ACTIVITY BOOK
Year 7
Teachers answer booklet

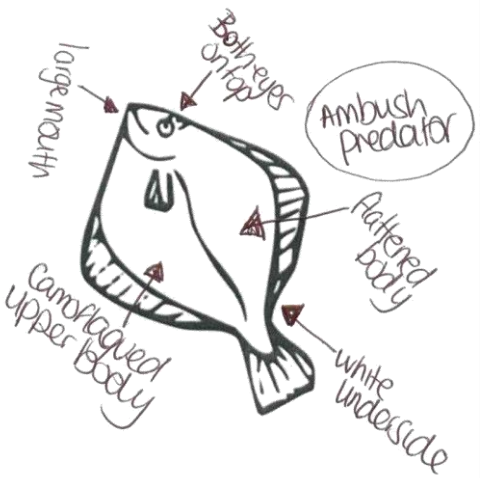
Welcome to
Anglesey Sea Zoo!

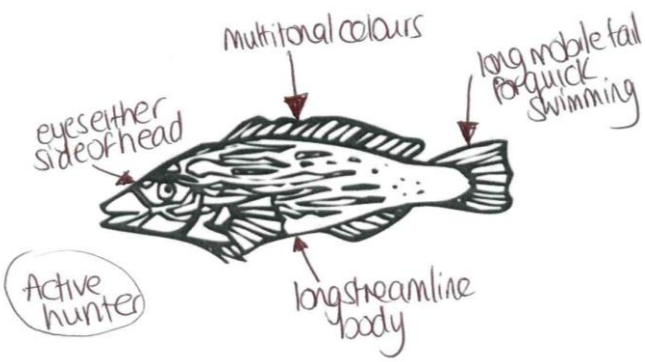
We are an entirely native marine aquarium. This means all the animals you will see are found around the U.K. In fact 80% of what you will look at today can be found around this very island. All the water within the aquarium is pumped from the Menai Straits (the body of water you saw on your way into the aquarium). This means the water isn't artificially changed in anyway before it enters the tanks.

Front Room

1. In many tanks you will find a variety of fish living together. In the pier tank you have both benthic fish (fish that reside on the seafloor) and pelagic fish (fish that swim in the middle of the ocean).
   Can you name one of each:
   a) Benthic fish- **Flatfish, Turbot or plaice**
   b) Pelagic fish- **Mullet or cuckoo wrasse**

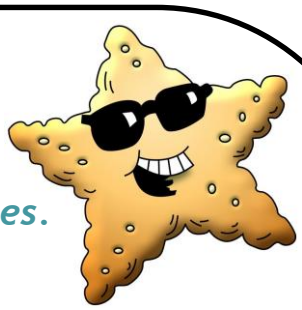
2. Can you draw your two different fish and label the differences between them.





3. Why is it important for these fish to be different from one another?
   So they can live together without competing / fighting over resources such as food or living space.

No Bone Zone



All animals here are invertebrates.

4. What is an invertebrate?
   An organism with no back bone.

<u>Adaptations</u> are changes to physical or behavioural traits that enable an organism to survive in its environment.

5. Some invertebrates (inverts) create an armour on the outside of their body to protect themselves from predators (organisms that may eat them).

   a) Name an animals with external armour:
European lobster / Shore crab / Sea Toad

   b) What is this armour called? **Exoskeleton**

6. Other inverts have adapted a sting to protect themselves from predators.

   a) Name two organisms that sting and their scientific names.

   1. Moon Jellyfish – *Aurelia aurita*
   2. Snakelock anemone – *Anemonia viridis*
   OR Daliah Anemone – *Urticina felina*

