



4D Experience
Nominated for
Best Short



SHARK

A 4-D EXPERIENCE®



LEARNING RESOURCE GUIDE

GRADES K-3



The BBC and BBC Earth are trademarks of the British Broadcasting Corporation and are used under licence. BBC logo © BBC 1996

© Morné Hardenberg/
Atlantic Edge Films

SHARK FACTS

There are 510 species of sharks. Let's learn more about a few of them.



Common Thresher Shark

- Known for its 10 foot tail
- Stuns and herds fish with its long tail
- Warm blooded
- Feeds on squid and schooling fish
- Prefers to stay towards the top of deep bodies of water



Six-gilled Shark

- Can grow up to 16 feet long
- Has six pairs of gills instead of the average of five
- Has one dorsal fin at the back of its body
- Also known as cow shark or mud shark
- Deep water shark



Shortfin Mako Shark

- Bluish gray on top part of body and white on the belly
- Has extremely sharp teeth, that stick out even when its mouth is shut
- Feeds on sharks, swordfish and tuna
- Jumps high in the air to escape fishing hooks
- Fastest of all the sharks as it can swim over 30 mph



Great Hammerhead Shark

- Eyes are at opposite sides of its rectangular shaped head
- Feeds on crustaceans, octopuses, rays and small sharks
- Usually found around tropical reefs
- Can give birth to over 40 pups in one litter
- Has a heightened sense of electro-reception

SHARK FACTS



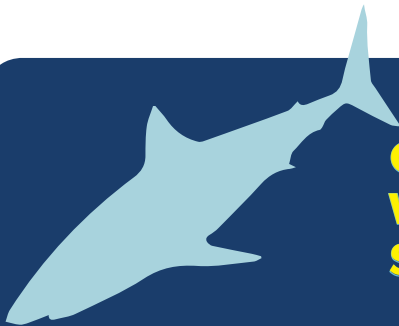
Bull Shark

- Can grow up to 11 feet long and over 200 pounds
- Gray to brown in color with a white belly
- Feeds on fish, dolphins, sea turtles and other sharks
- Found in fresh and salt water
- Aggressive species



Nurse Shark

- Has long, fleshy appendages called barbels that hang below its snout
- Feeds on crab, lobster, urchins and fish
- Usually found near rocky reefs, mudflats and sandbars
- Enjoys laying on the ocean floor
- Nocturnal animal



Great White Shark

- Can grow over 20 feet long and weigh over 6600 pounds
- Has a robust, large, conical snout
- Feeds on seals, sea lions, sea turtles and other sharks
- Found in all the oceans
- Strong and powerful swimmer



Epaulette Shark

- Usually under 3 feet long
- "Walks" by wriggling its body and pushing with its fins
- Chews its food for 5-10 minutes
- Found in shallow water on coral reefs or in tidal pools
- Most active at dusk and dawn

SHARK FACTS



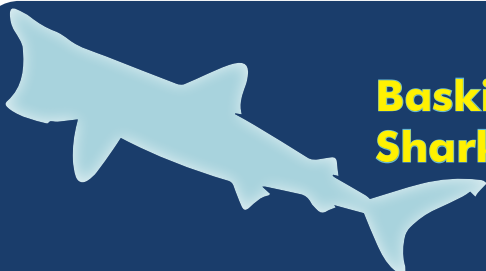
**Ragged
Tooth
Shark**

- Can grow up to 10 feet long; females are slightly larger than males
- Gray or bronze in color with a white belly
- Also known as the sand tiger shark or the grey nurse shark
- Slow moving and calm
- Holds air in its stomach to prevent rolling over or sinking to the bottom of the ocean



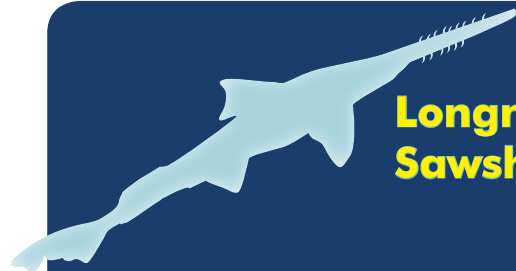
**Tasselled
Wobbegong**

- Can grow up to 4 feet long
- Tail is a lure that looks like a swimming fish
- Tassels on its chin help it camouflage against the reef
- Found near Australia and New Guinea
- A species of carpet shark



**Basking
Shark**

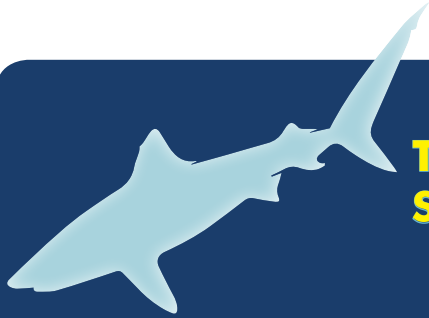
- Second largest shark in the world
- Mouth opens up to 3 feet wide
- Feeds on plankton
- Inhabits subpolar and temperate seas
- Keeps its mouth open to catch whatever it swims through



**Longnose
Sawshark**

- Can grow up to 5 feet long and 18.7 pounds; females are slightly larger than males
- Has a long snout edged with sharp teeth that alternate in size
- Has a pair of barbels in the middle of the snout that are used to detect prey
- Has two dorsal fins, but lacks an anal fin
- Feeds on various types of fish, crustaceans and squid

SHARK FACTS



Tiger Shark

- Can grow up to 25 feet long
- Dark, tiger-like blotches and stripes on the young giving the species its name
- Largest recorded weight was over 3000 pounds
- Feeds on fish, mollusks, crustaceans, sea turtles, seabirds and mammals
- Also known as sea tiger



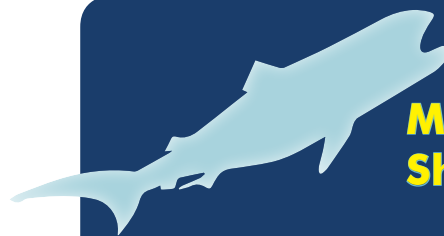
Blacktip Reef Shark

- Can grow up to 3 or 4 feet long
- Prominent black tips on its fins
- Feeds on small fish, cephalopods, crustaceans, sea snakes and seabirds
- Found in warm, shallow water near coral reefs
- A tropical and subtropical fish



