Shark Bites: Lesson Plan

Introduction

SEA LIFE Aquariums across Australia and New Zealand have created this Shark Bites lesson plans with one goal in mind

— making life easier for teachers!

This is a great way to introduce the creatures of the sea to your classes, we hope you find the information here useful and your students enjoy learning about Sharks.

Once you've introduced the creatures to your class, why not meet them in real life with a school excursion? You can continue the learning outside of the classroom after all the more they see, the more they'll learn!

To book your school excursion visit your local SEA LIFE Aquariums website!

Shark Bites 1. - The Shark Detectives teachers' notes

LESSON 1
Focus Questions

- What can we learn from a shark's mouth?
- Is there a tooth for all reasons?

INTRODUCTION 10-15 mins
Teacher Introduction:

Either using your own resource or our shark anatomy poster, introduce sharks to your students
- showing them what they look like and what special features they have, so we cam identify them as sharks.

Create your own interactive Kahoots quiz to see what facts your students know about sharks!

The Shark Detectives - Teachers' notes

- Sharks are the ocean's greatest predators
- Sharks have evolved over 400 million years – they were around before, during and after dinosaurs
- Sharks have finely tuned senses and adaptations for hunting and capturing prey
- Hunting is about using their smell, taste, their ability to feel the movement of fish in their environment – they even have an extra sense – electro reception – to detect the heartbeat of fish that hide under the sand.
- But hunting is no good if you can't catch and eat your prey – this comes down to…Jaws!
- We'll come back to sharks later but first to a predator that is more intelligent, more adaptable, more successful in hunting out and eating their prey. Who am I talking about? You
- We are what we eat.
- Humans are adaptable because we can have many different diets – what different foods can we eat?

The Shark Detectives - Teachers' notes

Interaction:

Use the whiteboard to capture foods that we eat and link to names for types of diet – what do we call a meat eater, a fish eater, a plant eater. What do we call an animal that eats different diets (like humans)?

Extention:

Discuss the difference between voluntary diets – i.e. vegetarianism – and adaptive diets – i.e. animals with narrow range of target foods.

What are the advantages and disadvantages to specialising or generalising.

Hand out Tooth Toolkit pack and introduce first activity

The Shark Detectives - Teachers' notes

ACTIVITY 1

Tools for the Job 20-30 mins

Set Up: Set up tables with pictures of different foods – e.g. Nuts, Steak, Apple, Crisps, Toffees, Chicken Drumstick. Also provide groups of students with a "toolkit" of knife, fork, nutcracker, tea strainer.

Activity: Allow students to create their word banks collaboratively then to create descriptions in their individual packs. This element can be used as opportunity to develop spelling skills, sentence construction, handwriting, etc.

Group Session 10-15 mins / Review: What have we learnt?

Key points:

- Omnivores have a range of teeth for different foods
- Our mouth is made up of incisors, canines, pre-molars and molars
- Not all animals are omnivores, some have very particular diets

Expand: Meet the sharks - Introduce four sharks (with the kitchen tools):

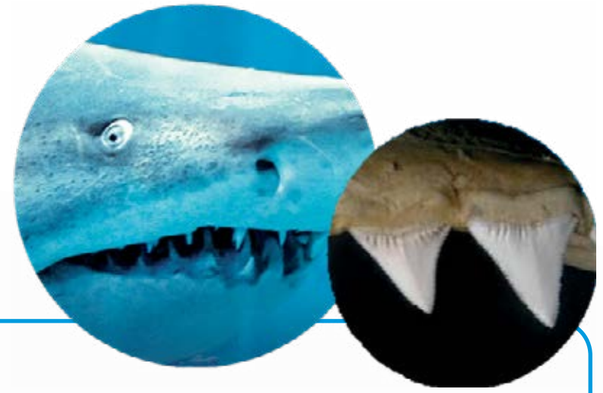
1. **Grey Nurse Shark** - "Fork Teeth" smooth edged, pointed teeth. Acts like a fork to grasp and trap prey, as they swallow food whole.
2. **Port Jackson Shark** -"Crushed Plates" these crush plates maybe covered in tiny serrations to help crush the prey. As they eat smaller animals that have hard shells,
3. **Whale Shark** - "Filter Feeder"- they only eat Plankton even though they are the biggest fish in the sea/
4. **Great White Shark** - "Knife Teeth "- serrated edge, not as pointy as a knife so they can tear chunks out of their prey.

