



EDUCATIONAL SUPPLEMENT #1

THE ARCTIC VS THE ANTARCTIC

Learning Objectives:

For students to gain an understanding of the similarities and differences between the Arctic and the Antarctic, including: location, climate, human occupancy, and the marine mammals that inhabit each polar region.

This Packet Contains:

- Teaching Materials
- Activities and Worksheets
- Supplemental Media and Resource Sheet
- Visual Aids (Separate Download)

Teaching Materials: A detailed comparison of the Arctic and Antarctic intended to supplement the PowerPoint visual aid.

Visual Aid: A PowerPoint presentation that compliments the teaching materials with maps, photographs, charts, fun facts and other visual aids.

Activities and Worksheets:

- Arctic Word Search
- Antarctic Word Search
- Orca Story and Maze
- Arctic vs. Antarctic Venn diagram (may be used as an activity or a quiz)



TEACHING MATERIALS

The following pages include a detailed comparison of the Arctic and Antarctic, with an emphasis on the different species of marine mammals that inhabit one and/or the other.

Ocean vs. Continent

The Arctic

- The Arctic is an ocean surrounded by continents and contains the North Pole.
- There is no land under its frozen surface, only ocean.
- Portions of surrounding continents are also considered to be a part of the Arctic.

The Antarctic

- The *Antarctic* (*Ant*= opposite) is a continent, it contains the South Pole and has land under its frozen surface.
 - About 70% of earth's fresh water is contained in Antarctica's ice sheets, which can be as thick as 2.8 miles.
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Climate, Flora and Fauna

Both

- Both experience approximately six months of darkness a year, followed by six months of light.
- When it is dark in Antarctica it is light in the Arctic and vice versa.
- Winter ice sheets are getting smaller in both places.
- Both are home to various marine mammals, with seals and whales in common.

The Arctic

- The Arctic is comprised of many different biomes.
- The Arctic has tundra and flowering plants.
- The Arctic has an average temperature of 3° Fahrenheit and average wind speed of 16 mph.
- Arctic winter begins in December.

- The Arctic has terrestrial (land) animals in addition to wider variety of marine mammals than found in the Antarctic.

The Antarctic

- Antarctica is the largest desert in the world.
 - Antarctica has almost no vegetation, mostly lichens.
 - Antarctica is the coldest, windiest place on earth with an average temperature of -55° Fahrenheit, average wind speed is 57 mph.
 - Antarctic winter begins in June.
 - Only marine mammals (seals, whales, etc) and birds are found in Antarctica, there are no land based animals.
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People

The Arctic

- There are people who inhabit the Arctic permanently.
- The Inuit, Inupiat and Yupik all call the Arctic their home.

The Antarctic

- Antarctica is much too harsh for permanent human settlement.
 - Scientists, researchers and even recreational visitors spend some time here.
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Marine Mammals

Animals of Interest that exist in both locations

Whales: *There are several species of whales that live in both the Arctic and the Antarctic; however some species have been subdivided into separate Northern and Southern species. Generally, only the largest whales are adapted to survive in Antarctica's harsh environment.*

- **Blue Whale-** This whale lives in all oceans is the largest animal on earth, weighing in at 200 tons. At birth, a blue whale weighs as much as a full grown hippopotamus, and will continue to gain 200 lbs. every day for the first year of their life. During the first seven months, a blue whale calf will consume 100 gallons of milk each day. It is also the loudest animal on earth; its calls are even louder than a jet plane. It breathes through two blowholes, through which it is capable of shooting water fifty feet in the air. It is believed to be the largest animal that has ever lived, beating out even the largest dinosaurs.

ENDANGERED.