Lemon Shark

- Adults can grow more than 10 feet long
- Easily recognized by its yellowish skin
- Has a flat head and two large dorsal fins
- Feeds on fish, mollusks, crustaceans, seabirds and other small sharks
- Lives in warm and shallow waters, usually near the coral reefs, mangroves and bays



Megamouth Shark

- Smallest of the three species of plankton feeding sharks
- Has a large mouth with small teeth and a broad, rounded snout
- Rarely seen by humans
- Relatively slow swimmer
- Species was not discovered until 1976

SHARK FACTS



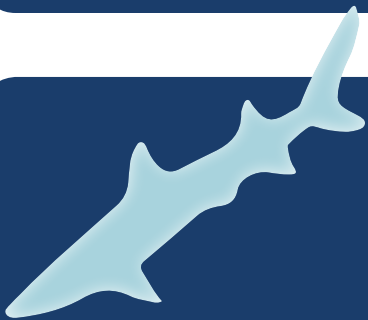
Whale Shark

- Largest fish on the planet
- Can grow to more than 40 feet long
- Has about 3,000 tiny teeth which it doesn't use to eat
- Its gills act like sieves, sifting out plankton from big gulps of seawater
- Gives birth to around 300 live young at a time, each about half a meter long



Zebra Shark

- Adults can grow to be between 6.6 feet to 11.5 feet
- Adults can weigh over 60 pounds
- Has stripes on its body when its young
- Skin becomes more spotted as it grows up
- Feeds small fish, crabs, shrimp, and other small invertebrates



Whitetip Reef Shark

- Adults can grow up to 5 feet
- Has a slender body, broad head, white-tipped dorsal, tail fins, and bays
- Feeds on bony fish, crustaceans, and octopuses
- Rests in caves for most of the day and hunts in groups at night
- Gill pumping keeps water flowing through its gills



Cookiecutter Shark

- Males can grow to a maximum of 16.5 inches, while females grow to 22 inches
- Glows because of light-emitting organs in its skin called photophores
- Feeds on tuna, stingrays, and other sharks
- Name comes from the cookie cutter-like wounds it leaves in its prey
- Lives at 3200 feet below the ocean's surface during the day but migrates vertically at night to feed

SHARK FACTS



Copper Shark

- Skilled predator that often hunts in large groups
- Uses senses of vibration and electric fields to hunt
- Adults feed on bony fish, squid, octopuses, and small sharks and rays
- Juveniles feed on jellyfish and crustaceans
- Also known as narrowtooth shark, bronze shark, cocktail shark, and bronze whaler



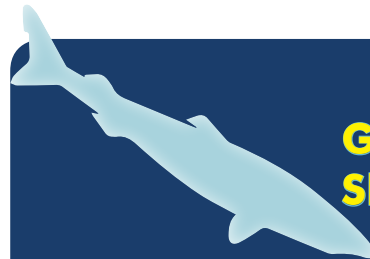
Leopard Shark

- Can grow to about 4 or 5 feet
- Known for its distinctive dark spots and saddle type markings
- Feeds on crabs, shrimp, clams, octopuses, and fish
- Forms large schools generally segregated by age and sex
- Ovoviviparous species means that it produces eggs that develop and hatch internally, and therefore gives birth to live young



Megalodon

- Went extinct around 2.6 million years ago
- Reached lengths of up to 60 feet and an estimated maximum weight of over 60 tons, largest known predator in Earth's history
- Teeth can grow up to 7 inches long
- May have consumed over a ton of food per day to sustain itself
- Had a bite force 6–10 times greater than great white sharks and modern crocodiles



Greenland Shark

- Can grow to 21 feet and 2,200 pounds
- Coloration can range from pale creamy gray to blackish-brown
- Feeds on smaller sharks, skates, eels, herring, capelin, Arctic char, cod, and mammals
- Also known as the gurry shark, or grey shark
- Inhabits the waters of the North Atlantic Ocean and Arctic Ocean

Name: _____

Date: _____



Based on what you have learned about sharks, decide whether each statement is a **Fact (+)** or **Fiction (-)**.

- _____ 1. There are more than 1,000 species of sharks
- _____ 2. Sharks have multiple rows of sharp teeth that are endlessly replaced
- _____ 3. Sharks have skeletons made of cartilage
- _____ 4. Sharks typically have 10–12 gill slits on each side of their bodies
- _____ 5. Whale sharks are the largest, with some measuring 40 feet
- _____ 6. Sharks have a very poor sense of smell
- _____ 7. Sharks have been around for over 400 million years
- _____ 8. Certain species of sharks are endangered
- _____ 9. All sharks lay eggs
- _____ 10. Sharks have been around longer than dinosaurs

Name: _____

Date: _____

SHARK ADAPTATIONS

*Finstagram
Posts*

Can you identify each shark from its Finstagram Post?
Match each name in the Shark Tank with the correct post.



finstagram



My tail can be as long as half the size of my body. I use it to slap the water to herd and stun my prey.

Answer:



finstagram



© Steve M Genkins, M.D.



Between my camouflaged pattern and coral-like tassels on my chin, I blend right in.

Answer:

SHARK TANK:

Epaulette Shark

Great White Shark

Hammerhead Shark

Basking Shark

Tasselled Wobbegong

Common Thresher Shark

Name: _____

Date: _____

SHARK ADAPTATIONS

Finstagram Posts

Can you identify each shark from its Finstagram Post?
Match each name in the Shark Tank with the correct post.



finstagram



© RACHEL BUTLER



My fins can be used as prototype legs to walk on land. I can also survive for hours with little oxygen.

Answer:



finstagram



My wide, hammer-shaped head helps me detect prey hidden in the sand.

