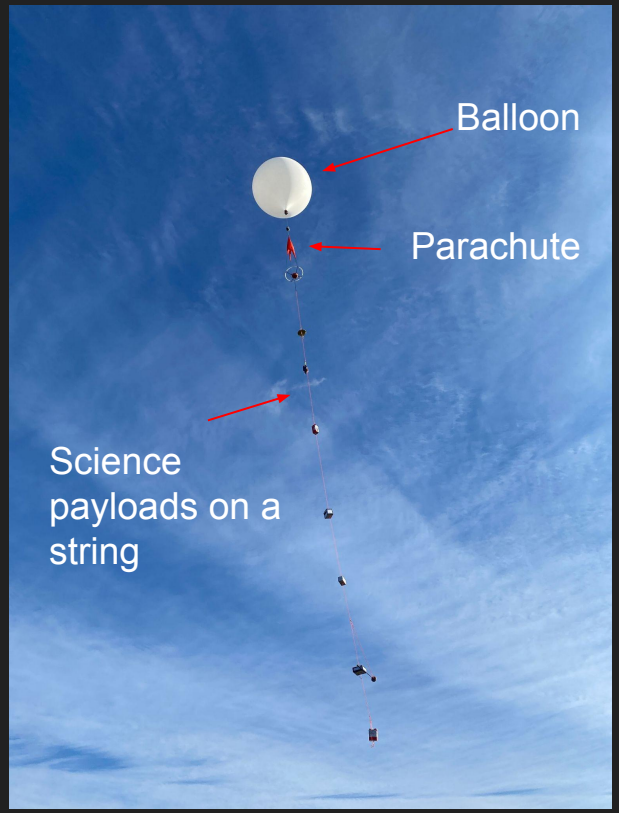
STEM Workshop: Forces

Lesson 5: Introduction to Forces

Brought to you by the University of Maryland Balloon Payload Program!

What do we do?



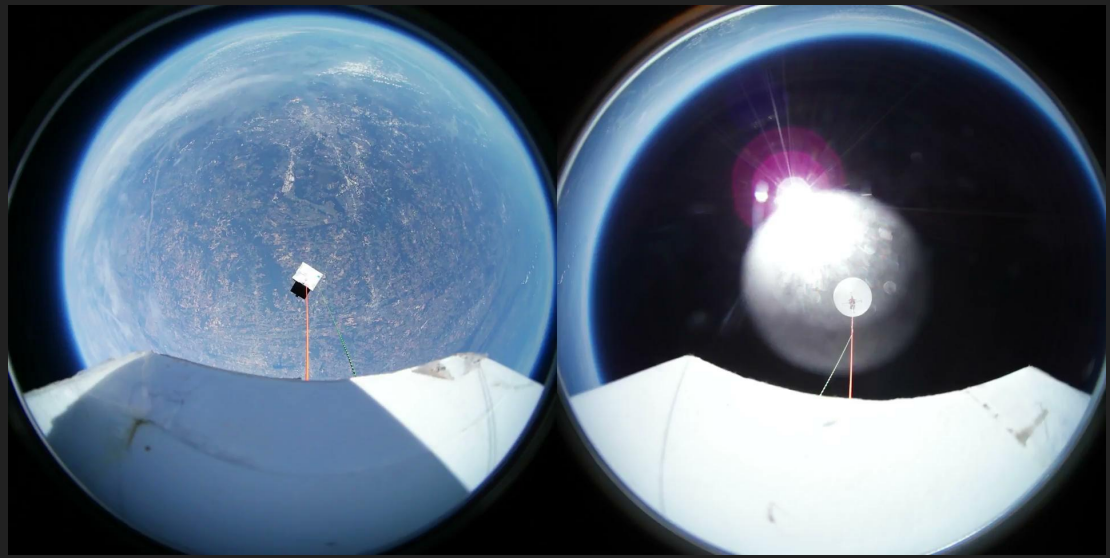
Weather balloons help collect data to give you weather forecasts!

Carry science payloads to do research and take photos, like ours!

Pop!

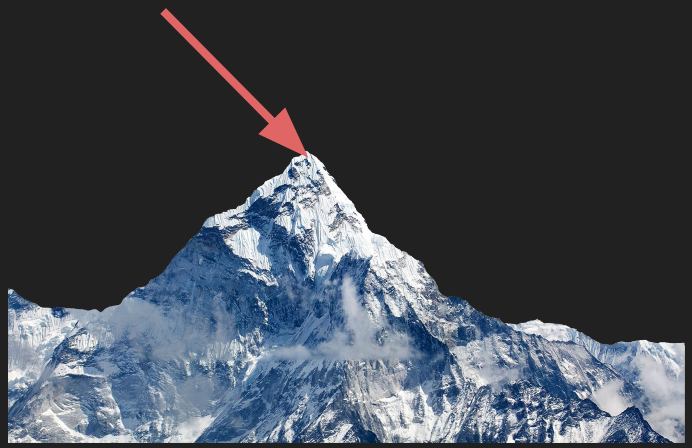
The balloon expands as it gets higher

Eventually, it cannot expand any more without breaking, so it pops!



