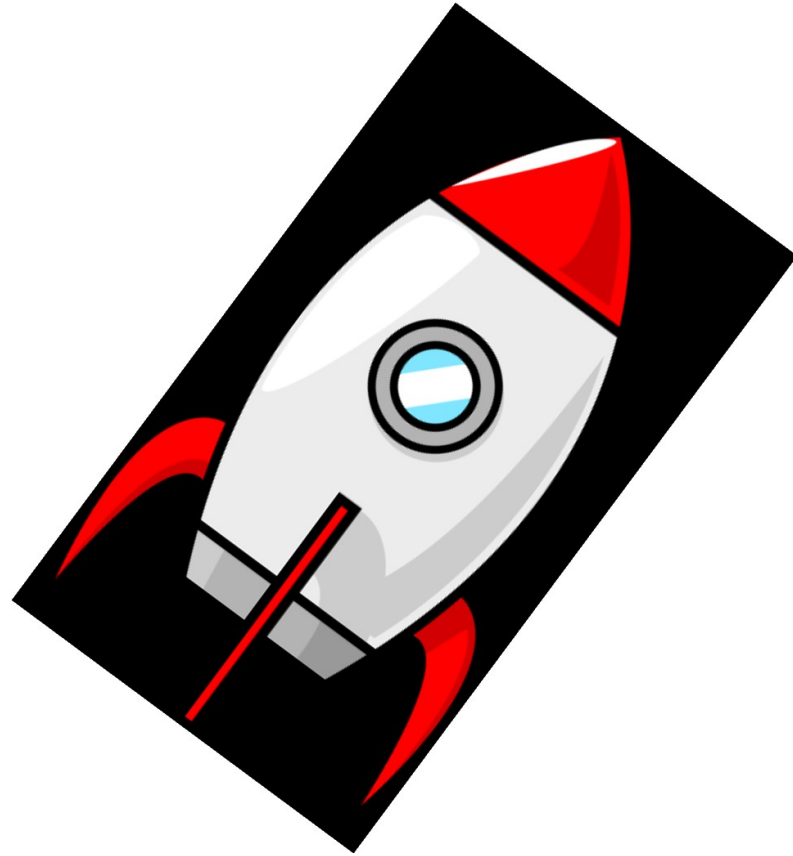


micro:bits in Space

Rockets!

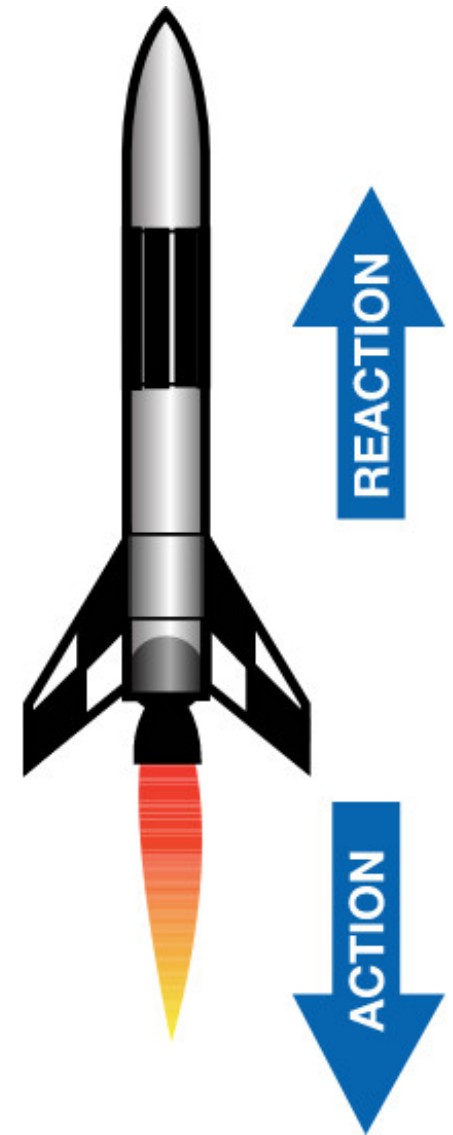


What Makes a Rocket Fly?



