

# Newton's laws of motion



## ✚ WHAT IS THE AIM OF THIS PRACTICAL?

To verify the laws of motion in a fun way...

## ✚ WHAT DO YOU NEED?

Diet coke	A mentos package	A skateboard	cardboard	Duct tape
				

## ✚ A BIT OF THEORY

Diet Coke basically consists of lots of sugar (sucrose, fructose, or a diet sweetener), some flavoring, water, and preservatives. What gives soda its bubbly appeal is the carbon dioxide gas ( $\text{CO}_2$ ), which is forced into the liquid using tons of pressure.

The reason why Mentos mints work so well is twofold:

Each mint has thousands of tiny holes all over its Surface called nucleation sites. They're perfect places for carbon dioxide bubbles to form. As soon as the Mentos hit the soda, bubbles form all over the surfaces of the mints and then quickly rise to the surface of the liquid.

Besides, the mints are heavy and sink to the bottom of the bottle. The gas released by the Mentos literally pushes all of the liquid up and out of the bottle in an incredible soda blast. The geyser continues to erupt as long as the pits remain on the surface of the mints. Eventually, enough of the surface is dissolved so that it becomes too smooth for the gas to rapidly collect. At that point, the reaction slows and stops.

### ✚ WHAT DO YOU HAVE TO DO?

- 1) Attach the full soda bottle to the skateboard.
- 2) Tell your mate to hold it tightly as you wrap the duct tape once around the lower end of the bottle and the skateboard and then once around the top end of the bottle and the skateboard near its tip.
- 3) Put the system on the ground and check the alignment of the bottle with the skateboard. It should be straight and centered, and the open end of the bottle needs to be above the curved tips of the skateboard.
- 4) Wrap two more layers of duct tape around each end of the system right on top of the first layer.
- 5) Hold the system off of the ground, keeping it vertical, with the top of the bottle pointing up.
- 6) Remove the bottle cap.
- 7) Ask your mate to open one end of the Mentos package and loosen the mints a little so they can slide out easily.
- 8) Tell him/her to hold the mints in one hand and place the open end of the Mentos package above the opening of the bottle.
- 9) Lift the package straight up and slide all of the Mentos mints into the soda all at once with the other hand. (Do this by pinching the closed end of the wrapper between your fingers and sliding the mints toward the open end. This will push the Mentos quickly into the bottle in one continuous motion. Note: It is essential to drop the mints into the bottle all at the same time.)
- 10) Once the Mentos drop into the bottle, place the Skateboard Rocket Car on the ground as fast as you can and get out of the way!



### ✚ QUESTIONS

- 1) What law of motion states that “for every action there is an equal and opposite reaction acting simultaneously”?

2) Fill in the gaps:

The force of the soda geyser moving quickly backward out the bottle is exactly matched by a force pushing the Skateboard Rocket Car \_\_\_\_\_.

The stronger the backward geyser, the \_\_\_\_\_ the car moves forward.

### FEED-BACK

Evaluate the difficulty of this practical. Circle the number that suits the level of difficulty you found while going through this practical:

*Very Easy*    1    2    3    4    5    *Very Difficult*

Did you enjoy going through this practical? Circle the number that suits your choice



*Not at all*

1

2

3

4

5

*Very much*

