Activity Title: The Key to Different Types of Sharks

Subject (Focus/Topic): Biology

Grade Level: Grades 9-11

Average Learning Time: Two 45 minute periods

Lesson Summary (Overview/Purpose): After learning the anatomy of a shark, as well as, using a dichotomous key, students play a game to identify different sharks.

Overall Concept (Big Idea/Essential Question): What characteristics do taxonomists use to put animals into groups? Is there an easy way to identify groups of animals?

Specific Concepts (Key Concepts): Once shark characteristics are understood, students can use the characteristics along with a dichotomous key to easily identify 10 sharks

Focus Questions:
1. What is the purpose of classification? (To organize and find organisms easily as well as observing similar characteristics in closely related organisms)
2. What is the correct name for the top side and bottom side of fish is? (dorsal and ventral)
3. Label the different type of fins in fish. (first dorsal, second dorsal, caudal, pectoral, pelvic and anal)
4. How does a student use a dichotomous key? (If the fish has the characteristic described, you follow those directions.)
5. What characteristics of all sharks? (cartilege skeleton, lateral line, ampullae of Lorenzini, lack of an swim bladder, placoid scales)

Objectives/Learning Goals: Students will learn the external characteristics of sharks (and all other fish). Students will use a dichotomous key and the shark characteristics to identify sharks. Students in groups of three will compete with each other to see how many sharks they can correctly classify. Each team will compete with the other groups to see which group got the most correct.

Background Information: See background sheet

Common Misconceptions/Preconceptions: All sharks are man eaters

Materials: Power point of shark research, Smart Board Power Point or Hands-on worksheets to explain shark external anatomy and how to use a dichotomous key.

Masters are in this lesson plan

Per group (3)

10 Shark cards

1 game board

Answer key (Located on Power Point)

Assessment quiz

Technical Requirements: This lesson was designed to be used with a Smart Board, a drag and drop component has been developed for reinforcing both the characteristics of the shark as well as for competing teams to challenge other teams for the correct answers.

Teacher Preparation: Teachers need to run off shark cards and game board using card stock and laminate, if it will be used more than once. Cut out or have student cut out shark cards.

Keywords: Dichotomous key, caudal fin, dorsal side, gill slits

Lesson Procedure:

1. Power Point: What is the purpose of shark research? (pictures of sharks being weighed, measured, tissue samples and tagged) Importance of collecting data. This data is written with a computer backup.

2. Power Point Shark lesson includes: Identification of shark anatomy using a real shark from the Teacher at Sea voyage.

3. Drag and drop activity, using a Smartboard, where student drag the correct label to the parts of the shark. In a classroom with no Smartboard this could be done with a fill in the blank activity.

4. The shark key is handed out and students are instructed in how to use it. Once again I used the Smartboard. I demonstrated the use of the key on a picture of a shark I took while diving. In a classroom without a Smartboard this can be accomplished with simple directions.

5. Each team of three students has a game board and ten shark cards and a shark key.

6. Each team competes with the other teams to see who can correctly identify the ten sharks first.

7. Each team records list of their sharks in order of completion.

8. Each team is called upon to identify a shark using the drag and drop on the Smartboard.

9. Each team's game board is checked to see that they have all their sharks correct. The first team that has the most

correct is the winner.

10. Assessment: Students return to their seats and are given the assessment sheet.

Assessment and Evaluation:

1. Given 10 shark cards students will be able to categorize the cards into their corresponding animal classification with 80% accuracy.

2. In the assessment quiz students should be able to Identify the parts of a shark and use a dichotomous key to classify it with 80% accuracy.

- **National Science Education Standard(s) Addressed:**

A-1 Science Inquiry:

Students should understand scientific inquiry

Content C- Life Science:

C-2 Biological Evolution:

a. Species evolve over time. Evolution is the consequence of the interactions of (1) the potential for a species to increase its numbers, (2) the genetic variability of offspring due to mutation and recombination of genes, (3) a finite supply of the resources required for life, and (4) the ensuing selection by the environment of those offspring better able to survive and leave offspring.

b. The great diversity of organisms is the result of more than 3.5 billion years of evolution that has filled every available niche with life forms.

c. Natural selection and its evolutionary consequences provide a scientific explanation for the fossil record of ancient life forms, as well as for the striking molecular similarities observed among the diverse species of living organisms.

d Biological classifications are based on how organisms are related. Organisms are classified into a hierarchy of groups and subgroups based on similarities which reflect their evolutionary relationships. Species is the most fundamental unit of classification.

e Like other aspects of an organism's biology, behaviors have evolved through natural selection. Behaviors often have an adaptive logic when viewed in terms of evolutionary.

