**Biomes**

**Section 1**

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| 00:00:00 | TEACHER: Well, that was a pretty smooth flight. Don't you think? During our flight, we reviewed what ecosystems are and the adaptations that increase an animal's ability to survive and reproduce in certain ecosystems. As we explore different areas around the globe, we'll talk about the characteristics of several regions and some of the adaptations |
| 00:00:20 | that allow certain animals to live within them. We've got a lot to explore, so let's grab our bags and head out on our way. |

**Section 2**

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| 00:00:00 | TEACHER: Hey, look at that! We have more words to know. I told you we'd have some more, and possibly we might even have some more later on. I guess we'll see. What do we have? We have coniferous tree, deciduous forest, deciduous tree and taiga. |
| 00:00:15 | Again, you can look up these words in your glossary. I highly recommend it. All right, let's continue. You know that an ecosystem includes both living and nonliving things that interact in a particular area. The major terrestrial, or land, ecosystems are classified into biomes. |
| 00:00:37 | A biome is an area with a specific climate and certain types of vegetation or plants and wildlife. An area's climate is the average weather in that region over a long period of time. Let's go ahead and take a look at Earth's terrestrial biomes on a map and here they are. These are the major biomes in the world. And you can see on the right here |
| 00:01:05 | that we have a key that is color-coded, so it lists off all of the biomes for you. So this world map shows how there are different biomes around the world. And there can be more than one biome within the same continent, country or state. For instance, let's look at the United States and you can see that there are many biomes. |
| 00:01:24 | Here we have a desert biome in yellow. There is a temperate rain forest here, and that's the Pacific Northwest. And there's even some grasslands here, among others. We're just naming a few. Now, I want you to notice that at the bottom of the map Antarctica is not shown. That is because Antarctica is covered in ice |
| 00:01:45 | and it's not associated with a particular biome. We are now ready for our first stop on our tour. Our first stop is the tropical rain forest. When you hear the word tropical rain forest, a certain picture probably pops up into your head. Does it look kind of like this one here? Well, tropical rain forests are some of my favorite places to visit. |
| 00:02:07 | I've been to the rain forests in the Philippines, many of them in Central America, such as in Panama, Nicaragua and Honduras, to name a few. I love these places. Why? Because they're home to such a variety of wildlife and plants. We're going to talk about that here in a second. So let's talk more in detail about where |
| 00:02:24 | they're located first. Tropical rain forests are found in regions close to the equator. Tropical rain forests are warm and wet. The temperature doesn't vary very much. It sticks around an average temperature of about 77 degrees Fahrenheit. Tropical rain forests receive 200 to 600 centimeters |
| 00:02:47 | of rain each year. That's equivalent to 79 to 236 inches of rainfall. Because conditions do not vary much throughout the year, a huge variety of plants can live in tropical rain forests and you can easily see that from looking at this picture here. With all kinds of plants, there are habitats for all kinds of animals as well. Even though tropical rain forests are only |
| 00:03:13 | found in relatively few places around the globe, ecologists think that they have more species of plants and animals than all the other biomes combined. Rain forest plants are adapted to the large amount of rainfall each year. The leaves of trees in the rain forest have drip tips to help rain run off quickly. Notice how the leaf here has a narrow tip. |
| 00:03:39 | And let me draw an arrow to that tip. There we go. Now, this tip acts like a funnel to cause water to run off quickly. If water were to stay on the plant, fungi and bacteria could easily grow and harm the plant. Tropical rain forests are ideal for animal life. There are no major seasonal changes. |
| 00:04:01 | Food is usually in abundant supply. Water is always available. And all of the plants offer shade and shelter. But lots of animals also means lots of predators. Dun, dun, dun. So animals that are preyed upon have to find ways to avoid being someone's meal. One way that many rain forest animals do this |
| 00:04:25 | is by camouflaging themselves. Now, go ahead and take a look at the image here. Can you spot the animal? I'll give you a moment. Take a look. What do you see there? Did you find it? Well, let me go ahead and outline it for you. |
| 00:04:43 | It's right about here. You see it now? This is a giant leaf-tailed gecko. It's very well camouflaged to blend in with the bark of this tree as well as the moss that is growing on it. This helps him hide from the view of potential predators. All right, so use all of this information |
| 00:05:04 | that you just learned to help you answer what comes next. |

