

Inertia: Just Keep Going

Newton's 1st Law:

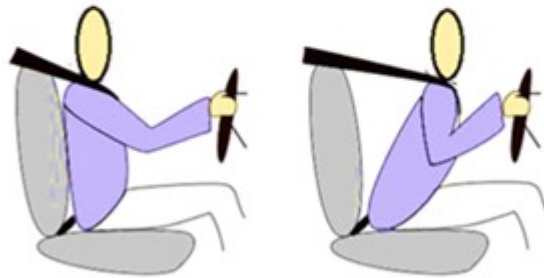
- All objects have **inertia** - a tendency to keep moving with the same speed in the same direction
- A **force** (push or pull) is required to change the speed or direction of an object.



Part 1: Ball and Tray

1. Place a ping-pong ball in the middle of a tray (resting against side wall is ok). Pull the tray forward with a jerk. **What happens to the ball? (circle one)**

The ball ends up at the front / back / center of the tray.
Relative to the table, the ball: moves forward / moves backward / doesn't move much



Discuss: What do you feel when you are sitting in a car (or roller-coaster) and it starts to speed up? How is this similar to the ball on the tray?

2. Is it possible to move the tray along at a steady rate with the ball staying in the center (not rolling towards the front or back)?

Yes / no

Discuss: What if anything do feel in a car when you are coasting along the freeway at a constant speed?

3. Get the ball and tray moving forward together. **What happens to the ball when you stop the tray?**

Rolls forward / rolls backward / stays put

Discuss:

- Why does this happen?
- Why is it important to wear a seat belt when riding in a car? In what situation is the seatbelt useful and what does it prevent?
- If you are walking across the floor and trip, which way do you fall and why?

Suppose you get a patch of mud on your shoe (or fur).
What is one way to get it off without touching the mud (or using any tools)?



4. Try simulating this situation by putting a bit of play-doh on the edge of a cup, lightly stuck on. Shake the cup once, hard, to make the play-doh fly off.

Now repeat and watch carefully. At what point does the play-doh fly off?

When the cup starts moving / mid-shake / when it stops moving

Discuss: Can you think of other situations where you see inertia in our everyday world?

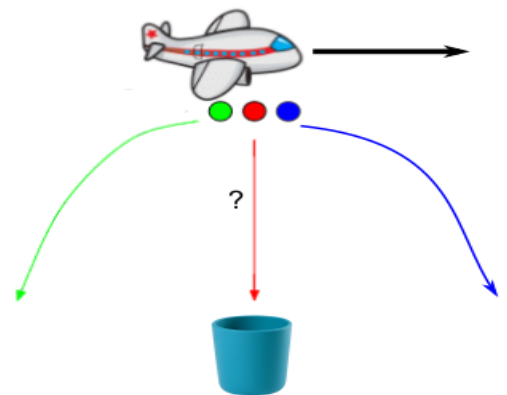
Part 2: Bombadier

5. Make a small ball of play-doh. Place a cup on the floor.

Predict: If you release the play-doh ball just over the cup as you walk past quickly (without stopping or slowing down), where will it land?

in front of the cup / behind the cup / in the cup

Try the experiment (a few times) and see if your prediction was right!



Where did the play-doh ball fall? Front of cup / behind cup / in the cup

Discuss: Why? Where should you release the play-doh to get it into the cup?

6. Try a few times and see if you can get the die into the cup.

Part 3: Falling Tower

7. Fold an index card into 3rds. Tape the edges to make a triangular column.
8. Place another index card over the top of the cup. Put the column on top. Balance a ping-pong ball on top of the column.



Make a prediction:

When you quickly pull out the bottom card,

What will happen to the bottom end of the column?

What will happen to the top end of the column?

What will happen to the ball? _____

9. Test your prediction! Hold the cup with one hand and yank out the card with the other. Where you right?

Discuss: Why does this happen?