Lesson 3

Content Section - Algae and its environment.

Part 1

The home in which algae or wildlife live is called their “habitat”.

The “habitat” of algae can be described as the home or neighbourhood that it lives in. If you visit a beach you will see that a particular variety of algae grows in the same general area.

Algae are found both in freshwater and saltwater environments. An example of a freshwater environment is a lake, pond, a river or a stream. Microalgae grow in both saltwater and freshwater. Diatoms grow in freshwater environments especially lakes or ponds. Dinoflagellates can be found growing in saltwater environments in the sea. Red, green and brown macroalgae are found growing in saltwater.

The “ecosystem” can be described as a community made up of living (algae, plants, animals, insects) and non-living organisms (rocks, tides, weather, nutrients, light). They are similar to a big community of people working together.

If there is a storm, bits of the macroalgae will be ripped and washed up on the shore so that the insects and other small animals will be able to use the macroalgae as food and shelter.

Some fish can hide among macroalgae such as the Sea Dragon.

These fish have the appearance and colour of the macroalgae. These fish try to protect themselves from being eaten by bigger fish by looking like macroalgae. Some microalgae use their shape to protect themselves from zooplankton as zooplankton like to eat microalgae. Zooplankton are tiny animals which are similar in size to microalgae.
Tides play an important part of the ecosystem of algae. The tides can be described as the movement of water over the shore or back towards the sea. The shore is divided up into different zones. The names of the three zones are called supratidal or splash, intertidal and subtidal zones.

1. **Supratidal/ Splash zone** - is the area of the beach that is usually dry unless the tide is high and then the water will splash onto the dry sand, grass or rocks.

2. **Intertidal zone** - is only wet during high tide. The intertidal zone is located between supratidal zone and the subtidal zone. When the tide is high it is covered by water and when the tide is low it is dry but not completely dry. There may be little pools of water located on the intertidal zone in low tide.

3. **Subtidal zone** - means underneath the tide. This area is always covered in water but when there is low tide the amount of water may be shallow.

**Supratidal or Splash Zone** Very few types of macroalgae grow here as the weather conditions are unsuitable. On a warm day when the tide is low the sun will dry up the available water on the sand leaving salty conditions. These conditions are very difficult for many algae to grow in so they prefer to find a habitat that is more suitable for them. Macroalgae will grow on rocks or small boulders as they use their holdfast to attach themselves to the rocks. Some microalgae can be found growing in thin layers on the sand.

**The Intertidal zone** is a prefect habitat for many types of macroalgae. If the waves are strong they will wash some macroalgae up on the higher part of the intertidal zone towards the splash zone. There is more sunlight on the intertidal zone than the subtidal zone and just enough water for macroalgae to live here. Species that are found here can survive changes in temperature when they are uncovered by water. When the tide is high the water provides the algae with nutrients, carbon dioxide (CO₂) and oxygen produced by the waves. They are able to find shelter from rocks. Some brown algae live in the intertidal zone, species such as Ascophyllum nodosum, Fucus vesiculosus and Fucus serratus live here. Green macroalgae such as Ulva intestinalis and Ulva lactuca can also be found in the intertidal zone.

**The Subtidal zone** is always covered by water. Some macroalgae that have their habitat in the subtidal zone are big and strong and these are commonly called the “kelps”. The kelps are brown macroalgae and they have long flexible stipes that bend easily. They are robust enough so that only strong waves break them such as during storms. The kelps provide shelter and food for animals. Other macroalgae that can be found living in the subtidal zone are the red macroalgae.
Examples of brown kelp species that live in the subtidal zone are called *Laminaria digitata* and *Saccharina latissima*. Red macroalgae that live in the subtidal zone are *Chondrus crispus*, *Palmaria palmata* and *Phymatolithon calcareum* (Maerl). If you discover some macroalgae along the shore take a look underneath and you will probably notice marine life such as snails or insects. Macroalgae that has been washed onto the shore after storms provide food, warmth, moisture and shelter for the marine life. When macroalgae are washed up on the beach they rot and their nutrients are washed back into the sea or sand.

**Microalgae** can be washed into the shore and provide food for certain marine life that live in the intertidal zone called “filter feeders”. A few examples of other marine life that live on the rocky shore are shown below.

**Barnacles**

Barnacles live in the intertidal zone. They eat microalgae. When a wave washes past them they use their feathery legs to catch the microalgae. They act like a sieve or a filter as they are only interested in eating microalgae. This is why they are called “filter feeders”. They are often found attached to hard surfaces such as rocks or boats.

