TECHNOLOGY

WATER ROCKETS

Water rockets work by releasing air pressure from inside their cases (bottles). Water, also inside the case, is forced out the nozzle and the combination of escaping water and air produces a thrust that propels the rocket upward.

This illustrates Newton's third law of motion—for every action there is an equal and opposite reaction.

By firing the water rocket with different amounts of water and air, Newton's second law, the force of motion is also illustrated.

In the second law, the force or thrust is equal to mass times acceleration. Compressed air inside the case provides the acceleration and water provides the mass. A rocket would not climb very high when it had only air inside. The air by itself has little mass and therefore does not produce much thrust on its own.

If you try to fly the rocket with all water and no air, you would see that it didn't travel upward at all. The water has a large mass, but by dribbling out of the nozzle (neck of the bottle), it has almost no acceleration. The best flights come when both mass and acceleration are large.

Name_____Grade_____Period_____A or B

What Happened ?

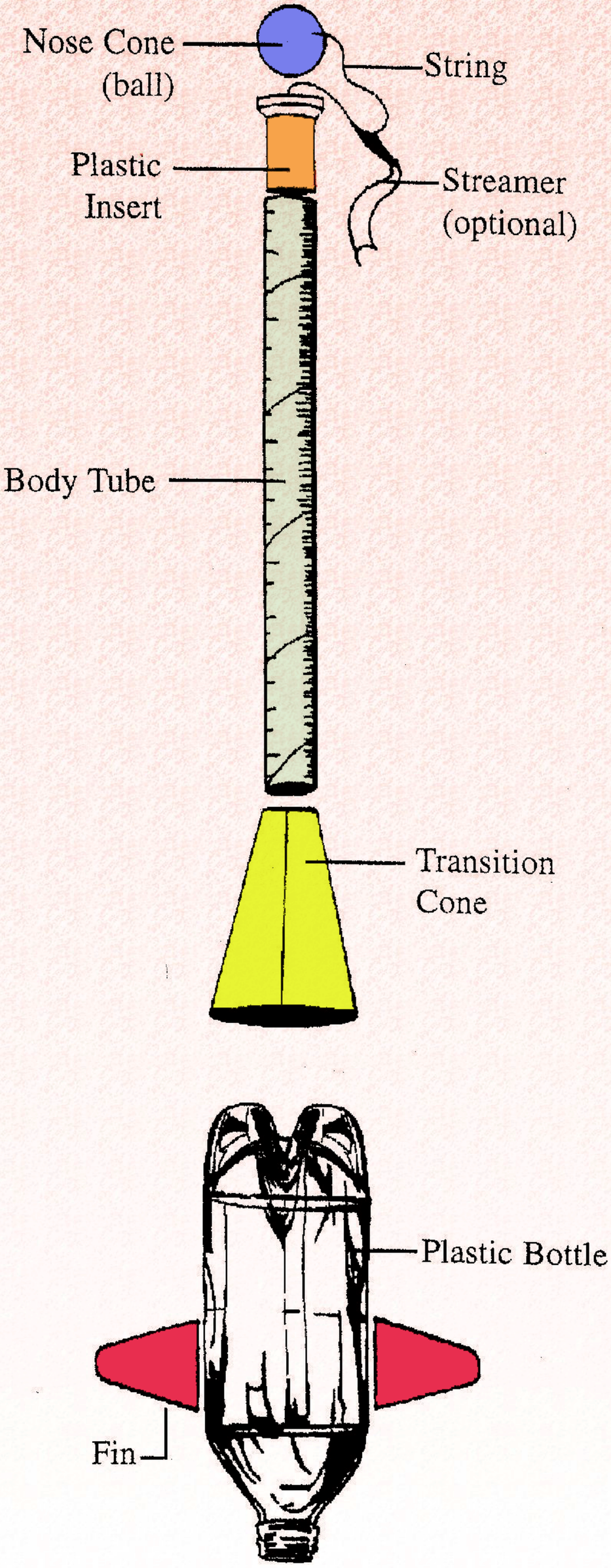
For every action, there is an equal but opposite reaction. if you push or pull anything, it pushes or pulls right back.
How does this compare to the operation of your rocket?
What happens to the end of a garden hose if the water is suddenly turned on?

In space, where there is no air to push against, the rocket is propelled by the gases from the engine pushing the rocket forward and the gases back. For an instant at the top of its flight, the rocket became weightless.

The terms ***weight*** and ***mass*** are often confused.
Weight *is* the measurement of the force of gravity.
Mass *is* the amount of matter in an object. In space, astronauts have the same mass as they do on earth, but most of the time they have little or no weight.

Two other terms that are often ' mixed up are ***speed*** and ***velocity***.
Speed tells us the rate at which an object travels.
Velocity tells us the speed *and the direction* of an object.
For example, If one student is riding a bicycle north at 10 miles (16 km) per hour and another is riding south at 10 miles 0 6 km) per hour, they both have the same speed, but not the same velocity. To have the same velocity they must be traveling in the same direction.

Acceleration *is* the increase of speed of an object during a certain period of time. A car accelerates when, for instance, a traffic light turns from red to green and the driver puts his or her foot on the gas pedal. However, the car is not accelerating when it is traveling down a highway at a steady speed.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