***Standards listed in bold font are Utah Core Science Standards. Those that are not in bold are supplemental.**
****Words that are in bold font in the lesson are vocabulary words that your child should know by the end of the lesson.**
****The general supplemental science standards (1, 1.1, 1.1.a, 1.1.b, 1.1.c, 1.1.d, 1.1.e, 1.2, 1.2.a, 1.2.b, 1.2.c, 1.2.d, 1.3, 1.3.a, 1.3.b 1.3.c, and 1.3.d) are included naturally in the lessons and will not always be listed in the Standards Taught for each lesson**

Title of Lesson 1: Earth and Moon

Standards Taught: S.S.1, S.S.1.1, S.S.1.1.a, S.S.1.1.b, S.S.1.1.c, S.S.1.2, S.S.1.2.a, S.S.1.2.c

Materials:	**Preparation:**	**Implementing the Lesson:**
Blue, white, and green clay or playdoh This image This image Flashlight Mirror Globe Sidewalk chalk Sunny day		Show your child the images of the earth and **moon**. Ask them to tell you what they know about each one. Ask them to describe both to you. What is their **appearance** like from earth? What about from space? What is their shape? (**Sphere**) Color(s)? What does the surface look like? Describe the size of each? Tell your child that the earth appears blue and green from space. The water, which makes up most of the earth's surface, is blue while the land looks green. Sometimes, clouds appear and the earth also has white places around it. The moon, however, looks white or grey. It is covered in craters, or bumps and holes, and has a very dry surface. There is no water on the moon. It is much smaller than the earth and rotates around it. Ask your child to use this new information and the clay/playdoh to build a **model** earth and moon. Ask them to pay close attention to color and size. Next, show your child the globe, explaining that this a model of the earth. Ask your child if the earth stands still. Explain that the earth **orbits**, or goes around the sun. One **revolution**, or one time all the way around the sun, takes a whole year on earth. It also rotates on its **axis**. Show your child the north and south poles. Point out that they are a little bit tilted. Then, show your child how the globe can spin on its axis, just like the earth. Ask your child to spin their earth like the globe. Explain that this rotation causes us to have night and day while the orbit of the earth around the sun causes seasons. One **rotation**, or turn all the way around, is equal to one day. Hold the flashlight up to your child's model and turn it on. Ask them to tell you what they see. Explain that the flashlight represents the sun. The sun is a big star that gives light and heat to the earth and other planets. Point out that the sun shines only on one side of the earth, while the other side is in shadow. Explain that the sunny side is where the earth is experiencing daytime. The shadowed side is where it is night. Now, ask your child to choose a spot on their earth model and put their finger on it. Have them slowly rotate their earth model, with their finger still in the same spot. Shine the flashlight as they do. Point out that, as the earth rotates, their finger goes from day to night and back again. Next, ask your child to spin the earth with their finger in the same spot again. Point out the area where their finger first starts to come into the sunshine. Point out that this happens gradually, rather than quickly. In fact, it takes a whole day for the earth to turn all the way around. Explain that this point is when the sun rises. Throughout the day, the sun seems to move across the sky, though it is really the earth moving. Continue to slowly spin the earth until your child's finger reaches the line between day and night on the opposite side. Explain that this is sunset. Take your child outside and explain that the earth rotates, making it look like the sun and moon move across our sky. Ask your child to draw an arrow in the direction of the sun. Repeat this activity at noon, and at 6 pm, making you're your

		child is in the same place and facing the same direction, pointing out that the sun appears to be in a different spot each time because the earth is turning. Explain that the same thing is true of the moon, though we are usually asleep when it happens. Finally, point out that the sun provides heat and light for more than just the earth. It also helps the moon to glow. Explain that the moon has no light of its own. Without the sun, it would not glow the way it does not. Take your child to the mirror. Ask them to hold up their earth model as you shine your light on it once again. Then, explain that the sun also shines on the moon. Point the flashlight at the mirror, being careful not to reflect it into anyone's eyes. Show your child that the light hits the mirror, and is reflected back in another direction. Move the flashlight so that the reflected light shines on the earth, explaining that this is exactly what the moon does. Allow your child to experiment with reflecting the light themselves. Answer any questions they may have. Keep the clay models for future lessons.

Title of Lesson 2: The Sun: A Heat and Light Source

Standards Taught: S.S.5, S.S.5.1, S.S.5.1.a, S.S.5.1.d

Materials:	**Preparation:**	**Implementing the Lesson:**
Two mercury thermometers or a surface thermometer A shady and a sunny spot Two pieces of chocolate Two ice cubes A sunny day Observation Sheet 2		Review the previous lesson with your child. Ask them to tell you what they remember and answer any questions they may have. Remind your child of the flashlight, representing the sun. Ask your child why our solar system needs the sun. What would happen if we didn't have it? Explain that, without the sun, earth would be very dark and very cold. We would not be able to live here, neither would plants or animals. Remind your child that the earth was created for them by Heavenly Father and Jesus Christ. Explain that they knew we would need the sun and placed the earth in the perfect place so we would have all we need. Point out that all the other planets in our solar system are too hot (because they are too close to the sun) or too cold (because they are too far away from the sun) for us to live on. They don't have any plants or animals on them, either (as far as we know). Take your child outside and ask them to stand in the sun for a few minutes. Ask them to describe what it feels like. Is it warm or cold where they are standing? Bright or dark? Hand your child the thermometer and ask them to take the temperature of a surface (or lay the thermometer in the sun). Then, ask them to lay an ice cube and a piece of chocolate somewhere in the sun where they will not be disturbed. Ask your child to note the shape and size of each item on the observation sheet. Next, ask your child to stand in the shade for a few minutes. Point out that shade is simply a shadow of an object. A shadow is created when light from the sun gets blocked by an object. Point out which object is creating this shade. Ask your child how it feels in the shade. Is it cooler or warmer than in the sun? Brighter or darker? Ask your child to take the surface temperature (or lay out the thermometer) in the shade. Then, have them lay out an ice cube and a piece of chocolate in the shade. In about 30 minutes, return to the sunny spot. Ask your child to record their observations of how the ice and chocolate changed in the sun. What happened? Read the thermometer (or take the surface temp. again) and ask your child to record the temperature. Then, return to the shady spot and repeat the process. Ask your child to tell you what the differences are between the sunny and the shady spot. Which one had a higher temperature? Which spot caused the chocolate and/or ice to melt more? Which spot was cooler? Point out that the sunny spot was heated to a higher temperature because the sun was able to shine on it. The sun provides heat and light to the earth and the things living on it.

Observation Sheet 2

	Sunny Spot	**Shady Spot**
Draw and/or describe the chocolate before you let it sit out		
Draw and/or describe the ice cube before you let it sit out		
Draw and/or describe the chocolate after you let it sit out		
Draw and/or describe the ice cube after you let it sit out		
Record the temperature		

Title of Lesson 3: The Sun: Helping Plants

Standards Taught: S.S.5, S.S.5.1, S.S.5.1.b

Materials:	**Preparation:**	**Implementing the Lesson:**
2 Quick-growing seeds (wheat grass, marigolds, beans) – or, for a slower but more dramatic experiment, potatoes 2 cups or potting plants \ Potting soil Water A large box and extra pieces of cardboard Scissors Example		Briefly review the previous lesson with your child, emphasizing the fact that the sun gives the earth, plants, and animals light and heat. Tell your child that, today, we are going to learn about how the sun helps plants to grow. Explain that sunshine is one things plants need. Plants get most of their energy from the sun and don't grow well without it. If the sun were not shining on the earth, the plants would die. Give your child the cups, potting soil, and seeds. Ask them to place potting soil in each cup and plant 2-4 seeds in each one. Allow your child to water their seeds and set them aside. Next, help your child cut a small hole in one end of the box. Then, help your child cut and tape the extra pieces of cardboard in a shelf-like fashion on the inside of their box. Place one of the planted cups at the bottom of the box, explaining that the hole will let in light from the sun, but the shelves will block the sun from the plant. See the example as needed for instruction. Place a lid on the box or push the open end against a wall by a window, ensuring that the hole on the end of the box is exposed to the sun. Place the second cup by a window, unobstructed. Allow the plants to grow, encouraging your child to water them each day. Ask your child to observe what they see each day as the plants grow. This may take several weeks. Point out that the plant with direct sunlight is likely doing better than the one in the box. It has more access to the sunshine for energy. Ask your child to describe which way the stems and leaves are pointing on the plant in the sunlight. Point out that they are probably leaning towards the window, trying to get more energy from the sun. Then, ask your child to describe the direction of the plant in the box. Point out that it grew around the shelves, searching for the light it needs to grow.

