Hands On Activity
Water Filtration

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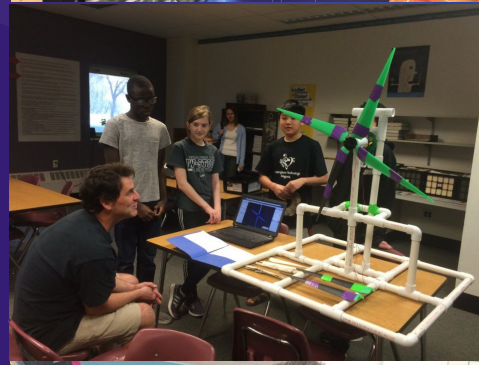
Hello!



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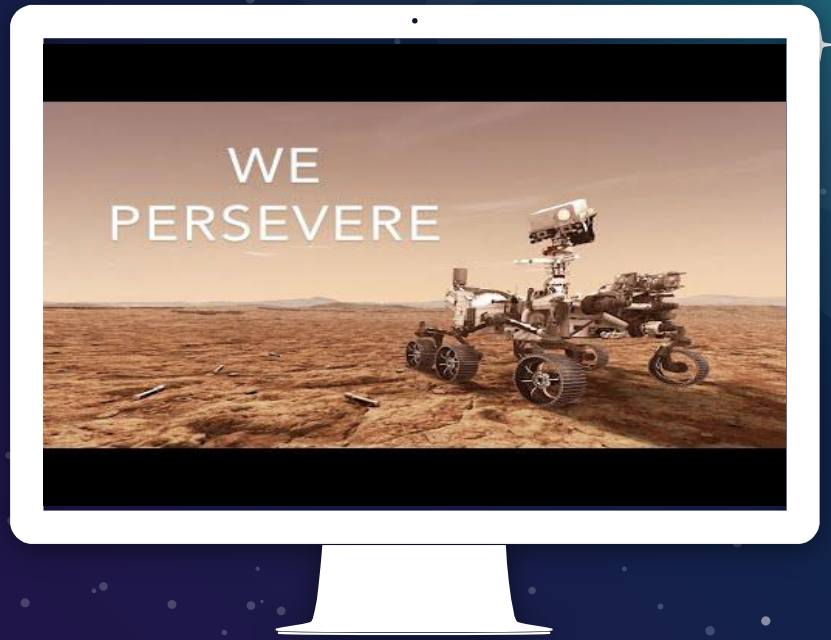
Hello!

We Persevere

February 18, 2021

Perseverance Rover
Mars Landing



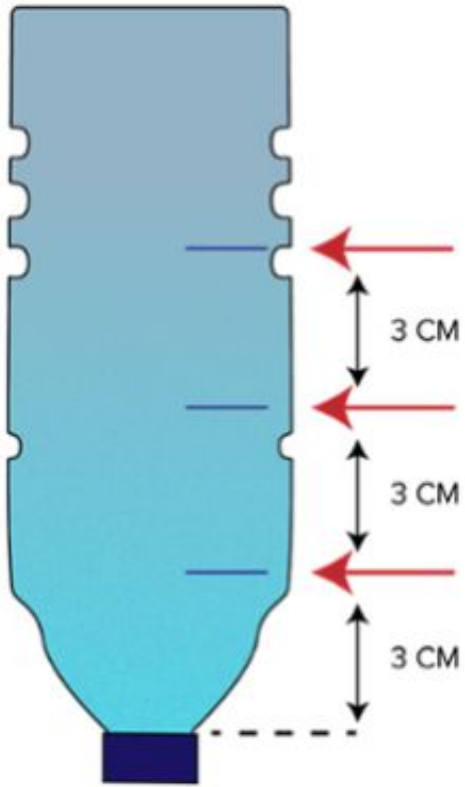
Water Filtration Materials

- 1-2 empty 16 oz plastic water bottles
- Any materials you think will make a great filter:
  - Cotton balls
  - Coffee filter
  - Activated Charcoal
  - Baking soda
  - Uncooked pasta
- Paper towels
- Cheesecloth
- Rubberbands
- pH paper/copy of pH table
- Scissors
- Permanent marker

