

Mini-Learning Cycle Overview

	Goals	Tasks	Outcomes (Objectives)
Engage	<p><u>Goals</u></p> <p>‘Surface’ and make explicit what students know about the needs of living things in general (food, water, shelter); and their knowledge about polar bears in particular (Where do they live? What do they eat?)</p>	<p>Whole group discussion on what do living things need to live by constructing web on the SMART Board</p> <p>Take the Polar Bear Quiz as a class and discuss results: http://www.louisvillezoo.org/project/polarbear/quiz-pbear.htm</p>	<p>Students will list major needs of living things:</p> <ul style="list-style-type: none"> • Food • Water • Shelter (protection from environment and/or predators) <p>Students will describe what they know about polar bears.</p>
Explore	<p><u>Learning Goals</u></p> <p><i>Facts</i> Polar bears’ main source of food is the ringed seal. The bears hunt the seals on the polar ice. Female polar bears need to gain at least 440 lbs of fat to have a successful pregnancy and feed their cub(s) until the next hunting season.</p> <p><i>Patterns</i> Over the past 30 years, the polar ice has gotten smaller (it has melted) by 520,000 square miles. Over the past 5 years, most polar bear populations in Canada have declined (gotten smaller).</p> <p><i>Related PA Standards (Concepts)</i> –Living things depend on other living things in their environment for survival. (S4.B.3.1; S4.B.3.3) –Living things depend on non-living things in their environment for survival. (S4.B.3.1; S4.B.3.3) – The survival of living things is affected by changes in the food, water, shelter and space available to them. (S4.B.3.2; S4.B.3.3)</p>	<p>Whole-class discussion about habitat & food source of polar bears.</p> <p>Students construct population graphs in small groups.</p> <p>Whole class construction of population graph.</p> <p>Whole class discussion of changes in area of polar ice.</p>	<p>Students will construct bar graphs using sticky notes and an axis outline.</p> <p>Students will describe (in words and in writing) the trend illustrated by the bar graph (most populations of polar bears are getting smaller or declining).</p> <p>Students will use the pictures of the polar ice caps to identify areas where the ice has receded.</p> <p><i>Related PA Standards (Competencies)</i> –Describe how an organism interacts with the living and nonliving parts of its ecosystem. –Describe a change that can occur in an environment. –Communicate (through speaking, drawing, and writing) predictions, observations, and conclusions.</p>
Explain	<p><u>Learning Goals</u></p> <p><i>Explanation (concept)</i> Some scientists think that—since polar bears hunt seals on the ice—the overall loss of polar ice has made it harder for the polar bears to find food. Without enough food, female bears will not be able to store enough fat to feed their young cubs and the cubs will not survive. This has led to a decline in many polar bear populations (groups).</p> <p><i>Related PA Standards (Concepts)</i> –Changes in the environment may affect the survival of living things in that environment. (S4.B.3.1) –The survival of living things is affected by changes in the food, water, shelter and space available to them. When a habitat changes it affects the organism. (S4.B.3.2; S4.B.3.3)</p>	<p>Whole class discussion around the questions—</p> <p><i>Why are the populations of polar bears getting smaller?</i></p> <p><i>Why does less ice mean there are fewer polar bears?</i></p>	<p>Students will explain (in words and/or writing) what effects the loss of polar ice has on polar bears:</p> <ul style="list-style-type: none"> • Less ice for hunting means less food • Less food means that female bears can’t feed their cubs • The cubs are less likely to survive when their mothers are not well fed. <p><i>Related PA Standards (Competencies)</i> –Explain how a particular change in the environment can affect the survival of an organism in that environment.</p>