Title of Lesson 4: The Sun: Helping People and Animals

Standards Taught: S.S.5, S.S.5.1, S.S.5.1.c, S.S.5.1.d

Materials:	**Preparation:**	**Implementing the Lesson:**
A warm jacket A dark room A fruit or vegetable your child enjoys A cooking pot with a lid Water		Review the previous lessons with your child, reminding them that the sun is necessary for life on earth and how the sun helps plants. Explain that people and animals also need the sun to grow and live. Ask your child how they think the sun may help them in their lives. Remind your child of the plant growing, getting its energy from the sun. Explain that, without plants, people and animals would have nothing to eat. Point out some of the plants your child regularly eats, explaining that these all grew in the sunshine. Without the sun, these plants wouldn't be able to get the energy they need to grow and we would have nothing to eat. The animals that eat the plants (e.g. deer, cattle, pigs, chickens), also provide us with food (meat). Without the plants to eat, the animals would not survive either, leaving us with no fruits, vegetables, or meat. Allow your child to enjoy the fruit of vegetable. Remind your child of the experiment with the chocolate and ice cube. Explain that the sun also keeps us warm. Without it, the earth would be cold and frozen. People, animals, and plants would not be able to live in such a cold place. Ask your child to give some examples of how they get warmed up. Explain that the sun provides much of our warmth, though somethings, like rubbing our hands together, produce heat, too. Ask your child to quickly rub their hands back and forth on each other until they feel it warm up. Then, explain that other things do not produce heat, but help us capture it and use it better. Ask your child to put on the jacket. Point out that the jacket is not warm on its own, but it holds in our body heat, allowing us to stay warmer. Next, take your child to the dark room. Turn out the lights and ask your child if they can think of another thing the sun gives us. Light. Point out that it is much easier to see during the day than at night. Point out that people did not always have electric lighting in their homes or flashlights to use. They simply went to sleep when it was dark because they couldn't see very well until the sun came up again. Explain that, like plants, people and animals need the sun to shine on their bodies. The sun provides vitamins that help us to grow and stay healthy. Finally, tell your child that the sun also helps us to get water that we need to survive. It shines over the oceans and warms the water there. When the water is warm enough, it evaporates and floats into the air. Here, it gathers into clouds, which are blown to different areas by the wind. These clouds rain, snow, and hail water and ice down on the earth, helping plants, animals, and people to have water throughout the earth. Demonstrate this concept with the cooking pot by placing the water inside and heating the water. Point out that, as the water heats, it turns into steam. The steam rises and gathers on the bottom part of the lid. Then, when there is enough water there, it drips back downwards, just like rain.

Title of Lesson 5: The Movement of the Earth

Standards Taught: S.1.2, S.1.2.a

Materials:	**Preparation:**	**Implementing the Lesson:**
Globe Flashlight Stickers		Review lesson 1 with your child by asking them to hold up the globe and flashlight (help as needed) to demonstrate the movement of the earth and how that affects the cycle of day and night. Remind your child that the Earth orbits the sun and rotates on its axis. Next, ask your child where the sun rises (in the east) and sets (in the west). Ask them to explain how the sun seems to move from the east to the west. Point out that the sun doesn't move, Earth does, but because we are standing on the Earth, it looks like the sun is moving to us. Show your child this video pointing out the movement of the sun and moon over time. Explain that this video is a time-lapse, meaning that it has been sped up so we can see the movement of bodies in the sky over an entire day in just a few seconds. Remind your child about their sundial experiment from last year. Discuss what happened to the shadow they drew with chalk as the day went on. What happened to the position of the sun? Remind them (or do the experiment again) that the sun's position seemed to move and the shadows changed length. Explain that this is because the Earth's rotation causes the angle of their position on the Earth relative to the sun to change. Show your child this image and point out that the position of the girl (and therefore the Earth) changes, but the sun does not. The Earth rotates, moving the girl with it and changing the way she sees the sun. Ask your child to place a sticker on the following body parts: tummy, left calf, right elbow, left shoulder, right shoulder, forehead, lower back. Explain that these stickers represent different people living on the Earth while their body represents the Earth. Ask your child to stand in an area with open space and rotate very slowly. Shine the flashlight on them to represent the sun. Do not move the sun as your child spins around. As they spin, ask your child to pay special attention to the sticker on their forehead. When is it in the sun? What would this be for the person living there? Day or night? When is it in the dark? Would this be day or night? What about when it is halfway in-between day and night? Is the light on your face brighter or darker at times? Does the sun look like it is in a different place? Do you have to move your eyes a different way to see it? Did the sun move, or just the Earth? Repeat this process for each sticker. Ask your child to pause at times, pointing out where the sun is in relation to a certain sticker and how that changed since the last pause. Help your child understand that the sun did not move, only the Earth.

Title of Lesson 6: The Moon's Orbit

Standards Taught: S.1.2, S.1.2.a, S.1.2.b, S.1.2.d

Materials:	**Preparation:**	**Implementing the Lesson:**
Globe Golf Ball Flashlight Blank paper Markers/Crayons		Review the previous lesson with your child, reminding them of the reason why things appear to move across the sky. Explain that this is true for the sun and stars, as they don't move. It is the movement of the Earth that makes them appear to move, but they actually stand still. However, celestial objects like the planets (which also orbit the sun and rotate on their own axis) and the moon (which orbits around the Earth and rotates) seem to move and change, too. This appearance of movement is a combination of Earth's orbit and rotation, and that of the other body. Remind your child of the movement of the moon in the video. Explain that that perceived movement is like the movement of the sun as demonstrated in the previous lesson. However, the moon is not staying still in the sky like the sun. It is also moving around the Earth and rotating on its own axis. The moon is also orbiting and rotating in relation to the sun, following the path of the Earth around the sun while all this happens. This movement means that area where the sun shines on the moon changes, just as it does on the Earth, and is the reason the moon sometimes looks like a different shape. Discuss some of the shapes your child has seen the moon appear to be (crescent, circle, semi-circle). It is also why the people on Earth only ever see one side of the moon. Watch this video with your child. Explain that the moon's orbit is the same speed as its rotation, so we only ever see one side of the moon. It takes about 28 days for the moon to complete its orbit around the Earth (making a month), just as the Earth takes 365 days to orbit around the sun (making a year). Ask your child to draw an image showing the Earth, Sun, and Moon and their relative orbits and rotations. It may look something like this image.

Title of Lesson 7: The Moon's Cycle

Standards Taught: S.1.2, S.1.2.a, S.1.2.b, S.1.2.d		
Materials: Chalk Black construction paper Various supplies for your child's model depending on which type they choose Observation Sheet 7	**Preparation:**	**Implementing the Lesson:** Review the previous lesson with your child. Remind them that the Earth orbits the Sun, creating a year with different seasons, and rotates, creating day and night. The moon orbits the Earth, creating a month, and rotates, creating the illusion of different shapes of the moon in the night sky. Ask your child to use the chalk to draw the different shapes of the moon they have observed in the sky. Point out that the moon never actually changes shape, it is always a sphere. However, like its position, our view on the Earth relative to the moon and the moon's position relative to the sun, make us think the moon is changing shape. Watch this video with your child. Answer any questions they may have and emphasize the phases of the moon and how they change. Show your child this image and ask them to review where the sun is, the fact that the sun doesn't move, and how the moon travels to create different phases. Ask your child to create a model of the moon phases and movement. You may need to search online for ideas and gather supplies. Encourage your child to use the video and image as a reference for their project. Display their finished work and ask them to teach someone else about the phases of the moon. Finally, use Observation Sheet 7 to help your child track the phases of the moon over a 30-day period. Each evening, ask your child to observe the moon and draw its appearance on their observation sheet. Discuss the changes and movements you observe together.

