# Right Club Curriculum

# *SKY HIGH*

# *Sky High Overview*

**Focus:** Science and Engineering

**Unit Description:** We're taking to the skies to explore our atmosphere and beyond. Let's learn about wonders of the sky, like aurora borealis, as well as the history of humans in flight. We'll become junior engineers we test our own aeronautical designs

**Essential Questions:** What does it take to make an object take flight? How do aeronautical engineers design flying machines? How can we find inspiration in natural wonders above our heads?

**Enduring Understanding:** The sky is full of beautiful and fascinating things that have sparked human curiosity for generations. Through scientific exploration, we can discover the secrets behind flight, clouds, auroras, and many other mysteries just above our heads. The sky is not the limit; it's just the beginning!

**Standards Addressed**:

- **LITERACY** Prepare for and participate effectively in a range of conversations and collaborations with diverse partners, building on others' ideas and expressing their own clearly and persuasively.
- **MATH** Students will analyze, compare, and create shapes.
- **MATH** Students will model shapes in the world by building shapes from components and drawing shapes.
- **SCIENCE** Students develop an understanding of the motion of objects and the various forces acting on them.
- **SCIENCE** Students understand that animals use unique adaptations, both behavioral and structural, to survive in harsh environments.
- **SCIENCE** Students will develop abilities to do scientific inquiry.
- **PHYSICAL EDUCATION** Students will exhibit a physically active lifestyle.
- **PHYSICAL EDUCATION** Students will exhibit responsible personal and social behavior in physical activity settings.
- **SOCIAL-EMOTIONAL LEARNING** Students develop the ability to make constructive and respectful choices about personal behavior and social interactions based on consideration of ethical standards, safety concerns, the realistic evaluation of consequences of various actions, and the well-being of self and others.
- **VISUAL ARTS** Students will understand and apply media, techniques, and process.

# *Daily Activities*

1) **Cargo Plane Craziness** – What kind of vehicle would you need to send an elephant to another country? What about to send an army tank? We'll discover how aeronautical engineers create the world's biggest cargo planes by creating some paper versions of our own in this high-flying challenge.

2) **Back At Ya!** – G'day, mate! We head "down under" for an activity that gives the phrase "What goes around, comes around" a whole new meaning. This boomerang bonanza will have you coming back for more.

3) **Stack Attack –** This action-packed and fun-filled team game requires catching and throwing to win. The secret is teamwork. Let's see how we "stack up" against the competition!

4) **Little Daredevils** – There's a long history of daredevils and extreme sports athletes that became famous thrilling audiences with their gravity-defying stunts. We'll join their team by preparing our own exciting jumps!

5) **Aurora Artwork** – We've all seen blue skies and red/orange sunsets, but have you ever seen green or purple skies? We head north for a light show like no other. This colorful display will serve as the inspiration for our own vibrant artwork.

6) **Going Batty** – Bats are fascinating creatures with unique abilities. Echolocation is just the beginning. We'll find out how they stay safe against birds of prey in air battles using deception and teamwork by playing a very special game of tag.

7) **Rockin' Rockets** – Get ready to blast off in this exciting, aeronautical adventure. We'll craft some power projectiles you have to see to believe. Next time someone says, "It doesn't take a rocket scientist," you can say, "That's okay. I am one!"

8) **Cloudy with a Chance of Inspiration** – Clouds come in all shapes and sizes. Everyone sees something different when they look up at them. We'll use clouds and our imaginations to create cirrus-, cumulus-, and stratus-inspired masterpieces.

9) **Balloon Battle** – Helium and hot air keep some balloons in the air, but this physical challenge is 100% human powered. How many balloons can we keep in the air at once? This balloon bumping bonanza will test our teamwork and communication.

10) **Kite Flight** – Kites have been used for over a century for a variety of purposes. How do they work? We'll find out by building our own and taking them outside for a kite-flying festival!

## *S&S Supplies Needed*

| Activity | Item # | Description | Amount |
|---|---|---|---|
| **Cargo Plane Craziness** | OC1041 | Paper clips | **1 per program** |
| **Back At Ya** | EC3342 | White Tagboard | **1 per 100 students** |
| **Little Daredevils** | SL8565 | Toy cars | **1 per program** |
| **Aurora Artwork** | SC1098 | Chalk | **1 per 30 students** |
| | PE113BK | Black construction paper | **1 per program** |
| | PE113BL | Blue construction paper | **1 per program** |
| **Rockin' Rockets** | SC313A | Rubber bands | **1 per program** |
| **Kite Flight** | BE631 | White cord thin | **1 per 15 students** |

## *Right Club Supplies Needed*

- Scissors
- Cups
- Cones
- Playground balls
- Cardboard
- Legos
- Craft sticks
- Straws
- Balloons
- Scissors
- Tape
- Glue
- White paint

# 1) Cargo Plane Craziness

**Supplies:** various types of paper (construction, cardstock, paper roll, etc.), scissors, meter stick, cones, paper clips

**Preparation:** Find a large, open space. Mark one line, long enough for all students to stand on, with cones. Mark another line 10 feet away, parallel to the first line. Create three example planes using the directions on Pics for Kids. Print out several copies of instructions for Basic Dart, The Stable, and Water Plane. Set out materials.