Answer:

SHARK TANK:

Epaulette Shark

Great White Shark

Hammerhead Shark

Basking Shark

Tasselled Wobbegong

Common Thresher Shark

Name: _____

Date: _____

SHARK ADAPTATIONS

Finstagram Posts

Can you identify each shark from its Finstagram Post?
Match each name in the Shark Tank with the correct post.



finstagram



© Morné Hardenberg/Atlantic Edge Films



Speed, strength, stealth and sharp teeth make me the ultimate hunter in the shark world.

Answer:



finstagram



Filtering large quantities of sea water through my modified gills, I feed on plankton and small fish.

Answer:

SHARK TANK:

Epaulette Shark

Great White Shark

Hammerhead Shark

Basking Shark

Tasselled Wobbegong

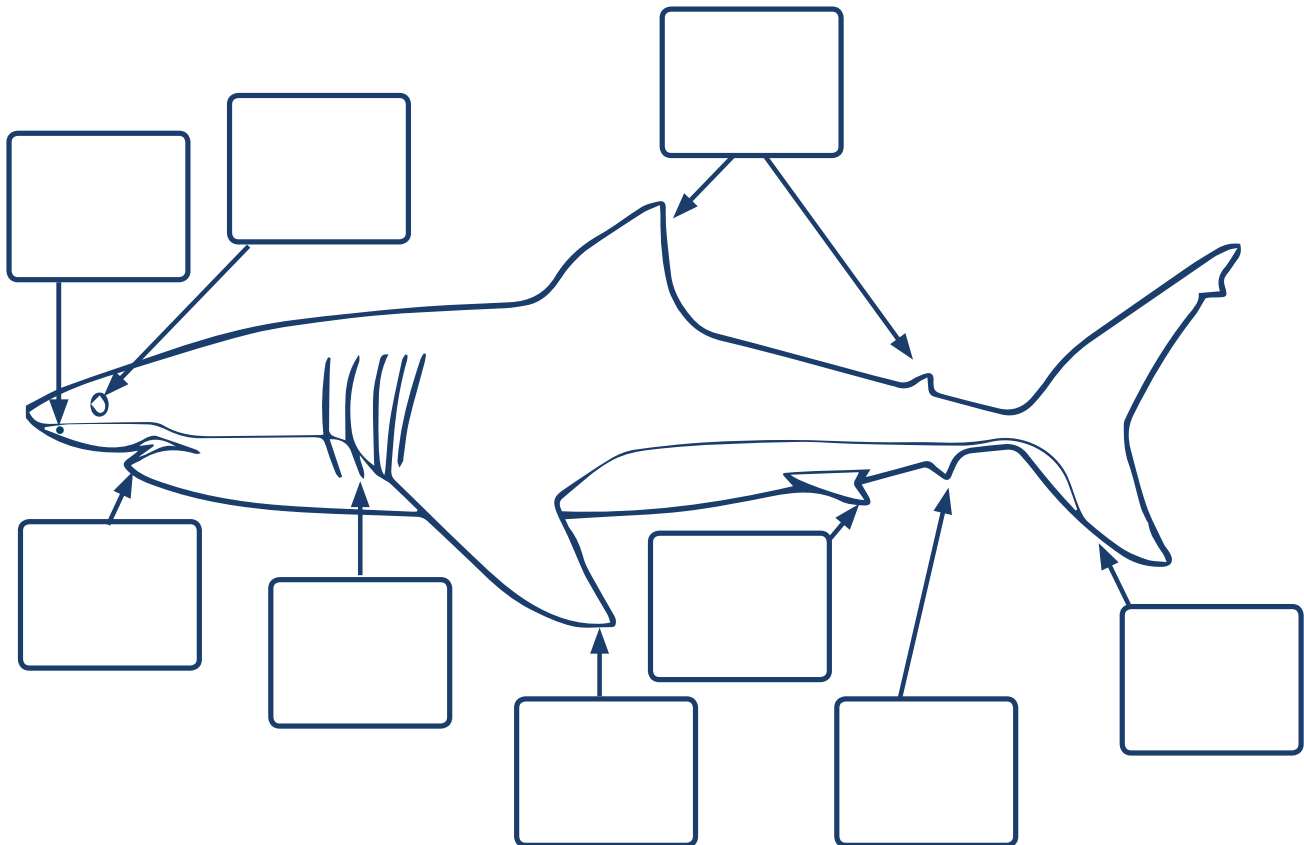
Common Thresher Shark

Name: _____

Date: _____

THE GREAT WHITE SHARK ANATOMY

Use the word bank below to label the Great White Shark



WORD BANK:

Caudal Fin

Nostril

Pectoral Fin

Pelvic Fin

Mouth

Eye

Gill Slits

Dorsal Fins

Anal Fin

Name: _____

Date: _____

SHARK LENGTH

GRAPHING ACTIVITY

Use the following data (information), below and graph the lengths of the sharks on the graphing worksheet (next page). Determine an appropriate scale for your graph. Label each column with the name of one of the sharks from the table. For each shark, color the correct number of boxes to show how long it is. Give your graph an appropriate title.

Average Length of Adult Sharks by Species	
Great White Shark	15 feet
Basking Shark	28 feet
Nurse Shark	6 feet
Great Hammerhead Shark	13 feet
Ragged Tooth Shark	10 feet
Longnose Sawshark	4 feet
Tasselled Wobbegong	6 feet
Epaulette Shark	3 feet
Common Thresher Shark	9 feet

1) Which shark is the longest?

2) Which shark is the shortest?

3) Which shark has the same length as a Hammerhead Shark?

4) Which shark has the same length as a Nurse Shark?

5) Which shark is longer, a great white shark or a basking shark?

6) Which shark is shorter, an epaulette shark or a sawtooth shark?

7) How much longer is a common thresher shark than a tasselled wobbegong?

8) How much shorter is a ragged tooth shark than a basking shark?