**Mussels**

Mussels are found on the intertidal zone. They can appear black, blue or brown. They live on microalgae as they are filter feeders. Mussels are usually found attached to a hard surface such as boats or rocks. Sometimes mussels will eat the microalgae called dinoflagellates. Dinoflagellates may contain toxins and the mussels may cause food poisoning to humans. Mussels are known as “bi-valves” this means they have two shells.
Snails

Gastropods are also known as snails or slugs. Gastropods without a shell are usually known as slugs. Snails can be described as any species with a tough external shell. Snails have a variety of habitats. Some live in gardens, mountains, lakes, the intertidal zone and some are found in the subtidal zone. Some marine gastropods are herbivores as they eat macroalgae from rocks. The snails that live in the marine environment can be eaten and these include species such as abalones, periwinkles and whelks. Gastropods have habitats all over the world from the cold to tropical environments. The gastropods only have one foot. When snails sense danger they go back into their shell. They are sometimes called “uni-valve”. This means they have one shell.

Crabs

There are many varieties of crabs and they vary in size, shape and colour. They have a tough outer exoskeleton which they use to protect themselves against predators. Crabs live in the subtidal zone and are sometimes found in the rocky intertidal zone. Crabs move quickly by walking or running and they are strong swimmers. Depending on the species they feed on microalgae, dead fish, worms and mussels. Crabs work together to provide food and shelter for their family. Crabs can be described as “decapods”. This means they have ten legs. Their first two legs at the front are known as claws. Humans must be careful when they are eating crabs as the microalgae that the crabs eat may be poisonous to humans.
Lesson 3–Part 2-Algae and its environment.

Food Chains

Do you ever wonder where your food comes from? A food chain is the transfer of energy through food from one organism to the next. Food chains begin by getting their energy from the sun. Algae and plants make their energy from the sun. This is called photosynthesis. This is the first stage of a food chain.

An example of a food chain is when macroalgae get their nutrients from the water and the energy and food from the sun. The sea snail gets their energy from macroalgae by eating the macroalgae. A fish eats the sea snail and the fish eventually dies. The nutrients from the fish are returned to the sea to help macroalgae and microalgae grow. The transfer of energy from one organism to the next can be shown by the use of arrows. The arrow must be directed towards the organism that is receiving the energy.

The food chain is really a continuous cycle. In the above picture this shows an example of a food chain.
The Food Web.

A food web is a connection of food chains. Below is an image of a food web. At the bottom of the image are microalgae and macroalgae. These organisms make energy from the sun and transfer the energy to other organisms.

Algae are examples of “Autotrophs” or “Producers”. These are organisms that use energy from the sun to produce the food for the rest of the consumers within the food chain.

A human or an animal are examples of “heterotrophs” or “consumers”. These are unable to make their own food and must obtain it from other-organisms. The consumers usually obtain their energy from “producers” such as algae or plants.

Another example is a cow which eats grass in the field. Where does the grass get its’ energy from? The grass must produce the energy for the cow. The cow is the consumer as it eats the grass. The grass is the producer as it produces the energy from the sun. The grass produces the energy and the cow is a consumer.

There are five types of consumers.

Herbivore - These are animals that get their energy from plants.
Carnivore - These are animals that get their energy by eating other animals by eating meat.
Omnivore - These are animals that get their energy by eating both plants and animals.
Decomposer - These are organisms such as bacteria that breakdown dead or dying organisms and return nutrients back to the producer.
Detritivore - These are animals that feed on dead or decaying organic matter, such as the insects that feed on decaying kelp at the top of the shore.

Some carnivores may also be described as a predator. A predator is an animal which may hunt and eat another animal for its energy. An example: shark is a predator that hunts fish. The fish is the prey.

The food chain and the food web show how all life is linked and how all life depends on each other.
As you can see both in the food chain and food web macroalgae and microalgae are important as they are the producers of energy and they give energy to the animals or creatures that eat algae.
This lesson is divided into two parts. Part 1 deals with habitat, ecosystem, life on the shore. Part 2 deals with Food Chains and Food Webs.

Part 1

**Brief summary**

**Aim:** To learn about the environment of algae by describing where algae live and to introduce the zones of the seashore.

The "habitat" of macroalgae and microalgae is a saltwater environment such as the sea or a freshwater environments such as lakes, ponds or rivers. The habitat of an organism is its' home and its' neighbourhood.

The "ecosystem" can be used to describe the environment and a community of organisms which live together. The ecosystem comprises of the natural environment surrounding the algae such as water, tides, weather, sand, trees and rocks. The algae may provide food and shelter for the animals and marine life. Another way to describe the ecosystem is nature working together as a big community.