End Lesson 5-10 mins (optional)

If time allows, pupils might write in their activity books about what sharks and humans have in common and how they are different. What can we learn from a shark's mouth?

Additional images of shark/teeth provided to test understanding:
• Describe teeth • Describe diet • Where might shark live?

Shark Bites 1. - The Shark Detectives - Activity Pack



Investigation 1 - Eat your words!

Either using your own resource or our shark anatomy poster, introduce sharks to your students
- showing them what they look like and what special features they have, so we cam identify them as sharks.

Verb Bank (words that describe how we eat)

Chew

Adjectives Bank (words that describe food)

Crunchy

The Shark Detectives - Activity Pack

Pick three of the foods on the table. Using your word banks write a sentence to describe what it feels like to eat each food. Really try to imagine eating the food from first putting in your mouth to swallowing. Try to use as many of your words as possible and think about which part of your mouth you would use when eating.

Food 1:

Food 2:

Food 3:

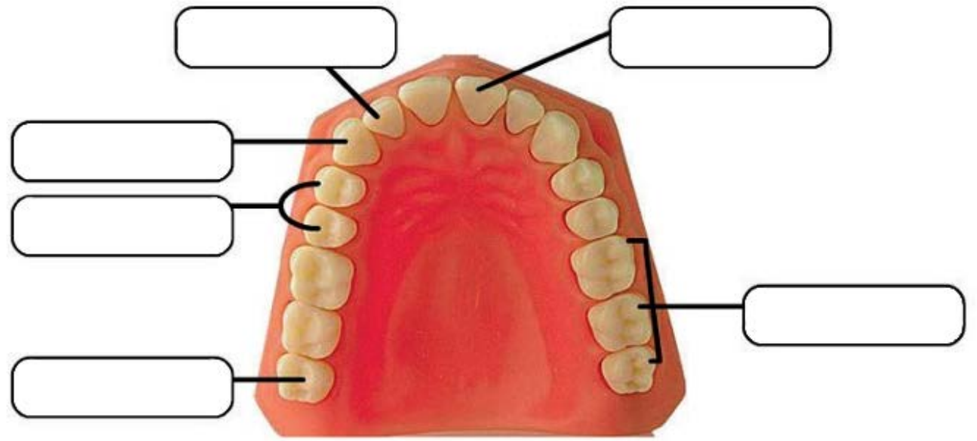
The Shark Detectives - Activity Pack

Investigation 2 - The name's in the frame

When we eat we use different teeth for different things. Feel around your mouth with your tongue. Your different teeth are all specialised for different foods and different eating actions (biting, cutting, tearing, chewing, crunching)

In this investigation, we are going to name the teeth from our identity parade. Fill in the labels with the names of the different teeth.

Correctly label the teeth in this diagram



Central Incisor | Canine | Premolars | Molars | Lateral Incisor | Wisdom Tooth

Bonus Questions

Which animal gives its name to the canine tooth?

_____

How many teeth do you have as a child?

_____

Which animal gives its name to the canine tooth?

_____

Clues – The identity parade:

Incisor – aka Mack the Knife
a sharp character, at the front of the pack. A serrated edge gives him extra cutting power.

Molar – aka Jimmy the Crusher
a real tough nut, flat and wide. Great when it comes to the crunch.

Canine – aka Butch the Shredder
pointed and sharp, hangs out at the edges but always useful when things get tough.

The Shark Detectives - Activity Pack

Investigation 3 - The tools for the job

On your table there are four kitchen tools. Below are some foods that a shark might find in the sea. Next to each food, draw the tool that would be best to help you eat the food. In the final column, write where in the sea you might expect to find this type of food (e.g. open sea/ seabed/ near the coast/ on the sea surface)

Anchovy (little, slippery fish)		
Tuna (big fish)		
Plankton		
Crab		
Mussel		
Seal		

Shark Bites 2. - The Shark's Toothpaste - Teachers' Notes

LESSON 2
Focus Questions

- Why do sharks not have toothbrushes?
- What would your dentist say to a ray?

Introduction 15-20 mins

Teacher Introduction: Use the presentation to introduce and link topic to shark theme.

