

amazing space

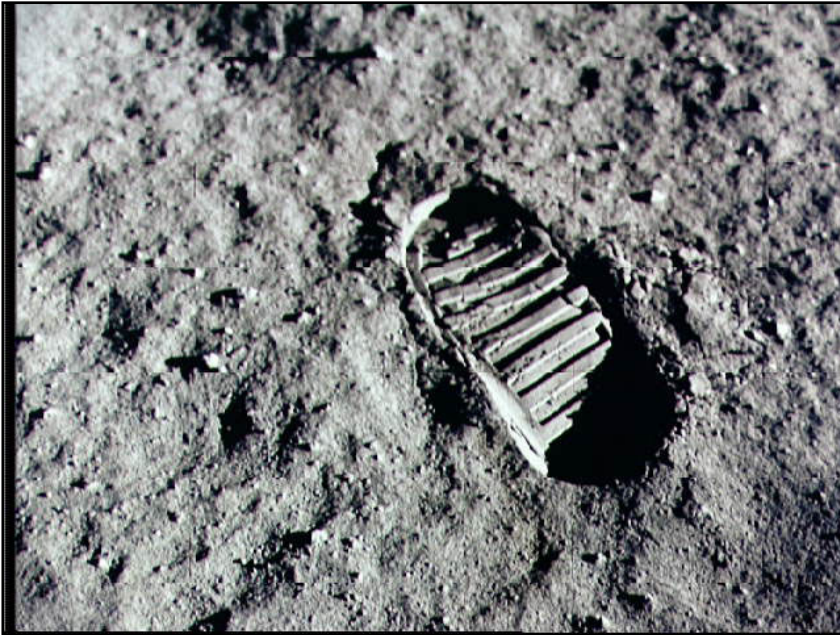


Jasztalville

Unit Packet

<http://teachingvision.org>

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Several photos (royalty-free) are from NASA.

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Some of these hands-on experiments came from excellent online resources like NASA.org. However, all pages are written in Ms. Jasztal's original words.

PASSWORD CLUES- SPACE

Directions: Read the clues on the left below and guess which space-related word the clues are referring to on the right.

| The five password clues are... | The word is... |
|---|----------------|
| 1. orbiting, particles, between, Mars, Jupiter | |
| 2. planet, blue, rings, side, outer | |
| 3. planet, largest, hydrogen, helium, outer | |
| 4. circle, deep, impact, explosion, surface | |
| 5. person, explorer, study, observe, wears a suit | |
| 6. planet, first, inner, craters, freezing | |
| 7. circle, around, elliptical, oval, path | |
| 8. planet, visible rings, belt, outer | |

Clues written by Ms. Jaształ, © 2008-2009

Lenses and Magnification

Lenses, as we already know, help us to see faraway objects through telescopes. However, they are also used for eyeglasses, contact lenses, the lenses in your eyes, binoculars, cameras, radar systems, and microscopes. Imagine this; lenses were even used for entertainment in the 1600s. In the time of Galileo Galilee, it became quite common for affluent (wealthy) people to pass out these round lenses called flea glasses. Guests would amuse themselves looking for fleas and other small critters in the folds of the other guests' clothing!

Today, your first challenge is going to be to make a simple lens out of water and conduct an investigation to see how it bends the light. (The bending of light is called _____!)

Procedure:

1. Obtain two small squares of plastic from the teacher.
2. Place one square directly over the print on the top of this page, somewhere toward the top of the page.
3. Place one drop of water on the plastic so it covers some print. Add a second drop of water directly on top of the first, making a single large droplet that will serve as your lens.

4. Compare the print UNDER the droplet to the one that does not have the droplet. What differences do you spot in print size, sharpness (clear or blurry), and letter position (upside down or downside up)?
5. While observing the print through the water droplet, very gently lift the plastic square away from the page and notice any changes to the appearance of the print.
6. Lay the plastic sheet back down on the paper (if the droplet has moved, wipe off and redo).
7. Now make a second "two-drop" water lens on the *second* plastic sheet.
8. Lift the second plastic sheet gently and hold it 1-2 centimeters above the first droplet, so you are looking at the print through BOTH droplets at the same time. Describe any changes in print size, sharpness, etc. on your Data Sheet.
1. Describe differences you observed when viewing the print through the water droplet.