The tides play an important role in habitat of algae along the shore. The tides are shown by water travelling over and back across the shore. The shore is divided into three different zones. They are called the "Supratidal/ Splash", "Intertidal" and "Subtidal" zone.

The **Supratidal zone** is usually dry and sandy or rocky. Sometimes it receives a gentle spray of water from the sea. It is difficult for algae to grow here.

The **Intertidal zone** is the area where there are a wide variety of algae and marine life found. This is the area of the shore where it is covered with water when the tide is high. When the tide is low tiny pools of water may be found on the sand and rocks. This is ideal for algae and other marine life as they never dry out from the sun.

BioMara gratefully acknowledges the following funders:
Sometimes the waves are very strong in the intertidal zone and the macroalgae get ripped off and cast upon the shore. Usually macroalgae that are gentle in texture such as the *Ulva* species are found high in the intertidal zone. *Fucus serratus, Fucus vesiculosus* and *Ascophyllum nosodum* species are strong in texture. These species can tolerate the strong waves lower in the intertidal zone. Sometimes macroalgae that live in the subtidal zone can be found ripped by strong waves and washed up into the intertidal zone.

**The Subtidal zone** is constantly covered by water even in low tide. The macroalgae found here are usually strong and able to withstand most waves, except during rough storms. The large and strong macroalgae are known as “Kelp”. The kelp species include *Laminaria digitata* and *Saccharina latissima*. Red macroalgae and microalgae also live in this zone. Microalgae live in the subtidal zone but some species can be found on the splash zone.

Most marine animals live in the intertidal and the subtidal zone. They can hide behind stones or underneath macroalgae from other marine animals who want to eat them. They also use algae as their food.

**Part 2**

**Brief summary**

**Aim:** To learn about the important role that algae plays in both the Food Chain and Food Web.

All food originally receives their energy from the sun. At the start of the food chain producer/autotrophs such as algae or plants make their own energy from the sun and the producer passes the energy onto another animal that feeds from the algae or plant. The food chain is a series of stages where one organism passes energy onto another organism. In the marine environment algae uses the sun to produce energy. If a snail or zooplankton eats the algae then energy is passed from the algae source. The energy will travel to other marine animals.

Food webs are a series of interconnected food chains. The food web is like the food chain as all energy originates from the producers. One organism may provide energy for various other organisms in the food web. Zooplankton and mussels may obtain their energy from microalgae. Zooplankton and mussels may be described as consumers. Consumers are organisms that are unable to make their own energy and consume energy from other sources. There are five different types of consumer which are classified as Herbivores, Carnivores, Omnivores, Decomposers and Detritivores.
Learning Outcomes:
► Explain the habitat of algae.
► Describe and illustrate the different zones of the shore.
► Describe where different species of macroalgae are located on the shore.

Introduction:
Encourage the pupils to describe their environment by initially describing their house and their family and comparing this to a habitat.
Allow the pupils to describe their food, environment, weather, friends and school and compare this to a natural ecosystem.
Compare the pupils environment to that of algae.
Ask the pupils to give a description of the habitat of the algae.
Discuss the ecosystem of algae mentioning the weather, tides, rocks and marine animals.
Describe the three zones on the shore and briefly explain the difference between low tide and high tide on the shore.
Discuss the different animals and algae that live on different parts of the shore.

Activities:
Activity 1—Locate the images of algae and marine creatures where you think you may find them on the shore.

Activity 2—Pretend you are a macroalgae on the intertidal zone. Write a short account about your experience.

Activity 3—What am I? Based on marine life living on the shore.

Questions

Final Activity:
► Teacher will revise the main learning points.
► Encourage the pupils to draw the zones of the beach and ask them to describe what is found within the area and why.
► Ask the pupils to write one sentence to describe the habitat of any macroalgae species.
► Ask the pupils to draw the three different zones and include one macroalgae in the intertidal zone and one macroalgae in the subtidal zone.
If necessary put key words up on the board.

Vocabulary: habitat, ecosystem, tides, supratidal, intertidal, and subtidal.
Learning Outcomes:
► Explain the importance of algae in the food chain.
► Design a food chain and a food web.
► Explain the associated vocabulary with food chains.

Introduction:
Introduce food chains by asking the class about the origin of the food they eat. You could ask the pupils such questions as:
Where does the shop get the milk?
Where does the farmer get the milk?
How does the cow get the energy to produce the milk?
Where does the grass get the energy?
Briefly explain the vocabulary associated with food chains.
Explain the difference between a food web and food chain.

Activities:
Activity 1 - Design your own Food Chain and Food Webs.
Pupils can work either on their own or with the teacher by completing this activity.

Activity 2 - Unscramble the words.