Shark Bites 2. - The Shark's Toothpaste - Teachers' Notes

- Sharks are the ocean's greatest predators
- Sharks have evolved over 400 million years – around before, during and after dinosaurs
- Sharks have finely tuned senses and adaptations for hunting and capturing prey
- But hunting is no good if you can't catch and eat your prey – this comes down to…Jaws!
- Different sharks have different teeth depending on what kind of food they usually eat
- Sharks don't have bones, their skeleton is made of cartilage – wiggle your ears, that's cartilage – more flexible and less rigid than bone.
- Great for swimming but when it comes to teeth there is a drawback. No bone for teeth to grip onto. (You could demonstrate by setting a "tooth" – e.g. lollipop stick in plaster and putting one in blue-tac)
- So sharks teeth are less fixed and they fall out easily. They rely on their teeth so the have a continual supply of new teeth.
- That means sharks have a lot of teeth in their lifetime – how many sets will you have? How many teeth will you have in your life?

Shark Bites 2. - The Shark's Toothpaste - Teachers' Notes

Activity 1 - Shark Tooth Challenge 15-20 mins

Challenge: Read out the below message from our one of our Aquarist Kerrie, who has a problem that can be solved with maths:

I have five sharks in my tank. They eat fish from a pole and sometimes they lose teeth, which fall down to the bottom of the tank. The boss has asked if we can send out a tooth to 285 schools in the local area. He asked me how long it would take to collect up enough teeth from my tank. So here is what I know:

- These sharks are thought to have 2000 teeth in their lifetime
- There are 60 teeth in the front set – 30 on top, 30 on bottom jaw
- There are 7 full rows of teeth behind the front set
- They live for an average of 11 years

So what I need to know is:
Roughly how long will it take for my 5 sharks to lose 285 teeth?

Activity: Hand out worksheets and set challenge to students. More able pupils may have steps removed from the worksheet to extend the challenge.

Group Session 5 mins

Review: How did you do? Discuss real-world problem soling, estimation, averages, etc.

Introduction to Activity 2

Introduce tooth structure using the following resource (or other):
https://www.childrensuniversity.manchester.ac.uk/interactives/science/teethandeating/structure/

Follow up with looking after your teeth:

Why do we clean our teeth? (breath, rotten teeth, minty fresh, etc.)
Why do teeth go rotten? Introduce activity sheet (comprehension exercise)

Activity 2 How to kill a tooth – 10-15 mins

Colour in and label diagram of the tooth structure – 1 for human, 1 for shark. Based on the paragraph, complete the tooth decay flowchart.

End Lesson 5-10 mins (optional)

If time allows, pupils might write in their activity books about their tooth cleaning targets.

Shark Bites 2. - The Shark's Toothpaste - Teachers' Notes

Shark Tooth Maths Challenge Calculations

Challenge: How long should Andy tell his boss it will it take to collect 285 teeth? Shark tooth facts

- These sharks are thought to have 2000 teeth in their lifetime
- There are 60 teeth in the front set – 30 on top, 30 on bottom jaw
- There are 7 full rows of teeth behind the front set
- They live for an average of 11 years

How many teeth are in each shark's mouth at any one time?
60 (set) x 8 (rows) = 480

How many teeth will a shark lose in a lifetime?
(assume he dies will a full mouthful of teeth) 2000-480 = 1520

How many teeth will a shark lose each year?
1520/11 = 138

How many teeth will 5 sharks lose each year?
5 x 138 = 690

How many teeth will fall out each month?
690/12 = 57

How many months will it take to get enough teeth for
285 schools? 285/57

How many months will it take to get enough teeth for 285 schools?
285/57 = 5

Shark Bites 2. - The Shark's Toothpaste - Teachers' Notes

Activity 1 The Shark Tooth Challenge

Working on your own, use your maths skills to work help Andy the Aquarist get an answer for his boss.
Remember: take one step at a time and show your working...

Blacktip Reef Shark Facts

- These sharks are thought to have 2000 teeth in their lifetime
- There are 60 teeth in the front set – 30 on top, 30 on bottom jaw
- There are 7 full rows of teeth behind the front set
- They live for an average of 11 years

How many teeth are in each shark's mouth at any one time?
Answer

How many teeth will a shark lose in a lifetime?
Answer

How many teeth will 5 sharks lose each year?
Answer

How many teeth will fall out each month?
Answer

How many months will it take to get enough teeth for
Answer

How many months will it take to get enough teeth for 285 schools?
Answer

The Shark's Toothpaste - Teachers' Notes

HOW TO KILL A TOOTH

Read the following paragraph, highlighting the names given to parts of the tooth.

