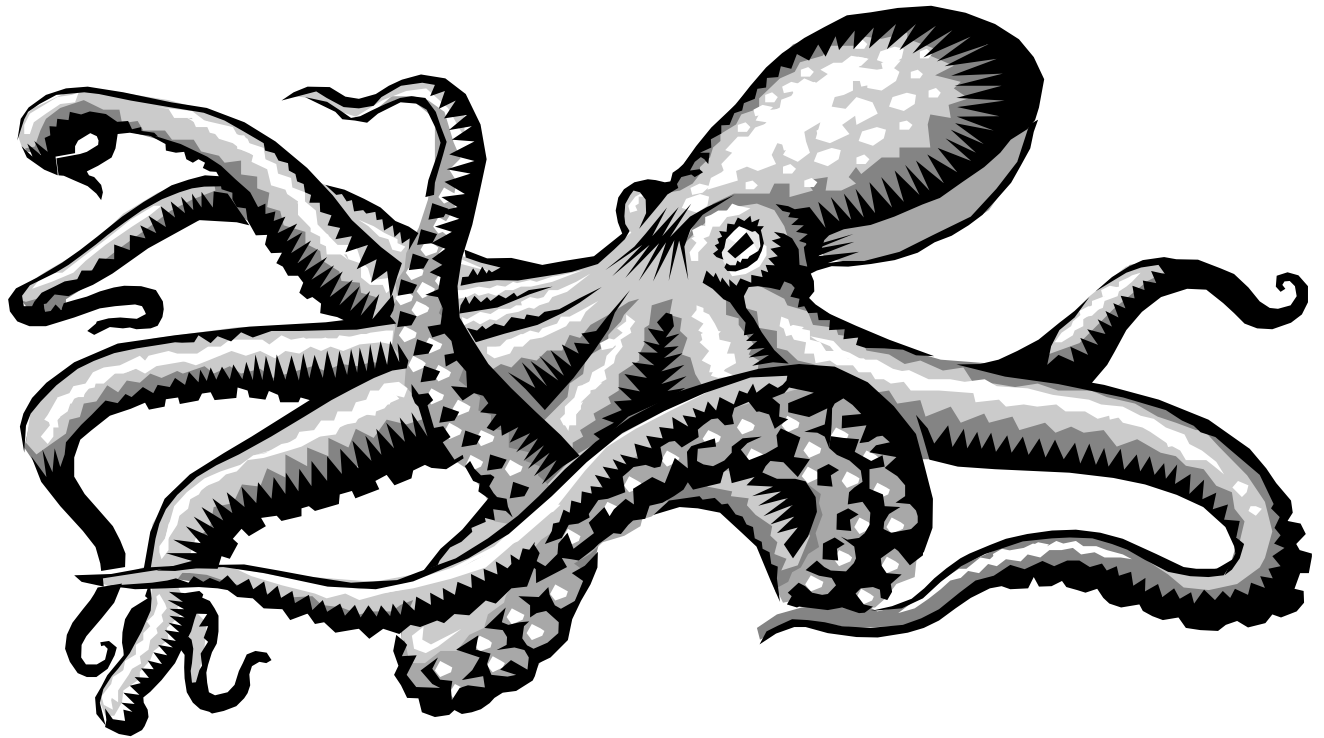


Aquatic Wonders



Teacher Idea Packet

Pittsburgh Zoo & PPG Aquarium

Aquatic Wonders Teacher Idea Packet

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Background Information

Approximately seventy percent of the earth is covered by water. About 97% of this water is held by the oceans. Only 1% is accessible to us humans as fresh water in rivers, streams and lakes. The other 2% is frozen in the icebergs of the arctic, and in the polar ice caps. That makes the oceans very important. Just imagine all of the things that live in all that water!

The oceans are home to more animals on our planet than dry land. There is also a wide variety of habitats in the oceans, just as there is on land. A habitat is where an animal finds its food, water, shelter and space – all the things it needs to survive. Some of these ocean habitats include coral reefs, the open ocean, polar regions, and deep sea.

Coral reefs are mostly found in the sunlight zone, in clean, warm, salty water that is shallow enough for sunlight to reach them. The average temperature for coral to grow successfully is between 78-82 degrees. A coral reef is made up from millions of skeletons of tiny animals called coral. These tiny animals produce shells made of calcium, the same stuff as our bones are made from, and when they die their shell stays to make another layer of the reef. Over many years all of the shells build up, and make the reef! The largest structure on earth created by living organisms is the Great Barrier Coral Reef, off the coast of Australia. The Great Barrier Reef is home to over 5,000 different species of animals and stretches over 1,250 miles, which is about the same distance from here to Dallas, Texas. Some animals that use the coral reef as their habitat are sea turtles, sea anemones, clownfish, and reef sharks.

Open ocean is a vast habitat of deep waters far from shore. These wide-open spaces allow for the growth, development and movement of the planet's largest inhabitants. It is home to such giants as the great whales (blue, humpback, and others), sea turtles, and most sharks, including the whale shark – the world's largest fish.

Deep Sea. If we were to travel to the deep sea, we would have to be transported in a submersible to a depth of 7 miles below the surface. The water pressure in the deep sea is equivalent to holding 50 jumbo jets over your body. Sunlight does not reach these dark waters, giving it the name "midnight zone." Without sunlight, not only is it dark, but it is also very cold. The average water temperature is a chilly 39 degrees. There is no plant or planktonic life, but it is home to some bizarre-looking creatures such as the deep-sea angler, deep-sea gulper, and lantern fish.

Polar Regions. Like the deep sea, these waters are extremely cold, with temperatures just above freezing. However, they are rich in planktonic, animal, and even plant life. This helps to maintain the often large creatures, including whales, polar bears, sea lions, and penguins, that call them home.

Kelp Forest. Giant kelp grows in the cool, shallow waters near the polar regions. Though it looks like a plant, kelp is really a brown algae. The kelp thallus (body) is anchored to the ocean floor with holdfasts, a structure that resembles roots, and grow up to and across the surface of the water. The blades (leafy structures) attach to the stipes (stem-like structures), and have an air pocket that keeps them afloat. Kelp can grow up to 18 inches a day, forming vast, dense forests that are home to many creatures including urchins, rockfish, horned sharks, and sea otters.

In order for animals to survive in these diverse conditions, each has its own unique adaptations. Fish, for example, are particularly well-suited for these conditions. Proof of this exists in the more than 25,000 species, each adapted to its environment. By comparison, there are less than 25,000 species of birds, mammals, reptiles and amphibians combined. One of the most striking differences between

fish and these other vertebrates is the presence of gills. Gills are able to take dissolved oxygen directly from the water, allowing the fish to “breathe” underwater. The streamlined shape of their bodies and fins allow them to move easily through the water. Scales and a mucus coat protect their bodies from injury. The lateral line is a sensory adaptation that is very sensitive to vibrations, helping the fish to orient itself.

Creatures of the coral reef have many adaptations that allow them to survive. Camouflage is a type of coloration that helps animals blend in with their surroundings, making them less noticeable to predators. The animals’ color and texture matches their habitat. An animal with false eye-spots usually has unusual color patterns that may hide the vulnerable parts of its body. The true eye is usually hidden with a band of color, and near the tail are two prominent “false eyes.” These “false eyes” may confuse a predator, causing them to attack the animal’s less vulnerable tail instead of its eyes, allowing it to escape in the opposite direction. Disruptive coloration is also common in coral reef fish. The different groupings of spots and stripes break up the body shape of the fish and help to conceal them against the coral reef. Some fish are so well protected by spines, poisons or armor that their bright colors warn other species to stay away. This is called warning coloration. Advertising colors and behaviors attract attention and alert other creatures to the special job they do. Predators recognize the bright color patterns and specialized movements. They do not harm them because of the useful services, such as cleaning, they perform. Bright colors can also be used to advertise for mates.

In the open ocean, size is a great deterrent to predation. This is also encouraged by the enormous amount of space available. Blue whales are the largest animals on the planet, at 100 feet long and weighing in at 100 tons. They eat about 4 tons of krill (a small, shrimp-like animal) a day. As the top predator, the shark’s job is to keep the populations of fish and other ocean life in check, including other sharks. If you peer into a shark’s mouth you may see up to fifteen rows of teeth! Only the first row of teeth is used for feeding; the others are replacements.

Fish of the deep sea have a special adaptation for living where they do. It is called bioluminescence. Bioluminescence is when an animal can produce its own light. The deep-sea does not receive any natural sunlight, so the bioluminescence is used as a lure by predators. The small light on the tip of the anglerfish just might fool other animals with its size. Smaller consumers may be attracted to the light and not be aware of the fact that it is dangling in front of the mouth of a hungry carnivore.

In the arctic polar waters, lives the largest jellyfish, the Lion’s Mane, reaching 8 feet in diameter with 200-foot long tentacles. Jellies can travel freely from the deep sea to the surface. Their body is about 97% water. This allows them to survive the extremes of temperature and pressure. Seventeen species of penguins live in the Southern Hemisphere (south of the equator). Penguins’ well-known black and white feathers are a protective coloration called counter-shading. When viewed from above, their dark back blends in with the darkness of the ocean. From below, it is difficult for predators to see light colored stomachs against the bright sunlit surface waters. Penguins are warm-blooded and need ways to retain their body heat. Under their layer of waterproof feathers, penguins have a thick layer of fat called blubber that works as a great form of insulation. Whales, polar bears, and sea lions also have blubber for insulation.

Creatures of the kelp forest use many of these adaptations. The sea otter does not have a layer of blubber to keep it warm in the chilly waters. Instead, it has the densest known fur, with between 800,000 and 1,000,000 hairs per square inch, which grows in a double layer. Air is trapped between these layers, providing insulation and buoyancy. The spectacular leafy sea dragon is a master of camouflage, resembling the kelp and seaweeds in which it lives.

Suggested Reading List PreK – K

Antarctica by Helen Cowcher

Baby Whales Drink Milk by Barbara Juster Ebsen

Big Al by Andrew Clements

Counting Penguins by Betsey Chessen and Pamela Chanko

Fish Book by Christopher Anglefish

Fish Eyes by Lois Ehlert

Fish Wish by Bob Barner

Fishes by Brian Wildsmith

A House for Hermit Crab by Eric Carle

Little Penguin by Patrick Benson

Little Polar Bear by Hans deBeer

Moving Day by Robert Kalan

Octopus' Den by Deirdre Langeland

The Rainbow Fish by Marcus Pfister

Sea Creatures by Pamela Chanko

Sharks by Betsy Chessen

Swimmy by Leo Lionni

The Underwater Alphabet Book by Jerry Pallotta

Winter Whale by Joanne Ryder

Suggested Reading List

Grades 1 – 3

Amazing Otters by National Geographic Society

Coral Reef Hideaway. The Story of a Clown Anemonefish by Don Boyle

Curious Clownfish by Eric Maddern

How to Hide an Octopus and Other Sea Creatures by Ruth Heller

The Magic School Bus on the Ocean Floor by Joanna Cole

Oceans by Seymour Simon

Otter on His Own by Doe Boyle

Our Ocean Home by Robert Lyn Nelson

Sea Elf by Joanne Ryder

Seal by Judy Allen

Seashore Animals by Michael Chinery

Swim for Cover by Sue Vyner

A Swim Through the Sea by Kristin Joy Pratt

Tammy Turtle by Suzanne Tate

Whale by Judy Allen

What is a Fish? by Barbara R. Stratton

Teacher Resources

Coral Reef by Barbara Taylor

Do Fish Get Thirsty? by New England Aquarium

Do Whales Ever? by Down East Books

Ecology, Usborne Science & Experiments by Richard Spurgeon

Look Closer – Coral Reef by Barbara Taylor

Looking at Penguins by Holiday House

Ranger Rick's Nature Scope: Diving into Oceans, Vol.4 No. 2 Ed. By Judy Braus

A Reef Comes to Life by N. Segaloff and P. Erickson

Sea Animals by Diane Williams

Sharks: The Perfect Predators by Howard Hall

Usborne Book of Ocean Facts by Usborne Publishing

Whales and Other Sea Mammals by Time Life Books

Web Resources

<http://people.whitman.edu/%7Eyancey/worms.html> - Deep-Sea Pages by Paul H. Yancey, Whitman College – Amazing pictures of deep sea creatures, links to amazing information

<http://www.divediscover.who.edu/index.html> - Dive and Discover: Expeditions to the Seafloor - Great site about Woods Hole Oceanographic Institution (WHOI)'s expeditions exploring hydrothermal vents off the Galapagos Islands. Great information, links to teacher materials and curriculum.

<http://www.extremescience.com/index.html> - Extreme Science - Great info and pictures about deep sea creatures, and a wealth of other science topics. Very kid friendly.

<http://www.mbayaq.org/> - Monterey Bay Aquarium – Amazing site! Includes web cams, online ocean animal field guide, teacher materials, games, and much, much more.

<http://oceanexplorer.noaa.gov/welcome.html> - National Oceanic and Atmospheric Administration (NOAA) – Comprehensive site including deep-sea technology, history, links to explorations of hydrothermal vents and the Lost City Hydrothermal Field, pictures, teacher materials and curriculum.

<http://earth.usc.edu/~stott/Catalina/Oceans.html> - University of Southern California – information about ocean currents and their relationship to climate.

<http://www.onr.navy.mil/> - Office of Naval Research – links to tons of information about the ocean, including currents, habitats, ocean life, salinity, technology, and much more. Also includes resources for teachers.

<http://www.nationalgeographic.com/seas/> - National Geographic: U.S. Marine Sanctuaries Expeditions – great info about Sylvia Earle and her sustainable seas research and exploration. Also includes a host of classroom ideas.

<http://oceanlink.island.net/> - Ocean Link – great site with information about ocean life, habitats, tides, conservation, as well as careers and the opportunity to ask an oceanographer! Very kid-friendly.

<http://www.mos.org/oceans/planet/index.html> - Oceans Alive! - comprehensive website with information about geography, tides, ocean life, exploration, and resources for teachers!

http://www.woodrow.org/teachers/help/temp_presentations/GaoNew/relatedactivities.htm - Woodrow Wilson National Fellowship Foundation – Links to original research and experiments to do in the classroom on a variety of ocean topics

www.coral.org – Coral Reef Alliance - conservation oriented. Lots of information, links to resources online and available to order. Suggestions for how to get involved.

www.fisheyeview.com - Fish-eye View Cam – incredible pictures, time-lapse photography, and live feed of coral reefs.

www.pbs.org/oceanrealm - Secrets of the Ocean Realm (PBS) – amazing website! Tons of resources for kids and teachers. Based on the PBS series.

