HYDRATION STATION

This hands-on educational activity is based on the NASA Train Like an Astronaut series.

Student Section

Student Name _____

This lesson will help you identify different levels of hydration and observe your own levels of hydration.

During this lesson you will:

- research hydration, and create a visual web poster about hydration and the human body;
- play the Hydrate the Astronaut Game;
- create and investigate simulated urine samples; and
- complete a 12-hour hydration log.

Problem

How can I identify different levels of hydration?

Background

Dehydration can affect athletic performance and increase the risk of a medical emergency. During athletic events or physical activities, athletes must drink sufficient amounts of liquids to prevent dehydration. Athletes who know the importance of hydration are more likely to consume the needed amount of liquid. However, athletes are not the only ones who are at risk. Children, elderly, laborers, and individuals enjoying outdoor activities are also at risk of suffering from dehydration.

Children perspire (sweat) less than adults, making it harder for them to stay cool. Parents and coaches must take care to ensure that children are slowly acclimatized to the heat and humidity.

Dehydration is a major cause for hospitalization among the elderly. These aging adults are more susceptible to dehydration due to less fluid content in their body (approximately 10% less than the average adult). The elderly also have a reduced sense of thirst and loss of appetite which can trigger dehydration similar to what astronauts experience in space.

Space explorers must also maintain proper hydration levels while in space. As an astronaut reaches the space environment, he or she stops feeling the pull of gravity. The normal functions of the body begin to change as bodily fluids begin to shift toward the

Discovery Lesson

Materials

Per class:

- Computer with Internet access
- LCD projector or overhead projector
- Hydrate the Astronaut Water Bottle pictures
- Bandanas (1-2)
- Masking tape
- Access to water

Per group:

- Poster board or a piece of chart paper
- Markers or colored pencils
- Clear 9 oz. plastic cups (4)
- Toothpicks (at least 6)
- Liquid food coloring (yellow, red, and green)
- Hydration Level Test Chart
- Hydration Level Labels
- Graduated cylinder (100 ml)
- Permanent marker

Per student:

- Printed copy of Hydration Station Section
- Colored pencils
- Eye protection

Safety

- Review your classroom and lab safety rules.
- Wear eye protection during this activity.
- Remember the importance of proper internet use.
- This activity requires proper clean-up.

head. As this happens, the body tries to flush what it thinks are “extra fluids” from the upper body. This large loss of fluids (filtered through the kidneys as excess urine) can result in dehydration for astronauts as they return to Earth. In order to avoid dehydration, astronauts must drink plenty of fluids while in orbit. Astronauts must ensure they are not dehydrated while completing their mission tasks, whether inside or outside their exploration vehicle. Every person needs adequate hydration to maintain proper health in space and on Earth.

Brainstorm with your group about hydration. Make observations about the importance of being properly hydrated following your teacher’s instructions.

Use the first column of this KWL chart to organize your observations about hydration. Brainstorm with your group what you want to know about hydration and record your list in the second column of the KWL chart.

KNOW	WANT TO KNOW	LEARNED

Problem and Hypothesis

Based on your observations, materials, and predictions, answer the problem question with your best guess. Problem: How can I identify different levels of hydration? Your hypothesis should be written as a statement.

My Hypothesis: _____

_____

Simulated Urine Lab

You should work in groups of 3–4 in this lab.

1) Collect the following materials with your group:
    - Four 9 oz. clear plastic cups
    - Yellow, red, and green food coloring
    - One permanent marker
    - Six toothpicks
    - Water
    - Hydration Level Test Chart
    - Hydration Level Labels
    - Graduated cylinder (100 ml)
2) With a permanent marker, label your cups 1–4.
3) Put on eye protection.

4) Fill each cup with 60 ml (2 oz) of water using the graduated cylinder.
    - In cup 1, use a toothpick to add one dab of yellow food coloring. Use a clean toothpick to stir the liquid in the cup.
    - In cup 2, use a toothpick to add two dabs of yellow food coloring, and use a clean toothpick to stir the liquid in the cup.
    - In cup 3, add one drop of yellow food coloring and use a clean toothpick to stir the liquid in the cup.
    - In cup 4, add one drop of red food coloring, two drops of yellow food coloring, and one drop of green food coloring, and use a clean toothpick to stir the liquid in the cup.
5) Testing: Compare your group's simulated urine samples to the Hydration Level Test Chart and arrange the samples into the four levels of hydration:
    - Optimal Level
    - Well Hydrated Level
    - Dehydrated Level
    - Seek Medical Attention Level

12-Hour Hydration Log

You will keep a hydration log for 12 hours to determine if you are drinking enough liquids to maintain a healthy hydration level.

