Our Changing Seasons

RMSC Strasenburgh Planetarium school show for grades K-2

Narration script for tape version

Good morning, boys and girls, and welcome to the Strasenburgh Planetarium. The Planetarium is part of the Rochester Museum & Science Center. The Museum next door and the Cumming Nature Center are also parts of the Rochester Museum & Science Center.

The room we are sitting in now is the Star Theater. As you can see, the shape of the Star Theater is round, or a circle. The ceiling is shaped like a giant, upside-down cereal bowl. That kind of ceiling is called a dome. In a few minutes we will make the dome look like the sky. And that big blue machine in the center of the room is the star projector. If you came to the Planetarium when you were a little kid, you might have heard that the star projector's name is Carl, because it was made at the Carl Zeiss factory in Germany. You probably waved and said, "Hi, Carl!" If you want, go ahead and do it again. Hi, Carl! The job of Carl the star projector is to show us how the stars, and the sun, and the planets look in the real sky outside.

Today our program is called Our Changing Seasons. And we certainly do have changing seasons here in western New York.

Today we will visit each of the four seasons. We will find out what the sun does, what the trees and flowers do, some of the things people do, and some of the things animals do in each season.

SUMMER

So let's start with our first season. Watch and listen. I'll give you a hint. It's warm outside.

I can hear children playing outside. The trees have big leaves. The leaves are even bigger than they are in the spring. And it's warm. It's summer! And this is what trees look like in the summer, when they have all their leaves. The leaves gather sunshine and turn the energy of sunlight into food for the trees.

In the summertime we have lots of sunshine. We're going to use Carl the star projector to help us understand why we have so much sunshine in the summer. So we'll ask Carl to come up on his elevator.

And we're going to walk away from the trees for a minute so we can see the whole sky.

To help us all find things in the Planetarium, we have something else that you will see ONLY in the Planetarium sky: the green arrow.

Now, if you will follow the green arrow around the bottom of the dome you will see four green letters. In front of us, look for a letter S. That S stands for south. When you look there you will see things that you see outside in the real sky when you face south. Where should you look for the letter N for north? That's right, behind you. Turn around, take a look and make sure it's there. Then find the W for west …and the E for east.

Now remember, it's summertime in the Planetarium. Let's ask Carl the star projector to show us the sun rising on the first day of summer.

Teachers, we mean the summer solstice, usually June 21.

Well, the sun is near the E for east, but not right on top of it. I wonder if that will change later on.

In the Planetarium, we can put time into fast forward. It's sort of like pushing the fast forward button on a VCR so a movie goes really fast. In the Planetarium we can make a whole day go by in about a minute. So let's put time into fast forward and watch the sun go up in the sky on the first day of summer. We will stop when the sun is as high as it can go.

Musical interlude, about 30 sec.

Now you probably know that the sun did not really go up. Instead, the sun seems to rise in our sky every morning because our Earth is turning, or rotating. We don't feel the Earth turning so it looks to us as if the sun is moving in our sky every day.

That's as high as the sun goes in our sky on the first day of summer. Would you all please quietly point to the sun? The sun is up high like that in the middle of the day. Remember how your arm feels when you point to the summer sun. (Teachers, the sun reaches its highest point in the summer sky shortly after 1 o'clock in the afternoon, because we're on daylight saving time in the summer. It's about 71 degrees of angle above the southern horizon. From Rochester's latitude the sun never appears directly overhead.) Okay, you can put your arms down.

Now that we have seen what the sun does in the summertime, let's look at things people can do in the summertime.

You can plant a garden. Or you can grow flowers in a flowerpot or a flower box. Sunflowers are easy to grow in a garden. Just plant some seeds early in the summer, then water them once in a while and wait patiently. By the end of July you can have big beautiful sunflowers.

In the summertime you might want to visit the Rochester Museum & Science Center's Cumming Nature Center, which is about an hour south of Rochester. When you go there you can

go for a hike in the woods. You can watch and listen to the birds and animals, and smell the fresh air. The trails at the Nature Center are soft and comfortable to walk on. There are many other beautiful parks where you can go for a hike in the summertime.