Our Biggest Problem: *coming back down!*

Top of Mt. Everest



- Up to 150 miles per hour
- Could land on a rock!
- *Delicate scientific circuitry!!*

How do we land safely?

Descent and landing (Recovery)

- A parachute protects our equipment as it falls back to earth
- Mission success!

- Without air, the parachute wouldn’t slow the fall

Wait… Parachutes need air to work?

What is a Force?

Something that causes an object to change speed, called acceleration

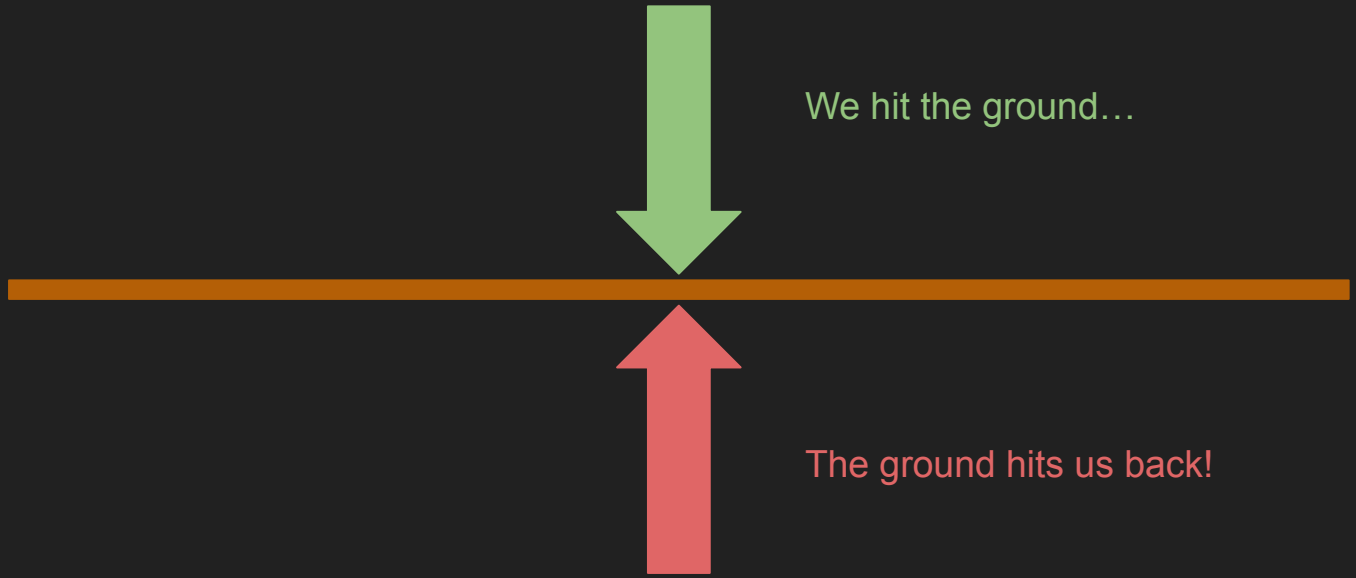
- Gravity
- Your muscles
- The wind

Force = mass x acceleration

What happens if two forces collide?

Newton’s Third Law

“Every action (force) has an equal and opposite re-action”



If one of these forces was stronger, what would happen?

Serious Question

When you go skydiving…

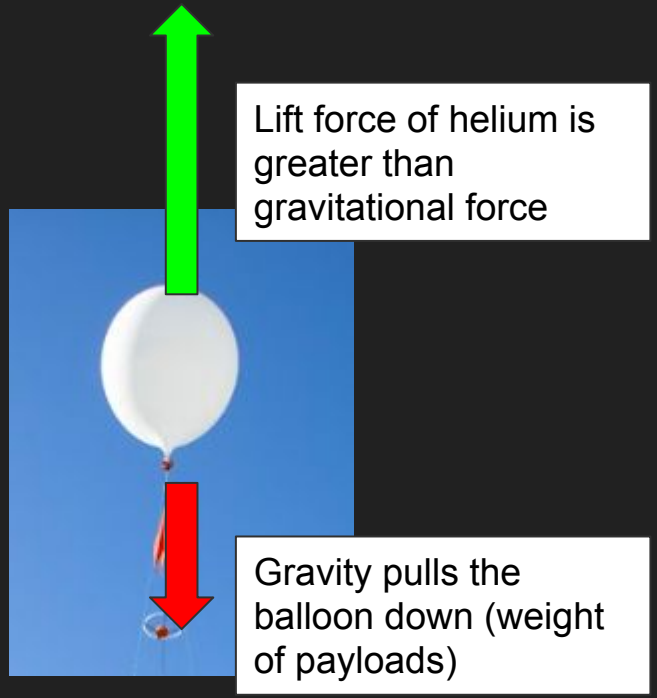
Does the Earth's gravity pull you *down*

