



**DREAM FLIGHT
ADVENTURES**

Inspiring the world to think and dream

Lesson Plans & Curriculum-based Activities

Helpful tools to extend the magic before and after the mission

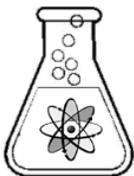
We ignite imaginations, blur the line between entertainment and education, and let dreams take flight.



Making Models of Atoms & Isotopes

During the *Succession* simulation, students will learn about radioactive isotopes and apply their understanding to locate a missing spaceship. To build upon this learning, considering using the following hands-on project, provided by our partners at www.science-class.net.

This project can be done either **before** or **after** the *Succession* simulation.



CHEMISTRY

Name _____

Making Models of Atoms & Isotopes

Problem: To build 3 - dimensional models of the hydrogen atom.

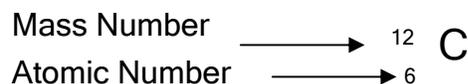
Background Information: An **atom** is defined as a small particle that makes up most types of matter. Atoms are so small it would take about 1 million of them lined up in a row to equal the thickness of a human hair. Atoms are made up of even smaller particles. The largest of these particles are **protons**, **neutrons** and **electrons**. The identity of a type of matter depends on the number of protons in the nucleus of an atom of that type of matter. All atoms of the same type of matter have the same number of protons in the nucleus. For example, *all* carbon atoms have six protons.

Not all atoms of the same type of matter have the same number of neutrons. Most carbon atoms have 6 neutrons, although some have more and some have less. Atoms of the same type of matter that have different numbers of neutrons are called **isotopes**. Most types of matter have isotopes.

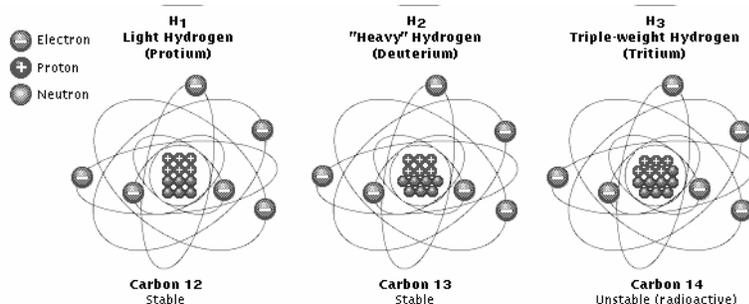
Re-write the main ideas of the background information here:

The atomic mass, or mass number, can be used to identify isotopes. The mass number of a type of matter is the number of protons and neutrons in one atom of that matter. In our example of carbon, 6 protons + 6 neutrons = 12 particles in the nucleus; the mass number = 12. The name for this isotope is Carbon - 12.

The symbol for Carbon - 12 is:



Diagrams of carbon isotopes:



Isotopes are used in many ways. Many are used in cancer therapy. Some are used to help identify the age of objects and locate buried cables.

The gas hydrogen has three isotopes. The most common isotope of hydrogen has a nucleus that is made up of one proton and no neutrons. More than 99% of hydrogen is this isotope. It is sometimes called **Protium**. A hydrogen atom that has one proton and one neutron in its nucleus is called **Deuterium**. Deuterium is not radioactive. Water made from deuterium is called heavy water because the extra neutron makes it heavier. It is used in nuclear reactors. The third isotope of hydrogen is known as **Tritium**. It has one proton and two neutrons in its nucleus. It is radioactive. It is formed in the upper atmosphere by nuclear reactions caused by cosmic rays. Each isotope of hydrogen has one electron.

Models are often used for things that are too small or too large to be observed or that are too difficult to be understood easily. In the case of atoms, scientists use large models to explain something that is too small to be looked at. Models of the atom are used to explain data or facts that were gathered experimentally.