Observation Sheet 7

Day 1	**Day 2**	**Day 3**	**Day 4**	**Day 5**
Day 6	**Day 7**	**Day 8**	**Day 9**	**Day 10**
Day 11	**Day 12**	**Day 13**	**Day 14**	**Day 15**
Day 16	**Day 17**	**Day 18**	**Day 19**	**Day 20**
Day 21	**Day 22**	**Day 23**	**Day 24**	**Day 25**
Day 26	**Day 27**	**Day 28**	**Day 29**	**Day 30**

Title of Lesson 8: Space Exploration

Standards Taught: These lessons are a review of previous standards dealing with space		
Materials: Varies depending on what your child would like to learn about	**Preparation:**	**Implementing the Lesson:** Review what your child has learned about the Sun, Earth, moon, and stars so far. Ask them to tell you how the plants and animals on Earth get the light and warmth they need, how the Earth and moon move, and what the different between the day and night sky is. Then, ask your child to choose something about space they would like to learn more about. This may be the Sun, Earth, moon, stars, planets, asteroids, meteors, comets, or space shuttles. Take time to research this aspect together. Look for books and webpages with information (this website is a great one for a variety of topics). Watch videos together. Then, perform a related experiment or create a craft reflecting the subject.

Title of Lesson 9: Gravity

Standards Taught: S.4, S.4.1, S.4.2, S.4.2.b, S.4.2.c, S.3.3.3, S.3.1,		
Materials: Ball	**Preparation:**	**Implementing the Lesson:** Review the previous lessons with your child. Ask them to explain how the Earth rotates on its axis to create day and night and how it orbits around the Sun, creating seasons and years. Review the moon's orbit around the Earth, which creates months. Next, ask your child why each of the planets orbits around the sun. Why don't the planets run into the sun? Why don't they fly away from it? Explain that the planets orbit around the sun because of **gravity**. Gravity is a **force** that exerts its pull on anything with mass (mass is how much matter a thing is made of, but for now it is easiest to explain mass simply as **weight**). It is what holds us on the Earth, pulling down the mass of our bodies towards the mass of the Earth. The more mass (heavier) an object is, the more gravity it has. For example, the moon has less mass than the Earth. This means that it exerts less gravity on objects than. So, if we were to jump on the moon, we would jump much further. Our mass does not change, but the amount of gravity does because the moon is smaller than the earth. Watch this video with your child. The planets are pulled by the gravity of the sun, which holds most of the mass in our solar system. However, they are also moving forward. These two forces combined (the force of planets moving forward and the gravity of the sun pulling them towards it) create each planet's orbit. Watch this video with your child. In addition to being pulled by the gravity of the Sun, Earth also has its own gravity. Earth's mass pulls the smaller, lighter moon into its orbit, just as the sun pulls on the planets. However, Earth's gravity also ensures that we won't fly off the planet. Earth's gravity is constantly pulling down us (and other objects). This is why a pencil doesn't float away when we set it on a desk and why we can't jump all the way to the moon. Gravity also means that objects fall down when they are dropped. Watch this video with your child and do the experiment shown using a small ball. Point out that no matter how the ball is thrown, it always falls to the ground. This demonstrates the force of gravity. Review each concept of the lesson with your child, ensuring that the understand gravity, force, mass/weight, and why things fall to the ground. Allow your child to ask any questions they may have and help them find answers.

Title of Lesson 10: Overcoming Gravity

Standards Taught: S.4, S.4.1, S.4.1.a, S.4.1.b, S.4.2, S.4.2.a, S.4.2.b, S.4.2.c, S.3.3.3, S.3.1, S.3.1.a, S.3.1.c, S.3.2, S.3.2.a, S.3.2.b

Materials:	**Preparation:**	**Implementing the Lesson:**
Pencil Flat table or counter 2 Balls, roughly the same size and weight Ramps (2 long and 2 short). This could be made of household objects such as spare wood, car tracks, etc. Small toy cars Canned good (i.e. soup, beans, corn, etc) Scale		Review with your child what they learned about the force of gravity in the previous lesson. Explain that today we are going to see if we can beat gravity. Place the pencil on the floor. Remind your child that the pencil is being held down by gravity and will not move on its own. Ask your child how they might move the pencil. Ask them to move the pencil from the floor to the table. Explain that your child overcame gravity for the pencil. By grabbing the pencil and pulling it upwards with their hand, they exerted a force stronger than the gravity pulling it down and the pencil was able to go in an upward **motion** (motion simply means movement). Point out that the pencil is now sitting on the table, being held up by the surface of the table and pulled down by gravity at the same time. Next, give your child the balls and one short ramp. Ask them to roll one ball down the ramp simply by letting it go at the top. What **direction** did the ball go? Why? Why did the ball not fall straight down? How did the ramp affect its motion? Then, ask your child to repeat the experiment. This time, you will hold the second ball and push it down the ramp at the same time your child drops theirs. Ask your child not to push their ball, as this will add extra force. Observe and ask your child which ball reached the bottom of the ramp first. Why? What was the difference in **speed**? Explain that your push on the ball exerted more force, adding a downward motion to the one already produced by gravity. The ball rolled down faster *because* you pushed it and helped gravity. Ask your child to help you set up the second short ramp, matching the incline. Explain that this is a **simple machine** that can affect how the ball interacts with gravity. Ask your child to place a ball at the top of one ramp while you place the other at the top of the other ramp. Let go of the balls at the same time and observe what happens. Then, change the incline of one ramp and repeat the experiment. What changed? Why? Did the one ball travel at a different speed or for a different **distance** based on the incline? Allow your child to experiment and explore different inclines. Then, give your child the remaining ramps and point out that they are longer. Repeat the experiment above, comparing different lengths and inclines to determine how they affect speed, distance, and direction of the ball. Allow your child to continue experimenting. Discuss observations you both make as you work. Finally, give your child the toy cars and canned good item. Ask them to weigh each item (along with the balls) on the scale and compare mass. Which one weighs more? Less? How do you think this will affect their speed, direction, and distance down the ramp? Allow your child to experiment and race the items down the ramp. Note their observations and point out your own. Point out that the difference in mass affects how much gravitational pull and object experiences.