Questions

Final activity:
Revise learning outcomes.
► Teacher will get each pupil to give an example of a food chain using the correct vocabulary.
► Ask the pupils to draw/design their own food chain/food web but with the food that they are familiar with.
► Ask what would happen if algae was removed from the food chain?
► Write a list of vocabulary associated with food chains/food webs on the board. Ask the pupils to explain each word.

State the importance of the autotroph (the algae source) at the beginning of the food chain or food web. If possible link this fact back to photosynthesis. Ask pupils where the algae and plants gets their energy (See Lesson 2).

Vocabulary: food chain, food web, herbivore, carnivore, omnivore, decomposer, predator, producer and consumer.
### Curriculum Links

**Scotland Curriculum for Excellence**

<table>
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<tr>
<th>Level 1</th>
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<tbody>
<tr>
<td><strong>Literacy and English</strong>&lt;br&gt;Listening and Talking&lt;br&gt;Finding and using information</td>
<td>As I listen or watch, I can identify and discuss the purpose, key words and main ideas of the text, and use this information for a specific purpose. <strong>LIT 1-04a</strong></td>
</tr>
<tr>
<td><strong>Reading</strong>&lt;br&gt;Finding and using information</td>
<td>Using what I know about the features of different types of texts, I can find, select, sort and use information for a specific purpose. <strong>LIT 1-14</strong></td>
</tr>
<tr>
<td><strong>Writing</strong>&lt;br&gt;Tools for writing&lt;br&gt;Finding and using information</td>
<td>I can spell the most commonly-used words, using my knowledge of letter patterns and spelling rules and use resources to help me spell tricky or unfamiliar words. <strong>LIT 1-21a</strong></td>
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| **Sciences**<br>Planet Earth<br>Biodiversity and interdependence | I can explore examples of food chains and and show an appreciation of how animals and plants depend on each other for food. **SCN 1-02a** |

<table>
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<tr>
<th>Level 2</th>
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<tbody>
<tr>
<td><strong>Literacy and English</strong>&lt;br&gt;Listening and Talking&lt;br&gt;Finding and using information</td>
<td>As I listen or watch, I can identify and discuss the purpose, main ideas and supporting detail contained within the text, and use this information for different purposes. <strong>LIT 2-04a</strong></td>
</tr>
<tr>
<td><strong>Reading</strong>&lt;br&gt;Finding and using information</td>
<td>Using what I know about the features of different types of texts, I can find, select and sort information from a variety of sources and use this for different purposes. <strong>LIT 2-14a</strong></td>
</tr>
<tr>
<td><strong>Writing</strong>&lt;br&gt;Tools for writing</td>
<td>I can spell most of the words I need to communicate, using spelling rules, specialist vocabulary, self-correction techniques and a range of resources. <strong>LIT 2-21a</strong></td>
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| **Sciences**<br>Planet Earth<br>Biodiversity and interdependence | I can use my knowledge of the interactions and energy flow between plants and animals in ecosystems, food chains and webs. I have contributed to the design or conservation of a wildlife area. **SCN 2-02a** |

**Skills:** Observe, sort, inquiry and use investigate.
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### First Class, Second Class

**English**
- Oral Language,
- Competence and confidence
- Reading, Competence and confidence in using language

- Ask questions that will satisfy his/her curiosity and wonder.
- Perform simple information retrieval tasks.

**Social Environmental and Scientific Education (SESE)**
- **Science**
  - Environmental awareness and care, Caring for my locality

**Geography**
- Environmental awareness and care, Caring for my locality

- Observe and develop an awareness of living things in a range of habitats in local and wider environments.
- Observe similarities and differences among plants and animals in different local habitats.

### Third Class, Fourth Class, Fifth Class

**English**
- **Fifth Class**
  - Oral Language,
  - Developing cognitive abilities through oral language

**Third Class, Fourth Class**
- Oral Language,
- Competence and confidence in using language

- Discuss issues of major concern.
- Summarise and prioritise ideas.

**Social Environmental and Scientific Education (SESE)**
- **Science**
  - Fifth Class
    - Living things, Plant and animal life,
    - Variety and characteristics of living things

**Third Class, Fourth Class**
- Living things, Plant and animal life,
- Variety and characteristics of living things

**Geography**
- **Fifth Class**
  - Natural environments,
  - The local natural environment

**Third Class, Fourth Class**
- Natural environments,
- The local natural environment

- Observe, identify and investigate the animals that live in local environments.
- Discuss simple food chains.
- Investigate the influence of these features on plants and on the lives of animals and people.
- Observe and explore ways in which these features have affected the lives of plants, animals and humans.

