1st Grade   **30-45 minutes**

SEA STAR FLIP EXPERIMENT

Oregon Science Content Standards:
1.1 Structure and Function: Living and non-living things have characteristics and properties.
1.1L.1 Compare and contrast characteristics among individuals within one plant or animal group.
1.3 Scientific Inquiry: Science explores the natural world using evidence from observations.
1.3S.1 Identify and use tools to make careful observations and answer questions about the natural world.
1.3S.2 Record observations with pictures, numbers, or written statements.
1.3S.3 Describe why recording accurate observations is important in science.

Ocean Literacy Essential Principles:
5. The ocean supports a great diversity of life and ecosystems

Goals:
- To get students to conduct their own experiment to answer a question.
- To introduce the terms experiment, hypothesis and results.
- To get students to share their results orally with the class.
- To give students writing practice.

Concepts:
- Scientists design experiments to test/answer a question.
- A hypothesis is an educated prediction of what may happen in an experiment.
- Scientists record and discuss their results with other scientists.
- Different types of sea stars may recover from being turned over at different speeds.

Materials:
- 10 or more sea stars of different types
- 10 buckets or containers big enough to house sea stars
- Cold sea water and bubblers
- Experiment Handout (attached)
- Stop watches
- Post-its
- Markers
- Butcher paper or white board

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Lesson Plan:
- Begin with a review of sea star parts, having the students help you label the parts of a sea star. (Refer to previous Sea Star lesson.) Ask how a sea star feeds, how many arms they tend to have, what helps sea stars to move, what is the importance of tube feet, etc.
- Make a list of the common names of the different species of sea stars you brought in. Ask what would happen if you turned one upside down. Ask if someone can make a prediction about which they think would be able to turn itself over again the fastest, and why they pick the one they do. Discuss the term hypothesis as an educated prediction. Use an example like a marker and have them guess what color it is, how they know what color it will write. Explain that this is an educated guess (e.g. color of marker top) not a random guess, and ask how you could test the marker hypothesis (write with it).
- Then discuss the sea star question again, and ask them if they can think of a way to test the question. Explain the term experiment. Guide them in the development of an experimental plan to time how long it takes each species to flip. Make sure they consider the need to have all conditions the same except for the sea star. Discuss the need for repetition. Depending on how many students and sea stars you have, design the experiment so there are 2 sea stars at each station, with replicates of the stations. When you gently flip the sea stars, the students at that station will time how long it takes the sea stars to turn back over.
- Give the students their handout and divide them into groups of four or five, reminding them not to touch the sea stars. Have them examine their sea stars and circle which two sea stars they have, and have them make a hypothesis on which will flip over faster and why (more tube feet, more arms, bigger, smaller etc).
- Gently flip the sea stars to preserve the tube feet. Encourage observations.
- Have the students write down the time it took for each of the two sea stars to flip back over and circle which sea star was faster. Have each group come up to the front of the class and report on the results of their experiment. Explain that scientists present their results. Ask how bringing together and comparing all the results influences what they know? Make a bar graph on the board (sea star type on X, time on Y), explaining what a graph shows. Discuss results. Which sea stars flipped more quickly? Why do they think they were faster? What adaptations allow for faster movement?

Assessment: experiment data sheets, reporting in front of class, discussion of hypotheses

Source: student Jessica Young for an interesting science fair project flipping sea stars

GK12 Fellow: Maya Wolf

Sea Star Flip Experiment

Name_____

1. Circle your two sea stars.

Sunflower Star	**Long-armed Star**
Ochre Star	**Leather Star**
Bat Star	**Blood Star**

2. Hypothesis
(Circle the sea star that you think will flip the quickest)

Sunflower Star	**Long-armed Star**
Ochre Star	**Leather Star**
Bat Star	**Blood Star**

3. Results
(Circle the sea star that flipped the quickest)

Sunflower Star	**Long-armed Star**
Ochre Star	**Leather Star**
Bat Star	**Blood Star**