Apply	<p><u>Goal</u></p> <p>Use knowledge of polar bears & ability to read graphical data to reason that groups of bears that have begun to hunt other food sources (e.g. land animals like caribou) will be more likely to survive. Thus, these groups will show increasing or steady populations over time.</p> <p><i>Related PA Standards (Concepts)</i> –Living things adapt to changing environmental conditions or they may become extinct. (S4.B.3.2; S4.B.3.3)</p>	<p>Small group discussion followed by class summary around the scenario—</p> <p><i>Scientists have found that some of the groups (populations) of polar bears they studied have started to hunt for food on land. These groups of bears eat other land animals like foxes and caribou in addition to seals.</i></p> <p><i>Which of the groups on our bar graph do you think might be the polar bears that are eating land animals in addition to seals?</i></p> <p><i>Why did you pick these groups?</i></p>	<p>Students will identify (predict/infer) on the graph (with an X) which groups of bears are eating other animals in addition to seals.</p> <p>Students will reason (in small group discussion and on paper) that the bears who are eating other animals in addition to the seals are the groups that are growing in population or staying the same.</p> <p>Students will explain in words and on paper that animals must adapt to changing environment in order to survive.</p>
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Preparation for Teaching
clarifying relevant student knowledge/experiences

Through this learning cycle, students will have an opportunity to draw on the following PRIOR KNOWLEDGE & EXPERIENCES

In order to help me prepare for this lesson, the students and I had a group discussion during morning meeting about what they know about polar bears. My students offered me the following information:

- ↪ They are white and fuzzy, cute and bears
- ↪ They eat fish
- ↪ They eat seals
- ↪ They are camouflaged and blend into the snow
- ↪ They “burry” into the snow to hunt the seal
- ↪ They swim fast
- ↪ They live in Antarctica, the arctic and in the snow
- ↪ They hibernate

Preparation for Teaching
clarifying content knowledge

By completing this learning cycle, students will continue to build an understanding of the following BIs (from PA Environment & Ecology Standards, grades 3-4):

- Living things depend on their habitat to meet their basic needs.
- The survival of living things is dependent upon their adaptations and ability to respond to natural changes in and human influences on the environment.

In particular, this Learning Cycle connects to these BIs by . . .

- ↪ Showing a connection between the decreasing ice habitat of the polar bears and the decreasing population of polar bears.
- ↪ Observing that the groups of polar bears that are eating other animals in addition to the seal (adapting) are growing in population or staying the same.

Preparation for Teaching

gathering & preparing materials

You will need the following materials for this lesson:

Whole class materials

Pictures (either in hard copy or in a powerpoint slide show so you can project them for all students to see)

- Caribou
- Polar bear with cub
- Polar bear on ice pack
- Ringed seal
- Satellite photo of polar ice cap in 2003-2005
- Satellite photo of polar ice cap in 1979-1981
- Diagram with range of polar bears marked (green shading)

Globe

Map of the United States with state borders clearly shown

Outline (axes and labels) for class population bar graph (identical to the group graphs) & class set of sticky notes (larger than those for individual groups)

Group materials (each group will need their own set)

Small envelope with 12 small sticky notes

Label each sticky note with a different letter (A through L)

Beneath the letter on each sticky note, write

Getting Smaller (8 sticky notes)

Getting Bigger (3 sticky notes)

Not Changing (1 sticky note)

A
Getting
Smaller

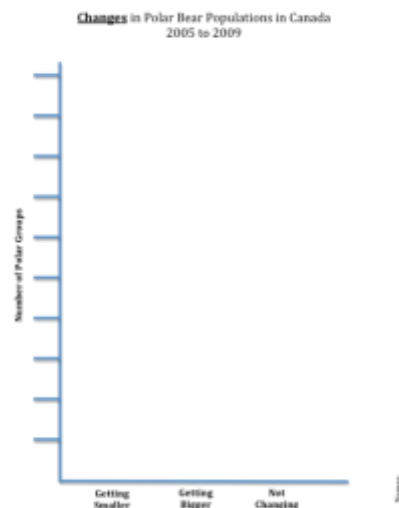
B
Getting
Bigger

Large white paper (11 x 17) with Graph title & axes labeled

Include place for students to write their group members' names (or have them write their names on the back)

Marking pen

Response sheet (next page)





Names: _____

Scientists (YOU) have found that some of the groups of polar bears in Canada have been hunting on land more and more. These groups of polar bears don't eat only seals. They also eat caribou and foxes and other animals.

1. Look at your graph.
Place an **X** on each sticky note that stands for a group of bears who are eating other animals and not just seals.
2. **List** the letters of all the sticky notes where you wrote an **X**. (*write the letters of those groups here*)
3. **Explain** why you think those groups are the ones that are eating other animals and not just seals.