2. Describe changes in the print when the water lens was lifted.

3. Describe changes in the print when you viewed the print through two water lenses at the same time.

Hands-On Activity- Crater Challenge

All the time, planets feel the impacts of rocks that crash into their surfaces. However, most of these rocks are not large or fast enough to give off the impact of a crater. From time to time, though, fast-moving rocks hit a planet's surface with a force so astounding that it literally explodes into the ground. These space rocks, called **impactors**, form craters.

The explosion releases a great deal of heat and energy, enough to melt the entire impactor and some surrounding rocks as well. Dust and rock fragments called **ejecta** fly off in every direction. A raised rim known as an **ejecta blanket** is formed, looking like a ring around the crater. Scientists take measurements with various instruments to study these impact craters. Some of these instruments create three-dimensional maps.

Impact craters can tell scientists a great deal about a planet like the age of different areas on the planet's surface.

The surface of Mars was mostly covered with these craters as of a few billion years ago. However, volcanism, erosion, and other geological processes have taken out signs of craters in some areas, revealing some rocks beneath the surface of the planet. Mars specifically has impact craters with ejecta patterns that resemble dried mud. The dried mud could have formed when the heat of impact melted underground ice and mixed it with soil and rocks.

Group Challenge: Modeling Martian Craters

Needed:

- Saran tray filled 5 centimeters deep with flour
- Large black garbage bag
- Paper cup filled with 100 mL chocolate powder
- Empty paper cup
- Stick of modeling clay
- 2 toothpicks
- Meter stick
- Ruler with centimeters

PART ONE

1. To make sure clean-up is quick and neat, place your Saran tray on top of a garbage bag.
2. Shake a thin layer of powder over the flour using the cup filled with cocoa powder.
3. Form an impactor with a diameter of about 2 centimeters (1 inch) using the modeling clay.
4. Drop the impactor into the flour tray from about a height of one ruler (30 centimeters or 12 inches).
5. Use two toothpicks to *gently* lift the impactor from its crater.
6. Make observations of the crater using **sketches, words, and numbers** on the attached sheet.

Make observations of the first crater you have made using sketches, words, and numbers below. Use your ruler to help you come up with numbers for this activity.

DISCUSSION!

Question: What might have affected the size of the crater you made in your tray?

Answer: How large the impactors were, the height you dropped the craters from, mass of the impactor, and the speed of the impactor

Because of any changes made to your impactors, this is how your crater can be impacted: the diameter of the crater, the circumference of the crater, and the depth of the crater

PART TWO

You will now try two more craters. Don't get rid of your original crater.

-Make an impactor the same size as before (1 inch or 2 centimeters across). Drop the impactor from the height of two rulers instead of one.

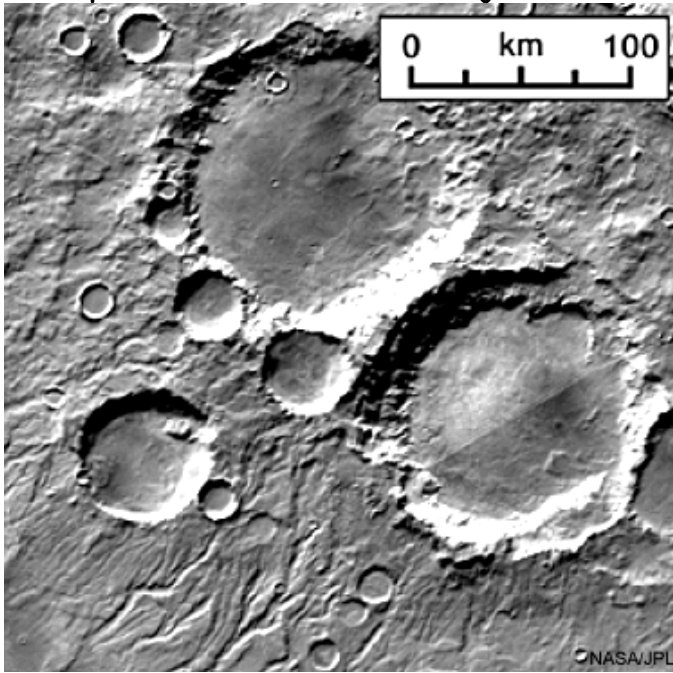
-For the last crater, make an impactor larger than the one you used for the first two craters. Drop the impactor from either the height of one or two rulers.

