

MYSTERY



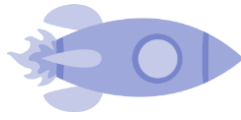
Blessed Are Who?

Science Guide

Overall Learning Objective: The kids will learn that in Jesus' kingdom there are many hidden strengths and amazing abilities ready to be discovered.

Table of Contents

- **Day One:** Digging Up the Past Page 2
- **Day Two:** Becoming Electrified Page 7
- **Day Three:** Plant Power Page 11
- **Day Four:** Food is Fantastic Page 18
- **Day Five:** Powerful as Paper Page 22



Day One: Digging Up the Past

Key Beatitude: Blessed are **the merciful**, for they will receive mercy.

Character Story: Esther

Experiments Overview: Today the kids will take part in two separate experiments. First, they will carefully uncover dinosaur remains like actual paleontologists. Second, they will recreate dinosaur fossils like a museum scientist.

Guiding Question: What can we learn when we dig up the past?

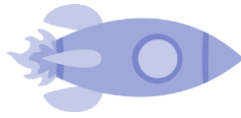
Questions to ask the kids while you're exploring together:

- What's your favorite dinosaur?
- What do you think it would have been like to live with the dinosaurs?
- Why do dinosaurs have things like spikes and shields or even their big teeth and claws?
- Was it also dangerous in the time of Esther?
- What was her protection from danger? *God's promises, her cousin's help, and the courage that God gave her!*

First Experiment: Discovering Dinosaurs

This fun, hands-on, activity uses a simple salt dough recipe to conceal dinosaur toys that the kids can uncover.





Learning Objective: Whenever we investigate the past, whether it's uncovering dinosaur remains or learning about an ancient figure like Esther, we need to take great care in understanding what came before. Not only do we discover what used to be, we can also see the impressions that it has left on our world. Esther was strong and incredible like a dinosaur and she left an impression of faith and love on the world.

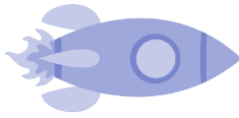
Supplies Needed (enough to make 3 large rocks – approximately 6 x 3 inches):

- Dinosaur Figures (small; at least 1-3 per kid)
- 2 Cups of Flour
- 1 Cup of Salt
- 1 Cup of Ground Coffee
- 1 Cup of Water
- Chisels or screw drivers (at least one per kid)
- Paint brushes
- Measuring cup
- Mixing Spoon
- Large mixing bowl

Preparing for the Experiment:

1. In a large mixing bowl combine all of the above ingredients together. Stir together, scraping the sides, until a soft pliable dough has formed.
2. Assemble the dinosaur fossil rocks by molding the dough around the dinosaur toys.

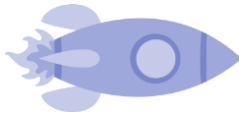




3. Leave to air dry for at least two to three days or speed up the process by baking in a 200°F oven for about 4 hours or until dry and hard, rotating every 30 minutes.

Experiment Instructions:

1. Before giving the kids their own dinosaur rock to experiment with, demonstrate how to carefully use the screwdriver to chip away at the rock and how to use the paint brush to gently brush away smaller pieces. You should even try to preserve the impression that the dinosaur toy makes in the rock.
2. Depending upon how many rocks you have premade and how many kids are present, break the kids up into groups and give them a rock and tools. Remind the kids that they need to carefully break apart the rocks in order to preserve what is inside and to preserve the impressions left in the rock. Look up online which dinosaurs you've uncovered.



Second Experiment: Duplicating Dinosaurs

Now the kids will recreate dinosaur bones themselves using salt dough.



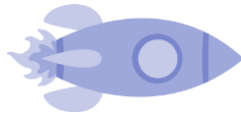
Learning Objective: These bones are what made the dinosaurs so strong. Some bones were big and some were small. They all had different shapes and they all fit perfectly together to make a dinosaur. Even one missing bone would leave a dinosaur incomplete and weak. When we think about Esther we should remember everything that went into making her great. When we recreate Esther today, like recreating a dinosaur, we should include all of what made her great.

