HYDRATION STATION

Educator Section

Introduction

Dehydration can be a problem for adults and children alike. Since our bodies are made up of 50 to 70% water, it is essential to drink plenty of fluids to keep our bodies healthy. Water plays many important roles in keeping our body in peak performance by giving nutrients to our cells, muscles, joints, our brain, skin and kidneys. Water also regulates our body temperature, and helps our heart function properly.
Space explorers must maintain proper hydration levels while in space. As astronauts complete their tasks on an exploration mission, whether inside or outside the space exploration vehicle, astronauts need adequate hydration to maintain proper health.

Lesson Objective

- Students will investigate the importance of staying hydrated, proper hydration methods, and learn to identify signs of dehydration.
- Students will understand the role hydration plays in keeping the body healthy.
- Students will identify the own hydration levels by creating simulated urine.

Problem

How can I create simulated urine to identify different levels of hydration?

Learning Objectives

The students will:

- Draw a picture and make a web of what hydration is to them.
- Investigate the importance of hydration to the human body.
- Create and investigate simulated urine samples and recognize what their own urine would look like during different levels of hydration.

Materials

Per class:

- Computer with Internet access for teacher use
- Library access

Discovery Lesson

Grade Level: 3-5

Connections to Curriculum: Science, Technology, Writing, Mathematics, Health and Physical Education

Science Processing Skills: predicting, observing, comparing, gathering, recording data (American Association for the Advancement of Science)

Teacher Prep Time: 30 minutes

Lesson Duration:

Prerequisite: knowledge of the scientific method, science lab safety rules, and basic physical activity

National Education Standards: Science, Technology, Engineering, Mathematics, Health, and Physical Education

National Wellness Initiative: This activity meets the needs of the federally mandated Local Wellness Initiative, and may help meet the needs of your Local Wellness Plan.

Materials Required:

- Chart paper or small poster board
- Pencil
- Markers
- Internet Connection
- Bandana
- Yellow, Red and Green food coloring
- Clear cups
- 8 inch disposable plate
- Toothpicks
- Water
- Hydration cards
- Colors

- One LCD projector or overhead projector
- One water bottle picture
- 2-3 bandanas
- Urine color chart

Per groups of 3-4 students:

- One poster board or chart paper
- One set of Markers
- Two computers with internet access
- One Hydration/Dehydration chart or poster
- Four clear plastic cups
- One disposable 8 inch plate
- Two toothpicks
- One small bottle of Yellow, Red and Green food coloring
- One Urine hydration color chart
- One set of Hydration cards

Per student:

- Hydration Student Section
- Hydrate the Astronaut
- Urine hydration color chart
- Pencil

Safety

Remind students of the importance of being hydrated during any type of exercise and wearing proper attire. Remind the students the importance of proper internet use.

Pre-lesson Preparation (To be done the day before the activity.)

Hydration Web-Poster:

- Gather material for groups to work on their hydration web poster. Materials include:
  - One poster board or chart paper
  - One set of markers per team
- Provide an area with computers for students to do research.
- Place materials in an easily accessible area.

Hydrate the Astronaut

- Gather material to play Hydrate the Astronaut. Materials include:
  - LCD Projector connected to a computer
  - Hydrate the Astronaut silhouette PDF file (Appendix F)
  - Blindfold
  - Laminated water bottle (Appendix E)
  - Masking Tape
  - Colored pencils for each team
- Students will do this activity as an individual in the class, no groups will be needed.
- Print out hydrate the Astronaut for each student in your class. Find this in Appendix F.

- Be Prepared to project the Astronaut silhouette at the student's eye level on a white board or screen to make it larger.
- Print, laminate, and cut water bottle pictures. Appendix E.

Simulated Urine

- Gather material to do simulated urine activity. Material include:
  - Four plastic cups
  - Yellow, red and green food coloring
  - A permanent marker
  - Print out urine color chart for each group
  - Print out hydration cards for each group
  - Eye protection
  - Each group should have accessibility to water
- Place materials in an easily accessible area.

Lesson Development

To prepare for this activity, the following educator background information is recommended:

- Read about the hydration in the National Space Biomedical Institutes' textbook, "Human Physiology in Space", found at http://www.nsbri.org/HumanPhysSpace/index.html
- Race from space coincides with Race on Earth. http://www.nasa.gov/mission_pages/station/expeditions/expedition14/exp14_boston_marathon.html
- Read the following text taken from the Observation Section of the Hydration Station Student Section.

  Observation

  Dehydration can affect an athletic performance and increase the risk of a medical emergency. During athletic events or physical activity most athletes do not make it a priority to drink sufficient liquids to prevent dehydration. The consumption of liquids can be modified by educating the athlete and increasing accessibility of liquids during physical activity. However, athletes are not the only ones who are at risk. The elderly, children, labors and individuals enjoying outdoor activities are also at risk of suffering the symptoms of dehydration. Children sweat less than adults. This makes it harder for children to cool off. Parents and coaches must make sure that children take it slow to be sure they can get used to the heat and humidity gradually. Dehydration is a major cause for hospitalization among the elderly. Elderly are more susceptible to dehydration due to less fluid content in the body, they carry about 10 percent less than the average adult body. The elderly also have a reduced sense of thirst and loss of appetite that can trigger dehydration.
  Space explorers must maintain proper hydration levels while on an exploration mission. As astronauts reach the space environment, they stop feeling the pull of gravity. The normal functions of the body begin to change as the fluids in the body begin to shift towards the head. As the body detects the extra fluid in the upper body, the body believes there is too much fluid and the body begins to get rid of what it thinks are extra fluids. This large loss of fluids can result in dehydration for astronauts. In order to avoid this dehydration, astronauts must drink lots of fluids while in orbit. Dehydration can be very dangerous, astronauts must make sure they are not dehydrated while completing their tasks on a mission, whether inside or outside the space exploration vehicle, just like they do on earth astronauts need adequate hydration to maintain proper health.