- **Sperm Whale-** There is a Southern species of which only the largest bulls (males) are found in the Antarctic and a Northern division which spends time in the Arctic. It is the largest toothed predator in the world and the deepest diving whale, capable of reaching depths of up to a mile. They have been poached for their ivory like teeth, and a chemical they produce in their lower intestine, which is still used in expensive perfumes today. **ENDANGERED.**
- **Fin Whale-** This whale is the second largest animal on earth and subdivided into a Northern and Southern group nicknamed The Antarctic Fin, which is significantly larger than their Northern counterpart. Both subspecies have been hunted extensively and are endangered. It is easy to tell apart from other whales because of its great length and slender build- the females are even longer than the males. It feeds by opening its mouth and swimming at a high speed, causing it to engulf 18,000 gallons of water in one gulp. **ENDANGERED.**
- **Humpback Whale-** These 40 ton endangered whales migrate each year from their summer feeding grounds in Polar Regions to the equator and warmer breeding grounds. They can live up to 77 years, and are known for their fascinating, complex songs that continue for hours and are the study of many scientists. It is currently believed that these songs are a form of communication between family members and possibly serve as a mating ritual.
- **Orca-** The “Killer Whale” is the largest of the dolphins and one of the most powerful predators; it hunts seals, sea lions and even other whales. They hunt in very dangerous and cooperative family groups and even in pods of up to forty members. Though they are very dangerous, they are also very intelligent and trainable, which makes them a popular candidate for captivity. While they are in many zoos and marine shows, they have never been hunted commercially and there is no threat to their survival. They have a lengthy 50-80 year lifespan.
- **Right Whale-** There are two Northern and a Southern subspecies of this whale, all of which are identified by their enormous callosity covered head. They got their name from whalers who determined they were the “right whale” to hunt. They are slow swimmers, they come very near to shore, and their large blubber content causes them to float when they are killed, all of which make them easy game. Not surprisingly, they are the rarest of all large whales, and have had international protection since 1949, though they reproduce slowly and their numbers have yet to really increase. The Northern Right Whale is the rarest of all, with only a few hundred individuals left in the world today. **ENDANGERED.**
- **The Sei Whale and the Minke Whale-** These whales have Northern and Southern subspecies and have been spotted (very large specimens) in Antarctic waters, but generally are not found south of the Antarctic Convergence.

Others

- **The Arctic Tern-** This bird migrates from the Arctic to the Antarctic, giving it the largest migratory pattern of animal.
- **Seals-** These marine mammals live in both places but the different species live exclusively in the Arctic or in Antarctica.

Marine mammals that live in the Antarctic, but not the Arctic

Penguins! *It is a common misconception that penguins live in the Arctic; however they only inhabit the southern hemisphere. There are seventeen total penguin species, but only four breed in Antarctica.*

- **Emperor Penguins-** Because they live exclusively in Antarctica and breed during the winter, these birds have many physical and social adaptations to their extremely harsh environment. They are the largest of all Penguins and have the deepest and longest dives of any bird. They clump together in large masses, taking turns rotating into the center where it is the warmest. After a courtship of several weeks, and a 63 day gestation period, females lay a single egg and leave. Their male counterparts balance the egg on their feet and protect it with their brood pouch- a layer of feathered skin for two months without moving, or eating. When the females return from sea and their hunting, they regurgitate food for the newly hatched chicks, and the males who have lost a third of their body weight leave to feed.
- **Adelie Penguins-** The most common and well known species of penguin in Antarctica, they are the stereotypical tuxedo shirt penguin. They are highly social and spend their winters out at sea resting together in groups on pack ice and icebergs. Mating pairs build nests out of small stones, there is a lot of competition for nesting space and stealing nesting materials from others is a common occurrence. Parents take turns feeding and incubating the egg.
- **Chinstrap Penguins-** These birds have a distinguishing band of black feathers that makes it appear as though they are wearing black helmets. They are small in size, growing to a maximum of 27 inches, with an average adult weight of ten pounds, but large in numbers, with a population of approximately 7,500,000 breeding pairs.
- **Gentoo Penguins-** These bright orange billed birds have the widest distribution of any penguin, though are the fewest in numbers. They are currently labeled “Near Threatened”. They are the fastest swimmers of the penguin species, and the largest outside the two giant species: Emperor and King. They have predators in the water, including leopard seals, orcas and sea lions, but on land there are no threats to this species.