Materials:

Small colored marshmallows

Toothpicks

Procedure:

1. Read the background information, then fill in the chart below:

Isotope	# of Protons	# of Neutrons	# of of Electrons
Protium			
Deuterium			
Tritium			

2. Pick a color of marshmallow to represent protons: _____
3. Pick a color of marshmallow to represent neutrons: _____
4. Pick a color of marshmallow to represent electrons: _____
5. How many protons will you need to make a model of each of the three isotopes?

6. How many neutrons will you need? _____
7. How many electrons will you need? _____
8. Have your teacher check and initial your answers.
9. Get the correct number & color of marshmallows to make the three isotope models.
10. Make a model of each isotope of hydrogen by attaching the marshmallows to each other with the toothpicks.
11. Have your teacher check your models and initial this paper when you are finished.

Teacher initials:

Models Correct

Data:

Draw a diagram of each model. Show each proton, neutron, and electron. Label the parts. Color the diagram.

Protium	Deuterium	Tritium
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Applications & Questions:

1. Define isotope:
2. Is an isotope an atom? Explain your answer.

3. the symbol for one of the isotopes of Uranium is ${}^{235}_{92}\text{U}$

How many protons does this atom have?

How many neutrons does this atom have?

How many electrons does this atom have?

What is the mass number of this atom?

What is the atomic number of this atom?

4. What is the symbol for the carbon atom that has 6 protons and 8 neutrons?



“A New Way” — Comparative Politics Debate

This class activity is designed for use **after** students have completed the *Succession* mission.

Background

During the mission, students will have encountered many fictional characters and groups, including a key character called the “Oracle of Delphi.” The Oracle of Delphi is a sacred figure in Megaran tradition and is tasked with using divine revelation to appoint a new King for the planet, as the former King has recently died. Thousands of years ago Megara experimented with democracy, but the chaotic mix of competing opinions led to years of bitter war. The Priests and Priestesses of Delphi restored peace by creating the tradition of Oracle-appointed succession that still exists today.

The current Oracle is a young girl who received a vision that “knights from the stars will show a new way for the Megaran people.” Following this vision, she diverted her course and crash-landed in a remote ocean. The students were tasked with rescuing the Oracle, and along the way they will have met two other fictional groups who are also trying to reach the Oracle, but for different reasons:

The House of Ares wants to find the Oracle so they can influence her to appoint one of their own as the new King. The House of Ares is the most militant of Megara’s five Noble Houses. Because Megara is not currently at war, it is unlikely that the Oracle would choose someone from the House of Ares to be King without intervention.

The Plebians seek to apprehend the missing Oracle of Delphi before the student crew or any of Megara’s five Noble Houses can rescue her. The Plebians are commoners, and for thousands of years the entire planet has been ruled by Kings selected from among the five Noble Houses. While this may have sufficed long ago, times have changed and the common people of Megara now call for a reformed government in which they too have a voice. While the current succession process does not specifically prohibit the Oracle from selecting a commoner as King, this has never occurred in Megara’s history and the Plebians are convinced that the whole political system is rigged.

This conflict has come to a poignant climax in recent months. The former King’s death has coincided with the rising popularity of a commoner called Janus. Janus comes from a common background but is articulate, passionate, and commands 70% of the popular vote. If the people were given the choice, Janus would lead Megara by a landslide.

The House of Ares detests the Plebians and their popular champion Janus. They view them as an extreme threat to the status quo, which has been maintained for thousands of years.



If the students completed their mission successfully, they will have rescued the Oracle from her snare and she will have told them about her vision. The students will also have become quite familiar with both the House of Ares' and the Plebians' goals and intentions. The students will have discovered that the only way to ensure the safety of the Oracle and deal with the political upheaval on Megara is to take the Oracle back to the Infinity Knights Headquarters where they can help the Oracle find a "new way" for her people, as predicted in her vision. This sets the stage for a the following class discussion.

Part 1 — Two-sided Debate

Divide the class into two groups. Assign one group to represent the House of Ares' point of view and assign the other to represent the Plebians' position.

Instruct the students to research **factual historic evidence** in support of their sides' position.