Vocabulary

adaptation – behavior or physical feature that improves an organism's chance for survival in its habitat

advertising – coloration or behavior that attracts attention

bioluminescence – the emission of visible light by living organisms

conservation – the wise use of natural resources in order to ensure continued availability to future generations

coral – colonial marine animals often characterized by tentacles, stinging cells, a hollow gut, and an internal skeleton, often forming reefs or islands

counter-shading – color pattern with dark backs and light bellies

disruptive coloration – spots and stripes which break up the body shape of an animal

dorsal fin – the single fin along the dorsal (top) side of the fish

ecosystem – an ecological community together with its environment, functioning as a unit

false eye-spots – unusual color patterns to hide vulnerable parts of an animal's body

glacier – a huge mass of ice formed from compacted snow that flows over a land mass

gills – respiration organ in fish used to take dissolved oxygen directly from the water

habitat – the place an animal lives

invertebrate – an animal without a backbone

kelp - fast-growing brown algae that forms dense patches of growth (forests) in cool, shallow waters.

lateral line – sense organs running along the side of most fishes; detects vibrations of sound and movement

operculum – the specialized scale covering and protecting the gills

pectoral fins – a pair of fins on the sides, immediately behind the gill slit. Used for fine movement backwards and forward.

pelvic fins – a pair of fins on the underside, just forward of the ventral fin

scales – overlapping structures covering the body of most fishes; used for protection

ventral fin – a single fin along the ventral (bottom) side of a fish

vertebrate – an animal with a backbone

warning coloration – use of bright or easy to see colors and patterns to warn other animals to stay away, often because of poisons, spines, or bad tastes

Ocean Poems

Time: 30 minutes

Skills: listening, verbal, language arts

Objectives:

TSW describe physical characteristics of fish.

TSW describe where fish live and/or how they move.

TSW create a poem about fish and their characteristics.

Materials: Sample poem, paper, crayons or markers

Procedures:

Anticipatory Set:

Select one of the following poem forms and copy it on the board:

Deep Blue Sea Chant

What do you see in the deep blue sea?

I see a(n) ____ in the deep blue sea.

What else do you see in the deep blue sea?

I see a(n) ____ and he's looking at me!

What do you see in the deep blue sea?

I see a lobster in the deep blue sea.

What else do you see in the deep blue sea?

I see a shark and he's looking at me!

What and Where Poem

Title

(Noun) here, (noun) there,

(Noun), (noun) everywhere!

Adjective noun participle

Adjective noun participle

Adjective noun participle

Adjective noun participle

Noun prepositional phrase

Noun prepositional phrase

Noun prepositional phrase

Noun prepositional phrase

Noun, Noun, Noun!

Fish

Fish here, fish there,

Fish, fish everywhere!

Red fish swimming,

Blue fish darting,

Big fish hunting,

Little fish hiding.

Fish in the ocean,

Fish in the reef,

Fish in the seaweed,

Fish in the sand.

Fish, fish, fish!

Add-on poem

Noun

Adjective noun

Adjective adjective noun

Adjective adjective adjective noun

Fish

Scaly fish

Six scaly fish

Six slippery scaly fish

Diamante

Noun

Adjective, adjective

Participle, participle, participle

Four word prepositional phrase

Participle, participle, participle

Adjective, adjective

Noun (synonym to subject)

shark

powerful, hungry

swimming, smelling, hunting

in the deep ocean

chasing, biting, eating

graceful, efficient

predator

Read the poem aloud to the students. Have older students identify the parts of speech used. Write the “recipe” on the board for younger students or use one of the poem fill-in sheets.

Development of Lesson:

1. Brainstorm a list of fish. Depending on the poem style selected, come up with words to describe where they live, how they move, or what they look like. Write these words next to the animals’ names.
2. Have the students select an animal and write their poem. You may wish to present all three styles to older students and allow them to choose for themselves. For the youngest students, write the poem as a class.
3. Have the students illustrate their poem.

Summary:

Share your poems as a class.

Extensions:

- Publish your poems as a class collection. Bind them together and design a cover.
- Share your poems with another class.

Deep Blue Sea Chant

Create a chant about the deep blue sea with a partner. Draw the animals below.

Written by: _____

Illustrated by: _____

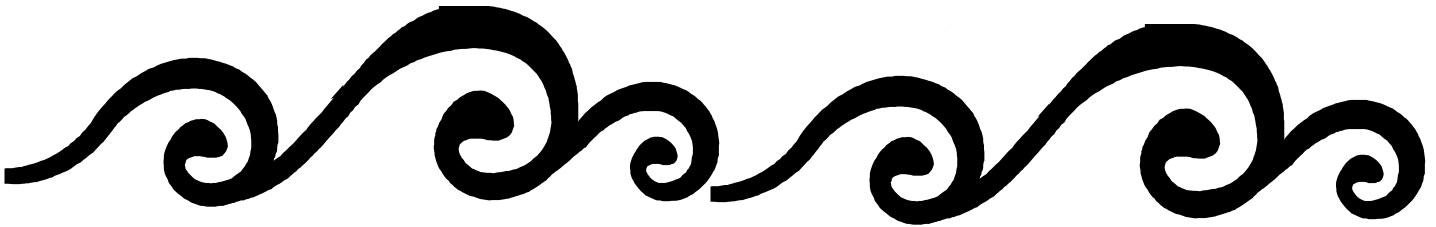
What do you see in the deep blue sea?

I see a(n) _____ in the deep blue sea.

What else do you see down in the deep blue sea?

I see a(n) _____

And he's looking at me!



What and Where poem

Title: _____

_____ here, _____ there,
_____, _____, everywhere!

_____ _____ _____ ing,
_____ _____ _____ ing,
_____ _____ _____ ing,
_____ _____ _____ ing,

_____ in the _____

_____ in the _____

_____ in the _____

_____ in the _____

_____, _____, _____!

Add-on Poem

Title: _____

_____.

_____.

_____.

_____.

_____.

Diamante

Title _____

_____, _____

_____ing, _____ing, _____ing

_____ing, _____ing, _____ing

_____, _____

Fish Tales

Time: 30 minutes

Skills: creative expression, verbal, fine motor

Objectives:

TSW listen to a fish story.

TSW identify fish behaviors and adaptations in the story.

TSW write their own fish tale.

Materials: Fish story book such as Big Al by Andrew Clements, shape book pattern, writing paper, pencils, stapler, crayons, markers, sequins, glitter, glue

Procedures:

Before you start: Enlarge the shape book pattern, and copy it onto colored paper.

Anticipatory Set:

Review fish adaptations and behavior. Read “Big Al” or another fish story to the class. What kind of adaptations did Big Al have/what made Big Al different from the other fish? What did the other fish do? What did Big Al do differently? How did Big Al’s adaptations help him in the story?

Development of Lesson:

1. Have the students brainstorm some other fish adaptations and how those adaptations help them to survive. You may wish to write these on the board.
2. Staple writing paper to the colored fish patterns, and cut out to make a shape book. You may wish to have this already done for younger students. For the very youngest students, cut out the writing paper and staple a sheet below, rather than behind, the fish pattern.
3. Have the students select one and write a story about how that adaptation helped their fish. The very youngest students can tell their stories and have the teacher record them.
4. Decorate the cover of the book with sequins, glitter, markers, crayons, etc.

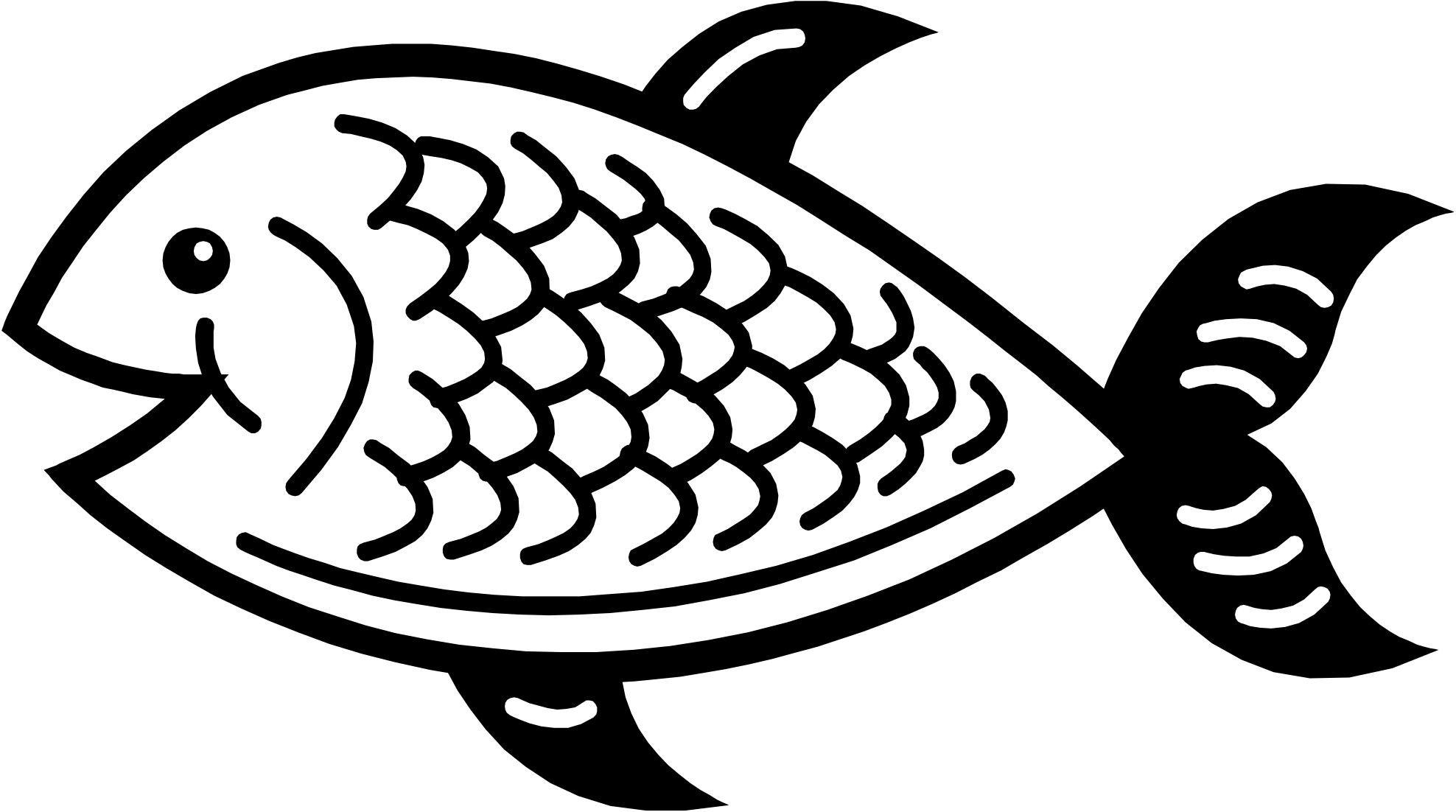
Summary:

Share your stories!

Extensions:

- Stretch your creative muscles even more and write some “Ocean Poems,” too!
- Host a fishy literature fair! Gather books, stories, and poems about fish and other ocean creatures and invite other classes to join you.

Shape Book Pattern



Songs

Content Area: Music, Science, Language Arts

Music is a great way to sharpen grammatical skills and, at the same time, present new material or check for understanding in a new and exciting way. Kids really connect with it, so it also makes a great memory tool. Not only that, it's FUN!

Who is It?

Sung to "Ten Little Indians"

Who has scales and fins and swims?
Who has scales and fins and swims?
Who has scales and fins and swims?
It's a fish!

Who is gray and has sharp teeth? . . .
It's a shark!

Who wears a shell and has big pincers? . . .
It's a crab!

Who has a shell and swims with flippers? . . .
It's a turtle!

Who has a spout to breathe the air? . . .
It's a whale!

The Deep Blue Ocean

Sung to "You are My Sunshine"

Down in the ocean, the deep blue ocean,
Live many creatures of different sorts.
Crabs, lobsters, turtles,
Fish, sharks and dolphins,
All swim together in the sea.

I'm a Little Fishy

Sung to "I'm a Little Teapot"

I'm a little fishy, I can swim.
Here is my tail and here is my fin.
When I want to have fun with my friends,
I wiggle my tail and dive right in!
In the Sea
Sung to "Up on the Housetop"

Deep in the ocean, in the sea,
Live many animals that we see.
Sharks and fish and turtles, too,
Crabs and jellyfish to name a few.
Ho, ho, ho, watch them go,
Some swim fast and some swim slow.
Deep in the ocean, in the sea,
Live many animals that we see.

Down By the Sea

Sung to "Down By The Bay"

Down by the sea,
Where the coral reefs grow,
Back to the tide pools, I dare not go
For if I do, my brother will say,
"Did you ever see a turtle wearing a girdle?
Down by the sea."

Did you ever see a . . .
shark who's afraid of the dark?
shrimp walk with a limp?
barracuda swim to Bermuda?
whale with a polka dot tail?
fish making a wish?
shell ringing a bell?
sea star driving a car?
sea otter use a fly swatter?

Octopus Arms

Fingerplay

One little octopus lived in the sea.
(Hold up one finger)

He jumped in a boat with you and me.
(Jump. Point to a friend and then to self)

He lifted his arms
(Lift arms)

He waved all eight 1-2-3-4-5-6-7-8
(Count and wave arms eight times)

He said with a smile
(Smile really big)

"I think you're great!"
(Give two thumbs up)

Peter Penguin

Chant

Peter, Peter Penguin marching by,
Toes turned out and his head held high.
With a long black coat
And a clean white vest,
Peter, Peter Penguin you're the BEST!

Where Is the Water?

Time: 30 minutes

Skills: geography, visual, fine motor, verbal, gross motor

Objectives:

- TSW locate the world's oceans.
- TSW color a map to identify land and water.
- TSW name animals that live in the ocean.
- TSW identify sources of fresh water (older students).

Materials: "Where is the Water?" map, crayons or markers or pencils, inflatable globe,

Procedures:

Anticipatory Set:

Have students toss the globe around the room. When a student catches it, ask him or her to locate one of the planet's oceans, and/or name an ocean animal. Older students may also locate major rivers and lakes. Continue until each student has had a turn.