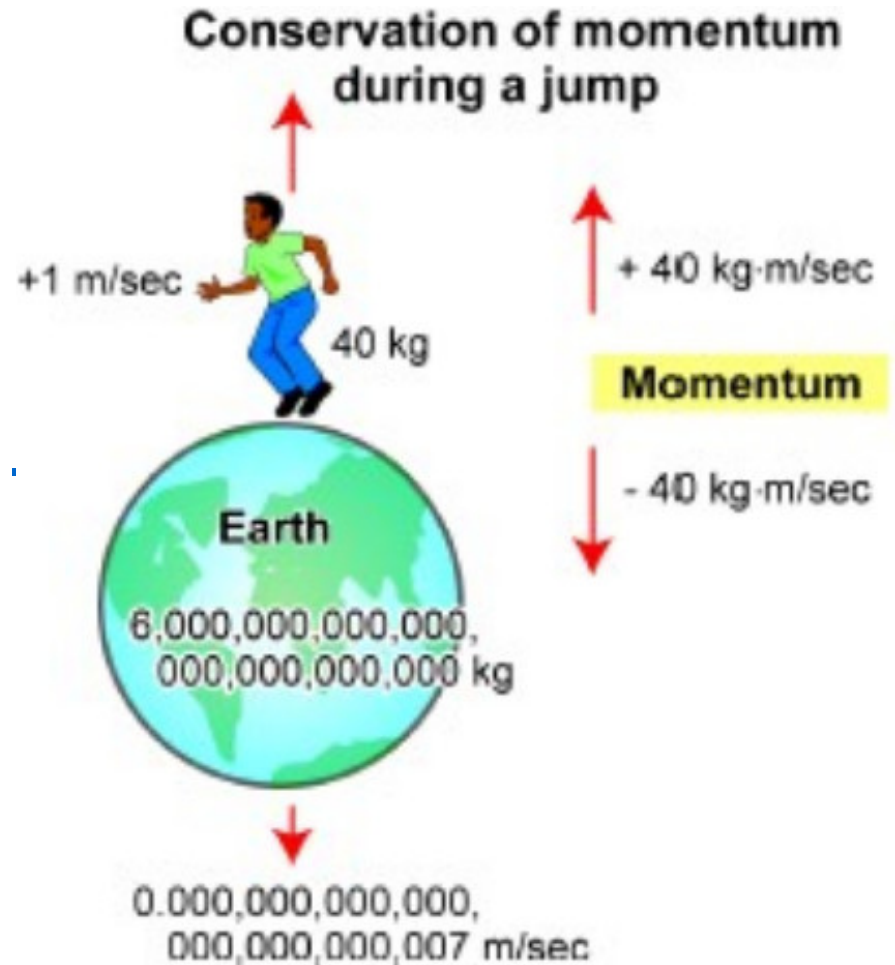
Action and Reaction

- Newton's Third Law
 - For every action, there is an equal and opposite reaction
 - Rocket pushes hot gas down
 - Hot gas pushes rocket up
- What about a car, or a plane, or a person jumping?