**Section 4**

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| 00:00:00 | Here you see a temperate rain forest. Temperate rain forests can be found in New Zealand, southern Chile, and in the Pacific Northwest in the United States. I, I actually grew up in the Pacific Northwest. And this looks like a forest that I used to play in. Oh, I miss those days. They're called temperate rain forest |
| 00:00:19 | because they have a moderate average temperature of 48 to 53 degrees Fahrenheit. This means they aren't really cold, but they aren't really hot either. Temperate rain forests receive 200 to 400 centimeters of rain each year. Now, if I was to calculate the equivalency in inches, that would be 79 to 157 inches of rainfall each year. |
| 00:00:44 | In these forests, you will find mostly coniferous trees. Trees that produce cones and have needle-shaped leaves that they retain year-round. Examples of coniferous trees include cedar, spruce, and Douglas fir. These trees can actually, they can grow very large. I know this personally because I used to climb them. Also, in these forests, you might find animals |
| 00:01:08 | like black bears, cougars, bobcats, northern spotted owls, and several species of salamanders. Deciduous forests. These are another type of biome. It's another type of forest biome, to be more specific. Deciduous forests have four distinct seasons, spring, summer, fall, and winter, and a wide range of temperatures. |
| 00:01:34 | In the winter, temperatures drop below freezing, that's below 32 degrees Fahrenheit. In the summer, temperatures may be around 85 degrees Fahrenheit or more. These forests receive 75 to 150 centimeters of rain each year. Now, if I use that calculator in my brain to convert to inches, that would be 30 to 59 inches of rainfall. Deciduous forests contain deciduous trees. |
| 00:02:01 | No surprise there. Trees that lose their leaves and then grow new ones each year are deciduous trees. You can see all the leaves on the ground here in this image. Just take a look around. Oak trees, birch trees, and maple trees are examples of deciduous trees. Some animals you might find in a deciduous forest |
| 00:02:20 | include chipmunks, skunks, white-tail deer, and black bears. Butt if you visit in the winter, don't expect to see much wildlife. Birds, they migrate to warmer areas, and many mammals, they hibernate during the winter. Let's move on to onto the taiga. The taiga is the world's largest biome. |
| 00:02:43 | It stretches across northern North America, northern Europe, and Northern Asia. Taiga is actually a Russian word, so you may have heard of it referenced as a boreal forest biome instead. The taiga receives 35 to 100 centimeters of rain each year. Now, if we calculate that real quickly, it would be 14 to 39 inches of rain each year. |
| 00:03:07 | That's 14 the 39 inches of rain each year. The winters are long and cold, and summers are warm and rainy. As you can see in this picture here, the taiga contains mostly coniferous trees like fir, spruce, and hemlock. Some animals you might find here include moose, lynxes, bears, and foxes. Taiga plants and animals in taiga biomes |
| 00:03:32 | are well adapted for cold conditions. Since a lot of water in the taiga is frozen for most of the year, the trees need a way to conserve or save water. Coniferous trees have thick, waxy needles to help prevent water from easily evaporating off their surface. Animals in the taiga find food wherever they can. |
| 00:03:56 | Some, like this red squirrel here, well, they eat seeds produced by coniferous trees. Others, like moose and beavers, eat bark off the trees. |

**Section 6**

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| 00:00:00 | TEACHER: So far, we've explored the characteristics of several forest biomes. Now, we're going to move on to something a bit different, and I'm not going to need this coat anymore. But you know what? I will need my sunglasses. And I probably should put on some sunblock, because we are going to go explore deserts and grasslands. |
| 00:00:20 | I hope you're ready, because we're about to go right about now. |

**Section 7**

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| 00:00:00 | TEACHER: Yeah. It looks like I was right. We have more words for you to know. There's a lot in this lesson. So you know the routine. Write these your eNotes, look them up in your glossary. It'll help you. We have desert. |
| 00:00:12 | Not dessert. It's not an ice cream. This is a biome we're talking about here. Grassland. Permafrost. Savannah. And tundra. Let's go ahead and talk about deserts. |
| 00:00:22 | Deserts are the driest biome on Earth. They get less than 25 centimeters of rain each year. That's equivalent to about 10 inches of rain each year. Some of the driest deserts may even go a full year without any rain. Deserts undergo large changes in temperature throughout the day. They may get very hot during the day but they might cool off as the evening approaches, |
| 00:00:47 | once the sun goes down. Most deserts have sandy or gravelly soil. Few types of plants live in the desert. Those that do are often spaced far apart. And you can kind of see that in this image here. Notice how far away those plants are from each other. Now, they're space far apart so they don't have to compete with each other for the limited amounts |
| 00:01:07 | of water. Animals found in deserts include lizards, javelinas, Gila monsters, coyotes, bobcats, scorpions, and kangaroo rats. Plants and animals that live in the desert have to be adapted to the lack of water and high temperatures. Cacti have folds in them. Go ahead and look at this image here. These folds are called pleats. |
| 00:01:32 | When it rains or water becomes available, the pleats expand to soak up water. When there is little water available, they shrink up. Cacti have specialized stems that are able to store water for a long period of time. Saguaros, like the ones in the picture here, can store up to 200 gallons of water at a time. As you probably know, cacti have sharp spines. |
| 00:01:58 | Did you know that these spines are actually its leaves? Yes, it's true. Not only do these spines protect the cactus, they are very narrow, which prevents water loss. Rather than having deep roots, cacti have shallow roots that can spread out long distances in search of water. Now let's take a look at this image here. |
| 00:02:19 | What is this creature? Well, this is a Gila monster. I know it's spelled with a G, but it's pronounced hee-la. The Gila monster is one reptile you might find in the deserts of southwestern United States and in Northwestern Mexico. The skin of a Gila monster is very water-resistant to prevent water loss when water is scarce. |
| 00:02:40 | Gila monsters are also able to absorb water from the urine in their bladder and reuse it to stay hydrated. You may have noticed that the Gila monster has a fat, stubby tail. They are able to store fat in their tails as an energy reserve when food is scarce. Gila monsters, they stay cool in underground burrows when temperatures are very high. |
| 00:03:06 | Many other desert animals do this as well, and are more active at night. |