**Skills:** Recall facts and definitions, record present findings and conclusions.
### Northern Ireland

**Council for Curriculum Examination and Assessment (CCEA)**

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<thead>
<tr>
<th><strong>Language and Literacy</strong></th>
<th><strong>Key Stage 1</strong></th>
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<tbody>
<tr>
<td>Talking and listening</td>
<td>Present ideas and information with some structure and sequence.</td>
</tr>
<tr>
<td>Reading</td>
<td>Begin to locate, select and use texts for specific purposes.</td>
</tr>
<tr>
<td>Writing</td>
<td>Understand and use a range of vocabulary.</td>
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<tr>
<th><strong>The World Around Us</strong></th>
<th><strong>Key Stage 1</strong></th>
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<tbody>
<tr>
<td>Interdependence</td>
<td>How plants and animals rely on each other within the natural world.</td>
</tr>
<tr>
<td>Place</td>
<td>Ways in which living things depend on and adapt to their environment.</td>
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<tr>
<th><strong>Language and Literacy</strong></th>
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<tr>
<td>Talking and listening</td>
<td>Identify and ask appropriate questions to seek information, views and feelings.</td>
</tr>
<tr>
<td>Reading</td>
<td>Use a range of cross-checking strategies to read unfamiliar words in texts.</td>
</tr>
<tr>
<td>Writing</td>
<td>Uses a variety of skills to spell words correctly.</td>
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<td>Ways in which people, plants and animals depend on features and materials in places and how they adapt to their environment.</td>
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</table>

**Skills:** Thinking, problem solving, working with others and managing information.
Activity 1-
Locate the images of algae and marine creatures where you think you may find them on the shore.

Draw a diagram of a shore separated in supratidal zone, intertidal zone and subtidal zone. You may draw this on the board or a large sheet of paper.

The teacher or pupils may divide the shore into three zones. You may use the seashore zone image as a guideline.

The teacher will remove by cutting the individual images on page 47 and asking the pupils to place the images of macroalgae, microalgae and marine life where they think they should be located along the shore.

You may wish to use additional large images located at the back of the teaching materials to ask pupils where these marine life live.

These additional images may include:
- Fucus serratus (Serrated wrack),
- Ulva intestinalis (Gutweed),
- Diatom (microalgae),
- Dinoflagellate (microalgae),
- Barnacles.

These images may be found in the photograph section.

A quick hint for the pupils is that strong macroalgae live where they can withstand robust waves. Macroalgae that have a gentle texture like to live where the waves are gentle. Marine creatures need algae to survive.

The Fucus species live together on the same zone.
Lesson Three

Sea lettuce
(Ulva lactuca)

Bladder wrack
(Fucus vesiculosus)

Knotted wrack
(Ascophyllum nodosum)

Sea Belt
(Saccharina latissima)

Dulse
(Palmaria palmata)

Oarweed
(Laminaria digitata)

Carrageen Moss
(Chondrus crispus)

Perwinkes
Gastropods/Snails

Maerl

Crabs

Mussels

Microalgae
Activity 2- Name ________________________________

Pretend you live as a marine creature on the intertidal zone.
Write a short account about your experience.
Comment on the weather, tides, what you eat, your friends that live in the intertidal zone and subtidal zone and the possible predators.
Activity 3- Name

What am I?

Based on marine life living on the shore. (Lesson 3, part1)
These marine life are describing their habitats.
Can you guess what they are? You may find information from Lesson 1 and Lesson 3 and also in the Macroalgae Identification section.

1. I live in the intertidal zone.
   I am a macroalgae.
   I live with Ascophyllum nosodum and Fucus vesiculosus.
   I have a jagged edge to my frond.
   What am I?

2. I live in the subtidal zone.
   I am a red macroalgae.
   I am unlike other macroalgae as I have a tough crust.
   I am very small in size.
   What am I?

3. I live in the subtidal zone.
   I am a macroalgae.
   I have a yellowish-brownish colour.
   I have a wavy crinkly body and I am very tall.
   What am I?

4. I live in the intertidal zone and the subtidal zone.
   My diet consists of microalgae and snails.
   Sometimes humans eat me.
   I have ten legs.
   What am I?
Based on marine life living on the shore. (Lesson 3, part 1)

These marine life are describing their habitats. Can you guess what they are? You may find information from Lesson 1 and Lesson 3 and also in the Macroalgae Identification section.

Questions:

1. Describe your own habitat?

2. What is an ecosystem and how do algae benefit from it?

3. What are the names of the different zones of the shore?

4. Name some of the marine life and macroalgae living on the shore?

5. What would happen if the weather conditions became stormy and how would it effect the marine life?
Activity 1-Answer:

Here is a list of macroalgae and sea creatures which you may find on the shore. Draw a diagram of a shore separated in supratidal zone, intertidal zone and subtidal zone. Place the macroalgae and marine creatures where you think they should be located in the diagram.