Title of Lesson 11: Weather Patterns at Home

Standards Taught: S.3.1, S.3.1.1

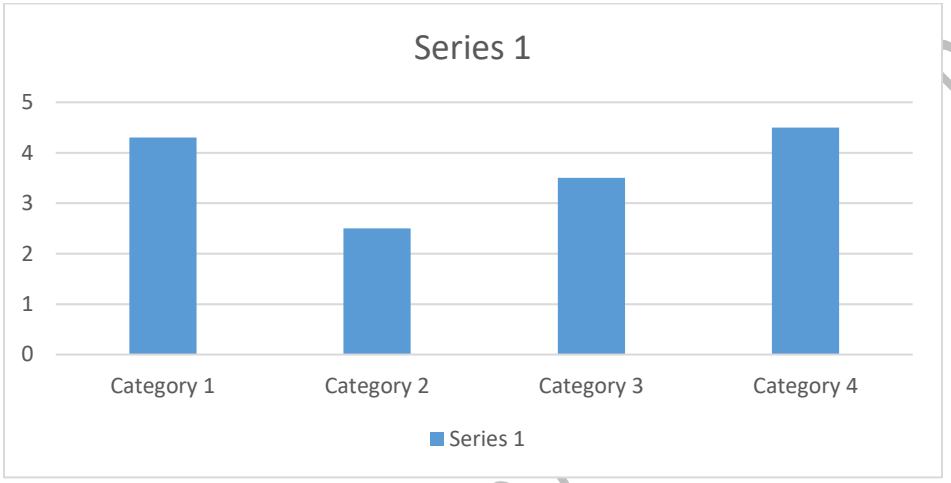
Materials:	**Preparation:**	**Implementing the Lesson:**
Internet Access and a Website Showing Typical Weather Patterns (temperature, precipitation, wind speed) in your area Blank papers Pencil Crayons/Markers Observation Sheet 11		Remind your child of the rotation and orbit of the Earth. Ask them to explain how these movements are affected by gravity. Then, ask them to remind you how they create day and night, months, and years. Finally, show your child this video to review how seasons are created. Ask your child to tell you the typical temperature and weather patterns of each season (i.e. summer is usually hot and dry, autumn is cool and windy, winter is cold and rainy/snowy, and spring is warm and rainy). For this lesson, focus on the typical weather patterns for where you live rather than in other regions. Ask your child to share some of their favorite things about each season and what they don't like about them. Discuss what they wear for each season and how those items help us adapt to the weather. Finally, discuss activities they enjoy in each season. Review the definitions of the following terms: temperature, precipitation, wind speed. Tell your child that today we are going to research these three weather patterns for our home. Give your child the first page of Observation Sheet 11. Point out the terms along the top and the colors (one representing each season) below and that they have been broken into months. Show your child how to follow the row all the way across with their finger for the month of December, explaining that this is where we will write the average temperature, precipitation, and wind speed for that month. Search online for this information and help your child fill in their chart. Next, show your child the bar graph example on page 2 of the Observation Sheet. Explain that they will be making a chart like this for their own information. Help your child build a bar graph for temperature on one of their blank papers, filling in the information you just gathered. The y-axis should be temperature in 5-10° intervals. The x-axis should be the months. Repeat the process, creating a second bar graph for wind speed. Show your child how this allows us to see and compare data quickly. Ask them which month is the coldest and which is warmest. Which month has the highest and lowest wind speed? Next, show your child the pie chart example on page 2 of the Observation Sheet. Explain that this another kind of graph, called a pie chart (because it looks like pieces of a pie). This type of graph also helps us compare amounts, but in a different way. Help your child build a pie chart, with a slice for each month, of precipitation. This may be easier to do using a computer program like Microsoft Word. Be sure to print the graph on a blank paper. Ask your child to name the months with the most and least amount of precipitation in your area.

Observation Sheet 11 (pg. 1)

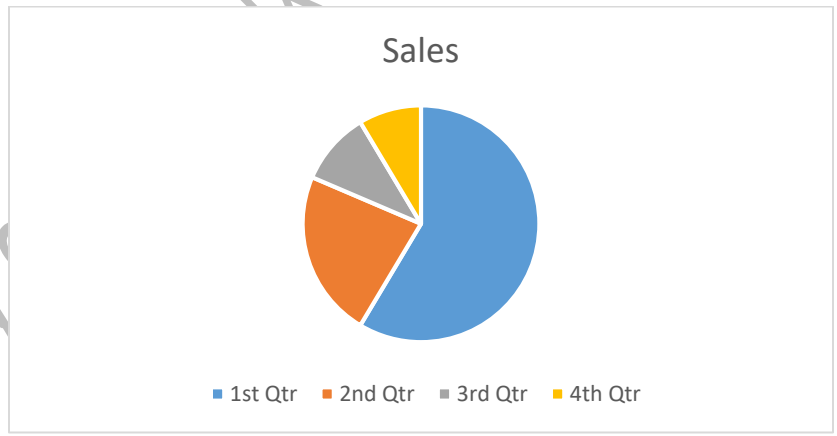
Month	Temperature	Precipitation	Wind Speed
December			
January			
February			
March			
April			
May			
June			
July			
August			
September			
October			
November			

Observation Sheet 11 (pg. 2)

Bar Graph Example



Pie Chart Example



Title of Lesson 12: Weather Patterns around the World

Standards Taught: S.3.1, S.3.1.2		
Materials: Observation Sheet 12 Pencil Crayons/Markers Internet Access	**Preparation:**	**Implementing the Lesson:** Review the history lessons from the beginning of the year about ecosystems with your child. Ask them to name the types of ecosystems they remember. This may be desert, tundra, wetland, plain, grassland, tropic, mountain, or forest. Remind your child that the weather is a part of those ecosystems. An animal in the tundra, for example, is used to the typical weather pattern of very cold temperatures and would not survive in the hot desert. A plant from the wet rainforest would likely not survive in the dry plains because its adaptations would not fit. Ask your child to draw and color a simple picture of each ecosystem in the bottom center of the correct box on Observation Sheet 12 (e.g. a cactus for the desert). Then, ask your child to draw a line down the middle of each box. Explain that the left side of the line will represent winter and the right will represent summer. One ecosystem at a time, search online for an area that represents it and the typical temperature, wind speed, and precipitation for both winter and summer. Ask your child to write down the winter temperature on the left side of that ecosystem's box and draw the typical weather (e.g. swirls for wind, snowflakes for snow) and that for summer on the right. Repeat for each ecosystem. Finally, compare and contrast the different weather patterns in the ecosystems. Discuss the differences in temperature, wind speed, and precipitation around the world. Explain that weather can affect how plants, animals, and people live. Ask your child to tell you about a time they went on a trip to a different ecosystem. Discuss the different clothing they wore, even in the same season and the different activities they were able to do.

Observation Sheet 12

Desert	**Tundra**
Wetland	**Plain**
Grassland	**Tropic**
Mountain	**Forest**

Title of Lesson 13: Protection from the Weather

Standards Taught: S.3.1, S.3.1.3		
Materials: Varies, depending on what your child decides to build	**Preparation:**	**Implementing the Lesson:** Review the previous two lessons on weather patterns with your child. Discuss some of the challenges of each type of weather (e.g. too much rain can make a plant's leaves heavy, too much cold can harm a human) and the adaptations and modifications that plants, animals, and humans have made to their environments to protect them from weather. Allow your child to discuss their favorite examples rather than trying to focus on each environment. Next, ask your child what some of the weather challenges are in your environment. Is it really windy? Do you get too much rain? A lot of snow? Is it extremely cold or hot? Does rain come only in certain seasons, leaving dry spells? Ask your child to choose one of these challenges. Explain that they will be working to create a modification that will help in this weather challenge. Help your child research, develop, and build a model of their modification. Look to see what has already been done to address this concern. Can your child make it better? Or can they think of a different way to address this problem? As you experience this weather, help your child test their model in real-time. You can also create a weather pattern (e.g. for cold, place the model in the freezer, for flooding, use a bathtub or garden hose). Discuss what can be improved or changed and what worked well. This process will vary depending on your child's creation. Praise your child for their hard work and perseverance in working to find new ways to keep everyone safe. Some examples: a reservoir to store water, a wind-resistant roof, a barrier to prevent flooding, an improved glove to protect from the cold, a cooling device for hot summer days, a new roof design that prevents heavy snow buildup, a shade that withstands wind, a tornado warning system, a hurricane shelter