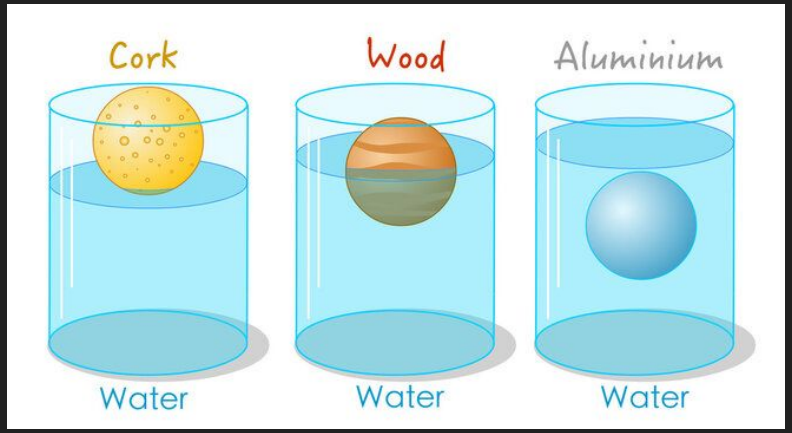
Or

Does your gravity pull the Earth *up*

How do balloons float?

Forces



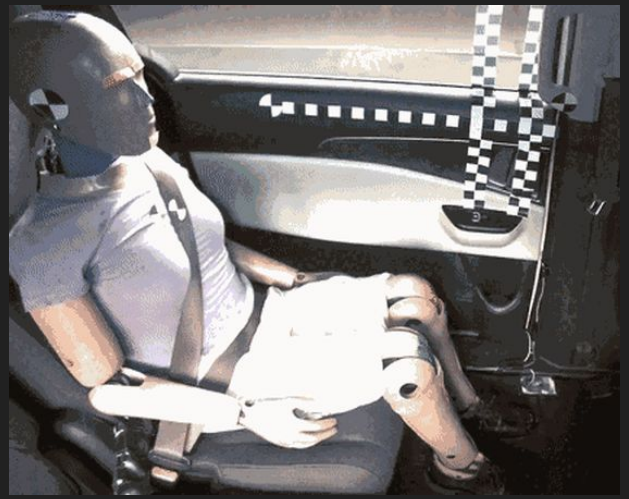


Question: Does farting make you lighter or heavier? (Hint: farts are lighter than air)

So how to we deal with Force?

1. Spread it out! (over space, or over time)

Seat Belt



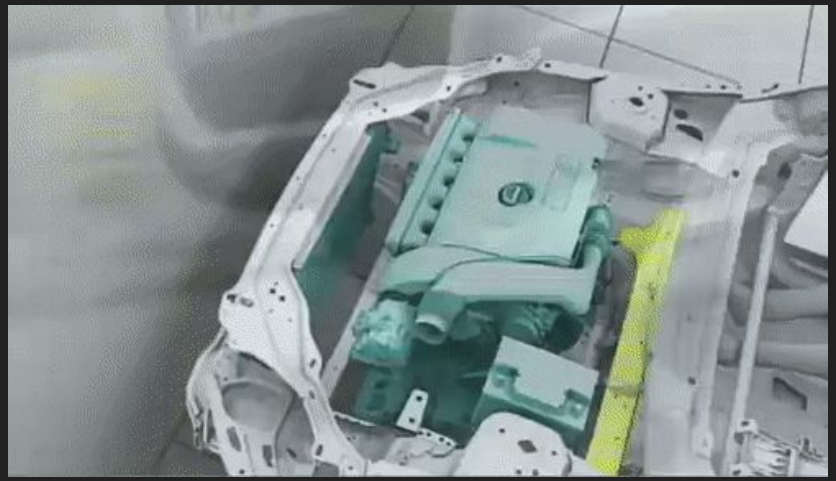
Air Bags

So how to we deal with Force?

2. Use it all up somewhere else!

Car bumper (absorbs force of impact)

It takes a lot of force to do this —------>



So how to we deal with Force?

3. Have less force in the first place!

Parachute

(just go slower = less acceleration when you hit the ground)

Workshop Time!

Design a device which will help your egg survive a ***drop*** from 3 meters (1 and a half people) high!