Detailed Instructional Plan

time	Teacher	Student	notes
Engage 5 min.	<ul style="list-style-type: none"> • What do living things need to stay alive? • What do you need? What do your pets need? • What is the importance of food? • What is the importance of Shelter? • Now, we are going to talk about the needs of polar bears specifically. • “One your KWL charts you said you new...” • “and you wanted to know...” • “Let’s test what you know by taking an online quiz as a class..” • I will read the questions and you will vote for the answer by raising your hand. • <i>Discuss how students did on the quiz</i> • Was anyone surprised with any of these answers? 	<ul style="list-style-type: none"> ▪ Food, Shelter, Water ▪ Stay healthy, grow ▪ Protection from weather, predators, place to live and eat ▪ Some students will know the correct answers to certain questions. ▪ Some students will just make guesses. 	<ul style="list-style-type: none"> ▪ Create web on SMART board with pictures ▪ Show picture of Polar Bears on SMART board ▪ Refer to students’ KWL charts in which the filled out during morning routine ▪ Take online quiz (link on SMART board) ▪ Choose answer by majority response ▪ Read answer and rationale to the class
Explore 20 min.	<ul style="list-style-type: none"> ▪ Does anyone remember what the polar bear’s favorite food is? ▪ We are going to now watch a clip of a polar bear hunting a ringed seal. ▪ Can someone explain to me why getting food is so important for survival of living things? ▪ Why is it particularly important for mothers? ▪ Polar bear’ need to gain at least 440 pounds of fat to have a successful pregnancy and feed their cubs until the next hunting season. ▪ How many third graders do you think 440 pounds is? ▪ <i>Ask 7 students to stand up so they can see a comparison</i> ▪ That is a lot of ringed seal that must be ate so mothers can have a healthy cub! 	<ul style="list-style-type: none"> ▪ Ringed Seal ▪ Students will be extremely excited about this but should remain at a level 0 and SLANT. ▪ So they can survive, get nourishment, grow, be healthy so they don’t survive ▪ They need extra food to help feed the babies ▪ 7 ▪ Students are likely to be surprised and energized about this information 	<ul style="list-style-type: none"> ▪ Show pictures on SMART board ▪ Play video by clicking link on SMART board ▪ Show picture of mother and baby polar bear on SMART board ▪ Reveal answer on SMART Board