Supplies Needed (enough to make 3 large bones – approximately 9 inches x 2 inches):

- 2 Cups of Flour
- 1 Cup of Salt
- 1 Cup of Water
- Mixing Spoon
- Large mixing bowl

Preparing for the Experiment:

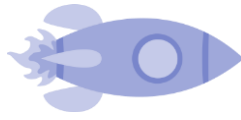
1. In a large mixing bowl combine all of the above ingredients together. Stir together, scraping the sides, until a soft pliable dough has formed.
2. Form the dough into balls that the kids can easily mold. The dough can be refrigerated and saved for later, if need be.



Experiment Instructions:

1. Give each kid a ball of dough to form into any dinosaur bone shape. Look up fossil pictures online for inspiration. Place all the completed bones on a baking sheet.
2. Bake the bones at 250 degrees for about 3 hours or until dry and hard. Let the bones cool before handling them.





Day Two: Becoming Electrified

Key Beatitude: Blessed are the **pure in heart**, for they will see God.

Character Story: Mary Magdalene

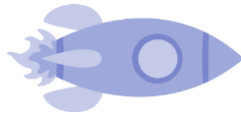
Experiments Overview: Today the kids will take part in a series of experiments about electricity and will not only learn about where electricity comes from but also what it can do.

Guiding Question: What are the secrets of discovery?

Learning Objective: Electrical charges act like invisible forces in the world but they have very real power. Everybody knows about the amazing inventor Thomas Edison and his famous lightbulb. Not as many people know about his former assistant Nikola Tesla who created or hypothesized the electrical systems and wireless communication that we use today. Even though Tesla was a hundred years ahead of his time, he died a poor and forgotten man. If it weren't for Jesus choosing Mary Magdalene as his first apostle, we probably wouldn't even know about her. Throughout his life Jesus focused on the people who everyone else had abandoned or forgotten. Jesus wanted us to learn that those people are an incredible invisible force like electricity.

Questions to ask the kids while you're exploring together:

- Have you ever experienced static electricity?
- Can you see electricity?
- How do you know that it's there?
- What are some things that run on electricity?
- Where does that electricity come from?
- Where did Mary Magdalene come from? *She was an outcast in an already impoverished place.*
- Who was Mary's really close friend? *Jesus*
- What did Jesus see in Mary that no one else seemed to see? *Lots of faith in God and a greatness for sharing that faith to empower other people's lives too!*



First Experiment Set: Hover Plate, Flying Tinsel, Water Bender, Bubble Trouble, Dancing Balls

These hands-on experiments allow the kids to witness the power of static electricity and charges. The instructions found below are demonstrated in this youtube video: <https://youtu.be/c7ljY6285CE>

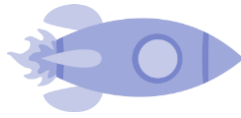
- Hover Plate (found at 0:09)
- Bubble Trouble (found at 1:43)
- Dancing Balls (found at 2:20)
- Water Bender (found at 3:34)

Supplies Needed:

- Styrofoam Plates (at least 2)
- Fabric Scrap
- PVC Pipe (about 12" of any diameter)
- Tinsel
- Paper Cup
- Bubble Solution
- Straw
- Plexiglas Sheets (at least 2)
- Aluminum foil
- Styrofoam Balls (small; at least 5)
- Scissors
- Blocks (small; at least 4)
- Water Tap

Experiment Instructions:

1. Rub one Styrofoam plate with the cloth to create an opposing charge and show the kids how this causes the plate to float. Allow the kids to play around with the effect.
2. Create the tinsel orb by tying strands together. Rub the PVC pipe with the cloth to give it a negative charge. Show the kids how the tinsel's positive charge at first attracts it to the pipe but once it touches the pipe and takes on the pipe's negative charge, the tinsel repels from the pipe. Let the kids attempt to use the difference in charges to make the tinsel float.