The tooth is made up of 4 distinct layers. The soft pulp in the center, containing the nerves, is surrounded by a harder dentine layer. This is protected by the crown, which is covered in enamel. The tooth sits in the socket within the jaw and is held in place by the gums.

Tooth decay happens when bacteria (plaque) are allowed to build up on the tooth surface. The bacteria feed on sugars and, as they eat the sugar, they produce acid as a waste product. This acid reacts with the calcium in the tooth, destroying the enamel and forming a small hole called a cavity. The softer inner layers of the tooth are then unprotected from further acid erosion.

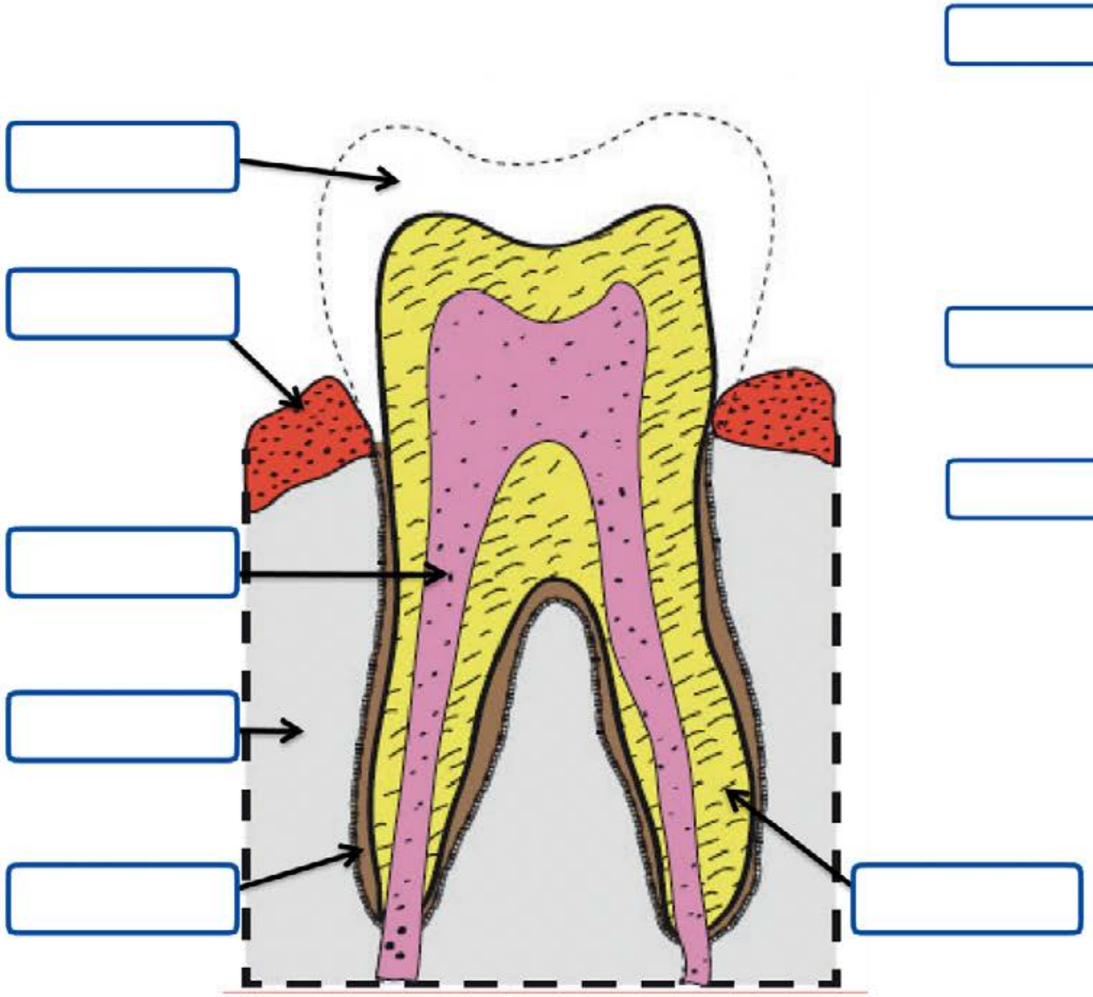
When plaque dies it can harden and, over time, a build up of dead plaque forms a solid layer called tartar. This often happens between teeth and near the gums when teeth are not cleaned properly or flossed. Tartar can trap other bacteria in the gums and cause red swelling and gum disease called Gingivitis. Unhealthy gums are less able to support teeth so tartar can lead to loose and missing teeth.