<ul style="list-style-type: none"> ▪ Does anyone remember where the polar bears live? ▪ Does anyone know what is happening to the polar bear' habitat right now – in the Arctic Circle? ▪ We are going to watch a video of the polar ice caps from 1979 to 2005; pay attention to what changes are occurring. ▪ Watch how this area is getting smaller and smaller, what is happening? ▪ Over these 30 years the polar ice has gotten smaller by 520,000 square miles. ▪ Does anyone know about how big that is? ▪ Let's compare it to Pennsylvania. How many Pennsylvania's do you think 520,000 square miles is? ▪ I want you to be thinking in the back of your mind about why the shrinking ice would affect the polar bears. ▪ Now that you know about polar bears, what they eat and where, and know about their habitat, I'm going to give you a task. ▪ You are now scientists. ▪ Who knows what the numbers and information is called that scientists use? ▪ I'm going to give you data about polar bear 	<ul style="list-style-type: none"> ▪ Alaska, Greenland, Canada, Norway, Soviet Union, North Pole, Arctic Circle ▪ Ice is melting because of global warming ▪ Students should be at a level 0 SLANTing ▪ Students should all be paying close attention to the video ▪ Students should be able to see that the ice cap is getting smaller or shrinking ▪ Students could respond with anything ▪ Students may respond with any number possible; correct answer is 11 ▪ Students should be SLANTing ▪ Students should respond with excitement ▪ Students may know and respond with 	<ul style="list-style-type: none"> ▪ Show images of Arctic circle and polar bear in habitat on SMART board ▪ Be sure to correct misconceptions about polar bears living in Antarctica ▪ Point out areas students should be familiar with like US and Canada ▪ Scaffold students if they do not understand what is happening to the ice caps. Use an example of what is happening here now with all the snow that we got (it's melting). ▪ Pause video to show earth and make sure students understand what area is being shown. Point out US and Canada. ▪ Point out areas they should be paying close attention to (the areas that are shrinking) ▪ Back to the SMART board lesson/picture ▪ Show map on SMART board, then reveal the image of 11 Pennsylvania's once students have made guesses. ▪ **Make a distinction between where the polar bears live, where they eat, and what areas are melting. ▪ Show task on SMART board ▪ Pass out Data packs ▪ Hang large chart paper at 4 different
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	<p>populations.</p> <ul style="list-style-type: none"> ▪ Work together in your groups to understand the data and then chart it. ▪ When you are referring to the different groups of polar bears call them by the letter that is listed on the picture. ▪ As you are graphing the data, be thinking about what the data means...how many polar bear groups are getting bigger, smaller, not changing... <ul style="list-style-type: none"> ▪ <i>Once students are done:</i> SLANT. Now I want each group to share their findings. ▪ Did each group get the same results with their data? ▪ Good, so we were all able to use our data about polar bear populations and create a graph; now was does this graph tell us? ▪ How many polar bear groups are getting smaller? ▪ How many are getting bigger? ▪ How many are staying the same? ▪ So what does this tell you about polar bears? 	<p>“Data.”</p> <ul style="list-style-type: none"> ▪ Students should be SLANTing ▪ Students should begin by laying data out and determining what exactly the data is telling them. ▪ They should notice that each pictures is different and contains a different letter – these represents the different groups ▪ They should then see that some are getting smaller, some are getting larger and one is not changing. ▪ Students should look at the chart I have set up for them and understand how to plot those data pictures on the graph. ▪ Each group will share their graph ▪ Hopefully each group will have 8, 3 and 1 for the bar graph. ▪ That most are getting smaller and only are couple are getting bigger and one is not changing. ▪ 8 ▪ 3 ▪ 1 ▪ That they are becoming endangered 	<p>stations for each group to work at.</p> <ul style="list-style-type: none"> ▪ Be sure students understand that each data picture represents a specific group of polar bears that is either getting smaller, getting bigger, or not changing. ▪ If students are struggling, model graphing a couple of the pieces of given data. ▪ Walk around and work with each group, make sure ▪ Create an identical group graph on the SMART board for class to see and refer to. ▪ Be sure students know that they are only threatened, or at risk in becoming endangered
<p>Explain 5 min.</p>	<ul style="list-style-type: none"> ▪ Now, why do you think this graph looks like this – why are so many groups getting smaller than bigger or not staying the same? ▪ Why does less ice mean there are fewer polar bears? 	<ul style="list-style-type: none"> ▪ Students should make predictions about why the polar bear populations are getting smaller. ▪ Students will most likely make predicts about ice melting so the 	<ul style="list-style-type: none"> ▪ Refer to graph on SMART board

	<ul style="list-style-type: none"> ▪ Can anyone think of what we could compare the polar ice caps to for people? ▪ Where is everyone's favorite place to eat? ▪ Mine is Pizza Hut; so say you only eat at Pizza Hut, but then, all the Pizza Huts start to disappear! ▪ So just like the area where we get our pizza from is disappearing, the areas where polar bears get their food from is disappearing. ▪ So what does this mean for polar bears? What would it mean for us if where we got our food disappeared? ▪ Think back to what I told you about mother bears.. why would this be so harmful to them? ▪ So if mothers can't feed their cubs, then what? ▪ And if cubs and mothers are not surviving, then what? ▪ So therefore: less ice =less of an area for hunting=less food=mother bears can't feed their cubs=cubs are less likely to survive=population gets smaller. 	<p>polar bears no longer have a place to live/eat</p> <ul style="list-style-type: none"> ▪ Students may compare to food rather than a place ▪ Students could respond any food chain ▪ They begin to starve, they cannot get food ▪ They won't be able to gain all that weight or be able to feed their cubs. ▪ Cubs die, do not live ▪ There are less bears: population is getting smaller. 	<ul style="list-style-type: none"> ▪ Show images on SMART board comparing ice caps to Pizza Hut and seals to pizza ▪ Show graphic organizer on SMAT board displaying the cause and effect sequence.
<p>Apply 10 min.</p>	<ul style="list-style-type: none"> ▪ Now that you are expert scientists on polar bears and the ice caps, I have an additional task for you ▪ This will require you to use, understand and apply all this data and information you have gathered about polar bears and the ice caps. First though, I want to give you one last piece of information to you... ▪ Scientists have found that some of the groups of polar bears they studied have started to hunt for food on land. These groups of bears eat other land animals like foxes and caribou in addition to seals. ▪ I want you to use your graphs and this new 	<ul style="list-style-type: none"> ▪ Students should be SLATing 	<ul style="list-style-type: none"> ▪ Show task on SMART board ▪ Show pictures of animals on SMART board ▪ Pass out response sheets with directions and task to each group

