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## Guide to Setting up a Fish Tank

### Aim / Description:

Creating a seashore “experience” for pupils using an aquarium is an exciting way of bringing the sea to life inside the classroom. Remember that taking wild animals from their natural environment (to put inside a fish tank in the classroom) should only be done for short periods of time. They must all be returned to the seashore after the class activity.

### Materials:

- A fish tank – a basic glass or tough plastic tank can be purchased from a pet shop or garden centre.
- A thermometer
- Air pump
- Air pipe
- An under-gravel filter system – (See instructions below for additional materials required and how to make an under gravel filter system).
- Stones or pebbles – can be purchased at your local pet shop
- Sea water
- A bucket / large container - for collecting clean salt water.
- Fish food – if you intend to keep the seashore species for more than a week you will need to feed them. (See instructions on Fish food and feeding).
- A small net - to remove uneaten food
- A cleaner – for cleaning the inside of the tank
- A log book and pen



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#### Your Fish Tank Explained

##### **The Challenge:**

A marine aquarium is more difficult to maintain than either a goldfish tank or tropical fresh water. This is because marine animals are used to living in a salt water environment at a particular temperature and to eating live food.

To give these animals the conditions they need to remain healthy requires a daily commitment over a period of time to ensure the tank and species are maintained. Do not set up a marine aquarium unless you can look after it.

##### **Why not set up a tank with lake or river fish instead?**

There are a couple of reasons why selecting a salt water aquarium over a fresh water aquarium is preferred.

- 1) There are very few fresh water fish native to Ireland that are small enough for a single tank.
- 2) The seashore offers many species that are small and hardy and can adapt to life in a captive environment for short period a time before they go back to the sea.

##### **The Fish Tank:**

The most basic fish tanks are simply four glass sides and a glass bottom bonded together. When selecting a tank consider:

1. The Budget: Small basic tanks, pumps and filter systems can be purchased from pet stores. Elaborate tanks maybe considered if the tank is to be kept for a long period of time. Such tanks are often more expensive.
2. Duration of Project: The length of time the fish are to be kept in the tank should be considered when determining what size tank is required.

*Note small tanks are only suitable for keeping fish for short periods of time (see the document "Fish Tank Problem Solving and Trouble Shooting" for more information).*

3. Space: Do you have room for a tank? A tank should be kept in a cool space in the room where there is not any direct sunlight and source of heat. Note that the larger the tank / volume of water the more stable the environment will be. This will make it easier to maintain the tank within the appropriate parameters of temperature, pH etc.



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#### **Salt Water:**

Saltwater aquariums can either be filled with natural seawater or made from fresh water using artificial sea salts purchased from pet shops. Although artificial water has its advantages, (e.g. it is guaranteed that no other animals or bacteria will get into the tank accidentally through contaminated seawater) it is expensive and can be difficult to make up.

The cheapest source of seawater is from the seashore. Depending on how long the tank is kept, fresh clean seawater should be collected and used to replace the water in the tank over time. As a rule - change 20-25% of the water once a month.

#### **What material to put in the bottom of the tank:**

The coarse sand or fine gravel (at the bottom of the tank) serves two main functions:

1. It serves as a hiding, feeding and resting place for your animals. Soft fine gravel or coarse sand is suitable for just about all the animals kept in the tank. For example, it allows hermit crabs to scavenge and flatfish to bury themselves in the sand etc.
2. It serves as a natural form of filtration. For filtration there needs to be as large a surface area as possible. This helps to filter the bacteria in the water and to allow particulate matter from the water column to be trapped.

Sand and gravel can be purchased from pet shops. Please be aware that permission is required from the relevant authority before removing sand from any beach.

The sand or gravel should never be thrown out. It can be recycled at the end of each project by rinsing it out in clean water.

#### **Filtration:**

Effective filtration is the key to successfully maintaining the aquarium. Filtration maintains the quality and cleanliness of the water and the health of the animals.

There are many types of filtration equipment available, all offering some or all of the basic filtration requirements. The drawbacks can include cost, maintenance, effectiveness and reliability.

Therefore, use a method of filtration which:

- a) is easy to understand and
- b) is cheap, simple, effective and reliable.

An under-gravel air filtration is often the most effective.