What else can we see in the summertime? A whole field full of sunflowers. And lots of animals, like this chipmunk. Wild animals seem to be running around everywhere in the summer—both daytime and nighttime, because there is plenty of food for them to eat.

What else can we see? Plenty of birds, like this little chickadee. And what about that bunny? That is a special kind of bunny called a snowshoe hare, H-A-R-E, and you'll see in a few minutes why it's called a snowshoe hare. For now, notice the color of this snowshoe hare's coat. It is brown, like the ground. If the hare is the same color as the ground, then predators will not be able to see the hare very well. So the color of the hare's coat is a kind of protection. Maybe you know the word for the kind of protection where something blends in with the background: camouflage.

Now we have seen some of the things that happen in the summer. Let's go back under the trees and watch and listen for another season.

AUTUMN

Do you hear the insects? Crickets and other insects rub their wings together to make that beautiful sound. You first hear it in late summer, and you still hear it in the next season …autumn, or fall.

It is autumn, or fall. The leaves on the trees have changed. On maple trees, the leaves turn yellow or orange or red, then they fall off the tree. On oak trees, the leaves turn brown, and many

of them stay on the tree until the winds blows them off in the winter. Evergreen trees, like fir trees and pine trees, have needles that do not change color at all.

Now let's bring back Carl the star projector and walk out under the open sky to find out what the sun does in the autumn.

Find the green letters again. Carl will show us the sun in the early morning, so look for the E for east, then look for the sun.

On the first day of autumn, the rising sun is right on top of the E for east! Do you remember: before, on the first day of summer, you had to start at the E then look to the north to see the rising sun. Since summer, the sun has slowly moved and now it's right on top of the E. Teachers, this is the autumnal equinox, September 23.

Let's put time into fast forward and watch the sun go up in the sky on the first day of AUTUMN. We will stop when the sun is as high as it can go.

Musical interlude, about 20 sec.

That's as high as the sun goes in our sky on the first day of autumn. Would you all please quietly point to the sun? Now, remember what your arm felt like when you were pointing to the sun in the middle of the day in SUMMER. Compared to summertime, is the sun now HIGHER or LOWER? It's lower. In the middle of the day in summer, the sun was up high; now, in the middle of the day on the first day of fall, it's not as high.

Let's look at some of things that happen around us in the autumn.

Trees everywhere changing colors, because all their leaves are changing. When the leaves fall off, if they pile up in your yard,

someone has to rake them. Maybe other people get to play in the leaf piles.

A jack-o-lantern? That's another thing you see in the autumn. Many people celebrate Halloween by carving pumpkins and putting lights or candles inside them at night.

How about animals in the autumn? Geese gather in flocks to fly south for the winter. Our friend the chipmunk is gathering nuts and seeds. In the autumn, a chipmunk will collect nuts and seeds and hide them in many different places. Later, during the winter, the chipmunk will sleep most of the time. But it will wake up occasionally and look for some of the food it stashed away during the autumn. If the chipmunk forgets where it hid some of its seeds, that's all right, because the seeds may sprout later and grow into new bushes and trees.

There are some ducks. They are gathering in flocks to fly south. And there's a big furry woodchuck. When winter comes, the woodchuck will not eat. Instead it will go into a very deep, deep sleep called hibernation. So, to get ready in the autumn, the woodchuck eats as much as possible, to get as fat as possible before winter.

Now that we have looked at autumn, let's go back under the trees and watch for the next season.

WINTER

The leaves are gone from the trees. The wind whistles through the bare branches. The season now is winter.

Let's go back under the open sky to find out what the sun does on the first day of winter.

If you can find the rising sun, please quietly point to it. If you haven't found the sun yet, just follow the pointing fingers. And if you still can't find the sun, Carl the star projector may be in your way. Don't worry; soon you will see the sun.

On the first day of winter, the sun does not rise above the E for east. Instead, you have to look part way toward the south to find it.

Now let's put time into fast forward and watch the sun go up in the sky on the first day of WINTER. We will stop in the middle of the day, when the sun is as high as it can go.