**Learning Objective:** Students will explore aerodynamics, engineering, and the relationship between appearance and function by creating various paper airplanes.

**Warm-Up:**

- *In our new unit, Sky High, we look up to the sky to learn about all the wonders taking place above us all the time. What are some of the fascinating things you can find in the sky?* (birds, clouds, airplanes, sun, moon, etc.) *We will dig into some of these subjects and much, much more. Let's take a look!*
- Read Daily Activities page with students to preview the unit and build excitement!
- *When most people think of airplanes, they think about people being taken from one place to another. Planes do that, but they also transport so much more! Everything from letters to animals and even other planes get transported from one place to another by different kinds of planes.*
- Show students Pics for Kids. *What difference do you notice about these planes? Why do you think they look so different?* (They have different functions.) *Each of these planes is designed to do something different. Some carry heavier loads which means the amount of power and size needed are different. This also affects the shape of the plane.*
- Point to plane #1 on Pics for Kids. ***Commercial planes****, the ones people usually take to travel somewhere far away, have lots of extra space below where people sit. They charge companies for the space to transport letters, packages, and other cargo.*
- Point to plane #2 on Pics for Kids. *Companies like UPS and FedEx have special* ***cargo planes*** *that they fill with nothing but packages.*
- Point to plane #3 on Pics for Kids. *For really BIG things,* ***super transporter*** *planes are used.*
- Point to plane #4 on Pics for Kids. *The world's biggest is the Antonov AN-225. It can fit 3-4 military tanks and was originally designed to carry Russian space shuttles!*
- *Today, we are going to create our own cargo planes and super transporters to see which designs can transport the biggest load.*

**Unit-Long Project Note:**

Remind students that they have the option of developing and participating in a unit-long, student-driven project that ties to the theme. This is what makes every day a Daily Double! (Add free art, and you've got a Triple Play!) Ideas for this project can include, but are not limited to, the following:

- Build a giant tetrahedral (triangular pyramid) kite.
- Create a diorama of your city's skyline and the things (birds, clouds, airplanes, etc.) you'd find in the sky.
- Design the airplane of your dreams and build a model.

These are just a few ideas to get you started. Ideally, this project is developed by the students, reflecting their interests.

## Activity (Take It Outdoors!):

1. *Just like real airplanes, there are lots of different types of paper airplanes*. Show students third page of Pics for Kids. *What differences do you notice?* (size, wing shape, etc.) *How do you think these differences affect how each design flies?*
2. *We are going to create paper airplanes for a very specific purpose today. Our planes will be used to transport cargo. In this case, our cargo is paperclips. How will this change the way you design your plane?*
3. The goal is for your plane to fly 10 feet with more paperclips attached than anyone else.
4. *Take your time creating and testing different designs. You can use any of the three instructions provided or design your own. When you are done, we will have a contest to see which plane can carry the heaviest load the farthest!*
5. Have students build various styles of paper airplanes. Encourage students to test each design by throwing each to see if they meet the 10 feet distance requirement. Add a paperclip before each trial to see how weight affects distance traveled.

6. Have students line up behind the start line shoulder-to-shoulder.
7. *When I say, "Go!" everyone will throw their planes. Your goal is to reach the cones on the other side. If you do, grab your plane, add a paper clip, and return to the start line for the next round. If you don't make it, you can make adjustments to it before rejoining us. Every round we will add another paper clip. "Ready, set, go!"*
8. Have students throw their planes, adjusting and adding paper clips for each round. If their planes do not make it, suggest changing the placement of paper clips or making other adjustments to the design.

**Wrap It Up:**

- *How did the placement of the paperclips affect the flight of your planes? What adjustments did you make to the placement to make your planes fly better?*
- *What did you notice about planes that held lots of cargo that was different than planes that were less successful?*
- *What adjustments did you make to your plane as we added more and more cargo? Why did you make those adjustments?*

**Take It Away:**

- *Sometimes learning what doesn't work is just as important as learning what does work. What did you try in this activity that didn't work? How did it lead you to a better solution? When is another time in your life you got better at something by first learning what did not work?*

**Lead In:**

- *Next time, we will learn the secrets behind one of Australia's best known aeronautic inventions!*

