In order to understand the diversity or variety of marine fish, it is important to identify their common features. Fish morphology or the forms and structures that make up the organism is especially important for identifying unique characteristics and adaptations of different species. So what makes a fish a fish? Well, typically there are five characteristics that will help you narrow it down: they are living in water, have fins, have gills, are ectothermic and are vertebrates. It seems silly but the habitat of the organism will tell you more about it, then you start to look at the anatomy and structures of the fish to identify them. Ectothermic animals do not regulate their internal body temperature, instead relying on the environmental conditions around them. For example, snakes are also ectothermic, you may have seen them basking in the sun on a rock; they use that heat to warm up their body temperatures. Fish are unlikely to be found basking on rocks, so they are using the water temperature around them to keep their body temperatures in check. That’s one reason why you are unlikely to find a tropical fish in the Arctic sea, its temperatures would be thrown off! When discussing vertebrates vs. invertebrates there is one key thing to keep in mind; the spine or backbone! Vertebrate organisms all have a backbone to support their muscles and skeletons, while invertebrates lack a backbone and must rely on other methods to support their bodies.

**Common fish anatomy and movement:**

There are three main classes of fish: agnatha, chondrichthyes, and osteichthyes. We use classes to group similar animals from larger groups, so while these classes all have different defining characteristics, they are all fish and contain some of the same traits. The below diagrams show you the typical internal and external anatomies of marine and freshwater fish. The main parts to distinguish of the external anatomy will be differences in mouth shape and size, dorsal fin location and shape, caudal fin shape, coloration and pattern, and location of the eye.
These characteristics can tell you more about the diet, habitat, and movement of the species. For example, the shape of the back caudal fin will tell you if the fish is a fast swimmer or slow swimmer and the mouth shape will tell you what kind of prey it may be eating. It is also important to note a few other structures of the fish, such as the lateral line, swim bladder, gills, and scales. The lateral line senses movements in the water such as other organisms, currents, and more. The swim bladder is crucial to being a fish, as it is a sack of air inside the body that maintains the buoyancy of a fish. Fish also all have gills instead of lungs that take in the oxygen dissolved in the water, this is why they can breathe underwater, but can’t breathe out of water. The scales can come in different forms but all scales are meant to move easily through water and protect the animal. Now let’s get into the different groups of fish!

**Agnatha or jawless fish:**

The class agnatha are the jawless fish that have oral suckers instead of jaws. These are the lampreys and hagfish, which are primitive fish with tube shaped bodies often attaching themselves to other animals. Not only do they not have jaws like other groups of fish but they lack scales, instead having a leathery or slimy skin to protect them. They have a cartilaginous skeleton like some other fish, meaning they don't have bones, but their other differences separates these two types of fish from the others.

**Chondrichthyes or cartilaginous fish:**

The class chondrichthyes are the sharks, stingrays, and skates of the fish world. They all have skeletons of hard cartilage (the material in your ears and the tip of your nose but more firm) instead of bones. They have jaws like other fish, but their jaws are very loose so they can open their jaws much wider. The other main differences that separate these species from other fish are their scales and lack of swim bladder. Instead of a swim bladder, the chondrichthyes have a very oily liver, and if you have ever tried to mix oil and water you may know that the oil floats on top. This is due to different densities, and it also allows the liver of this group of fishes to act as a swim bladder and keep the fish buoyant. Their scales are called dermal denticles which essentially means skin teeth, and they are very small scales that feel like sandpaper. But this group still has gills and a backbone making them fish!

**Osteichthyes or bony fish:**

Osteichthyes are the fish you typically think of when someone mentions a fish, such as minnows, tuna, striped bass, or flounders. These fish come in a variety of shapes and sizes but all of them have a bony skeleton, like a human! They also are similar in that they scales that look and feel like fish scales, although different shapes. They have a swim bladder, jaws, and gills, and also have fins that appear in pairs.
Marine Fishes Comprehension
Task #1

Complete the Venn diagram. Include the three classes of marine fishes and include the defining characteristics for each group, as well as the characteristics of all fish.

Agnatha (jawless fish)

Chondrichthyes (cartilaginous fish)

Osteichthyes (Bony fish)
1. How many groups of marine fishes are there?
   a. Three
   b. Four
   c. Five
   d. Six

2. What do cartilaginous fish have instead of a swim bladder?
   a. Floaties
   b. This is a trick, they also have swim bladders
   c. Oily livers
   d. Blubber

3. Which group of fishes have oral suckers?
   a. Osteichthyes
   b. Chondrichthyes
   c. Agnatha

4. Which of the following is not a characteristic of all fish?
   a. Gills
   b. Ectothermic temperature regulation
   c. Live in water
   d. Scales

5. Which of the following is not considered a fish based off the reading?
   a. Shark
   b. Starfish
   c. Tuna
   d. Lamprey

6. What class of fish have paired fins?
   a. Osteichthyes
   b. Chondrichthyes
   c. Agnatha

7. This feature allows fish to breathe underwater
   a. Fins
   b. Gills
   c. Mouth
   d. all of the above

8. What can the external anatomy of a fish tell you about the fish?
   a. Habitat
   b. Diet
   c. Movement
   d. All the above

9. Where is the dorsal fin of a fish located?
   a. On the bottom of the fish
   b. At the back of the fish
   c. On the top of the fish
   d. On the sides of the fish

10. Which class of fish have dermal denticles?
    a. Osteichthyes
    b. Chondrichthyes
    c. Agnatha

11. Agnatha have backbones and are still considered vertebrates.
    a. true
    b. false

12. What does ectothermic temperature regulation do?
    a. Body temperature controlled by the organism
    b. Body temperature not controlled at all
    c. Body temperature controlled by environment
Marine Fishes
Task # 3:
Complete the vocabulary

Lateral line-
Swim bladder –
Caudal fin-
Vertebrate-
Gills-
Morphology-
Scales-
Dermal Denticles-