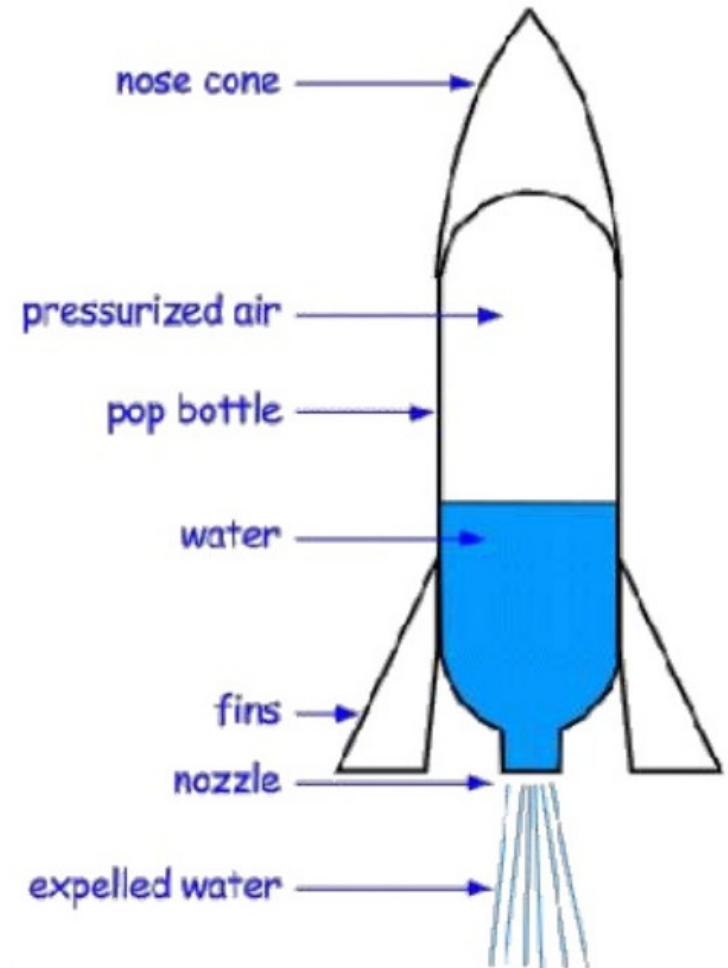
Action and Reaction

- Newton's Third Law applies to everything!
 - When we jump...
 - We push the earth down..
 - ...and the earth pushes us up!