3. Cut a small hole in a paper cup. Fill the cup with water and let the water spill out through the hole. Show the kids how the charged PVC pipe repels the water.
4. Pour the bubble solution on the Plexiglas sheet and use the straw to make a bubble. Use the charged PVC pipe to attract the bubble and move it over the sheet. Create more bubbles and allow the kids to use the pipe to move them.
5. Use the small blocks to elevate the other Plexiglas sheet above a piece of aluminum foil. Allow the kids to wrap the small Styrofoam balls in foil. Use the cloth to give the Plexiglas a charge. Start by placing one ball on the Plexiglas. Allow the kids to place each of their balls on the plexiglas. You can next place all of the balls beneath the Plexiglas and allow the kids to move them with only their finger.

Second Experiment Set: Christmas Light Circuit, Steel Wool Fire, Homopolar Motor

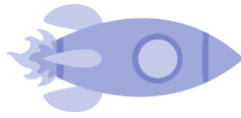
These experiments will show kids what electricity is capable of—producing heat, creating light, powering magnets and motion. The instructions found below are demonstrated in this youtube video:

<https://youtu.be/c7ljY6285CE>

- Homopolar Motor (found at 1:37)
- Steel Wool Fire (found at 4:16)
- Christmas Light Circuit (found at 6:22)
- Flying Tinsel (found at 8:12)

Supplies Needed:

- Christmas Lights (1 discarded strand)
- AA Battery
- Aluminum foil
- Computer Paper
- Tape (scotch or masking)



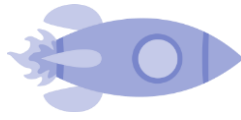
- Wire Cutters
- Steel Wool
- 9V Battery
- Magnets (small round; at least 4)
- Copper wire

Preparing for the Experiment:

1. Cut several Christmas lights off from the strand and use the wire cutters to strip the plastic off of the metal wire ends.
2. Tape bits of aluminum foil to the paper and then tape the individual lights to the paper with the wire ends touching the foil. Make sure that the lights and foil are set up in circuits that can be completed by touching the batteries to the foil.

Experiment Instructions:

1. Show the kids how you can power the Christmas lights by simply touching the batteries to the foil in the circuits you have created. Allow the kids to use the battery to power the circuit. Experiment by removing lights and adjusting the circuit. Even invisible electricity has the potential to do incredible things!
2. Make sure that the kids are a safe distance away from the steel wool and then touch it with both terminals of the 9 volt battery. The wool will complete a circuit between the battery terminals and as the charge passes through it will heat the iron up enough to catch on fire. Even invisible electricity has the potential to do incredible things!
3. Stack the small magnets together and place them on the negative end of a AA battery. Cut and bend a piece of the copper wire like an "M" shape that can balance on the top of the battery. The electromagnetic field created when the wire completes a circuit with the battery will cause the wire to spin rapidly. Even invisible electricity has the potential to do incredible things!



Day Three: Plant Power

Key Beatitude: Blessed are **the meek**, for they will inherit the earth.

Story Character: Deborah

Experiments Overview: The kids will experiment with plant growth using light and will investigate the way plants absorb water in order to observe the qualities of soil. We have given you three experiments that each stretch over several days.

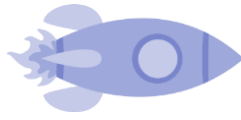
Guiding Question: What's hidden in the soil beneath our feet?

Learning Objective: The roots from plants strengthen the soil they grow in and those plants eventually become mulch. Strong plants make soil richer and rich soil make plants stronger! Plus sunlight and water help plants to grow. Deborah used to give the people of Israel help from beneath a palm tree. That tree must have been pretty important to the people who knew it but it was also important to the animals, soil, and other plants that were around. With rich soil, lots of sunlight, and plenty of water, her tree grew into something great too. With humility, confidence, creativity, and faith Deborah grew into a great hero. You can also grow into a great hero!