Title of Lesson 14: Living vs. Non-Living Things

Standards Taught: S.2, S.2.1, S.2.1.a, S.2.1.b, S.2.1.c

Materials:	**Preparation:**	**Implementing the Lesson:**
A **terrarium** kit that includes the following: pebbles, soil, seeds, a clear container large enough to hold the terrarium, light-source, method to water it (spray bottle, cup), and a small figurine – don't put it together yet, just gather supplies- Alternatively, you can use an **aquarium** Observation Sheet #14		Review with your child the definition of an **environment** (the world or area in which something lives). Ask your child to describe their environment. This may be your home, your property, or your city. Allow your child to describe as big or small an environment as they want. Ask them to describe some of the things in their environment. What is around them? Above them? Below them? How do these things help them throughout daily life? Next, ask your child if everything in their environment is alive. What are some **living** things, or **organisms**? Are they living? What else is living around them? How do these living things help your child? Be sure to point out people, animals, and plants. Then, ask your child to name a few **non-living** things in their environment. What do these things do to help your child in everyday life? How would life be different without them? Finally, ask your child what the difference is between living and non-living things. Point out that there may be more than one thing that is different. How do we know that something is living? How do we know it is non-living? Show your child Observation Sheet #14 and point out that living things eat, drink water, breathe, move or grow, and reproduce. Explain that people and animals eat, drink water, breathe, move and grow, and have babies. Plants also eat (or gain energy from the sun and soil), drink water, breathe (though they use carbon dioxide rather than oxygen), grow, and create seeds. Without the ability to do these things, living items would not **survive**. Items such as cars, chairs, desks, tiles, or pencils don't do these things, but cannot die. These actions are how we know whether something is living or non-living. Ask your child to name a living thing in their environment and draw and label it in the first box on the observation sheet. Ask them to answer each question for that item to prove it is a living thing. Then, ask your child to repeat this process, naming three living and three non-living things in their environment and answering the questions to prove the classification of that thing. Finally, help your child put the **terrarium** together and plant their seeds. As you work, ask them to classify each item as living or non-living. Place the terrarium where it will have light and warmth it needs to grow and help your child water it each day. It will be used for future lessons.

Observation Sheet #14

Item	Does it eat?	Does it drink?	Does it move or grow?	Does it breathe?	Does it reproduce?	Living or Non-Living

Title of Lesson 15: Living and Non-Living Interactions

Standards Taught: S.2, S.2.2, S.2.2.a, S.2.2.b, S.2.2.e

Materials:	**Preparation:**	**Implementing the Lesson:**
Terrarium (or aquarium) from previous lesson Observation Sheet #16 (from the next lesson)		Remind your child of the previous lesson. Ask them to remind you of some of the living and non-living things in their own environment. Next, choose two of the things that your child named and ask your child how these two things **interact** with, or affect, each other. Remind your child of their lessons on ecosystems and how each part of the ecosystem depends on and plays a role in the well-being of the others. Explain that their environment is the same and living and non-living things work together to create a place where living things can survive. An example of this would be: a house is non-living while the person in it is living. The person cares for the house (cleaning, maintenance, decorating) and the house provides protection from the weather and extreme temperatures outside. If the person were to leave, the house would become dirty and start to break apart over time. Likewise, if the person did not have the house, they would be too cold, too hot, or out in the rain and snow. Ask your child to name two more things that interact in their environment and explain what would happen to each if the other disappeared. Discuss the fact that living and non-living things, living and living things, and non-living and non-living things each interact within an environment. Next, remind your child of their **small-scale** (or small example/model) environment in the terrarium. Ask them to remind you of the living and non-living things within the terrarium. Then, ask them to discuss the interactions that take place there. What would happen if the seeds were not planted? If the soil was not there? If the pebbles disappeared? If the container holding it all together were removed? Point out that interactions take place between living and non-living things within this small environment, too. Finally, ask your child what they think would change within their small environment if they changed the **temperature**, **moisture** level, or light exposure inside of it. Point out that each of these is a non-living element of the environment. Ask your child to choose one change and record their choice on Observation Sheet #16. Record their prediction for how the environment will change here, as well. Continue to water and care for the terrarium as you have until the next lesson.

Title of Lesson 16: Living and Non-Living Changes

Standards Taught: S.2.2, S.2.2.b, S.2.2.c, S.2.2.d		
Materials: Observation Sheet #16 Terrarium from the previous lessons	**Preparation:**	**Implementing the Lesson:** Remind your child of the previous lesson. Briefly discuss how living and non-living things interact within an environment and affect each other. Ask your child to remind you of their chosen change and prediction from the previous less. Explain that the terrarium had been cared for in the same way for the past week. Ask your child to note any differences they see since they last **observed** their terrarium (i.e. did it grow, change structure, etc). Then, explain that today will be Day 1 of our experiment in their chosen change. Ask your child to draw their observations of the terrarium in the Day 1 box on the Observation Sheet. Then, begin the experiment by making the change that your child chose. If your child chose temperature, place the terrarium in an area where it will receive the same amount of light, but at a warmer or cooler temperature (you may have to add a heat pad or place ice packs around it). If your child chose moisture, use more or less water than in the past when it is cared for each day. If they chose sunlight, move the terrarium to a place with more or less sunlight, but that is at the same temperature. Be sure to only change one aspect of the terrarium's environment while keeping the others steady. Each day, ask your child to observe the terrarium and draw their observations on the observation sheet. Ask them to note any changes they see each day. At the end of seven days, ask your child to compare the environment now to what it was on Day 1. What changed? What stayed the same? Did they guess what would happen correctly? Why were the living things affected more than the non-living things? How did the change to one affect the others? Allow your child to research as needed to answer their questions. Then, ask them to complete observation sheet 16 and replace the normal environment conditions (water, sunlight, and temperature) to their terrarium. Finally, compare their small-scale environment to a larger version. A terrarium may be a tiny forest or grassland. Point out that changes to the larger version would probably result in the same types of effects on the living and non-living things there. Discuss how changes to the amount of sunlight, water, or the temperature in a forest would affect living and non-living things there. Compare this to what your child observed in their small-scale environment. Allow your child to care for their terrarium as long as they like.

Observation Sheet #16

Chosen Change: **(circle one) Temperature Moisture Light**	**Predicted Result:** **(what do you think is going to happen)**
Day 1:	**Day 2:** **Observed Differences:**
Day 3: **Observed Differences:**	**Day 4:** **Observed Differences:**
Day 5: **Observed Differences:**	**Day 6:** **Observed Differences:**
Day 7: **Observed Differences:**	**Overall Observed Differences Throughout the Week:**
Conclusion: **(What actually happened as a result of the change you made?)**	**Was your hypothesis correct?:** **(Did you guess the result?)**

Title of Lesson 17: Adaptations

Standards Taught: S.3.2.3, S.3.2.4, S.3.2.4		
Materials: Adaptations Cutouts Environment Printouts	**Preparation:** Print and cut out the physical adaptations papers	**Implementing the Lesson:** Review the lessons on ecosystems (from history) and living vs. non-living things (from science) with your child. Remind your child that ecosystems include both living (plants, animals, and humans) and non-living things that support life (soil, water, weather). Ask your child to remind you of what they know about adaptations of animals and plants in different ecosystems. If needed, review history lessons 2-9 and 16 briefly if needed. Next, show your child the adaptations cutouts and the environment printouts. Ask them to match the plants and animals to the correct environment and explain why that organism is able to survive within their environment. Remind your child that plants and animals have both physical and behavioral adaptations. For example, the cactus has narrow leaves that protect it from the hot sun and from predators (physical) and the coyote is nocturnal (behavioral), allowing it to move around the hot desert in the cooler temperatures of the night. The coyote is also camouflaged, its fur matching the environment (physical). Likewise, rainforest plants have broad leaves (physical) which allow the excess water to run off the plant so it doesn't get too heavy and tree frogs are brightly colored (physical) to blend in with the trees they live on and move around mostly at night (behavioral) so that they can avoid predators. In the tundra, many of the plants (like mosses and lichen) do not grow very tall (physical) and have adapted to the short growing season of the cold environment. Polar bears have fur that matches the snowy landscape (physical) and hibernate (behavioral) during the coldest times of the year when food is scarce. Take the time to research and learn about more the adaptations of these animals with your child. Then, ask your child to take the polar bear out of his environment and place it in the desert. Ask your child how the polar bear's adaptations would help or hurt him in that environment. Point out that his white fur would make him stand out in the desert and he would likely be too warm in the hot weather. Hibernation may work, but only if he learned to hibernate when it was hot, rather than very cold. Most likely, the polar bear would not be able to survive in the desert because his adaptations were not meant for that environment. Repeat this process with each of the plants and animals from the cutouts. Finally, place each plant and animal back into their correct environment. Then, ask your child what would happen to the animals in the desert if there was too much water. How might they have to change or to survive? Would more plants grow? Would there be enough food? Where would animals who usually burrow into the ground find shelter? What if the tundra suddenly became warmer or the rainforest went through a drought? Point out that plants may grow taller in the presence of more water or sun and shorter if there is less. This would affect how much food was available to the animals and may cause population changes. The animals, too, may experience changes such as starvation, overeating, shedding, or migration in these circumstances.

