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# Fish in the Classroom Education Program

## Aquarium Basics

### Before You Begin

An aquarium in a classroom is a doorway to scientific, creative, and critical thinking. Setting up and maintaining an aquarium can be easy with the right amount of knowledge. Aquariums shouldn't be hard work; they should be fun and interesting. Understanding how an aquarium functions is the first step in keeping your fish alive and well. The fundamental parts of an aquarium include the tank, filter, gravel, lights and water. Let's explore each part individually and discover their role in a healthy aquarium.

### Tank

Without the **tank** there couldn't be an aquarium. Early fish tanks were made of slate with a glass front, but today's tanks are usually four walls and a bottom made of glass or acrylic. The tank, of course, holds the water and animals, and the walls and seams are rigid and sturdy. A hood is usually included to keep water from evaporating and fish from jumping out of the tank. Tanks are also designed to support lighting and filtration.

### Filter

**Filters** come in many different shapes and sizes and clean the tank using many different methods. All filters are used to improve water quality and make long term fish care possible. There are three basic methods of filtration.

**Mechanical filtration** is the simplest and most common. Filter floss or pads trap small debris and keep them from floating around in the water. This prevents the debris from decaying and polluting the aquarium and clouding the water.

**Chemical filtration** employs chemicals or chemical compounds to remove small dissolved organic particles from the water that cause discoloration, odor and other more serious problems. Activated carbon is the most common form of chemical filtration. Carbon binds to some organic compounds and, like a sponge, absorbs them and removes them from the water.

**Biological filtration** is arguably the most important form of filtration when it comes to long term fish care. Biological filters grow beneficial bacteria, which remove ammonia and nitrite from the water through a process called the Nitrogen Cycle. Please see *The Nitrogen Cycle* for more information. For the bacteria to stay alive it must stay in constant water conditions and be fed a steady diet of ammonia and nitrite. Luckily, this isn't hard with fish around.

Water quality is most easily maintained when all three filtration methods are used simultaneously. Many filters today incorporate all three methods of filtration.

### Gravel

Believe it or not, **gravel** actually does more than make the tank look pretty. In a healthy aquarium, each tiny piece of gravel is home to thousands of beneficial bacteria that work alongside the filter to keep the water clean. **It is extremely important to keep these bacteria alive, so never remove the substrate to wash it or let it dry.** Doing so will destroy the bacteria, and fish will have a hard time surviving without it. Porous gravel provides the greatest amount of surface area for the bacteria to colonize. Marbles and other smooth glass or plastic stones should be avoided or added only as accent pieces

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because they do not provide an adequate amount of space for the bacteria to grow.

### Lights

Lighting is an important aspect of daily life for a fish. Just like people, fish need to experience regular cycles, or **photoperiods**, of light and dark. Fish do sleep; however some fish are more active at night. It is recommended to keep the fish on a 12/12 light/dark cycle, though any range from 8/16 to 14/10 is acceptable. Ambient light should be considered when calculating the photoperiod.

Excess light from classroom lights, windows and tank lights can encourage the growth of algae. The best way to limit the amount of light an aquarium is exposed to is to keep the blinds closed on the windows close to the aquarium, or to place the aquarium in a spot away from any windows. **Turn the lights on in the morning just before the aquarium will be viewed, and shut them off as you leave for the day.** Setting a timer to turn the lights on and off makes it easier to ensure a regular photoperiod for the aquarium. Fish are fine with the ambient light in a classroom, though they look their best when viewed under aquarium lights.

### Water

The most important factor for fish is **water quality**. The fish used in this program come from a **freshwater** environment, which contains almost no salt. Freshwater fish can be found all over the world in rivers, streams, lakes, ponds, swamps, and practically anywhere there is a sustainable source of water. Therefore, different fish prefer different **water chemistry** depending on their origin. Freshwater community fish, the kind of fish you will be

using in this program, enjoy neutral water conditions. **It is important to maintain the water at a pH between 6.5 and 7.5 and a temperature of about 75° Fahrenheit.** Furthermore, for fish to survive, **the dissolved ammonia and nitrite levels in the tank must remain at or very close to 0** (see *The Nitrogen Cycle*). This may sound like a challenge, but with the help of the filter and gravel, routine care, and a little vigilance, it is quite easy.

A neutral **pH** of 7 is perfect for a freshwater community tank. Fresh from the tap, the pH value of water can vary widely based on location, so **it is recommended that you check your tap water and adjust the pH accordingly.** Most pet stores sell convenient liquid pH adjusters to help correct this problem. **Water also contains dissolved chlorine or, in some areas, chloramine.** This keeps the water clean and safe for people to consume, however it can be fatal for sensitive aquarium animals. It is essential to add **dechlorinator** to the tap water to neutralize the chlorine. **Not all dechlorinators are able to neutralize chloramine** (which breaks down into ammonia and chlorine when regular dechlorinator is used). If you suspect you have chloramine in your tap water, make sure to use a dechlorinator appropriate for removing chloramine, chlorine and ammonia. Follow the instructions on the bottle, but note that dechlorinator is not toxic to fish. Most dechlorinators work instantly, and after the water is dechlorinated it is safe to add to the aquarium.

Fish and other organisms living in the tank will negatively affect the quality of the water. **For this reason it is important to**

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**test the water regularly and perform a water change once a week** (see *Tank Maintenance*). If left unchecked, **ammonia** and **nitrite** levels will rise and **pH** will slowly fall over time. This is harmful for fish, and will make them vulnerable to stress and disease.

As you can see, aquariums consist of several parts all working together to keep the fish alive and make your job easier. Read on to learn about the nitrogen cycle, a must for any aquarium, and to find out what sort of routine maintenance will be required to keep the tank in tip top shape. Feel free to do more research on your own using books or a reliable internet source. Above all, have fun watching your fishy friends. Enjoy!