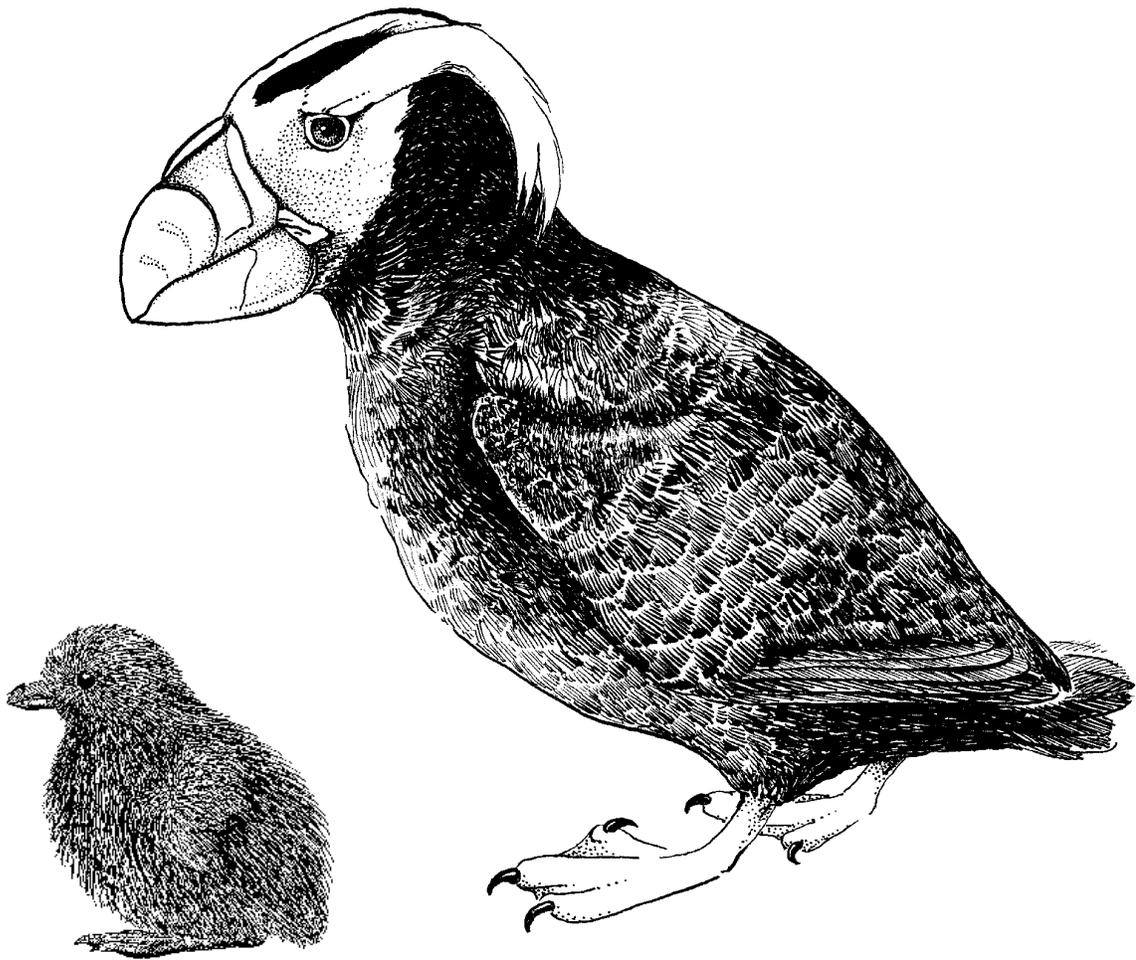


Sea Cycles



**Lab Program Curriculum
Grades 2-3**

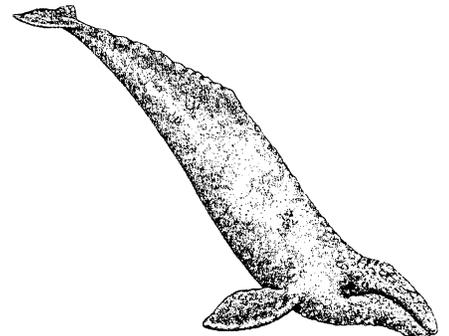
Program Description

This 45-60 minute lab program introduces students to four ocean life cycles, including the gray whale migration cycle, the tufted puffin reproductive cycle, the metamorphosis occurring in a jelly's or crab's lifecycle, and a kelp forest food cycle. Students and their chaperones will explore the changes occurring in each of these sea cycles as they travel to four interactive stations. Participating in this program will help your student to meet the grade three common curriculum goals and benchmarks listed on pages five and six of this packet.

Chaperones will be asked to take an active role in the lab program, which is designed so that they read informational cards in English to the students in their group. It will also be the chaperone's responsibility to monitor the students' behavior during the lab program.

Before your visit:

- Using pictures from magazines or drawings make ocean plant and animal cards. Use these and the enclosed **animal flash** cards to familiarize students with organisms they may see at the Aquarium. Incorporate appropriate vocabulary, play concentration or use them as flash cards for plant and animal identification.
- Use the **Sea Cycles Crossword Puzzle** activity to introduce student to some of the vocabulary words they will hear in the lab program.
- Introduce student to the concept of change in a cycle, using examples they may already be familiar with, for example, metamorphosis (caterpillar or tadpole), seasonal cycles (school year or weather changes) or daily cycles (eating and sleeping).
- Discuss how children treat their pets at home. What is proper and improper when handling animals? Discuss how some animals are too delicate to be touched and should only be observed.
- Use the **Dilemmas** to start a discussion about social responsibility and the marine environment.



Gray Whale

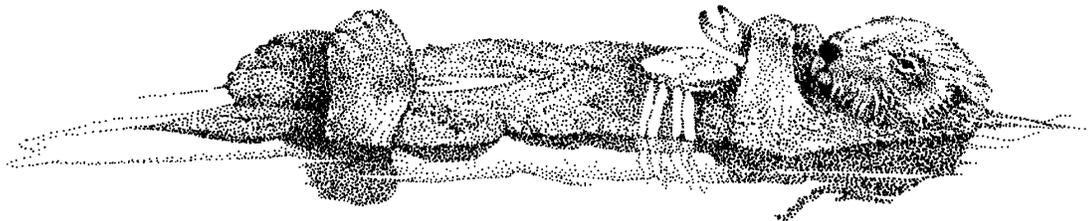
- Create a list of questions students would like to find the answers to during their visit to the Aquarium.
- Use the activities in the **self-guided** materials to further prepare your students for their self guided tour of the Aquarium.

During your visit:

- Provide you students with copies of the **Oregon Coast Aquarium Student Guidebook**. A master copy of the pages needed to create this booklet is included in the center of the self guided packet.
- An **Oregon Coast Aquarium Chaperone Guidebook** is also located there. This book will allow your chaperones to more effectively direct their students as they use their activity books.