7. What else are these stings used for?
   Catch their prey

8. Can you name a member of the cephalopod family residing in this room.
   Octopus

9. What is the only hard part of this organism?
   Its beak

10. What does this mean for the organism?
    It can fit through any hole/space its beak can fit through

11. What the maximum size this species reaches?
    Up to 50cm in length

12. Is this a continuous or discontinuous variable?
    Continuous Variable

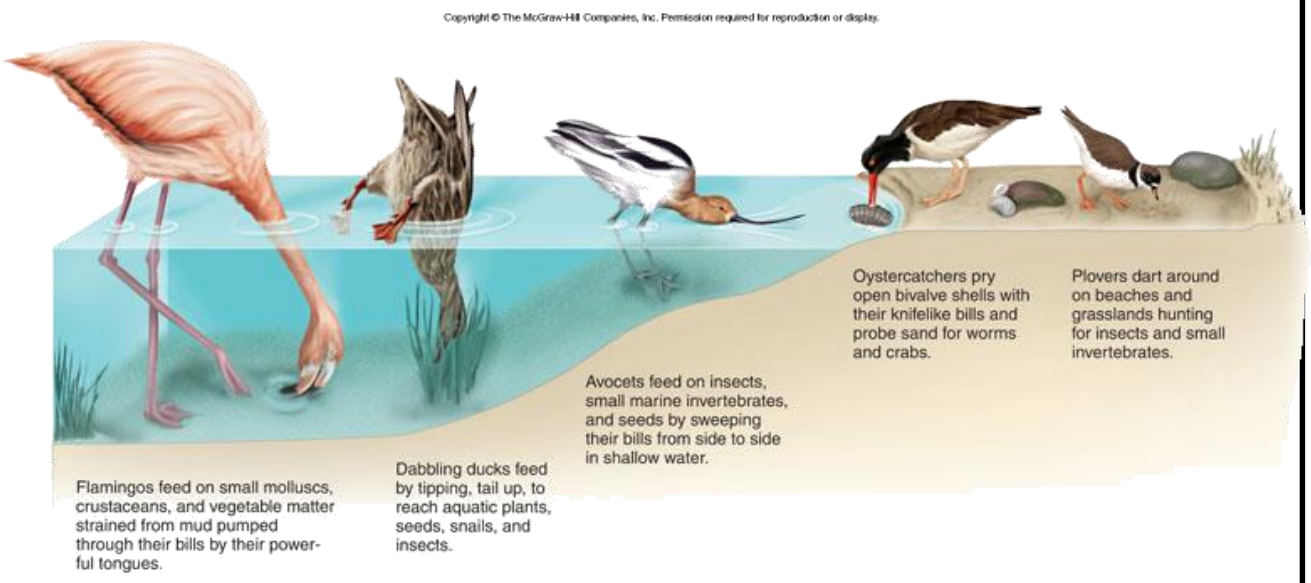
Fact File

One big happy family.

To ensure a community of organisms can live together it is important that they are not competing for the same ***resources***. This can include food and living space.

The organisms do this by each occupying a specific ***niche*** in the ecosystem. A niche is a function or position of a species within an ecological community.

An **example** of this that just includes birds…



As you can see each species is adapted differently ensuring they won't be in direct competition for food / living space.

If there is an over abundance of resources then two organisms can occupy the same niche in an environment. This relationship can only remain harmonious whilst the resources are available.

Once the resources change, the organism with the best adaptations is able to out-compete the other organism. This results in either a temporary displacement (with the other species moving away then coming back) or it could be a permanent displacement where the other species does not return.

In areas where one species is highly adapted to a very specific niche, if conditions change it could lead to a severe drop in numbers or even elimination of the species if no alternative ecosystem is found.

Breeding and Conservation

13. Can you name two animals from this area that would directly compete for a niche?

1) Thornback Rays

2) Plaice / Flat fish

14. What evolutionary traits have helped the cuttlefish survive?

a) Ability to change their colour

b) Ability to change the shape of their skin.

15. Name two prey animals that are part of the cuttlefish's diet, and an adaptation they have to help them avoid capture.

a) Prawn – Has a translucent body (see through body)

b) Crabs – Has a hard exoskeleton / a shell

16. What organism would occupy the same niche as the cuttlefish and therefore compete with it for food?

Plaice / Flatfish / Thornback rays. They are all predominantly benthic animals so live on the bottom of the ocean.

The Wreck

Animals don't always spend their entire lives in the same location. Many will move from one place to another either annually following the availability of food, or during mating seasons ready for the birth of their young.

17. What is this movement called? **Migration**

18. Name an animal in the wreck that does this? **Conger Eel**

19. What colour variations can this animal be? **Blue / Grey colours**

20. Why does this animal migrate? **To breed**

21. How often does it migrate? **Once in its lifetime**

22. What other species does this animal co-habit with in the aquarium? Why? (explain your answer).
Spider Crabs - they occupy a different niche in the ecosystem. They live on the floor of the tank so don't fight for living space. They are also scavengers so eat whatever is left in the tank. Food is much smaller.

OR Thorny Starfish - Same reasons

23. What adaptations does this other animal have to survive?
Crab- a) Hard Shell b) Claws
OR Starfish - a) Thorns for protection b) Tube feet that help them scale their environment