There are also three species of Penguins found in the sub-Antarctic region which sometimes appear in the Antarctic:

- Rockhopper Penguin
- Macaroni Penguin
- King Penguin

Seals *There are four species of seals that breed and live in the waters of Antarctica. These species are different from their northern counterparts in their lack of predators. An Antarctic seal has no land predators and fewer predators in general than an Arctic Seal.*

- **Crabeater Seal-** These seals are the most abundant seal species in the world -- there are millions of them. Despite their name, they mainly eat krill and very little

crab. They feed at night and usually spend 8-10 hours doing so, making over a hundred dives.

- **Leopard Seal-** The most fearsome of seals, they prey on penguins and other seals. They are earless seals, and have never been commercially hunted for their coats. Their only predator is the Killer Whale.
- **Ross Seal-** The least common of Antarctic seals, they are very rarely seen, and little is known about them. They have a distinct siren like call, and look very different from other seal species. They have the shortest hair of any seal, a smaller, wider head and a short snout.
- **Weddell Seal-** These seals spend most of their lives beneath the Antarctic ice; they can dive to depths of 600 meters and hold their breath for up to an hour. They do not migrate often and are usually found in close proximity to their birthplace. They are very resourceful hunters. Some of their tactics include diving below their prey and allowing them to be backlit against the ice and blowing air into cracks in the ice, causing small fish to be projected towards them.

Comparable animals of the Arctic

Seals *There are six seal species that live in the Arctic, all of which are different from the species that live in the Antarctic, though there is no overall major size difference.*

- **Harp Seal-** Pups are born with snow white fluffy fur, which is prized by poachers, putting this animal's conservation status at "threatened". Adults have gray- brown markings that have earned them the nickname "the saddle back seal".
- **Hooded seal-** The males "hood" is really an enlargement of their nasal cavity, and can be blown up to the size of the seals head -- doubling the apparent size of its head for courtship and defense. Additionally, males can also inflate a bright red membranous "balloon" from their left nostril.
- **Ringed Seal-** These are the smallest seal species and the most common in the Arctic. They make conical breathing holes in the ice which allows them to live much further from the ice edge than most seals. They are largely solitary creatures and only come together on top of the sea to breed, molt and rest. They build lairs with snow on top of the ice to rest in.
- **Bearded Seal-** Their blubber can be as thick as 7 cm. and at about 7 ½ feet long, and can weigh up to 750 pounds! Within a week of birth, pups are capable of diving to depths of 200 feet. They spend most of their time laying on ice at the waters edge, with their heads face down in the water, in order to make a quick get away should a predator approach. They are a primary food source for both Polar Bears and the Inuit people of the Arctic
- **Spotted Seal-** This seal has a self describing speckled coat and is commonly seen in coastal waters when there is little ice, but during the winter is rarely spotted.
- **Ribbon Seal-** This animal is the most distinguishable of the seals, the light colored ribbon- like markings that cover their dark coats become more distinct with age. They are unwary and easily approached by boat, which leads researchers to believe they are rarely preyed upon, though their list of possible predators includes killer whales, polar bears, sharks and walruses.