Development of Lesson:

1. Have students color the oceans blue and the land brown.
2. Have the students color the lakes and seas, and trace the rivers in blue.
3. Older students may label the oceans, seas, rivers, lakes and continents on the map. Place the following list on the board:

Continents

1. North America
2. South America
3. Africa
4. Asia
5. Europe
6. Australia
7. Antarctica

Oceans

8. Atlantic Ocean
9. Pacific Ocean
10. Indian Ocean
11. Arctic Ocean

Seas

12. Mediterranean Sea
13. Red Sea
14. Black Sea
15. Caspian Sea

Lakes

- A. Great Lakes
(Huron, Ontario,
Michigan, Erie,
Superior)

Rivers

- B. Mississippi River
- C. Missouri River
- D. Amazon River
- E. Nile River
- F. Niger River
- G. Congo River
- H. Danube River
- I. Volga River
- J. Yangtze River

Summary:

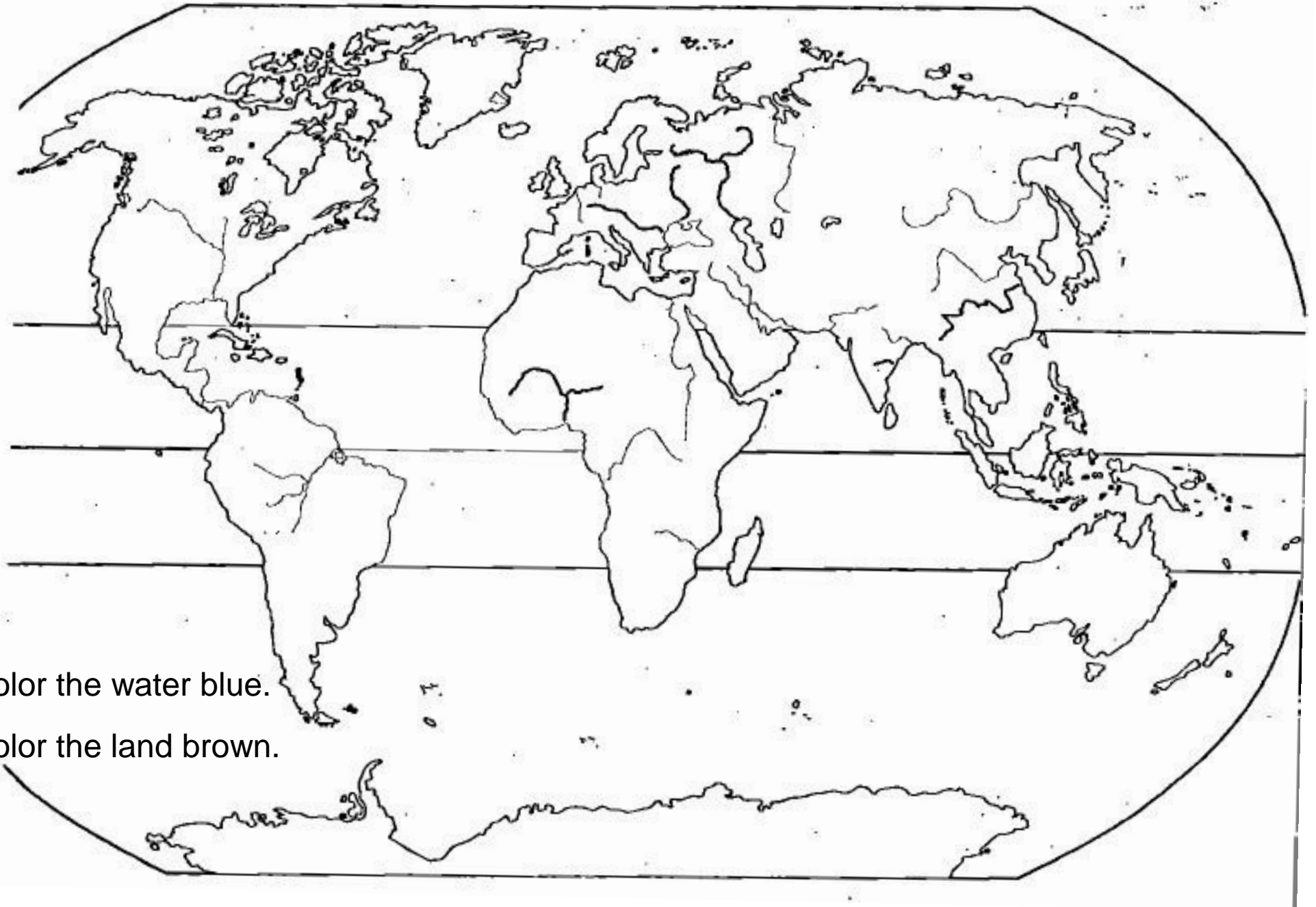
Discuss the amount of water compared to land. Which is there more of? (water – about 70%). Is there more ocean water or fresh water? (ocean – only about 1% is useable by us).

Extensions:

- Conduct your own water experiments! Do the "Fresh or Salty?" activities.
- Make a graph showing the amount of water and land or fresh and salt water.
- Cut out water pictures from magazines and make a collage. You may want to make one for both fresh and salt water.

Name _____

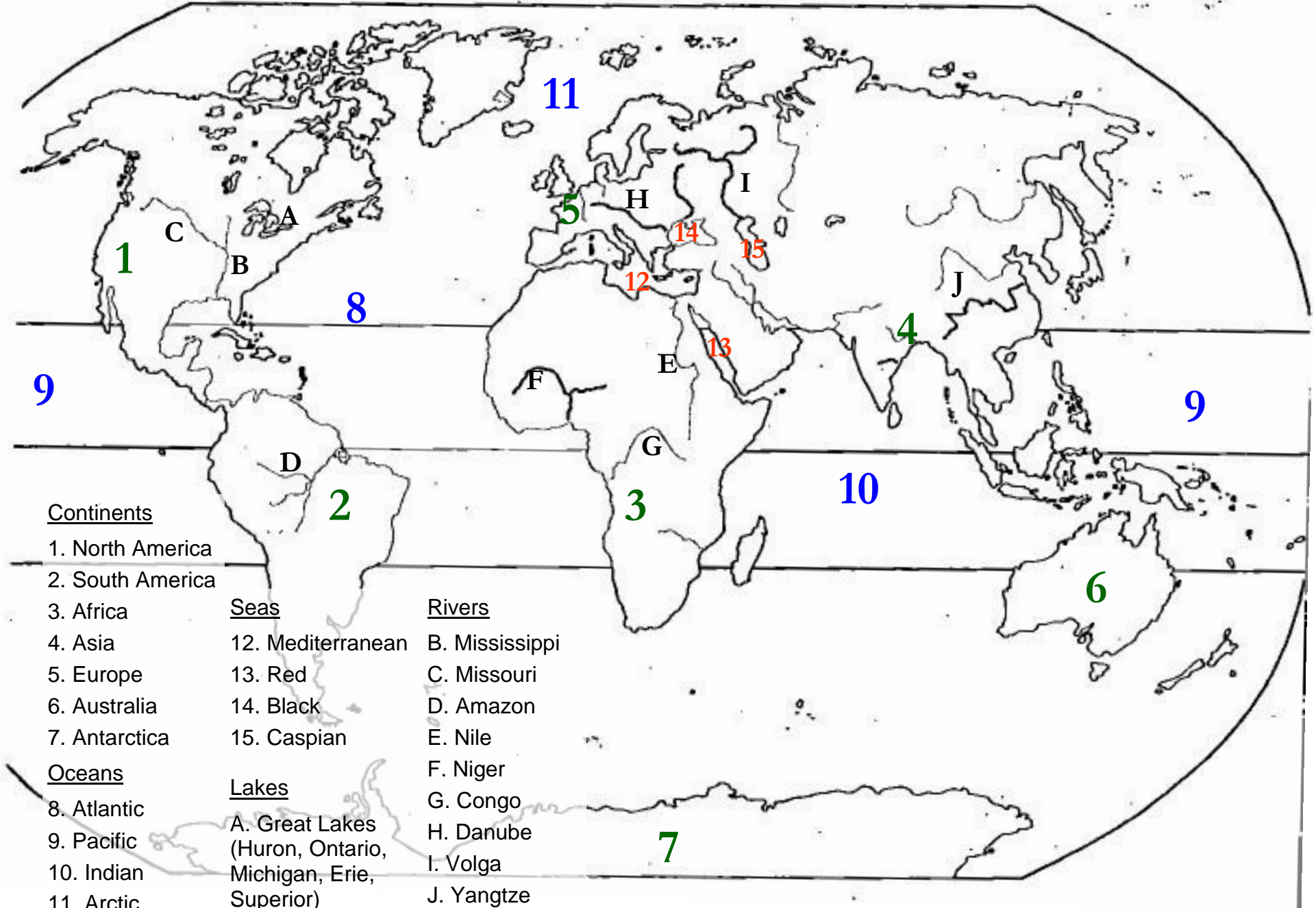
Where Is the Water?



Color the water blue.

Color the land brown.

Where Is the Water?



Continents

1. North America
2. South America
3. Africa
4. Asia
5. Europe
6. Australia
7. Antarctica

Seas

12. Mediterranean
13. Red
14. Black
15. Caspian

Rivers

- B. Mississippi
- C. Missouri
- D. Amazon
- E. Nile
- F. Niger
- G. Congo
- H. Danube
- I. Volga
- J. Yangtze

Lakes

- A. Great Lakes (Huron, Ontario, Michigan, Erie, Superior)

Fresh or Salty?

Time: 30 minutes

Skills: predicting, fine motor, sensory

Objectives:

TSW locate sources of water on a globe.

TSW identify at least two physical properties of salt and fresh water.

TSW differentiate between salt and fresh water.

Materials: globe, 2 clean 2-liter bottles, tap water, clear plastic cups labeled "A" and "B" (1 set/group), eggs* (1/group), spoons (1/group), salt, yellow food coloring, blue food coloring, paper towels

*You may wish to hard boil the eggs. This will not affect the outcome of the experiment.

Procedures:

Before You Start: Prepare the "river" water: Fill one 2-liter bottle with tap water. Add a few drops of yellow food coloring to tint it. Prepare the "ocean" water: Fill one 2-liter bottle with tap water. Add 1c. salt and shake until completely dissolved. Add a few drops of blue food coloring to tint it.

Anticipatory Set:

Show the globe. What is this? What color do you see the most of? (blue) What does that color represent? (water) Water covers most (71%) of our planet. Is all the water the same? Let's find out!

Development of Lesson:

1. Divide the students into cooperative groups. For the very youngest students, you may wish to do these experiments all together.
2. Show the two 2 liter bottles of water to the students. Explain that one of them is like the water from the ocean and one is like water from the river.
3. Conduct the experiments to discover how salt water is different from fresh water. Have the paper towels on hand to take care of any spills.

Experiment #1: Taste Test

Question: Does ocean water taste like river water?

Have the students predict if they will taste the same or different.

Test:

1. Have everyone wash their hands.
2. Give each group 2 cups. Pour a small amount of river (fresh) water in cup "A." Pour a small amount of ocean (salt) water in cup "B." Do not reveal which is which.
3. Have each member of the group dip their right index finger in cup "A" and taste it.
4. Repeat for cup "B" using the left index finger.

Conclusions:

Did ocean water taste the same as river water? How are they different? (salty v. fresh) Which came from the ocean? Which came from the river? Is all water good to drink?

Experiment #2: Will it Float?

Question: Do things float the same in salt and fresh water?

Ask the students if they have ever gone to a swimming pool. Ask if they have ever gone swimming in the ocean. Do you float the same way? Have the students predict the outcome.

Test:

1. Give each group an egg and a spoon. Refill the cups to the halfway mark, if needed.
2. Place the egg in cup "A." Observe what happens. (The egg should sink)
3. Use the spoon to carefully remove the egg.
4. Place the egg in cup "B." Observe what happens. (The egg should float)

Conclusions:

Did the egg float the same in both? In which did it float better? Things float better when they are lighter (less dense) than the water they are in.

Experiment #3: Why Did it Float?

***You will probably want to do this as a demonstration for younger students. It requires very careful transfer of liquid and may frustrate them.*

Question: Why did the egg float better in salt water?

What will happen if we put salt and fresh water together? Have the students predict the outcome.

Test:

1. Use the spoon to carefully transfer fresh water from cup "A" into the salt water in cup "B." Observe what happens. (The fresh water should layer on top of the salt)
2. Ask: What if we try it the other way and pour the salt water into the fresh water? Have the students predict the outcome.
3. Gently pour salt water from cup "B" into the fresh water in cup "A." Observe what happens. (The water should appear to mix at first, but then separate into layers)

Conclusions:

What happened? Why do you think it happened? Remind the students of the egg experiment. Since things float better when they are lighter (less dense) than what they are in, what does that tell you about the fresh water? (It is lighter (less dense) than the salt water.

Summary:

Review your conclusions. Point out that almost all (97%) of Earth's water is in the oceans, leaving only a small amount for us to use (1% available, 2% frozen in glaciers and ice caps). Do you think we should take care of the water we have? Brainstorm ways to conserve water (turn off the water after washing hands, take short showers, let a grown up know if there is a leaky faucet, turn water off while brushing your teeth, put clean clothes away – not back in the laundry, only run the dishwasher when it is full, etc.).

Extensions:

- Make posters showing ways to conserve water. Hang them up around your school.
- Make a water saving pledge. Choose a water conservation action and do it!
- Make a water savers chart. When students practice water conservation actions (turn off the water after washing hands, reporting drips, etc.) put a sticker on the chart. When the chart is full, have a celebration.

Something's Fishy Around Here!

Time: 30 minutes

Skills: labeling, verbal, fine motor

Objectives:

TSW identify the parts of a fish.

TSW apply vocabulary to label the fish parts.

TSW assemble the fish body.

Materials: Vocabulary sheets (older students), sentence strips with fish body parts (younger), fish body sheet (blank and/or puzzle), blank paper, pencils, crayons or markers, scissors, glue, fish story book

Procedures:

Before You Start: Copy the fish body puzzle page. Cut along lines; make one set for each student. For younger students, you may wish to use the blank fish body and cut into fewer pieces: head, tail, and body or head, tail, back (dorsal fin) and belly (ventral fin).

Anticipatory Set:

Read a fish story to the class. Look at the pictures. Discuss the similarities and differences in the appearance of the fish.

