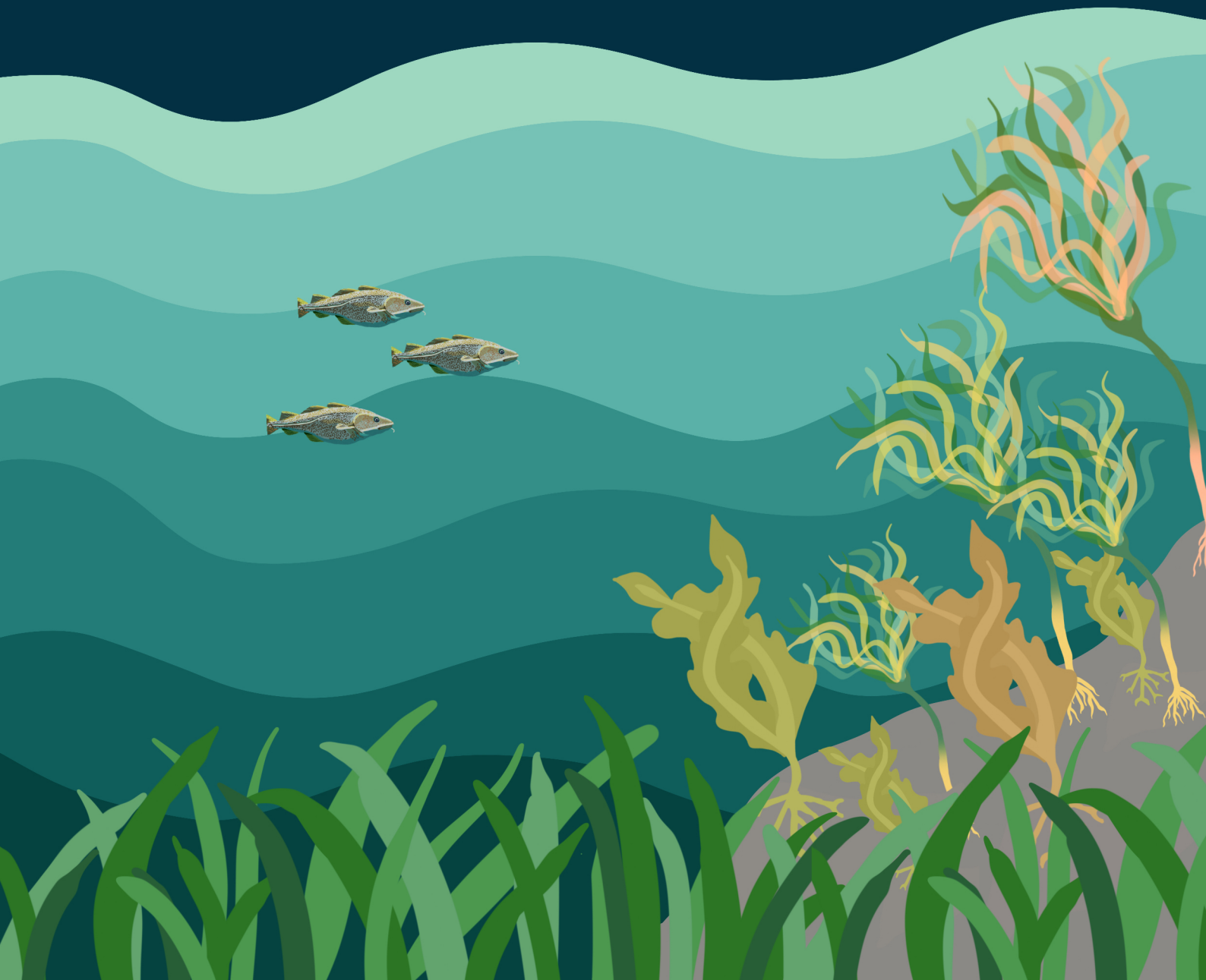
PROJECT SEAGRASS

PLANT ANATOMY
ACTIVITY GUIDE
AGES 11-14



OVERVIEW

This activity guide introduces the topic of plant anatomy. Within are two activities: firstly, a quick plant identification activity and secondly, a guide to using food colouring to understand a plant's vascular system and processes such as transpiration.