Whales *There are three species of whale that live exclusively in the Arctic and sub-arctic waters. They are significantly smaller than whales that spend any part of their life in the Antarctic.*

- **Beluga Whale-** Also called “the sea canary” for its high pitched squeaks, clicks and clangs, they also mimic other sounds. It is all white, and has a melon shaped head that it is able to change the shape of by blowing air around its sinuses. It is very small for a whale, only ever growing up to about 16 feet, and it appears to always be smiling.
- **Narwhals-** This marine mammal is also called “the sea unicorn” because males have one long tooth that protrudes from their upper left jaw, which can reach up to nine feet in length. They are found in Arctic coastal waters and rivers, often spotted in groups of ten to fifteen, but groups of several thousands have been seen.
- **Bowhead Whale-** Also known as the Arctic Whale, these mammals can weigh up to ten tons and break through up to four feet of ice to create breathing holes. Their large heads can be up to 40% of their body length. There are only 11,700 left, compared to the estimated 50,000- 150,000 before the commencement of whaling.



ANTARCTIC WORD SEARCH

N C S O A J A T V N E S
S R T T C O V A E C E N
B T E C E E H S N S T A
N O S T N E N I T N O C
E T O I C R H L U A N L
L N U V T I E S R T B E
A P T S A N T R E S E D
H C H E N S E C A C R O
W B P I E E T I R V I C
E S O A P J H I C A I W
U A L S R U E C T S B N
L S E P E N G U I N S N
B C N N T E E B C L N I

WORD BANK

- Continent
- Ice sheets
- South Pole
- Desert
- June
- Scientists
- Penguins
- Blue Whale
- Orca
- Arctic Tern
- Seals
- Lichens

BONUS: Find
Venture Arctic



ARCTIC WORD SEARCH

E P L C M W A U R B
L O K C A B P M U H
O L H O S A L S O C
P A N N C A C O E B
H R D R H E D G T E
T B O W H E A D U L
R E R W D S R N N U
O A R S E R E I D G
N R E T C I T C R A
E A I N U I T E A G
L Y U P I K A R E N

WORD BANK

- Ocean
- North Pole
- Inuit
- Yupik
- Tundra
- Beluga
- Hooded Seal
- Orca
- Narwhal
- Arctic Tern
- Humpback
- Bowhead