- If needed, additional research can be done on the following topics:

- Hydration
- Dehydration
- Marathons

- Physical activities that will use energy and allow your students to *train like an astronaut* can be found in the NASA Fit Explorer Challenge at http://www.nasa.gov/fitexplorer

Instructional Procedure

Throughout this lesson, emphasize the steps involved in the scientific method. These steps are identified in ***bold italic*** print throughout the Instructional Procedure Section.

1. Review the Scientific Investigation Rubric with your class. This performance rubric is located in the Hydration Student Section. A sample of performance-based grading is located at the end of this Educator Section.
2. Introduce the lesson objective and learning objectives to the students.
3. Have the students discuss and make ***observations*** about hydration needs by completing the first two columns in the KWL (KNOW/WANT TO KNOW/LEARNED) chart in the Hydration Station Student Section with their group. Use the KWL chart to help students organize prior knowledge, identify interests, and make real world connections. As students suggest information for the KNOW column, ask them to share how they have come to know this information.
4. Review the Hydration Glossary of vocabulary words with your class. (Appendix B) Post words for students to see on your science word wall.
5. Have the students read the Observation Section in their Hydration Student Section and discuss what they read with their group. Use your own technique to check for comprehension of the Observation Section.
6. Review the ***problem*** with the students, "How can I create simulated urine to identify different levels of hydration?"
7. Help the students refine their predictions into ***a hypothesis.*** In their student section, they should re-state the problem question as a statement based upon their observations, materials and predictions. As they formulate a hypothesis, have students include verbs from the objectives. Encourage the students to share their hypotheses with their group.

Hydration Poster:

Have the students discuss and make ***observations*** about Hydration by designing and creating a hydration web poster. See an example of a hydration web poster in Appendix?. Use the hydration poster to help students organize prior knowledge, identify interests, and make real world connections.

8. Have students pick up all materials needed by their group to complete their hydration poster.
9. While students create their group poster encourage them to keep the following questions in mind as they are creative with their poster.
    - What is dehydration?
    - What are the causes of dehydration?
    - What are the signs of dehydration?
    - How can dehydration be prevented?
    - Why is it important to keep your body hydrated?
    - What are the best beverages to stay hydrated?
    - Do you think hydration is important to astronauts while they are in space? When should an astronaut be concerned about hydration in space?

Hydrate the Astronaut

1. Project the Astronaut silhouette on a white board or screen.
2. Give each student their own copy of Hydrate the Astronaut.
3. Blindfold a student and spin the student three times. Have the student place the water bottle on the Astronaut.
4. The student will return to their desk and take a seat.
5. Depending on where the water bottle landed, ask the following questions
    - Where did the water land?
    - How is water helping this particular body part function properly.
    - How would dehydration affect your health if this organ or body system was not getting enough water to function?
6. The students should color in the organs that are being described and write a short paragraph about hydration needs for this organ in their mission journal.
7. Continue this procedure until you have covered all the body systems and organs described below. Here are some organs or body systems that require water to function properly.

    A. **Brain:** Dehydration can impair your ability to concentrate. It may also affect your brain's processing and abilities as well as impair your short term memory.

    B. **Heart:** Fluids play a role in keeping your blood pressure normal. Dehydration can decrease cardiac output which may lead to increased heart rate and reduce your blood pressure.

    C. **Kidneys:** Hydration is essential for Kidneys; water helps remove waste, toxins and excess nutrients from the body. A healthy hydrated kidney filters approximately 180L (190quarts) of water each day.

    D. **Digestive System:** Water aids in the digestion of food, It's found everywhere in your digestive track from your saliva to the solution of enzymes of your lower intestine. Water helps dissolve nutrients that are absorbed into your bloodstream and delivered to your cells.

    E. **Cells:** Hydration is critical for transporting carbohydrates, vitamins and minerals to your cells. Your cells then produce energy to help keep your going.

    F. **Muscles and Joints:** Water is important for your muscles and joints, it helps cushion joints and keeps muscles working properly. Your Muscles are made up of 70-75% water.

    G. **Temperature:** Your body's water helps dissipate heat, regulating your overall body temperature. When you get too hot your body releases water by perspiring, thus removing heat from your body. If you do not replace the water you lose through perspiration your body can become dangerously overheated.