KEY INFORMATION

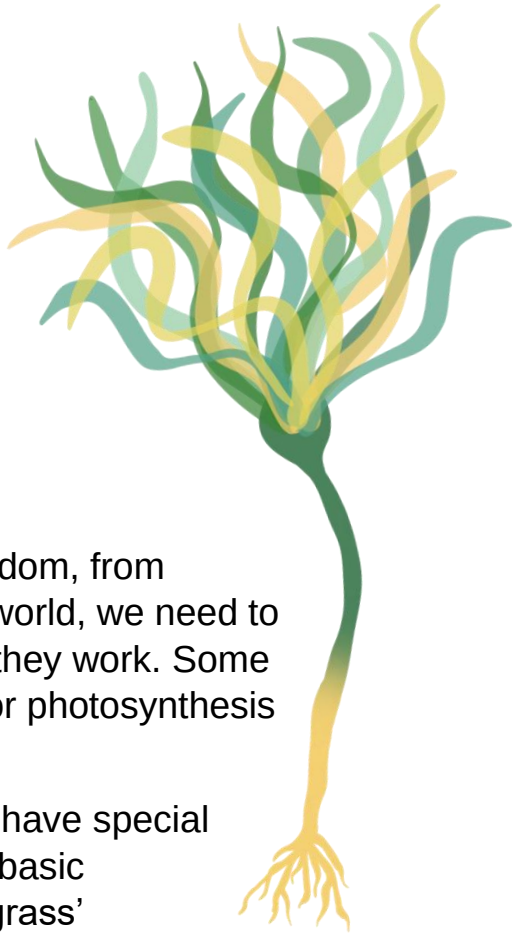
- Indoor and outdoor activity
- Individual and group activity
- Time – 1 hours (return next day for results)
- Teacher presentation, practical, workbook

- **Lesson Objective:** how are water and nutrients moved around the plant?
- **Curriculum Links:** Science

LEARNING TIPS

This 'Plant anatomy' guide can be used alongside Project Seagrass activities in the '**Photosynthesis**' and '**Reproduction**' guides.

UK seagrass flowers between June and August!



INTRODUCTION

There is a huge amount of diversity in the plant kingdom, from cactuses to vines to seagrass. To understand their world, we need to first understand their different 'body parts' and how they work. Some parts of the plant collect water, others take in light for photosynthesis or attract insects for pollination.

Thankfully, plants in the sea are really similar! They have special adaptations to deal with life under the sea, but their basic structure is the same as plants on land. In fact, seagrass' closest relatives are lilies!