After your visit:

- Have students describe what happened in the cycle that they remember the most from the lab program.
- Discuss human impact on the marine environment as related to the natural cycles they learned about in the lab program. Use the Dilemma Cards if you haven't already.
- As a class, discuss the before-visit questions that were answered, and misconceptions that were corrected.
- Have each student discuss, draw and/or write about the most interesting animal they saw at the Aquarium.



Sea Cycles addresses the following Oregon Common Curriculum Goals and Benchmarks:

Oregon State Benchmarks and Common Curriculum Goals

Science

LIFE SCIENCE (ORGANISMS)

- **Common Curriculum Goal (Organisms):** Understand the characteristics, structure, and functions of organisms.

Content Standard: Describe the characteristics, structure, and functions of organisms.

Grade 3 Benchmark: Describe the basic needs of plants and animals.

Grade 5 Benchmark: Classify organisms by the system to which they belong.

LIFE SCIENCE: (DIVERSITY/INTERDEPENDENCE)

- **Common Curriculum Goal:** Understand the relationships among living things and between living things and their environments.

Content standards: Explain and analyze the interdependence of organisms in their natural environment.

Grade 3 Benchmark: Describe a habitat and the organisms that live there.

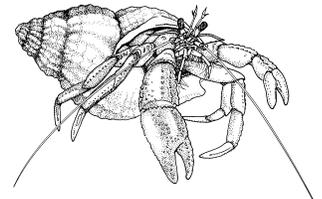
Grade 5 Benchmark: Describe the relationship between characteristics of specific habitats and the organisms that live there.

Career Related Curriculum Standards

PROBLEM SOLVING:

Content Standard: Apply decision-making and problem-solving techniques in school, community, and workplace.

- **Criteria:**
 - Identify problems and locate information that may lead to solutions.
 - Identify alternatives to solve problems.
 - Assess the consequences of the alternatives.
 - Select and explain a proposed solution and course of action.
 - Develop a plan to implement the selected course of action.
 - Assess results and take corrective action.



English/Language Arts

GRADE 2

READING

- **Common Curriculum Goal:** Analyze words, recognize words, and learn to read grade-level text fluently across the subject areas.

DECODING AND WORD RECOGNITION

- Read regular multi-syllabic words.
- Use letter-sound correspondence knowledge to sound out unknown words.

VOCABULARY

- Understand, learn, and use new vocabulary that is introduced and taught directly through orally read stories and informational text as well as student-read stories and informational text.
- Develop vocabulary by listening to and discussing both familiar and conceptually challenging selections read aloud.

READ TO PERFORM A TASK

- Read written directions, signs, captions, warning labels, and informational books.

Sea Cycles addresses the following
National Science Education Standards:

LIFE SCIENCE CONTENT STANDARD C

Grades K-4:

- The characteristics of organisms
- Life cycles of organisms
- Organisms and environments

Sea Cycles

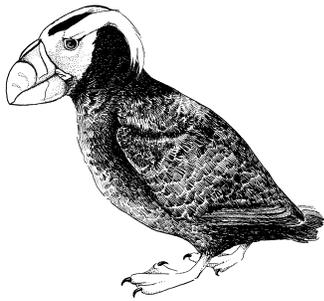
Background Information

What is a cycle?

A cycle is a period of time during which a **repeated sequence of events** takes place. Every time the cycle comes around, the same sequence happens again. Each stage of a cycle usually involves a **change** in something (the shape of an animal, the makeup of a forest, the events of a school year) or some sort of **transfer** (energy in a food cycle, water in a water cycle, the baton in a relay race).

Life cycle

The life cycle of an animal begins with fertilization, and many changes occur as the animal grows to adulthood, lives out its life and dies. Some animals, such as frogs, butterflies and jellies, go through such drastic changes in their life cycle that they appear to be entirely different animals at certain stages in their development. This is called **metamorphosis**.



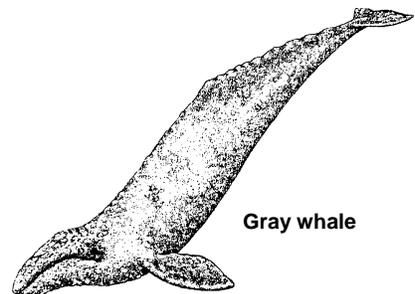
Tufted puffin

Reproductive cycle

Seabirds, such as the tufted puffin, go through dramatic changes in appearance as they exchange the dull brown feathers of the winter months for the brilliant breeding plumage of spring and summer. This **reproductive cycle** also involves a lifestyle change from an open ocean habitat during the winter to an inland habitat for breeding and rearing chicks in the summer.

Migration cycle

Gray whales migrate from their food source to their breeding area with the change of seasons. During this **migration cycle**, gray whales spend the summer months feeding in the plankton-rich waters off the coast of Alaska and the Bearing Sea. As fall approaches, the whales begin their 5,000-mile southbound trek to breed and/or calve in the warm lagoons of Baja California, Mexico. In the spring, they follow the coastline again as they return to their northern feeding grounds.



Gray whale



Food cycle

In a **food cycle**, energy is transferred from one organism to another, beginning with the energy provided by the sun. For example, plants can make their own food; this energy is carried up the food chain and used by plant-eating animals.

In turn, when these animals are consumed by a meat-eating member of the cycle, the energy is transferred once again. Finally, when any organism dies, the energy that remains is recycled back into the earth where it nourishes plant life and animals that feed on decaying organisms.

Human impact

Nature's cycles are relatively stable. Any disturbances that do occur are usually limited, the cycle continues and life goes on. However, human activity can fundamentally change the environment and disturb these natural cycles.



Sea Cycles Vocabulary

adaptation (A-dap-TAY-shun): a characteristic, such as a body part, color pattern or behavior, that helps an organism survive in its environment.

baleen (bay-LEEN): Plates of fingernail-like material that hang from a baleen whale's upper gum, forming a mesh to trap the tiny animals the whale eats

burrow: a hole or tunnel in the ground made by an animal for shelter

cycle: a period of time during which a repeated sequence of events takes place

invertebrate (in-VER-tuh-brut): an animal without a backbone

kelp: any of the large brown seaweeds, such as bull kelp

krill: shrimplike crustaceans that are the primary food of some whales and fishes

larva (LAR-vah) [plural: Larvae (LAE-vee)]: an early developmental stage of an animal, which bears little or no resemblance to the adult.

medusa (meh-DOO-sah): the free-swimming, umbrella-shaped form of some cnidarians, with tentacles hanging down like a fringe

metamorphosis (MEH-tuh-MOR-fuh-sis): a radical physical change occurring in the development of an animal

migration: a seasonal or long-term movement of organisms from one area to another

molt: to shed and replace the exoskeleton, fur or feathers

plankton (PLANK-tun): organisms suspended in water that drift with the currents and swim only weakly or not at all

plumage(PLOO-midge): the feathers of a bird

polyp (PAH-lip): the sessile stalk-like form of some cnidarians (or a stage in the life cycle of some cnidarians), attached to a surface at one end, with a circle of tentacles surrounding the mouth at the other end

seabird: a marine bird that relies on the open ocean for its habitat and food source

vertebrate (VER-tuh-brut): a member of the subphylum Vertebrata (VER-tuh-BRAH-tah), a group of animals that have a segmented spinal column. Mammals, fishes, birds, reptiles and amphibians are vertebrates.