C-3 Interdependence of organisms

a. A population consists of all individuals of a species that occur together at a given place and time. All populations living together and the physical factors with which they interact compose an ecosystem.

b.The number of organisms an ecosystem can support depends on the resources available and abiotic factors, such as quantity of light and water, range of temperatures, and soil composition. Given adequate biotic and abiotic resources and no disease or predators, populations (including humans) increase at rapid rates. Lack of resources and other factors, such as predation and climate, limit the growth of populations in specific niches in the ecosystem

Content E-Science and Technology

a. Science often advances with the introduction of new technologies. Solving technological problems often results in new scientific knowledge. New technologies often extend the current levels of scientific understanding and introduce new areas of research.

b. Science and technology are pursue for different purposes. Scientific inquiry is driven by the desire to understand the natural world, and technological design is driven by the need to meet human needs and solve human problems. Technology, by its nature, has a more direct effect on society than science because its purpose is to solve human problems, help humans adapt, and fulfill human aspirations. Technological solutions may create new problems.

Content Standard F Science in Personal and Social Perspective:

a. Science, by its nature, answers questions that may or may not directly influence humans .Sometimes scientific advances challenge people's beliefs and practical explanations concerning various aspects of the world.

b. Populations grow or decline through the combined effects of births and deaths, and through emigration an immigration. Populations can increase through linear or exponential growth, with effects on resource use and environmental pollution.

c. The earth does not have infinite resources; increasing human consumption places severe stress on the natural processes that renew some resources, and it depletes those resources that cannot be renewed.

Content Standard F

a. Natural ecosystems provide an array of basic processes that affect humans. Those processes include maintenance of the quality of the atmosphere, generation of soils, control of the hydrologic cycle, disposal of wastes, and recycling of nutrients. Humans are changing many of these basic processes, and the changes may be detrimental to humans.

b. Humans have a major effect on other species. For example, the influence of humans on other organisms occurs through land use–which decreases space available to other species–and pollution–which changes the chemical composition of air, soil, and water.

c. Individuals and teams have contributed and will continue to contribute to the scientific enterprise. Doing science or engineering can be as simple as an individual conducting field studies or as complex as hundreds of people working on a major scientific question or technological problem. Pursuing science as a career or as a hobby can be both fascinating and intellectually rewarding.

Content Standard G- History and Nature of Science

The historical perspective of scientific explanations demonstrates how scientific knowledge changes by evolving over time, almost always building on earlier knowledge.

Ocean Literacy Principles Addressed:
The ocean supports a great diversity of life and ecosystems.
The ocean and humans are inextricably interconnected.
The ocean is largely unexplored. The ocean is largely unexplored.

State Science Standard(s) Illinois Science Standards:
12: Understand the fundamental concepts, principles1and interconnections of the life, physical and earth/space sciences
12.A: Know and apply concepts that explain how living things function, adapt and change
12.B: Know and apply concepts that describe how living things interact with each other and with their environment

Additional Resources: Biozone Biology 2- Sharks.