Safety: goggles & gloves

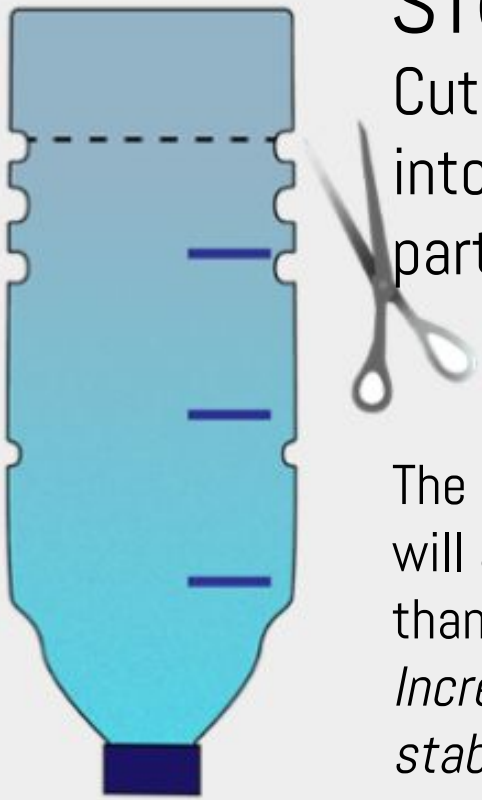
Step 1

Using a permanent marker, mark the top half of the bottle with three lines that are 3 cm apart starting from the small bottle opening.



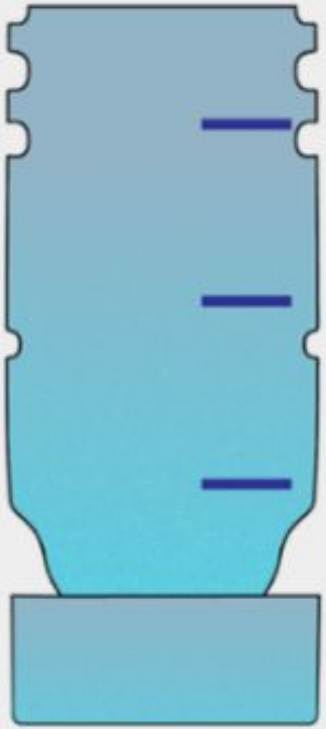
Step 2

Cut the bottle into two parts.



Water Bottle Cut into Sections

The bottom half will appear taller than pictured. *Increased stability is ideal.*



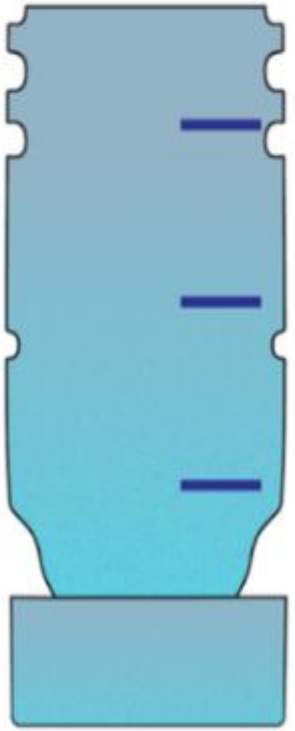
Top Section Inverted into Bottom

Step 3

Attach cheesecloth to the bottle opening using a rubberband.

Step 4

Invert the “filter column” in the bottom of the bottle.



Step 5

Choose three different filtering materials from the materials provided.

Step 6

Pack each chosen filtering material into one of the 3 cm layers, as indicated by the lines drawn on the bottle.

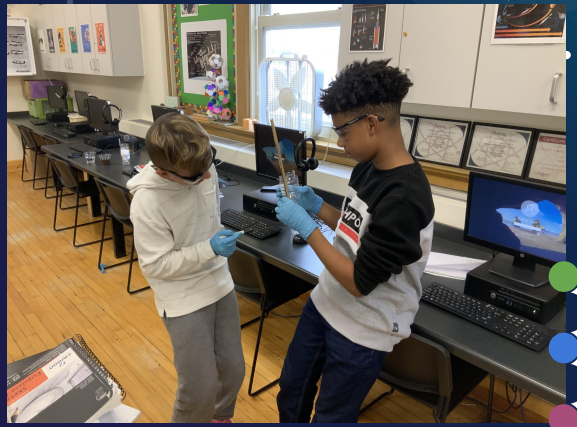
Step 7

Obtain a supply of clean and dirty water. Filter. Use the pH strips and pH table to test the pH level in both water samples.