    H. **Skin**: Staying well hydrated will help preserve your skin's elasticity, softness and coloring.

Simulated Urine

*(Students will **test** their hypotheses following this procedure. These steps were taken from the Hydration Student Section. Educator specific comments are in italics.)*

1. You should work in groups of three or four during this lab.
2. Collect the following materials with your group.
    a. Four plastic cups
    b. Yellow, red, and green food coloring
    c. A permanent marker
    d. Make sure your group has access to water.
    e. Urine color chart
    f. Hydration cards

3. Label your cups 1-4
4. Fill each cup with 2oz of water
5. In cup 1 use 1 toothpick to add 1 dab of yellow food coloring.
6. In cup 2 use a toothpick to add 2 dabs of yellow food coloring.
7. In cup 3 add 1 drop of yellow food coloring.
8. In cup 4 add 1 drop of red food coloring 2 drops of yellow food coloring and 1 drop of green food coloring.
9. Compare your simulated urine to the Urine color chart. *(Appendix H)*
10. Arrange your simulated samples into the four hydration levels.
    a. Optimal
    b. Well Hydrated
    c. Dehydrated
    d. Seek Medical Aid
11. Identify each sample of hydration levels by placing the hydration card next to the appropriate simulated urine.

By making their own observations, students now understand how to determine their own level of hydration.

Record Data

1. You will keep a 12 hour hydration log to determine your own hydration levels. You will determine if you are drinking enough liquids to maintain healthy hydration.
   Explain the 12 hour hydration log to students. They will be documenting the following
   - *What time they drink*
   - *How much they drink*
   - *Physical activity levels*
   - *Urine hydration level: Students will make an observation of their own urine. Students will determine what category their own urine would fall under. For Example is it Optimal, Well Hydrated, Dehydrated or do they need to Seek Medical Aid. Students can use the Hydration color chart to make this determination.* ***Remind students that at no time will they bring a urine sample into the classroom.***
2. Make observations of your own urine to determine what category your urine would fall under. Is your urine Optimal, Well Hydrated, Dehydrated or do you need to See Medical Aid. Use your Hydration color chart to help you determine your hydration level.
3. **At NO time will you bring an actual urine sample into the classroom.**
   After making all their observation, ***study data*** *by answering the questions following the Data Sheet. Using this information, ask the students to determine if the data supports or refutes their hypothesis.*

Study Data

After completing all investigations, study data by answering the following questions.

1. Why is hydration important to you? *Answers may vary*
2. What color best describes your urine color? Answers may vary
3. Would you consider yourself to be hydrated or dehydrated? What do you need to do to reach optimal hydration? Answer may vary
4. In your opinion, what can change your urine colors? *Foods you have eaten, Drugs or vitamins you have taken, Health issues*

5. Why should you be concerned if your urine is a darker color rather than a light yellow to clear color? *More than likely you are dehydrated and you body needs more water, dehydration can cause heat illnesses. If you urine is a dark yellow or even going into the brown colors you should see a doctor.*
6. After observing your hydration levels for 12 hours, what time of the day did you find you were dehydrated the most? *Answers will vary*
7. What circumstances do you think made your urine a darker color at this time of day? *Answers will vary.*
8. What actions did you take to change your hydration levels to have healthy hydration levels? *Answers will vary.*

Conclusion

- Fill in the learned column in the KWL chart.
- Restate your hypothesis then explain what happened during testing, including your results.

  Discuss the answers to the Study Data questions in the Hydration Student Section. Have the students restate their hypothesis and explain what happened during testing, including their results. Ask students to compare their group data to the class data. What patterns can be found? Ask students what they wonder now. Encourage students to design their own experiments.

Assessment

- Assess student knowledge through questioning.
- Assess student understanding by administering the Hydration Quiz. (Appendix A)
- Observe and assess student performance throughout the activity using the Scientific Investigation Rubric found in the Hydration Student Section.

Activity Alignment to National Education Standards

National Science Education Standards (NSES):
Content Standard A: Science as Inquiry

- Abilities necessary to do scientific inquiry (K-8)
- Understandings about scientific inquiry (K-8)

Content Standard E: Science as Inquiry

- Abilities of technological design (K-8)
- Understanding about science and technology (K-8)

Content Standard F: Science in Personal and Social Perspectives

- Personal health (K-8)
- Characteristics and changes in populations (K-4)
- Changes in environment (K-4)
- Science and technology in local challenges (K-4)
- Science and technology in society (5-8)

National Technology Education Standards (ITEA):
Design:

- Standard 8: Students will develop and understanding of the attributes of design.
- Standard 9: Students will develop an understanding of engineering design.

National Mathematics Education Standards (NCTM):

Data Analysis and Probability Standard:

- Develop predictions that are based on data

Measurement Standard:

- Apply appropriate techniques, tools, and formulas to determine measurements

National Council of Teachers of English Standards (NCTE):

- Students conduct research on issues and interests by generating ideas and questions, and by posing problems. They gather, evaluate, and synthesize data from a variety of sources (e.g., print and non-print texts, artifacts, people) to communicate their discoveries in ways that suit their purpose and audience.

National Visual Arts Standards

- Content Standard 5: Reflecting upon and assessing the characteristics and merits of their work
  a) Understand there are various purposes for creating works of visual art

National Health Education Standards (NHES) Second Edition (2006):
Standard 1: Students will comprehend concepts related to health promotion and disease prevention to enhance health.

As a result of health instruction in grades 3 through 5, students will:

- 1.5.1 Describe the relationship between healthy behaviors and personal health.