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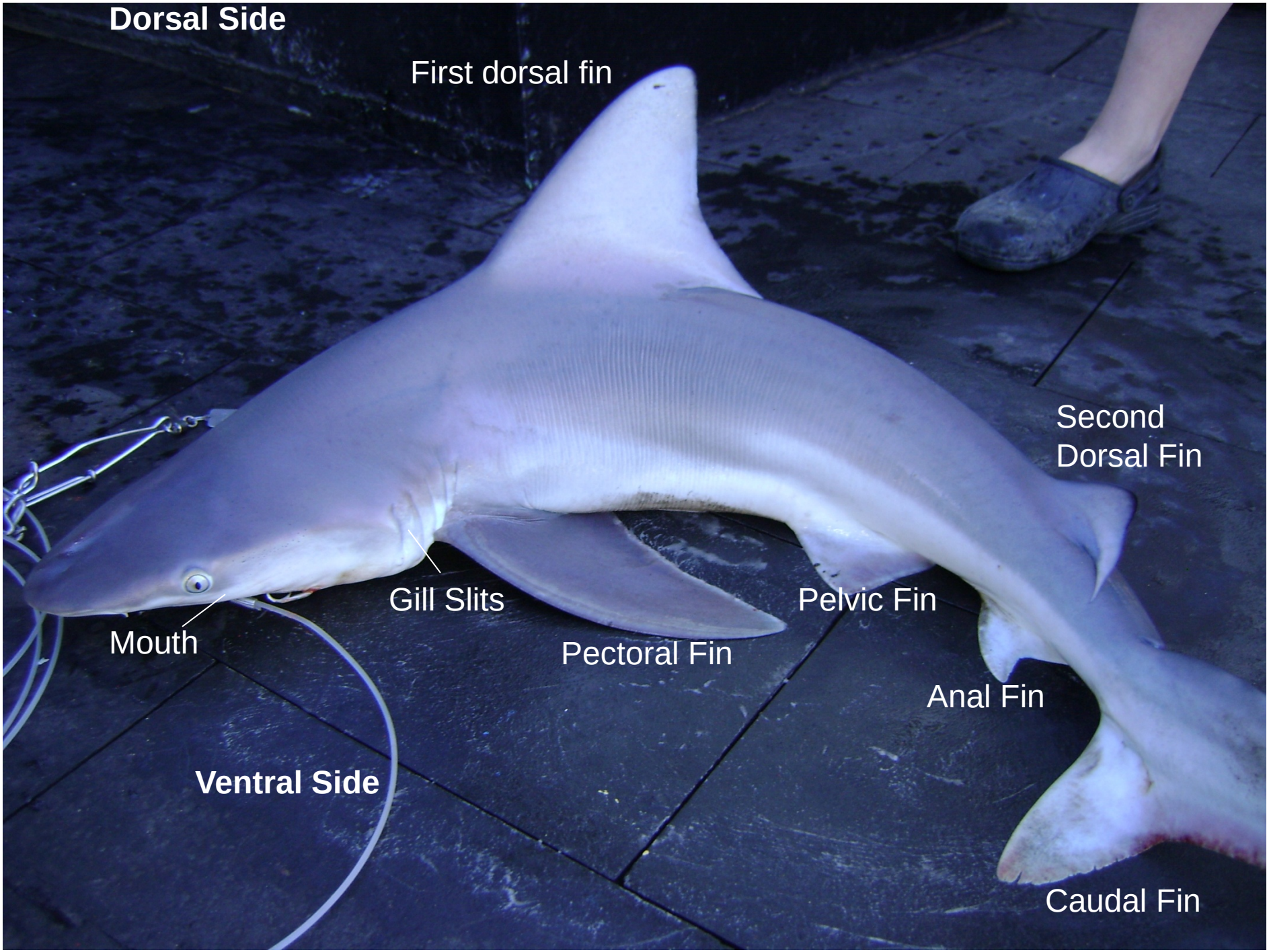

Dorsal Side
First dorsal fin
Second
Dorsal Fin
Gill Slits
Pelvic Fin
Mouth
Pectoral Fin
Anal Fin
Ventral Side
Caudal Fin