Questions to ask the kids while you're exploring together:

- Have you ever planted something before?
- How long does it take for different plants to grow, like flowers, vegetable plants, and trees?
- What are the things that plants need to be able to grow?
- Do you know where soil comes from? What makes rich soil?
- When we say that soil is rich, do we mean that it's made of money?
- What does it mean to be rich but not have lots of money?
- Deborah was rich with gifts from God; name some of her gifts?

Deborah was a prophet, judge, leader, warrior, and singer.



First Experiment: Light Maze

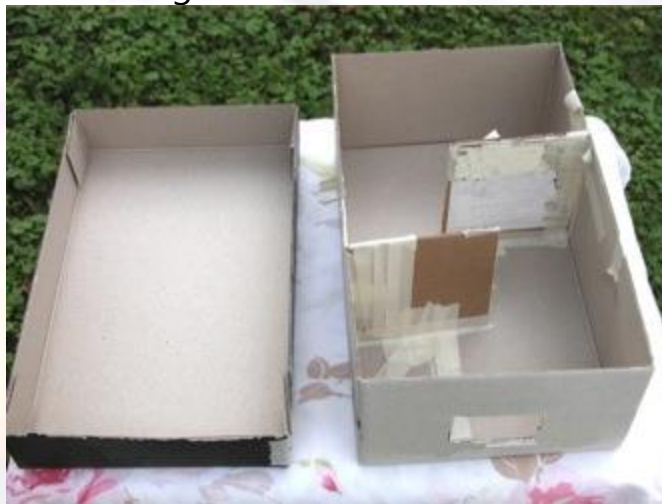
This awesome experiment proves the necessity of light to plants. The experiment stretches over several days.

Supplies Needed:

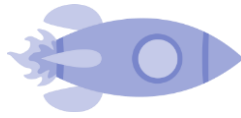
- Shoebox with Lid
- Cardboard Scraps
- Scissors
- Tape (scotch or masking)
- Planter (small; at least 1)
- Potting Soil
- Bean Seed

Preparing for the Experiment:

1. Cut a hole at one end of the shoebox. Hold the box up to a light and be sure to tape up any other spaces where light shines through.
2. Cut two pieces of cardboard that are the same height as the box but half of the width and tape these pieces upright inside of the box at one-third and two-thirds of the length of the box.



3. Use potting soil to plant the bean seed in the small planter. Set the shoebox on end with the end that has the hole at the top and place the planter inside the box at the bottom.



4. Water the seed, tape the lid onto the box, and place the box where the hole at the top will receive direct sunlight. After 4-5 days open the box and the plant should have already grown around the cardboard towards the light.

Experiment Instructions:

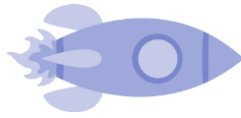
1. Show the kids the result of their light maze experiment with the bean plant but at first don't explain why the plant grew that way. Ask the kids to hypothesize as to why the plant might have grown in a zig zag. Plants need light to grow tall and strong.

Second Experiment: The Water Way

This experiment illustrates how much water plants drink up. The experiment stretches over several days.

Supplies Needed:

- Jars (at least 4)
- Cabbage Leaves (at least 4)
- Flowers (must be white; at least 4)
- Food Coloring (red, yellow, blue, and green)
- Water Tap

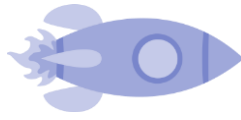


Preparing for the Experiment:

1. Fill the four jars $\frac{3}{4}$ of the way with water and add a different food coloring to each. Make sure the color is vibrant by using about 10 drops.
2. Cut the cabbage leaves and flowers so that the stems are about twice the height of the jars.
3. Place one flower in each jar and let the flower soak up the water for about a week so that its petals begin to change color.

Experiment Instructions:

1. Show the kids the jars and the flowers with the colored petals. Have them hypothesize as to why the petals changed colors.
2. Ask the kids whether they think the same thing will happen to the cabbage leaves if you place them in the colored water too. Place the cabbage leaves in the water with the flowers and tell the kids that they will check on them the next day.



Third Experiment: Soil Strength

This experiment tests different soil strengths. The experiment stretches over several days.