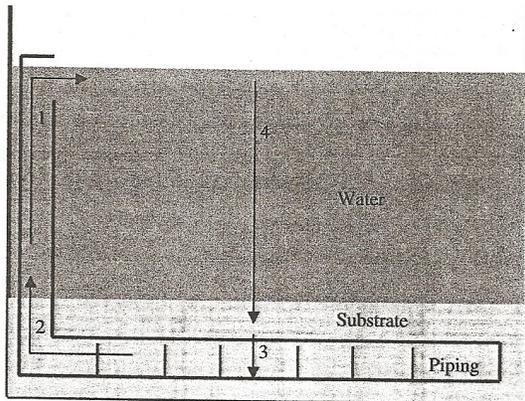
The under-gravel air filtration is powered by an air pump. This serves the dual purpose of driving the filter and oxygenating the water. The air pump is the only piece of mechanical/electrical equipment needed for the aquarium.

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A filtration system can be purchased at pet stores and are economical and very reliable. A reliable air pump should work around the clock for several years.

#### 1. How the Filtration System Works:

The under gravel filter system is a series of pipes joined together to make a rectangle shape which sits at the bottom of the tank. It has a vertical pipe attached to one end of the main pipes.



- As the air pump forces air into the vertical pipe, the air rises up the pipe, pulling water with it and forcing the water out the top of the pipe and into the tank.
- The water which is forced out of the vertical pipe by the bubbling air is replaced by water from the connected horizontal grid of pipes.
- This water is then replaced with water surrounding the pipes i.e. water in the substrate. (Water passes from the substrate to the pipes through narrow slots cut in the pipes)
- That water is in turn replaced with water from the main body of the tank, which is drawn down into the substrate.

Effectively, a “water cycle” has been created in the tank. The filter simply works by drawing dirty water down into the substrate, and pumping clean water back up the vertical pipes and back into the tank. As the water passes through the substrate, the two main stages of filtration take place:

1. Solid particles (e.g. uneaten food, debris etc) are trapped among the substrate, thus removing it from the water column, keeping the tank “clean”.
- 2) The “friendly” bacteria living on the surface of the substrate break down the contaminants such as ammonia, nitrite etc which have built up in the tank.

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Provided basic cleaning and maintenance takes place, the filter will run effectively and reliably for a long time (one year average). The beauty of this system of filtration is that it is very easy to observe if it is working – if air is bubbling out the top of the pipes, its working!

**2. Materials to make the under gravel filter system you will need:**

Plastic Connections and Plastic Piping cut as follows:



Plastic Connections:

- A & B:  
1 x t-junction  
4 x corners



Plastic Piping:

C: 2 x smaller pieces of pipe with holes cut in the bottom for the end of the tank (to fit t-junction and corners)



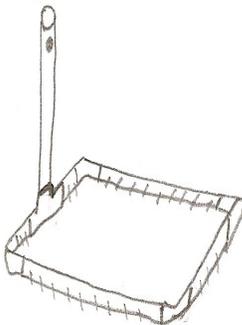
D: 1 x piece of short pipe with holes cut in the bottom (to fit the other end of tank)



E: 2 x long pieces of pipe with holes cut in the bottom for the side (length of tank)



F: 1 x piece of white with a hole drilled about 3-4 cm at one end of it.





**3. Instructions on how to make the under gravel filter system:**

**Step 1:**

- Cut the pipe into pieces to form a rectangle to fit in the bottom of your tank.
- Cuts holes into one side of the pipes C, D and E. The cuts can be about 2cm apart.
- Drill a hole in pipe F 3-4 cm from one end of it.

The hole needs to be big enough for the air pipe to go through it and should be facing down when the pipes are all connected.

**Step 2:** Push the air pipe down through the hole in the pipe F until it is about 5 cm from the end. The other end of the air pipe is to be attached to the air pump.

**Step 3:** Push pipe F into the t-junction and attach in between joining to pipes C. This pipe is to stand vertical with the drilled hole below the surface of the water. (When running the air pump, air should come out the top forming bubbles at the surface of the water).

**Step 4:** Join pipes C, D and E together using the four corner pipes to form a rectangle.

**Selecting the Animals for the tank:**

A saltwater aquarium needs to house small, hardy, non-fussy (diet-wise), seashore animals. Seashore fish and shellfish are used to small environments and can adapt readily to the rapid flux in water conditions that can occur in a small aquarium.

Suitable animals for your tank might include Common Starfish, Blenny, Butterfish, Sea Scorpion, Stickleback, young Mullet, Hermit Crab, Sea Anemones and Prawns.