Development of Lesson:

1. All fish have some common features. Have the students brainstorm what they are. Write them on the board, or use sentence strips. When they mention fins, point out that there is more than one kind. Your list should include:

Fins: pectoral	gills	mouth
dorsal	eyes	lateral line
ventral	scales	operculum (older students)
pelvic	tail (caudal fin)	

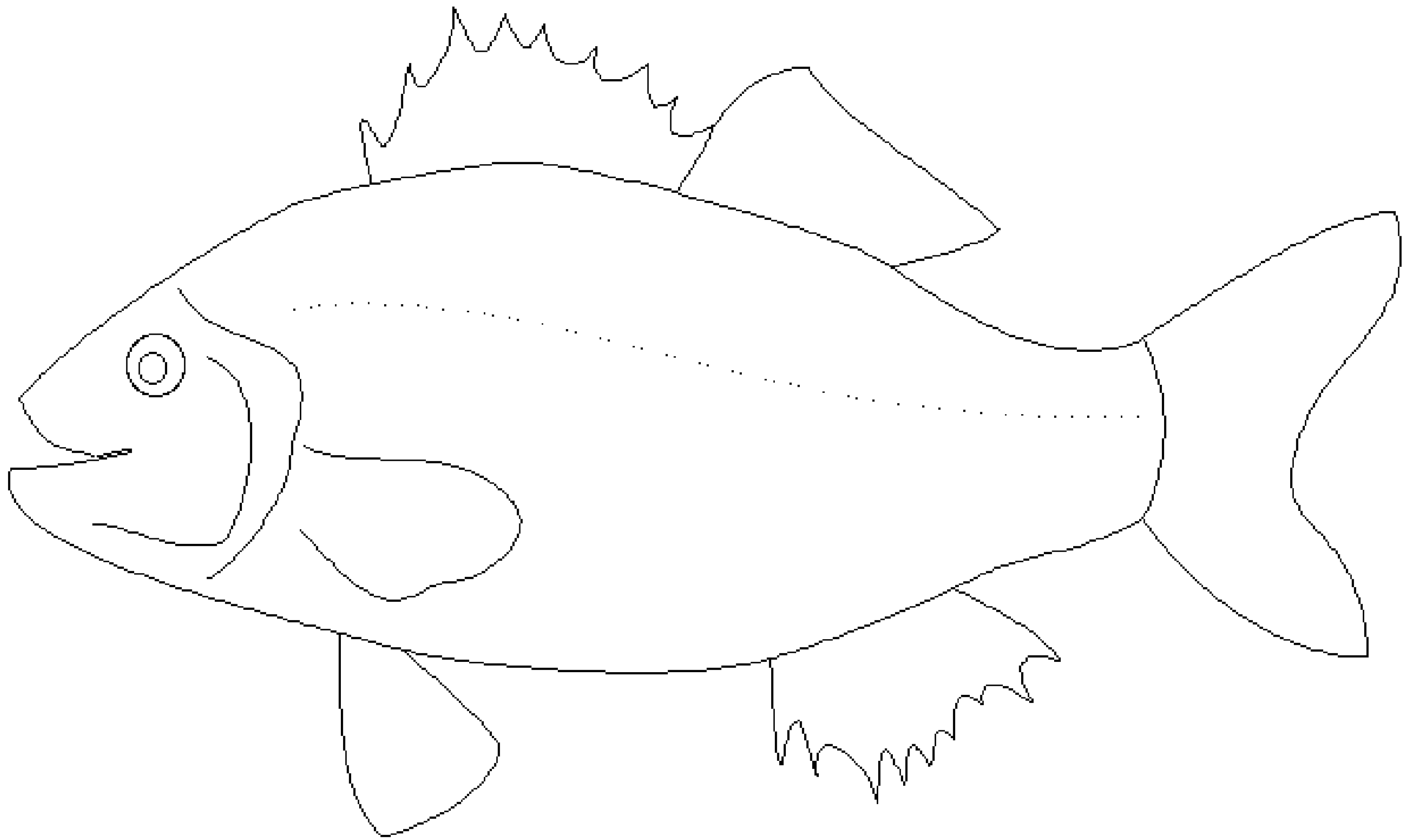
2. As the older students name the parts, write the definition next to the word on the board and/or use vocabulary sheets. For the younger students, put an enlarged fish body on the board. As the parts are named, add them to the body. Briefly explain what the parts do. Use the sentence strips to label the parts, if the children are readers.
3. Pass out the fish body pages. Have the older students use the list or the vocabulary sheet to label the parts of the fish.
4. Allow students to color and assemble their fish part puzzle.

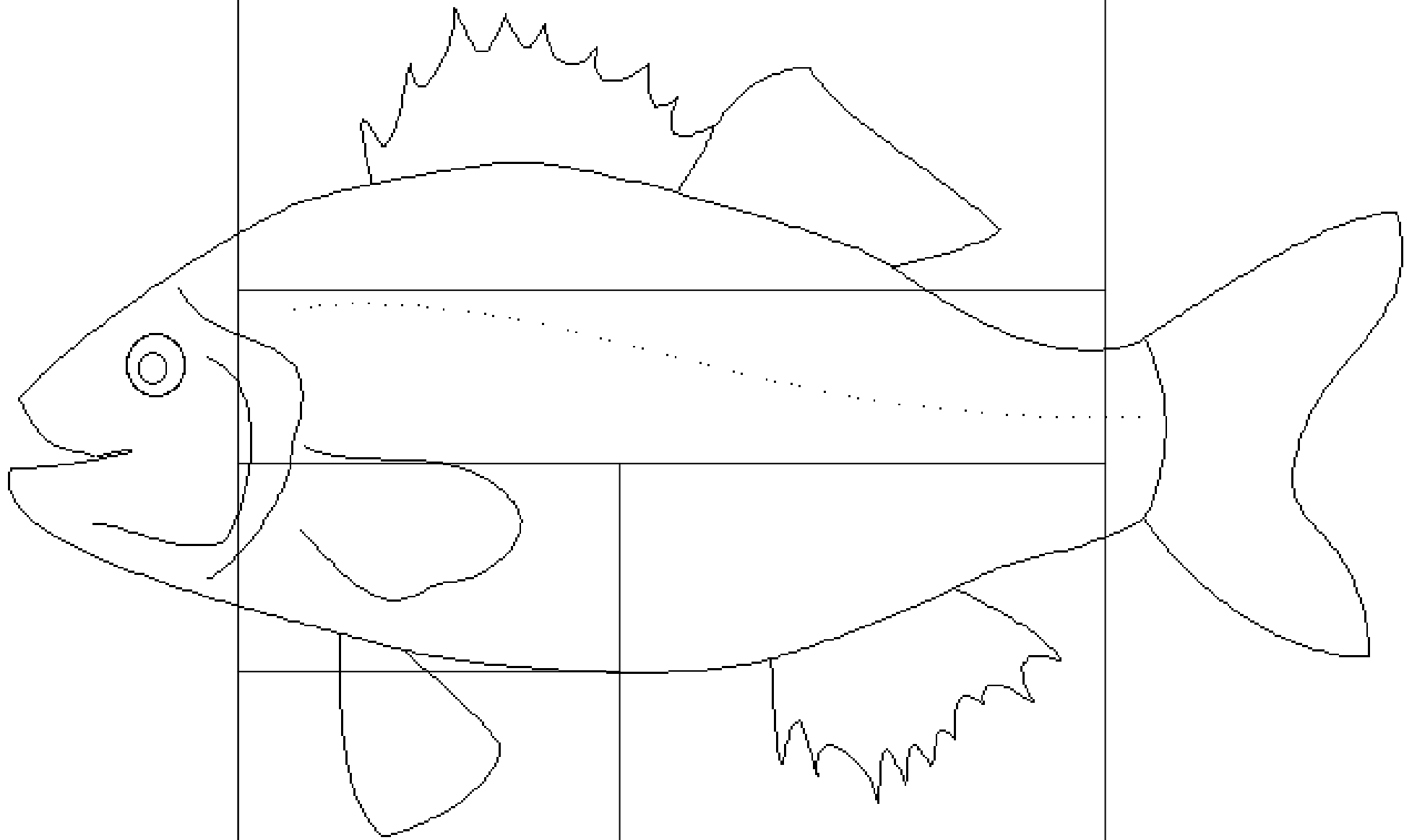
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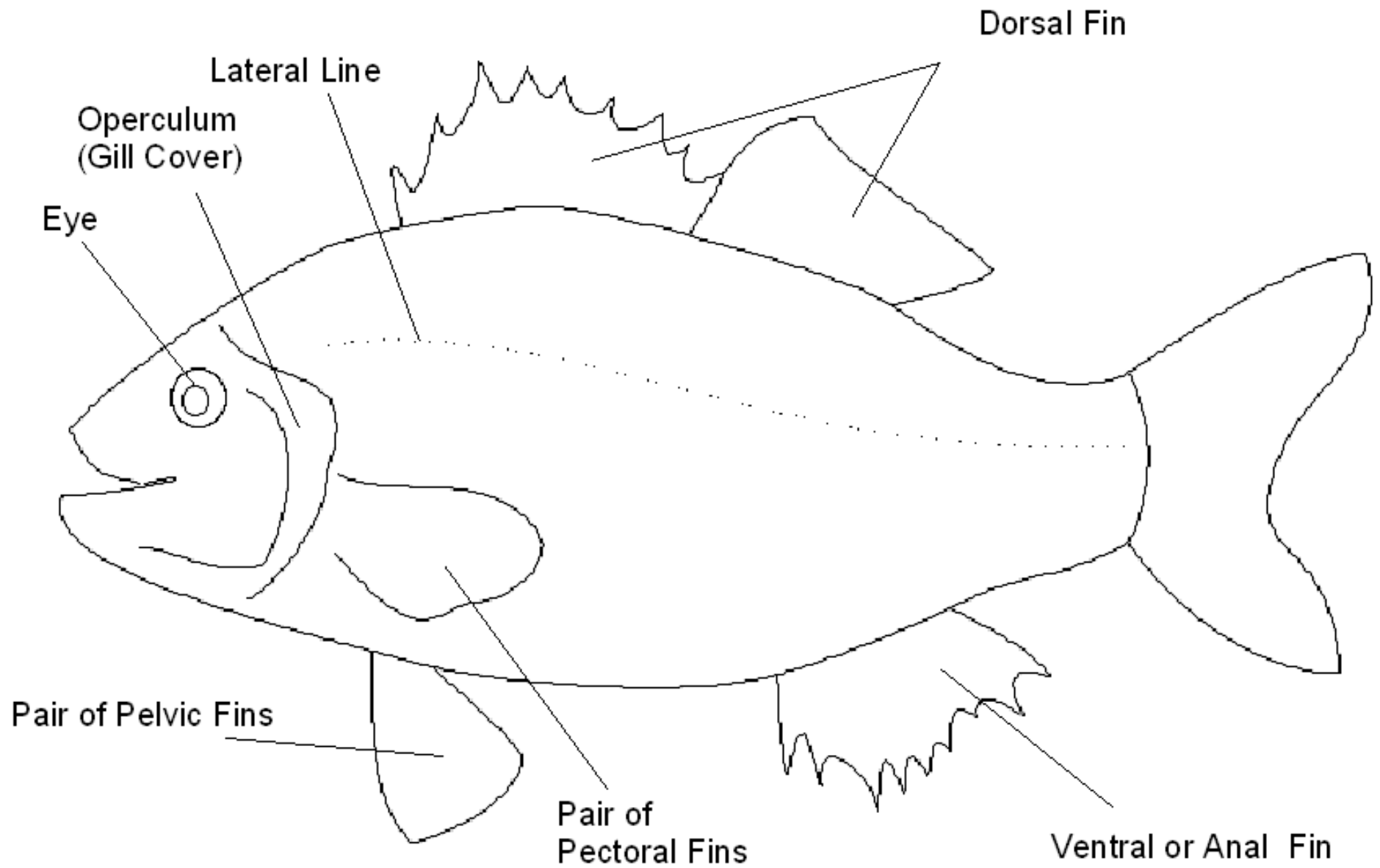
Review the parts of the fish with one of the games below. Hang the fish in your school.

Extensions:

- Older students can review fish anatomy with "Name that Part." Draw the outline of a fish on the board or use an unlabeled fish sheet, already assembled. The teacher reads the definition or description of one of the parts. The students identify the vocabulary word and its location on the fish body. This may be played individually or in teams.
- Younger students can review with "Fishing for Parts." Have an enlarged fish body, assembled and unlabeled, on the board. Have slips of paper with the names of the body part in a fishbowl. Students take turns pulling out a slip of paper. The teacher reads it, and the student must locate the part on the fish body. Return the slips to the bowl so that all can have a turn!







Fishing Responsibly

Grades 1 – 3

Time: 20 minutes

Skills: fine motor, problem solving, counting, sorting

Objectives:

- TSW name at least two ocean animals used for food.
- TSW describe at least two ways to catch fish.
- TSW identify problems associated with some fishing practices.
- TSW brainstorm possible solutions to those problems.

Materials: Can of tuna, small tub or bucket of water, paper plate, white and green styrofoam pieces (non-biodegradable packing peanuts work well), small net

Procedures:

Anticipatory Set:

Show the students the can of tuna fish. Ask them what it is. Have they ever eaten tuna? What other kinds of ocean animals do we eat? How do we get fish to eat? Ask them to come up with as many ways to catch fish as they can.

Development of Lesson:

1. Pass out the materials. Add water and styrofoam pieces to the bucket or tub. If you have the students work in cooperative groups, have one set for each one.
2. Each paper plate is a fishing boat. They are commercial fishermen who depend on the money they raise from tuna to support your family.
3. Use the net to make one attempt at catching as many “fish” (styrofoam pieces) as possible.
4. Look at your catch. Sort them by color.
5. The white styrofoam pieces are the tuna fish that you caught. How many tuna fish did you catch?
6. The green styrofoam pieces are dolphins that were accidentally caught in your net. How many dolphins did you catch? Did you want to catch dolphins? (if they students are not sure about this, remind them that they were trying to catch tunas)

Summary:

You may wish to explain to older students that the dolphins (and any other sea creatures, besides tuna, caught in the net) are called by-catch. These animals are thrown back overboard, but do not usually survive. How would you have fished differently knowing that the green pieces were dolphins? Have the students brainstorm possible solutions.

Extensions:

- Find out more about good seafood choices. Go online to www.seafoodwatch.org to find seafood fact sheets, seafood guides and much more provided by the Monterey Bay Aquarium.

Chill Out!

Time: 20 minutes

Skills: sensory, comparing, verbal

Objectives:

- TSW name at least two animals with blubber.
- TSW identify blubber as a cold climate adaptation.
- TSW evaluate the insulating properties of blubber.

Materials: polar animal book such as Little Penguin by Patrick Benson or Little Polar Bear by Hans deBeer, zip-lock type sandwich-sized baggies (NOT the easy-zip type), stapler, packing or duct tape, shortening, plastic tub or bucket, snow or ice cubes, water

Procedures:

Before You Start:

Make a blubber glove:

1. Take the zip-lock bag and add about ½ c. of shortening. DO NOT get shortening on the outside of the bag. Note: if you are going to have this set up in your room for several days as a discovery station, use a heavy freezer bag or it may break open and you will have a big mess!
2. Take another zip-lock bag and carefully turn it inside out. Be careful not to tear the sides as you do this. Put it inside the first bag, aligning the male and female sides of the zip-locks. DO NOT get shortening on the inside of the bag.
3. Zip the bags together. Reinforce the top with staples, if necessary, ABOVE THE ZIP-LOCK ONLY, smooth side of the staple facing out. Cover the top edge with duct tape, cuff the top, and reinforce again with duct tape.
4. Distribute the shortening inside the bag, making sure that the bottom and sides are covered.
5. Fill your tub with snow or ice water.