Supplies Needed:

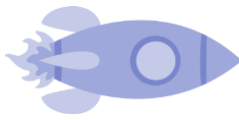
- Empty 2-liter Bottles (at least 3)
- Glue (Elmer's Style)
- Scissors or Utility Knife
- String
- Square Piece of Wood (about as long as a 2-liter bottle)
- Compost Mixture (bark chips, dead leaves, and sticks)
- Potting Soil
- Seedlings (at least 3)
- Water Tap

Preparing for the Experiment:

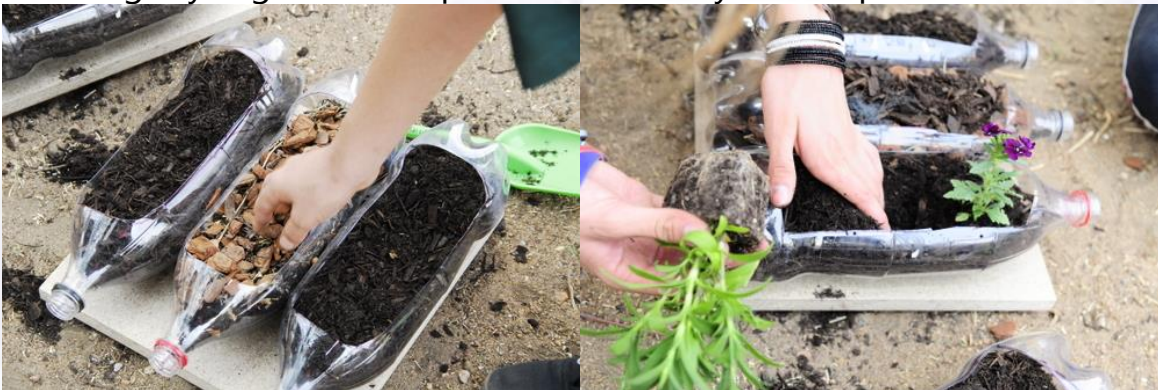
1. Prepare three of the bottles by cutting a large rectangular hole along the side of the bottle.
2. Stick the bottles to the wood with the glue making sure that the necks of the three bottles protrude a little over the edge of the board.



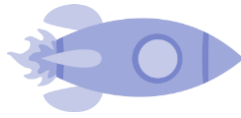
3. Fill the first bottle with potting soil and the other two with a soil and compost mixture. Press down firmly to compact it.



4. Leave the first bottle as is. Cover the top of the potting soil in the second bottle with your compost mixture (bark chips, dead leaves and sticks, etc). Plant your seedlings in the third bottle. Make sure you plant them tightly together and press down firmly to compact the soil.

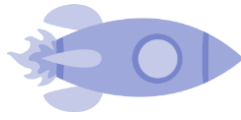


5. Cut the other three bottles in half, horizontally and keep the bottom halves. Make two small holes opposite each other, nearest the cut side of the bottle. Cut three pieces of string and insert each end into the holes. Tie a knot on the ends to secure them. This will form a "bucket" to collect the water. Hang them over the necks of each of the three bottles on the board.



Experiment Instructions:

1. Slowly pour equal amounts of water into each of the bottles. Pour the water in at the end furthest from the neck of the bottle. Take note of the color of the water collecting in the cups. The water in the first cup is really dirty but the water from the second and third cups is much cleaner which shows that both compost as well as the root structure of plants assist in preventing soil erosion and help to filter our water.



Day Four: Food is Fantastic

Key Beatitude: Blessed are **the poor in spirit**, for theirs is the kingdom of heaven.

Story Character: Tabitha

Experiments Overview: Today the kids will experiment with how milk can magically morph colors and then discover a surprise element in their breakfast cereal.

Guiding Question: Are there even secrets to the things we eat?