Adaptations Cutout

Environment Printouts (3 pages)

Desert

Tundra

Rainforest

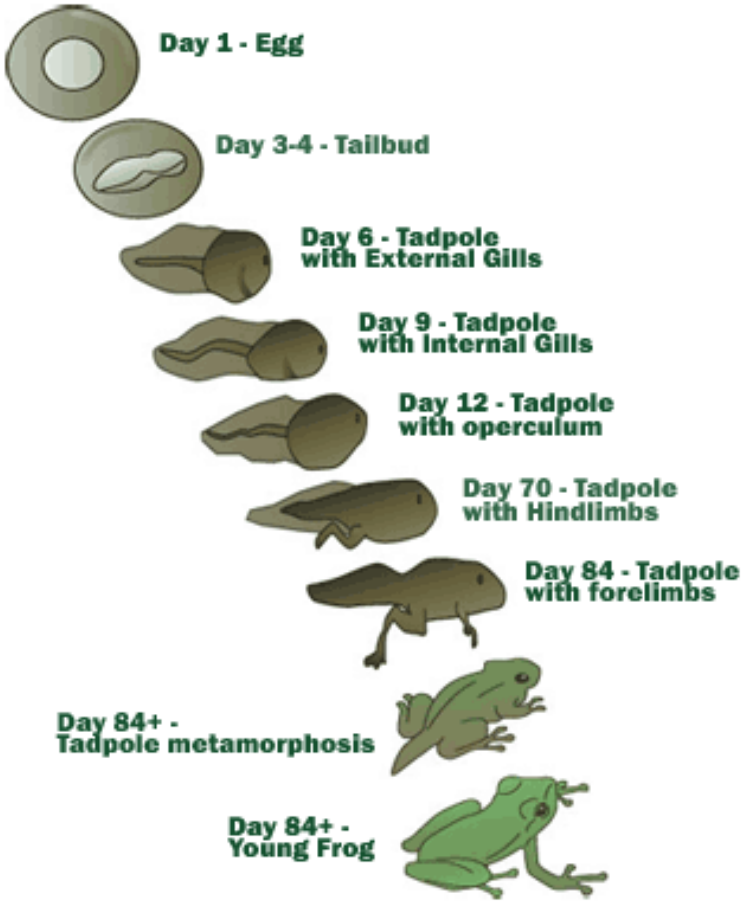
Title of Lesson 18: Inherited Traits and Life Cycles

Standards Taught: S.3.2.1, S.3.2.2		
Materials: Life Cycles Printout: Frog vs. Deer Set of at least 5 plants of the same variety (e.g. houseplants, flowers, trees). You may want to visit a grove, nursery, orchard, or gardening center) Observation Sheet 18	**Preparation:**	**Implementing the Lesson:** Briefly review the previous lesson with your child, asking them to remind you about environments, adaptations, and how animals survive in specific ecosystems. Then, ask your child to name and describe a baby animal they've recently seen. What did it look like? What color was it? How many legs/arms did it have? How did it move around? How did it communicate? Point out that this baby probably shared some traits and behaviors with its parents. Perhaps the baby had the same color skin, hair, eyes, fur, feathers, or scales as its parents. Maybe it communicated, moved, or hid from predators the same way it parents did. Perhaps the baby engaged in some of the activities of the parents. Explain that most offspring (or babies) of plants and animals share traits with their parents. Read Genesis 1:11-12, 21-24, and 26-28 and discuss how God planned for plants and animals to reproduce so that humans would have everything they needed on earth. Parents pass down physical and behavioral characteristics to their offspring to help them survive in their specific environments. Show your child the 5 different plants, explaining that each of these plants is the same type of plant. Ask them to note similarities and differences between the plants. Point out that, though they are not exactly the same, they share some traits (e.g. leaf shape, flower coloring, etc.) that help them to survive. Likewise, differences in size of plant, health, or resistance to insects may be the result of differences in resources or physical adaptations. Next, ask your child to tell you what traits they have in common with their parents. Do they look the same? Share a common eye, hair, or skin color? Are they tall or short like their parents? Do they enjoy any of the same activities? Give your child Observation Sheet 18 and ask them to fill in the information about their family members. Allow your child to interview family members and/or use photographs to fill in their chart. Then, ask your child to note which characteristics they share with their ancestors and why those characteristics may have been passed down to ensure survival. Finally, point out that not all babies start out looking like their parents. Butterflies, for example, begin a caterpillars which look very different from their parents. However, through their lifecycle, they change over time to look more and more like their parents. Review the life cycles printout with your child and ask them to identify which animal changes (and how) and which one looks much like a small version of their parent as a baby and grow bigger as they age. Discuss the survival-related advantages (e.g. tadpoles have tails that help them swim until they are able to leave the water, baby deer are camouflaged brown like their parents, but have spots that help them blend in with the spring flowers, etc).

Observation Sheet 18

Person	Good or Bad Eyesight	Tall or Short	Eye Color	Easily Sunburned or Tanned	Hair Color	Survival Behavior
Me						
Mom						
Dad						
Grandmother 1						
Grandfather 1						
Grandmother 2						
Grandfather 2						

Life Cycles



Title of Lesson 19: Adaptations Review

Standards Taught: S.3.2.1, S.3.2.2, S.3.2.3, S.3.2.5, S.3.2.5		
Materials: Library books and/or online sources about the adaptations of your child's chosen animal Poster board Markers/Crayons /Pens and Pencils	**Preparation:**	**Implementing the Lesson:** Briefly review the previous two lessons with your child. Discuss behavioral and physical adaptations and how traits and behaviors can be passed from parent to offspring. Ask your child to explain how these inherited traits and behaviors can help offspring to survive. Then, ask your child to explain what a life cycle is and give an example of an animal that does not look like its parent when it is born. Next, ask your child to choose a plant or animal they are interested in learning more about. Ask your child to draw their animal in the center of the poster board and write the animal's name on the top of the poster board. Spend time learning about this animal with your child. Research using books and/or online sources. As you work, ask your child to note interesting facts, physical traits, behavioral adaptations, usual environments, diet, and needs of this animal on their poster board. Allow your child to decorate and/or color their poster, pointing out that it should look neat and organized. When your child is finished with their research, ask them to give a presentation about their animal in front of a friend or family member. Encourage your child to share what they've learned and why they enjoyed learning more about this animal.