(Some marine animals and algae live in two different zones.)

Barnacles = Intertidal and Subtidal
Mussels = Intertidal and Subtidal
Gastropods/Snails = Intertidal and Subtidal
Crabs = Intertidal and Subtidal
Chondrus crispus (Carrageen Moss) = Subtidal
Palmaria palmata (Dulse) = Subtidal
Laminaria digitata (Oarweed/ Kelp) = Subtidal
Ulva lactuca (Sea lettuce) = Intertidal attached to rocks
Ulva intestinalis (Gutweed) = Intertidal
Ascophyllum nodosum (Knotted wrack) = Intertidal
Phymatolithion calcareum (Maerl) = Subtidal
Saccharina latissima (Sea Belt/ Kelp) = Subtidal
Fucus vesiculosus (Bladder wrack) = Intertidal
Fucus serratus (Serrated wrack) = Intertidal
Microalgae = Subtidal
(Lesson 3, part 1)

Activity 2- Answer: Try to encourage pupils to comment on all aspects of the life as sea creature living in the intertidal zone. This activity will show their understanding and creativity. Their answer should include such factors as the environment, the weather conditions, the variety of macroalgae they see on the shore, their diet and the possible effects of humans.

Activity 3- What am I? - Based on marine life living on the shore.

These marine life are describing their habitats. Can you guess what they are? You may find information from Lesson 1 and Lesson 3.

1. I live in the intertidal zone.
   I am a macroalgae.
   I live with Ascophyllum nosodum and Fucus vesiculosus.
   I have a jagged edge to my frond.
   What am I?  
   \[ Fucus serratus \]

2. I live in the subtidal zone.
   I am a red macroalgae.
   I am unlike other macroalgae as I have a tough crust.
   I am very small in size.
   What am I?  
   \[ Maerl \]

3. I live in the subtidal zone.
   I am a macroalgae.
   I have a yellowish-brownish colour.
   I have a wavy crinkly body and I am very tall.
   What am I?  
   \[ Saccharina latissima \]

4. I live in the intertidal zone and the subtidal zone.
   My diet consists of microalgae and snails.
   Sometimes humans eat me.
   I have ten legs.
   What am I?  
   \[ Crab \]
Questions
(Questions on part 1)

1. Describe your own habitat?
   **Answer:** Pupils should describe their habitat by including where they live, their home, their family members, their basic needs to survive such as food. Small groups of the same population live in a habitat. For example a species of *Laminaria* live in the same habitat.

2. What is an ecosystem and how do algae benefit from it?
   **Answers:** Pupils may describe their ecosystem, how they live in a similar environment with new people, different cultures, experiencing similar activities, similar food and adapting to change for example weather conditions. The pupils may also describe the ecosystem of algae. The relevance of this would be that different animals, algae and plants can live in the same ecosystem with living things (plants and animals) and they need to be dependant and able to adapt to non-living things (weather, nutrients, soil). Algae are able to survive in this ecosystem as the living and non-living parts of their ecosystem are adequate for their survival.

3. What are the names of the different zones of the shore?
   **Answer:** Supratidal zone, Intertidal zone and Subtidal zone.

4. Name some of the marine life and macroalgae living on the shore?
   **Answer:** *Ulva intestinalis* (Gutweed), *Ulva lactuca* (Sea lettuce), *Fucus vesiculosus* (Bladder wrack), *Ascophyllum nodosum* (Knotted wrack), Crabs, Snails and Mussel.

5. What would happen if the weather conditions became stormy and how would it effect the marine life?
   **Answer:** If there was a storm at sea the macroalgae might be ripped and washed up onto the intertidal zone. This would be good for the marine life as they could get shelter or food from the washed up macroalgae.
Lesson Three, Teachers pack Page 57

Polar Bear
Shark
Fox
People
Grass
Penguin
Kril
Whale
Salmon
Sprats
Lesson 3 - Part 2

Activity 1 -
Design your own Food Chain and Food Webs.

The teacher will cut the picture cards on page 55 and page 57 the pupils will first design a food chain. The pupils will then design a food web using the cards. They should be able to identify from the food chain or food web possible herbivores, carnivores, omnivores, decomposers, predators and producers. The pupils should be able to talk about the role of the autotroph/ producer (example grass, macroalgae and microalgae).

1. **Food Chains** - From the images of algae/ plants and animals below, design your own food chain.

2. **Food Web** - From the images of algae/ plants and animals below, design your own food web.