BONUS: Find
Polar Bear



OSCAR THE ORCA

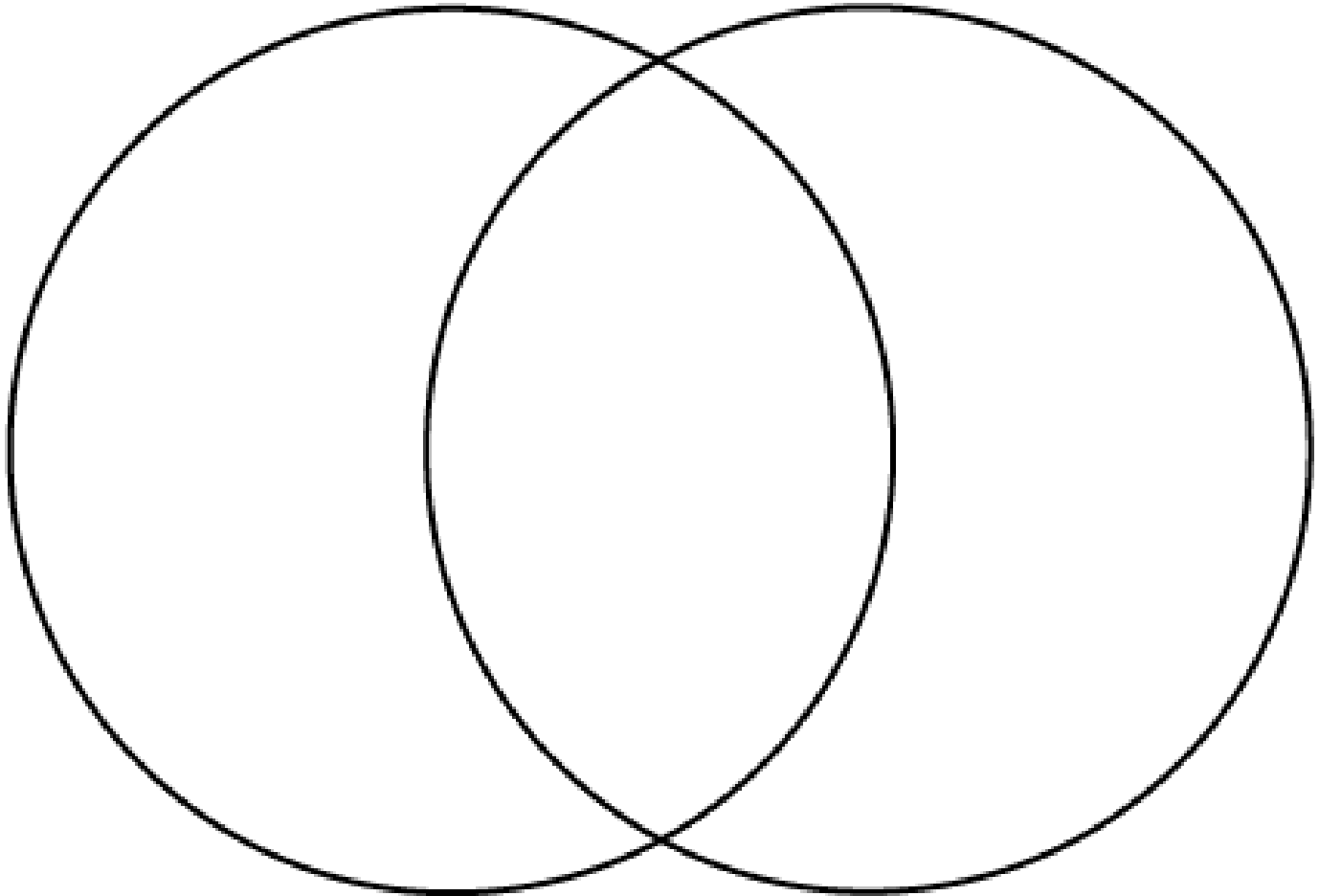


Oscar is a young Killer Whale who was separated from his tight-knit family pod while hunting. Hunting is a very important part of his life as he eats 551 pounds of food a day! Luckily for Oscar, his 52 teeth and his fearsome reputation will protect him from any possible dangers lurking in the Antarctic waters. Oscar is very sad without his pod and is beginning to fear he is stuck under an ice sheet. Help him find his way to a hole in the ice so he can catch his breath and find his family!



THE ARCTIC

THE ANTARCTIC



PLACE THE FOLLOWING TERMS IN THE CORRECT SPOT:

North Pole, South Pole, Winter in June, Winter in December, Desert, Snowy, Dark 6 months every year, Orcas, Emperor Penguins, Blue Whales, Narwhals, Arctic Tern, Seals, Chinstrap Penguins, Average temperature -55° , Average temperature 3° , Inuit people, flowering plants.

BONUS: Can you figure out where Polar Bears should go?



SUPPLEMENTAL MEDIA & RESOURCES

Fun extras for the classroom:

- The U.S Antarctic Program website includes live video feed from the Amundsen-Scott South Pole Station, current time, temperature and wind chill.
<http://www.usap.gov/videoClipsAndMaps/spwebcam.cfm>
- The National Oceanic and Atmospheric Administration (NOAA) Arctic theme page contains a live webcam feed, current temperature and photo galleries.
<http://www.arctic.noaa.gov/>
- An excerpt from BBC's Planet Earth Series that shows a male hooded seal inflating his hood and his red nasal balloon.
<http://youtube.com/watch?v=3xZKLzwZY9Y>
- The Sound in the Sea section of the NOAA's Ocean Explorer website has great audio clips of the Blue Whale (the loudest animal in the world) as well as Fin and Humpback Whales vocalizing.
<http://oceanexplorer.noaa.gov/gallery/sound/sound.html>
- The Whale Center of New England has video footage of Humpback, Sei and Right Whales, as well as great audio clips of Humpback Whale vocalization.
<http://www.whalecenter.org/av.htm>