Date: _____

PAPER PLATE SHARK CRAFT

Materials:

- Paper plates
- Gray paint
- Paintbrush
- Scissors
- Glue or tape
- Black marker
- Jumbo googly eyes



Instructions:

- Fold a paper plate in half. At the seam/bend, cut a triangle shape from one side to form the mouth. These will be the wing and shark fin.
- Cut a tail shape from another paper plate. Along the rim, cut a triangle tip in between each indentation to create the perfect shark teeth.
- Paint all the pieces with gray paint and let dry.
- Once dry, fold the paper plate back in half and run your hand along the crease. Tape or glue the teeth to the mouth area inside of the paper plate.
- Glue or tape shut the top corners to keep the plate from going flat. Attach the shark's fins and tail. Add a jumbo googly eye. Draw the gills (sharks have 5-7).

**Now your paper plate shark is ready to rock!
Just lightly press down on the head and watch
it rock back and forth.**

SHARK BINGO



- Set of 25 game pieces for each student (ex. dried pasta shells or beans, gummy bears or fish crackers)
- SHARK BINGO board (1 per student)
- SHARK BINGO playing cards (1 set for teacher/designated helper)

HOW TO PLAY

- Provide students with the list of sharks.
- Students write the names of the sharks in the squares (in any order they wish) on the SHARK BINGO game board sheet. (Note: Pen can work better than pencil to avoid erasures on the game board sheet). **This step can be done ahead of time by the teacher for younger students—see note below.*
- Cut apart and mix up the SHARK BINGO playing cards. The teacher or other designated helper will draw one card at a time and read it aloud. The card reader should give the name of the shark first, followed by a few facts about that shark to give students time to find the shark on their SHARK BINGO board.
- The card reader needs to keep track of the shark names that have been chosen and read, so they may be reviewed to verify the winner.
- Students find the shark on their SHARK BINGO sheet and cover it (or simply cross out the word if game is only to be played once).
- The first student that has a vertical, horizontal or diagonal row of shark names covered indicates so by saying "SHARK!"
- The sharks are then reviewed to make sure they were correct.

***Teacher Tip:** You can make a permanent classroom set of laminated SHARK BINGO boards with shark names randomly placed in each square.

Name: _____

Date: _____

S H A R K

		FREE SPACE 		

SHARK BINGO PLAYING CARDS

*Cut apart
and mix up!*

Common Thresher Shark:

- Known for its 10 foot tail
- Stuns and herds fish with its long tail
- Warm-blooded
- Feeds on squid & schooling fish
- Prefers to stay towards the top of deep bodies of water

Six-gilled Shark:

- Can grow up to 16 feet long
- Has six pairs of gills instead of the average of five
- Has one dorsal fin at the back of its body
- Also known as a cow shark or mud shark
- Deep water shark

Shortfin Mako Shark:

- Bluish gray on top part of body and white on the belly
- Has extremely sharp teeth, that stick out even when its mouth is shut
- Feeds on sharks, swordfish and tuna
- Jumps high in the air to escape fishing hooks
- Fastest of all the sharks as it can swim over 30 mph

Great Hammerhead Shark:

- Eyes are at opposite sides of its rectangular shaped head
- Feeds on crustaceans, octopuses, rays and small sharks
- Usually found around tropical reefs
- Can give birth to over 40 pups in one litter
- Has a heightened sense of electro-reception

SHARK BINGO PLAYING CARDS

*Cut apart
and mix up!*

Bull Shark:

- Can grow up to 11 feet long and over 200 pounds
- Gray to brown in color with a white belly
- Feeds on fish, dolphins, sea turtles and other sharks
- Found in fresh and salt water
- Aggressive species

Nurse Shark:

- Has long, fleshy appendages called barbels that hang below its snout
- Feeds on crab, lobster, urchins and fish
- Usually found near rocky reefs, mudflats and sandbars
- Enjoys laying on the ocean floor
- Nocturnal animal

Great White Shark:

- Can grow over 20 feet long and weigh over 6600 pounds
- Has a robust, large, conical snout
- Feeds on seals, sea lions, sea turtles and other sharks
- Found in all the oceans
- Strong and powerful swimmer

Epaulette Shark:

- Usually under 3 feet long
- "Walks" by wriggling its body and pushing with its paired fins
- Chews its food for 5-10 minutes
- Found in shallow water on coral reefs or in tidal pools
- Most active at dusk and dawn

SHARK BINGO PLAYING CARDS

*Cut apart
and mix up!*

Ragged Tooth Shark:

- Can grow up to 10 feet long; females are slightly larger than males
- Gray or bronze in color with white belly
- Also known as the sand tiger shark or the grey nurse shark
- Slow moving and calm
- Holds air in its stomach to make sure it doesn't roll over or sink to the bottom of the ocean

Basking Shark:

- Second largest shark in the world
- Mouth opens up to 3 feet wide
- Feeds on plankton
- Inhabits subpolar and temperate seas
- Keeps its mouth open to catch whatever it swims through

Longnose Sawshark:

- Can grow up to 5 feet long and 18.7 pounds; females are slightly larger than males
- Has a long snout edged with sharp teeth that alternate in size
- Has a pair of barbels in the middle of the snout that are used to detect prey
- Has two dorsal fins, but lacks an anal fin
- Feeds on various types of fish, crustaceans and squid

Tiger Shark:

- Can grow up to 25 feet long
- Dark, tiger-like blotches and stripes cover the body of the young giving the species its name
- Largest recorded weight was over 3000 pounds
- Feeds on fish, mollusks, crustaceans, sea turtles, seabirds and mammals
- Also known as sea tiger

SHARK BINGO PLAYING CARDS

*Cut apart
and mix up!*

Zebra Shark:

- Adults can grow to be between 6.6 feet to 11.5 feet
- Adults can weigh over 60 pounds
- Has stripes on its body when its young
- Skin becomes more spotted as it grows up
- Feeds on small fish, crabs, shrimp, and other small invertebrates

Whitetip Reef:

- Adults can grow up to 5 feet
- Has a slender body, broad head and white-tipped dorsal and tail fins
- Feeds on bony fish, crustaceans, and octopuses
- Rests in caves for most of the day and hunts in groups at night
- Gill pumping keeps water flowing through its gills, even when they are motionless on the sea floor