# *Pics for Kids*


***#1***

***Planes look very different depending on their function. Here we see a passenger plane (#1), a cargo plane (#2),***

***What differences do you notice among these planes?***


***#2***

# *Pics for Kids*

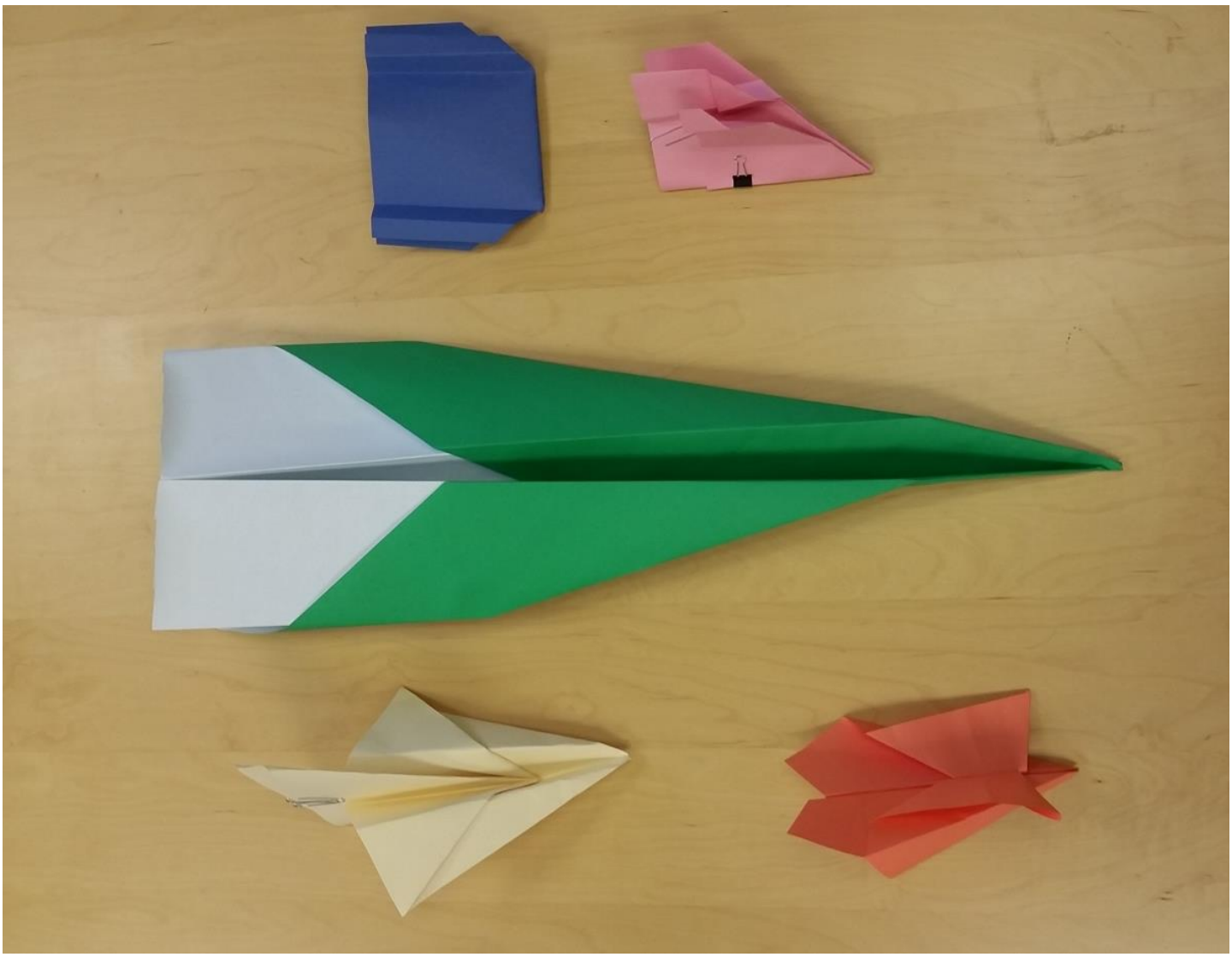

*#3*

*Here we see a super transporter (#3),*

*and the Antonov AN-225 (#4), the world's largest!*

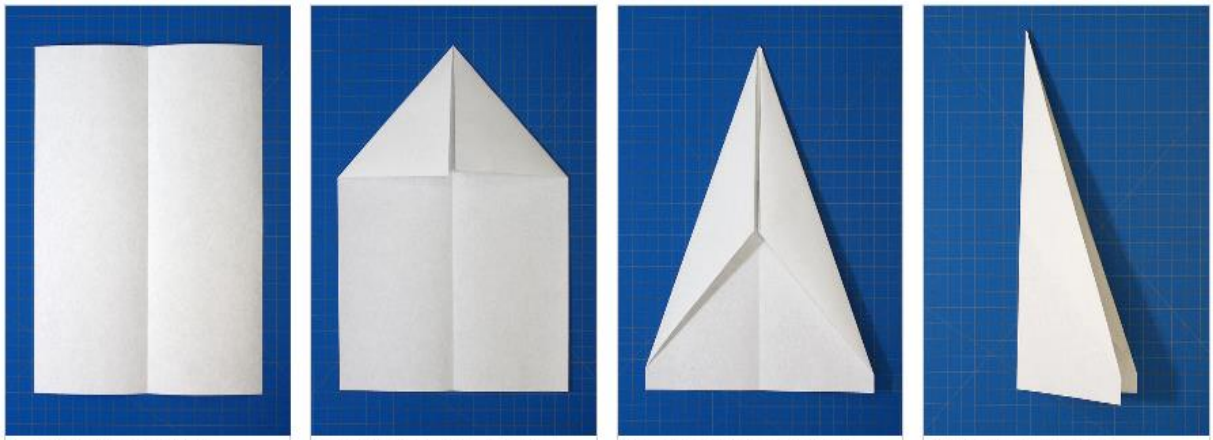
*#4*

# *Pics for Kids*



*There are so many different types of paper airplanes!*
*Which one do you think will be able to carry the most cargo?*
*Why?*

## *Basic Dart*

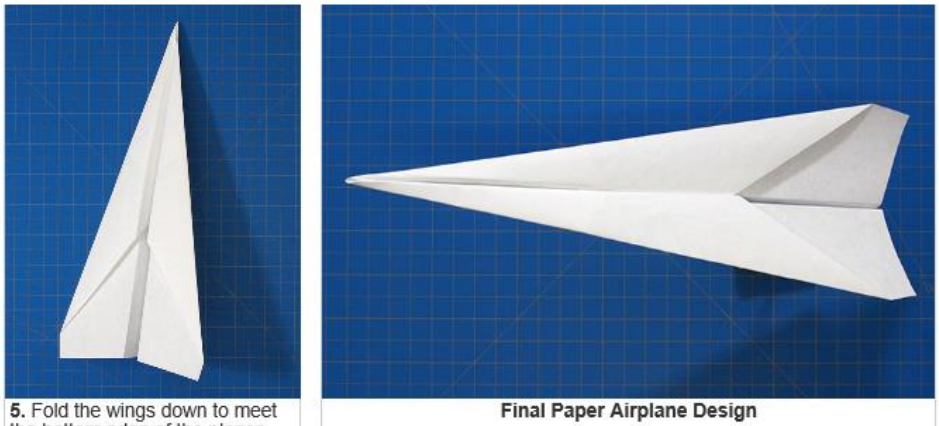


**1.** Fold the paper in half.

**2.** Unfold and then fold the corners into the center line.

**3.** Fold the top edges to the center.

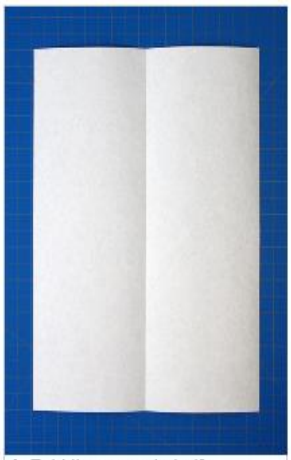
