

LESSON 1 Anatomy of a Humpback Whale

Lesson at a Glance

Students brainstorm what features a marine mammal needs to survive in a marine environment. They role-play as humpback whales to learn how whales are designed for life in the ocean. Students label the external body features on a diagram of a humpback whale, and create anatomically correct humpback whale models.

Lesson Duration

Two 45-minute periods
(Optional activities require an additional 45-minute period)

Essential Question(s)

How do the body structures of humpback whales allow them to function in a marine environment?

Key Concepts

- Humpback whales have special body features that enable them to survive in marine environments.
- Humpback whales are large marine mammals that depend on specific environmental conditions to survive.
- This type of whale must migrate between the cold, productive waters of Alaska where they feed, and the warm, protected waters of Hawai‘i where they give birth.

Instructional Objectives

- I can identify the major body features of a humpback whale and explain the function of each feature in helping the whale to survive in a marine environment.
- I can describe the environmental conditions humpback whales need to survive as marine mammals.
- I can use verbal skills in group activities in order to collaborate on a task.

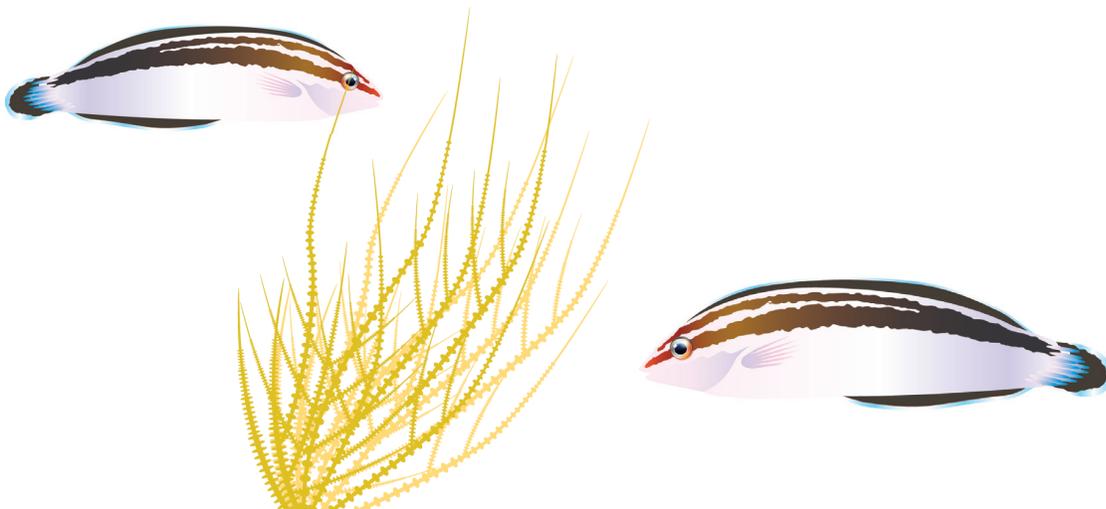
Related HCPS III Benchmark(s):

Science SC. 3.5.1
Describe the relationship between structure and function in organisms.

Language Arts LA.3.6.1
Use oral language to obtain information, complete a task, and share ideas and personal opinions with others.

Language Arts LA.3.7.1
Add concrete details and specific facts to support and develop ideas when speaking

Math MA 3.3.3
Estimate the results of whole-number computations



Assessment Tools

Benchmark Rubric:

Topic		Unity and Diversity	
Benchmark SC.3.5.1		Describe the relationship between structure and function in organisms	
Rubric			
Advanced	Proficient	Partially Proficient	Novice
Classify the structures of organisms according to their function	Describe the relationship between structure and function in organisms	Identify the relationship between structure and function in an organism	Recall that structures in organisms are related to the functions they perform

Topic		Discussion and Presentation	
Benchmark LA.3.6.1		Use oral language to obtain information, complete a task, and share ideas and personal opinions with others	
Rubric			
Advanced	Proficient	Partially Proficient	Novice
Use creative oral language to obtain information, complete a task, and share ideas and personal opinions with others, in a highly effective way	Use oral language to obtain information, complete a task, and share ideas and personal opinions with others	Use typical oral language that sometimes aids in obtaining information, completing a task, or sharing ideas and personal opinions with others	Use inappropriate oral language that does not aid in obtaining information, completing a task, or sharing ideas and personal opinions with others

Topic		Meaning	
Benchmark LA.3.7.1		Add concrete details and specific facts to support and develop ideas when speaking	
Rubric			
Advanced	Proficient	Partially Proficient	Novice
Add concrete details and specific facts to support and develop ideas when speaking, in a highly effective way	Add concrete details and specific facts to support and develop ideas when speaking	Add obvious or trivial details and facts that partially support and develop ideas when speaking	Add vague details and irrelevant facts that do not support and develop ideas when speaking

Topic		Estimation	
Benchmark MA.3.3.3		Estimate the results of whole-number computations	
Rubric			
Advanced	Proficient	Partially Proficient	Novice
Consistently make appropriate estimates of the results of whole-number computations using an estimation strategy	Usually make appropriate estimates of the results of whole-number computations using an estimation strategy	Sometimes make appropriate estimates of the results of whole-number computations using an estimation strategy	Rarely make appropriate estimates of the results of whole-number computations using an estimation strategy

Assessment/Evidence Pieces

Lesson

- Worksheet: Diagram and Group Presentation Self-Assessment

Materials Needed (NOTE: Optional Extended Activities Materials are not listed.)

Teacher	Class	Group	Student
<ul style="list-style-type: none"> Method to present PowerPoint PowerPoint Anatomy of a Humpback Whale 	<ul style="list-style-type: none"> 50 ft of twine or thick string Spool of same string or twine Piece of twine cut to length of average student height 	<ul style="list-style-type: none"> Sheet of notebook paper Sheet of drawing paper Whale Anatomy Cards 	<ul style="list-style-type: none"> Worksheet: Anatomy of a Humpback Whale Diagram Scissors Tape or glue Ruler Pencil Black marker Crayons or colored pencils

Instructional Resources

PowerPoint Presentation: *Anatomy of a Humpback Whale*

Student Reading: *Whale Anatomy Cards*

Teacher Answer Key: *Whale Anatomy Cards*

Student Worksheet: *Anatomy of a Humpback Whale*

Teacher Answer Key: *Anatomy of a Humpback Whale*

Self Assessment: *Diagram and Group Presentation*

Extension Activity: Teacher Reading: *Humpback Holoholo: Guided Imagery and Behavior Choreography Teacher Guide*

Extension Activity: Teacher Reading: *Humpback Holoholo: Building the Class Whale Teacher Guide*

Student Vocabulary Words

adaptations: special traits that help living organisms survive in a particular environment.

anatomy: the physical structures of organisms.

baleen: overlapping plates that hang from the sides of a humpback whale's upper jaw; used for feeding.

blowholes: the hole(s) on top of the whale's head used for breathing.

blubber: the thick, insulating layer of fat of most marine mammals.

cetacean: a marine mammal in the Order *Cetacea*, including whales, dolphins, and porpoises.

dorsal fin: the small fin on the back of the whale used for balance in the water.

flukes: the two lobes of a whale's tail.

marine mammal: mammals that live in the ocean.

pectoral fins: the two paddle-shaped front limbs of whales, used for steering and stopping.

peduncle muscle: the powerful tail muscle the whale uses to swim through the water.

rostrum: the large, flat upper jaw of the whale.

splashguard: the raised area in front of the blowholes that prevents water from pouring into the blowholes when the whale breathes; also called a blowhole crest.

tubercles: knobs on the head and jaws of some humpback whales.

ventral pleats: long folds in the skin under the mouth that expand when the whale takes in large amounts of water and food.

Lesson Plan

Lesson Preparation

- Read the Science Background provided in the Unit's Overview.
- Copy the *Whale Anatomy Cards* onto card stock. Laminate (if desired), and cut into individual cards. [Suggestion: You may copy the *Whale Anatomy Cards* on copy paper and cut and paste them onto cardstock before laminating them.]
- Set up computer projector to display *Anatomy of a Humpback Whale* PowerPoint presentation.
- Make copies of *Anatomy of a Humpback Whale Diagram* (one per student).
- Extension Activity: Make a copy of *Humpback Holoholo: Building the Class Whale Teacher Guide*.
- Extension Activity: Make a copy of *Humpback Holoholo: Guided Imagery and Behavior Choreography Teacher Guide*.
- Extension Activity: Select an open area (playground, field, or gymnasium) with plenty of space for the whole class to move around (role-play activity).