Cookiecutter Shark:

- Males can grow to a maximum of 16.5 inches, while females grow to 22 inches
- Glows because of light-emitting organs in its skin called photophores
- Feeds on tuna, stingrays, other sharks
- Name comes from the cookie cutter-like wounds it leaves in its prey
- Lives at 3200 feet below the ocean's surface during the day but migrates vertically at night to feed

Leopard Shark:

- Can grow to about 4 or 5 feet
- Known for its distinctive dark spots and saddle type markings
- Feeds on crabs, shrimp, clams, octopuses, and fish
- Forms large schools generally segregated by age and sex
- Ovoviviparous species meaning that it produces eggs that develop and hatch internally, and therefore gives birth to live young

SHARK BINGO PLAYING CARDS

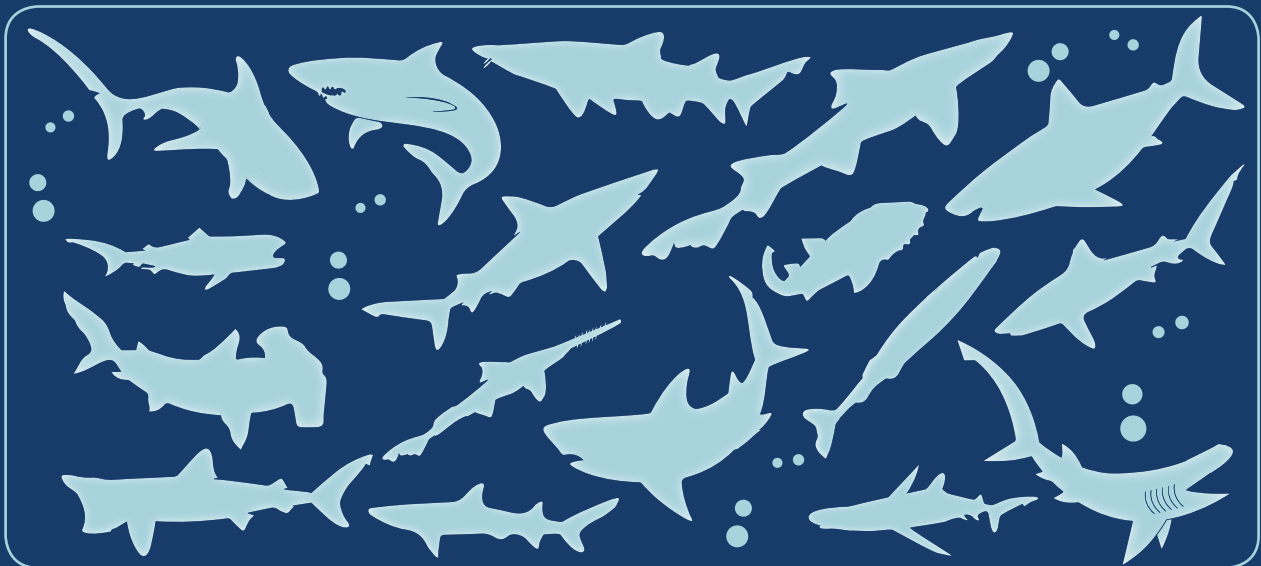
*Cut apart
and mix up!*

Greenland Shark:

- Can grow to 21 feet and 2,200 pounds
- Coloration can range from pale creamy to blackish-brown
- Feeds on smaller sharks, skates, eels, herring, capelin, Arctic char, cod, and mammals
- Also known as the gurry shark, or grey shark
- Inhabits the waters of the North Atlantic Ocean and Arctic Ocean

Copper Shark:

- Skilled predator that often hunts in large groups
- Uses senses of vibration and electric fields to hunt
- Adults feed on bony fish, squid, octopuses, and small sharks and rays
- Juveniles feed on jellyfish and crustaceans
- Also known as narrowtooth shark, bronze shark, cocktail shark, bronze whaler, and New Zealand whaler



SHARK LAB

SINK OR SWIM

Bony fish have swim bladders to help them move up or down vertically in the water or remain at a uniform depth. The swim bladder works by varying the amount of gas it contains, giving the fish buoyancy. Sharks, on the other hand, do not have a swim bladder. So what keeps a shark from sinking?

Materials:

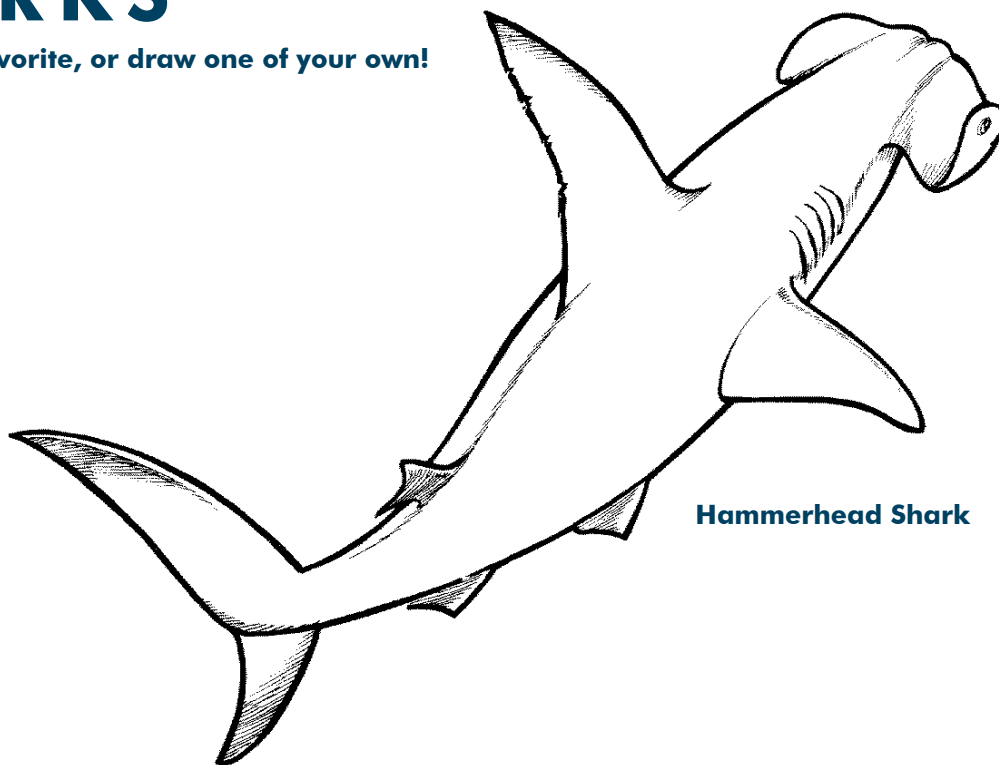
- Toilet paper tube
- 3 coins
- Clear packing tape
- Glue stick
- A paper shark (drawn or printed from the included handout)
- 1/3 cup of vegetable oil
- Funnel
- 12 inch inflatable balloon
- Sink, plastic bin or bucket filled with water
- Lab sheet