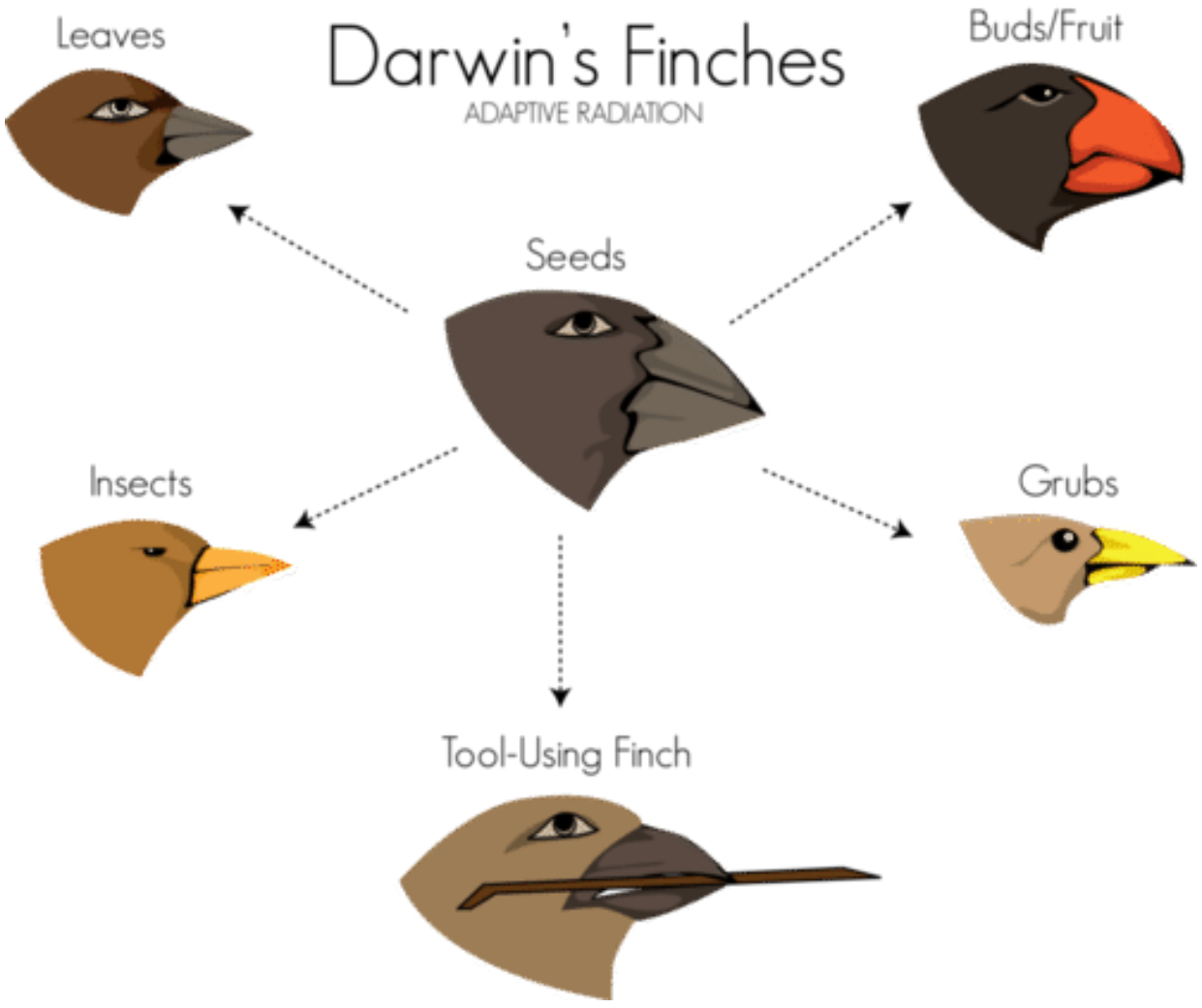
24. Can you name three similar other species?
Crab - 1. Edible Crab 2. Shore Crab 3. Hermit Crab
Starfish - Cushion stars / Brittlestars / Common starfish / sunstars.

Fact File

Survival of the fittest

Many ***traits*** can make an organism specialised for its niche in an ecosystem. The traits can range from its colouration to how good its reflexes are.

These traits are usually perfected by the organism over time spanning the gap of many generations. The traits that are passed onto the young are a result of surviving adults. The process of unwanted traits being removed is called ***natural selection***.



Charles Darwin was the first person to look into the theory of natural selection. On the Galapagos, he discovered 14 extremely similar birds who all had different shaped beaks. He concluded that all of the new species had originally come from one species. Over time and to ensure an abundance of food for everyone, different birds began changing their beak morphology to have different shapes and sizes.

Lobster Hatchery of Wales

25. What is the scientific name for the European Lobster?
Homarus gammarus

26. What colour are they usually and why?
Blue colour- This is because in the murky depths of the ocean where they live the dark blue colour is difficult to see

25. Orange lobsters don't usually survive in the wild. Give one reason as to why?
Predators easily spot them.

26. The natural way of choosing desirable traits to be passed onto the young are decided through which process?
Natural selection

25. Give an example of this process at work? *It doesn't't have to be a marine example*.
Two moths on a tree. One brown one white. As the white one is easily spotted it is eaten by a bird leaving the brown one to go on and reproduce.

26. *Lobsters are scavengers*. What does this mean?
They will eat anything they come across.