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#### Looking after the animals in your tank:

Although seashore animals are hardy, there are a few things they need:

##### 1. Salt Water

To maintain a healthy tank the fish need good quality clean saltwater. Always ensure that the air pump and filter system is working, as this affects both the oxygen levels and the quality of the water. Your air pump needs to be working at all times. If the water in the tank is cloudy - something is wrong. The main causes of water contamination are due to a fish or animal that has died or uneaten food left in the tank.

##### 2. Feeding the Animals

The best type of food for the fish and animals in the tank are the animals they would feed on normally in the wild e.g. mussels for starfish, sand eels for flatfish etc.

It is vital that the class get into a good routine of feeding the fish and removing the uneaten food each day. A good idea is to feed the fish first thing each morning, and then remove uneaten food at the end of the day. Uneaten food should never be left in the tank for too long as it will decay and contaminate the tank.

**Fish Food:** Liquidise raw fresh squid with a little tap water added, pour into ice cube trays and serve frozen. Feed the animal's with one cube at a time straight from the freezer.

**Do not over feed your fish:** Over feeding will kill fish much quicker than a little bit of starvation. One squid cube three or four times a week is generally enough unless you've added a lot of new fish to the tank.

**Remove all uneaten food:** This is as important as feeding the fish. Make sure to take out uneaten food before you add fresh food to the tank, since rotting food will poison with water and reduce the amount of oxygen in it, eventually killing all the animals.

If you are feeding the starfish with fresh mussels (from the seashore – not bought) add one fresh one every week or two. Make sure to remove uneaten ones unless they are empty (the shell will be open, like one you would find on the beach).



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#### 3. Regular Water Changes

Changing **20-25%** of the water in your tank once a month will help keep it all healthy.

#### 4. Do Not Over Stock the Tank

Small tanks can only cope with a small quantity of fish. If the tank is over stocked, be prepared to feed the fish more, change the water more frequently and deal with issues.

#### 5. Avoid Certain Animals:

There are a number of animals that can not live for long periods of time in the tank environment.

- Shellfish such as limpets, clams, mussels, and oysters like flowing water and tend to die in a still water tank environment. If these die and you do not notice they can contaminate the tank.
- Animals such as shore crabs tend to bully other animals in the tank and can result in a lot of fish going missing!
- Seaweed can also cause problems as it can die and rot, taking up all the oxygen and killing the animals.



### 6. Maintaining the Tank

See the following sample time plan for maintaining the tank:

Task	Who Should Do it	Time to do
<b>Daily or every Second Day</b>		
Feed the fish	Pupils	10 mins
Clean the outside glass	Pupils	5 mins
Check that the fish are not distressed	Pupils	5 mins
<sup>1</sup> Measure the water temperature	Pupils	5 mins
Remove uneaten food/waste	Pupils	5 mins
<sup>2</sup> Fill out Log Book	Pupils	10 mins
<b>Weekly</b>		
<sup>3</sup> Clean Inside Glass of Tank	Pupil with Teacher	20 mins
<sup>4</sup> Photo/Video to record progress	Pupil with Teacher	10 mins
<b>Fortnightly / Monthly</b>		
Clean salt from light fittings, lid	Teacher	10 min
<sup>5</sup> Water change	Teacher	30 min
Check filter and air pump	Teacher with Pupils	5 min

<sup>1</sup>Measure the water temperature: This is important to ensure that the water is not too warm i.e. over 19°C. Note that there is less oxygen in warm water for the fish to breathe. This can be stressful for the fish and cause fatalities. During the summer season, it is recommended that the tank is emptied and the fish are returned to their natural environment.

<sup>2</sup> Fill out Log Book: This is a vital part of keeping animals in captivity. You should record all events such as new arrivals, deaths, unusual happenings, temperature, water changes etc.

<sup>3</sup> Clean Inside Glass of Tank: This is done to control the amount of algae (seaweed) which will grow on the inside of the tank and on any rocks or other solid objects that are in the tank. While the algae is not harmful in any way, it can quickly get out of control and make the tank look dirty and unsightly. A tip to help reduce the amount of algae is to position your tank away from direct sunlight.

<sup>4</sup> Photo/Video to record progress: This is a great way for the class to keep a visual record of the development of the tank. For example, you will be amazed when you look back at the end of the year to see how the animals have grown!

<sup>5</sup>Water change: You should change as much of the water as you can as often as you can. As a rule - change 20-25% of the water once a month.