Anticipatory Set:

Read the story. What animal was the story about? What was the weather like where it lives? (cold, snowy, ice, etc.) What other animals live in the cold? (polar bears, penguins, sea lions, walruses, whales, etc.)

Development of Lesson:

1. What do we do when it is cold outside? (wear coats, mittens, etc.) How do you think the animals stay warm? (fur, feathers, etc.) Animals use fur and feathers, but some also have blubber. It is a thick layer of fat that keeps them warm, even when they swim in icy water! We are going to see how it works.
2. Show the blubber glove. Explain that this glove is filled with shortening, which will work like blubber.
3. Place the glove in the snow or ice water.
4. Have the students take turns trying on the glove. Put one hand in the glove and one hand in the snow.

Summary:

How did it feel when you put your hand in the snow/ice water? What happened when you put on the blubber glove? Discuss how the blubber helped keep their hand warm and relate it to the polar animals.

Extensions:

- Try other insulators, too! Make “gloves” out of feathers (you can often get old down jackets, comforters, or pillows at thrift stores, or use craft feathers), and quilt batting (to simulate fur). You could also try pet hair (beware of allergies) or wool. Have the students try the different gloves, and evaluate their effectiveness. Graph your results.

Same or Different
Grades PreK – K
Time: 30 minutes

Skills: sorting, observation, pattern recognition

Objectives:

TSW recognize a pattern

TSW sort animals based on characteristics.

Materials: Toy ocean animals, Same or Different student page, crayons

Procedures:

Anticipatory Set:

Display several aquatic animal toys. Ask the students to sort them according to their characteristics (size, color, fins, etc.).

Development of Lesson:

1. Distribute the “Same or Different” coloring pages. Explain to the students that the fish tanks are only supposed to have one kind of fish in each tank. They are to find the one that is different from the rest and circle it.
2. After the animals are circled, the students can use their crayons to color all of them.

Summary:

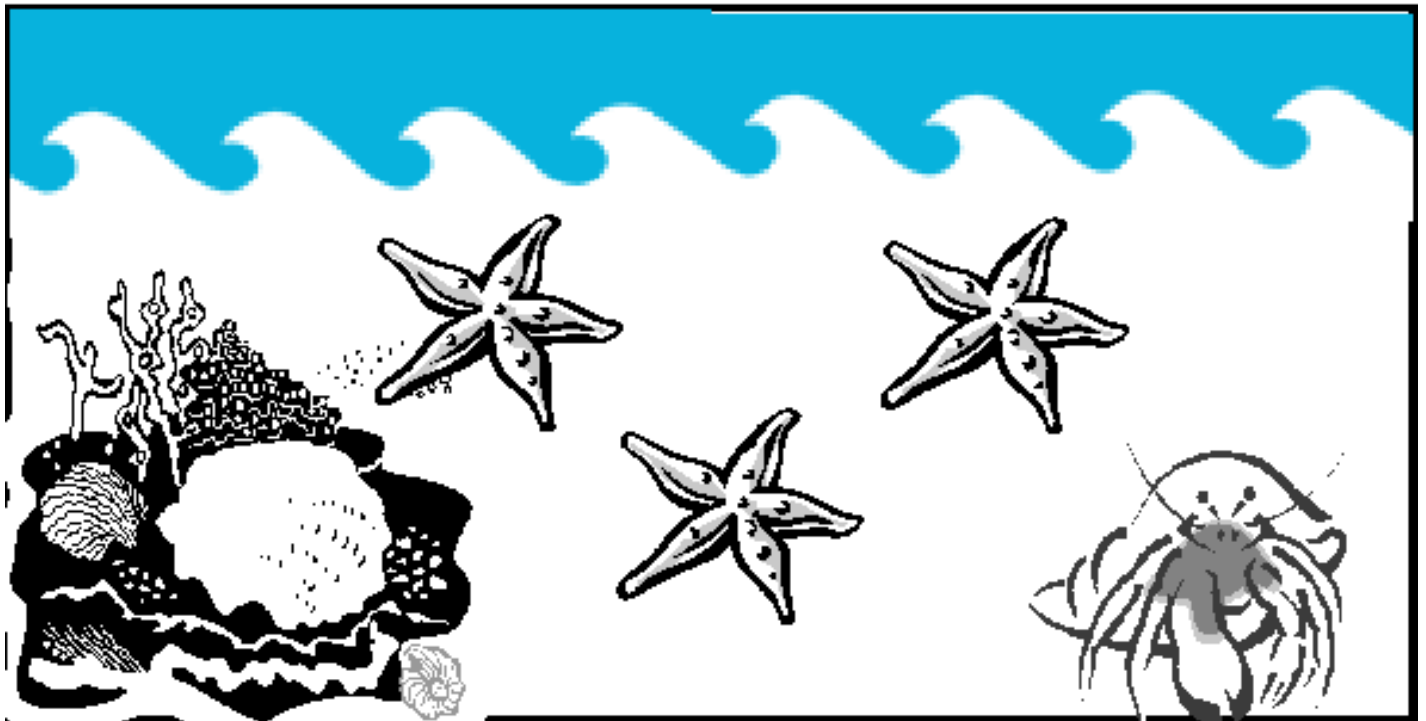
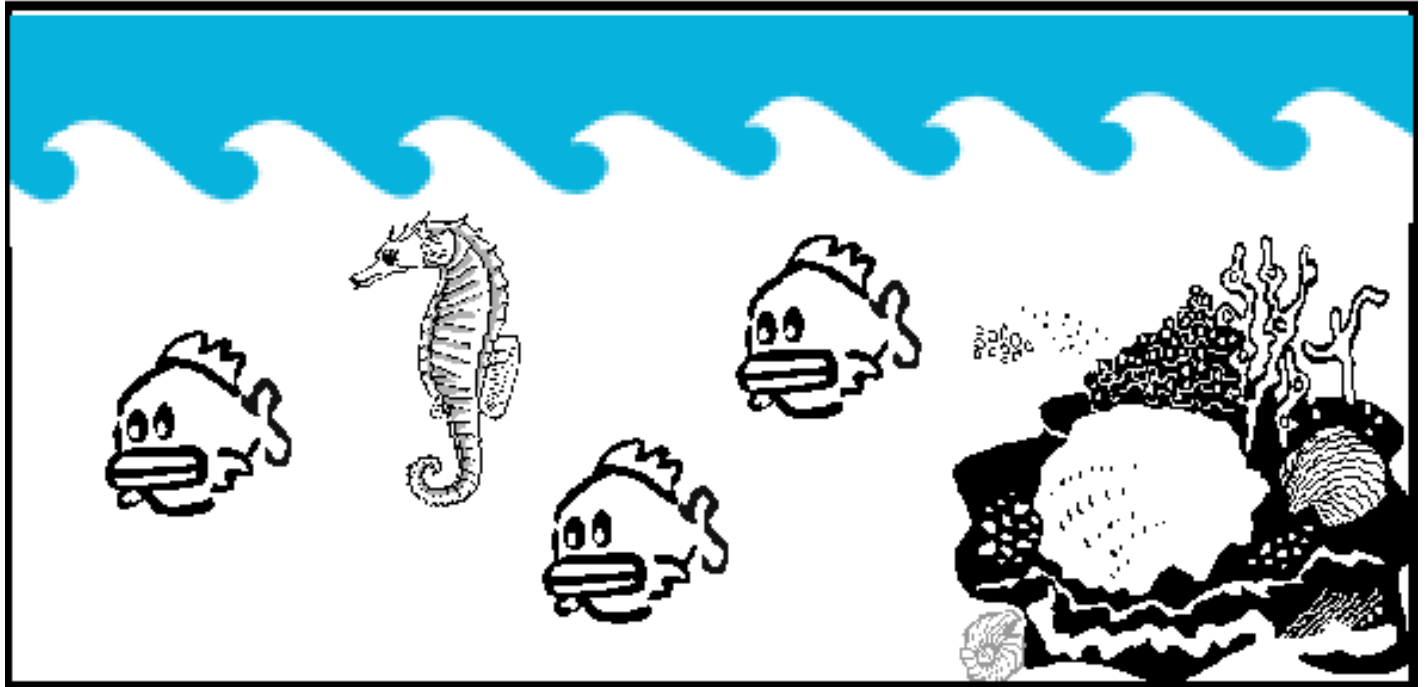
Ask the students to identify the animals on their coloring sheet.

Extensions:

- The students can draw their own fish tank and animals.
- Display a fish tank in your classroom.

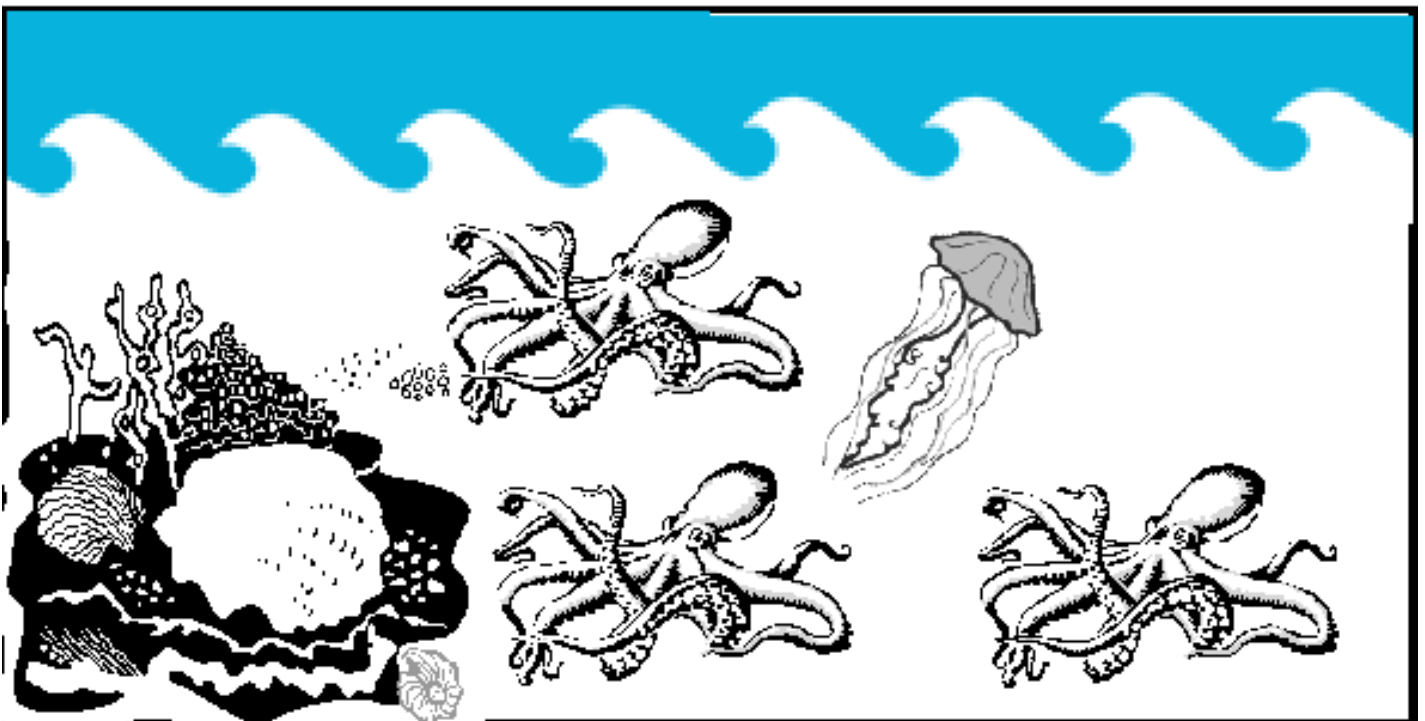
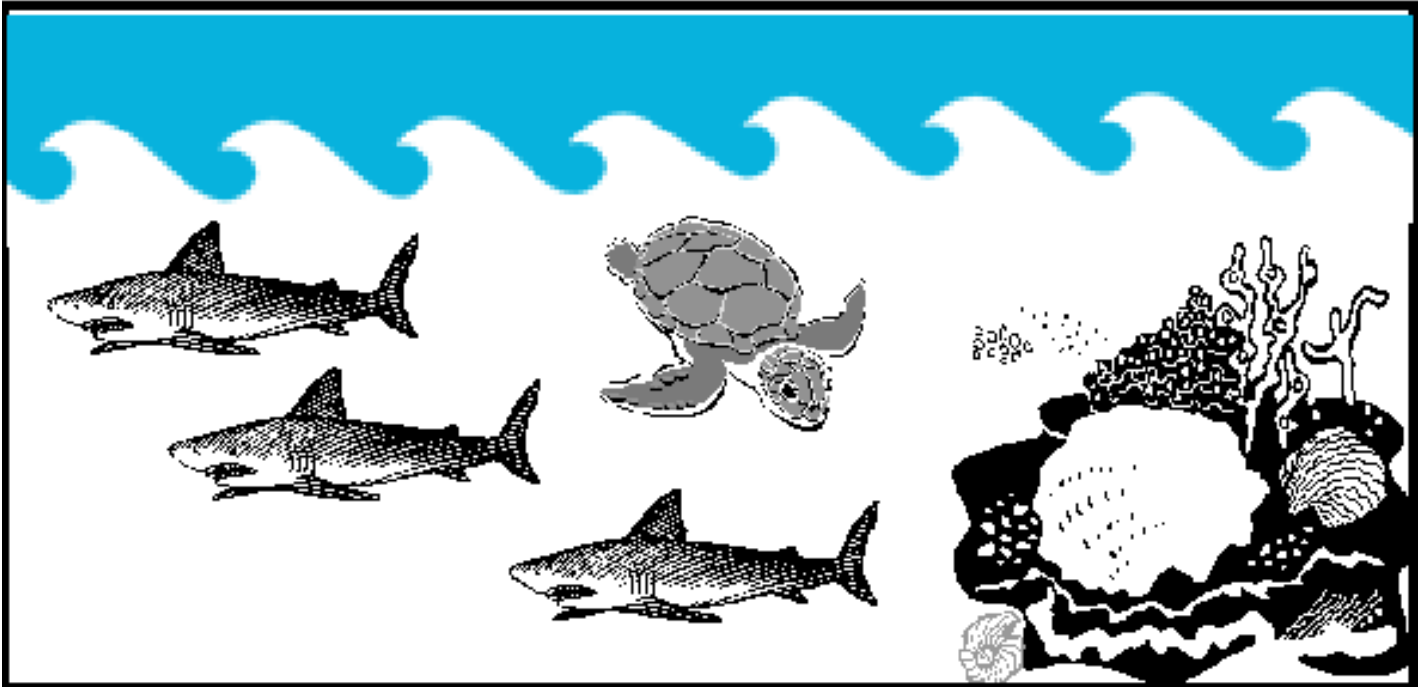
Name _____

Same or Different
Circle the one that is different.