Title of Lesson 20: Environmental Changes and Ecosystem Preservation

Standards Taught: S.3.2.6		
Materials: Various, depending on your child's chosen project	**Preparation:** Do some research on changes to the environment in your area and search for a problem-area that needs some attention. This may be your own garden, greenhouse, animal shelter areas, or yard. It may also be something as large as a nearby forest, wetland, or agricultural area. If possible, list a few of these on a piece of paper to help guide your child in choosing their project.	**Implementing the Lesson:** Ask your child to review what happens to a plant or animal if it is taken out of their environment. Discuss how organisms have adapted to the needs of their environment and have a hard time surviving in places that are different. Then, ask your child to remind you of an environmental change that can affect organisms in the same way. Some examples may include humans changing the land use, the levels of water, temperature, food availability, or invasive (not naturally living there) species. Show your child the list of local issues that you've prepared. Explain the environmental change that is hindering the survival or growth of plants or animals. Some examples may include: farming which depletes nutrients in the soil, deforestation, honey bees dying in mass, drought, temperate change, overhunting, or a problem caused by an invasive insect. Point out that, often, we cannot control everything in an environment. However, since humans were charged with stewardship over the earth and plants and animals in it, we should strive to do what we can to minimize negative impacts (bad changes). Ask your child to choose a problem from your list that they have an idea for changing. Point out that there may be several different answers to helping solve the problem. If your child chose depleted nutrients in the soil, for example, they may want to add fertilizer, create a compost bin, or plow a crop back into the field. Help your child research their problem, looking for reasons why it is happening, what plants and animals it is impacting, and what possible solutions have been tried. Encourage your child to come up with a plan of their own to implement a solution of their own that will decrease the impact of what is happening. Your child may decide to plant and care for a tree, create a bee garden, find a way to conserve or store water, create shelter for plants and animals that protects them from temperature changes, work to change hunting laws, or find a defense for vulnerable populations against invasive species. They may also come up with their own solutions. Help your child to implement their solutions. Remind them that change may take some time and that advocacy (teaching others about the problem and solutions) is a great way to increase awareness. Encourage your child to stick with it until they can see change, no matter how small. Perhaps honey bees began visiting your garden, a compost bin cut down on garbage and added nutrients to now-healthy plants, or a greenhouse allowed sensitive plants to survive a cold spell. Praise your child for their hard work and their willingness to be good stewards.

Title of Lesson 21: Forces 2.0 (2 pages)

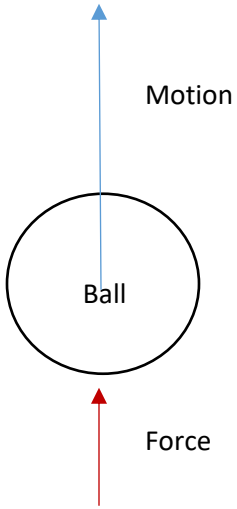
Standards Taught: S.3.1, S.3.1.a, S.3.2, S.3.2.a, S.3.2.b, S.3.2.c, S.3.2.d, S.3.d.e, **S.3.3.1, S.3.3.2**

Materials:	**Preparation:**	**Implementing the Lesson:**
Marbles Ball larger than the marbles Masking Tape A large area with a smooth surface (e.g. table, un-carpeted floor) Park or playground with slides and swings Observation Sheet 21	Tape strips of masking tape to the floor at one-foot intervals for at least 6 feet	Review with your child what they learned about gravity and other forces in lessons 9-10. Remind them that a force is a strength or energy that acts on objects with mass (or weight). Discuss the experiment from lesson 10, pointing out that gravity is the force that holds things down and pulls them towards the earth. Pushing and pulling are also forces. Tell your child that today we are going to learn more about forces and how they create movement in objects. Give your child the marbles and ask them to flick or gently push the marbles towards the tape strips. Discuss how far the marbles went and why they moved. Remind your child that noon-living objects do not move by themselves, so a force had to be exerted on the marble. Point out that it was their hand pushing the marble that made it move. Use Observation Sheet 21 to record the highest distance a marble went. Next, collect the marbles, this time asking your child to exert a greater force on them, pushing harder than last time. Point out that a greater force changes the distance the marble is able to travel. Help your child record their new highest distance on their observation sheet. Collect the marbles again, asking your child to exert very little force on them this time. Point out that pushing them more gently results in the marbles traveling a shorter distance. Help your child record their highest distance and discuss the results of this experiment. What does this show about the amount of force compared to the distance traveled? Next, repeat the experiment with the ball, pointing out that the ball is larger, but may weigh more or less than the marbles. Discuss the fact that weight, or mass, changing the effects of a force on an object. Heavier objects travel shorter distances when the same force is applied while lighter ones travel further. Next, remind your child that there is actually more than force working on each marble and ball. Gravity is pulling them downward while their hand is pushing them forward. This means that when they push the marble/ball it stays on the ground instead of floating above it. When more than one force works on an object, both forces work together or against each other to change the direction and speed of that object. Give your child the ball and ask them to push it across all of the lines. Point out that here, gravity and their push made a mostly straight line along the floor. Ask your child to take their ball back to the first line and use it to create a zigzag pattern along the floor. Point out that they will have to push the ball back and forth, exerting force in two different directions at different times to change the motion of the ball into a zigzag pattern. Finally, ask your child to push the ball at the same time and force with both hands in opposite directions. Point out that this exerts a force from both sides. These two forces cancel each other out and the ball does not move. Ask your child to draw a diagram of the forces in

		each of these three experiments, showing the forces at work on the ball for each. Use blue to represent motion and red to represent forces. An example is provided. Next, ask your child to place the ball on the third line and roll a marble towards it. Observe the motion of both objects, especially after contact. Discuss how force can be transferred from object to object, which is why we move when something bumps into us. Allow your child to experiment with different speeds, directions, and amounts of force, trying to hit the ball with the marble several times. Discuss the outcomes of each and how the movement changes each time. Then, place the marble at the three-foot mark and repeat the experiment, this time throwing the ball towards the marble. Discuss how the lighter object has more movement while the heavier one is quicker to stop or less likely to be moved. Point out that the heavier object has more of a pull from gravity and the force that hits it must be strong enough to overcome that pull. Finally, take your child and the ball to the park or playground. Ask your child to observe some of the forces at work. Point out that the swing is being pulled down by gravity, pulled up by the bars holding it, and pushed forward by the person behind/on it. These three forces working together change the movement of the swing, allowing it to move in a curved motion. Point out that the swing is moving upwards, downwards, forwards, and backwards at different times. What would happen if one of those forces disappeared? If there was no gravity, the swing would simply keep going up, if no one pushed it, it would stop, and if the bars weren't holding it up, it would fall to the ground. The movement needs all three forces working together. Next, show your child someone going down a slide. Ask them if they can name the forces that allow a child to do this. Point out that gravity pulls them down, the slide holds them up, and they push their bodies forward. All of these forces make the predicted movement. Next, remind your child of what happened when they hit the ball with the marbles. Point out that the force of one was transferred to the other, creating motion. Roll the ball towards your child and ask them to kick it. Ask your child what happened to the motion of the ball. Point out that the ball was rolling towards them because you rolled it. However, when they kicked the ball, it changed direction because their foot exerted a force stronger than the one that made the ball roll towards them.