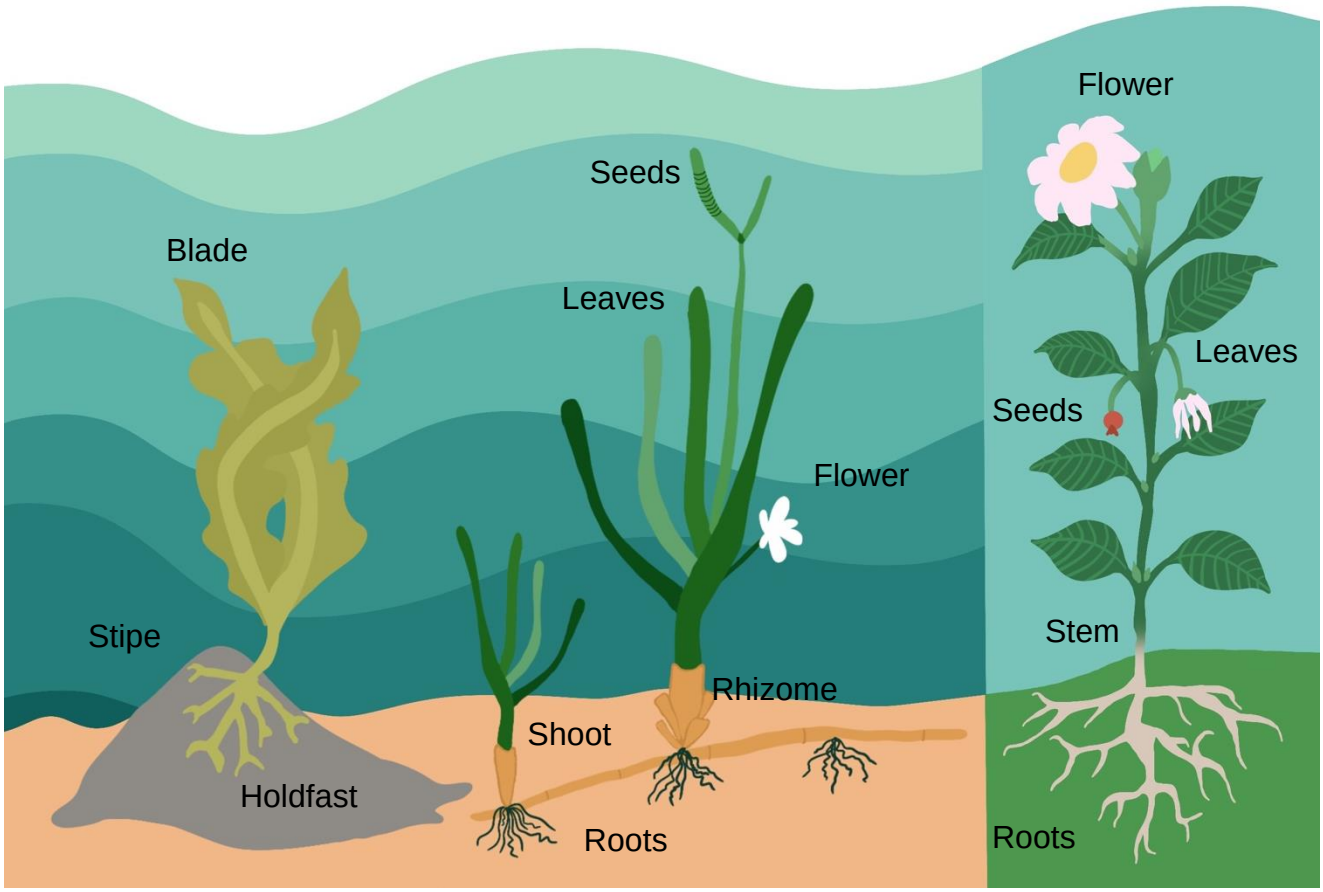
Often there's a bit of confusion when it comes to seagrass - people tend to think it's a type of seaweed. This is not true! Both plants and seaweed have a green pigment called chlorophyll to allow photosynthesis, and have similar structures, but the names and functions of these structures differ.

Here are the main body parts of flowers:	Here are the main parts of seaweed:
Flowers – these are involved in reproduction and produce seeds from which new plants grow. The flower is usually colourful for attracting insects	**Thallus** – the entire body of a seaweed
Roots – take up water and nutrients from the soil which is carried to the rest of the plant through branches and fibres	**Lamina/Blade** – a flattened structure that is the site of photosynthesis
Rhizome – a plant stem that grows underground and stores nutrients like carbohydrates and proteins	**Air bladders** – a hollow, gas-filled structure which helps the seaweed float, found on the blade or stipe
Stem – carries water and nutrients to different parts of the plant	**Stipe** – a stem-like structure of a seaweed (though not all seaweeds have these)
Leaf – site of photosynthesis	**Holdfast** – a specialized structure on the base of a seaweed which acts as an “anchor” allowing it to attach to a surface (e.g., a rock)
Sheath – protects newly formed leaves	**Haptera** – finger-like extensions of holdfast which holds the seaweed upright

A big difference between plants and seaweed is their reproductive organs. Most plants are **monoecious**, meaning that individuals have both female and male structures. Notice how seaweeds don’t have roots, stems, leaves or flowers. However, they do have mini balloons called air bladders to help them float!

Here are a few more differences between plants and seaweed:

- In flowering plants, reproductive structures can appear together in a single bisexual flower (monoecious), or the flowers can be only male (staminate) or only female (pistillate).
- Seagrasses can have separate male and female plants (dioecious) or have both sexes on the same plant (monoecious).
- Overall, about 75% of all seagrass species are dioecious.
- *Zostera marina,* one of the main UK seagrass species, is monoecious, where individual plants have both male and female flowers in separate alternating clusters.



Seaweeds, however, reproduce by releasing spores into the water; if male spores (sperm) and female spores (eggs) coincide they fuse together, developing into a new seaweed. The development happens in the water, normally away from the seaweed, and doesn't go through a seed stage.

Plants, however, produce pollen which needs to develop into a seed on the plant before being released.