3. **From the images**, identify if the following are herbivores (H), carnivores (C), omnivores (O), decomposers (D), predators (Pt) or producer (Pc).

4. **State the importance of the autotroph/ producer at the beginning of the food chain or food web. If possible link this fact back to photosynthesis. Ask pupils where the plant gets its energy from** (See Lesson 2).
Unscramble the words.

Unscramble the words in box A and draw a line to match the words in box B. Spell the words properly on the lines provided.

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. duoppsec</td>
<td>Producers</td>
</tr>
<tr>
<td>2. tooratspuh</td>
<td>Decomposers</td>
</tr>
<tr>
<td>3. mcssuoren</td>
<td>Herbivores</td>
</tr>
<tr>
<td>4. stteepohrro</td>
<td>Heterotrophs</td>
</tr>
<tr>
<td>5. raicvseron</td>
<td>Carnivores</td>
</tr>
<tr>
<td>6. rvroheebsi</td>
<td>Consumers</td>
</tr>
<tr>
<td>7. oovesminr</td>
<td>Autotrophs</td>
</tr>
<tr>
<td>8. poosscdeemr</td>
<td>Omnivores</td>
</tr>
</tbody>
</table>
Activity 1 - Design your own Food Chain and Food Webs.
(Lesson 3, part 2)

Autotrophs or Producers are organisms that produce their own energy from the sun. Examples of autotrophs/producers are microalgae, macroalgae and grass. These produce energy to pass on to the organism that eats the producer.

Herbivores (H), Carnivores (C), Omnivores (O), Decomposers (D), Predators (Pt) or Producer (Pc).

Microalgae (Pc)  
Mussel (H)  
Crab (O)  
Abalone (H)  
Cow (H)  
Polar Bear (C), (Pt)  
Big Fish (Salmon) (C)

Macroalgae (Pc)  
Snail (Pc)  
Rabbit (H)  
Zooplankton (H)  
Sea otter (C)  
Polar Bear (C), (Pt)  
Shark (C), (Pt)  
Small Fish (Sprats) (O)

Fox (O), (Pt)  
Human (O)  
Grass (Pc)  
Penguin (C)  
Krill (O)  
Whale (C), (Pt)

Examples:

**Land Food Chain**

Grass → Rabbit → Fox  
(Pc) → (H) → (O)

**Land Food Web**

Grass  
Rabbit → Fox  
Cow → Human

**Marine Food Chain**

Microalgae → Krill → Sprat → Salmon → Human  
(Pc) → (O) → (O) → (C) → (O)

**Marine Food Web**

Microalgae  
Zooplankton → Crabs  
Krill  
Sprat → Salmon  
Polar Bear  
Humans
<table>
<thead>
<tr>
<th>Questions</th>
<th>Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Give an example of a producer and a consumer in the food chains?</td>
<td></td>
</tr>
<tr>
<td>2. What is an autotroph? Give an example.</td>
<td></td>
</tr>
<tr>
<td>3. What is a heterotroph? Give an example.</td>
<td></td>
</tr>
<tr>
<td>4. What is a carnivore? Give an example.</td>
<td></td>
</tr>
<tr>
<td>5. What is an omnivore? Give an example</td>
<td></td>
</tr>
<tr>
<td>6. How does a decomposer contribute to the food chain?</td>
<td></td>
</tr>
<tr>
<td>7. What is the difference between a food chain and a food web?</td>
<td></td>
</tr>
<tr>
<td>8. Can you think of an example of a predator and its prey?</td>
<td></td>
</tr>
<tr>
<td>9. What would happen if the macroalgae and microalgae was removed from the food web?</td>
<td></td>
</tr>
<tr>
<td>10. Draw a food chain and explain in your own words how energy is transferred from one organism to the next.</td>
<td></td>
</tr>
</tbody>
</table>
Possible examples of answers are listed below:

*Microalgae makes energy from the sun.*

*Macroalgae makes energy from the sun.*

*Mussel eats Microalgae and Zooplankton.*

*Snail eats Microalgae, Macroalgae and Zooplankton.*

*Crab eats Zooplankton, Mussel and Snail.*

*Rabbit eats Grass.*

*Abalone eats Macroalgae and Microalgae.*

*Zooplankton eats Microalgae.*

*Cow eats Grass.*

*Sea Otter eats Snail, Crab, Mussel, Sprat and Abalone.*

*Polar Bear eats Big Fish (Salmon), Small Fish (Sprat), Whales and Fox.*

(They don’t eat penguins as Penguins live in the Antarctic and Polar Bears live in the Arctic. Polar Bear do not eat Sea Otters as the Sea Otters do not live in Arctic conditions.)