I. *Land to Sea, Mammals Like Me*

- Begin the lesson by asking students to Pair-Share the characteristics of humans that make us mammals. Record students' responses on chart paper.
- Review mammal characteristics with the class. Key characteristics that should be identified with students include: 1. mammals are warm-blooded (must maintain a certain body temperature), 2. breathe air with lungs 3. give birth to live young, and nurse their young with milk, and 4. they have hair or fur.
- Return to the list created by the class and ask students to again Pair-Share and brainstorm the activities people do to survive. Have students list their survival behaviors on a piece of notebook paper. Encourage students to use the list of mammal characteristics to help them think of their needs. Here are some examples: eat food, drink water, breathe oxygen, stay at the right temperature, care for babies, avoid danger, and communicate with others.
- Have students share their list of behaviors with the class and get students thinking about the physical and behavioral adaptations that enable us to survive. For example, if a student states that people need to eat food, ask the student to explain the adaptive physical features needed to find, prepare, and eat the food.
- Read the following imaginary scenario aloud to the class:

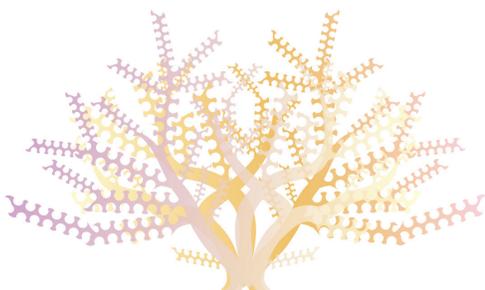
You are marine biologists studying the ocean. One day, you learn that your best friend has become a marine mammal.
- Ask students to brainstorm their friend's survival needs and the adaptations needed to survive in the marine environment. Remind students that adaptations need to be consistent with characteristics of a mammal. Introduce the following concept: *Adaptation plays a major role in the evolution of species. An adaptation is a characteristic or trait that enables an organism to survive in its environment. An adaptation can only occur if there is variety within the offspring of a species.*
- Provide students with drawing paper to illustrate these features. Have students also create captions to explain the features of this new mammal and how these features help it to survive in the marine environment.
- Lead a class discussion to help students share their illustrations, explain the changes they made to transform their friend into a marine mammal, and reiterate the role of adaptation in evolution.

II. *How big is a humpback whale really?*

- A. Bring students to a school hallway or nearby field and tape or tie down one end of the string.
- B. Tell the students that you are going to unravel the spool of twine and when they think you have reached the point where the twine is the length of a humpback whale, they should tell you to stop.
- C. Walk from the start point, when the first student says, “stop,” and ask the class, “Does everybody agree?” If they don’t agree, ask “Why not?”
- D. Continue this process until the class reaches a consensus and no more twine is unraveled. Pull out the 50 ft piece of twine, announce that your string is the average size of a humpback whale, and lay it down next to the class consensus string. Have students figure out how far off their guess was from the actual average size of a humpback whale.
- E. Show students the piece of twine cut to the length of the average student height. Ask them to guess how many students laying head to foot (how many of those strings) it would take to equal the length of a humpback whale.
- F. Perform the math and how far off their estimate was from actual.

III. *PowerPoint Presentation and Discussion*

- A. Tell the students that the class will be focusing on a marine mammal that visits the islands every year.
- B. Share with them that they will learn about the humpback whale and how humpback whales are adapted to survive the marine environment by participating in a presentation.
- C. Distribute the *Whale Anatomy Cards* equally among the groups. (Some groups may have more than one card depending on class size.) Tell the students they will be explaining the humpback whale body feature described on the card to the class during the PowerPoint presentation.
- D. Ask each group to read the information on the card, discuss with their group how to present the information to the class, and determine a way to role-play the function of their assigned humpback whale body feature.
- E. Allow 15–30 minutes for the groups to discuss and prepare presentations.
- F. Provide each student with a copy of the *Anatomy of a Humpback Whale Diagram*. Ask the students to label each feature on the diagram as it is discussed during the presentation. This will be their note sheets.
- G. Begin the PowerPoint presentation. Ask each group to present their information as the slide with their assigned humpback whale body feature is displayed. Have the students in the audience stand up and role-play the function of each whale adaptation as it is displayed by the group presenting. Refer to the Teacher Background for a list of the PowerPoint slides and summary of the Humpback Whale Anatomy Information cards.
- H. After the last PowerPoint slide and presentation, review each humpback whale feature with the class, and have them check their diagrams to ensure each feature is labeled correctly.

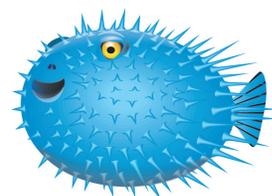


Extended Activities

I. *Humpback Holoholo: Role-play Activity*

This activity is modified from MARE Ocean Immersion: Grade 5 curriculum activity, *Whale with Class: Becoming the Whale*.

- A. Teacher should review all pages of the Teacher and Student worksheets before beginning the activity.
- B. Review the behaviors of humpback whales in the Alaskan and Hawaiian environments, and the function of some humpback features.
- C. Have the whole class do the activity together, to prepare them for the activities separately.
- D. Tell the students that they are going to build the structure of one giant humpback whale with the entire class. Each student will take on the role of a particular body feature. They must work cooperatively as a group to role-play behaviors of humpback whales in the marine environment by leading the students in an interactive role-play activity.
- E. Take the students to an open area (playground, field, or gymnasium) with plenty of space to move around. Assign each student a body feature to role-play. Modify the positions as needed for number of students in the class. Extra students can take the role of krill and small fish during the feeding behavior role-play.
- F. Build the class whale one structure at a time, starting with the head. Have the students role-play and describe the function of each body feature as the class whale is assembled. Refer to *Humpback Holoholo: Building the Class Whale Teacher Guide* for descriptions on how to position the students.
- G. Take the students on an imaginary journey from Alaska to Hawai‘i, and have the class play the role of the whale behaviors you describe, one at a time. Allow students time to work cooperatively to solve problems and communicate how to move together as a group to role-play each behavior. Refer to *Humpback Holoholo: Guided Imagery and Behavior Choreography Teacher Guide* for suggestions on describing and role-playing humpback whale behaviors. The first two behaviors practice swimming and turning to get the students working together and communicating between body features.
- H. After the activity, ask the students to complete a *Humpback Holoholo Reflection*.



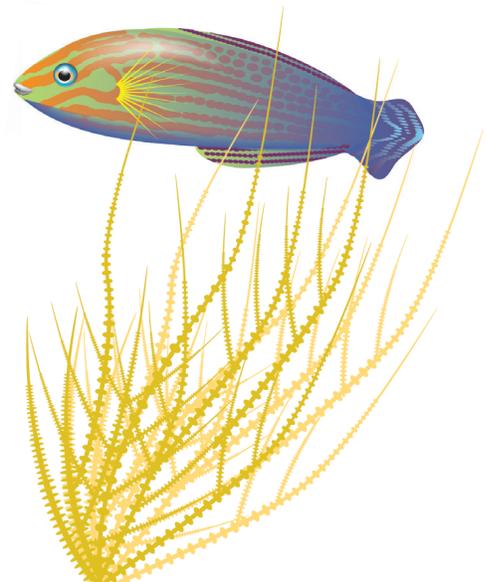
II. Whales-to-Scale

(Adapted from Hawaiian Islands Humpback Whale National Marine Sanctuary’s (HIHWNMS) Integrated Humpback Whale Activities, *Whales to Scale: Student Activity 2*.) Students visualize how big humpback whales are by making a life-size drawing of an adult humpback whale and a calf.

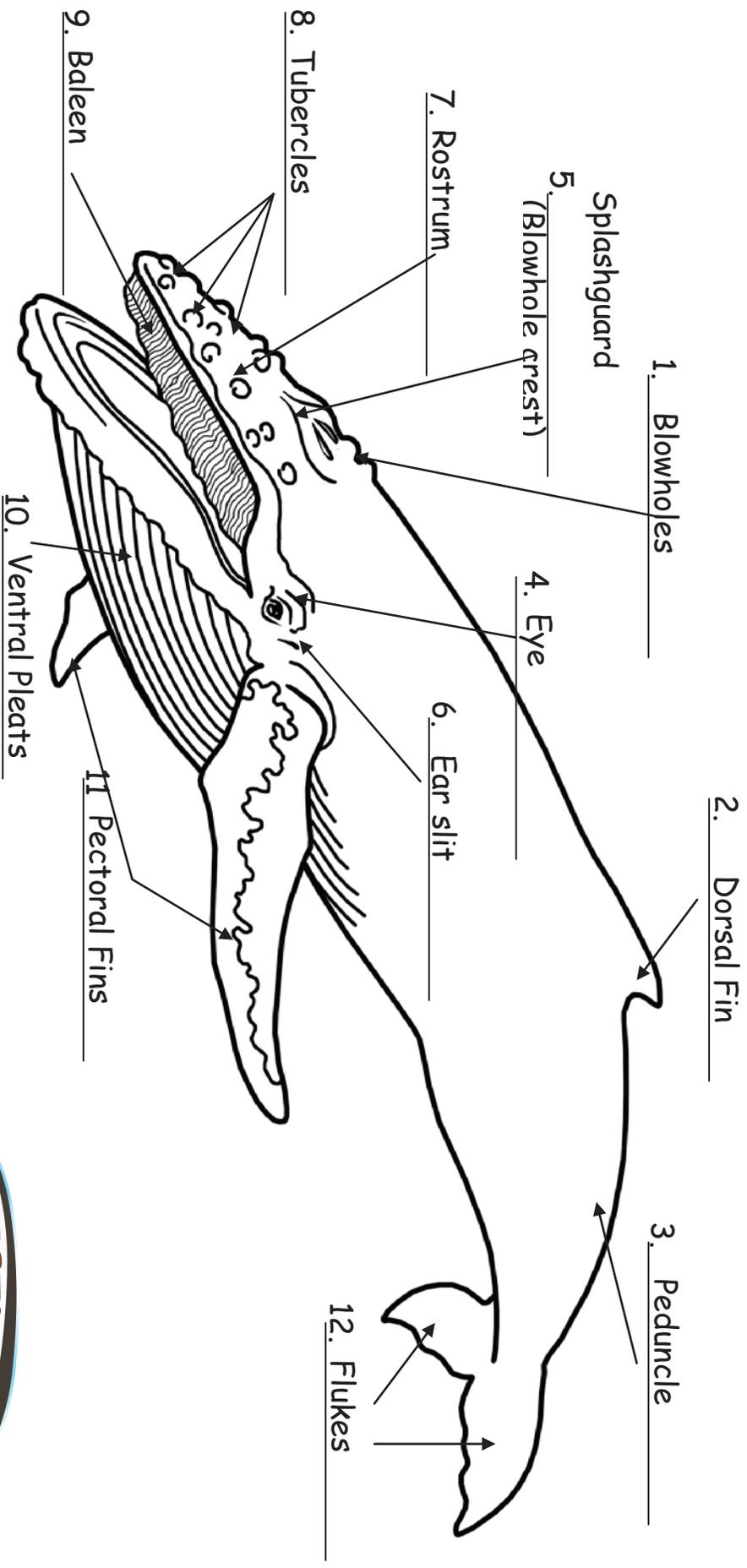
- A. Select a safe location outdoors with a large paved area.
- B. Provide a gridded picture of the humpback whale and a calf. (1 inch = 5 feet)
- C. Using chalk and a tape measure or yardsticks, have the students create a 50- by 30-foot grid on the pavement, with each grid box measuring 5 feet by 5 feet.
- D. Ask the students to use different colored chalk to draw the life-sized humpback whale and calf, box by box, using the gridded picture of the whales with the overlaid grid as a guide. (The adult whale is about 45 feet long, and the calf is approximately 15 feet long.)