Step 8 - Data Collection

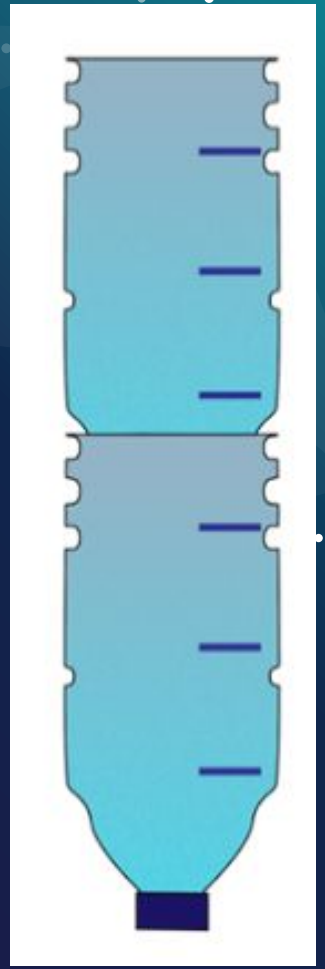
	Clarity	Odor	pH (1–14)
Clean water			
Dirty water **before** filtering			
Dirty water **after** filtering			
Dirty water **after COMBINED** filtering			


INTERNATIONAL SPACE ROCKETS
AMERICA



Extensions:

- Combined Filters - Combine your filter with another team's filter by stacking one on top of the other.
- Present Findings
  - *What worked well today?*
  - *What was challenging today?*
  - *What would I do next if I had more time?*
- Create a hydrolysis graph in Google sheets
- Conductivity Test



STEM To go Bags

Make it a unit.

STEM To Go Bags
Artemis Mission Activities

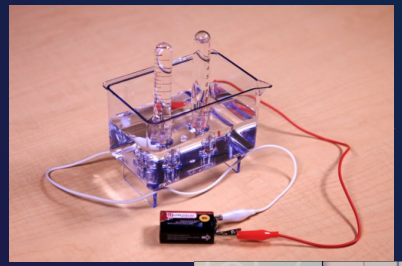
- JPL Straw Rockets - Going to the Moon
- Design Squad/NASA Lunar Lander - Landing on the Moon
- JPL Water Filtration - Living on the Gateway Lunar Orbiting Platform
- Design Squad/NASA Roving on the Moon - On to Mars! (Perseverance)

STEM To Go Bags
Materials

Item	Quantity to order	Individual Size To Bag	Activity
Gallon Ziploc Bags	30	1	Storage
Cheesecloth	1 yard	10 cm x 10 cm	Water Filtration
Water Bottles	30	1	Water Filtration
Paper Towel	1 roll	tear individually	Water Filtration
Rubber Bands	180	6	Water Filtration, Touchdown, Roving on the Moon
Cotton Balls	90	3	Water Filtration
Coffee Filter	30	1	Water Filtration
Uncooked Macaroni	2 - 12 oz boxes	scant 1/4 c.	Water Filtration
Waste Water Sample	*I had students make their own*	1	Water Filtration
sharpened pencils	30	1	Straw Rockets, Roving on the Moon
straws	300	10	Straw Rockets, Touchdown, Roving on the Moon
cardboard	30	6" square	Roving on the Moon
cardboard	60	2 - 5" squares	Roving on the Moon
thin cardboard (cereal box)	30	4" x 5"	Touchdown
white breath mints individually wrapped	60	2	Touchdown
small cup	30	1	Touchdown
index cards	90	3	Touchdown
Large marshmallows	60	2	Touchdown
Small marshmallows	300	10	Touchdown

PLTW Activity 2.6

- Not just about making a water filtration system
- Learn about how resources are not unlimited and that they need to be recycled to sustain life aboard a spacecraft
  - Water Recovery System
  - Oxygen Generation System
  - Sabatier System
  - Waste Management System
- Apply knowledge about living on Earth to living in Space



A Classroom that Fuels an Interest

Create a visual display that tracks which astronauts are on the International Space Station and shows a diagram of each module on the station.

How fast is the ISS moving?

- ★ 17,130 mph

How high is the ISS above the earth?

