



**NATURAL HISTORY
MUSEUM OF UTAH**

Rio Tinto Center | The University of Utah

You are a Scientist!

Alignment to Utah Core Curriculum Intended Learning Outcomes (ILO's): 1. Use science process and thinking skills. 2. Manifest scientific attitudes and interests. 3. Understand science concepts and principles. 4. Communicate effectively using science language and reasoning.	Enduring understanding: Scientists are just regular people who approach questions systematically. Students are scientists when they apply the same process to solving problems.	Grade Level: 3-5
		Activity Length: 60-75 minutes
		Process Skills: • Data Collection • Observation

Materials Needed

- Biographies of famous scientists (included in the lesson)

Enough of the following for each group:

- Individual plastic bottles of Sprite, Milk, Water (room temperature)
- 3 balloons (one for each bottle)
- 3 packets of yeast
- Funnel
- Measuring devices (ruler, string, etc)
- Science notebook, journal or data table provided in the lesson

Background

Many people have a distorted view of who and what a scientist is, what a scientist does and why they do what they do.

A scientist is a person who has made it his or her job to ask questions and find out ways to solve problems. Scientists work in almost every field searching for ways to understand how and why things work. To do this scientists use the scientific process. It is a way to subject questions to the same criteria.



The parts of the scientific process are:

- Asking a question
- Devising a hypothesis (making a guess about what might be the answer)
- Testing the hypothesis (experimenting, seeing what happens when...)
- Analyzing the results of the test
- Coming to a conclusion

This process isn't much different from the critical thinking skills that people use everyday to make decisions or to solve problems.

Activity

Ask students to pick one word that would best describe them. Have different students share their word and write them on the board.

Explain that these are words that describe scientists.

Ask if any of the students have ever felt like a scientist. If there are some, have them share what they were doing that made them feel like a scientist.

Discuss the background information about how scientists are regular people who ask questions and try to solve problems and that anytime students are asking questions or trying to solve problems they are also being scientists!

Ask the students how they find solutions to questions or problems.

Discuss the scientific process from the background information and tell students that they will have a chance to be scientists by going through this process.

Explain that scientists always record their data (or write what they are doing, observing, finding out) and that students should record each step of the process. Students could also draw what they observe.

Introduce the experiment. Talk about yeast, and explain that it is a living organism that grows rapidly in liquid, you can tell when it is growing because it releases gas, just like we do when we are breathing. Also introduce the liquids that will be used as part of the experiment.

Introduce the question. "Which liquid will yeast grow best in?" Have students write their hypothesis and an explanation of why they guessed that.

Experiment

- Give each group the 3 liquids, yeast packets, funnel, balloons, and measuring tools.
- Have students put a packet of yeast in each bottle and cap it each with a balloon.
- Record what is observed and measured immediately.
- Make observations, measurements and recordings every 15 minutes.
- During wait time share the bios of famous scientists from the background information. You may choose to give each group of students a scientist or two to read about and report on to the class.
- Ask students to talk about the qualities or experiences of the scientists that they can relate to.

Common Misconception:

Many people think that to be a scientist you need to have specific educational background, use certain tools or vocabulary, and wear a lab coat. Conversely, people also think of/portray scientists as people in labs who struggle with interacting with the world around them. This is not true, everyday people can be scientists and scientists are everyday people.



- Have students record their conclusions and their thoughts about why, also have them record what new questions they have and what they might do differently to effect the results of the experiment.

Learning Extensions

You may choose to give students opportunities to research and test out their new ideas of what they would do differently by changing the experiment based on their conclusions, observations and research. You could also have students start their own biographies, or do more research on the life of a scientist that they find interesting.

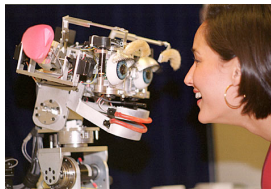
Formative Assessment Strategies

1. Discussing what students think science is will help you understand their background knowledge as well as their own efficacy in science. Having students record the experiment in journals or on the sheet will help you understand their rigor in recording data.
2. Circulate through the groups and listen to their conversations. Ask students to justify their observations, inferences and conclusions. This will give you unique insight into what previous experience students are drawing on to explain discrepant observations.

Scientist's Biographies



Mae Jemison was the first black woman in space. She was a talented dancer and studied to be a professional dancer and a doctor. During her years at Cornell Medical College, Jemison took lessons in modern dance at the Alvin Ailey School. She built a dance studio in her home and has choreographed and produced several shows of modern jazz and African dance. As an astronaut, because of her love of dance and as a salute to creativity, she took a poster from the Alvin Ailey American Dance Company along with her on her flight to space. "Many people do not see a connection between science and dance," says Jemison. "but I consider them both to be expressions of the boundless creativity that people have to share with one another."



Cynthia Breazeal builds robots. She studies the science of the way animals, insects, and people move to inspire her to build robots that move and act naturally. She incorporates artistic inspiration into her work to make robots that appeal to people on an emotional level. She developed a robot named Kismet that is sociable and interacts with people.