Standard 5: Students will demonstrate the ability to use decision making skills to enhance health.

As a result of health instruction in grades 3 through 5, students will:

- 5.5.1 Identify health related situations that might require thoughtful decision.

Standard 7: Students will demonstrate the ability to practice health enhancing behaviors and avoid or reduce health risks.

As a result of health instructions in grades 3 through 5, students will:

- 7.5.1 Identify responsible personal health behaviors
- 7.5.2 Demonstrate a variety of healthy practices and behaviors to maintain or improve personal health

Curriculum Explorations

Science:
To extend the concepts in this activity, the following explorations can be conducted:

- Hydration is critical in sports performance; athletes require adequate hydration before, during and after exercise and sports. Any activity done for twenty five minuets or longer involving intense physical exertion or sweating requires rehydration. Marathon runners and long distance runners for example need to hydrate at a higher level than someone exercising for an hour.
  - Have students research and prepare a presentation about why rehydration is important to athletes. During their research they will learn the best liquids to drink before, during and after physical activity for rehydration. Here are some key investigation questions.
    - What are the best liquids to drink for healthy hydration?
    - What liquids should be avoided when trying to maintain proper hydration?
    - When are some hydration guidelines athletes should follow to prepare for physical activity? How much liquids should they drink pre-exercise, during exercise and following exercise?

  - Hydration was particularly important to astronauts Sunita Williams and William Mcarthur while running and completing marathons as they were orbiting the earth at a speed of 5 miles per second. Williams ran 26.2 miles and completed the Boston Marathon.

McArthur ran 13 miles as part of the Houston half marathon during his stay on the International Space Station. Even though these astronauts were physically 210 vertical miles apart from the runners on earth, they shared a common need: water. The length and intensity of marathons, both on Earth and in space, takes a toll on the human body and demands proper hydration. Thus runners must continue to drink appropriate fluids throughout a race to avoid the dangers of dehydration.

- Have students investigate what options astronauts have in space to keep themselves hydrated while living and working in space.

Mathematics :
Ask students to display their data in a graphic organizer of their choice. Ask them to explain why they have chosen to display their data in this format.

Analyze the data, looking for patterns and trends.

National Mathematics Education Standards (NCTM):

Algebra Standard:

- Understand patterns, relations, and functions
  - represent and analyze patterns and functions, using words, tables, and graphs

Data Analysis and Probability Standard:

- Develop and evaluate inferences and predictions that are based on data
  - propose and justify conclusions and predictions that are based on data and design studies to further investigate the conclusions or predictions

Language Arts Exploration
As an extension to the earlier lessons on hydration have the students write a children's book or poem about hydration. Have them write the story or poem from the point of view of liquids preparing to hydrate a human for optimal hydration.

Fine Arts Exploration
Have students design a poster on hydration to educate the school and community on the importance of Hydration health. The students can also record a class video on the importance of hydration to the human body to educate the school and community.

Sources and Career Links

Thanks to subject matter experts

Dr. Scott M. Smith is the Scientific Lead for the Nutritional Biochemistry Lab at the NASA Johnson Space Center in Houston, TX. You can find out more about Dr. Smith and his work here: http://hacd.jsc.nasa.gov/labs/nutritional_biochem.cfm.

Educator and Student Resources
Web resources:

The Healthy Kids website teaches your students good health practices with correct food choices and exercise. http://www.kidshealth.org/parent/nutrition_fit/index.html

The Learn to Be Healthy website offers activities and lesson plans on nutrition and physical activity. http://www.learntobehealthy.org

This NASA resource from the Nutritional Biochemistry Lab at the NASA Johnson Space Center in Houston, TX provides Space Nutrition Newsletters for kids.
http://hacd.jsc.nasa.gov/resources/kid_zone_newsletters.cfm

The National Space Biomedical Research Institute has a variety of space related educational materials ready for download http://www.nsbri.org/Education/Elem_Act.html

For guidelines for fluid replacement and exercise visit the National Athletic Trainer's Association (NATA) website and read their statement on Fluid Replacement for Athletes http://www.nata.org/statements/position/fluidreplacement.pdf

Books and articles:

- ***The ABC's of Hydration and Breathing*** (Audio CD) by Patty Kondub.
- ***Your Body's Many Cries for Water*** (Paperback) by F. Batmanghelidj.
- ***Water and Fiber for a Healthy Body (Body Needs)*** (Paperback) by Angela Royston.
- ***The Magic School Bus Inside the Human Body*** by Joanna Cole. Illustrator Bruce Degen.
- ***From Head to Toe: The Amazing Human Body and How It Works*** by Barbara Seuling. Illustrator Edward Miller.

Lesson development by the NASA Johnson Space Center Human Research Program Education and Outreach team.

Hydration Quiz

Answer the following questions about the Hydration activity.

1. Define and give an example of healthy hydration sources. Make a list of different types of beverages and categorize them as healthy hydration drinks and unhealthy hydration drinks. Explain the importance of proper hydration.

2. What are the consequences of becoming dehydrated and how can it be prevented.

3. After observing your hydration levels for 12 hours, what time of the day did you find you were dehydrated the most?

4. What actions did you take during the day to change your hydration levels?

5. Explain why hydration is important for athletes during physically demanding sports such as football, basketball and running marathons.