Name _____

Same or Different
Circle the one that is different.



Same or Different

Grades 1 – 3

Time: 30 minutes

Skills: grouping, observation, science

Objectives:

TSW identify characteristics of two animals from the ocean.

TSW compare and contrast animal characteristics.

TSW distinguish between discrete and shared characteristics of the animals.

TSW chart the characteristics using a Venn diagram.

Materials: Chalk, blackboard, pencils, student copies of Venn diagram

Procedures:

Anticipatory Set:

Review what the students learned about oceans, including the kind of water they have, location, etc.

Brainstorm a list of animals that live in oceans.

Development of Lesson:

1. Select two animals (not octopus or shark) that are familiar to the students. Write their names on the board in two columns.
2. Have the students identify five characteristics of these animals (what they eat, where they live, body features, etc.) List them on the board under their name.
3. Discuss the similarities and differences of the animals. If the students did not mention shared characteristics, have them brainstorm what these two animals have in common.
4. Put a Venn diagram on the board. Explain that this is a way to show which characteristics are shared and which are not shared.
5. Label the Venn diagram with the animals' names and both. Have the students determine which characteristics belong where.
6. Give the students the Venn diagram. Put the following list of animal characteristics on the board:

lives in the ocean
has tentacles
has gills
can change color
has sharp teeth

eats meat
has bones
is an animal
has no bones

7. Ask the students to chart the characteristics for the octopus and shark on their own.

Summary:

Go over the student diagrams. Discuss any trouble points. Answers should be:

Octopus
has no bones
has tentacles
can change color

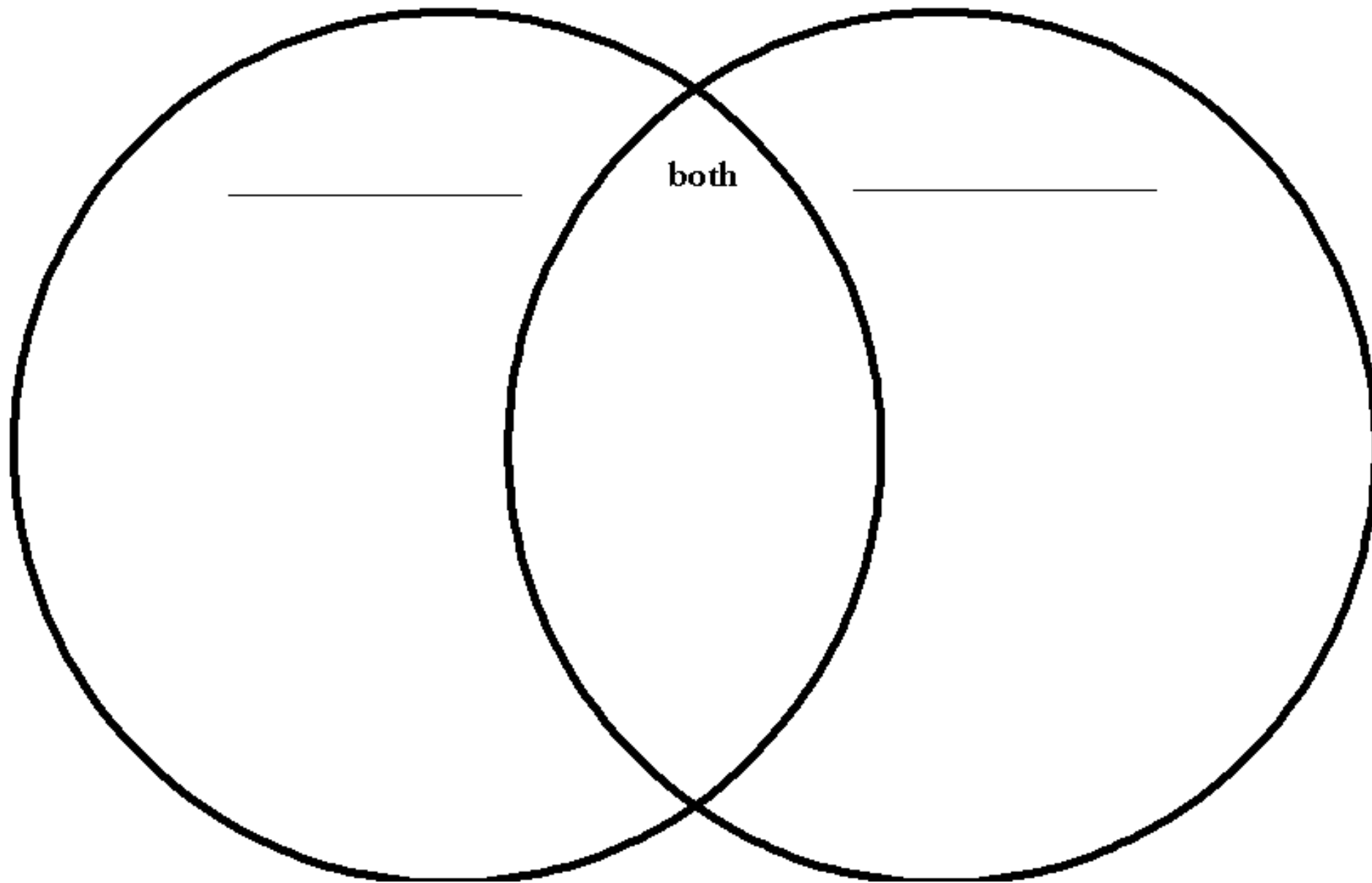
Both
is an animal
lives in the ocean
can swim

Shark
has bones
has gills
has sharp teeth

Extensions:

- Create a Venn Diagram for other ocean animals!

Name _____ Same or Different?



Sizing the Seas

Time: 30 minutes

Skills: language, measuring, counting, sequencing

Objectives:

- TSW use a non-standard unit of measurement
- TSW compare the height or length of several ocean animals
- TSW identify several ocean animals
- TSW name one animal's height or length

Materials: rope or masking tape, scissors, tape, measurement cards

Procedures:

Before You Start: Use either rope or masking tape to pre-measure and mark out the length of the ocean animals from the cards. Try to include a picture of the animal at the end.

Anticipatory Set:

Ask the students to name an ocean animal. Ask if all ocean animals are the same size. Ask the students how we could measure them.

Development of Lesson:

1. Tell the students that they are going to measure the lengths of some ocean animals using their bodies. Let older students know that this was how things were measured before measuring units were standardized. For example, a foot was the length of a person's foot, a yard was the distance from the tips of an outstretched arm's fingers to the chin.
2. Have each student measure by counting the number of hand lengths it takes to go the length of the animal. Try again with hand widths.
3. Mark the measurement on the floor and have the students use their feet, too!

Summary:

Ask older students what they discovered about using their bodies to measure. How long were the animals? Were they all the same? Which was the longest? Which was the shortest? Have the students put them in order from largest to smallest.

Extensions:

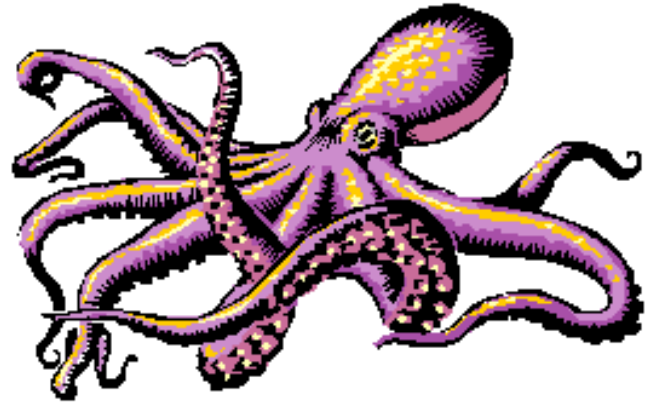
- Use construction paper hands or feet and graph the animals.
- Find out more about the origins of measurement! You can find a brief history of measurement online at www.cftech.com/BrainBank/OTHERREFERENCE/WEIGHTSandMEASURES/MetricHistory.html or at ellerbruch.nmu.edu/CS255/JONIEMI/metricsystem.html where you can also find some measuring activities.

Measurement Cards

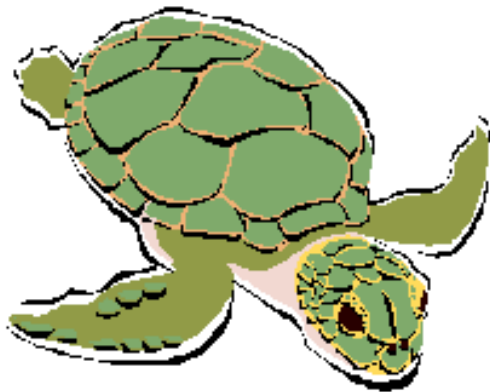
Emperor Penguin = 4 ft.



Octopus = 12 ft.



Leatherback Sea Turtle = 8 ft.



Japanese Spider Crab = 12 ft. 1 in.



Lion's Mane Jellyfish = 120 ft.



Humpback Whale = 60 ft.



How Many Fish in the Sea?

Time: 20 minutes

Skills: counting, sorting, listening, language arts

Objectives:

- TSW listen to a story about fish.
- TSW sort snack fish by color.
- TSW count up to 10 and down from 5 to 1.
- TSW repeat a fish chant.

Materials: fish storybook such as Fish Wish by Bob Barner (see “Suggested Reading List”), colored goldfish crackers or gummy fish

Procedures:

Anticipatory Set:

Read the story. Ask what the story was about.

Development of Lesson:

1. Discuss what it would be like to be a fish. How would a fish move? What do fish eat? Where do they live?
2. Distribute at least 10 fish to the students. Ask them to count their fish. Sort them by color.
3. Separate 5 fish to use in the following chant. As each fish is caught, the students can eat that fish.

Five Little Fish

5 little fish swimming by the shore.
One got caught and then there were 4.

4 little fish swimming in the sea.
One got caught and then there were 3.

3 little fish swimming in the blue.
One got caught and then there were 2.

2 little fish swimming in the sun.
One got caught and then there was 1.

1 little fish swimming for home
Decided it was best to never roam!

Summary:

Discuss other animals that can be found in the sea!

Extensions:

- Cut out pictures of different kinds of fish. Sort them into categories based on color, size or shape.
- Try having a tuna snack! Make tuna salad from the “Recipes” page with the students.

Recipes

Content Area: Math, Science

Cooking with children is a great way to introduce many basic math concepts such as comparing volume, weight and quantity. As you make these recipes with your children, have them count the ingredients, weigh them, measure them, and compare the amounts of different ingredients. You can even graph them! Basic science concepts in chemistry (dissolving = solutions, combining/mixing = compounds) and physics (states of matter: room temperature = liquid, frozen/chilled = solid, boiling = gas) may also be demonstrated. All that, plus a yummy treat to eat!

A Fishy Snack

- Round sugar cookies (1 per student)
- Icing or cream cheese
- Small cereal (Fruity Pebbles works well)
- Raisins or chocolate chips (2 per student)
- Fruit slice candy or small triangular wedge of fruit (1 per student)
- Licorice nibs (2 per student)

Directions:

1. Spread the icing or cream cheese on the cookie with a plastic knife or craft stick.
2. Sprinkle the cereal on the icing for scales. Press gently, if necessary.
3. Use the raisins or chocolate chips as eyes.
4. Add the fruit slice for a tail.
5. Add Licorice nibs for fins – one on top (dorsal fin) and one below (ventral fin).
6. Encourage the students to identify the parts they are adding.
7. Enjoy!

Edible Ocean

- Clear plastic cups
- 2 boxes blue or clear jello (flavor doesn't matter)
- Gummy fish

Directions:

1. Make the jello according to the directions on the box for finger jello.
2. Fill the plastic cups about 2/3 full of jello. It is helpful to do this on a tray.
3. Chill until the jello is partly set.
4. Put a gummy fish in the jello. Push it down so that it looks like it is swimming.
5. Chill until jello is completely set.
6. Enjoy!

Tuna Salad Boats

- 1 small can tuna
- 2 T mayonnaise
- 2 T sweet relish
- 1 hard boiled egg, diced
- Celery stalks, cut into 3" pieces
- Pepper to taste

Directions:

1. In a small bowl, combine tuna, mayonnaise, sweet relish and pepper.
2. Gently stir in hard boiled egg. If mixture is too dry, add a little more mayonnaise.
3. Combine thoroughly.
4. Fill celery stalks with the tuna mixture.
5. Enjoy!
6. Variations: use hot dog relish instead of sweet relish or mustard instead of mayonnaise.
7. Try adding some of these unusual extras: chopped green olives, raisins, shredded cheese, chopped peppers (red or green), mini seashell pasta, chopped onion, shredded carrot, chopped water chestnuts

Jello Jellyfish

- Ziplock sandwich baggies
- 2 – 4 boxes jello (any flavor)
- Rubber bands
- Streamers

Directions:

1. Make the jello according to the directions on the box.
2. Fill the ziplocks about half full and close securely.
3. Chill until the jello is set.
4. Gather the zip end together and secure the streamers to the bag with a rubber band.
5. Enjoy!
6. Variation: Try adding some diced fruit to the jello.

Best Buddies

Time: 30 minutes

Skills: listening, gross motor, spatial, creative movement

Objectives:

- TSW define symbiosis.
- TSW identify ways of helping.
- TSW act out a symbiotic partnership.

Materials: “Best Buddies” information page, bubble blower, stuffed clownfish or hermit crab

Procedure:

Anticipatory Set:

Ask the students if any of them have a friend. Do you help your friends? Do they help you? Explain that some animals have best buddies that help them, too.

Development of Lesson:

1. Discuss the meaning of symbiosis with your class. Share one of the examples from the information page with the students. Give older students a copy of “Best Buddies” and read about one of the partnerships.
2. Act out one of the partnerships! Explain to the students that they will be the anemones. Have them sit on the floor and wave their “tentacles” (arms). Remind them that anemones don’t swim, so they must keep their bottoms on the ground at all times.
3. Explain that you will be the clownfish or hermit crab. Hold the stuffed animal as you walk around the class with the bubble blower.
4. The students should catch the “food” (bubbles) as you bring it to them.

Summary:

How did the buddies help each other? What are some ways you help other people? How do they help you?

Extensions:

- Use the template from “Fish Tales” to write a story about your best buddies.
- Be a Best Buddy! Assign each student someone to help out for the day. It could be another student, a teacher, or a parent. Think up ways to be helpful. This can be especially fun if it is done anonymously!
- Make a “Thank You” card for someone who has helped you out.