IDENTIFY SHARK PARTS

Dorsal side

Ventral side

Mouth

Gill Slits

Pectoral Fin

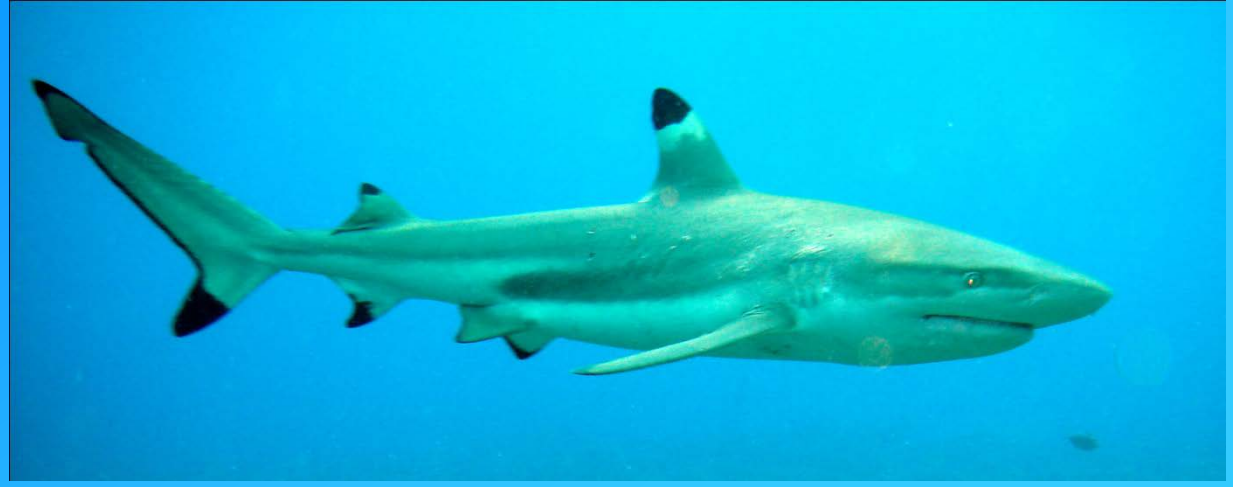
Pelvic Fin

Anal Fin

Caudal Fin

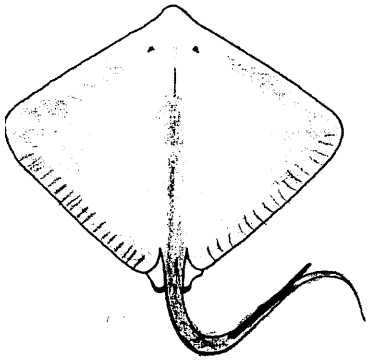
First Dorsal Fin

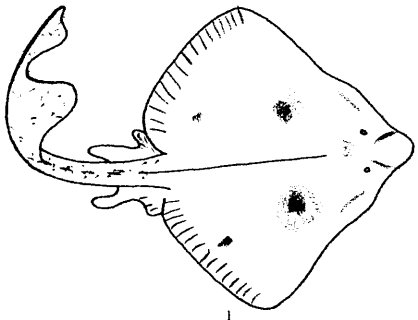
Second Dorsal Fin

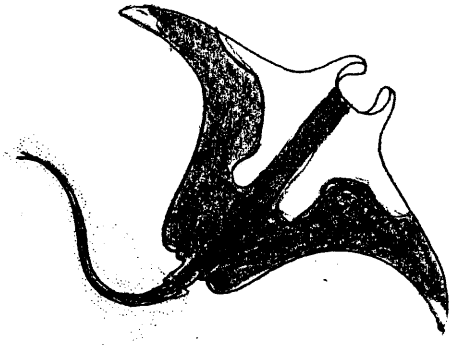


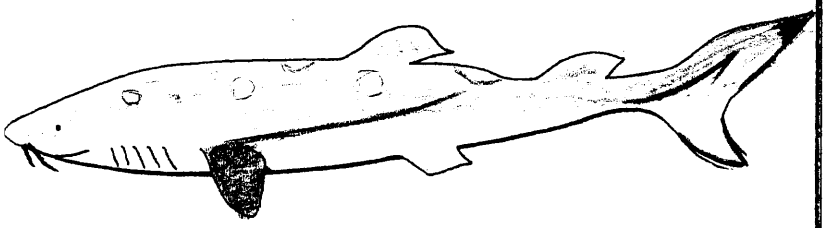
Using key to classify this shark

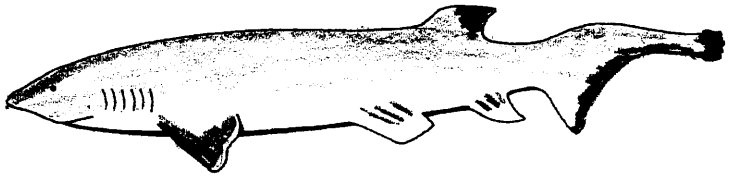
1 B Body not kite like in shape	Go to statement 2
2 B Pelvic Fin present	Go to statement 3
3 B Five Gills slits present	Go to statement 4
4 B Two Dorsal fins	Go to statement 5
5 B Mouth along underside of head	Go to statement 6
6 B Head not expanded	Go to statement 7
7 B Top of Caudal fin different in size then bottom of fin	Go to statement 8
8 B First Dorsal fin normal length	Go to statement 9
9 B Caudal Fin regular length	Go to statement 10
10 B Nose without needle point	Go to statement 11
11 B Anal Fin present	**Family Carcharhinidae**