Flash Card Notebook

Lesson at a glance:

This activity will allow students to identify some of the animals they will see at the Aquarium.

Oregon State Benchmarks and Common Curriculum Goals

LIFE SCIENCE (ORGANISMS)

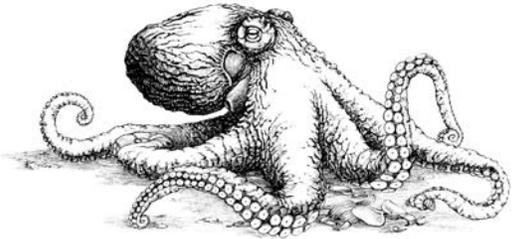
- **Common Curriculum Goal** (Organisms): Understand the characteristics, structure, and functions of organisms.
Content Standard: Describe the characteristics, structure, and functions of organisms.
Grade 3 Benchmark: Describe the basic needs of plants and animals.

LIFE SCIENCE: (DIVERSITY/INTERDEPENDENCE)

- **Common Curriculum Goal:** Understand the relationships among living things and between living things and their environments.
Content standards: Explain and analyze the interdependence of organisms in their natural environment.
Grade 3 Benchmark: Describe a habitat and the organisms that live there.
Grade 5 Benchmark: Describe the relationship between characteristics of specific habitats and the organisms that live there.

Materials:

- A copy of the flash cards for each student
- 25 solid colored 3x5 inch index cards for each student
- Crayons
- Glue for each student
- Scissors for each student (or pre-cut the flashcards)
- A hole punch
- Yarn or a binder ring



Background information:

This activity will introduce the students to some of the animals they will see at the Aquarium during their visit.

Activity:

1. Hand each student a set of flashcards, index cards, glue and scissors (if appropriate).
2. Have the students attach their flash cards to the index cards with the picture of the animal on one side and the information on the opposite side.
3. Have the students color the pictures of the animals.
4. Have the students decorate two of the remaining index cards. These will be the cover of their notebook.
5. Place the remaining six index cards at the back of the picture cards and inside the cover.
6. Punch a hole in the left hand corner of each animal card. Tie the cards together using either yarn or a binder ring to complete the notebook.
7. During or following their visit to the Aquarium, have your students draw some of the other animals they saw at the Aquarium.
8. Have the students write interesting facts they learned on their trip on the opposite side of their picture.



9. Have the students share their notebooks with their classmates.

Summary:

1. Review what the students learned about the animals at the Aquarium.

Continuation:

1. Have the students identify which animals are predators and which animals are prey animals. Can they create a food chain using the animals in their notebooks?

Assessment:

1. Have the students write a story about the animals in their notebook.
2. Have the students draw a picture of the animals in their notebook. Are they able to place the animals in their correct habitats? Are they able to label the animals in their drawing?

Flash Cards

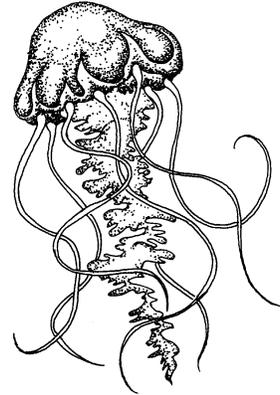
Sea nettle

Size: The bell may grow to 11 inches in diameter. The tentacles may reach a length of 7 ½ feet.

Color: The bell of the sea nettle is brown or tan in color with a ring of reddish tentacles at the edge. Their four ribbon-like oral arms are also reddish in color.

Diet: They consume small fishes, crustaceans, and plankton.

Did you know? Sea nettle tentacles have powerful stingers called nematocysts.



Northern sea otter

Size: Grow to about 5 feet long and up to 100 pounds.

Color: Dark brown; blond to light brown head.

Diet: Sea urchins, abalone, crabs, clams, squid, shrimp, mussels, fish and sea stars.

Did you know? A sea otter's body is covered with a very thick fur having up to one million hairs per square inch -- humans only have about 100,000 hairs on their whole head! Sea otters eat 25 percent of their body weight a day. Sometimes they use a tool, such as a rock, to break open the hard shells of prey.



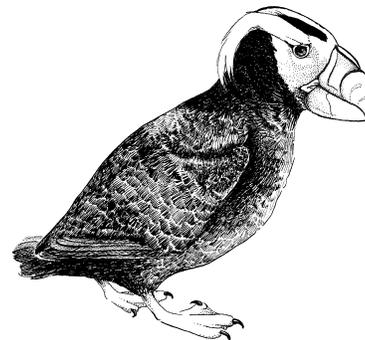
Tufted puffin

Size: About 15 inches long

Color: They are black with orange bills and feet. In the spring and summer, their faces turn white, yellow feather tufts grow above their eyes and their beaks turn red-orange with an olive-green bill plate.

Diet: They dive and swim under water to catch small fishes and invertebrates especially squid.

Did you know? These seabirds spend most of their lives out on the ocean



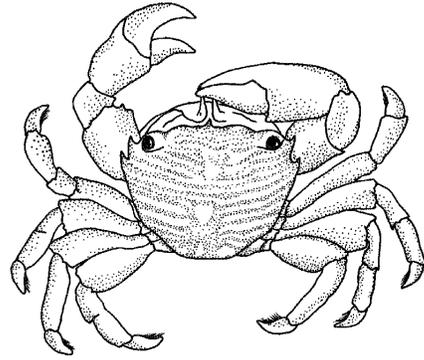
Purple shore crab

Size: About 2 inches wide.

Color: Usually purple with dark spots on the claws. Sometimes may be olive-colored or dark brown.

Diet: Purple shore crabs scrape green algae off the rocks and also eat dead animal matter.

Did you know? Often this crab is found hiding under rocks and will come out at night to look for food. When discovered, they will often walk sideways to escape and find a new hiding spot.



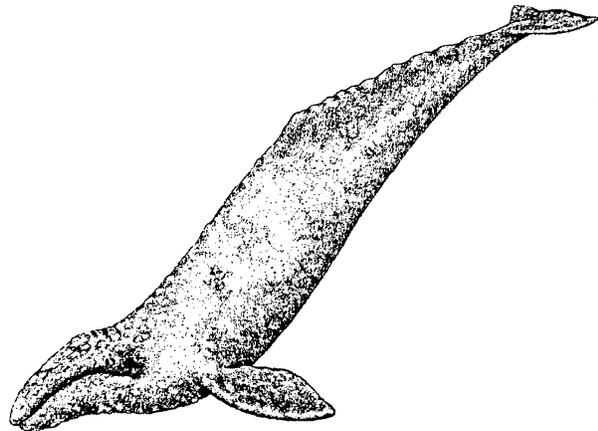
Gray Whale

Size: Males up to 40 feet, can weigh up to 64,000 pounds. Females up to 50 feet, can weigh up to 70,000 pounds.