Procedure:

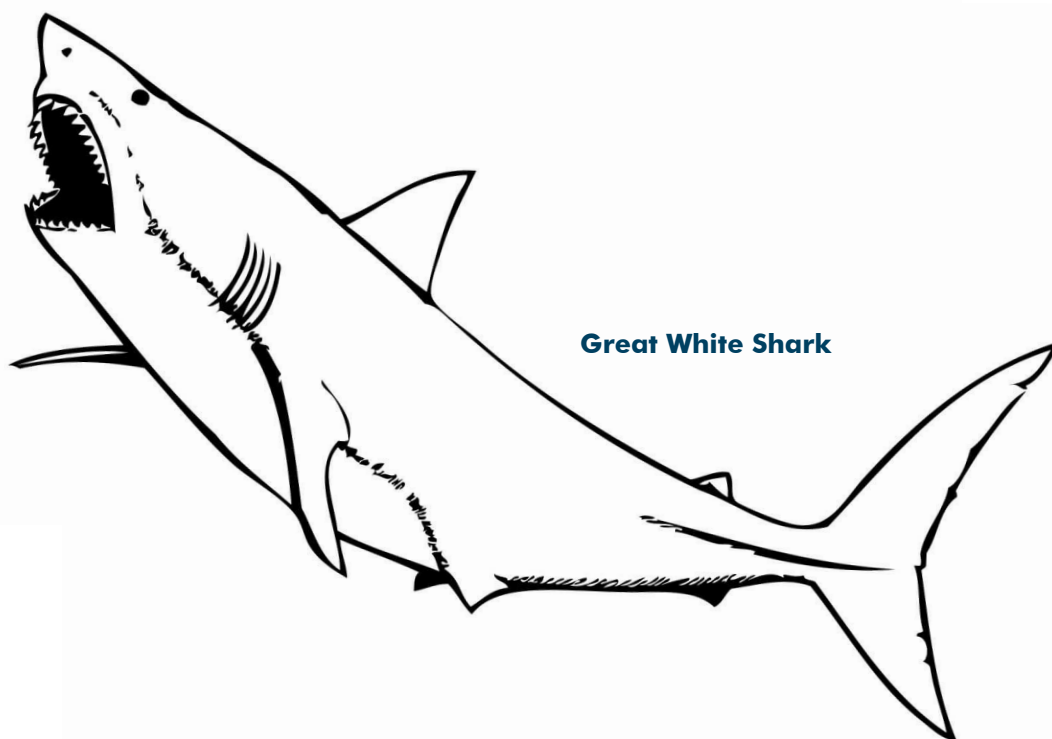
- Print out a paper shark using the included handout, or draw one of your own. Color your shark and cut it out.
- Attach your shark to the toilet paper tube using a glue stick or small piece of tape.
- Wrap clear packing tape around the tube so it covers the whole shark.
- Place three coins across the bottom side of the tube and tape them in place as well.
- Fill a sink, plastic bin, or bucket with water. Gently place your shark in the water and observe what happens. Remove your shark from the water.
- Carefully fill a balloon with 1/3 cup of vegetable oil (using a funnel will help with this step). Tie off the balloon once it is full.
- Gently insert the balloon into the toilet paper tube. Center it as much as possible.
- Place your shark in the water again and observe what happens this time. Is your shark able to stay afloat?

SHARKS

Choose your favorite, or draw one of your own!