Observation Sheet 21

	Regular Flick	Greater Force	Less Force
Marbles			
Ball			

Straight Push	Zigzag	Push from two directions
		

Title of Lesson 22: Magnets and Electricity

Standards Taught: S.3.3.4, S.3.b

Materials:	**Preparation:**	**Implementing the Lesson:**
Balloon Someone with long hair String or yarn Magnet set like the one here		Briefly review what your child has learned about forces so far. Discuss interactions of forces and how the weight, amount of force, and interaction of forces affect motion. Next, explain that electricity can also exert a force on an object. Ask your child to discuss what they know about electricity and how it effects their own life (e.g. light, machines, and daily tasks). Then, explain that electricity can also make objects move. Remind your child that it is dangerous to work with electricity as too much can harm their body, and they should only experiment with it when an adult is present. Explain that today they will be working with static electricity, which is a very small amount of electricity. Give your child the balloon. Ask them if the balloon has any electricity or if it can move anything on its own. Point out that a balloon is a non-living object and that it is not yet charged with electricity. Next, ask your child to place the balloon on the head of their friend with long hair. What happens? Point out that not much happened. Then, ask your child to gently rub the balloon on the head of their friend for at least 30 seconds. Explain that this rubbing will charge the balloon with static electricity. After 30 seconds, ask your child to slowly pull the balloon away from their friend's head. What happened? Point out that the balloon's new electricity is moving their friend's hair. Next, ask your child to pull the balloon away from their friend and then move it towards their head again, but not to touch it. Point out that the hair moves towards the balloon because it is being pulled by the force the electricity stored in the balloon is exerting. Finally, ask your child to hold the balloon in one hand and the string or yard in the other. Don't let the two objects touch, but slowly bring them together. Point out that, like the hair, the string moves towards the balloon, even without touching. Next, explain that magnets work much like electricity and can also exert a force without touching an object. Place a magnet on the table and ask your child to hold the other. Have your child wave the magnet in their hand above the magnets on the table until they jump up to the one in their hand. Point out that the magnets never touched, but the top magnet exerted a force stronger than gravity to pull the ones on the table upwards. Ask your child to do this again, pointing out that, at larger distances, this does not work because the pull of the magnet is not strong enough to overcome gravity. Then, give your child two magnets with labeled polarities (+ and -). Ask them place both magnets on the table with opposite polarities facing each other (+ to – and – to +). Have your child slowly push one magnet towards the other until they jump together. Point out that the magnets never touched, but one moved towards the other without them touching it. The force of magnetism pushed them together when they got within a certain distance. Try the experiment again, this time with like polarities facing each other (+ to + and – to -). Point out that this creates a force in the opposite direction. While opposite polarities pull the magnets together, like polarities push them apart. Allow your child to experiment and explore with the magnets and static electricity as long as they like.

Title of Lesson 23: Problem Solving with Electricity or Magnets

Standards Taught: S.3.3.5		
Materials: Varies	**Preparation:**	**Implementing the Lesson:** Ask your child to review what they've learned about forces exerted by magnets and electricity. Remind them that these forces do not require objects to touch, only to be within a certain distance of each other. Explain that scientists use this concept with magnets to solve problems in our world every day. One example of this is a medicine cabinet or cupboard with a magnetic latch. The magnets help the door close when it is close enough and keep it secure. Otherwise, items inside would be visible to others and may fall off the small shelves. Another is a magnet strip in a kitchen to hold knives so they are easily accessible. Magnets are also used for chore charts, classroom displays, and other projects. Ask your child to identify a problem in their daily life that may be solved with magnets (you can find some ideas here or here). Then, help them use magnets to solve this problem. Gather supplies and help your child build, experiment with, test, and change their design to fix flaws. Praise your child for their hard work and make their design a part of your family's everyday life.

Title of Lesson 24: Machines and Produced Heat

Standards Taught: S.5.2, S.5.2.a, S.5.2.b, S.5.2.c

Materials:	**Preparation:**	**Implementing the Lesson:**
Thermometer Room with a lightbulb Electric heater or fireplace Furnace room Observation Sheet 24		Briefly review with your child what they've learned about electricity and how it can exert a force on objects without touching them. Discuss the experiments you've done so far and how they demonstrate this concept. Then, explain that using electricity can also cause two other outputs: light and heat. Explain that **mechanical** (machines) and **electrical** (using electricity) objects create light and/or heat when they are working. Ask your child to list different **heat sources** in your home. Walk through your home with your child, asking them to point out **machines** that run on electricity. You may find lightbulbs, an oven or microwave, a refrigerator, a heater or cooler, a dishwasher, a washer and dryer, a telephone charger, a water heater, or various other appliances. Ask your child if each of those machines lights up when they are turned on (e.g. a lightbulb). Point out that electricity is creating that light. Then, ask them which machines produce heat, or warm up when being used. Explain that it is obvious that a microwave, heater, dryer, and water heater would produce heat. However, many of the other items do, too. Help your child place their hand near (but not on) a lightbulb that has been on for at least 15 minutes. Point out that it is warm because it is producing heat. Explain how other machines in your home also produce heat (e.g. visit the furnace room, feel the dishwasher door as it is running, feel a charger as it is charging, explain that a refrigerator has a cooler built in to blow away the warm air it produces, etc.). Finally, give your child Observation Sheet 24. Explain that they are going to observe the **temperature** change in different areas of the house before and after the use of an electrical/mechanical device. Using the observation sheet, ask your child to take the temperature in an empty room with the light off and record their observation in **degrees**, explaining that this is the measurement we use for temperature. Next, take the temperature in a different room with no heater on. Then, take the temperature in the furnace room when the furnace is not running. Turn on the light, the heater, and the furnace and wait for about an hour. Then, ask your child to re-take each temperature. Record their observations and discuss how the devices running on electricity made the room warmer, even if just slightly. Help your child record their conclusion on the observation sheet.

Observation Sheet 24

	Temperature Before	Temperature After
Lightbulb Room		
Heater Room		
Furnace Room		
Conclusion:		

Title of Lesson 25: Heat from Friction

Standards Taught: S.5.3, S.5.3.a, S.5.3.b

Materials:	**Preparation:**	**Implementing the Lesson:**
Ball Ice Cube Lotion This Video Large box or tote, filled with heavy objects	Place the box in a carpeted room or on a rug	Briefly review with your child what they've learned about forces, electricity, and heat. Then, explain that today they are going to learn about friction. Friction is the resistance that one object encounters when trying to move across another. In the ball experiment, for example, there was friction between the ball and the floor, causing it to slow down. Friction is the reason things slow down or stop moving over time. Give your child the ball and ask them to gently roll it across the floor. Point out that, over time, the ball slows down and stops on its own. This is because of friction from the floor and the air around it. These things are pushing back against the ball, fighting the force of the push. Friction is why swings stop when no one is pushing them, too. Explain that friction produces heat, just like electricity. Ask your child to hold up their hands, palms facing each other. Ask them to tell you how their hands feel: cold, warm, or hot. Then, ask your child to hold an ice cube for a few seconds until their hands feel cold and dry their hands. Next, ask them to rub their palms together quickly and observe what happens. Did their hands warm up? This is because of the friction between them. Watch the video with your child, demonstrating that objects can be rubbed together, creating friction, until they become so hot they catch on fire. Explain that friction can be reduced by making a surface smoother or more slippery. This is why a water slide sends children faster and further than a slide without water. The water **lubricates** the slide, or makes it more slippery. Likewise, it is why a sled works better on ice and snow than on grass. The ice and snow provide a surface with less friction. Repeat the palm-rubbing experiment again, this time placing lotion on your child's hands after they dry them. Point out that it is easier to move their hands across each other because there is less resistance from friction. Explain that this is also the reason there is less warmth. Show your child the box and ask them to try to lift it. Point out that this box is very heavy, or has more mass. This means that gravity has a stronger pull on it. It also means that it will encounter a lot of friction. Ask your child to try to push and/or pull the box across the room. Discuss the difficulty level and how successful they were at the task. Then, ask your child to think of a way to reduce the friction between the floor and the box. Some example may include: adding a smoother surface below it (e.g. a tarp or plastic sheet), placing in on a floor with a smoother surface, removing the rug, or tilting it). Ask your child to experiment with different ways of moving the box across the floor, noting how they reduce the friction and make it easier to move further distances.

Title of Lessons 26-27: Explore

Standards Taught: Review		
Materials: Varies	**Preparation:**	**Implementing the Lesson:** Part of science is being willing to ask questions and work to find answers. Ask your child to tell you what they would like to learn about or build in science during these two weeks. Maybe they've seen an experiment someone else did. Perhaps they've been wondering how something works. Or maybe they have a new book full of engineering ideas. Allow your child to choose two science experiments based on their own interests. Collect supplies, prepare, and carry out these experiments with your child. Spend time researching the science behind them and teach your child what you learn. Chart, graph, record, and collect and present data from your experiments. Encourage your child to share what they learn with family, friends, or others. *This is a great time for a co-op science fair