27. Give a few examples of the things a lobster would like to eat?

1. Mussels
2. Fish
3. Seaweed

But the kids can put anything on here

32. What is the difference between adult lobster meals and juvenile lobster meals? *You may see examples in their enclosures*.
The size of their meals. Usually if the animal can hold it in its claws it can eat it. The smaller the claws the smaller the piece of food.

Shark Pool

33. What's the name of the group of animals in this room?
    Elasmobranchs

***Continuous variation** is a characteristic that changes gradually over a range of values (e.g. length or weight).*
***Discontinuous variation** is a characteristic with a limited number of possibilities (e.g being male/female or the colour variants found within a species).*

34. What range of lengths can be seen within the octagonal egg case tanks? *(Roughly measure the egg cases through the tank)*. **5.5-7.5cm (usually, the eggs do change throughout the year)**

35. Where would you find these animals in the sea?
    Near to the substrate (floor)

36. Name an adaptation they have to help them live there?
    Camouflage- Their skin is a multitonal brown colour to blend in with sand, gravel and mud.

37. *These animals are nocturnal*. What does this mean?
    Awake at night and sleep in the day

38. What sixth sense do these animals have to aid them whilst hunting?
    Electro reception

39. How does this sense work?
    Tiny pores in the underside of their noses can detect electrical pulses given off by muscles. This means that the elasmobranchs can 'see' their prey even if their eyes cant.

40. Is it found within all species of this group? **YES**

41. ***The Basking shark is the second largest shark in the world.*** What length can they reach? **10m**

42. What do they eat? **Plankton.**

Fact File

The Road to Extinction

Extinction is the end of an organism or a group of organisms. Usually the death of the last known individual of a species.

There are two types of extinction…

1.Mass extinction - A moment in time when abnormally large numbers of a species die out simultaneously or within a limited time frame (*e.g*. Mass extinction during the time of the dinosaurs where 96% of all species perished).

2.Background extinction - Also known as the normal extinction rate. This refers to the standard rate of extinction in Earth's geological and biological history before humans became the primary contributors to extinction. Happens over a long time frame.

There are many factors that can lead to extinction. These include new diseases, new predators, invasive organisms, more successful competitors or even changes to the environment over geological time.

Once one species becomes extinct, unless another moves into its ecological role within the environment, this can lead to the destruction of a food chain.

For example, Algae – Mullet – Shark

When you remove the predator (shark) from the food chain the number of mullet increase. They then eat all of the algae in an area, this leads to a dead spot where the mullet can no longer live; resulting in either the mullet having to move away or they all perish.

The IUCN red list is an organization which keep track of organism numbers and monitors them for signs of extinction. They have a scale to rate the organisms as to how abundant they are.

Big Fish Forest

43. Is this tank bigger or smaller than it appears? **BIGGER**

44. What is the window made from? **Acrilic**

45. Many fish here can be eaten by humans. How can this affect fish numbers in the wild?
Can drop the numbers of wild stock.

46. What is this called? **Over fishing**

45. Name two species in this tank that are eaten on a regular basis and can be badly affected?

1. Sea Bass

2. Guilt head Bream

Humans catch organisms for many reasons such as for their meat or oil. For some animals though such as sharks and rays they can be caught for another reason.

These next questions will be found on the posters the other side of the big fish forest.

48. What is a major problem for sharks that is only down to humans?
Finning

49. Explain what this is?
Where fishermen/women catch the sharks and remove all their fins before throwing the animal back into the sea.

Rock pools.

50. Name an invertebrate in this area?
Beadlet anemone.

Rockpools are a harsh environment where only the most hardy of organisms can survive. Temperature and salinity fluctuate constantly, as a result of the changing weather and the tides coming in and out.
For example, during the summer the weather warms up, increasing the water temperature and the water will begin to evaporate leaving a higher concentration of salt. This is instantly changed when the tides return causing cooler water with a lower salinity to crash into the rock pool.

51. Can you think of two other factors that can affect a rockpool?

1. Ph

2. Predators / Prey

52. Can you write a simple food chain based on the image on the wall?

An invasive species is an species that is not native to a specific area (an introduced species) that has a tendency to spread or damage the area around it.

53. Name two invasive species in the U.K.?

Chinese Mitten Crab / Slipper Limpet / Signal Crayfish / Carpet Sea Squirt.
Get the children to look at the invasive species display on the wall.

53. Why are invasive species bad? **They usually cause harm in the areas they are introduced to. Either by damaging the environment or killing other animals in the area.**

What have you learned?

Draw an underwater ecosystem taking into consideration what you've learned today. You will need to include **6 different organisms** that can be combined harmoniously together (*Live happily together*).
Use labels to identify and explain your choices.

Use everything they've learned today.
They need to have animals that occupy different niches, and are clearly understanding the difference between them.