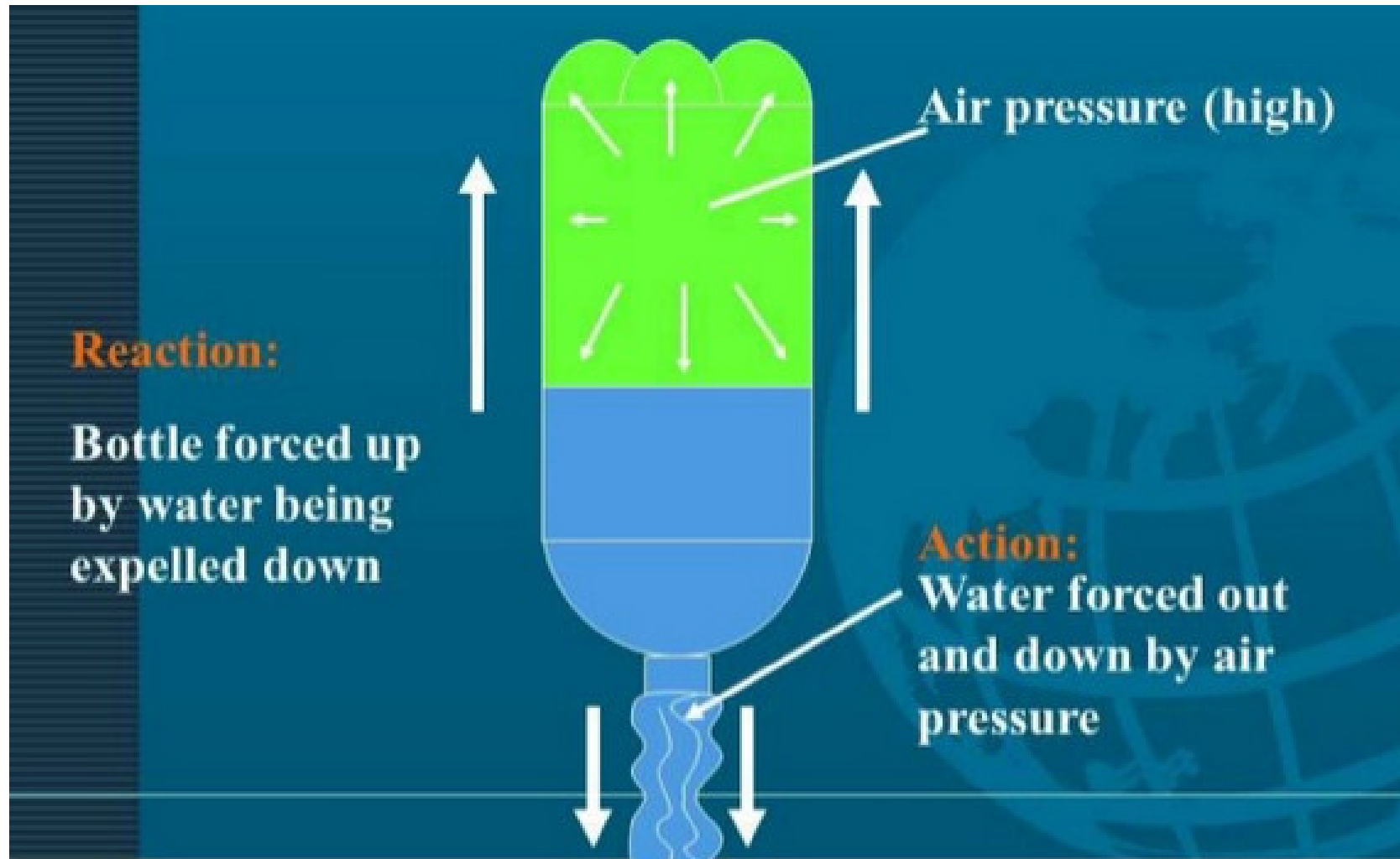


Water Rockets

- Uses air pressure to push water out
- Works just like a real rocket! (...but with water instead of hot gasses)



Water Rockets



Experiment

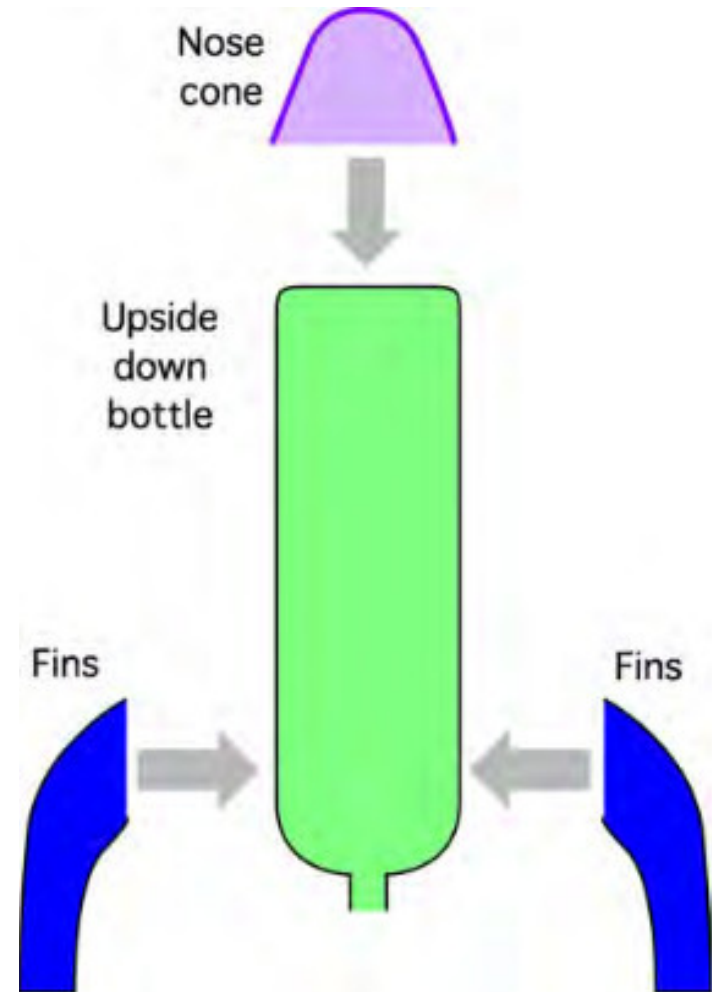
- Why do we need the water?
- We need a volunteer...

What did we learn?

- When we throw a...
 - Light object: Very little force
 - Heavy object: Much more force
- If the rocket only contains air, then it will not fly well because air is very light
- What if the rocket only contains water?