Specifically, students representing the House of Ares should research evidence highlighting the benefits of monarchies, appointed leadership, and long-time traditions. Students representing the Plebians should research the benefits of pure democracies, the separation of church and state, and elections.

Instruct the students to adhere to goals of the side they represent, regardless of their own personal opinions. Encourage the students to consider objections from the opposing side and prepare rebuttals accordingly.

Give the students sufficient time to adequately explore the issues. Assign the research as homework if desired.

When adequate exploration has occurred, conduct a classroom debate where students can persuasively share their findings. Arrange the seats so students in one group sit together opposite the other group. Moderate the debate by calling on one student at a time, first on one side, and then on the other. Instruct each student to present what they consider to be the most compelling and persuasive argument in favor of their side's position. Rotate through the students until everyone has had a chance to share their thoughts.

Encourage the students to build upon the ideas their classmates suggest and to rebut against the arguments of the opposing side. Use appropriate follow-up questions to explore the factual and historic evidence the students present in favor of their cases.

Moderate the discussion to maintain an appropriate discussion adhering to objective discussion of the facts and free from personal attacks against students.



Part 2 — Collaboration, Creativity, and Compromise

Now that the class has fully explored the perspectives of the two fictional groups, it is their find a “new way” for the Megaran people.

Divide the class into small groups of three or four students each. Instruct each group to brainstorm new forms of government and ways to select leaders. Remind the students that their solutions must be appease both sides of the debate—the House of Ares and the Plebians. No side will be able to have everything the way they want it, so the students must propose compromises for both sides.

Encourage the students to integrate concepts they have learned about politics and governments, which may include: separation of powers, checks and balances, representative democracies, etc.

Instruct the student teams to take notes of their discussion and write their ideas down.

Allow each group to present their recommended solution to the class, summarizing their decision, highlighting key compromises, and explaining the rationale behind their decisions.

If desired, after each group has presented consider letting the class select a single proposal—or combine elements from multiple proposals—as a recommended “new way” for the Megaran people.



Mission Debrief Class Discussion Guide

Your students will encounter a wide variety of educational topics in their Dream Flight Adventures mission. After the mission is complete, use this guide to lead your students in a class discussion to explore these topics in more depth.

Consider dividing your students into small groups to discuss each question and then share their group's opinion with the entire class. Be sure to let every student's voice be heard. Dream Flight Adventure missions are multi-faceted, and each student is exposed to a slightly different part of the story. Let every student share their thoughts and experiences so the entire group can benefit.

Suggested thought-provoking questions for *Succession* are:

What was the founding fathers' reasoning behind how they set up the U.S. government?

What are the advantages and disadvantages of democracy? Monarchy? Democratic republics?

Under what conditions should decisions be made by majority rule? When shouldn't majority rule be used?

How should societies handle minority interests?

What roles do longtime traditions play in rapidly changing societies?

What is the fine line between competitive rivals and enemies?

If you could do the mission again, what would you do differently?

How do you relate to the characters, events, or issues that you encountered during the mission?

What parts of the mission were the most challenging?

What new things did you learn during the experience?



Name _____

Multimedia Mission Memoir

Reflect on your recent Dream Flight Adventures mission and prepare a multimedia project that tells about your experience.

Be creative and draw upon any type of multimedia to create your project. Possible examples include posters, collages, short stories, PowerPoint presentations, dioramas, plays, podcasts, animations, videos, music, or comic books.

In your project, be sure to address the following questions:

What happened during your mission? Summarize the events.

What was your responsibility?

What did you do in your mission? What were the results?

If you could do the mission over again, what would you do differently?

How do you relate to the characters, events, or issues that you encountered during the mission?

What parts of the mission were the most challenging?

What parts of the mission were the most exciting?

What new things did you learn during the experience?

Did the mission change the way you think about anything? If so, what, and how has your perspective changed?

Be prepared to share your project with your peers and to describe why you chose the form of multimedia you did.