PART THREE

Smooth out the tray so you have a flat surface for your craters again. You are now going to create a 3-D scale model of Martian impact craters, supplied by your teacher. You need to think of how large your impactors will be and from which height you will drop them to make your model as accurate as possible. When you are done, please show your teacher.

Model of Martian Impact Craters

(For part three of the activity)



Your Weight on Other Planets

Weight is a measure of how you are attracted by gravity to the planet. Your weight does not remain the same as you move from one planet to the next.

Your Weight: _____ pounds

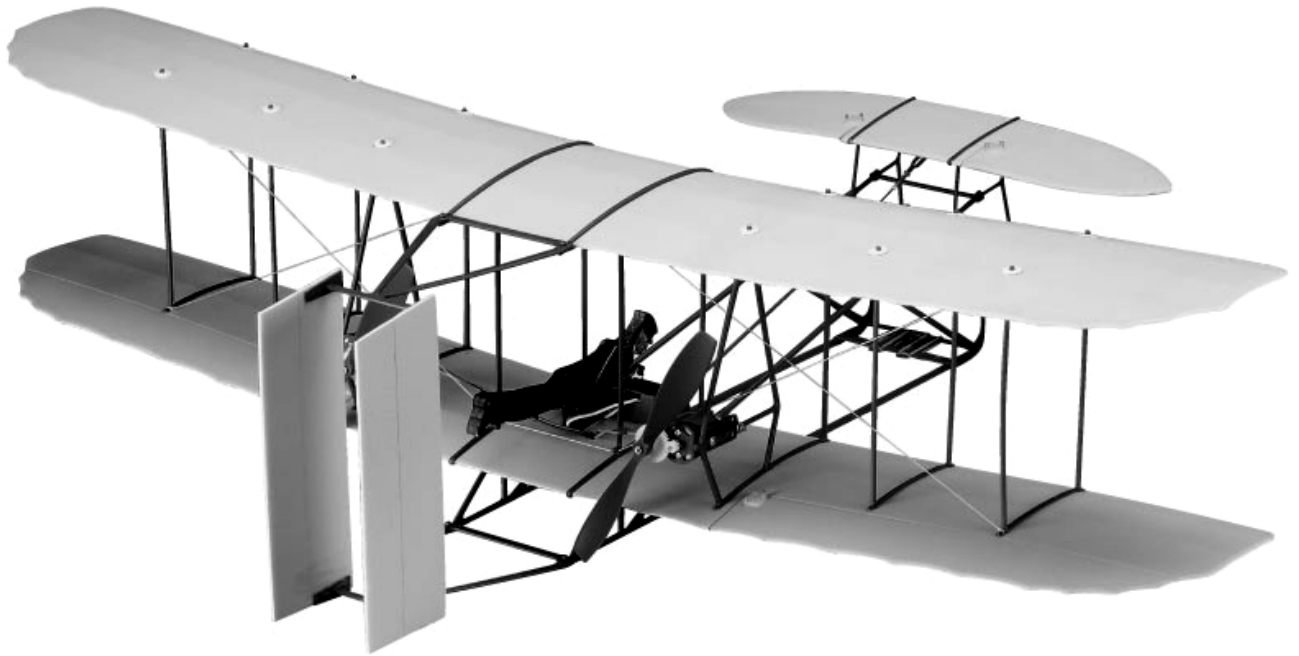
For each planet below, multiply your weight by the number given in the weight chart. If you weigh 80 pounds, for example, you multiply 80×0.4 to find out that you weigh 32 pounds on Mercury. ($80 \times 4 = 320$, but it's 80×0.4 , so you move the decimal one place to the left to make it 32.0.)

Of course, don't forget to show your work!

| Planet | Multiply your weight by... | Your New Weight |
|----------------|-----------------------------------|------------------------|
| Mercury | 0.4 | |
| Venus | 0.8 | |
| Earth | 1 (doesn't change) | |
| Moon | 0.17 | |
| Mars | 0.4 | |
| Jupiter | 2.5 | |
| Saturn | 1.1 | |
| Uranus | 0.8 | |
| Neptune | 1.2 | |
| Pluto | 0.01 | |
| Sun | 28 | |

[Information derived from various sources]

Build a Model of the Wright Brothers Flyer (Kitty Hawk)



(Image from Electrify.com)