Tooth decay can be prevented by reducing the amount of acid attacking the teeth and by building a strong defensive layer of enamel. Toothpaste containing fluoride helps to build stronger enamel and removes plaque bacteria. Removing the food from bacteria by cutting down on sugar is also very effective.

Alternatively, simply replace your teeth on a regular basis like a shark. No toothpaste required (also sharks never eat sweets!)

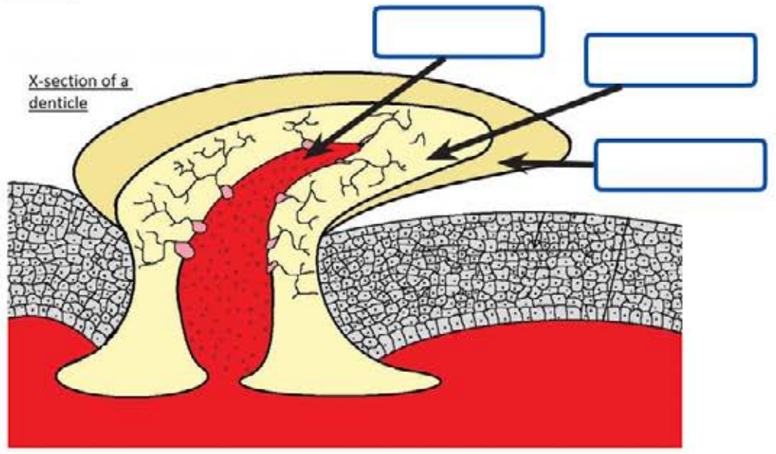
The Shark's Toothpaste - Activity Pack

The map of the tooth Fill in the boxes to label the different parts of the teeth – yours and a sharks



Amazing Fact

Shark enamel contains fluoride, which we have to add by using toothpaste. Sharks have built in toothpaste!



The Shark's Toothpaste - Activity Pack

Cavity Wars – the Battle for Healthy Teeth

Plaque bacteria are at war with your teeth. They want to destroy your teeth, cause you pain and force you to go to the dentist!

Your teeth need to defend themselves from the attackers so that they can stay in your mouth and enjoy a long, healthy life.

If they could speak to you, what would the commander of the plaque army tell to do/not to do so that they could destroy your teeth?

1. _____

2. _____

3. _____

4. _____

5. _____

Bonus Questions

Why do sharks not have toothpaste? _____

What chemical in toothpaste builds strong enamel? _____

Name a food that you can eat that contains calcium _____

Where in the sea does acid attack calcium? (Clue: Nemo's Home) _____

Shark Bites 3. The Shark Feed - Teacher's Notes

LESSON 3 – Focus Questions

- Who shares the world of the shark?
- Who eats who in the sea?

Introduction 10-30 mins

Teacher Introduction:

Create a interactive Kahotts quiz using the facts provided on next page.

Teacher Notes

NB there are a couple of opportunities for extension here so this could be extended over two lessons.

The Shark Feed - Teacher's Notes

- Sharks are the ocean's apex predators

- Sharks, like us, need to get energy from food

- What do sharks eat?

- How does their diet relate to their teeth? Different sharks eat different things.

Hand out Food Chain Investigation pack and introduce lesson activity.

Interaction:

Use the whiteboard to capture animals that we find in the sea? Do we know what they eat? Can we build a simple food chain from three animals (and one plant): Plankton, Shrimp, Mackerel, Mako Shark (Producer, Primary consumer, tertiary consumer, apex predator)

Extention:

If you're feeling daring, grab a mackerel from the local fishmonger and perform a dissection for the class.