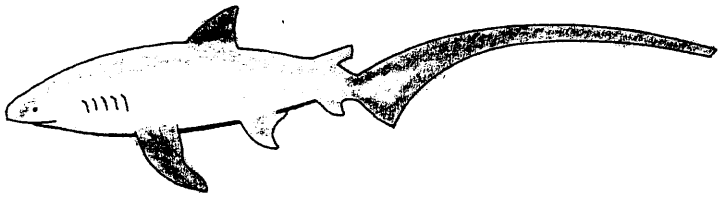


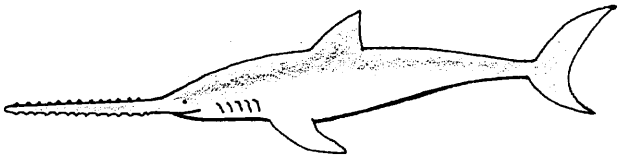


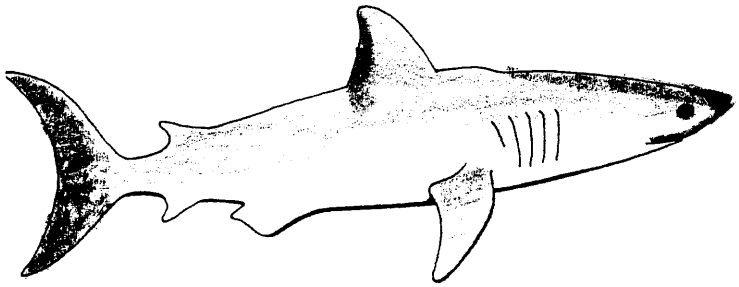


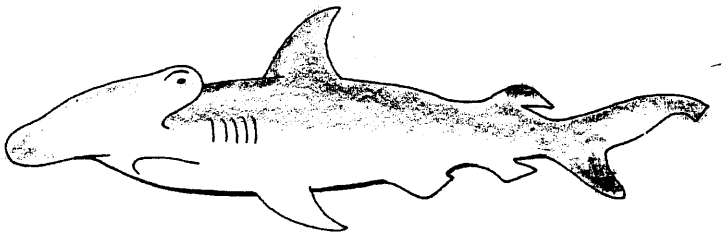


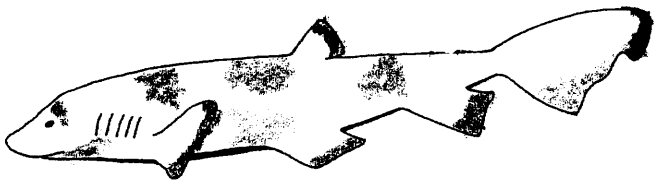


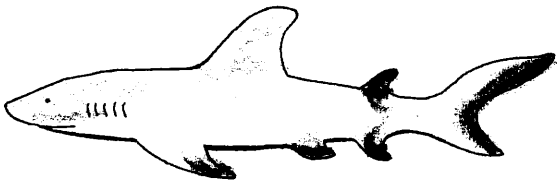


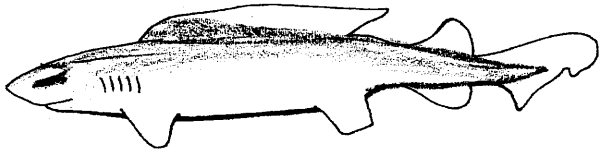


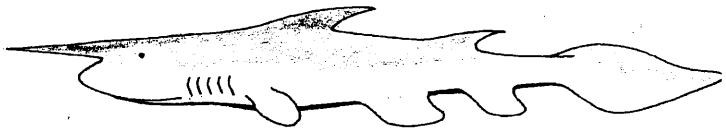












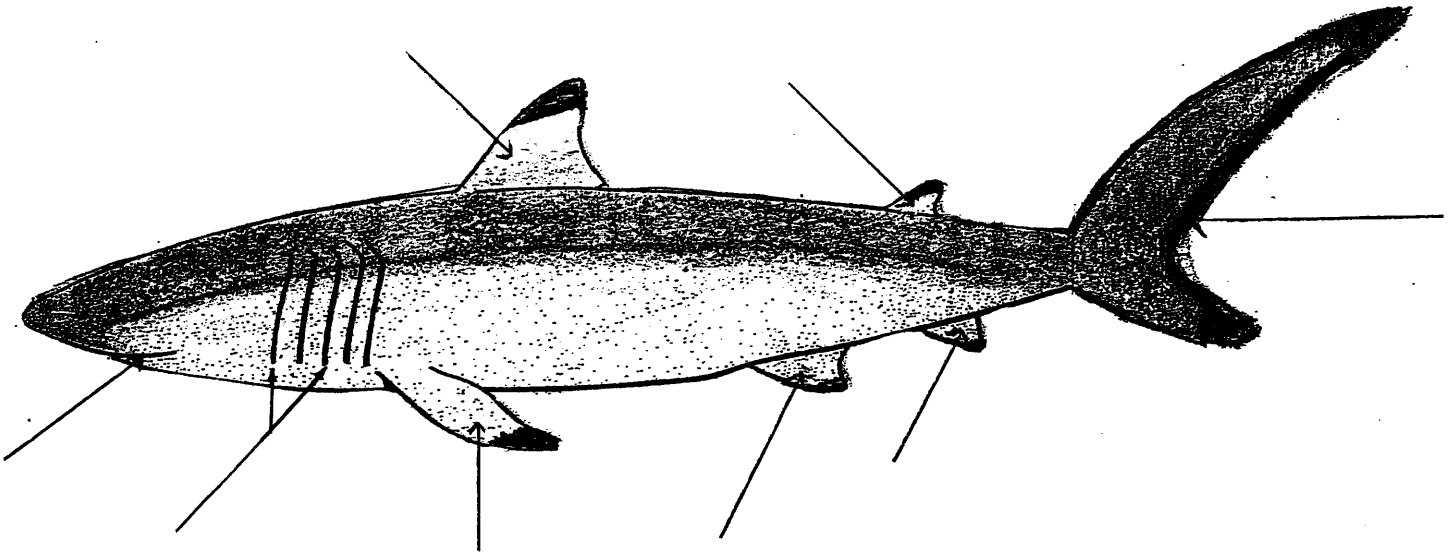
Shark Key Quiz

Name _____

Period ___ Number ___

1. Using the names below identify the parts of the shark.

_____



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Ventral side	anal fin	pectoral fin	Second Dorsal fin
Dorsal side	pelvic fin	caudal fin	
Mouth	gill slits	First Dorsal fin	

2. Using your shark key, identify this shark

_____

Shark Key

1. A. Body kitelike	Go to statement 11
B. Body not kitelike	Go to statement 2
2. A. Pelvic fin absent and nose sawlike	Sawfish Shark
B. Pelvic fin present	Go to statement 3
3. A. Six gill slits present	Sharpnose Shark
B. Five gill slits present	Go to statement 4
4. A. Only one dorsal fin	Swell Shark
B. Two dorsal fins	Go to statement 5
5. A. Head expanded with eyes at end of expansion	Hammerhead Shark
B. Head not expanded	Go to statement 6
6. A. Top half of caudal fin same size and shape as bottom half	Mako Shark
B. Top half of caudal fin different size and shape as bottom half	Go statement 7
7. A. First Dorsal Fin very long, almost half length of body	Catshark
B. First Dorsal Fin regular length	Go to statement 8
8. A. Caudal Fin very long, almost as long as entire body	Thresher Shark
B. Caudal Fin regular length	Go to statement 9
9. A. Long needlelike point on end of nose	Goblin Shark
B. Nose without long point	Go to statement 10
10 A. Anal Fin absent	Dogfish shark
B. Anal Fin present	Black tip Shark
11. A. Small Dorsal Fin present near tip of tail	Brown Ray (Skate Family)
B. No Dorsal Fin near tip of tail	Go to Statement 12
12. A. Front of fish with two hornlike appendages	Manta Ray
B. No hornlike appendages	Sting Ray