Color: Their long, football-shaped body is gray. Orange whale lice and white barnacles hitch a ride on the whale's skin.

Diet: They scoop up mouthfuls of mud from the ocean bottom, sifting it through their baleen for amphipods, small fishes and shrimps.

Did you know? Gray whales travel



A Few Words About Cycles

Lesson at a glance:

The purpose of this activity is to introduce students to the concept of cycles and to familiarize them with some of the vocabulary they will encounter in your Sea Cycles program.

Oregon State Benchmarks and Common Curriculum Goals

English/Language Arts

GRADE 2

READING

- **Common Curriculum Goal:** Analyze words, recognize words, and learn to read grade-level text fluently across the subject areas.
DECODING AND WORD RECOGNITION
 - Read regular multi-syllabic words.
 - Use letter-sound correspondence knowledge to sound out unknown words.VOCABULARY
 - Understand, learn, and use new vocabulary that is introduced and taught directly through orally read stories and informational text as well as student-read stories and informational text.
 - Develop vocabulary by listening to and discussing both familiar and conceptually challenging selections read aloud.READ TO PERFORM A TASK
 - Read written directions, signs, captions, warning labels, and informational books.

Materials:

- ❑ Cycles introduction text: **Finding Out About Cycles**
- ❑ **Sea Cycles** Crossword Puzzle

Background:

A cycle is a period of time during which a repeated sequence of events takes place. Every time the cycle comes around, the same sequence happens again. Each stage of a cycle usually involves a change in something (the shape of an animal, the makeup of a forest, the events of a school year), or some sort of transfer (energy in a food cycle, water in a water cycle, the baton in a relay race). Examples of some biological cycles include plant or animal reproductive cycles and migration cycles. These cycle examples both occur along with the cycles of the seasons.

Activity:

1. Ask students to share what they know about cycles.
2. Have them list examples of cycles that they are familiar with.
3. Hand Out **Finding Out About Cycles** for students to read.
4. When they have finished reading, have them fill out the **Sea Cycles** Crossword Puzzle using the **bold** words included in the **Finding Out About Cycles** text.

Sea Cycles Vocabulary Words:

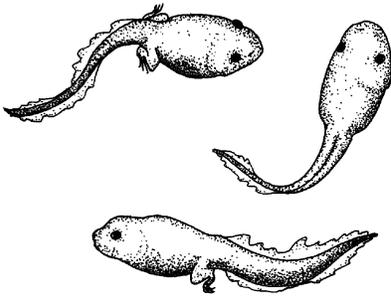
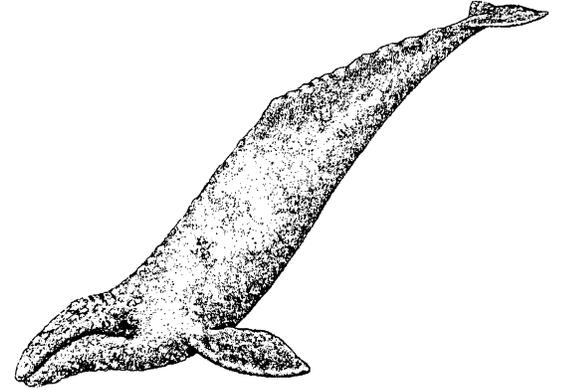
Change	cycle	metamorphosis	migration
Reproductive	seabirds	seasons	



Finding Out About Cycles

When something happens over and over again, it is called a **cycle**. Some cycles happen every day and some happen every year.

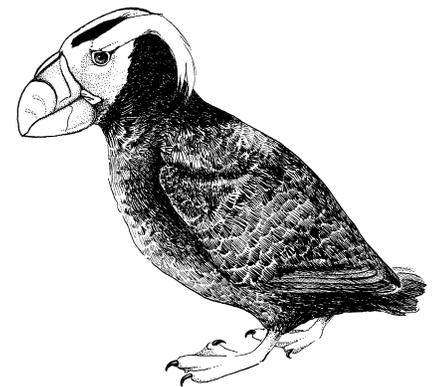
Seasons happen in cycles. Winter begins at about the same time every year. When winter is over, spring begins, followed by summer, then fall and then finally it is winter again. This is the cycle of the **seasons** and it happens every year.



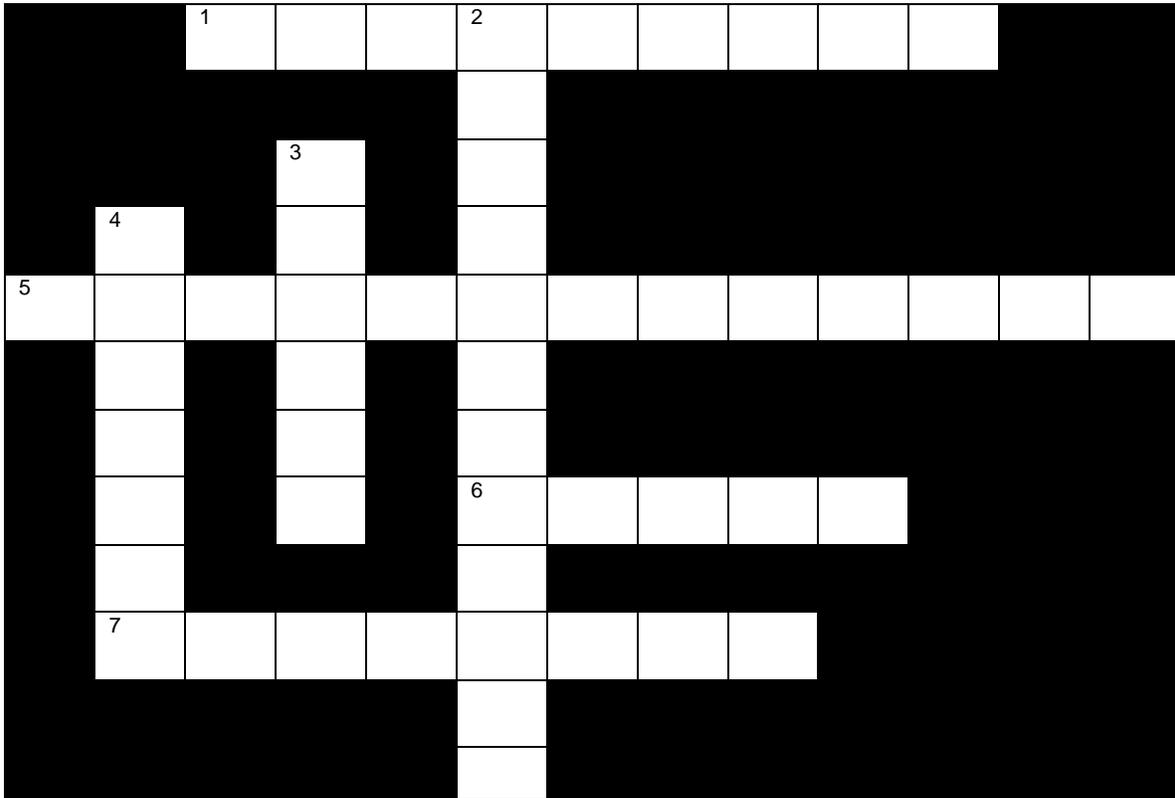
Another kind of cycle is a life cycle. In a life cycle, a plant or animal changes as it grows. This is called metamorphosis. Frogs go through **metamorphosis** when they **change** from eggs to tadpoles to adult frogs.