6. Do Astronauts in space have to be concerned about their hydration levels? How do they keep themselves hydrated in space?

7. How many astronauts have run marathons in space? Who are they, what marathon did they run while living on the International Space Station. Did they have to keep themselves hydrated while running their marathon in space?

Hydration Station Quiz Answers

1. Define and give an example of healthy hydration sources. Make a list of different types of beverages and categorize them as healthy hydration drinks and unhealthy hydration drinks. Explain the importance of proper hydration.

   The best hydration source is water. When combined with foods naturally high in moisture, such as fruits and vegetables, lost liquids and electrolytes are replaced after most workouts.

   The body depends on water for survival. Water makes up more than half the body weight. Every cell, tissue, and organ in your body needs water to function correctly and stay healthy.

Healthy hydration drinks	Unhealthy hydration drinks
Water Sodas	
Sports Drinks	Coffee or Tea
Fortified waters	Alcohol
Energy Drinks (beware of artificial color and high fructose)	Cool-Aid

2. What are the consequences of becoming dehydrated and how can it be prevented?

   If you become dehydrated, you could experience any of the following symptoms:

   - *dry mouth*
   - *no sweating*
   - *muscle cramps*
   - *nausea and vomiting*
   - *heart palpitations*

   You can prevent dehydration by drinking plenty of water and protecting yourself from excess heat. Keep a bottle filled with water nearby and eat plenty of fruits and vegetables.

3. After observing your hydration levels for 12 hours, what time of the day did you find you were dehydrated the most?

   Answer will vary based on students' observations of their own hydration levels.

4. What actions did you take during the day to change your hydration levels?

   Answers will vary.

5. Explain why hydration is important for athletes during physically demanding sports such as football, basketball, and running marathons.

   Whether you're a serious athlete or recreational exerciser, it's important to make sure you get the right amount of water before, during, and after exercising. Water regulates your body temperature, lubricates joints, and helps transport nutrients for energy and health. If you're not properly hydrated, your body will be unable to perform at its highest level, and you may experience fatigue, muscle cramps, dizziness, or more serious symptoms.

6. Do Astronauts in space have to be concerned about their hydration levels? How do they keep themselves hydrated in space?

Yes, astronauts must stay well hydrated. As astronauts reach orbit they experience a shift of fluids. The body senses the extra fluid and begins to get rid of what it thinks is excess. This sudden loss of fluids can result in dehydration. Dehydration is a lack of water that can be extremely dangerous. Astronauts' bodies cannot function properly without water. Therefore, when they first enter orbit, astronauts must drink a sufficient amount of water. They continue to drink water and eat properly while in orbit to stay hydrated and healthy for their return to Earth.

7. How many astronauts have run marathons in space? Who are they, what marathon did they run while living on the ISS? Did they have to keep themselves hydrated while running their marathon in space?

   Two astronauts have run marathons in space on the International Space Station. The first was Bill McArthur. He ran a half marathon on the station treadmill, supporting friends and colleagues running the Houston Marathon. McArthur circled the globe at an altitude of 354 km (220 miles) above the Earth's atmosphere as runners on the ground ran the Houston marathon.

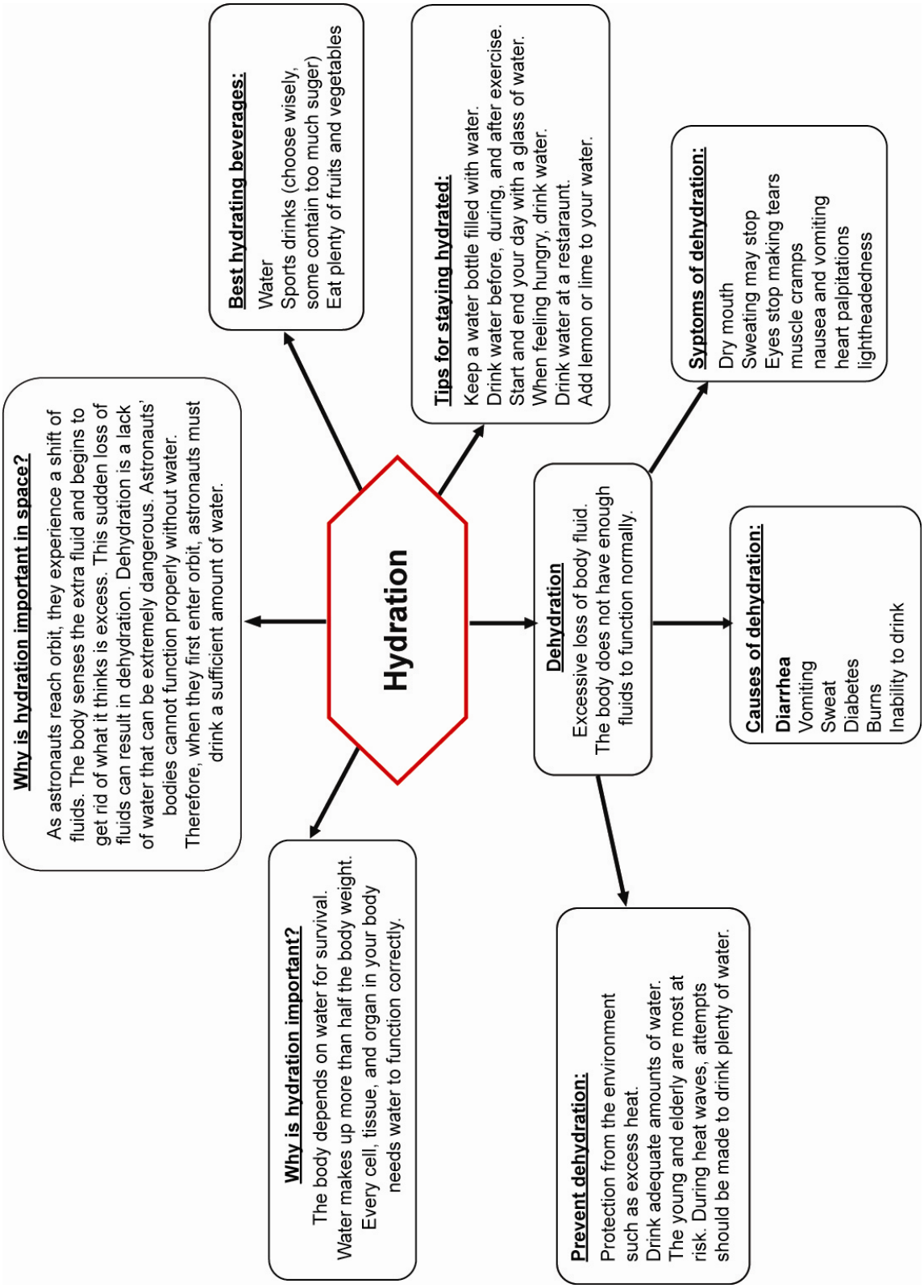
   Suita "Suni" Williams complete the Boston marathon more than 338km (210 miles) above the Earth. Suni completed 42km (26.2 miles) on a treadmill at the International Space Station. Her finish time was 4 hours, 23 minutes and 46 seconds. Running on the ground in Boston supporting Suni were NASA Astronaut Karen Nyberg and her sister, Dina Pandy.

