

OIMB GK12 CURRICULUM

6th Grade

60 minutes

SPINY DOGFISH DISSECTION

Oregon State Content Standards:

6.1 Structure and Function: Living and non-living systems are organized groups of related parts that function together and have characteristics and properties.

6.1L.1 Describe the functions and relative complexity of cells, tissues, organs, and organ systems.

6.2 Interaction and Change: The related parts within a system interact and change.

6.2L.1 Describe the relationships and interactions between and among cells, tissues, organs, and organ systems.

6.2L.2 Explain how individual organisms and populations in an ecosystem interact and how changes in populations are related to resources.

Ocean Literacy Principles:

5. The ocean supports a great diversity of life and ecosystems.

6. The ocean and humans are inextricably interconnected.

Goals: Students will:

- make observations and conclusions about shark adaptations from a dissection
- learn about shark anatomy

Concept:

1. Shark adaptations include a flexible and streamlined cartilaginous body, an asymmetrical tail for lift, oil for buoyancy, a spiral valve for faster digestion, and replaceable rows of teeth.

Materials: (modify if only one dissection as a class demonstration)

- Preserved dogfish (order online from Carolina Biological supply, takes about 1.5 weeks to ship, double injected specimens are approximately \$12), one per group
- Trays, one per group
- Dissection tools (sharp scissors or knife for teacher), (tweezers, toothpicks for student groups)
- Gloves, one pair per student (determine if there are allergy concerns in the class)
- Trash bags, 3 large to triple bag remains
- Anatomy guide, 1 per group
unlabeled: <http://www.savalli.us/BIO370/Anatomy/2.Shark.html>
labeled: <http://www.savalli.us/BIO370/Anatomy/2.SharkLabel.html>
- Dissection Worksheet, 1 per student

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Tips:

- Order dogfish ahead of time
- Laminate anatomy guides
- Have students wear just one glove on their non-dominant hand so they can touch with one hand and write with the other
- wear safety goggles while cutting open dogfish
- keep space ventilated (chemicals and sharks are smelly)

Background:

A good website for general information about spiny dogfish, a figure of external anatomy, and peoples' connection:

<http://www.enchantedlearning.com/subjects/sharks/species/Dogfish.shtml>

More detailed anatomy and dissection information for teachers, including photos of internal anatomy, male and female anatomy, etc.:

<http://www.pc.maricopa.edu/Biology/ppepe/BIO145/lab04.html>

An excellent site with links to a labeled and unlabeled photograph of the internal dogfish anatomy: <http://www.savalli.us/BIO370/Anatomy/2.SharkLabel.html>

It is suggested that a copy of the labeled photo be used as an anatomy guide during the dissection. The images could also be projected for student reference during the dissection.

Lesson plan:

1. Review interesting facts about sharks and dogfish (refer to background web pages). Spiny dogfish can reach 3-4 feet in length and are identified by their dorsal spines and lack of anal fin. They live in temperate waters, school, live to be 25+ years old, give birth to live young and have several important anatomical adaptations. Important adaptations of sharks include an asymmetrical tail (*lift while swimming*), liver full of oil (*for buoyancy*), a spiral valve (*absorbs nutrients for faster digestion*), replaceable rows of teeth, and gills (*to exchange gasses in their body*). People harvest these sharks for fertilizer, food and liver oil.
2. Explain how the dissection will proceed. (For detailed dissection information see: <http://www.pc.maricopa.edu/Biology/ppepe/BIO145/lab04.html>)
3. Have students put on gloves.
4. Depending on the number of sharks you have (class demonstration or group dissections) have the students file past the shark or pass them out to student

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- groups. Have the student run a finger over the skin to feel the rough texture. Point out that sharkskin has been used for sand paper.
5. Go over the dogfish's external anatomy (refer to <http://www.enchantedlearning.com/subjects/sharks/species/Dogfish.shtml>)
 6. Identify different fins and other external structures. Go over the structure and function of each of the following:
 - dorsal fin
 - caudal fin (asymmetry is for lift while swimming)
 - pectoral fins
 - pelvic fins
 - claspers (for mating)
 - lack of anal fin
 - spines (removed on specimens)
 - eyes
 - lateral line (pressure and electrical sensing)
 - countershading (camouflage)
 - spiracles (provides oxygenated blood directly to the brain and eye)
 - teeth/jaw
 - nostrils
 7. Circulate around the class and have students point out external structures.
 8. Pass out the worksheet and have students (separately or as a class) fill in the blanks for the external features.
 9. Once the external features are labeled, begin the dissection (teacher should cut open body cavity) using the worksheet as a guide. If you are using preserved specimens, explain that veins and arteries are injected with a silicone dye (colored blue/pink).
 10. As the dissection progresses, discuss the:
 - Liver (2 lobes, full of oil for buoyancy)
 - Spiral valve (helps with digestion)
 - Stomach
 - Esophagus
 - Heart
 - Gills
 - Gill rakers
 11. Again, circulate around groups and have them point out all these structures using the worksheet and anatomy guide.
 12. If time allows, cut open the stomach to look at its contents (often krill, sometimes squid beaks)