Look at the gills, the shape of the body, the fins, etc. The mackerel is a fast swimming, streamlined fish, which needs a lot of oxygen and eats a lot of small prey. You can quite easily remove the stomach and organs if you wish and relate them to the children's own biology. It's not to everyone's taste but most kids love it!

The Shark Feed - Teacher's Notes

Activities

Link the Link & Catch of the Day 20-40 mins

Link the Link: Pupils prepare for the science activity by completing the food chain comprehension in their activity pack.

Catch of the Day:

Set Up: Set up tables with the equipment:

Washing up bowl (rectangular), plastic beads (50), stirrer, stopwatch, fishing nets, plastic tweezers.

Activity: Encourage pupils to think about how they can make the test fair: stirring speed, standard procedure, direction and duration of "feeding", position of the net in the water (standard depth).Allow them to run tests and collate results. First they need to devise a fair test – do this by allowing them to compete and let them think about how to make it fair!

The Activity requires the children to devise a fair test and then take five measurements (or one per person in the group).These results can then be plotted on a bar graph (along with a mean value) and then be used to complete the table in their activity books.

Group Session - 10-15 mins

Review: What have we learnt?

Key points:

Food chains transfer energy from the sun up to predators

Food chains in the sea have the same properties (links) as those on land

A fair test means making sure that the conditions for the experiment don't influence the result

Results can be made easy to understand using charts and tables

Extension:

By referring to the results table you can have a conversation about what happens to small pieces of plastic in the sea. Small animals take up plastic in small quantities but it remains in their bodies. Through the food chain the amount of plastic in the diet is magnified so large animals at the top of the food chain are eating large amounts of plastic (which can be harmful) through eating their normal food.

End Lesson 5-10 mins (optional)

If time allows, pupils might write in their activity books about what sharks and humans have in common and how they are different.

Shark Bites 3. The Shark Feed - Activity Pack

Activity 1 Link the Link

Food chains

A food chain describes the transfer of energy from the sun to plants to animals. Animals and plants in a food chain are given names depending on what they do. **Fill in the missing words below:**

Energy in the sea comes from _____. Plants that turn the sun's energy into food are called _____. Animals that get their energy by eating plants or smaller animals are called_____. _____ consumers eat plants while _____ consumers eat animals. Larger animals that kill and eat smaller animals are often called_____ with the one at the top of the food chain called the _____ predators. Sharks are usually but not always apex predators.

Predator **Producer** **Consumer** **Secondary** **Primary** **Apex** **The Sun**

We can also represent a food chain in pictures. Use the terms that you used above to label the pictures:

Sun

Plankton

Shrimp

Mackeral

Mako

The Shark Feed - Activity Pack

Activity 2 Catch of the Day

On your table you have the equipment for the catch of the day experiment. Check and tick that you have everything:

- **Washing up bowl**
- **Plastic Beads**
- **Stirrer**
- **Stopwatch**
- **Fishing Net**
- **Tweezers**

The Question is...

What is a better way to feed on small pieces of food – straining or picking?

Your Challenge:

Design a fair test that will allow you to measure how much food (plastic beads) a straining feeder (the net) can collect.

Then design a fair test to compare how much food a picking feeder (the tweezers) can collect.

The Shark Feed - Activity Pack

How do we perform a fair test?

What do we need to do to make it fair?

Think about how you could make it unfair. Think about what will affect the number you catch.

Where in the water are the beads? How many beads are there to start with?

How do you compare the different feeding styles? What equipment do you have to help make it fair?

Work out a protocol and write it down.

Do 3 “feeds” for each feeding style – work out average “energy” per feed.

	Feed 1	Feed 2	Feed 3	Average (mean)
Straining				
Picking				

Do 3 “feeds” for each feeding style – work out average “energy” per feed.

Based on your test, which is the better way to feed on small pieces of food?

The Shark Feed - Activity Pack

When a primary consumer feeds they pick up energy that producers have converted from the Sun's energy. The energy that a primary consumer eats is partly used up and partly stored.

What do you use energy for? Can you think of three things?

1. _____

2. _____

3. _____

How do you store energy?

_____

Stored energy passes to a secondary consumer when they eat primary consumers. This is how energy moves through the food chain. Bigger animals need more energy to live and grow so they need to take in more.