Gray whales migrate every year. They travel from Alaska to Mexico and back to Alaska again every year. This is called a **migration** cycle.

Tufted puffins are **seabirds**. This means they spend most of their lives living out on the ocean, far away from land. Every spring tufted puffins come to shore to find a mate and raise a chick. In the fall, the tufted puffins go back out to sea for the winter. This is the puffin's **reproductive** cycle.



Sea Cycles Crossword Puzzle



Across

1. Gray whales travel from Alaska to Mexico every fall. This is part of their _____ cycle.
5. When tadpoles change into frogs, it is called _____.
6. When something happens over and over again every day or very year, it is called _____.
7. Tufted puffins are _____ and only come to shore in the spring to mate.

Down

2. Puffins come to shore every year to find a mate. This is part of their _____ cycle.
3. Tadpoles _____ into frogs when they go through metamorphosis.
4. Winter, spring, summer and fall are _____, and each one happens at the same time of year.



Dilemmas

Lesson at a glance:

This lesson is designed to give students an opportunity to examine their values and beliefs related to the environment and to practice discussing environmental issues without placing judgments.

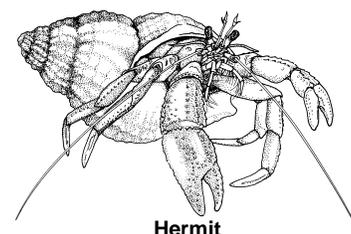
Oregon State Benchmarks and Common Curriculum Goals

CAREER RELATED CURRICULUM STANDARDS

PROBLEM SOLVING:

Content Standard: Apply decision-making and problem-solving techniques in school, community, and workplace.

- **Criteria:**
 - Identify problems and locate information that may lead to solutions.
 - Identify alternatives to solve problems.
 - Assess the consequences of the alternatives.
 - Select and explain a proposed solution and course of action.
 - Develop a plan to implement the selected course of action.
 - Assess results and take corrective action.



Materials:

crab

- Dilemma cards

Background information:

Discussing environmental ethics can be difficult. There are many sides to every issue, and often the feelings for one position or another are strong. In presenting this activity to students, stress the importance of not placing judgment, and listening to perspectives other than their own. Understanding all sides can provide a bigger picture of the issues. It is not the intent of this activity to prescribe right and wrong answers for the students.

Activity:

1. Divide students into groups of four or five.
2. Give each group a dilemma card and have one member read the dilemma and give the choices or answers to the rest of their group.
3. Students in the group should decide on their own what their response would be. They have each group discuss their choices among themselves. Students should be able to defend their reasoning.

Summary:

Discuss each dilemma as a class. The final point is that there are several sides to any issue and usually there isn't one right answer. Stress the importance of gaining an understanding of all positions.

Extension:

Have students make up their own dilemmas regarding local or national issues

Adapted from "Ethi-reasoning," Project Aquatic, Boulder, Colorado, 1992.



Dilemmas

<p>1. You have just cleaned your basement. On a dusty back shelf you discovered 10 cans of old paint and some very old pesticides and weed killers that you can't use. What will you do with them</p>	<p>4. You were fishing at a secluded lake and caught seven fish this morning. Now, its afternoon and the fishing has been great! You have caught five fish in one hour, all of which are on your string in the water and are bigger than this morning's fish. The law allows you to possess 10 fish per day. What should you do?</p>
<p>2. You are walking on the shore with a friend who is visiting you from the Midwest. Your friend sees a purple sea star she thinks is very beautiful. She tells you she wants to go into the tidepool and get it to take it home. What do you do?</p>	<p>5. You are on a field trip to the Newport bay front. Although you know it's not a good idea to feed the wildlife, some of your friends are tossing pieces of their tunafish sandwiches to the sea lions. What should you do?</p>
<p>3. You are an expert salmon angler. You always know where the BIG ones are. You're sanding on the side of a stream where you know the salmon run. On the far side of the stream you see a pool you just know has the BIG one in it, but to get there you must cross the stream. You know this is probably an area with salmon redds (nests), but no one from the Department of Fish and Wildlife is around and you're expected to come home with fish for dinner. What do you do?</p>	<p>6. You're on a charter boat with your family during your summer vacation. Your grandfather, a grumpy, stubborn man, is a heavy smoke and keeps throwing his plastic cigar butts over the side. What should you do?</p>

Choices

<p>4.</p> <ul style="list-style-type: none"> a. Continue to fish and keep all the fish. b. Let the smallest fish you caught this afternoon go free and keep the big ones to stay within your limit. c. Quit fishing and go for a hike. d. Continue to fish but release them. e. Other 	<p>1.</p> <ul style="list-style-type: none"> a. You know it's illegal, but you simply hide them in your garbage can with your other household waste and have taken to the county landfill. b. Leave them in your basement. c. Call the county to find out where to dispose of them safely. d. other
<p>5.</p> <ul style="list-style-type: none"> a. Tell them that feeding the sea lions can harm the animals and ask them to stop. b. Report their behavior to an authority on the dock. c. Ask the teacher to ask them to stop. d. Ignore them. e. Other 	<p>2.</p> <ul style="list-style-type: none"> a. You notice that there are many sea stars and you think it won't hurt anything to take just one. b. Offer to pull it off the rock and suggest you play Frisbee with it. c. Explain that this animal won't be able to survive if she takes it home and suggest that she watch it here and then leave it in its habitat. d. Yell at her and ask her how she would feel if someone picked her up and threw her out in the ocean e. Other.
<p>6.</p> <ul style="list-style-type: none"> a. Yell at him, call him an idiot and ask him if he hasn't heard of the MARPOL Protocol, the law prohibiting the dumping of all plastic wastes from ships at sea. b. Ask the captain for a can, give it to your grandfather and politely ask him to use it for his cigarette butts. c. Do nothing. d. Tell your parents to tell your grandfather to quit smoking. e. Other 	<p>3.</p> <ul style="list-style-type: none"> a. Go to the nearest house and ask to borrow their boat, knowing you'll be in the doghouse if you don't come home with fresh fish. b. Put on your best lure, cast as close to the pool as possible and hope for the best. c. Carefully walk through stream. d. Go to the fish market for fish for dinner. e. Other



Dilemmas Assessment Rubric

Student Name: _____

CATEGORY	4	3	2	1	Score
Respect for other classmates	All statements, body language, and responses were respectful and were in appropriate language.	Statements and responses were respectful and used appropriate language, but once or twice body language was not.	Most statements and responses were respectful and in appropriate language, but there was one sarcastic remark.	Statements, responses and/or body language were consistently not respectful.	
Information	All information presented in the discussion was clear, accurate and thorough.	Most information presented in the discussion was clear, accurate and thorough.	Most information presented in the discussion was clear and accurate, but was not usually thorough.	Information had several inaccuracies OR was usually not clear.	
Use of Facts/Statistics	Position was well supported with several relevant facts, statistics and/or examples.	Position was adequately supported with relevant facts, statistics and/or examples.	Position was supported with facts, statistics and/or examples, but the relevance of some was questionable.	Position was not supported.	
Presentation Style	Student consistently used gestures, eye contact, tone of voice and a level of enthusiasm in a way that kept the attention of the audience.	Student usually used gestures, eye contact, tone of voice and a level of enthusiasm in a way that kept the attention of the audience.	Student sometimes used gestures, eye contact, tone of voice and a level of enthusiasm in a way that kept the attention of the audience.	Student had a presentation style that did not keep the attention of the audience.	