   Both astronauts kept themselves well hydrated throughout the entire marathon in order to keep their bodies in good athletic condition to complete the marathon.

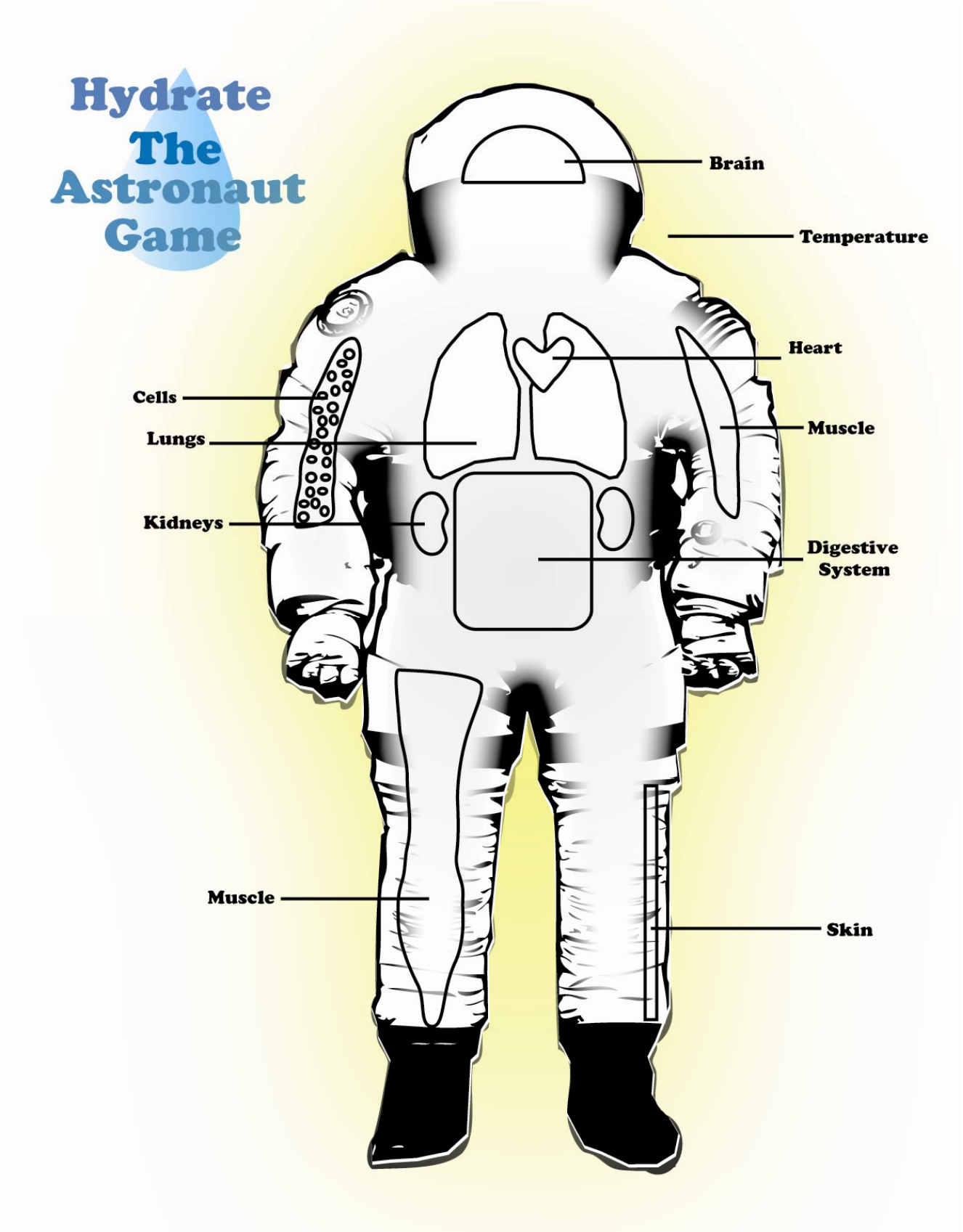
Hydration Glossary

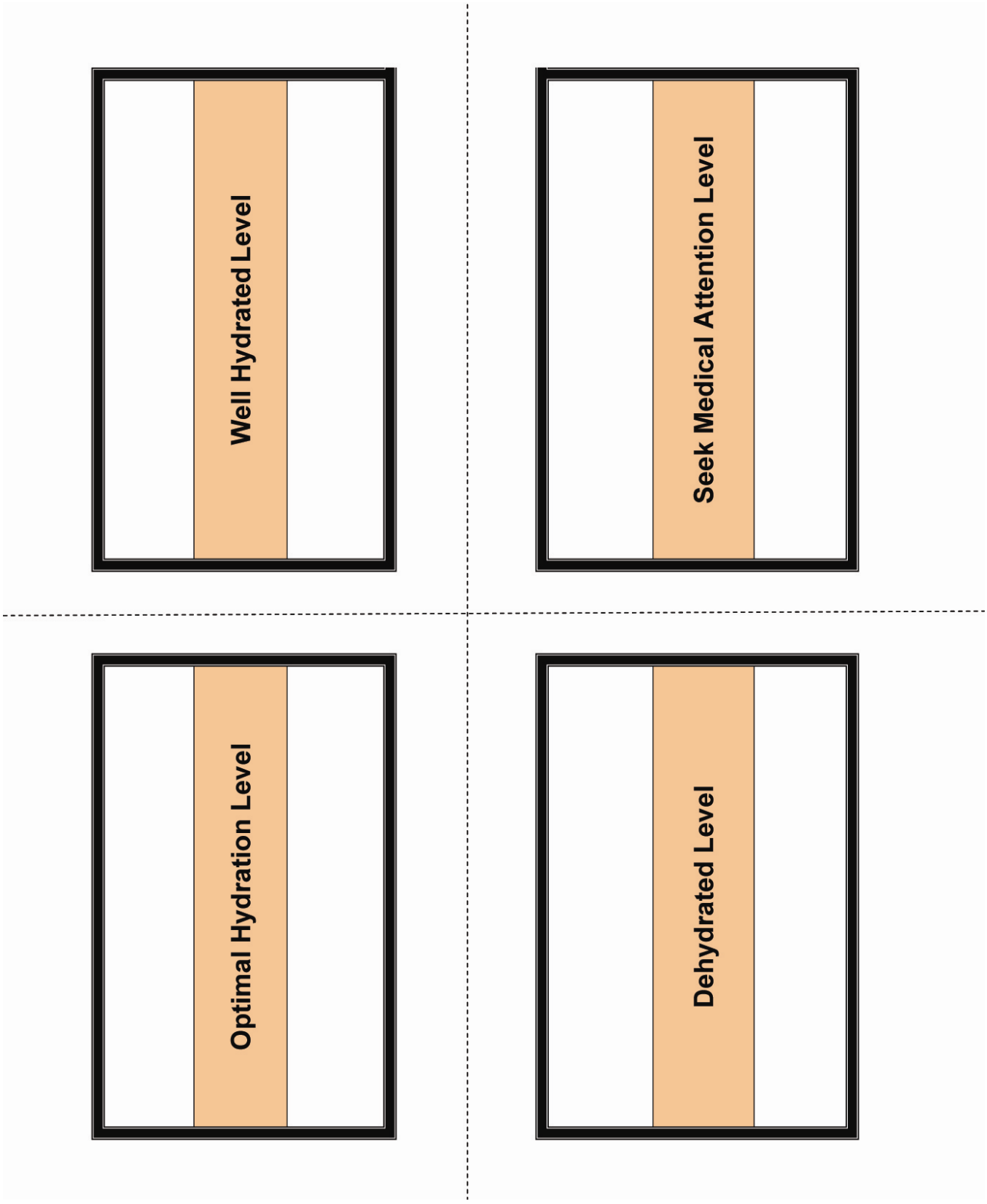
Athletic performance	Characterized by or involving physical activity or exertion.
Dehydration	Occurs when you lose more fluid than you take in, and your body doesn't have enough water and other fluids to carry out its normal functions.
Heat Illness	Under certain circumstances, such as unusually high temperatures, high humidity, or vigorous exercise in hot weather, the bodies natural cooling system may begin to fail, allowing internal heat to build up to dangerous levels. The result may be heat illness, which can result in heat cramps, heat exhaustion, or heatstroke.
Hydration	give water to somebody or something: to provide water for somebody or something in order to reestablish or maintain a correct fluid balance
Rehydration	replenish somebody's body fluids: to restore somebody's body fluids to a normal or healthy level