Building a water rocket

- Consists of 3 parts:
 - Bottle
 - Fins
 - Nose cone

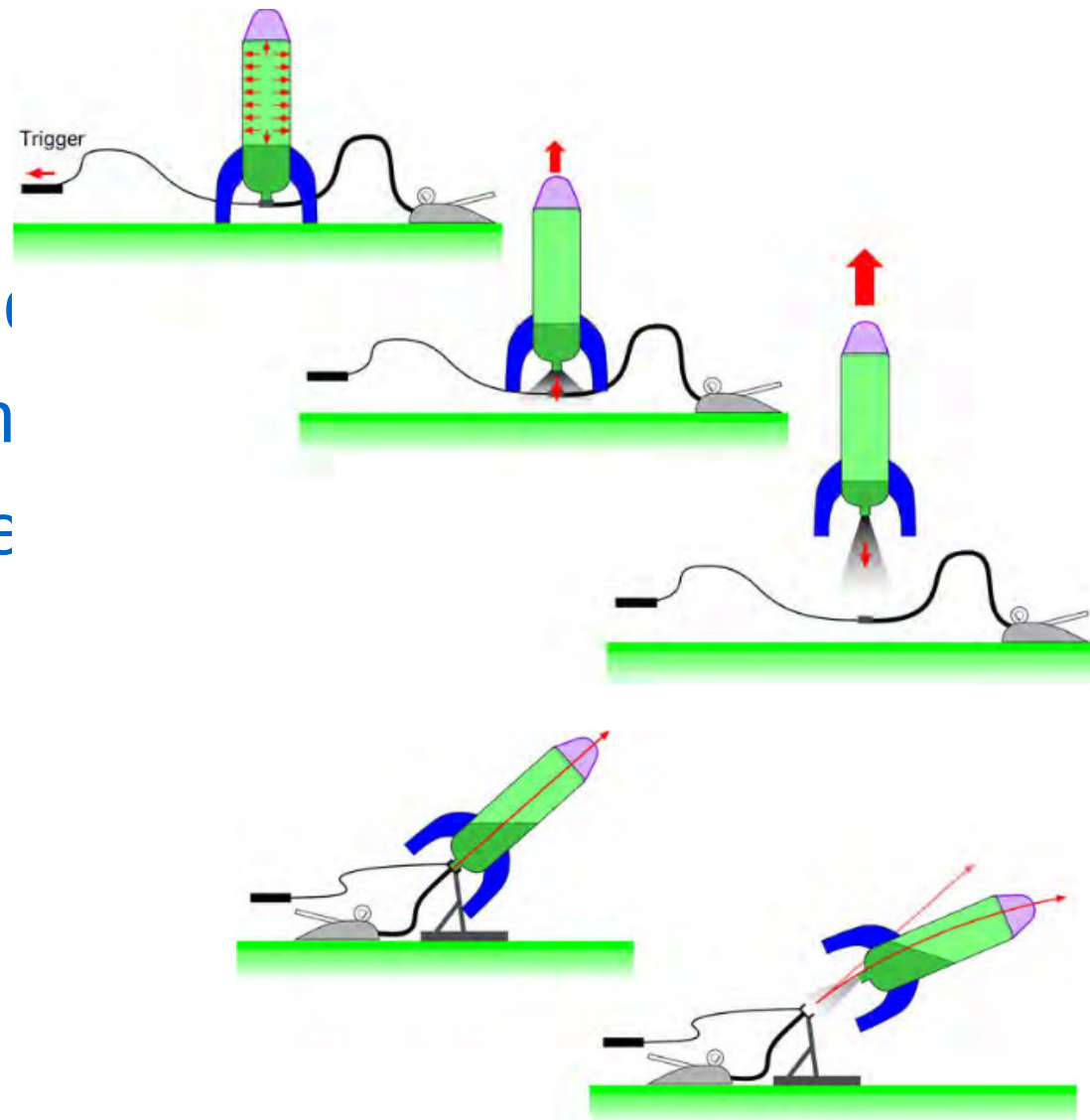


Launcher

- 3 main types of launchers
 - Simple
 - Launch Ramp
 - Launch Tube

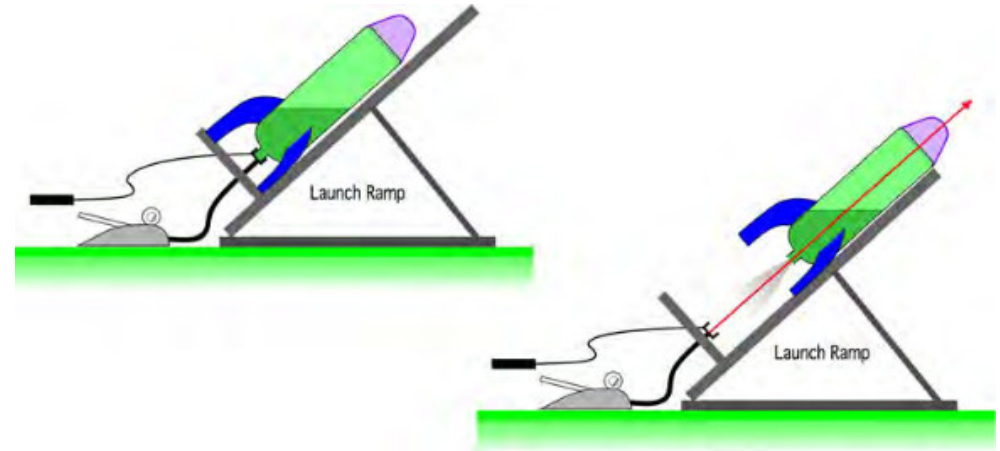
Launcher

- Simple launcher
