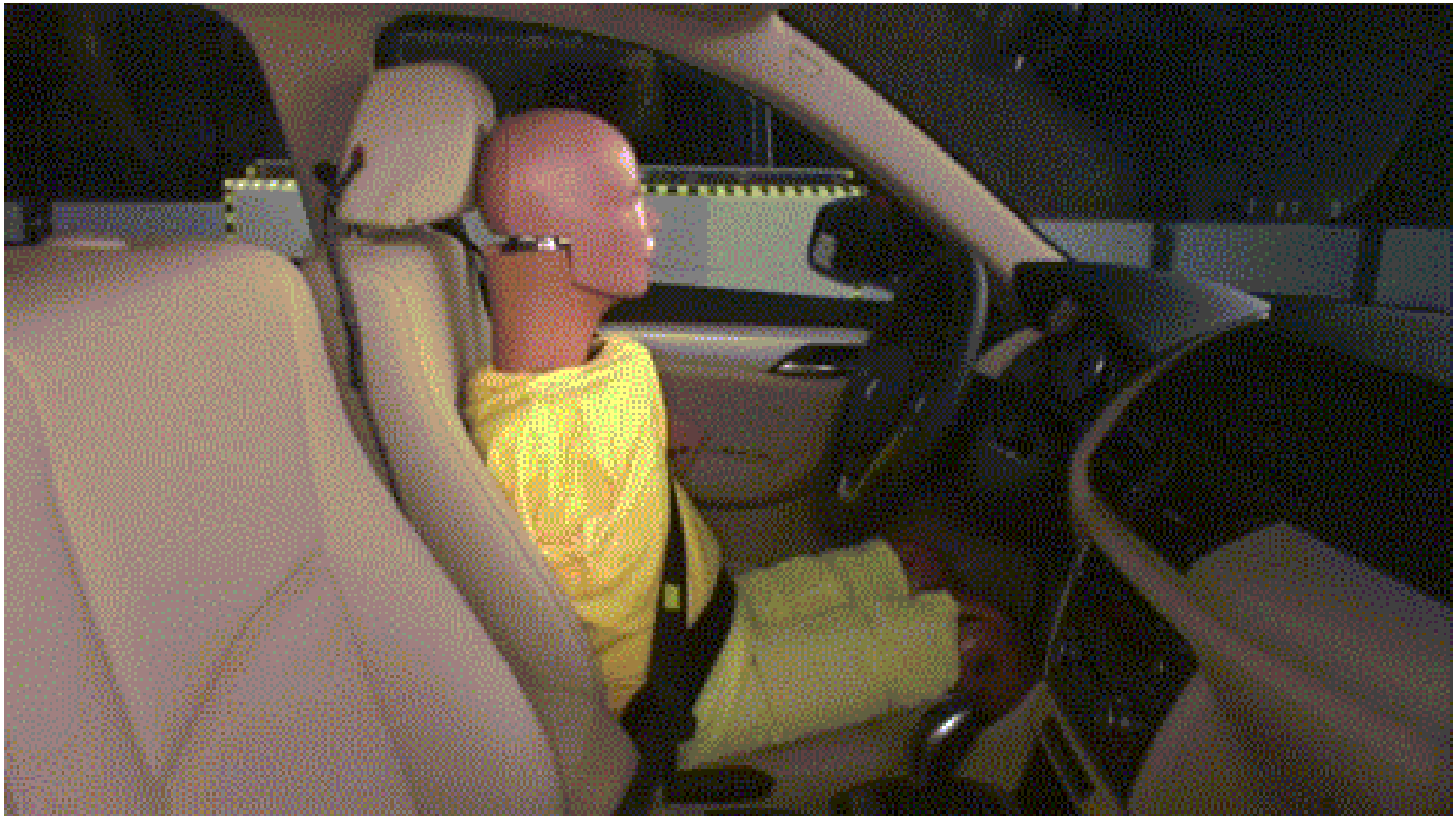
Inertia is the tendency of an object to resist being moved or, if the object is moving, to resist a change in speed or direction until an outside force acts on the object.

Law of Inertia

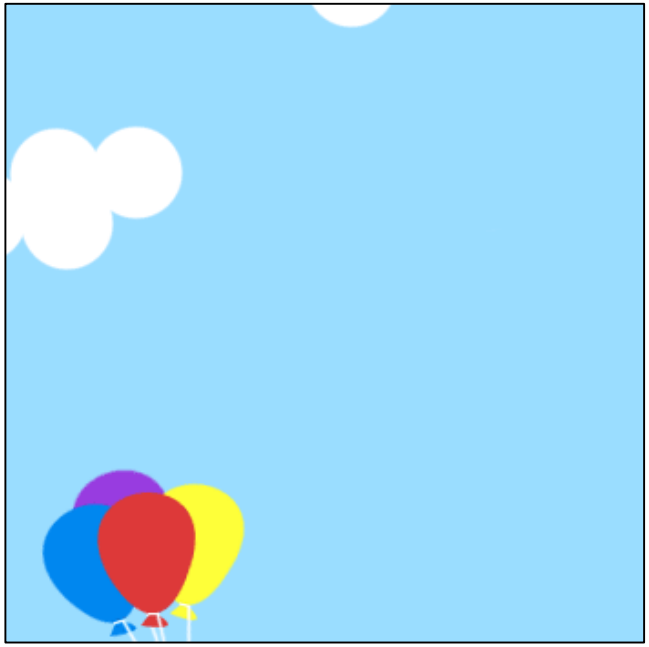


- Because of Inertia, an object at rest will stay at rest unless acted on by an unbalanced force.
- In other words, objects will not start moving until a push or a pull is exerted on them.