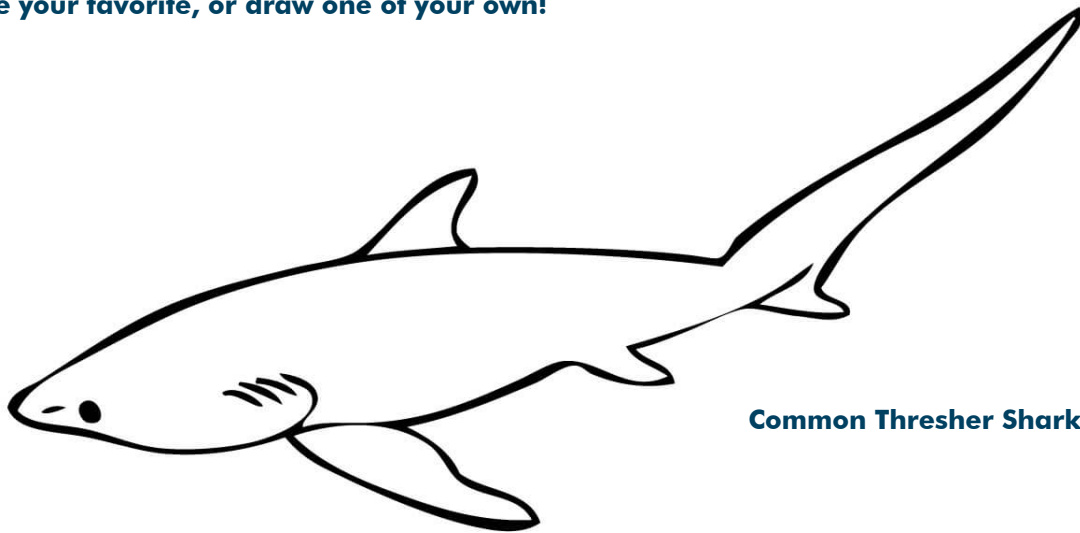
Hammerhead Shark



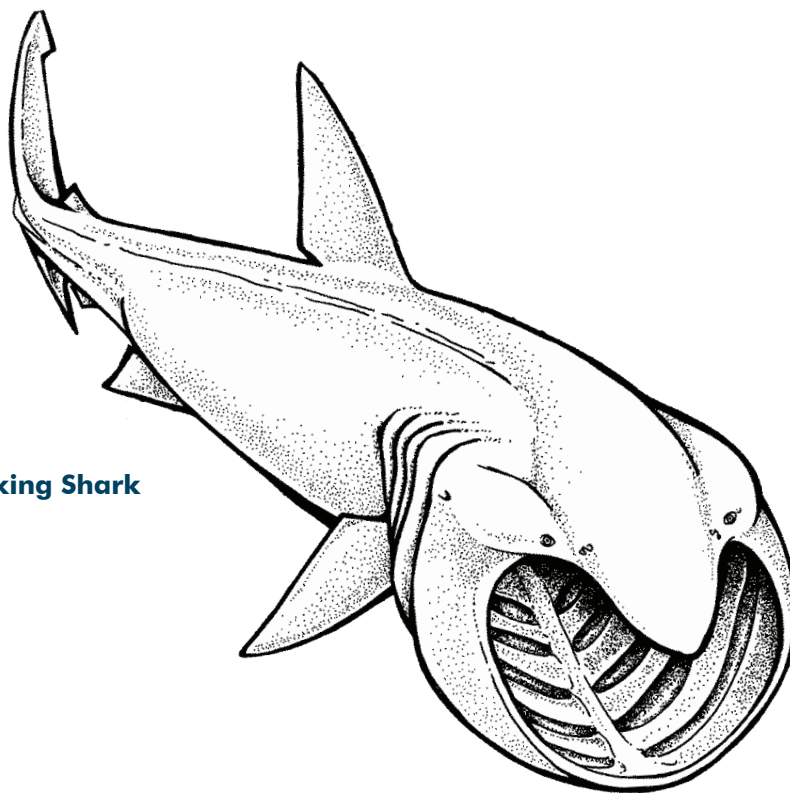
Great White Shark

SHARKS

Choose your favorite, or draw one of your own!



Common Thresher Shark



Basking Shark

Name: _____

Date: _____

SHARK LAB

SINK OR SWIM

1) What happened the first time you put your shark in the water?

2) Why do you think this happened?

3) What do you predict will happen when you put your shark in the water with the oil filled balloon inside it?

4) Explain why you think this will happen.

5) What actually happened the second time you put your shark in the water?

6) Why do you think this happened?

SHARK LAB

SINK OR SWIM

Explanation:

Did you know that the oil contained in a shark's liver is what keeps it from sinking to the bottom of the ocean? Sharks are buoyant because their liver oil isn't as dense as the surrounding water. In fact, some sharks have livers that account for up to 25% of their entire weight. Real sharks must also swim constantly to avoid sinking.

In this activity, the weight of the coins represents the high density of a real shark, and causes the handmade shark to sink. Adding the oil-filled balloon to the shark represents the shark's liver and makes the shark buoyant.

Density is a physical property of matter and refers to the mass or "heaviness" of an object with a constant volume. The density of an object is often compared to the density of water. In other words, does an object float or sink? If an object is able to float in water or another type of liquid, it is considered to have **buoyancy**.



SHARK LAB

SNIFF-O-RAMA

How well can sharks smell?

Sharks have an extremely acute sense of smell. Nearly two thirds of a shark's brain is devoted to the sense of smell. They can detect extremely small quantities of certain substances, especially blood, in the water. Fish give off a certain odor when they are in distress, which is easily detected by sharks. They can detect odors up to one mile away.

Sharks have odor-detecting cells inside their nostrils. They can smell odors in very low concentrations—for example: a great white shark can smell one drop of blood in 100 gallons of water.

This activity will allow you to use your sense of smell just like a shark.

Materials:

- **Several (5–10) different opaque containers, jars or vials with lids (you should not be able to see the contents through the container)**
- **Masking tape**
- **Marker**
- **Fragrant items—select familiar scents that students will recognize (ex. cinnamon, rose petals, orange slices, lemon slices, vinegar, peppermint extract, vanilla extract, coffee, pine needles, ginger, garlic, onion)**
- **Lab sheet**

Procedure:

- **Label each container by number using masking tape and marker**
- **Fill each container with different fragrant items**
- **One at a time, have students take turns sniffing the containers**
- **Have students record their answers on their lab sheet**
- **After every student has had a turn sniffing all the containers, go over the contents**

Name: _____

Date: _____

SHARK LAB

SINK OR SWIM

Sniff each container and try to identify what you smell. Record your answers on the table below.

What I Think is in the Container	What Was Actually in the Container
1.	1.
2.	2.
3.	3.
4.	4.
5.	5.
6.	6.
7.	7.
8.	8.
9.	9.
10.	10.