 - Rocket is unsupported
 - OK for vertical launch
 - Tends to fall over when launched at an angle



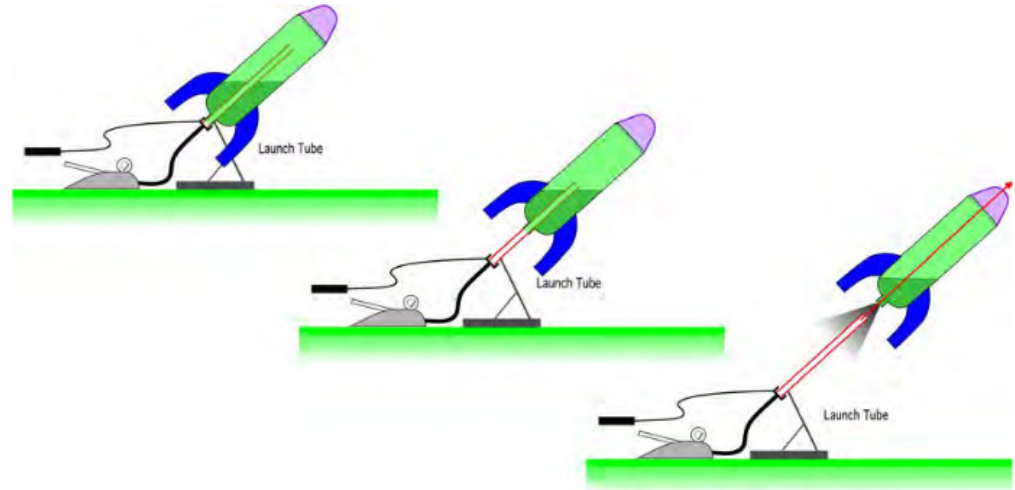
Launcher

- Launch ramp
 - Rocket is supported by a ramp
 - Otherwise the same as a simple launcher
 - Can launch at an angle