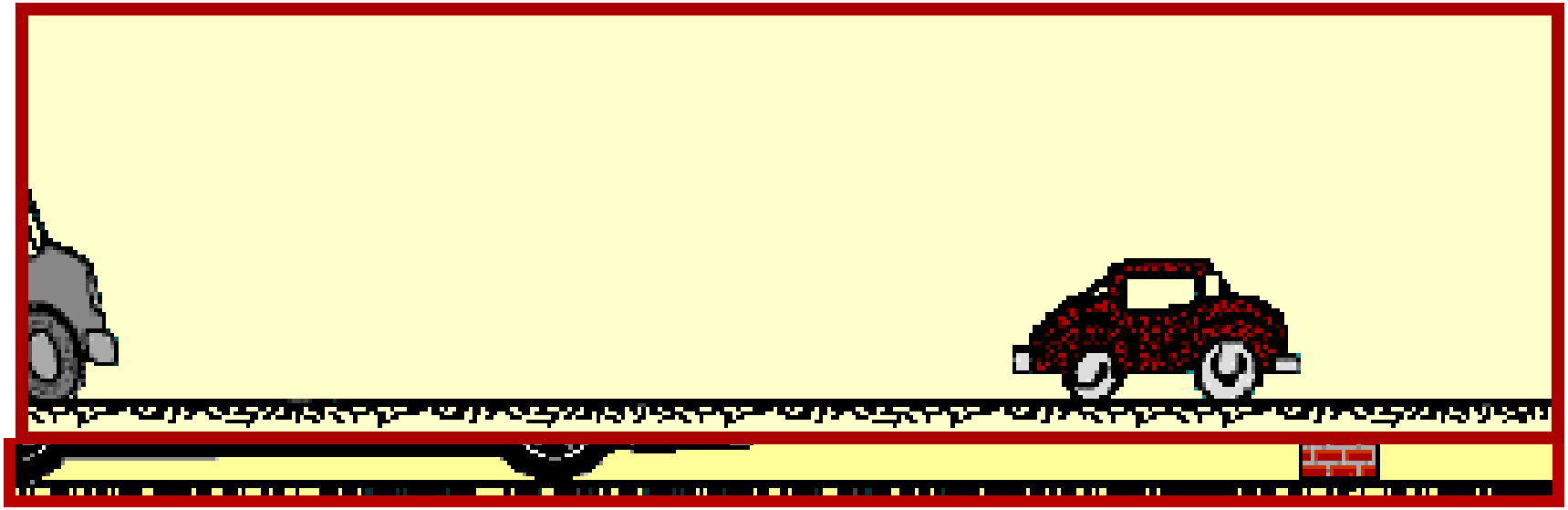
Law of Inertia



Law of Inertia



- An object in motion remains in motion unless acted on by an unbalanced force.
- The object will continue to move in the same direction with the same speed unless an unbalanced force occurs.

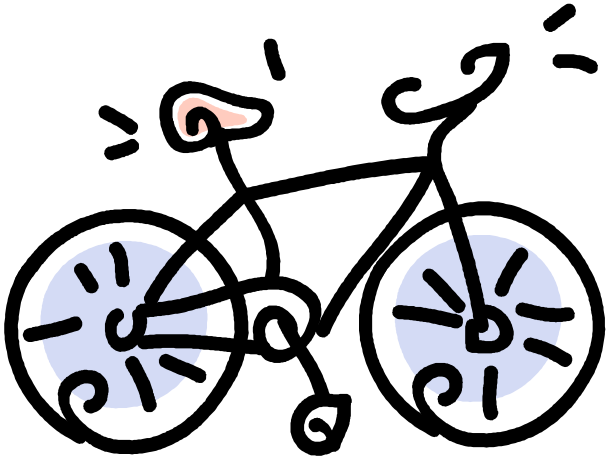


Mass and Inertia

- Mass is a measure of Inertia
- An object that has a small mass has less inertia than an object that has a large mass
- So, changing the motion of an object that has a small mass is easier than changing the motion of an object that has a large mass.

Mass and Inertia

Look at the images below. Which would require more force to move or slow down? Why?



The car because it has more mass therefore more inertia.

Mass and Inertia

Which would require more force to move or slow down? Why?

The bowling ball because it has more mass therefore more inertia.

The snowboard is in motion. Based on the Law of Inertia, the snowboard will keep moving right?

What force(s) allow him to snowboard on the brick wall and rail?

Study Jams: Newton's First Law of Motion: Inertia