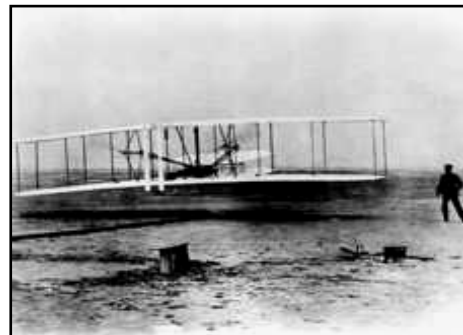
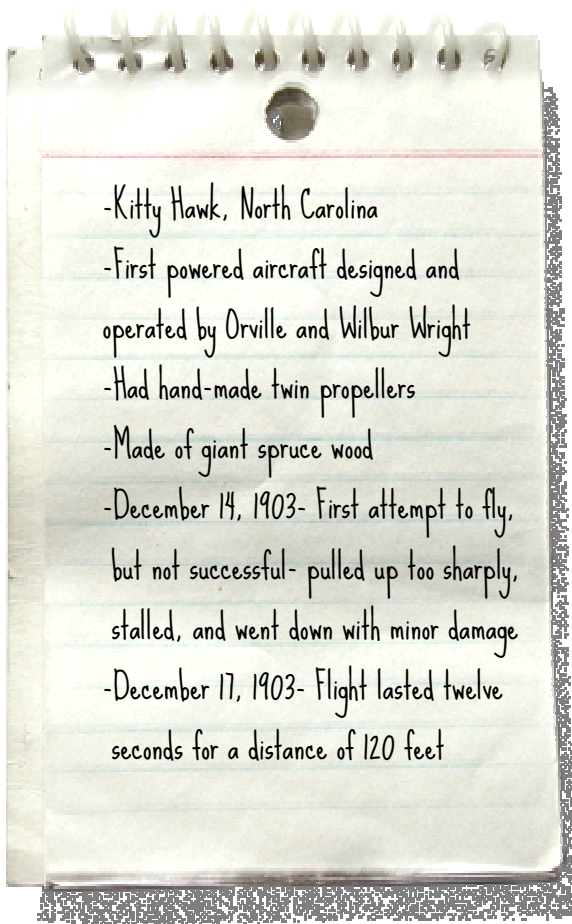
Materials Needed:

- Paper plate
- White frosting (to "cement" parts of your aircraft together)
- (5) popsicle sticks (you may not use them all)
- (3) graham crackers
- About a dozen pretzel sticks

Looking at the completed model of the Wright Brothers flyer, use the materials in constructing an edible model of your own.

Newspaper Report: Wright Brothers Flyer

Write a short newspaper article about the Wright Brothers flyer using the "reporter notes" below. Make it at least ten sentences and use reporter lingo (language). To enhance your article, go to Google.com and search "Wright Brothers flyer" or simply "Wright flyer". (You decide which websites provide the best information; when you grow up, your boss will not be telling you all the time which books, websites, or resources to use for your job.)



See the next page for a handy rubric!

Handy-Dandy Rubric

Your task: Write an article about the Wright flyer as if it is being used for the very first time(s) in 1903. You can write about how the flyer was built, the materials used in constructing it, and the (lack of) success with the flights.

| Component | Rating- | Comments |
|--|---|----------|
| You gave your article an interesting title. | 0 pts- Not there 1 pt. - Some evidence, yet could be stronger 2 pts. - Provided what was needed | |
| Your article had at least ten sentences. | | |
| You found more information from the Internet and used it for your article. | | |
| You used mature language in your article. It sounded like it was written by a reporter and didn't just "spit" out information. | | |

Moon Archaeology- Chip Mines

(NASA.org is simply incredible!)

Materials Needed: (1) chocolate chip cookie, a few toothpicks, straw (cut into pieces one inch long), and a paper towel

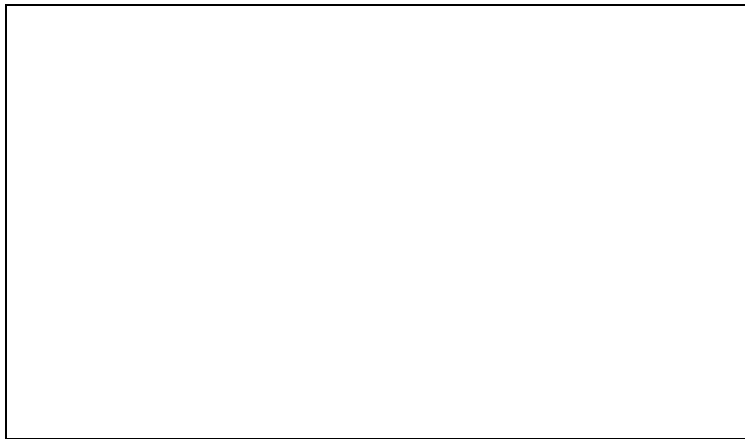
Your Task: Your group must discover the best way to remove the chocolate chips from a cookie.