	<p>information and make a reasonable prediction about which groups on the chart are eating land animals in addition to seals.</p> <ul style="list-style-type: none"> ▪ Mark them with an X and list those groups by their letters on your response sheet. ▪ After you have picked the groups you predict are eating additional land animals, please write your reasons as to why you think those groups are eating other animals. ▪ Write your answer on your papers and on the sentence strips and post on your Chart. <p>▪ SLANT: Now I would like each group to share their predictions and their reasons for why they picked those groups of polar bears. <i>After a consensus is met...</i></p> <ul style="list-style-type: none"> ▪ Once again, let's compare this to Pizza Hut so we can better understand. So let's say since the Pizza Hut's are disappearing, I'm going to now eat at Taco Bells also! So now instead of Pizza only, I am eating tacos and nachos! ▪ How can you compare this to the Polar bears? ▪ And so someone please explain to me their reasoning about why the populations that are growing or not changing are eating land animals. ▪ Does anyone know what that word is where you are making changes or adjusting in order to, in this case, help you survive? <p>▪ You all were excellent scientists! I'm very proud of you so let's just review everything we have learned... Less ice= less of an area for polar bears to hunt on = less food = mother bears cannot feed their cubs = cubs are less likely to survive= populations get smaller OR Less ice = less of an area for polar bears to hunt on = less food = ADAPT = find other places to get food = mothers can feed their cubs = cubs can survive = populations stay the same or get bigger!</p> <ul style="list-style-type: none"> ▪ Does anyone have any questions? 	<ul style="list-style-type: none"> ▪ Students should be making reasonable predictions about which groups are eating land animals and marking those groups on their graphs with an X. <p>▪ All groups should share their predictions</p> <p>▪ Students will once again be excited about this connection and should respond very well.</p> <p>▪ Student should be able to answer that just like we are going to other areas to get different kinds of food, polar bears are going to land to get different kinds of food</p> <p>▪ Some students may know this is adapting.</p> <p>▪ Students should be SLANTing</p> <p>▪ Some students may have additional questions</p>	<ul style="list-style-type: none"> ▪ Monitor students to make sure they are making accurate predictions <p>▪ Reach a consensus and mark those groups with an X on the SMART board chart</p> <p>▪ Show comparison animation on SMART board</p> <p>▪ Show adapting animation on SMART board</p> <p>▪ Show cause and effect sequence chart on SMART board, this time with two different paths the polar bears can follow</p>
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	<p style="text-align: center;">CLOSURE/EXTENSION</p> <ul style="list-style-type: none"> ▪ Can anyone think of anything we can do to help the polar bears? ▪ The last thing I want you to do is now fill out your LEARN section on your KWL chart. Hopefully you have taken a lot away from this less. ▪ In fact, what is something you could go home and share with a parent or brother or sister? ▪ What is a question you could ask them to quiz them? 	<ul style="list-style-type: none"> ▪ Use less power ▪ Turn off lights ▪ Turn off the TV ▪ Close refrigerator door ▪ Use public transportation ▪ Write to senators/representatives ▪ Learn more about polar bears ▪ Students should fill out KWL chart at their desk. ▪ Students should e able to respond with accurate/interesting information. ▪ Students may refer to the quiz we took in the beginning of the lesson, the lesson, or the ideas during closure/extension 	<ul style="list-style-type: none"> ▪ Show/write list on SMART board ▪ Show students interesting site where you can track polar bears/and join groups advocating saving the polar bears.
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