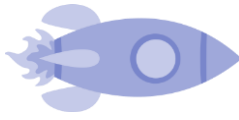
Questions to ask the kids while you're exploring together:

- Has anyone ever told you that you should drink your milk to grow big and strong?
- Where does milk come from?
- What's the difference between milk and water?
- What do you think is hidden inside milk?
- Are there also surprising things hidden inside your cereal?
- How did those things get there?
- Do you eat the same breakfast every day?
- How did Tabitha's community count on her every day?
- How can you be like Tabitha for your community?

First Experiment: Magic Milk

This experiment shows how the proteins and fats in milk are affected when their molecular structure is weakened.

Learning Objective: Even though the milk is becoming weaker it also looks more beautiful. Some people would have thought of Tabitha as weak because she didn't care about becoming rich or powerful but through Jesus we can see that it wasn't weakness. Tabitha had very little wealth but her community saw her as it's greatest treasure.



Supplies Needed:

- Pie Plate
- Dish Soap
- Milk (at least 3 cups)
- Food Coloring

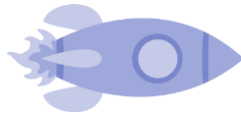
Experiment Instructions:

1. Pour milk into the pie plate about halfway full.
2. Add a few drops of food coloring to different areas of the milk.



3. Put one drop of dish soap in the center of the milk and watch as the colors swirl around one another. You can also dab the soap into the milk using a cotton swab. The milk swirls around as the dish soap expands outwards breaking down the molecules of fat and protein in the milk, taking the food coloring with it. You can restart the experiment and allow the kids to drop the dish soap into the milk themselves or add more soap to the same milk to see what happens.





Second Experiment: Eating Nails

This experiment shows kids the awesome elements hidden in our ordinary food.

Learning Objective: We eat cereal just about every day. Why? Because cereal is an excellent way to get a lot of the minerals and vitamins that our body needs. Tabitha was a regular person who had an extraordinary life because she devoted it to providing for others. From the outside Tabitha might have looked like nothing special but looks can be deceiving. When she suddenly wasn't there any more, the people were desperate to get her back. Our foods, like cereal, often hide something special too.

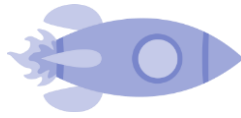
Supplies Needed:

- Frosted Wheats Cereal
- Ziploc Bags (quart size)
- Strong Magnet
- Water Tap

Experiment Instructions:

1. Give each kid a bag. Open the box of cereal and give each kid a small handful to place in their bag. Instruct the kids to use their fingers to break the cereal up into tiny pieces. Give each kid a magnet and ask them to see if they are able to attract anything in their cereal (they should not be able to at this point).
2. Next pour 2 cups of warm water into each bag of cereal crumbs and instruct the kids to break up the cereal even more.

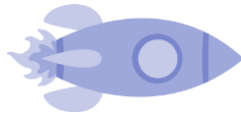




3. Ask the kids to attempt to attract something with their magnet again. If they carefully move their magnet back and forth over the cereal crumbs they should be able to collect some bits of iron.



4. If you have extra time, float a few pieces of cereal in water and attempt to move them with the stacked magnets. The movement might be subtle but with practice you should be able to control the cereal.



Day Five: Powerful as Paper

Key Beatitude: Blessed are **the peacemakers**, for they will be called children of God.

Story Character: Miriam

Experiments Overview: Today the kids will experiment with different structures for paper pillars and different structures for paper and straw airplanes.

Guiding Question: How can something that seems weak be so strong?

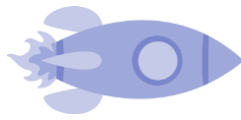
Questions to ask the kids while you're exploring together:

- How many pillars do you think it would take to hold up one book? What's the least amount it would take? *Three*
- If you add up Miriam and her brothers, how many people do you get? *Three*
- Did you trust that the paper would be able to hold up the books?
- Miriam was a poor slave who never had the chance to even go to school. Do you think people thought of her as weak and flimsy like paper?
- What was Miriam able to accomplish?
- Besides making pillars, what are other amazing things that you can do with paper?

First Experiment: Paper Pillars

This experiment shows kids how even something as flimsy as paper can hold a great weight if it is shaped the right way.