*Shark (Basking Sharks) eats Big Fish (Salmon) Small Fish (Sprat), Zooplankton, Whales, Snail, Krill and Penguin.*

*Fox eats Rabbit, Big Fish (Salmon) and Small Fish (Sprat).*

*Human eats Mussel, Crab, Rabbit, Abalone, Big Fish (Salmon) and Small Fish (Sprat).*

*Grass makes energy from the sun.*

*Penguin eats Small Fish (Sprat) and Big Fish (Salmon).*

*Krill eats Zooplankton and Microalgae.*

*Whales eats Krill, Big Fish (Salmon), Small Fish (Sprat), Penguin and Zooplankton.*

*Big Fish (Salmon) eats Crab, Snail, Zooplankton, Small Fish (Sprat) and Krill.*

*Small Fish (Sprats) eats Zooplankton and Krill.*

**Activity 2. Unscramble the words.**

Questions on part 2

1. Give an example of a producer and a consumer in the food chains?
   Answer: A producer is a plant that makes energy from the sun through photosynthesis. An example is macroalgae or grass. Consumers can be divided into herbivores, carnivores and omnivores. Consumers can get their energy from other consumers. Examples are rabbits, lions, humans.

2. What is an autotroph? Give an example.
   Answer: An autotroph is an organism that uses the sunlight to make energy. An example is macroalgae, microalgae and grass.

3. What is a heterotroph? Give an example.
   Answer: Heterotrophs organisms gain their energy from autotrophs. They can not make their own energy. They are consumers. Examples are fish, deer, mice, cows.

4. What is a carnivore? Give an example.
   Answer: Carnivores are organisms that gain their energy from other consumers. They can be classified as consumers. They can be classified as meat eaters. Examples of carnivores are lions, tigers, bears.

5. What is an omnivore? Give an example
   Answer: Omnivores are consumers. They gain their energy by both eating plants and animals. Examples of omnivores are humans (except vegetarians), bears, dogs.

6. How does a decomposer contribute to the food chain?
   Answer: Decomposers are bacteria and fungi that help to break down dead or dying animals or plants. They return the nutrients back to the autotroph/ producers.

7. What is the difference between a food chain and a food web?
   Answer: A food chain is a simple chain starting with the autotroph (plant) and comprising of many consumers which pass energy from the autotroph until the end of the chain. A food web comprises of many single food chains interweaved through each other.

8. Can you think of an example of a predator and its prey?
   Answer: A dog – predator and a rabbit – prey.
   A cat – predator and a mouse – prey.

9. What would happen if the macroalgae and microalgae was removed from the Food Web?
   Answer: Algae is a producer so if algae were removed there would not be any food/ energy produced for a consumer to use.

10. Draw a food chain and explain in your own words how energy is transferred from one organism to the next.
    Answer: The food chain must begin with a producer/ autotroph such as grass, microalgae or macroalgae. The producer uses the sun to make energy. Another organisms gains energy from the producer and passes it on. The direction of the arrows are also important.
Seashore Zones

Shore at high tide
- *Pelvetia canaliculata*
- *Ascophyllum nosodum*
- *Fucus vesiculosus*
- *Fucus serratus*
- *Chondrus crispus*
- *Saccharina latissima*
- *Himanthalia elongata*
- *Palmaria palmata*
- *Laminaria digitata*
- *Maerl* (bed of maerl)

Splash/ supratidal zone

Intertidal Zone

Subtidal Zone

Shore at low tide
- *Pelvetia canaliculata*
- *Ascophyllum nosodum*
- *Fucus vesiculosus*
- *Fucus serratus*
- *Chondrus crispus*
- *Saccharina latissima*
- *Himanthalia elongata*
- *Palmaria palmata*
- *Laminaria digitata*
- *Maerl* (bed of maerl)

Low Tide
Snail eats macroalgae

Fish decomposes and add nutrients to the sea

Macroalgae uses these nutrients

Fish eats sea snail
Fish eats crab, snail, microalgae and zooplankton

Snail eats macroalgae, microalgae and zooplankton

Microalgae

Zooplankton and small crustaceans eat microalgae, macroalgae and dead macroalgae

Zooplankton and small crustaceans eat microalgae, macroalgae and dead macroalgae

Bird eats flies and fish

Flies eat dead macroalgae

Dead Macroalgae

Crab eats snails, zooplankton and small Crustaceans

Crab

Fish eats crab, snail, microalgae and zooplankton

Fish

Humans eat fish, crab, macroalgae and snails

Humans

Bird eats flies and fish

Flies

Snail

Snail eats macroalgae, microalgae and zooplankton

Macroalgae