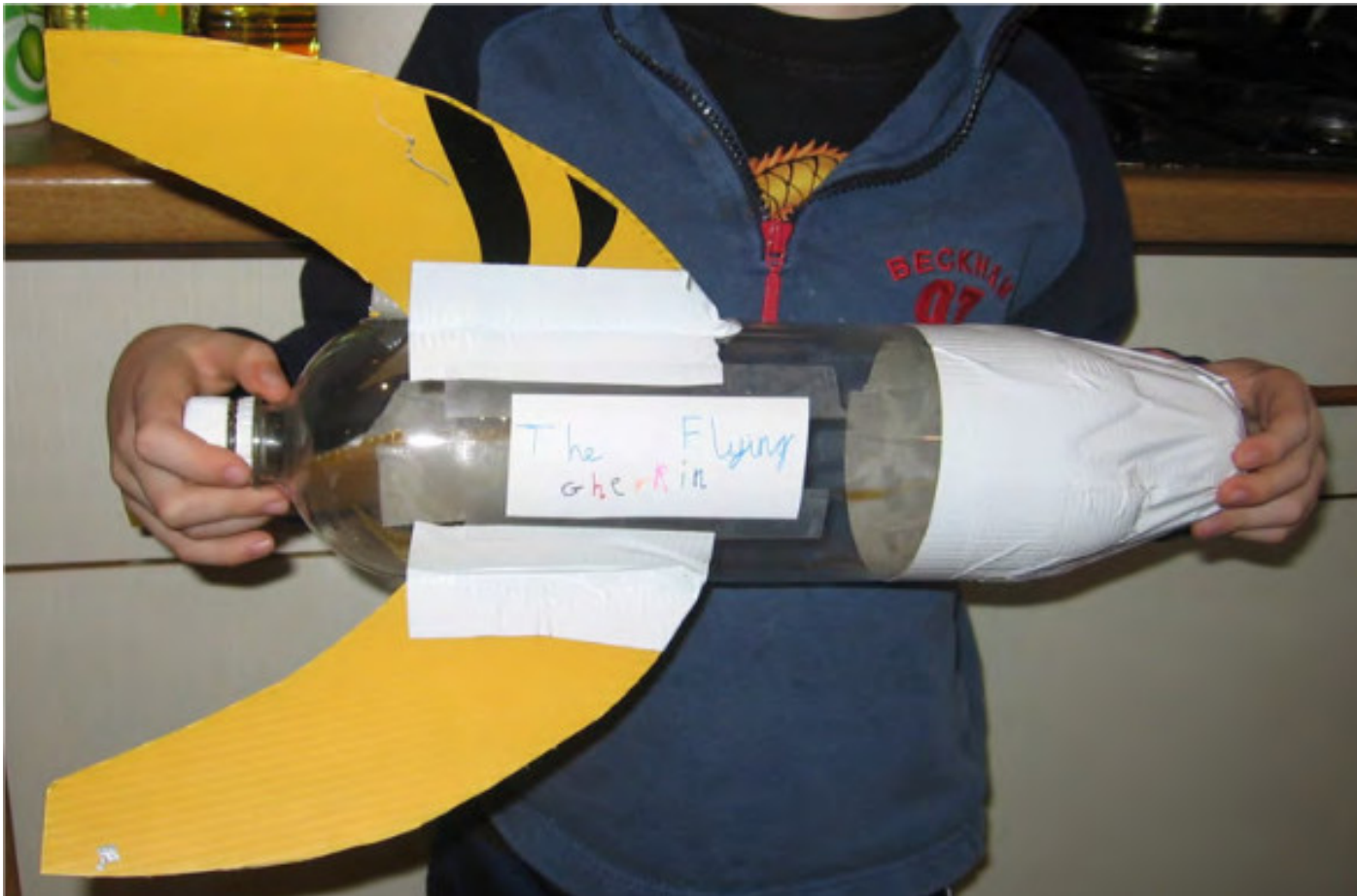


Launcher

- Launch tube
 - Tube is inserted into rocket
 - Can launch at an angle
 - Tube guides the rocket keeping it straight
 - Tube also provides a boost at the start (Why?)
 - **This is what we will be using! (demo)**



Building a water rocket

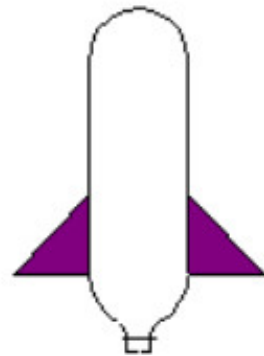
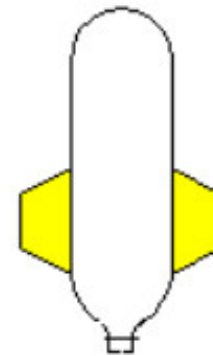
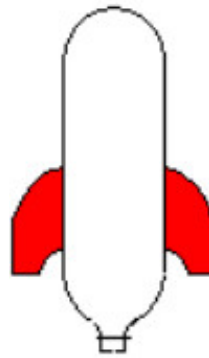
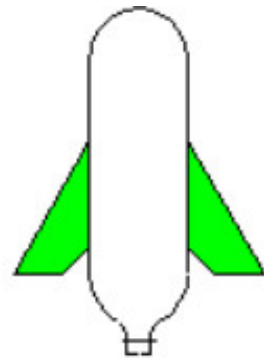
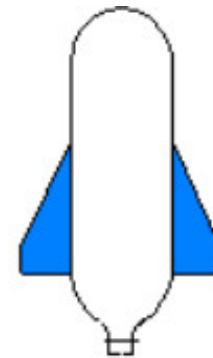
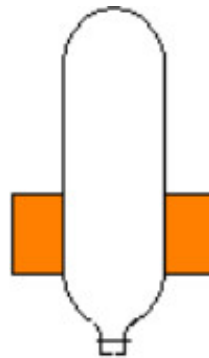