The Gray Whale Migration Game

Lesson at a glance:

Students will become gray whales and discover some of the challenges faced by gray whales during their spring and fall migrations.

Common Curriculum Goals and Benchmarks:

LIFE SCIENCE

- **Common Curriculum Goal (Organisms):** Understand the characteristics, structure and functions of organisms.

Grade 3 benchmark: Classify organisms based on a variety of characteristics.

Grade 5 benchmark: Describe the needs of living things.

LIFE SCIENCE

- **Common Curriculum Goal (Heredity):** Understand the transmission of traits in living things.

Grade 5 benchmark: Describe the life cycle of an organism.

LIFE SCIENCE

- **Common Curriculum Goal (Diversity/Interdependence):** Understand the relationships among living things and between living things and their environments.

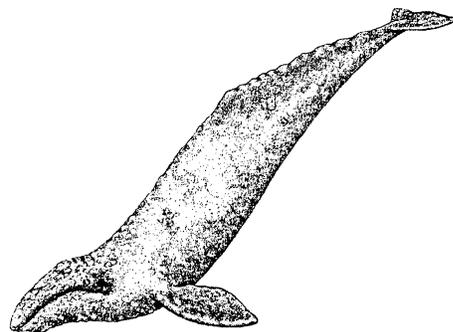
Grade 3 benchmark: Describe a habitat and the organism that lives there.

Grade 5 benchmark: Describe the relationship between characteristics and specific habitats and the organisms that live there.

Grade 8 benchmark: Identify and describe the factors that influence or change the balance of populations in their environment.

Materials:

- ❑ One game board per group of 4-5 students
- ❑ One spinner per game board
- ❑ Cardboard squares (for spinner)
- ❑ Brads (for spinner)
- ❑ **Gray Whale Fact and Coloring** sheets (optional)
- ❑ Game pieces (one per student)



Background Information:

Gray whales feed in the cold nutrient-rich waters of Alaska and the Bering Sea and mate and give birth to their calves in the warm tropical lagoons of Baja California, Mexico. During this annual round-trip migration, gray whales must travel up to 12,000 miles. Although scientists originally thought that these whales fasted during their journey, recent evidence suggest that they do eat a small amount along the way. However, the majority of their energy is obtained during winters up north as they gorge themselves on tiny crustaceans called amphipods. During this five-month period they will gain an estimated 16 to 30 percent of their total body weight. This is not too surprising since an adult gray whale may consume about 67 tons of food during this feast!



Gray whales feed by diving down to relatively shallow sandy ocean bottoms and sucking in huge mouthfuls of amphipod-rich mud. Once their mouths are full, they force out the mud and water through their foot-long baleen plates. The tiny amphipods become trapped on the fringed inner row of baleen. The whales then swallow their meal with the help of a 2,500-pound tongue.

By springtime, having built up their protective blubber layer, they begin their trip south. Along the way, scientists believe that gray whales navigate using the coastline as a guide. Once they reach the Baja lagoons of northern Mexico, the courtships begin. Males seek the attention of willing females, and may even push and bump each other in the process. However, unlike many whale species, gray whales are not considered to be aggressive in their mating behavior.

Expectant females typically arrive first at the lagoons, where after a 13-month gestation, they will soon give birth to their calves. Calves are born tail first, measuring about 15 feet in length and weighing close to 2,000 pounds. The calves grow quickly due to the fat content of their mother's milk. Gray whale milk contains approximately 50 percent fat, and calves will drink about 50 gallons a day.

As fall approaches, the newly impregnated cows begin their journey first, followed by adult bulls, immature cows and soon by immature bulls. Cows with new calves are the last to leave the lagoons, staying an extra month or two to allow their calves to continue growing in the safety of the lagoons.

They have an arduous journey ahead, with the possibility of encountering predators, including white sharks and killer whales. An adult female gray whale is larger than an adult male. Perhaps this size difference has evolved due to the fact that a cow and her calf migrate alone, and the cow does not rely on other whales to help her protect her calf.

Activity:

1. Make enough game boards and spinners for each group of students.
2. Introduce gray whales as baleen whales and describe how they use their baleen for feeding. Define the following vocabulary words: *baleen*, *blubber*, *migration*, *flukes*, *flippers*, *amphipods*.
3. Divide your students into groups of 4 or 5.
4. Read the following directions to your class and have the students begin.

Directions:

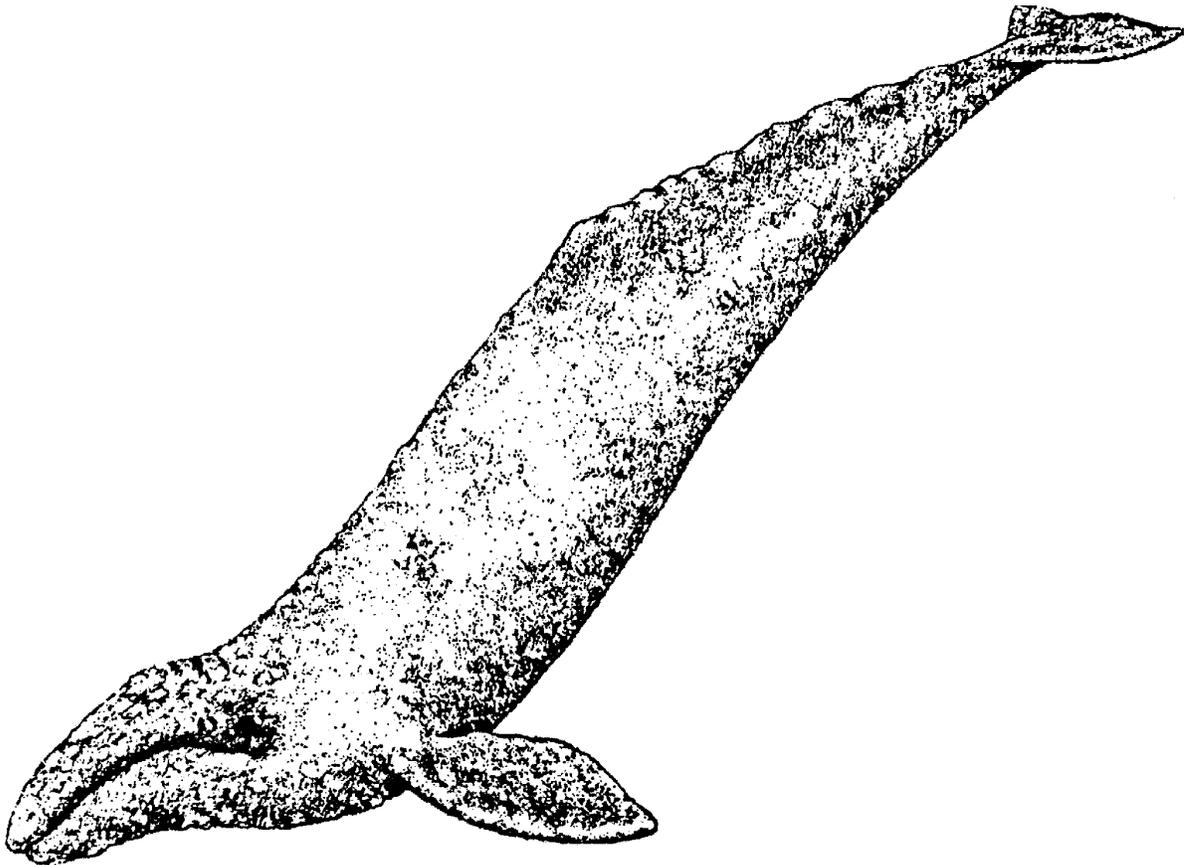
1. Taking turns, spin the spinner and move ahead that number of spaces.
2. Follow the directions on the space you land on.
3. Keep playing until everyone has completed their migration.