ACTIVITY 1:

Get down to the beach and have a peer at some real plants and seaweed. Time this trip with low tide so you don't have to pull plants up. If not possible, then collect a terrestrial plant, a marine plant and a seaweed, carefully keeping the whole organism intact, and bring them to the classroom. Ideally, select a terrestrial grass, seagrass and kelp. Use your guides to check what you're looking at!

YOU WILL NEED:

If possible, have a live terrestrial plant, a marine plant and a seaweed (we recommend using kelp if you can)

Plant and seaweed ID guides

Pictures and photos can also be used – (UK seagrasses flower between June and August)

HEALTH AND SAFETY

- Ensure adequate botany skills when selecting live plants. Some should not be picked, and others may be harmful when touched or consumed.
- No need to get wet!

1) Lead the class through the different plant and seaweed parts.

2) Wherever you are, get everyone to try sketching one of each. Note down key identifying features and label the sketches with the different anatomical parts and their functions.

3) Try a second series of sketches but focusing on the flowers of the plants. Select a typical flower and a grass flower, both a terrestrial and marine one. When searching for seagrass flowers, look for lighter yellow/green, cylindrical strands. The flowers, and later the seeds, are held on a spathe – just like a pod of peas – at the top of the light green strand.

4) Label the flowers. A more stereotypical flower might be easier to label than a grass flower.

5) Try the quick true/false activity, hands up for true, hands down for false, or just shout out!

ACTIVITY 2:

A plant has special cells to help move water around the plant – up from the roots, all the way to the leaves of the plant, in a process called **transpiration**. These specialised cells are called the **xylem**, hollow structures which resemble pipes or tubes. A piece of celery is needed for this activity! It's crunchy, good for you… and it can show us how plants move water around inside them.

1) To set this experiment up, fill half the cup with water.
2) Add at least 5 drops of food colouring to the water (the more food colouring that's added, the easier it will be to see later!).
3) Cut the bottom edge of the celery stalk so that the end is nice and fresh.
4) Put the celery in the water and leave it for a whole 24 hours. After 24 hours, look at the leaves of the celery, they should be blue or red (depending on the food colouring used).
5) Pick up the stalk and look at the bottom edge that was standing in the water.
6) Look closely at the bottom of the celery, the colour will help you see the special cells (xylem) which help the plant move water around, from the roots all the way to the leaves!

YOU WILL NEED:

Celery

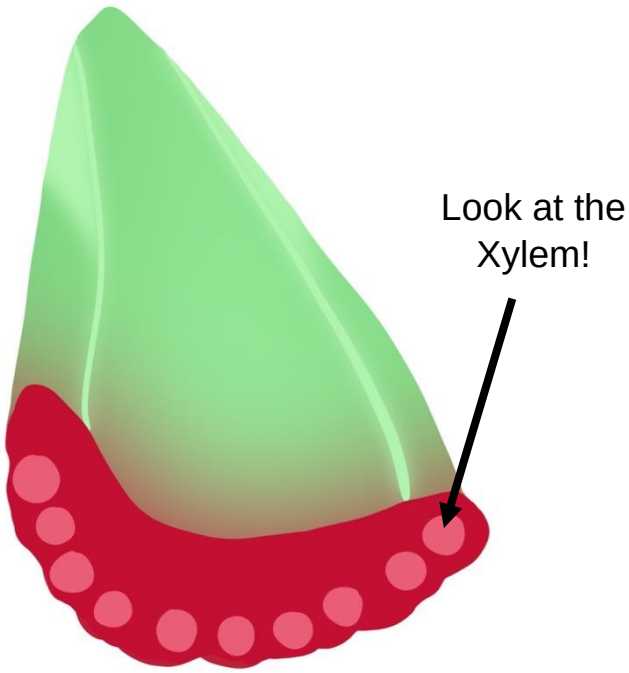
Food colouring (red or blue works best)

Cup

Water

Spoon

Have fun with this activity and try other experiments. What would happen if different food colouring was used? What would happen if you split the bottom of the celery stalk in two, and put each half in a different colour of water? Would the same experiment work if you used a different type of plant, or even flower? The experiments are endless!



FUN FACT!

Some plants are adapted to eating flies and insects, for example, the Venus fly trap.

FUN FACT!

Redwoods are the tallest trees in the world and can easily reach heights of 300 feet - the equivalent to 3 blue whales! And just like celery, water is moved around the plant in exact the same way!