Best Buddies

Life is not easy in the oceans. Animals must have a way to survive. One of these is symbiosis. Symbiosis literally means “living together”. Whenever two different species are interdependent in a relationship that benefits one or both partners and harms neither, we say they are symbiotic. In the ocean, there are many examples of this kind of peculiar partnership.

The Hermit Crab and the Sea Anemone

Crabs are a major food source in the ocean, so they have to find ways to avoid predators. Most crabs have hard shells to help protect them. Hermit crabs do not. To protect their soft bodies, hermit crabs live in the abandoned shells of snails and other similar animals. They are especially well protected if they attach a sea anemone to their shell. The sea anemone provides excellent camouflage, allowing the hermit crab to often go unnoticed. Though the sea anemone looks like an underwater flower, its “petals” are actually tentacles tipped with poisonous stinging cells. This makes many predators, especially the octopus, think twice before having crab for lunch. The sea anemone benefits, too. Normally stationary, it gets a free ride on the crab’s back and feeds on the crab’s leftovers.

The Clownfish and the Sea Anemone

Clownfish, also known as anemone fish, make their homes within the stinging tentacles of the sea anemone. This provides them with a hiding place safe from predators, since other fish would be stung and, most likely, eaten by the sea anemone. Scientists think that the clownfish is able to do this because of a special mucous coating that masks its presence from the sea anemone. In return for a safe hiding spot, the clownfish chases away the sea anemone’s enemies, like the butterfly fish, which loves to eat them. The clownfish also cleans the anemone by eating scraps of food dropped among the tentacles. This gives the clownfish a free meal and keeps the sea anemone healthy.

The Great Escape

Time: 30 minutes

Skills: gross motor, science, color identification, creative movement

Objectives:

TSW describe survival strategies of the octopus.

TSW demonstrate these strategies in a game.

TSW evaluate the effectiveness of their octopus' survival strategies.

Materials: picture or model of octopus, balloons (one for each student, all the same color), balloon pump (optional), large sheets of colored paper, most of which match the balloons, plus a few that do not match

Procedures:

Anticipatory Set:

Show students the picture or model of the octopus. Ask the students to identify it. Count its tentacles. Explain that the octopus has some very special ways of staying safe.

Development of Lesson:

1. Explain the survival strategies used by the octopus. One of these is the way it swims away. Instead of swimming like a fish, it fills its body with water, then squeezes it out, shooting backwards. At the same time it squirts out a cloud of "ink" (this "ink" is actually a mix of mucus and melanin). Another is its amazing use of camouflage. The octopus is sometimes called the chameleon of the sea. When it settles on the ocean floor, it quickly changes color and texture to match its surroundings.
2. Try these strategies for yourself! Go to a large, open space. Lay out the pieces of colored paper on the floor, randomly distributing the non-matching squares. This is the ocean floor.
3. Divide the students into two or three teams. Have them stand in lines.
4. Give the first student in each line a balloon that is inflated, but not tied. Older students can inflate them themselves. You may wish to write their names on them to avoid mixing them up. This is their octopus. They need to stay safe by escaping from predators.
5. On your signal, the students are to release their balloons so that they fly out over the ocean floor. Point out that this is how the octopus shoots away from danger.
6. If the octopus lands on a matching square, they have changed color and escaped. If they land on a different colored square, they have been eaten. Have the students determine if they survived, and retrieve their octopus.
7. Repeat steps 4 – 6 until everyone has a turn.
8. What would happen if the octopus could not change colors? Pick up about half of the matching squares and replace them with non-matching ones.
9. Play again.
10. Keep score, if you wish. The team with the most surviving octopus wins.

Summary:

Ask the students whether their octopus survived the first round. What happened when they couldn't change colors? Why do you think that is?

Extensions:

- Use the balloons to make an octopus. Inflate the balloon and tape streamers to the tied end. Use stick-on hole reinforcers for tentacles. Draw eyes on the balloon with markers. Hang them from the ceiling with fishing line!
- Find out how other ocean animals escape danger by playing "Best Buddies" or "Scooting Lobsters"

Games

Content Area: Active/Creative Play, Science

Games are a fun and active way to improve your students' gross motor skills while reinforcing scientific concepts such as predator/prey, habitat components, locomotion, and natural history.

Clownfish in the Anemone

Materials: headbands for shark and clownfish (optional)

1. Select one student to be the clownfish and one to be the shark. The rest form a circle around the clownfish and join hands. They are the anemone. The shark stays outside of the anemone.
2. The clownfish starts the game by ducking out of the anemone and swimming around the players. The shark tries to tag the clownfish, staying outside the anemone (the shark may reach in over the arms of the anemone players).
3. The clownfish may run in and out of the anemone. The anemone players may lift their arms over the clownfish's head to help him, and likewise block the shark.
4. When the shark finally tags the clownfish, the clownfish becomes the new shark. The shark joins the anemone, and another player becomes the new clownfish. You may wish to select both a new clownfish and a new shark, and have the old ones rejoin the circle. If your shark takes too long to catch the clownfish, you may wish to impose a time limit, after which the clownfish has officially escaped. At that point, both players join the anemone and a new clownfish and shark are chosen.
5. Variation: if more than one classroom of students is playing (or if the group is very large), they may wish to play together. Each room has their own anemone, clownfish, and shark. (You may wish to identify them with headbands) The clownfish may swim around all of the anemones, but can only hide in their own. The anemone players will only allow their clownfish in – they will block the other clownfish as well as all the sharks. The sharks, however, don't care which fish they eat, and so may chase any clownfish. Whenever any clownfish is caught, players return to their own anemone and new clownfish and sharks are chosen.

Shark, Shark! (Assassin)

Materials: none

1. Sit in a circle.
2. Secretly select a shark. An easy way to do this is to have everyone bend over and hide their eyes. Gently tap one player on the back. They will be the shark. Everyone else is a fish.
3. The shark makes eye contact with a fish and winks at them. When they have been winked at, the fish says, "Shark! Shark!" and drops out of the game. They have been eaten.
4. The other fish try to guess the identity of the shark before they are winked at and eaten.
5. If someone catches the shark in the act of winking, they win. If the shark eats all the fish but the last one (who will soon figure out who the shark is by the process of elimination), the shark wins.

Archerfish and Insects

Materials: large playground ball or nerf ball

1. Play in a large, open area. Set boundaries so that insects can't run too far from the archerfish.
2. The archerfish got its name from its unusual hunting style. They squirt water out of their mouth at insects on the plants above the water. They have a groove in the roof of their mouth (like a rifle barrel) that allows them to be extremely accurate. When they hit the insects, they fall off the plants and into the water, where the hungry archerfish gobble them down.
3. Select one player to be the archerfish. They have the ball. The others are insects.
4. At a starting signal, the archerfish tries to hit the insects with the ball. The ball should be thrown gently!!! The archerfish may swim toward the insects, but only while bouncing the ball (dribbling). You may wish to have younger players roll the ball.
5. Insects may deflect the ball with their hands. For the hit to count, it must hit them in the body or legs. Head shots do not count.
6. When the archerfish successfully hits an insect, that insect becomes an archerfish. The archerfish must now work together to move. They can no longer dribble the ball; they must pass it to one another.
7. Eventually, all the players but one will be archerfish. That surviving insect is the winner, and may be the first archerfish if you wish to play another round.

Hot Water! (Hot Potato)

Materials: small stuffed or plastic ocean animal

1. Sit in a circle.
2. Hand one student the stuffed animal.
3. Pass the stuffed animal around the circle. You may sing an ocean song, if you wish.
4. When the leader calls out "Hot Water," whoever has the stuffed animal has been caught.
5. If they can name an animal from the ocean or answer a question about the ocean, they continue in the game. If not, they must spend one round in the center of the circle. They may return to play the following round.

Octopus

Materials: none

1. Play this in a large, open area. Establish two safe zones about 20 yards apart.
2. Select one child to be the octopus. The octopus is free-moving in the area between the safe zones. The rest of the students are fish.
3. Line the fish up in one safe zone. When the leader calls out, "Swim, fish, swim!" the fish try to run to the other safe zone without getting caught by the octopus.
4. The octopus tries to tag the fish. Any fish tagged becomes one of the octopus' tentacles. Tentacles may either be free-moving or stay put where they are caught. During the next round, the tentacles also try to tag fish as they swim by.
5. Any fish tagged become tentacles. Continue this way until either all the fish are caught or only one remains.

Scooting Lobsters

Materials: scooters, large playground balls or nerf balls

1. Play in a large, open area, such as the gymnasium. Establish a starting line, end zone, and side boundaries.
2. Select 4 – 6 players to be predators. Predators receive anywhere from 1 to 3 balls, depending on the size of the class and the difficulty of the game. They take a position in one of the side zones, and may not leave it. Their goal is to snag a lobster for lunch. They can do this by rolling the ball across the floor and touching a lobster anywhere on their legs, hands, or scooters. Throwing the ball is not permitted, and any hits above the elbows do not count.
3. Predators may work together by rolling the ball to one another, and retrieving stray balls on their side. If a ball should get stranded in the center of the field, a predator may retrieve it, but may not roll it at a lobster until they are in their zone again.
4. The rest are lobsters. Lobsters receive a scooter and line up at the starting line. Their goal is to make it to the end zone without being eaten. Lobsters use their legs to creep along the ocean floor. This is their normal means of locomotion. To get to the far side, they must use their feet and hands to walk them toward the end zone. Their feet must always be pointed toward the end zone.
5. If lobsters are threatened by a predator, such as a large fish or humans, they flip their muscular tail forward and shoot away, backwards. When a ball is rolled in their direction, they may sit up and scooter away backwards (i.e. toward start). They may go on a diagonal, but it must be angled away from the end zone.
6. If a lobster is eaten, they must sit out for 10 – 30 seconds, then return to start.
7. Play several rounds, then switch out the predators. The round ends when: all the lobsters are safe in the end zone, all the lobsters are eaten, or after a reasonable period of time. For continuous play: when a lobster reaches the end zone, they become a predator. The predators rotate out to become lobsters. The new predators take the place vacated, and the new lobsters take their scooters to the starting line, beginning their saga of survival all over again.
8. Play until everyone has had a chance to be a predator and a lobster.

Create a Sea Creature

Time: 30 minutes

Skills: fine motor, science, visual

Objectives:

- TSW identify adaptations of fish.
- TSW discuss how these adaptations aid in the animals' survival.
- TSW use adaptations to create a new ocean creature.

Materials: Paper, pencils, crayons or markers

Procedures:

Anticipatory Set:

Review what the students have learned about oceans, including where they are, what the water is like (salty), etc. Have the students name some of the animals that live in the oceans. Brainstorm adaptations these animals have to survive. List them on the board. A possible list of adaptations and their purpose follows the lesson.

Development of lesson:

1. Discuss how these adaptations aid in the animals' survival.
2. Explain that animals often have multiple adaptations to help them survive, and that no two are exactly alike.
3. Pass out paper and crayons. Ask the students to pick at least two adaptations from the list to create their own reef animal. Students may work individually or in small groups.
4. Have students name their creature and write a brief natural history: what it eats, where it lives, how it hunts, the adaptations it uses, etc. Older students can do this themselves; younger students can tell this and the teacher record it.

Summary:

Share creatures with the class. Display them in the classroom.

Extensions:

- Publish the pictures and natural histories as a class field guide to the newly “discovered” creatures. Put it in the school library and/or share it with another class.
- Carefully cut out the pictures. Use them to create an ocean bulletin board or display in your classroom.
- Collect (clean) garbage: cereal boxes, paper tubes, pop cans, fabric scraps, etc. Create your sea creature out of recycled materials, using masking tape to hold them together. Use paper maché to make a smooth surface. You may wish to try using fabric scraps instead of newspaper – just use white glue in place of the flour. Paint the creatures and decorate with glitter, pipe cleaners, google eyes, etc. Display them proudly!

Amazing Adaptations List

False eye spot – distract predator

Tube feet – locomotion

Disruptive coloring – breaks up the outline of the animal's body

Thin body – fit in tight places and turn quickly

Stinging cells – defense and hunting

Tentacles – allow to grasp prey

Claws – defense and manipulate objects

Photoreceptor – detect light and dark without vulnerability of an eye

Sharp teeth – eating meat

Flippers or fins – aids in swimming

Scales – protect body

Cartilaginous skeleton – lots of flexibility

Bioluminescence – hunting or attracting mates in very dark waters

Fishing lure – attract prey

Hard shell – protection

Spines – protection

Small size – hide in small places

Hard plate – crushing shells (for food)

Large size – discourage smaller predators, speed

Camouflage – blend in to surroundings to avoid detection (predators and prey)

Lateral line – detect vibrations of sound and movement

Ampullae of Lorenzini – detect faint electrical current produced by living organisms

Barbels/whiskers – feel objects in mud or murky water (find food)

Warning colors – alerts others to danger to avoid attack

Streamlining – rapid movement through water

Long, pointed mouth – nipping off tentacles or coral polyps

Denticles – allow sharks to cut fish to follow scent of blood and to weaken prey

Mouth at bottom of head – eating food on bottom of sea

Mouth in the middle of head – catching and consuming prey in surrounding water

Mouth at the top of head – catching food swimming above

Symbiotic relationships – working together for mutual benefit

Multiple rows of teeth – rapid replacement of lost teeth

Flat body – lie on bottom for better camouflage

Crafts

Content Area: Art, Science, Math

Crafts are a fun way to improve your students' fine motor skills, matching, and counting. They also give you the opportunity to review the different forms and functions of each part of the animal. Some of these crafts use a pattern for at least one portion of the craft. They can be found following the instructions.

Sun Fish

Materials:

- Waxed paper (2 per student)
- Glue
- Crayon shavings or small pieces of tissue paper
- Copy paper (1 per student + 1 for teacher)
- Iron and ironing board
- Thin string or tape
- Hole punch
- Sun fish body template
- Colored paper (2 per student)

Directions:

1. Cut out sunfish body.
2. Cut waxed paper to fit the opening in the body, and give one piece to each student. Place it on top of a sheet of copy paper.
3. Add crayon shavings or tissue paper to the waxed paper.. These represent the fish's scales. Carefully take it to the ironing board.
4. Place a second sheet of waxed paper over the shavings or tissue paper.
5. Put the second sheet of copy paper on top (this is to avoid getting wax residue on the iron and ironing board). Use a warm iron to seal the waxed paper together (teacher does this).
6. Glue the waxed paper between the sun fish bodies and decorate with crayons or markers.
7. Punch a hole in the top (dorsal) fin and hang in a sunny window with a string (or use tape).