III. Feature ID Game

- A. Use the *Whale Anatomy Cards* to assess learning by dividing students into two teams. Team A lines up on one side of the classroom; Team B lines up on the other side. Set up a table in the middle of the classroom with several sets of the *Whale Anatomy Cards* randomly placed on the table, with the name of the body feature facing up. Read the function of a body feature. When you say, *Go!*, the first student in line from each team will step up to the table to find the correct body feature that matches the description.



LESSON 1 Anatomy of a Humpback Whale - Teacher Answer Key

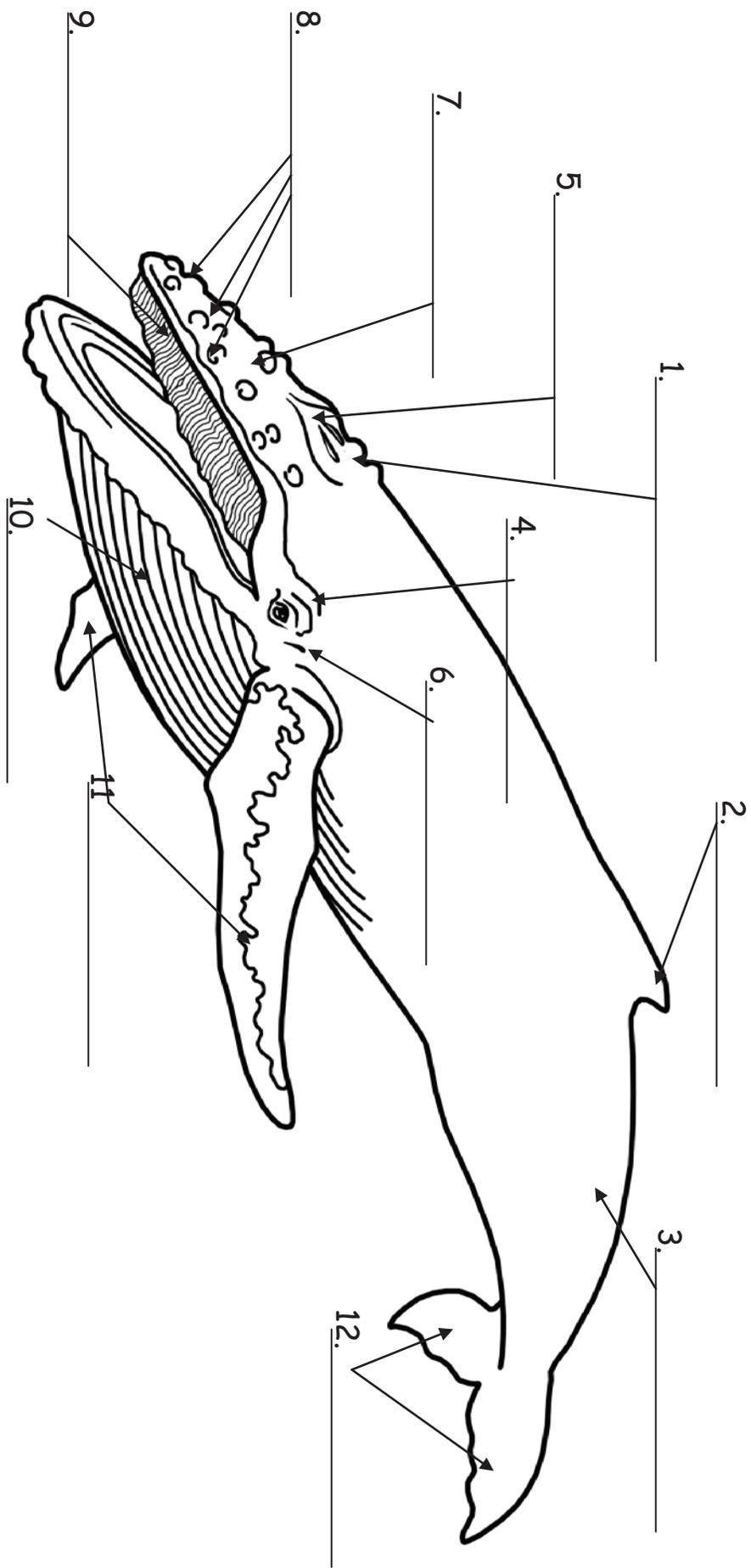


LESSON 1 Anatomy of a Humpback Whale

Name _____

Date _____

Directions: Label the body features of the humpback whale using the example provided.



Self Assessment: Diagram and Group Presentation

- | | Yes | No |
|---|-----|-----|
| 1. Did you label each humpback whale body feature correctly? | ___ | ___ |
| 2. Are your labels neat and easy to read? | ___ | ___ |
| 3. Identify 3 physical features of a whale and describe how each feature helps the whale survive: | | |

4. How I helped my group the most: _____

5. How I can help my group more next time: _____

6. What I still have questions about or don't understand: _____



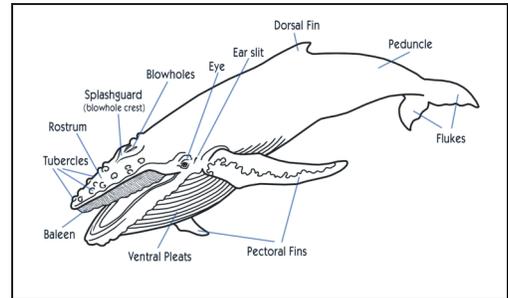
LESSON 1 Teacher Answer Key

WHALE ANATOMY CARDS

[Note: These are smaller versions of the student version of the Whale Anatomy Cards]

STREAMLINED BODY SHAPE:

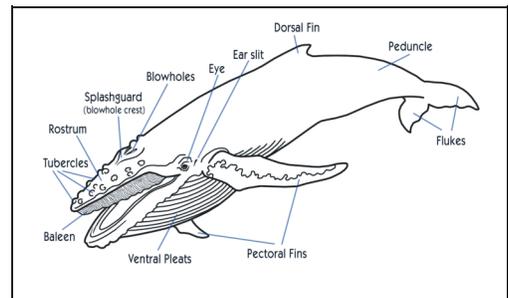
- The bodies of humpback whales are streamlined, or torpedo-shaped, to help them glide smoothly and easily through the water.
- Humpback whales are black on the dorsal, or upper side, and mottled white and black on the ventral, or underside.
- The average length of a humpback whale is 45 feet, and average weight is approximately 90,000 pounds (45 tons).



Cool Fact: A humpback whale's skin feels like smooth, wet rubber. The outer layer of skin actually absorbs water, which helps the whale move smoothly through the ocean.

BLUBBER:

- Humpback whales have a thick layer of fat, called blubber.
- Blubber helps whales stay warm in Alaska's cold waters. It also makes whales buoyant, which helps them to float and not sink in the water.
- Blubber is where whales store food to give them energy when they migrate to Hawai'i where no food is available.

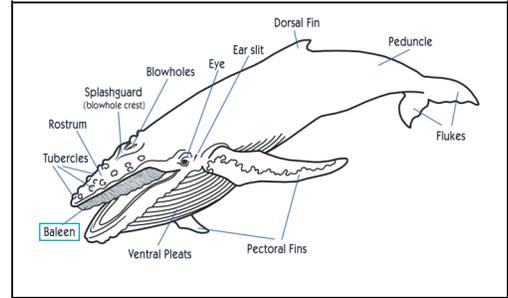


Cool Fact: A humpback whale's blubber is 8- to 12-inches thick.