Musical interlude, about 20 sec.

That's as high as the sun goes in our sky on the first day of winter. Would you all please quietly point to the sun?

OPERATOR: Green arrow on sun altitudes as mentioned

Teachers, this is also known as the winter solstice, usually December 21. Now, remember what your arm felt like when you were pointing to the sun in the middle of the day in AUTUMN? Compared to autumn, is the sun now HIGHER or LOWER? It's lower. Compared to SUMMER, is the sun now higher or lower? A lot lower! In the middle of the day in summer, the sun was way up high; in the middle of the day on the first day of fall, it was medium-high; now, on the first day of winter, even in the middle of the day, the sun is low in our sky. That means everything will have long shadows. Also, the sun rises late in the winter, and sets early. On a winter day we do not have much sunshine.

Let's look in on some people and animals in the wintertime.

If there's enough snow, lots of people like to go to a park with a big hill and slide down the hill on sleds and toboggans and saucers! In the picture in the middle, look for some people

cross-country skiing, a very healthy kind of exercise for wintertime and one of the things people can do at the Cumming Nature Center. And there's one more picture, taken at the Cumming Nature Center the morning after a big snowfall. That's Melissa, who works at the Nature Center, arriving at work. Behind her is the front door to the visitor's building! She had to shovel about five feet of snow away from the door just to get in to work. If you take it easy and have a place to take breaks and warm up, shoveling snow isn't too bad.

How about some animals?

Deer, running through the park. Deer are easier to see in the winter because many trees and bushes have no leaves to get in the way.

In the wintertime, if you are quiet and patient you can have small birds eating out of your hand. Take some healthy bird seed. Go to a path in a quiet park and stand near a bush or a tree with low branches. Put some bird seed in your hand, hold your hand out in front of you and stand very still and quiet. A chickadee, or maybe a red-breasted nuthatch like this one, might first land in the bush or tree next to you just to look you over. Then, suddenly, the bird will land on your hand. If you're not wearing gloves you'll feel the sharp little talons in the bird's feet as it lands on your hand and grips your finger. Then the bird will peck a seed out of your hand and push off with its feet as it flies to a nearby tree. You might see the bird hitting the seed against a tree branch to break it open. There's not much food around for birds in the wintertime, so they seem to be happy to have what you offer them.

There's our chipmunk, asleep. It will wake up a few times during the winter to eat some of the nuts and seeds it stashed away during the autumn. And there's that snowshoe hare again. Now that winter is here, the snowshoe hare still has the protection of camouflage. In winter, the snowshoe hare loses all of its brown fur and grows new white fur—white like the snow. This animal is called a SNOWSHOE hare because it has extra fur on its hind feet that work like a pair of snowshoes. The extra

fur helps the hare walk on top of the snow without sinking in. The snowshoe hare is also called a varying hare.

Now that we've seen what the sun does, what people might do, and what animals might do in the winter, let's go back under the trees for our next season.

SPRING

On the tree branches there are buds that will soon turn into leaves. The season is spring!

Can you hear water? The snow is melting. The water from the melted snow flows downhill to make streams and creeks and rivers. If you take a walk in the woods in the early springtime, AFTER a winter that brought lots of snow, you might hear the sound of water coming from under the snow. The snow on top has not melted yet, but there is a stream flowing underneath, making a tunnel under the snow.

Now let's walk out from under the trees again to find the sun, early on the morning of the first day of spring.

There it is, right on top of the letter E again! Maybe you can remember the last time we saw the sun rise right on top of the E. It was on the first day of fall. But now it's the first day of spring. Teachers, we mean the equinox, about March 21.

Let's put time into fast forward and watch the sun go up in the sky on the first day of SPRING. We will stop in the middle of the day, when the sun is as high as it can go.

Musical interlude, about 20 sec.