Jane Goodall was given a stuffed monkey toy as a present when she was little. This made her curious about animals, especially primates. She is famous for discovering that chimpanzees make and use tools. Before that people thought that only human beings did this. She is now very interested in helping kids understand about the earth and the animals that live here and has written many books for kids and adults.



Sylvia Earle was raised on a small farm. From the time she was very small, Sylvia loved exploring the woods near her home. She was fascinated by the creatures and plants that lived in the wild. Neither of her parents went to college, but they loved nature, and they taught her to respect wild creatures and not to be afraid of the unknown. When Sylvia was 13, her family moved to Florida. She tried to learn all she could about the ocean. Her parents could not afford to send her to college, but she was an exceptional student and won scholarships that helped her pay for her education. One of the things she is famous for is living under the sea with a group of women scientists for 2 weeks! She is an expert on sharks, whales and all kinds of plants.

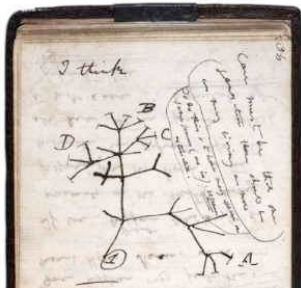
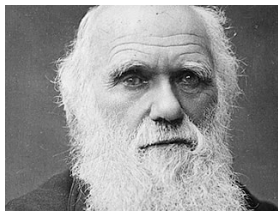
Scientist's Biographies



Diane France was always interested in nature. She especially loved animals. Her dad was a doctor who had a skeleton in his office that she thought was fun to dress up on Halloween. Diane loved to catch gophers and tadpoles and hated Barbies. She and her friends liked to look through her dad's microscope and make things like invisible ink and stink bombs. When she went to college she took a class about bones and decided to become a forensic anthropologist- that is someone who finds out what happened to people by studying their bones. She has solved murders and helped identify people who died in the 9/11 attacks.



Heidi Hammel loved math, playing Monopoly, and music when she was a kid. She played piano and drums and sang in a chorus. In college she was in a band where she sang and played guitar. She even traveled to China to play percussion in an opera! She took an astronomy class and found that she LOVED looking at the stars and planets. When Heidi first began studying Uranus and Neptune, little was known about them. This meant she could be a pioneer, discovering things no one else had ever seen!



Charles Darwin studied to be a doctor but didn't like that. His father signed him up to study to be a preacher but he didn't like that either. He did like rocks, plants, the ocean, and animals. He started competing with other boys to see who could collect the most beetles. This led him to meet scientists who taught him more about insects. One of his teachers recommended that he try to study on board a ship called the HMS Beagle that was sailing to South America. His father thought this was a terrible idea but eventually let him go. It was on this journey that he noticed things about animals and plants that made him ask questions. He wondered why similar birds had different shaped beaks. To answer this question he drew a sketch of what he thought might have happened over time to change the shape of the beaks. Above his sketch he wrote, "I think". This was his first sketch of an evolutionary tree!

Scientist's Biographies



George Washington Carver was born as a slave in 1864. When he was little he was kidnapped by soldiers. When found by his owner he was very sick. Too sick to work, he wandered through the fields wondering about the plants that grew there. He became known as the "plant doctor" and helped people with plant problems. One day he was sent to a neighbor's house to help them with their plants. When he went inside he saw beautiful paintings of plants on the wall that made him decide he wanted to know all he could about them. When slavery was abolished his owner raised him and even taught him to read and write. Black people weren't allowed to go to school then but when he was 13 he found a place that would teach him. Later he wrote to many colleges until one finally accepted him as a student. He was interested in helping poor black families understand how to grow better crops. He is famous for figuring out 300 ways to use peanuts. He invented peanut butter!



Marie Curie loved school and would often go without food or sleep so she could continue studying. Where she lived women weren't allowed to go to college so she went to an illegal college. Later she moved to Paris where she was able to attend school and learned all she could about chemistry. She realized during her studies that something was missing and began to experiment along with her husband. They discovered 2 new elements, radium and polonium. She was awarded 2 Nobel Prizes for these discoveries!



Lindsay Zanno grew up in a very small town. She loved to dance and took many classes. As a girl she would curl up in front of the fireplace and read books from cover to cover. At the time she didn't realize that girls could be paleontologists. In college she worked in a lab wearing a white lab coat and measuring things in vials. She hated it and wanted to be outside finding out things for herself. She moved to Utah so she could study dinosaurs and has since discovered 2 new types of raptors! She takes her daughter with her when she goes to China, Africa, and Mexico to study dinosaurs there.



Yeast Growing Experiment				
Name:	Question...	What liquid will yeast grow best in?		
Date:	Hypothesis (guess)...			
	Why I think that...			
	What I observe immediately...	Sprite	Milk	Water
	What I observe after 15 minutes...	Sprite	Milk	Water
	What I observe after 30 minutes...	Sprite	Milk	Water
	What I observe after 45 minutes...	Sprite	Milk	Water
	Results...			
	Conclusion...			
	Questions I have...			
	What I would do differently...			



Name:

Date:

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What I observe immediately...	
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Results...	
Conclusion...	
Questions I have...	
What I would do differently...	