Learning Objectives: The paper has to be shaped into pillars before it can even have a chance of holding up the books and even then multiple pillars have to work together. Miriam and her brothers were shaped by many hardships and had the guidance from God to lead them through. Together they accomplished something great. But we need more people to be like them and keep God's plan moving forward!



Supplies Needed:

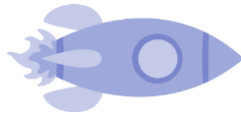
- Computer Paper
- Scissors
- Tape (scotch or masking)
- Books (to be used as weights)

Experiment Instructions:

1. Show the kids how to fold a piece of paper into a pillar that is shaped like a circle, triangle, or square. Make sure that they tape the loose ends together. Also make a tightly wound circle pillar. Make sure that there are four of each kind.



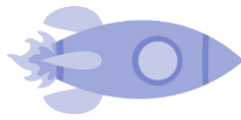
2. Make another set of four of each kind using paper sheets that have been cut in half so that the pillars are half as long.
3. Test out the short pillars against the long pillars by placing the sets of four in a square shape and then stacking books on top of them one at a time. Count the number of books before the pillars collapse. Repeat this for all four pillar shapes—tight circle, wide circle, triangle, square.



Second Experiment: Paper Planes

Through this experiment the kids will see how different shapes generate different possibilities for flight.

Learning Objective: Whether you're Esther, Mary, Deborah, Tabitha, Miriam, Moses, or you, you need someone behind you to back you up. That's God. All of these heroes worked hard to bring God's kingdom to earth but none of that work would have meant a thing without God. God's son Jesus really did change everything. Jesus' beatitudes teach us how to shape the world into God's kingdom. We are peacekeepers like Miriam—shaped by the challenges of life and the gifts that God gives us we work together towards Jesus' vision.

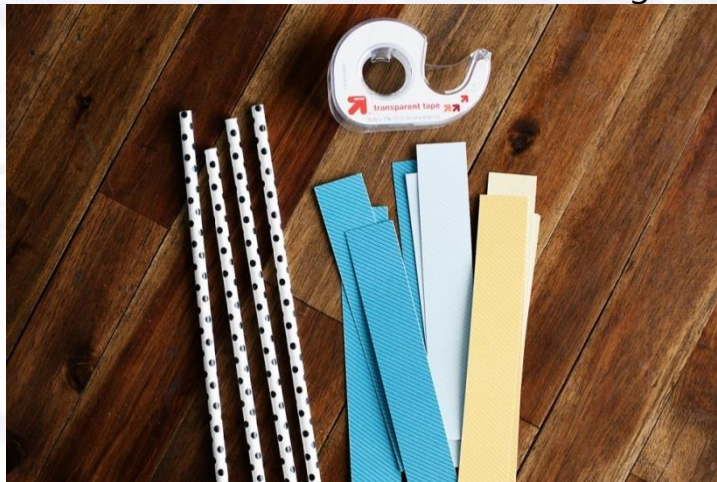


Supplies Needed:

- Cardstock (5-10 per kid)
- Straws (at least 4 per kid)
- Scissors
- Tape (scotch or masking)

Preparing for the Experiment:

1. Cut the cardstock into 1 inch strips. Half of the strips should be twice as long as the other half. In other words, a third of the strips should be 5.5 inches long and two-thirds should be 11 inches long.

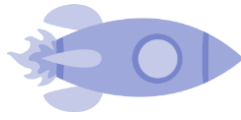


2. Create an airplane flying area where the kids will have an unobstructed flight path for their planes. These planes can fly surprisingly far.

Experiment Instructions:

1. Help the kids create small and large versions of a circle, triangle, and square and tape the ends together.





2. Next help them to tape a large shape to one end of the straw and a small shape to the other end. They can mix and match the different shapes or use two of the same.



3. Let the kids take turns flying their planes by grasping the straw in the middle and throwing it like a normal paper airplane. The large shape in the back creates just enough drag to keep the straw steady and the small shape in the front provides stable steering. Both shapes create lift.