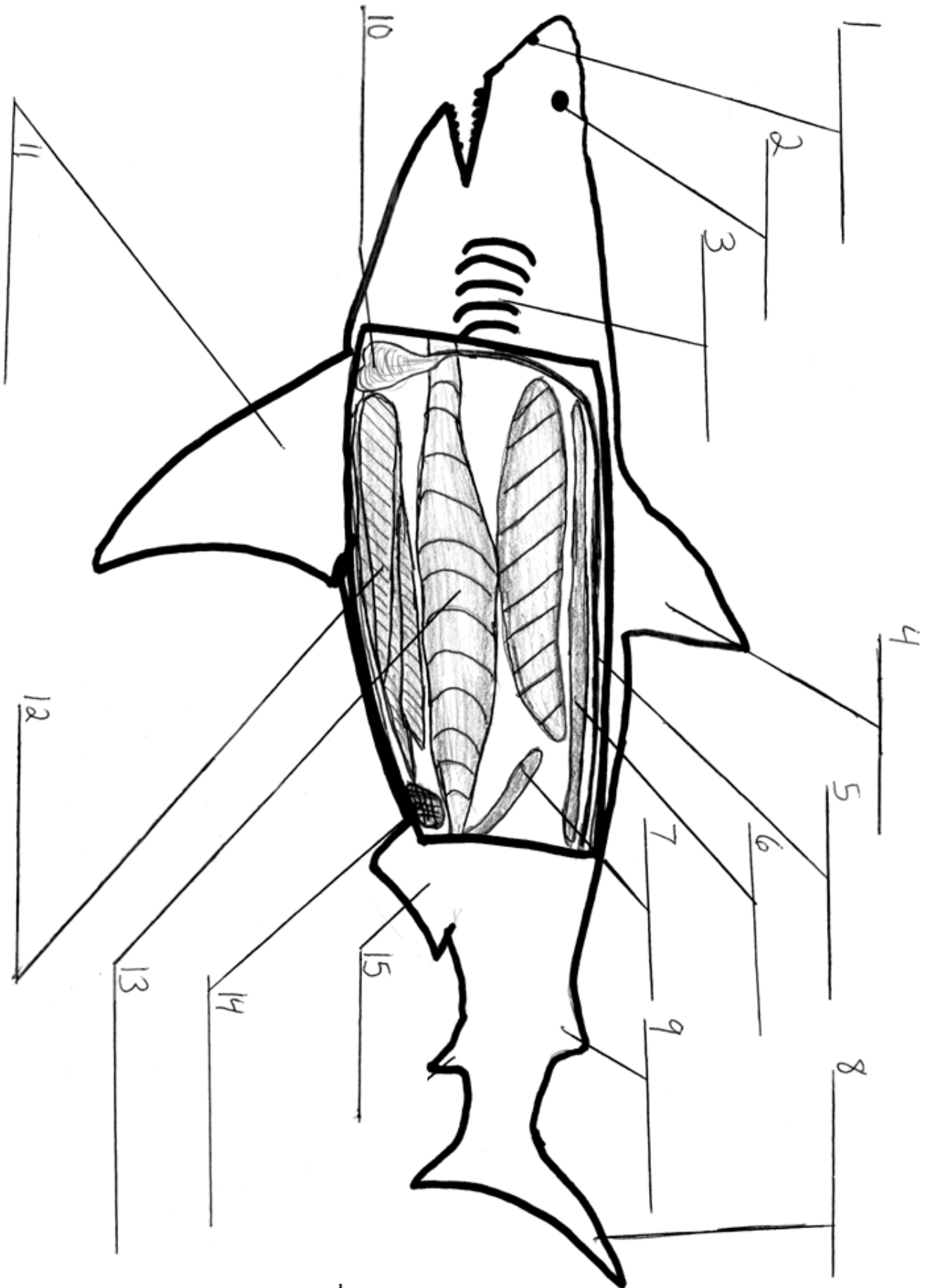
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13. Look at the external anatomy and gonads—is the dogfish male or female? If female, open uterus and look for embryos of young sharks. (refer to http://www.pc.maricopa.edu/Biology/ppepe/BIO145/lab04_5.html for photos of external and internal male and female anatomy.)
14. Clean up and review adaptations of dogfish.
 - Countershading—camouflage
 - Lateral line—sensing
 - Liver—full of oil that helps with buoyancy
 - Spiral valve—helps with digestion
 - Gill rakers—protect delicate gills
 - Stomach—what did the dogfish eat?
 - Gender—is it a female or male? If female, were there embryos?

Assessment: Dissection Worksheet and discussions

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KEY TO SPINY DOGFISH ANATOMY:

1. Nostril
2. Eye
3. Gills
4. Anterior Dorsal fin
5. Pancreas
6. Kidneys
7. Rectal Gland
8. Caudal fin
9. Posterior dorsal fin
10. Gall Bladder
11. Pectoral fin
12. Liver
13. Stomach
14. Colon
15. Pelvic fin