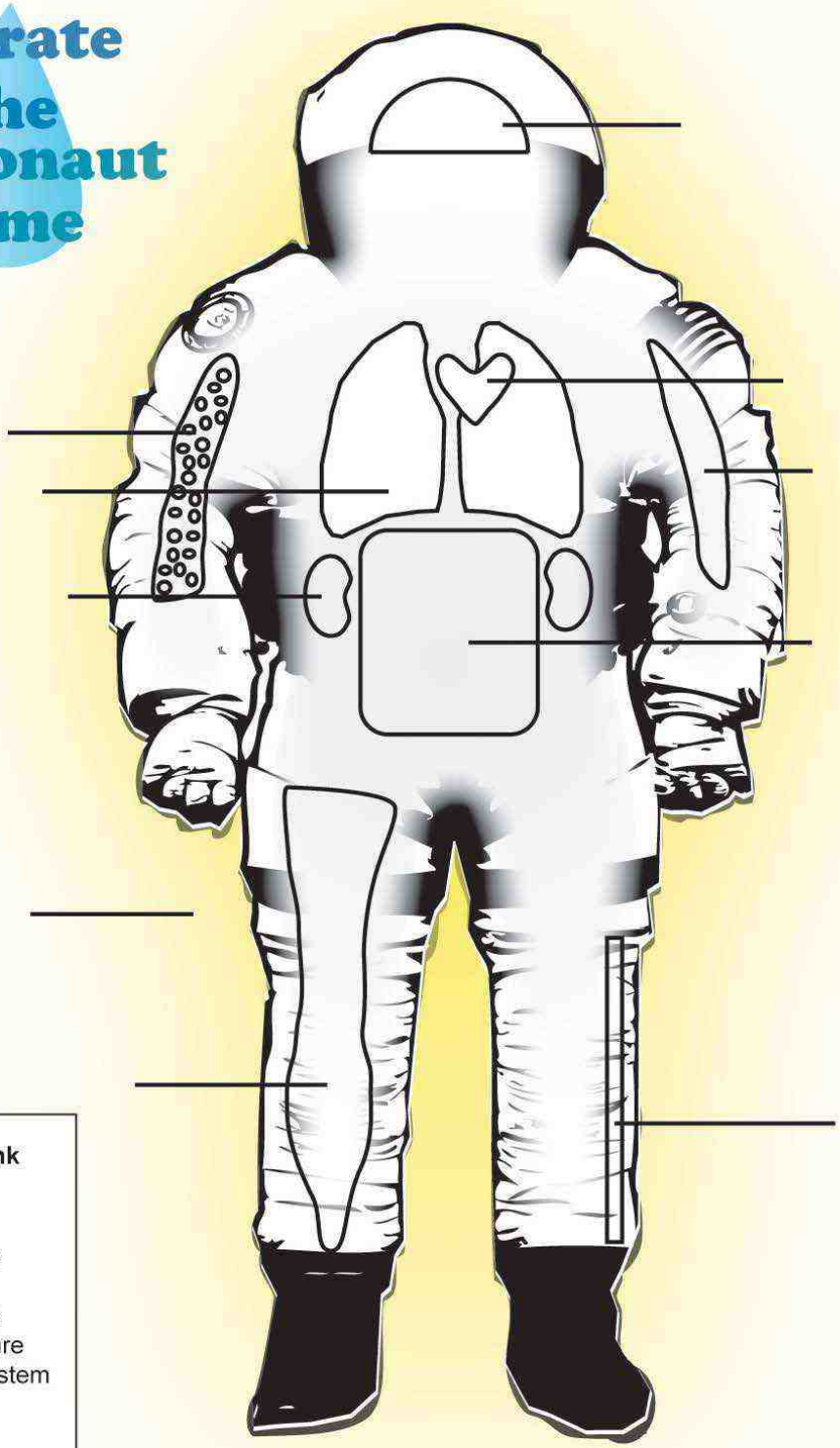
1) Using the 12–Hour Hydration Log found in your student section (Appendix B), document the following information for a 12–hour period:
    - Bathroom time
    - Observed urine color
    - Hydration level
    - What you previously drank
    - How much you previously drank
    - Your previous physical activity level

    For the hydration level, reference the Hydration Level Test Chart to determine the level your own urine color matches. (At no time should you collect or touch your urine or bring a urine sample into the classroom. You should only make observations by looking at the color.)
2) Does your urine color indicate optimal, well hydrated, or dehydrated? Or should you seek medical attention? *(If the color is of concern, students should share appropriately with their guardians or medical professionals.)*
3) Record the data on your 12–Hour Hydration Log. After making all your observations, study the data by answering the Study Data Questions. Using this information, determine if the data supports or refutes your hypothesis.

Conclusion

- Fill in the LEARNED column in the KWL chart.
- Restate your hypothesis, and then explain what happened during simulated testing. Include your results.

Hydrate The Astronaut Game



Word Bank

Cells
Heart
Muscles
Brain
Kidneys
Temperature
Digestive System
Skin
Lungs

12–Hour Hydration Log

Use this log to record your observations from urine output throughout the day. Track your liquid intake on a separate sheet of paper. Use the Hydration Level Test Chart to categorize your hydration levels throughout the day. Complete this log on your own. (Important: At no time should you bring an actual urine sample into the classroom.)

Bathroom Time (hour of day)	**Observed Urine Color**	**Hydration Level**	**What I Previously Drank**	**How Much I Previously Drank**	**Previous Physical Activity Level** (none, low, moderate, high)

Study Data Questions

Study the recorded data on the 12–Hour Hydration Log (Appendix B) and answer the following questions:

1. Based on the data you 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 the 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

Student Name _____ Date _____

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

Grading Scale:

A = 18–20 points B = 16–17 points C = 14–15 points D = 12–13 points F = 0–11 points

Point total from above: _____ / (20 possible)

Grade for this investigation: _____