BALEEN:

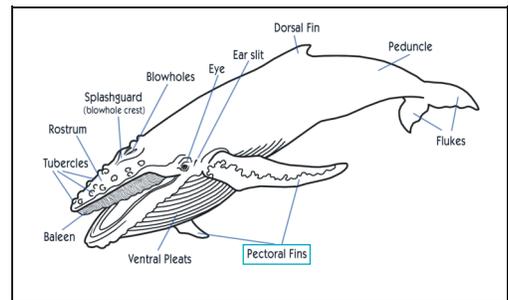
- Baleen whales do not have teeth. They have baleen plates hanging down from both sides of their long upper jaws.
- Humpback whales use baleen to feed. They gulp in large amounts of water, and use baleen to filter out small prey, such as krill and small fish.
- Baleen plates overlap, and the lower edges are frayed (like frilly plastic hair). This helps the whale trap large amounts of prey.
- Humpback whales have between 270 and 400 pairs of baleen plates. Each baleen plate is approximately 2–3 feet long.

Cool Fact: Baleen is made out of a strong and flexible material called keratin. This is the same material our fingernails are made of.



PECTORAL FINS:

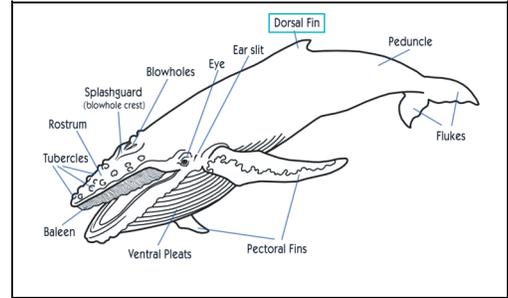
- Humpback whales have the longest pectoral fins of all whales. They are 15 feet long, which is 1/3 of their whole body length.
- Pectoral fins are mostly white underneath, with bumps along the front edge. Pectoral fins are also called flippers.
- Humpback whales use their paddle-shaped pectoral fins for steering and stopping in the water while swimming. They can turn very quickly with their long pectoral fins.



Cool Fact: The humpback's scientific name, *Megaptera*, means Big Wings, named so because of their really long pectoral fins.

DORSAL FIN:

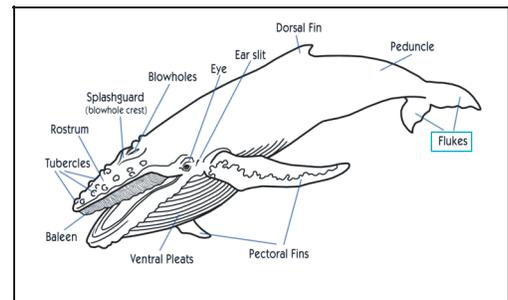
- The humpback whale's dorsal fin is located about 2/3 of the way down its back.
- It is pointed and approximately 12 inches tall, which is very small compared to the size of the whale's body.
- The dorsal fin is used for balance in the water. It helps the whales to stay upright as they swim through the ocean.



Cool Fact: Scientists take pictures of dorsal fins to help identify whales. The dorsal fin of each whale has different shapes, color patterns, and scar markings.

FLUKES:

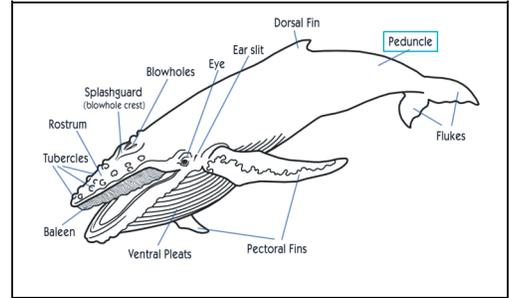
- Flukes are the whale's tail. Each side of the tail is called a fluke.
- A humpback whale's flukes are approximately 15 feet across. That is 1/3 their whole body length.
- Whales move their powerful flukes up and down to propel themselves through the water. Humpbacks can swim up to 20 mph, but usually swim a lot slower (between 8–13 mph).
- Flukes do not have bones. They are made of muscle and other tissues.



Cool Fact: Each humpback whale has different flukes, just like people all have different fingerprints. Researchers look at the patterns on the underside of flukes to name and study individual whales.

PEDUNCLE MUSCLE:

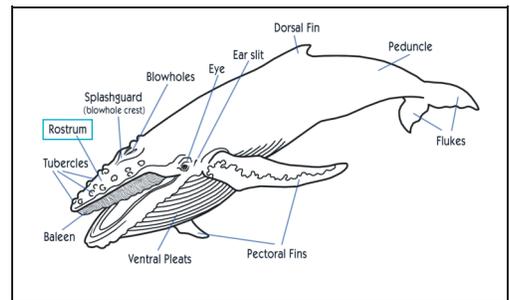
- The peduncle muscle is the last third of the whale's body, located between the dorsal fin and the flukes.
- This powerful muscle is used to move the tail up and down for swimming.
- A humpback whale arches its peduncle when getting ready to dive down. This looks like a hump on the back of the whale, which is how the humpback whale got its common name.



Cool Fact: The peduncle muscle is the strongest muscle in the entire animal kingdom.

ROSTRUM:

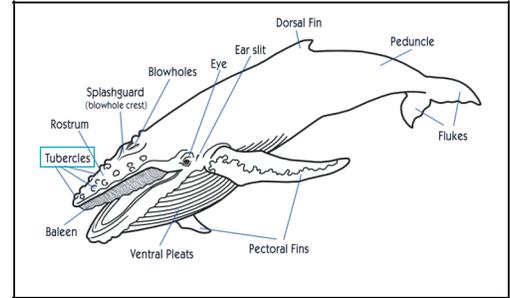
- The large upper jaw or snout of the whale is called the rostrum.
- It is flat, and tapers to a point. This makes the shape of the head streamlined to help the whale move easily through the water.
- The rostrum is bumpy and often has barnacles attached to it.



Cool Fact: Humpback whales do not have a neck.

TUBERCLES:

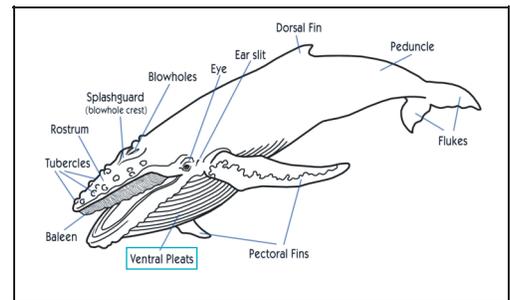
- Tubercles are golf ball-sized bumps on a humpback whale's upper and lower jaws.
- Each tubercle has a half-inch long hair, called a vibrissa.
- Scientists are not sure why humpbacks have tubercles, but think they are used to sense temperature and vibrations in the water.



Cool Fact: Humpbacks are the only whales with tubercles.

VENTRAL PLEATS:

- Ventral pleats are long grooves on the underside of the whale's throat that run from the chin all the way to the navel.
- Ventral pleats allow the whale to expand its mouth three times its normal size during feeding. This helps the whale to capture large amounts of food in one giant gulp.
- Humpback whales have 12–30 ventral pleats.

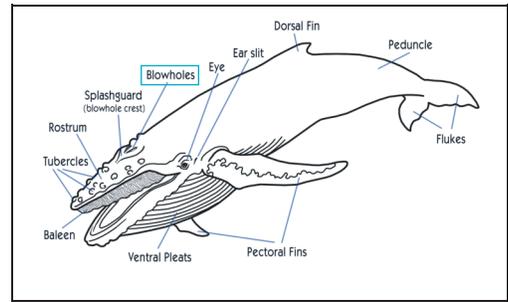


Cool Fact: Male humpback whales gulp in water to expand their ventral pleats. This makes them look larger and more impressive when competing with other males in the breeding grounds.

BLOWHOLES:

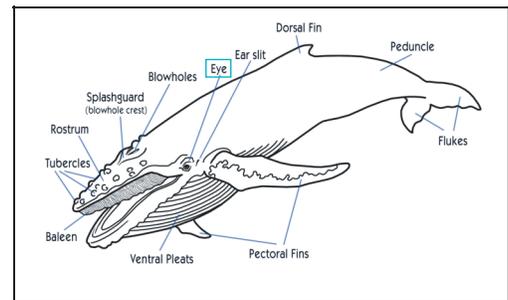
- Blowholes are the whale's nostrils. They are located on top of the whale's head near the center.
- Whales use blowholes to breathe air at the surface of the water.
- Baleen whales have two blowholes. Whales and dolphins with teeth instead of baleen only have one blowhole.
- When a whale comes to the surface to breathe, it opens its blowholes, exhales to clear out any leftover water, inhales a large breath of air, then snaps the blowholes closed tightly before diving under again.
- The raised area in front of the blowholes is called a splashguard. The splashguard prevents water from pouring into the blowholes when the whale breathes.

Cool Fact: Humpback whales exhale at a speed of 300 miles per hour. Air is forced from the blowholes so fast, that it creates a fountain of mist up to 15 feet high. The fountain of mist is called a blow or spout.