That's as high as the sun goes in our sky on the first day of spring. Would you all please quietly point to the sun? Now,

remember what your arm felt like when you were pointing to the sun in the middle of the day in WINTER. Compared to winter, is the sun now HIGHER or LOWER? It's higher than winter. Compared to SUMMER, is the sun now higher or lower? It's lower than summer, but higher than winter. Compared to AUTUMN or FALL, it's the same! On the first day of spring and the first day of fall, the sun does exactly the same thing: it rises exactly in the east and goes up until it is medium-high.

OPERATOR: Green arrow on sun altitudes as mentioned

On the first day of summer, in the middle of the day, the sun was very high in the sky. After that, it got lower and lower each day. On the first day of fall, in the middle of the day, the sun was only medium-high. After that, the sun got lower and lower each day. On the first day of winter, in the middle of the day, the sun was LOW. After that, the sun started to go back up, higher and higher each day. Now it's springtime, and in the middle of the day the sun is medium-high again. We could keep going till the next summer, and see the sun way up high again …then next fall, medium-high …then winter, low …then spring, medium-high again …then summer, way up high … and so on and so on. But we won't take time now. You get the idea. Okay, you can put your arm down now.

Let's find out what people might do in the springtime.

If you are an expert, and you know how to do it, you can drill a little hole in the trunk of a maple tree and put in a little straw. The liquid inside the tree, which is called sap, will come out through the straw very slowly. If you gather enough sap —and it takes a lot— then you can boil it for a long time until it turns into maple syrup.

We also have a picture of some people flying a kite. If the weather is changing fast, and in the springtime it often is, there will be plenty of wind to carry a kite up into the air.

The picture in the middle shows flowers blooming. You can see beautiful flowers like this all over Rochester and western New York in springtime.

Listen to that sound. That's the sound of thousands of tiny frogs called spring peepers that live around ponds and swamps. Look carefully at the picture and you may be able to find one. They come out of the mud and sing with that peeping sound in early April every year. Spring peepers are shy. If you try to get close to one, it will probably hop into the water to hide. They are small frogs. A spring peeper is about as big as your thumb.

There's a chipmunk again …but not the same one we saw before. It's a baby chipmunk. Many animals have babies in the spring, so the babies will have all summer to learn how to survive before winter comes.

Baby ducklings! And baby birds pushing and shoving each other to get food from their mother! And a flower that Rochester is famous for: a lilac. When the lilacs bloom, there is a beautiful fragrance you can smell in many places in western New York. The lilacs all bloom at about the same time, in May, sometimes at the same time as the Lilac Festival!

BONUS SOUND

And now, a bonus sound. You might hear it in the spring, or the summer, or the fall, or sometimes even in the winter.

It's a thunderstorm. The sun is still shining, but only up above those clouds. Down here, it's raining! This would be a good time to go inside and get a preview of something you'll learn more about when you get older.

SEASONS ANIMATION

Why do we have seasons?

Seasons animation video

This is an animation, made with a computer, showing what you might see from far out in space. The big yellow ball is supposed to be the sun, and you can see the earth traveling in its orbit around the sun.

Sometimes people say that summer is warmer than winter because Earth is closer to the sun. Actually that's not true. Earth is closest to the sun every year around January 3, and farthest away around the Fourth of July. We have seasons because our Earth is tilted. The axis of the Earth is tipped over. So, as we go around the sun, sometimes our northern half of the Earth gets the most sunlight. Then we have summer -- and at the same time people on the southern half of Earth have winter. Then, six months later, our northern half of the Earth does not get much sunlight, so it's winter for us. But at that same time it's summer in the Earth's southern hemisphere. That's our Earth, going around the sun. The axis of our Earth is tilted, and that's the reason for the seasons.

Now, here were are in downtown Rochester, New York. So far, everything we have looked at in the sky has been something you see in the daytime. But now it's late in the afternoon, so nighttime is not far off. As the Earth turns us away from the sun, we will see the sun go down, then daytime will change to nighttime. If you go outside on a clear night and look at the stars, you will see different stars in each season. Let's watch quietly as the sun sets and the stars and planets come out.

OPERATOR: Musical interlude.

Live sky tour, pointing out key constellations and planets of the current season

Music and effects for sunrise