Sample Hydration Web



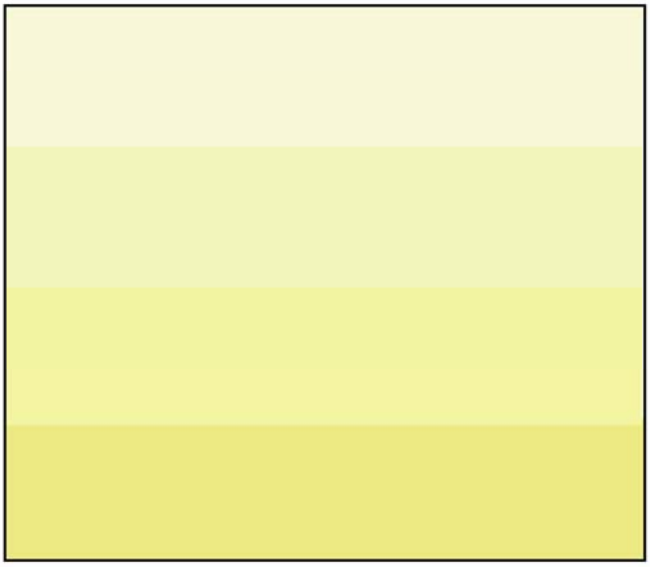

WATER


Hydrate
The
Astronaut
Game
Brain
Temperature
Heart
Cells
Muscle
Lungs
Kidneys
Digestive
System
Muscle
Skin


Well Hydrated Level
Seek Medical Attention Level
Optimal Hydration Level
Dehydrated Level

Urine Color Test

Hydrated



Optimal Level

Well Hydrated Level

Dehydrated

Dehydrated Level

Drink more water

Seek Medical Attention Level

May indicate blood in urine or kidney disease

This chart is a representation. Do not use for clinical purposes.

12-Hour Hydration Log

Track your liquid intake for 12 hours. Use your Urine Color Test chart to categorize your urine. You will complete the log on your own. At no time should you bring an actual urine sample into the classroom.

Bathroom Time (hr)	**Urine Color**	**Urine Category**	**What I drank**	**How much I drank**	**Physical Activity (None, Low, Moderate, High)**

Study Data:

After completing the test, study the data on the 12-Hour Hydration Log and answer the following questions:

1. Based on the data you have collected, are you well hydrated? Explain why or why not.

2. Would you change any of your drink choices based on your data?

3. How is the amount of liquids you drank related to the color of your urine?

4. Was the amount of liquids that your drank affected by the your level of physical activity?

5. What are some methods of hydration?

6. What are signs of dehydration?

7. What can you do throughout your day to help keep yourself hydrated?

8. Do astronauts become easily dehydrated?

9. Why is it important for an astronaut to stay hydrated while working in space?

10. Do you see any patterns in your data?

11. Does this data support your hypothesis? Why or why not?

Scientific Investigation Rubric

Experiment: Hydration

Performance Indicator	0	1	2	3	4
The student developed a clear and complete hypothesis.	The student made no attempt at developing a clear and complete hypothesis.	The student made very little attempt at developing a clear and complete hypothesis.	The student developed a partial hypothesis.	The student developed a complete but not fully developed hypothesis.	The student developed a clear, complete hypothesis.
The student followed all lab safety rules and directions.	The student followed no lab safety rules.	The student followed one lab safety rule.	The student followed two or more lab safety rules.	The student followed most of the lab safety rules.	The student followed all of the lab safety rules.
The student followed the scientific method.	The student followed none of the steps to the scientific method.	The student followed one of the steps to the scientific method.	The student followed two or more of the steps to the scientific method.	The student followed most of the steps to the scientific method.	The student followed all of the steps to the scientific method.
The student recorded all data on the data sheet and drew a conclusion based on the data.	The student showed no record of data and no evident conclusion.	The student showed one record of data collection and did not complete the conclusion.	The student showed two or more records of data collection and showed a partial conclusion.	The student showed most data recorded conclusion nearing completion.	The student showed all data recorded and a complete conclusion.
The student asked engaging questions related to the study.	The student asked no engaging questions relating to the study.	The student asked one engaging question relating to the study.	The student asked two engaging questions relating to the study.	The student asked three engaging questions relating to the study.	The student asked four or more engaging questions relating to the study.
Point Total					

Grading Scale:

A = 22 - 24 points B = 19 - 21 points C = 16 - 18 points D = 13 - 15 points F = 0 - 12 points

Experiment:

Student Name _____ Date _____

Performance Indicator	0	1	2	3	4
The student developed a clear and complete hypothesis.					
The student followed all lab safety rules and directions.					
The student followed the scientific method.					
The student recorded all data on the data sheet and drew a conclusion based on the data.					
The student asked engaging questions related to the study.					
The student described at least one way that this observation related to the exploration of other moons and planets.					
Point Total					

Point total from above: _____ / (24 possible)

Grade for this investigation _____

Grading Scale:

A = 22 - 24 points

B = 19 - 21 points

C = 16 - 18 points

D = 13 - 15 points

F = 0 - 12 points