Conclusion:

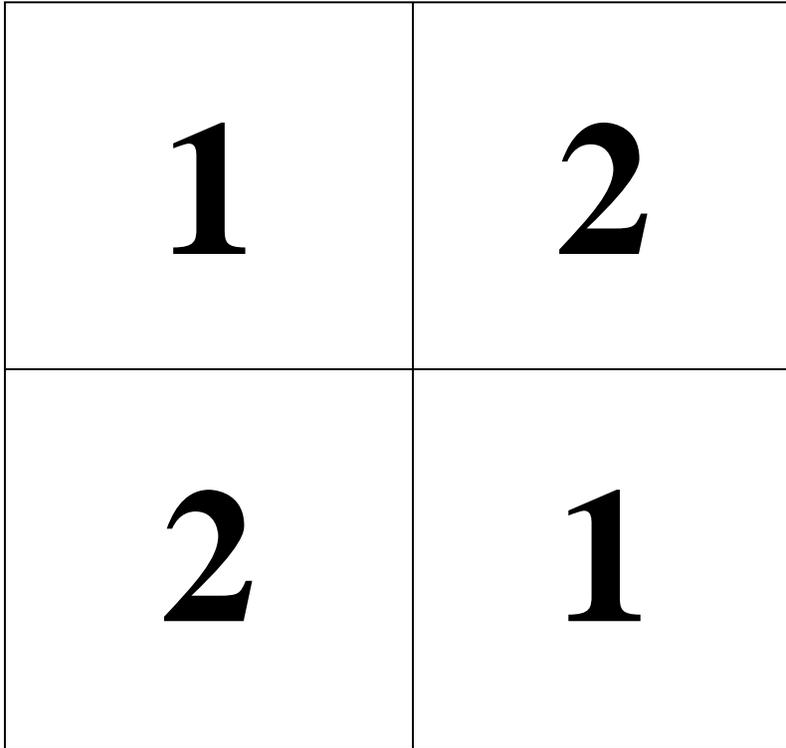
As a class, discuss some of the issues and challenges faced by gray whales as they migrate twice a year.

Extensions:

1. Have your students write a story about a gray whale on its migratory journey. What challenges did their whale face?
2. Take a whale-watching trip to see gray whales.