**Section 9**

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| 00:00:00 | TEACHER: What do we have here? Well, this is a grassland biome. Grassland biomes are found in many places around the world. They receive more rain than desert biomes, about 25 to 75 centimeters of rain each year. That's about 10 to 30 inches. But they still have a dry season that prevents the growth of forests. |
| 00:00:20 | This is why grasslands contain mostly grasses and a few other small plants. A prairie like the one pictured here is an example of a grassland. In North America, you might spot some large herbivores, like bison, as well as some smaller ones like prairie dogs, rabbits, and deer. Grasslands are also, excuse me, grasslands are also |
| 00:00:43 | great for growing crops and raising livestock like sheep and cattle. Predators on the grasslands in North America include wolves and coyotes. Dun, dun, dun. And those wolves and coyotes, they prey on both wild animals and livestock. Grasslands that are closer to the equator |
| 00:01:01 | are called savannas. The African Savanna is probably the one that you're most familiar with, but there are savannas on other continents as well. Savannas receive more rainfall than grassland biomes. They receive up to 120 centimeters of rain each year. That's about 47 inches of rain per year. They contain mostly grasses with a few scattered shrubs |
| 00:01:26 | and trees. Similar to grasslands in North America, you would see many large herbivores on African Savannas. In fact, some of the largest animals on land are found here, like wildebeests, giraffes, zebras, and impalas. There are no wolves and coyotes here, but there are other fierce predators |
| 00:01:46 | like lions and cheetahs. Dun, dun, dun. |

**Section 11**

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| 00:00:00 | What is pictured here? Well, just south of the North Pole, there is a biome called the tundra. It receives very little rainfall, less than 25 centimeters of rain each year, that's about 10 inches of rain, yet it is covered with ice for most of the year. So it's cold and dry with no trees. |
| 00:00:20 | Sometimes it's referred to as a cold desert, and you can see that here, because look, there's still some snow on the ground. Well, winters can last six to nine months, and there are often days to stay dark for all 24 hours. Average temperatures are around 10 degrees Fahrenheit, that's pretty cold. Summers are short and cold as well, here. |
| 00:00:42 | Opposite to winter, there may be days when the sun is visible for all 24 hours. During the summer, the top part of the soil may thaw out. But below the surface, the soil is permanently frozen. This is what we call permafrost. Any plants that do grow in the tundra, like moss, grass, and shrubs, they grow during the short summer season. In the summer, you may find insects and birds |
| 00:01:08 | on the tundra, but in the winter birds, they migrate south to warmer locations. Other animals that live in the tundra include caribou, foxes, wolves, and arctic hares. Plants on the tundra are adapted to dry and cold conditions. Mosses, grasses, and shrubs, they actually grow close to each other, and close to the ground, to resist cold. |
| 00:01:35 | They have shallow roots because they cannot penetrate beneath the frozen soil. Similar to cacti, tundra plants have small leaves to prevent water loss, and you can see that in this image. Look how tiny these leaves are. Plants that bloom, like flowers that are pictured here, do so quickly during the short summer growing season. While birds on the tundra migrate |
| 00:01:59 | south to warmer temperatures in the winter, many mammals stick around. Animals, like this musk oxen that you see pictured here, stick around. Caribou and arctic hares, they grow thick winter coats to stay warm in the winter. |

**Section 13**

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| 00:00:00 | TEACHER: You've probably noticed by now that mountains are found in several biomes. Portions of mountains contain a unique biome called an alpine biome. Alpine biomes are found all around the world, from Rocky, Sierra, and the Cascade mountains in North America to the Andes mountains in South America. |
| 00:00:20 | There's the Himalayas in Asia. There's the Alps here in Europe. And there's also the Rift mountains in Africa. Even though there are alpine biomes across the globe, they're not found across large areas of land like other biomes. They are restricted to particular areas. Unlike other biomes, the alpine biome |
| 00:00:41 | is not determined by temperature or rainfall. Alpine biomes are determined by elevation. Alpine biomes do not fit a particular climate range. Mountains get colder and colder the higher you go. Rainfall varies depending on which side of the mountain you're on. The side that is exposed to the wind gets the rain. If you were to climb a mountain in an alpine biome, |
| 00:01:08 | you would find coniferous trees at a certain elevation. But as you continue on, the biome would take on a tundra-like plant community, including wildflowers, mosses, and other low-growing plants. Animals in alpine biomes are similar to those in the taiga and tundra biomes. They include a variety of birds like jays, small mammals like chickarees and it |
| 00:01:34 | marmots, and larger mammals like mountain goats. |