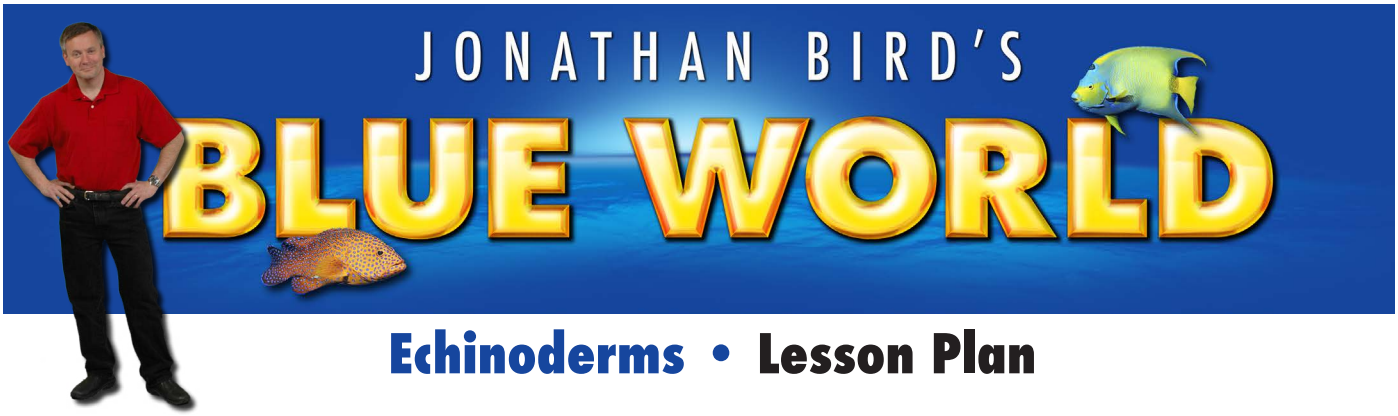

Echinoderms • Lesson Plan

Exploring Echinoderm Biology

Grade Level: Middle School (6th-8th grade)

Video: www.blueworldtv.com/webisodes/watch/the-spiny-world-of-echinoderms

Duration: 2 class periods (45 minutes each)

Next Generation Science Standards (NGSS):

- **Disciplinary Core Ideas:**
  - LS2.A: Interdependent Relationships in Ecosystems
  - LS2.B: Cycles of Matter and Energy Transfer in Ecosystems
  - LS4.A: Evidence of Common Ancestry and Diversity
  - LS4.B: Natural Selection
  - LS4.D: Biodiversity and Humans
- **Crosscutting Concepts:**
  - Patterns
  - Cause and Effect
  - Systems and System Models
  - Stability and Change
- **Science and Engineering Practices:**
  - Developing and Using Models
  - Asking Questions and Defining Problems
  - Constructing Explanations and Designing Solutions
  - Engaging in Argument from Evidence

Learning Objectives:

1. Understand the characteristics and significance of echinoderms in marine ecosystems.
2. Differentiate between the three sub-phyla of echinoderms.
3. Identify common echinoderm species and their unique features.

Materials:

- Video script about echinoderms (provided in the prompt)
- Whiteboard and markers
- Diagrams or images of echinoderms (prepared in advance)

- Computer and projector for video presentation
- Handouts with questions related to the video script
- Sea star, sea urchin, and sea cucumber specimens (optional)

Procedure:

Day 1: Introduction to Echinoderms *Introduction (10 minutes)*

1. Begin the lesson by asking students if they have heard of or seen any marine animals with spiny skin, such as sea stars.
2. Explain that today's lesson is about echinoderms, a unique group of marine invertebrates.

Video Presentation *(15 minutes)*

3. Play the video script about echinoderms, pausing at key points to highlight important information and engage students in discussions.
4. After the video, initiate a class discussion about the characteristics of echinoderms. Encourage students to ask questions.

Class Activity: Identifying Echinoderm Characteristics *(10 minutes)*

5. Provide students with diagrams or images of various echinoderms, including sea stars, sea urchins, and sea cucumbers.
6. Ask students to identify the common characteristics of echinoderms based on the video. Write their responses on the board.

Homework Assignment *(10 minutes)*

7. Assign a homework task in which students need to research and list examples of echinoderms they find in their local area or in different marine ecosystems.

Day 2: Differentiating Echinoderm Sub-phyla

Recap and Discussion *(10 minutes)*

1. Start the class by recapping what students learned about echinoderms in the previous class. Review the key characteristics.

Class Activity: Echinoderm Sub-phyla *(15 minutes)*

2. Explain the concept of sub-phyla and introduce the three sub-phyla of echinoderms mentioned in the video: Asterozoa, Crinoidea, and Echinozoa.

3. Show images and diagrams of echinoderms from each sub-phylum.
4. Discuss the main differences between the sub-phyla, such as physical features and feeding habits.

Hands-on Activity *(15 minutes, optional)*

5. If available, show students real specimens of sea stars, sea urchins, and sea cucumbers to reinforce the differences between the sub-phyla.

Class Activity: Sea Cucumber Defense Mechanisms *(10 minutes)*

6. Focus on sea cucumbers and discuss their unique defense mechanisms, including the ejection of Cuvierian tubules and expulsion of poisonous chemicals.
7. Engage students in a discussion about why few predators eat sea cucumbers.

Conclusion *(5 minutes)*

8. Summarize the main points from the lesson and emphasize the significance of echinoderms in ocean ecosystems.
9. Encourage students to share their homework findings on local echinoderms in the next class.

Assessment:

- In-class participation in discussions and activities.
- Homework assignment where students list examples of local echinoderms.
- Optional assessment through a short quiz or written report on the characteristics and sub-phyla of echinoderms.

Extension Activities:

1. Create a classroom aquarium with echinoderms or sea creatures for students to observe and learn from.
2. Research and discuss the ecological roles of echinoderms in various marine ecosystems.
3. Field trip to a local aquarium or marine biology research center to see live echinoderms and other marine life in action.