Chapter 28 **Arthropods and Echinoderms** **Name _____**

Lab Identifying Echinoderms

Background Information

Echinoderms are characterized by a spiny skin and radial symmetry. Echinoderms also show some unique adaptations to life in water. For example, they have an internal network of fluid filled tubes called a water vascular system. The movement of fluid in the water vascular system can extend bulb-shaped appendages called tube feet, or produce a partial vacuum in the tube feet. The partial vacuum helps echinoderms hold onto prey or onto surfaces as they move. Echinoderms are headless animals that have a simple nervous system without a brain. Exchange of gases occurs through skin gills all over the echinoderm body, so a complicated circulatory system is not present. Despite these similarities there are also differences in echinoderms. Based on these differences, echinoderms are grouped into five classes: starfish, brittle stars, sea cucumbers, sea urchins and sand dollars, and sea lilies and feather stars. In this laboratory investigation, you will use a key to identify these different echinoderms.

Problem

How can echinoderms be identified?

Materials (per group)

assorted echinoderms (pictures or preserved specimens)

Procedure

1. After you identify each echinoderm, enter its name in the data table on the following page.

2. Your teacher will provide either pictures or preserved echinoderm specimens. Each specimen will be numbered.

3. Use the key on the next page to identify each numbered specimen. Start at step 1 and read descriptions A and B. Only one of the descriptions correctly applies to the specimen you are examining. At the end of a description is the identity of the specimen or directions to proceed to another step. Continue to follow the directions step by step until you identify the specimen.

4. After you identify the specimen, write its name next to its identification number in the data table. Then proceed to the next numbered specimen.

Identification Key

1a. Has obvious radial symmetry ..... Go to 2a
1b. Appears to have bilateral symmetry ..... Sea Cucumber

2a. Has arms or branches ..... Go to 3a
2b. Spherical, oval, or disc shaped ..... Go to 5a

3a. Arms in multiples of five ..... Go to 4a
3b. Arms are branched and feathery ..... Go to 7a

4a. Arms are long, slender, and flexible ..... Brittle Star
4b. Arms are thick and less flexible ..... Starfish

5a. Spherical; Covered with spines ..... Sea Urchin
5b. Not spherical ..... Go to 6a

6a. Oval ..... Heart Urchin
6b. Flattened disc ..... Sand Dollar

7a. Has a long stalk ..... Sea Lily
7b. Stalk short or absent ..... Feather Star

Observations

Data Table

Specimen Identification Number	Identity of Specimen (from Identification Key)	Class
1		
2		
3		
4		
5		

1. What feature did all of the echinoderms you examined have in common?

2. How did the echinoderms you examined differ?

3. Did any echinoderms with visible differences have the same identity?

Analysis and Conclusions

1. How is the use of an identification key similar to the process of classification?

2. Why is it possible for two organisms that look different to have the same identity based on the key used in this investigation?

Critical Thinking and Application

1. A spiny skinned organism has 15 stubby arms arranged in a circle. What type of echinoderm is it?

2. If a brittle star lost an arm in a battle with a predator, what difficulty would this cause in identifying it with a key?

3. Echinoderms have characteristics not found in other organisms living or extinct. Unlike other invertebrates echinoderms have an internal skeleton. What does this suggest about their place in the evolutionary tree?

4. Radial symmetry is a characteristic of simple organisms such as cnidarians, but it is also found in echinoderms. The sieve plate in echinoderms is off center, however, and the larval form of all echinoderms has bilateral symmetry. What does this suggest about the development of radial symmetry in echinoderms?

5. List several echinoderm adaptations that are not found in any other phylum.

   a)

   b)

   c)