Egg Carton Puffer Fish

Materials:

- Colored paper
- Fish body template
- Scissors
- Small google eyes
- Fishing line
- Hole punch
- Glue
- Crayons or markers
- Pipe cleaner pieces (optional)
- Self-sticking magnet strips
- Crayons or markers
- Styrofoam egg carton cups

Directions:

1. Cut 2 cups from the carton. Colorful cartons make colorful fish!
2. Trace and cut fish body from colored paper.
3. Glue an egg cup on both sides of the fish body for a 3-D fish, or on one side for a flat fish.
4. Glue on a google eye. Push pipe cleaner pieces into the egg cup to make a porcupine puffer, if you want.
5. Add fins, scales, gills, etc. with crayons or markers.
6. Punch a hole in the top fin of 3-D fish and hang with fishing line. Add a magnet strip to the back of flat fish, and put it on your refrigerator!

Paper Plate Sea Turtle

Materials:

- 9" paper plate
- Glue
- Brown, green and yellow tempera paint
- Green construction paper
- Scissors
- Sponges
- Stapler
- Turtle head and flipper templates
- Google eyes (10 – 12 mm.)

Directions:

1. Cut a slit to the center of the paper plate.
2. Overlap the two sides of the slit and staple in place. This forms the shell.
3. Trace and cut turtle head, front and back flippers from green construction paper. Cut a narrow triangle for the tail.
4. Glue head, flippers and tail to the underside of the shell.
5. Use sponges to dab tempera paint in patterns on the shell.
6. Glue on google eyes. Draw a mouth, if desired.

Personal Penguins

Materials:

- Black and white construction paper, cut into half sheets
- Yellow construction paper diamonds
- 1" x 3" orange construction paper strips
- Large google eyes
- Yellow craft feathers (optional)
- Craft sticks
- Tape
- Glue
- Scissors
- Pencil or crayons for tracing

Directions:

1. Trace your foot on the white construction paper and cut it out. This is the penguin's body.
2. Fold the black paper in half, short and fat like a book. Trace your hand, fingers and thumb together, and cut out. These are the penguin's flippers. Glue them on either side of the body.
3. Fold the orange strip in half. Trace your 3 fingertips so they are touching, and cut out. These are the penguin's feet. Glue them at the bottom of the body.
4. Fold the yellow diamonds in half. This is the penguin's beak. Glue on the head.
5. Glue on google eyes. Add yellow feathers to the head, if you want to make a crested penguin (like a rockhopper or macaroni).
6. Tape a craft stick to the back and use your penguin as a puppet.

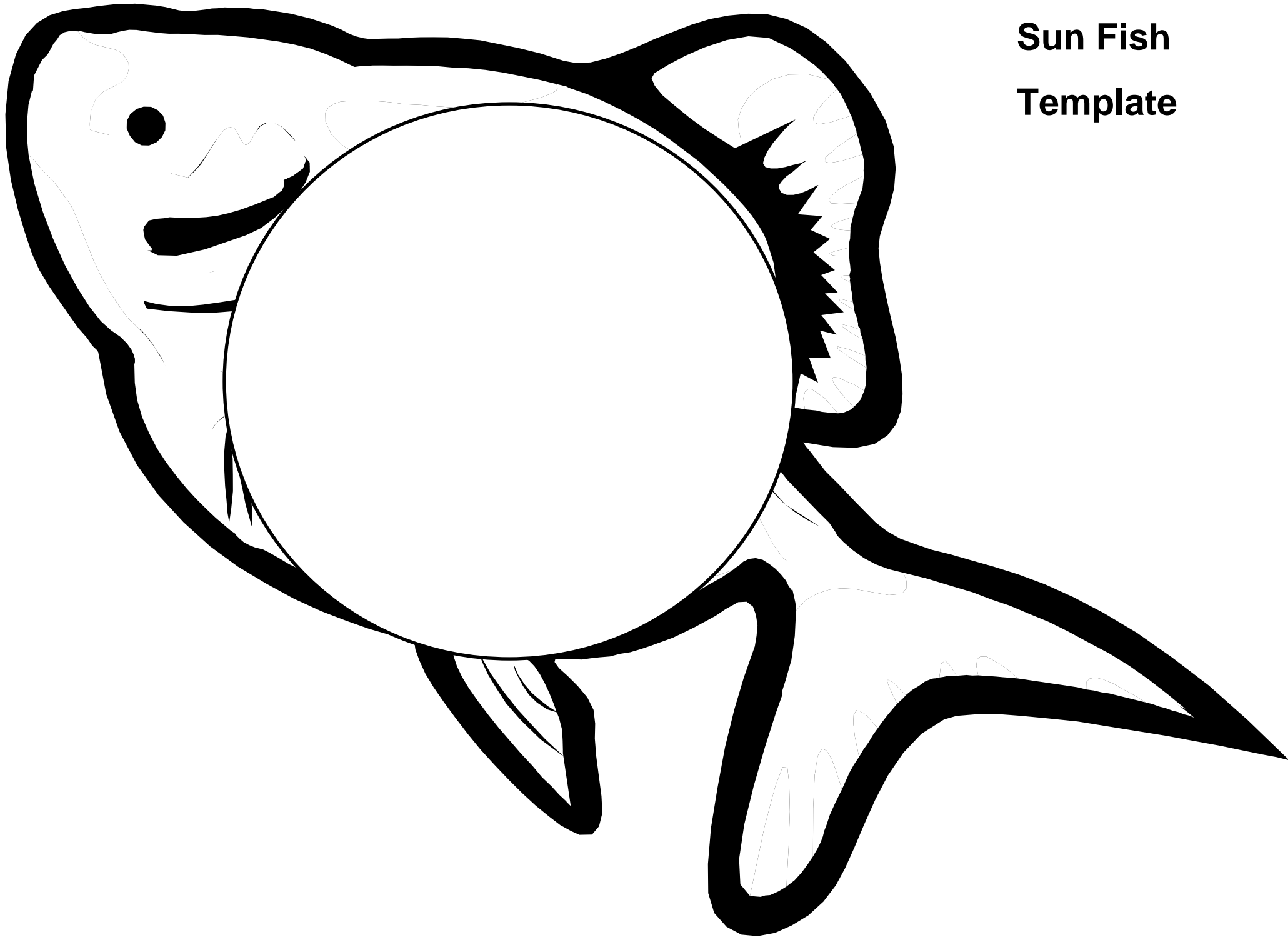
Jazzy Jellyfish

Materials:

- Paper plates
- Crayons or markers
- Glue
- Glitter
- Streamers

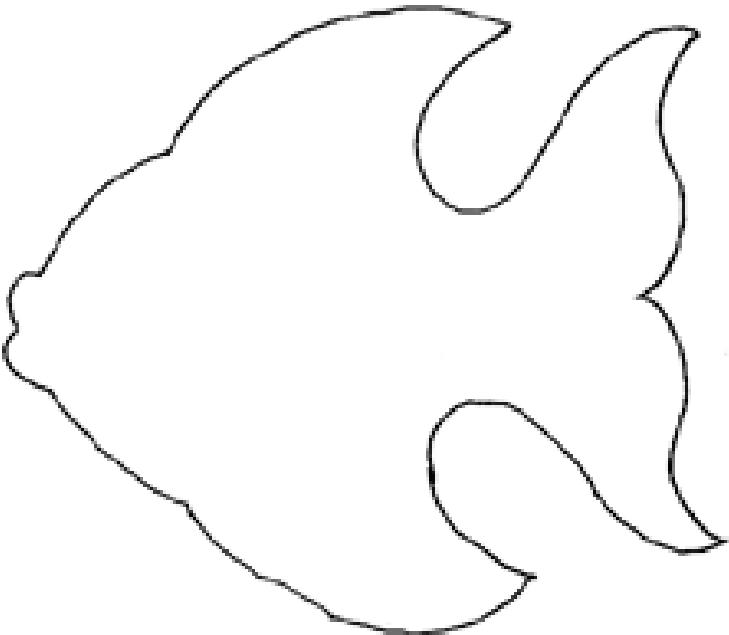
Directions:

1. Jellies are amazing animals. They are able to survive in some of the toughest environments on earth, but they do not have a heart, kidneys, or even a brain! They come in many beautiful colors, shapes and sizes, from the size of the head of a pin, to over 120 feet long!
2. Put the plate on the table, curved side up. Decorate the paper plate with crayons or markers. This is the jellyfish's bell.
3. Glue or tape the streamers to the underside of the bell. These are the jellyfish's tentacles. They have stinging cells to catch their food.
4. Add some sparkle! Make a design on top of the bell with glue and sprinkle it with glitter. Gently tap off the excess and allow it to dry.
5. If you want, carefully poke a hole in the center and hang it with a piece of string.



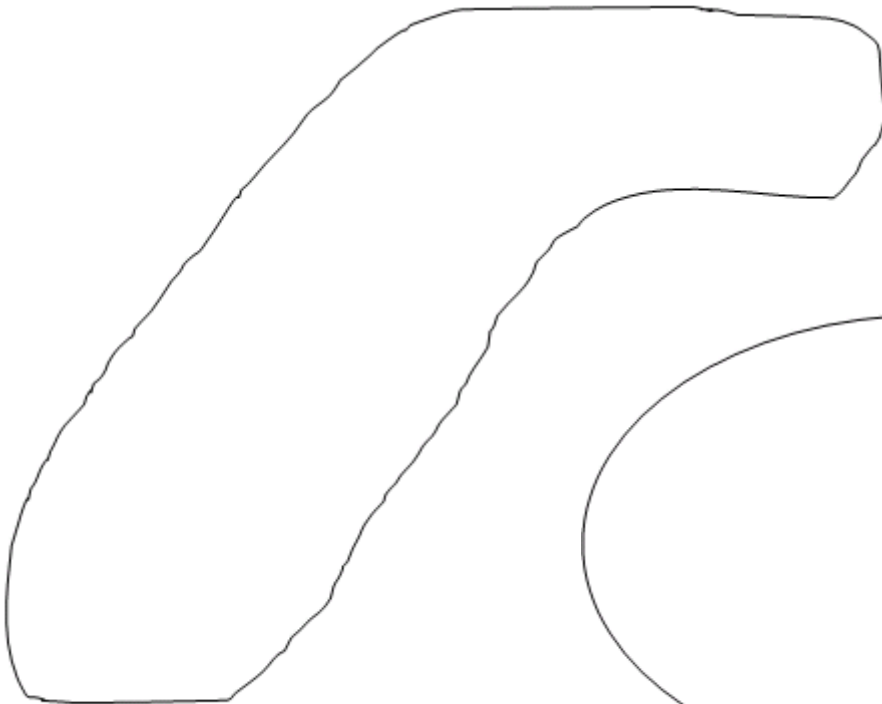
**Sun Fish
Template**

Egg Carton Puffer Fish



Paper Plate Sea Turtle

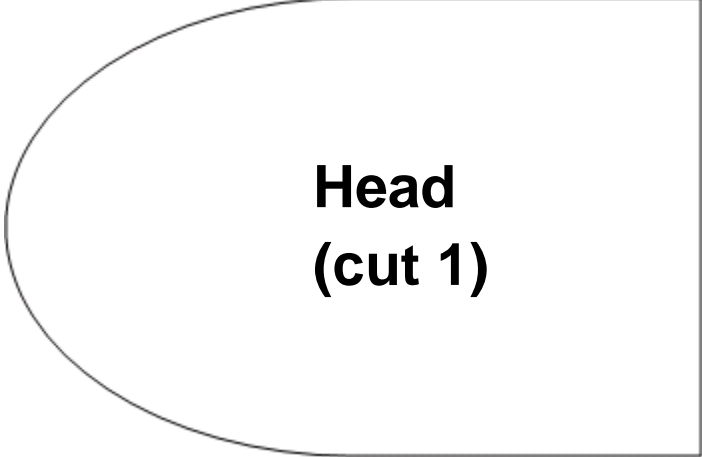
Front Flipper (cut 2)



Back Flipper (cut 2)



Head (cut 1)



Picture Bank Activities

Animal Bingo

Content Area: Science

Give each student a copy of the blank bingo card and picture bank page. Allow them to choose and cut out (coloring is optional) nine animals and glue them in the spaces. *Note: if you have made animal cards for other games, they may use these and change the arrangement on their cards each game, if desired.

Call out the animals by name or give simple clues for the students to guess which animal you are describing.

Card Games

Content Area: Math

Make cards by cutting out the animal pictures, mounting them individually on 3"x5" cards and laminating them for durability.

Concentration (2 sets of cards)

Go Fish (2 sets of cards)

Action Art

Content Area: Art, Science, Social Studies

Using animals from the picture banks and other conservation images, have the students create posters, buttons, bumper stickers, etc. to promote the awareness of wildlife and the importance of preserving wild spaces.

Habitat Scenes

Content Area: Art, Science

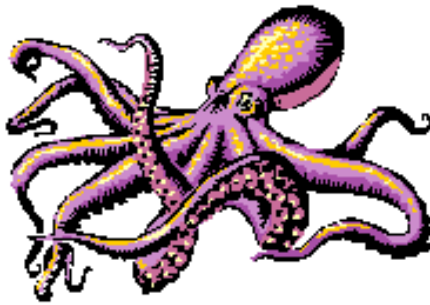
Have the students draw the habitat of an animal from the picture bank, then color, cut out, and glue that animal or animals from the picture bank to include in their habitat scene. You may also wish to enlarge the pictures to life size using a wall projector. Students can color or paint the animals, and use them to decorate the classroom.

Picture Bank

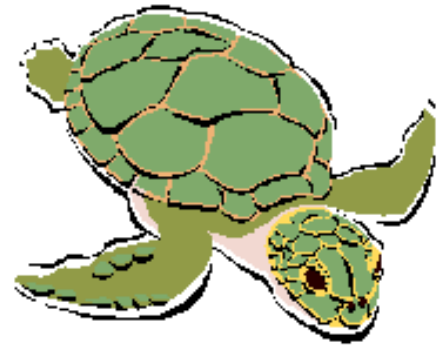
Jellyfish



Octopus



Sea Turtle



Sea Star



Anemone



Coral Reef



Hermit Crab



Crab



Lobster



Penguin



Sea Horse



Clownfish



Sand Dollar



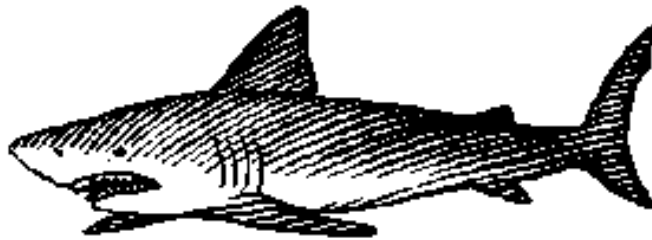
Conch (snail)



Clam



Shark



Whale