EYES:

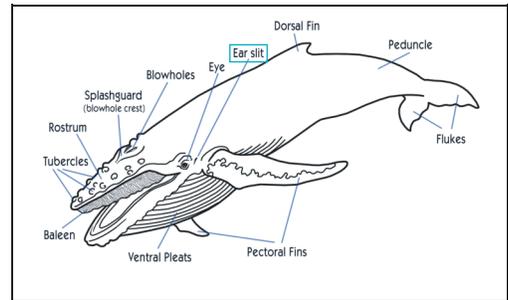
- A humpback whale's eyes are located on either side of the head, just above the end of the mouth line.
- The eyes are about the size of a large orange and bulge out from the whale's head. This helps the whale to see in all directions without moving its head.
- Humpback whales can see above the surface of the water as well as they can underwater, approximately 400 feet. Special glands produce a thin layer of fat to cover the eye to protect it from saltwater.



Cool Fact: Humpback whales have brown eyes with a kidney-shaped pupil.

EARS:

- A humpback's ears are located just behind and below its eyes.
- The ears do not stick out; they are internal (on the inside of the whale). This helps to keep the whale's body streamlined to move easily through the water.
- The opening to the ear is a very small slit, about a half-inch long. The ear slit is small to help keep water from pouring into the ear.
- Humpback whales depend on their excellent hearing to find food, avoid danger, and locate other whales and objects in the water.



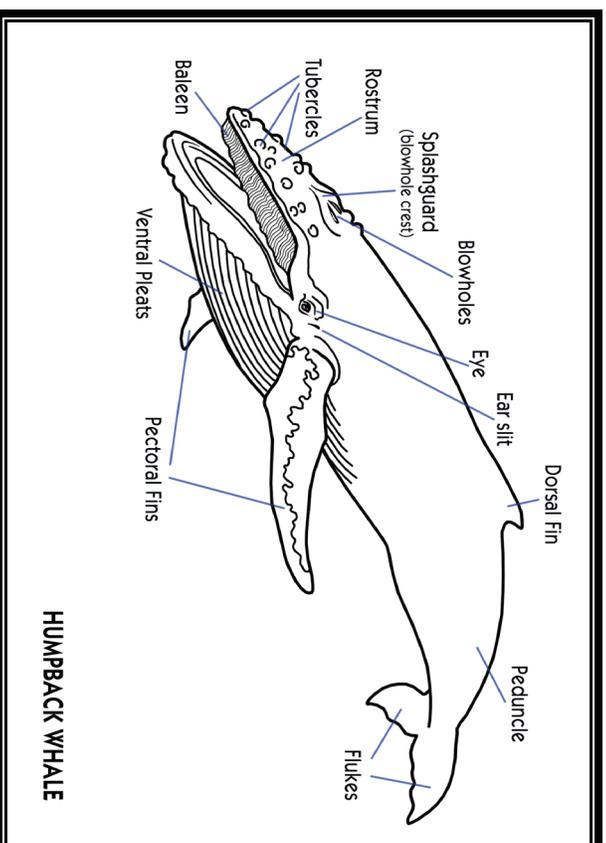
Cool Fact: Scientists estimate how old a humpback whale is by looking at its earwax. They remove the plug of earwax and count the layers of wax. The layer built up while the whale is in Alaska (feeding grounds) is darker than the layer that builds up when the whale is in Hawai'i (breeding grounds). So scientists can count how many years the whale migrated from Alaska to Hawai'i to figure out the age of the whale.

WHALE ANATOMY CARD - BLOWHOLES

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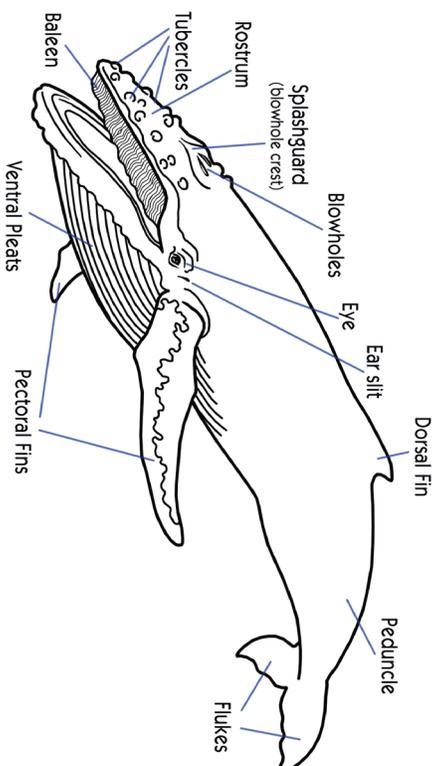


WHALE ANATOMY CARD - EARS

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- The opening to the ear is a very small slit, about a half-inch long. The ear slit is small to help keep water from pouring into the ear.
- Humpback whales depend on their excellent hearing to find food, avoid danger, and locate other whales and objects in the water.

Cool Fact: Scientists estimate how old a humpback whale is by looking at its earwax. They remove the plug of earwax and count the layers of wax. The layer built up while the whale is in Alaska (feeding grounds) is darker than the layer that builds up when the whale is in Hawai'i (breeding grounds). So scientists can count how many years the whale migrated from Alaska to Hawai'i to figure out the age of the whale.



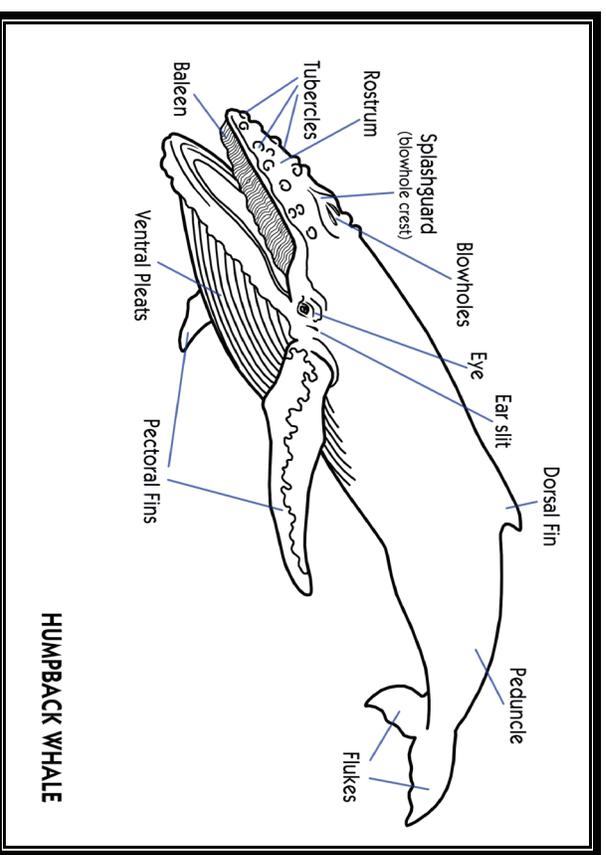
HUMPBACK WHALE

WHALE ANATOMY CARD - PEDUNCLE MUSCLE

Peduncle Muscle:

- The peduncle muscle is the last third of the whale's body, located between the dorsal fin and the flukes.
- This powerful muscle is used to move the tail up and down for swimming.
- A humpback whale arches its peduncle when getting ready to dive down. This looks like a hump on the back of the whale, which is how the humpback whale got its common name.

Cool Fact: The peduncle muscle is the strongest muscle in the entire animal kingdom.



WHALE ANATOMY CARD - FLUKES

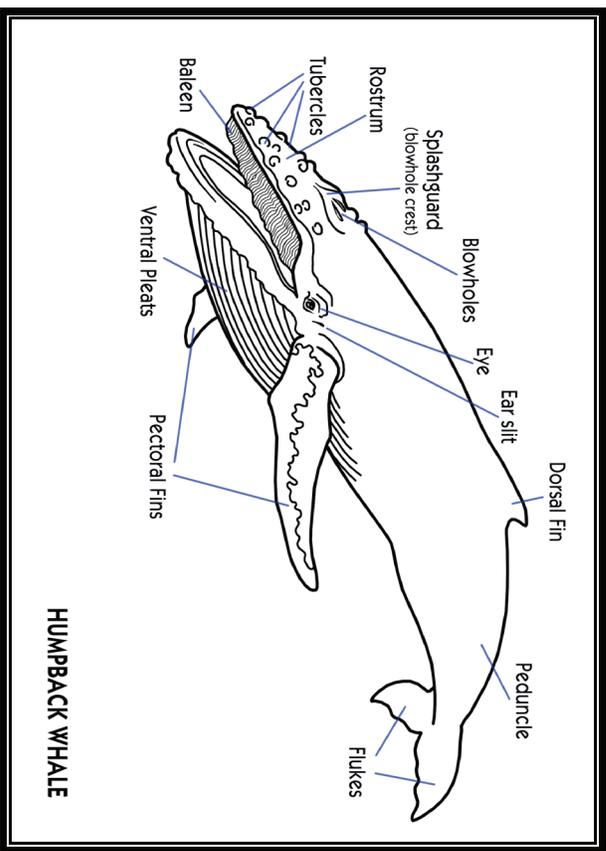
Flukes:

- Flukes are the whale's tail. Each side of the tail is called a fluke.
- A humpback whale's flukes are approximately 15 feet across. That is 1/3 their whole body length.
- Whales move their powerful flukes up and down to propel themselves through the water. Humpbacks can swim up to 20 mph, but usually swim a lot slower (between 8–13 mph).
- Flukes do not have bones. They are made of muscle and other tissues.