We are going to call our filter feeder the Primary Consumer and our picker feeder the secondary Consumer. Use the results from your experiment to fill in the table below:

We have assumed that each primary consumer eaten by a secondary consumer is worth 50 beads of stored energy and each secondary consumer eaten by a predator is worth 500 beads of stored energy. Remember:

The Shark Feed - Activity Pack

Use your results to fill in the table below:

We have assumed that each primary consumer eaten by a secondary consumer is worth 50 beads of stored energy and each secondary consumer eaten by a predator is worth 500 beads of stored energy. Remember: **Sun** **Producer** **Primary Consumer** **Secondary Consumer** **Predator**

	Primary (Filter)	Secondary (Picker)	Predator
A: Energy in each Food Item (bead)	1	50	500
B: No of Food Items per feed			4
C: Energy per feed (A x B)			2000
D: Energy for Activity (90%) C x 90%			1800
E: Energy Stored (10%) C x 10%			200

You can see how predators get more energy from less food items as they are eating the energy that has passed up the food chain.

Bonus Questions

Our table says that a predator has to eat 4 secondary consumers to get 2000 energy units.
How many primary consumers would they need to eat to get this much energy? _____

Do you think that would be easier or harder? _____

A basking shark is a huge filter feeder. How do they get enough energy to live? _____

Where in the sea does acid attack calcium? (Clue: Nemo's Home) _____

Shark Bites 4. The Shark Champion

LESSON 4 Focus Questions

Have you got your teeth into the topic?

Introduction

Teacher Introduction:

Set up class for quiz session. We have provided a set of questions, the format of the session is up to you.

You could divide the class into teams or have individual answer sheets. See 16 questions that are provided on following page.

End Lesson – 5-10 mins (optional)

Introduce some of the threats posed to sharks and what we can all do to make sure they are around for the future.

Sharks threatened by breakdown of food chains, habitat destruction and fisheries.

Shark slow growing and late to reproduce, if they are caught in large numbers they cannot reproduce quickly enough and populations shrink.

What can you do:

Discover more about sharks and share what you learn with others

Join SEA LIFE Trust and help with their conservation projects

Raise money for Shark Projects

Shark Champion Quiz

1. How long have sharks been around?

A. 400 years **B. 4 million years** **C. 400 million years**

2. What do you call an animal that only eats plants?

3. What do you call a person that only eats plants?

4. Name the three main types of tooth in your mouth?

5. What is a sharks skeleton made from? Which part of your body is made from this?

6. An animal (like you) that eats a varied diet is called what?

7. What type of shark is this and what food would it eat?

8. How many teeth does a Blacktip Reef Shark go through in a lifetime?

9. How many teeth are in an adult human mouth (as long as they keep their teeth clean)?

10. What chemical is found in a sharks tooth and in toothpaste?

11. What does this chemical help to do?

12. What is the name given to hardened plaque?

12. What attacks the enamel to form cavities in your teeth?

14. Give me three ways to keep your teeth healthy?

15. What do you call something that turns sunlight into energy?

16. Energy in a food chain flows from the _____

To the _____

ANSWERS on next page

Shark Champion Quiz

TOTAL 23 POINTS

1. How long have sharks been around? (1) 400 million

A. 400 years **B. 4 million years** **C. 400 million years**

2. What do you call an animal that only eats plants? (1) Herbivore

3. What do you call a person that only eats plants? (1) Vegetarian

4. Name the three main types of tooth in your mouth? (3) Molar, Canine, Incisor

5. What is a sharks skeleton made from? Which part of your body is made from this?
(1) Cartilage, Ears (3) Nose

6. An animal (like you) that eats a varied diet is called what? (3) Omnivore

7. What type of shark is this and what food would it eat? (2) Mako, Fish

8. How many teeth does a Blacktip Reef Shark go through in a lifetime? (1) 2000

9. How many teeth are in an adult human mouth (as long as they keep their teeth clean)? (1) 44

10. What chemical is found in a sharks tooth and in toothpaste? (1) Fluoride

11. What does this chemical help to do? (1) Strengthen enamel

12. What is the name given to hardened plaque? (1) Tartar

12. What attacks the enamel to form cavities in your teeth? (1) Acid (from plaque digesting sugar)

14. Give me three ways to keep your teeth healthy? (3) Strengthen enamel

15. What do you call something that turns sunlight into energy? (1) Producer

16. Energy in a food chain flows from the _____ (2) Sun to predators
To the _____