ANSWER KEY

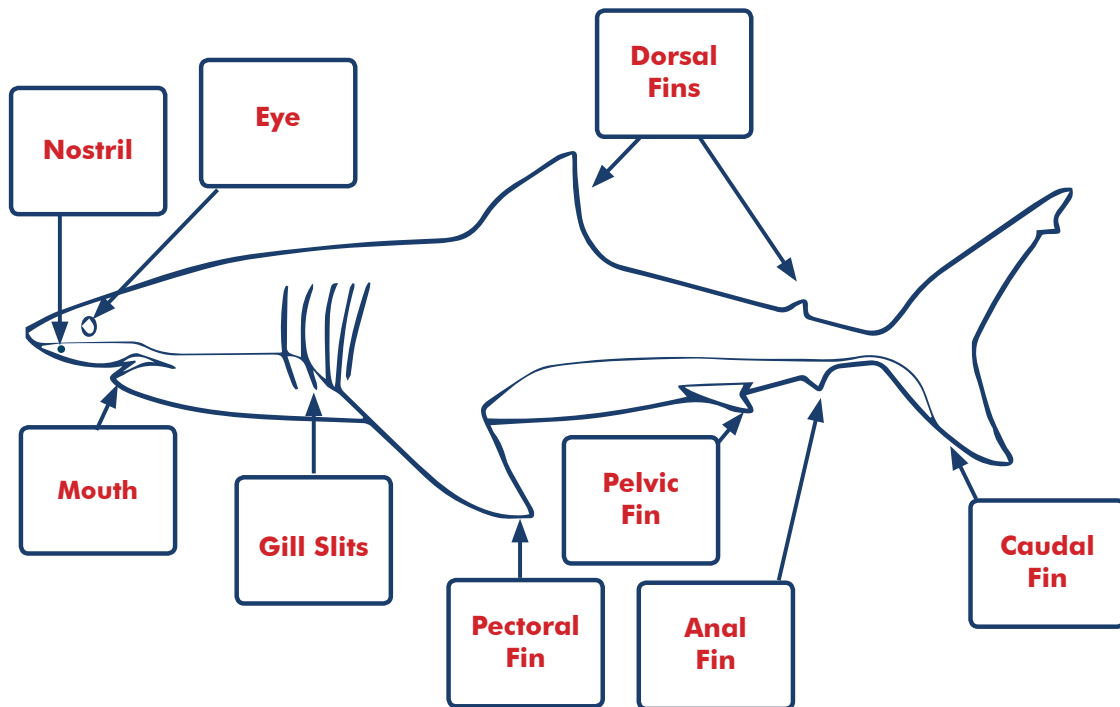
FIN-TASTIC FACT OR FICTION?

1. -
2. +
3. +
4. -
5. +
6. -
7. +
8. +
9. -
10. +

SHARK ADAPTATIONS FINSTAGRAM POSTS

1. **Common Thresher Shark**
2. **Tasselled Wobbegong**
3. **Epaulette Shark**
4. **Hammerhead Shark**
5. **Great White Shark**
6. **Basking Shark**

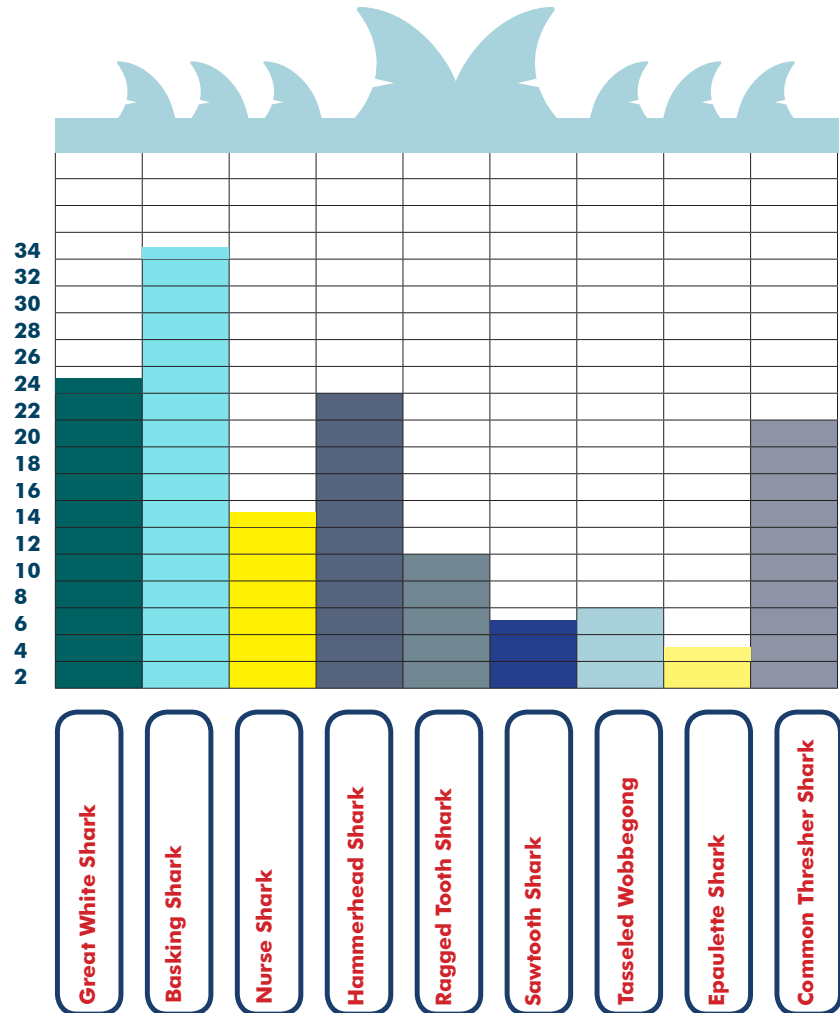
GREAT WHITE SHARK ANATOMY



ANSWER KEY

SHARK LENGTH GRAPHING ACTIVITY:

1. **Basking Shark**
2. **Epaulette Shark**
3. **Common Thresher Shark**
4. **Tasselled Wobbegong**
5. **Basking Shark**
6. **Epaulette Shark**
7. **3 feet longer**
8. **23 feet shorter**



SHARK LAB RESOURCES

SINK OR SWIM:

www.connectionsacademy.com/resources/instructographics/shark-science-activity

SMELL - O - RAMA:

www.connectionsacademy.com/resources/instructographics/shark-science-activity

The BBC logo, consisting of the letters 'B', 'B', and 'C' each inside a white square, is positioned at the top center of the image. The background is a dark blue, underwater scene with light rays filtering down from the surface.

BBC

SHARK

A 4-D EXPERIENCE®