Building a water rocket

- Bottle
 - IMPORTANT! Only use gassy drinks bottle (eg. Coke, Pepsi, Sprite)
 - Other types of bottles (eg. mineral water, green tea) are NOT designed to withstand pressure and will explode when pressurized
- Pick your bottle, wash it if it is dirty

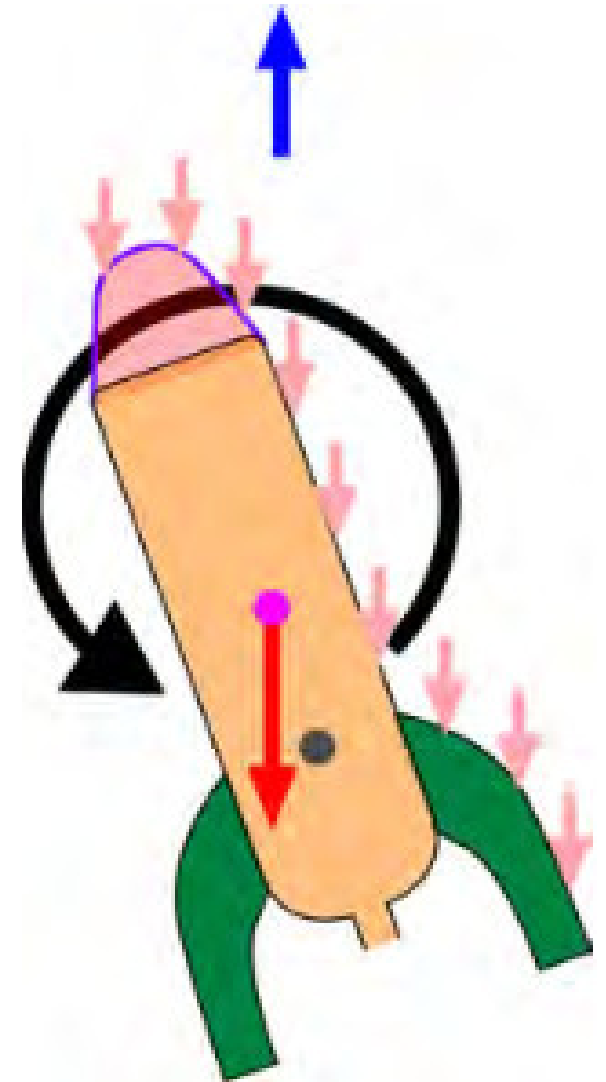
Building a water rocket

- Fins
 - Why do we need fins?
- Experiment and test out different...
 - Fin designs
 - Fin placement (front, middle, back)



Fins

- Helps to stabilize the rocket
- Without fins, the rocket will tend to tumble
- Should be placed near the back



Building a water rocket

- Fins (hands-on)
 - Design your fin. You decide on...
 - Shape
 - Number
 - Position
 - Attachment type
 - Choose your color
 - Cut out your fin
 - Attach it to the bottle

Building a water rocket

- Nose cone
 - Make the rocket more aerodynamic (...less air resistance)
 - Space for...
 - Sensors
 - Camera
 - Electronics
 - Parachute
 - Use tape NOT glue!



Flight Recorder

- Use micro:bit
 - Record acceleration
 - Save to file
 - Display on computer
- Add this extension
 - github.com/Cybot101/pxt-filesystem