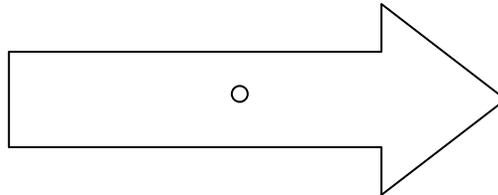


Spinner

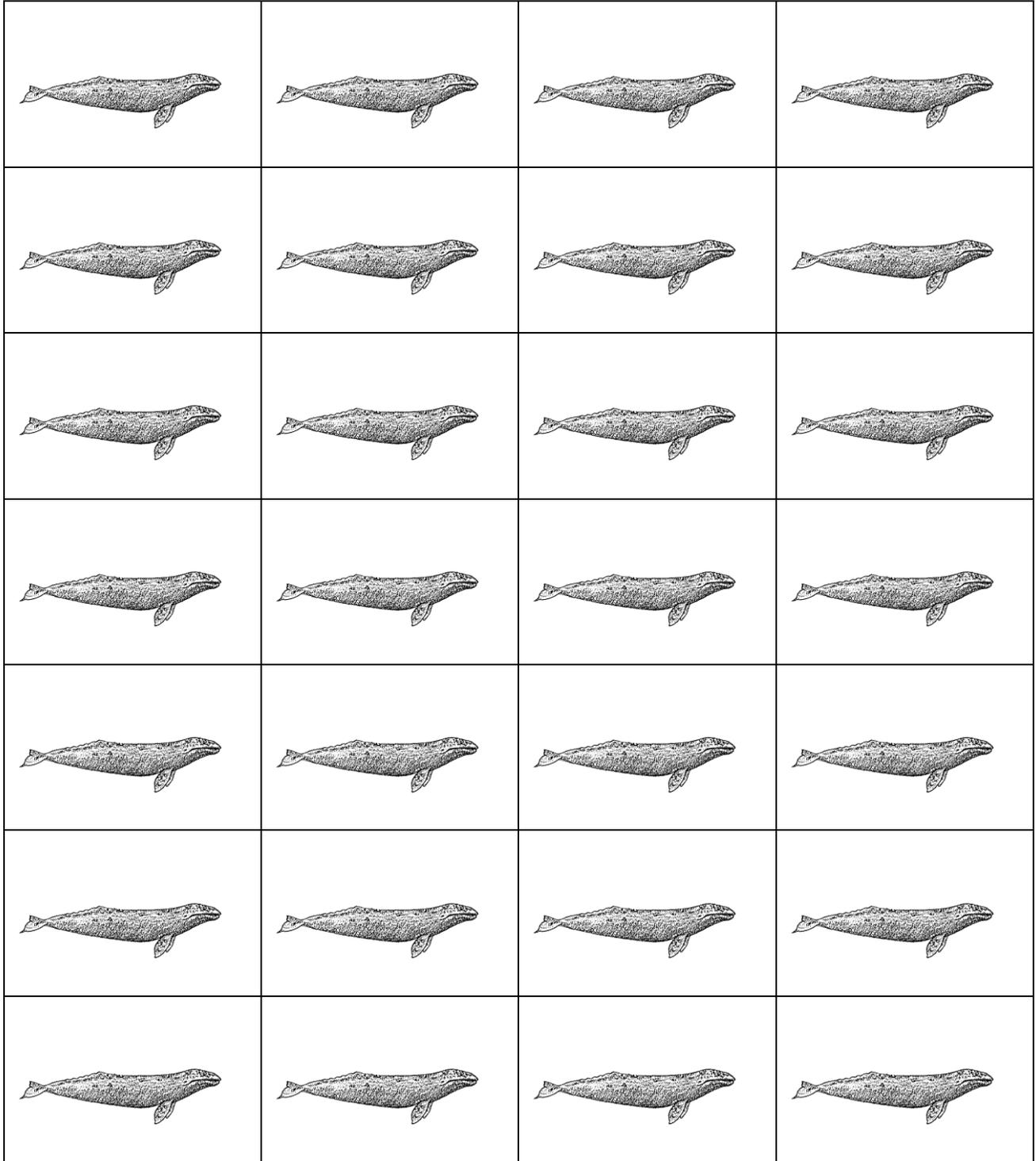


Directions

1. Cut out the square above.
2. Glue the square onto cardboard.
3. Punch a hole in the center of the spinner and in the end of the arrow.
4. Secure the arrow to the spinner board with a brad. Attach them loosely enough that the arrow will spin.



Game Pieces



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Directions:

Cut out the game board pieces on the following pages and attach them to a piece of poster board using the number in each right-hand corner of the message to place them in the proper order. We suggest placing them in a circle with the gray whale image at the end of the pieces in the center of the circle.

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START

- 1. Spin the spinner and swim ahead that number of spaces.**
- 2. Follow the directions on the square you land on.**
- 3. Enjoy your migration.**

1

It's April and that means seven months of sucking up juicy amphipods. You eat so much that you have 10 or more wheelbarrow loads of amphipods in your stomach at one time. *Spin again on your next turn.*

2

It's the end of September, and you have added 12 inches of blubber all over your body. *Take another turn. Spin again.*

3



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It's early October and it's getting colder in the Arctic. You begin your 6,000-mile journey to the warm waters of Baja California. You swim 20 hours, travel up to 100 miles a day and seldom eat or rest. *Spin again on your next turn.*

4

After about six weeks, you arrive in the warm lagoon waters of Baja California, Mexico. You'll share these waters with about 16,000 of your gray whale friends. *Swim ahead one space.*

5

It's late December. You give birth to a 15-foot-long, 1,500-pound bundle of flukes and flippers. *Rest one turn.*

6



Your calf drinks 50 gallons of fat-rich milk and gains 70 pounds each day. Soon it will weigh 6,000 pounds and be ready to head north. *Spin again.*

7

Whale-watching boats are all around you but they are keeping their distance. Suddenly, a whale-watching skiff motors between you and your calf. Your calf can't see you and cries out. *Spin again.*

8

You slap your tail flukes hard on the water and nearly knock the whale-watching boat over. Your reaction reminds the watchers that getting between a mother and calf is against the law. They move the boat away. *Go back one space.*

9

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It's March, and time for you to head north to feed in the waters of the Arctic. You and your calf travel close to shore. *Spin again.*

10

Suddenly a pod of killer whales appears. The hungry whales kill your calf. You must continue your journey alone. *Stop and rest. Move ahead two spaces on your next turn.*

11

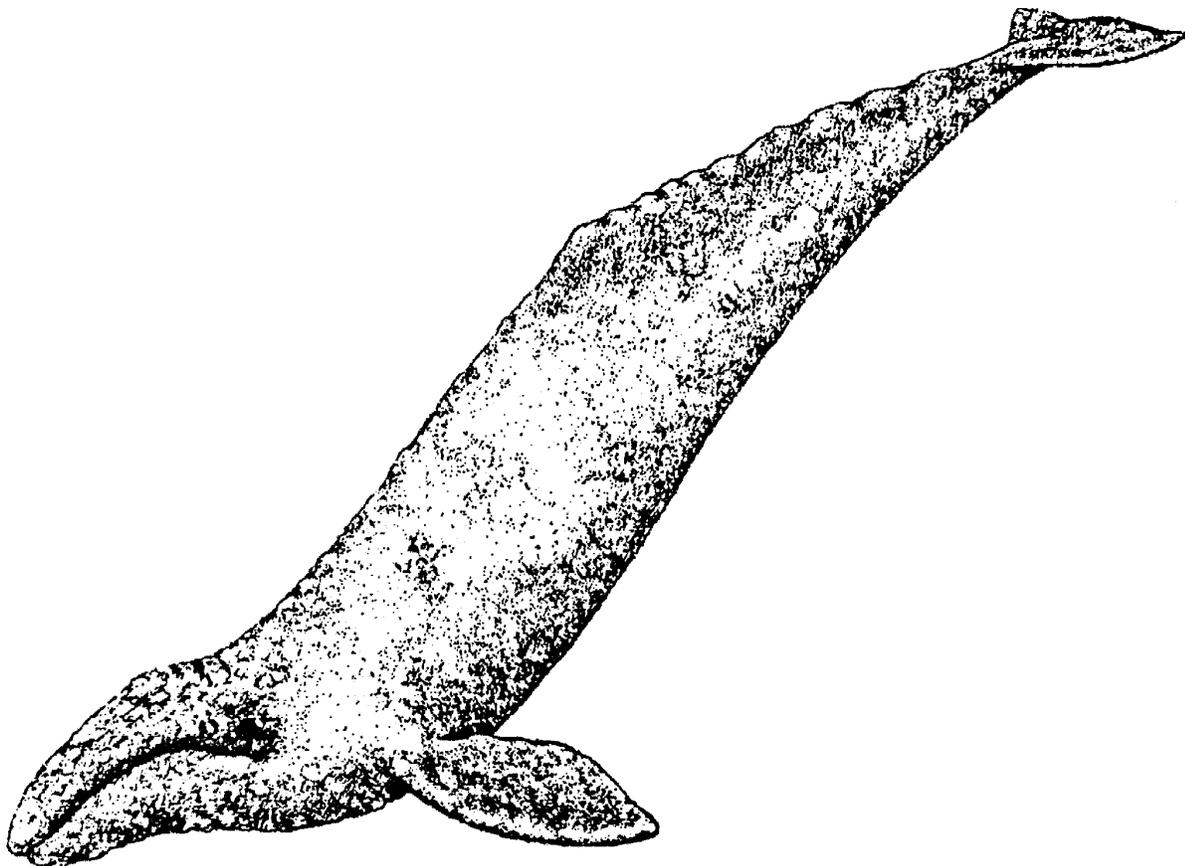
Suddenly a pod of killer whales appears. You and your calf dive quickly and hide in the thick kelp forest. The whales attack another mother-calf pair. You had a close call! *Stop and rest. Miss a turn.*

12



Congratulations! It's now July, and you survived the return to your feeding grounds in the Arctic. It's time for you to feed, rest your 40-ton body and get ready for your migration cycle to begin again.

13



Congratulations

Has learned all about

Sea Cycles