Ground Rules:

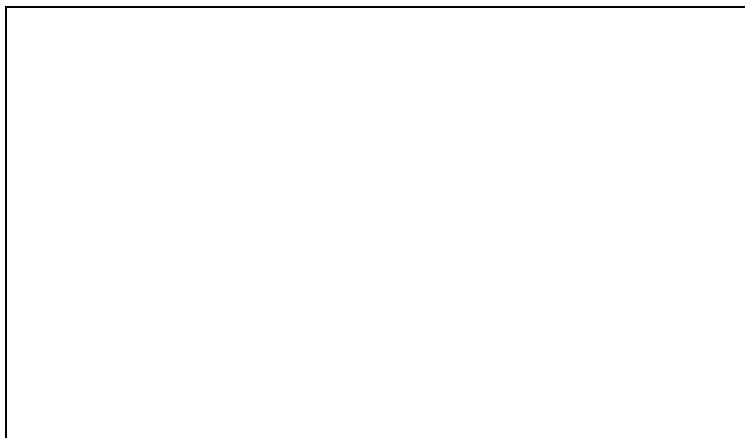
1. For every 1-inch straw you fill with chocolate pieces, your group will receive \$1,000.
2. For every minute it takes to get out the chocolate chips from your cookie, you will be charged \$100.00.
3. You will at the end of your experiment total up the value of your chip mine. Just for mining your cookie, the value of your chip mine goes down \$100.00. The more damage to your cookie, the more you lose. For every cookie piece that breaks off or crumbles, you lose \$100.00.

Here You Go:

1. Place your cookie (chip mine) on the paper towel and look at it. How many chips appear on the surface of the cookie? Sketch your chip mine below.



2. Begin using your toothpick to remove the chocolate chips. You may "look underground" by checking out the bottom of your cookie, yet you must only mine the cookie from the top!
3. When you are done, sketch your chip mine once again.



4. PROCESS YOUR CHOCOLATE. Separate the crumbs from the chocolate.
Someone in your group needs to time your work. Round off the time to the nearest minute (after thirty seconds, you are at the next minute!). Record it under "Processing Time" in the chart below.
5. MEASURE YOUR CHOCOLATE: Pick up the pieces with your 1-inch straws.
Repeat with as many straws as you need. Under the section on your chart called "Chocolate Mined", record the number of straws you filled.
6. Then "Figure Your Earnings".

Fill in your scores and multiply to get the total dollar values.

Land Damage (Step 4): _____ pieces \times \$100 = \$ _____

Processing Time (Step 5): _____ minutes \times \$100 = \$ _____

Chocolate Mined (Step 6): _____ straws \times \$1,000 = \$ _____

Add the dollar values for Processing Time and Land Damage. Write the answer here: \$ _____

Total Costs: \$ _____

QUESTION: Are the Total Costs (Step 2) more than the dollar value of your Chocolate Mined (Step 1)?

If Yes: Your mine has lost money. Write "Bankrupt" in the blank.

If No: Subtract the Total Costs from the Chocolate Mined. Write the answer here:

Total Earnings: \$_____ (Write "bankrupt" if your mine has lost money.)

COOL FACT: You just got a "taste" of the coal mining industry!

Reference Page-

Answers for PASSWORD CLUES- SPACE

1. asteroids, 2. Uranus, 3. Jupiter, 4. crater, 5. astronaut, 6. Mercury, 7. orbit, 8. Saturn

BRAIN-COMPATIBLE STRATEGIES USED IN THIS UNIT:

Twenty Brain-Compatible Strategies That Are Proven to Help Us Learn

Author: Marcia Tate

Publication: *Worksheets Don't Grow Dendrites*

-Brainstorming and Discussion

-Games (Mining)

-Cooperative Learning

-Visuals

-Technology

-Drawing and Artwork

-Manipulatives, Labs, and Models (Mining, Craters)

-Project/Problem-Based Instruction

-Writing, Journals, and Writer's Notebooks