Cool Fact: Each humpback whale has different flukes, just like people all have different fingerprints. Researchers look at the patterns on the underside of flukes to name and study individual whales.



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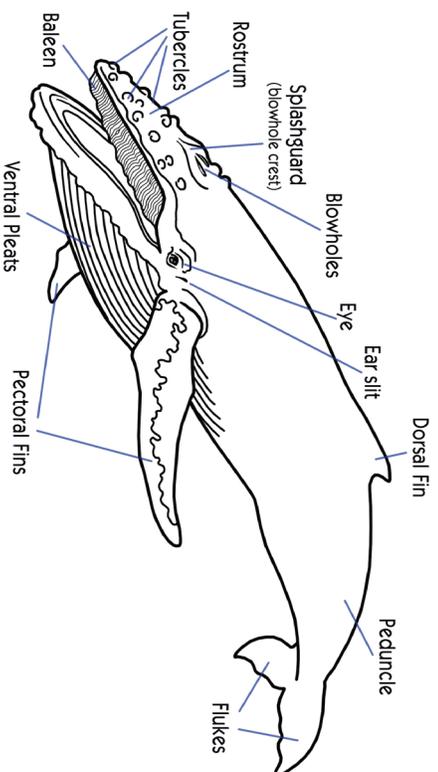
HUMPBACK WHALE

WHALE ANATOMY CARD - VENTRAL PLEATS

Ventral Pleats:

- Ventral pleats are long grooves on the underside of the whale's throat that run from the chin all the way to the navel.
- Ventral pleats allow the whale to expand its mouth three times its normal size during feeding. This helps the whale to capture large amounts of food in one giant gulp.
- Humpback whales have 12–30 ventral pleats.

Cool Fact: Male humpback whales gulp in water to expand their ventral pleats. This makes them look larger and more impressive when competing with other males in the breeding grounds.



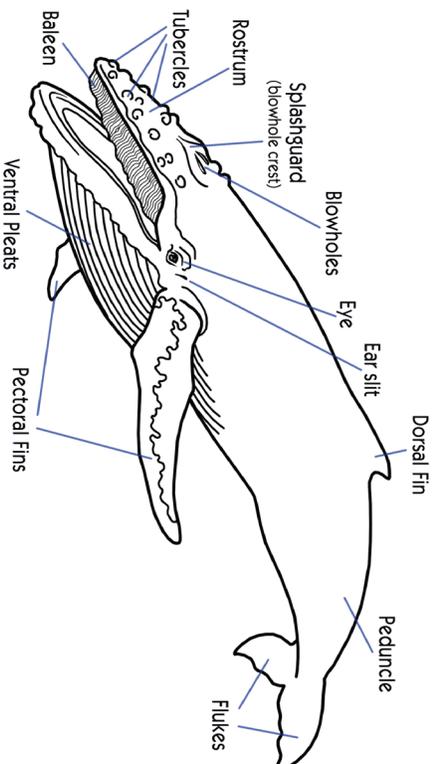
HUMPBACK WHALE

WHALE ANATOMY CARD - PECTORAL FINNS

Pectoral Fins:

- Humpback whales have the longest pectoral fins of all whales. They are 15 feet long, which is 1/3 of their whole body length.
- Pectoral fins are mostly white underneath, with bumps along the front edge. Pectoral fins are also called flippers.
- Humpback whales use their paddle-shaped pectoral fins for steering and stopping in the water while swimming. They can turn very quickly with their long pectoral fins.

Cool Fact: The humpback's scientific name, *Megaptera*, means Big Wings, named so because of their really long pectoral fins.



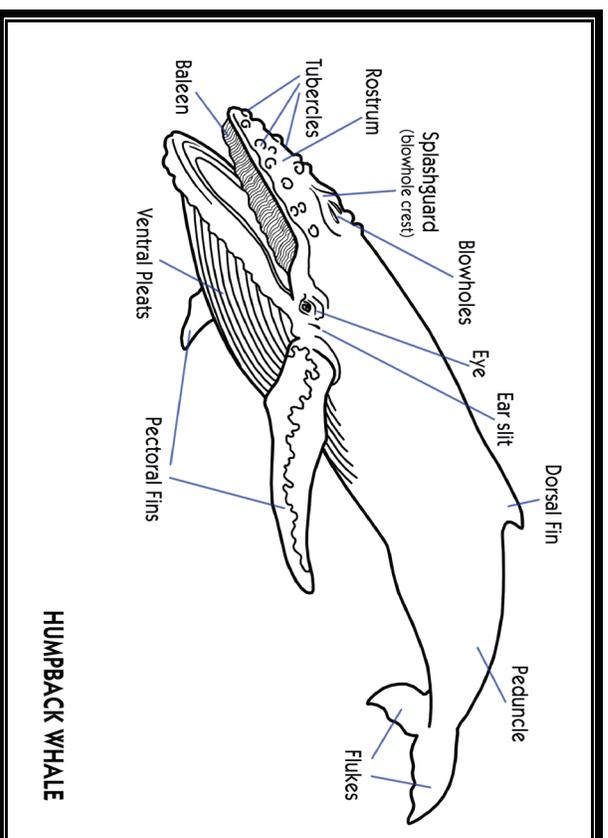
HUMPBAC WHALE

WHALE ANATOMY CARD - DORSAL FIN

Dorsal Fin:

- The humpback whale's dorsal fin is located about 2/3 of the way down its back.
- It is pointed and approximately 12 inches tall, which is very small compared to the size of the whale's body.
- The dorsal fin is used for balance in the water. It helps the whales to stay upright as they swim through the ocean.

Cool Fact: Scientists take pictures of dorsal fins to help identify whales. The dorsal fin of each whale has different shapes, color patterns, and scar markings.

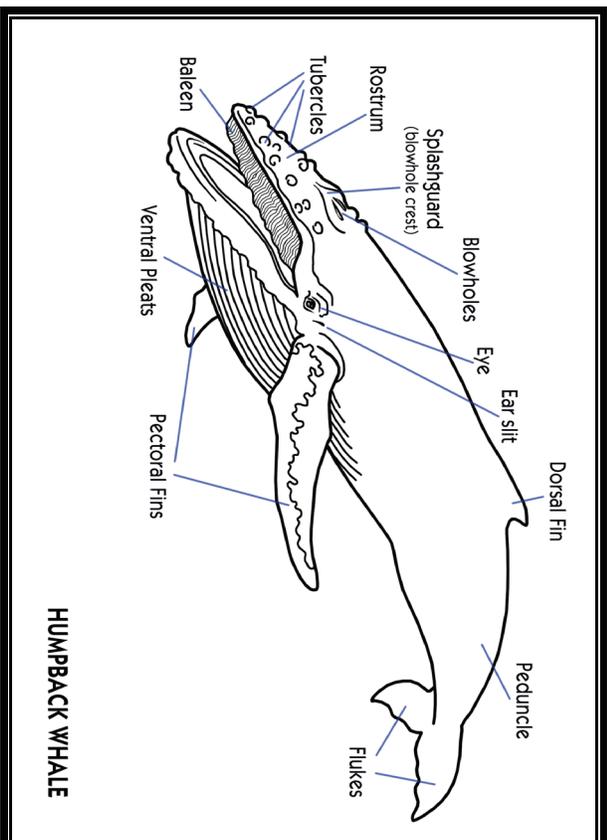


WHALE ANATOMY CARD - BLUBBER

Blubber:

- Humpback whales have a thick layer of fat, called blubber.
- Blubber helps whales stay warm in Alaska's cold waters. It also makes whales buoyant, which helps them to float and not sink in the water.
- Blubber is where whales store food to give them energy when they migrate to Hawai'i where no food is available.

Cool Fact: A humpback whale's blubber is 8- to 12-inches thick.