- ★ 254 miles

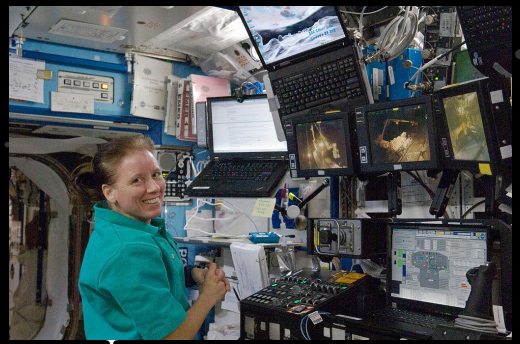
How long is the ISS?

- ★ 357 feet (football field)

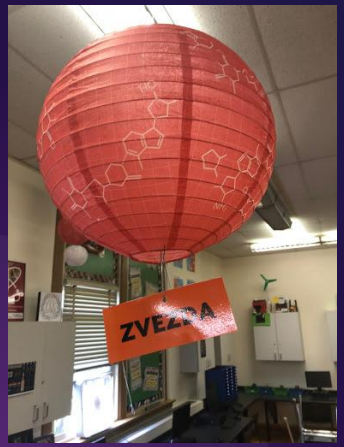
Can I see the ISS from earth?
https://spotthestation.nasa.gov/

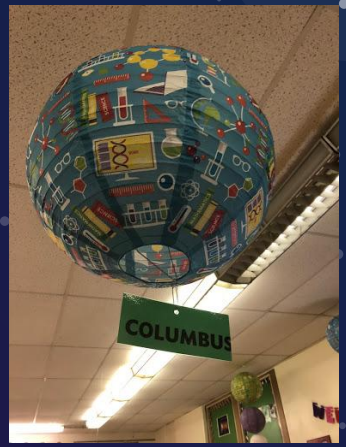
Live footage from the ISS:
http://www.ustream.tv/channel/iss-hdev-payload

Current Astronauts/Cosmonauts On Station

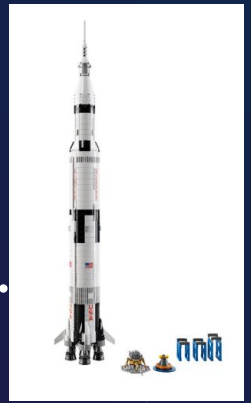


Classroom Groups - ISS Modules





1. Kibo, JAXA
2. Zvezda, Roscosmos
3. Columbus, ESA
4. Tranquility, ESA & ISA
5. Destiny, NASA
6. Harmony, NASA

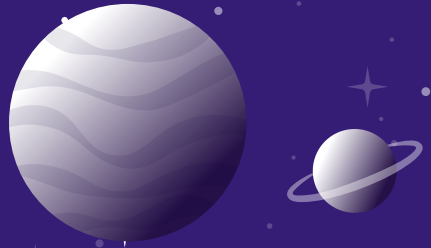


Professional Development

- Space Academy for Educators
- Space Center University
- Abrams Space Across the Curriculum Educator Training
- Lift Off
- Dayton Air Camp for Educators
- USNA SET Sail STEM Educator Training

Suggested Space Resources

- NASA STEM Engagement - BEST activity guide & Train Like an Astronaut
- NASA Opportunities & Tools for Educators & Students
- NASA Spinoff - highlight NASA technologies that benefit life on earth
- Chris Hadfield Master Class - $15/month or $90/class
- Orion's Quest - authentic research for today's youth
- Space Station Explorers - sign up to be a space station ambassador
- Lunar & Meteorite Sample Disk Program - borrow sample disks for your class
- International Space Station - STEM on Station, your connection to the ISS
- ISSabove - raspberry pi that enables live feed of the ISS ($147.50)
- Spotthestation.nasa.gov - text notifications of upcoming sightings in your area
- Skyview app - point your device at the sky to identify stars, constellations, etc
- Afterschool Universe - free curriculum for an afterschool astronomy program
- Ship the Chip - engineering design to safely ship a product
- GE Additive Education Program - Dremel 3D45 and Polar3d account
- NASA Express weekly email sign-up https://www.nasa.gov/stem/express
- Prime Video: Xploration Outer Space hosted by Emily Calandrelli, @TheSpaceGal



THANKS!

ANY QUESTIONS?

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References

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