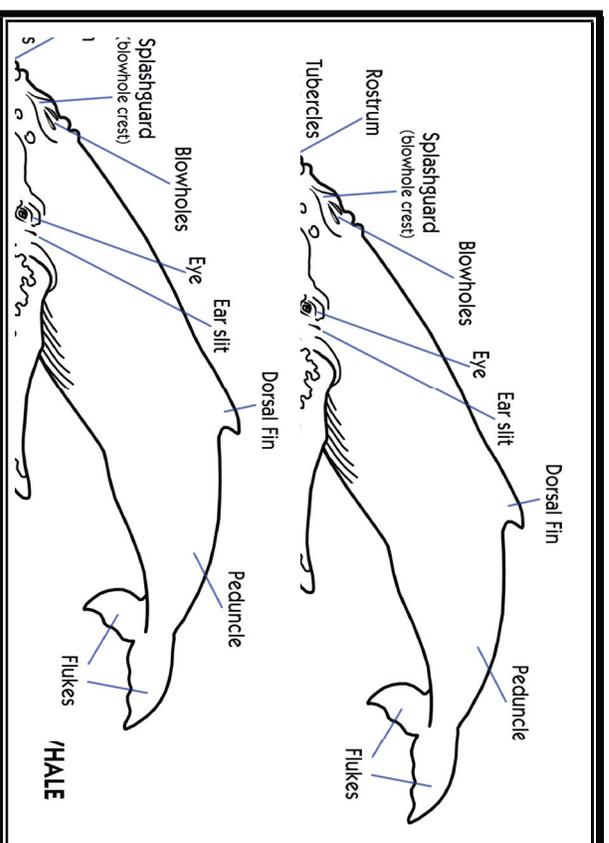
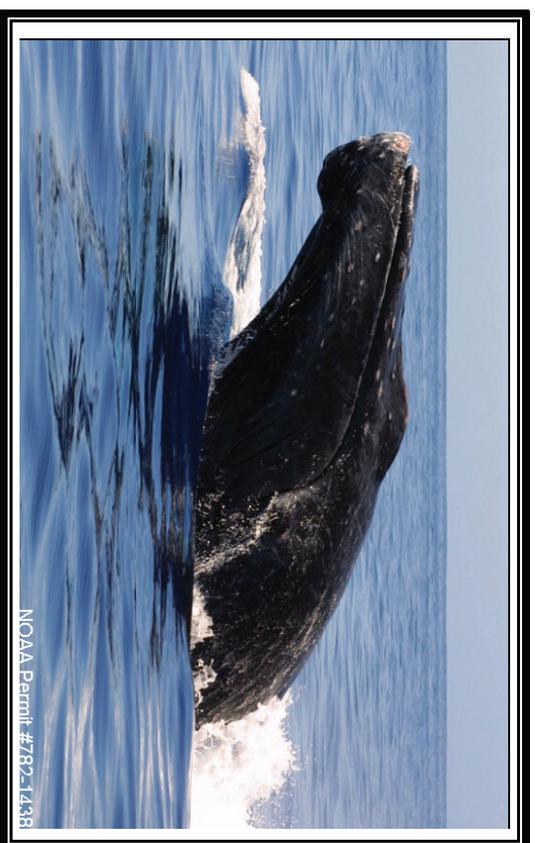


WHALE ANATOMY CARD - ROSTRUM

Rostrum:

- The large upper jaw or snout of the whale is called the rostrum.
- It is flat, and tapers to a point. This makes the shape of the head streamlined to help the whale move easily through the water.
- The rostrum is bumpy and often has barnacles attached to it.

Cool Fact: Humpback whales do not have a neck.

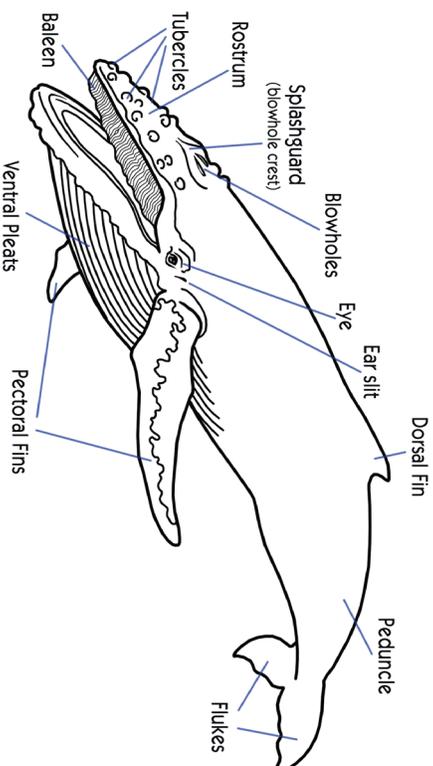
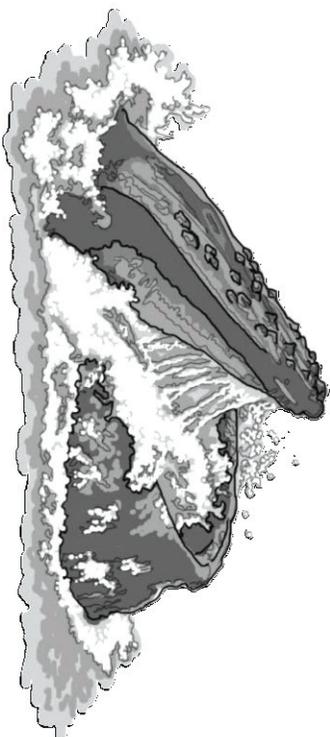


WHALE ANATOMY CARD - BALEEN

Baleen:

- Baleen whales do not have teeth. They have baleen plates hanging down from both sides of their long upper jaws.
- Humpback whales use baleen to feed. They gulp in large amounts of water, and use baleen to filter out small prey, such as krill and small fish.
- Baleen plates overlap, and the lower edges are frayed (like frilly plastic hair). This helps the whale trap large amounts of prey.
- Humpback whales have between 270 and 400 pairs of baleen plates. Each baleen plate is approximately 2–3 feet long.

Cool Fact: Baleen is made out of a strong and flexible material called keratin. This is the same material our fingernails are made of.



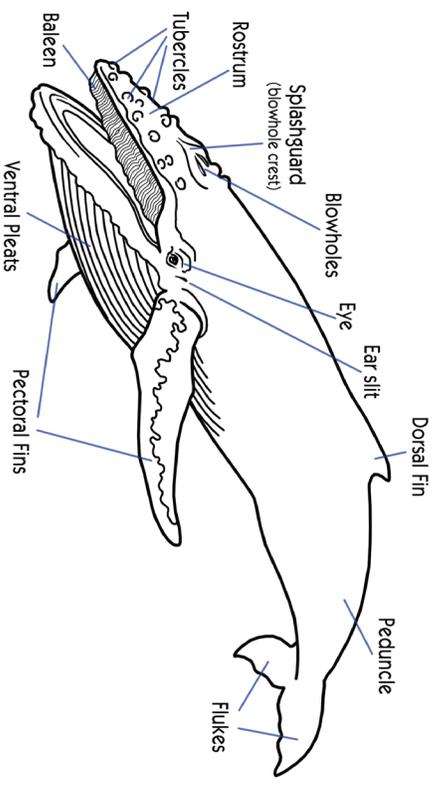
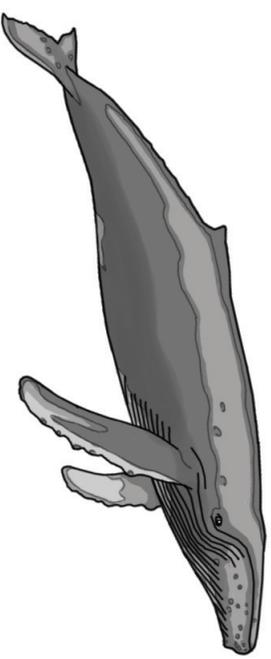
HUMPBACK WHALE

WHALE ANATOMY CARD - STREAMLINED BODY SHAPE

Streamlined Body Shape:

- The bodies of humpback whales are streamlined, or torpedo-shaped, to help them glide smoothly and easily through the water.
- Humpback whales are black on the dorsal, or upper side, and mottled white and black on the ventral, or underside.
- The average length of a humpback whale is 45 feet, and average weight is approximately 90,000 pounds (45 tons).

Cool Fact: A humpback whale's skin feels like smooth, wet rubber. The outer layer of skin actually absorbs water, which helps the whale move smoothly through the ocean.



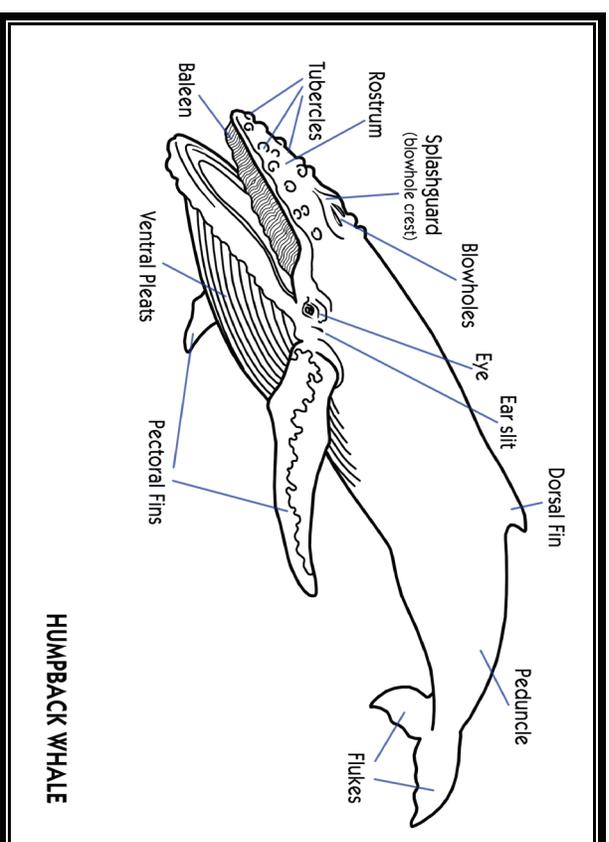
HUMPBACK WHALE

WHALE ANATOMY CARD - TUBERCLES

Tubercles:

- Tubercles are golf ball-sized bumps on a humpback whale's upper and lower jaws.
- Each tubercle has a half-inch long hair, called a vibrissa. Scientists are not sure why humpbacks have tubercles, but think they are used to sense temperature and vibrations in the water.

Cool Fact: Humpbacks are the only whales with tubercles.

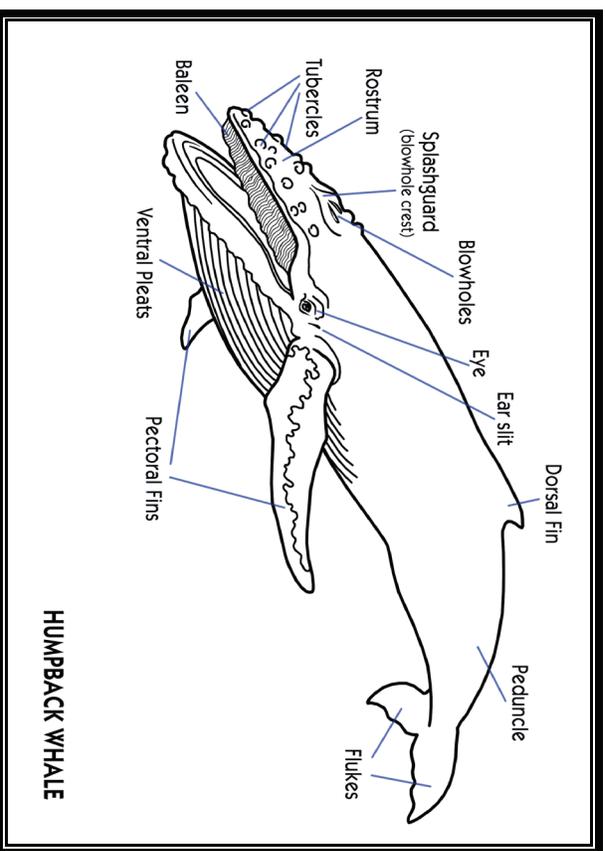


WHALE ANATOMY CARD - EYES

Eyes:

- A humpback whale's eyes are located on either side of the head, just above the end of the mouth line.
- The eyes are about the size of a large orange and bulge out from the whale's head. This helps the whale to see in all directions without moving its head.
- Humpback whales can see above the surface of the water as well as they can underwater, approximately 400 feet. Special glands produce a thin layer of fat to cover the eye to protect it from saltwater.

Cool Fact: Humpback whales have brown eyes with a kidney-shaped pupil.



LESSON 1 Teacher Reading

Humpback Holoholo: Building the Class Whale Teacher Guide

Body Feature	Number of Students	Description of Student Positions
Rostrum	2	Two tall students stand 2-3 feet apart facing each other. Have one of them hold his/her right arm straight out from his/her side, and the other his/her left arm out. Have the students join hands to form the point of the rostrum. They can rest their heads on their shoulders to be streamlined.
Lower Jaw	2	The students squat next to the hips of each half of the rostrum facing each other. They extend their arms out (same as above) so that their hands meet under the rostrum. The lower jaw opens and closes the mouth. They can curve their arms outward to make the lower mouth wider for feeding.
Blowholes	4	Have the students pair up and stand side by side. Have each pair join hands and make a circle with their arms to form the two blowhole openings. They can squeeze their arms together to close the blowholes while underwater.
Blow	2	The students squat down under each blowhole (between each pair of students playing the blowholes) when the whale is underwater holding its breath. When the whale surfaces to breathe, they jump up through the blowhole openings exhaling loudly, then inhale loudly and squat back down under the blowholes.
Eyes	2	The students stand a few feet behind the blowholes facing out, one on each side behind the mouth. The eyes stick out on the sides of the head and should face the direction in which the whale is looking (up when surfacing, down when diving, to the side when turning).

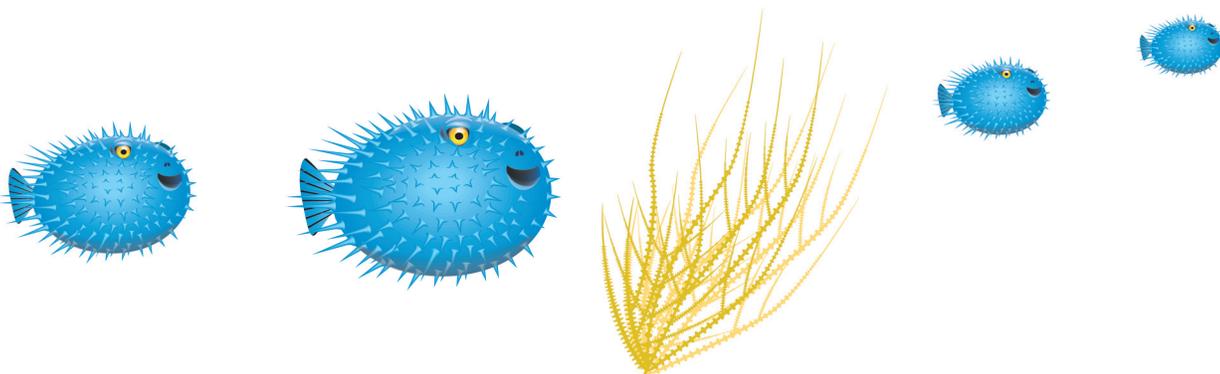
Body Feature	Number of Students	Description of Student Positions
Pectoral fins	4-6	2-3 students stand side by side a few feet behind the eyes on each side of the whale. They can hold their arms out to their sides and join hands to form the long flippers. The flippers angle back to be streamlined while swimming. One flipper goes up, and the other goes down when turning. Both flippers go straight out to the side when stopping.
Dorsal fin	1	One student stands several feet behind the blowholes. She/he can face backward, and bend over slightly to make the curved shape. The student can stand tall when the dorsal fin comes out of the water, as the whale is getting ready to dive down.
Peduncle	2	The students stand directly behind the dorsal fin facing each other with their arm extended out to the side in the direction of the tail. They will place the hand of their extended arm on the shoulder of the flukes. They can move their extended arms up and down to move the tail for swimming. They can stand tall and curve their arms up when getting ready to dive (as flukes stand tall).
Flukes	2-3	The students stand in a line facing away from the head. They can extend their arms out to the side, and join hands to form the wide tail. The peduncle controls the flukes by gently placing pressure on the shoulders of the flukes. When the whale is moving forward, the flukes walk backward, and rise up and squat down, in time with the up and down motion of the peduncles.
Calf (optional)	2-3	The students stand in a cluster a few feet in front of the dorsal fin. One student is standing with both arms pointed forward to form the streamlined head. Another student, the body and pectoral fins, stands behind the head and extends arms out. The other student is the tail and stands behind the body with both arms opened wide for the flukes. When the whale gives birth, the students move out from under the whale tail first, and the head rises to the surface to breathe. They can position themselves just behind a pectoral fin as Mom swims around.



LESSON 1 Teacher Reading

Humpback Holoholo: Guided Imagery and Behavior Choreography Teacher Guide

Guided Imagery/Behavior	Suggestions for Role-Playing
You are a large humpback whale swimming slowly forward in the cold water near Alaska. Feel how smoothly you move through the water.	Rostrum leads the whale forward and is streamlined. Lower jaw and blowholes are closed. Blows are squatting under the blowholes. Eyes are facing forward. Pectoral fins angle back to streamline. Dorsal fin moves forward in sync with the head. Peduncle guides the flukes up and down. The calf goes with the flow.
You hear a group of whales feeding and turn to the right to investigate.	Swimming Action, except the eyes, face to the right. The right pectoral fin goes down, and the left pectoral fin goes up to turn the whale.
Suddenly, a school of small delicious- looking fish swim to your left. You turn to the left in pursuit.	Swimming Action, except the eyes, face to the left. The left pectoral fin goes down, and right pectoral fin goes up to turn the whale.
You rise to the surface of the water to breathe , so that you can continue to chase after your meal.	Rostrum points up, then levels. Blowholes emerge and open. Blow jumps up through the blowholes exhaling loudly, then inhaling loudly, and squat back down under blowholes. Blowholes snap shut. Rostrum points down slightly, and dorsal fin emerges above the surface.
You dive down under the school of small fish hoping they do not see you and swim away.	Dorsal fin emerges above the surface (stands tall), followed by the peduncle muscles, which arch upward (do the wave) guiding the flukes upward (stand tall). The rest of the whale squats down in sync to make it appear like the flukes are raised into the air.



Guided Imagery/Behavior	Suggestions for Role-Playing
You are hungry and cannot wait to <i>feed</i> . You swim up toward the school of fish, open your giant mouth, and gulp in a large amount of water and fish.	Rostrum points up, lower jaw opens (drop arms toward the ground), and expands the ventral pleats (curve arms out to make wider). Students role-playing the prey can crawl in the mouth. Lower jaw closes (move arms back to the rostrum).
The water is getting very cold and you have eaten tons of food all summer. It is time to head to Hawai'i for the winter. You <i>swim slowly</i> away from Alaska.	Repeat slow swim actions.
Yikes! You see a pod of Orcas and <i>swim quickly</i> to avoid the predators.	Swimming Action, but faster.
You come to the surface to <i>breathe</i> a lot during your migration.	Repeat breathing actions.
Ahh! Nice, warm tropical water. You have made it to Hawai'i just in time to <i>give birth</i> to your calf.	Repeat slow swim to the surface. Calf moves from under the whale tail first, followed by the body and head, and swims to the surface to breathe.
You <i>care for the calf</i> by keeping it close to you where it is safe, as you swim slowly around, listening to whale song.	Mom repeats slow swim actions. Calf positions itself next to one of Mom's pectoral fins, and moves flukes (arms) up and down.