**4.** Fold the plane in half.



**5.** Fold the wings down to meet the bottom edge of the planes body.

**Final Paper Airplane Design**

# *The Stable*



**1.** Fold the paper in half.

**2.** Unfold and then fold the top two corners to the center line.

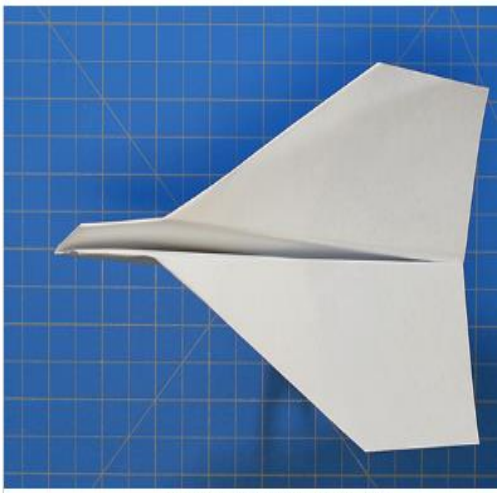
**3.** Fold the top peak down to create a square.

**4.** Fold the top two corners to the center about an inch above the downward facing point, to form a triangle shape on top and a diamond shape on bottom.

**5.** Fold the downward facing point up to secure the flaps.

**6.** Fold the plane in half away from you and flatten it out.

**7.** Fold the edges down to create the wide wings. The body, or part you hold, should be about half an inch tall.



**Final Paper Airplane Design**

# *Water Plane*

**1.** Fold the paper in half and repeat.

**2.** Open the sheet and then fold down about 3 inches before the edge.

**3.** Fold the top two corners to the line that's closest to it.

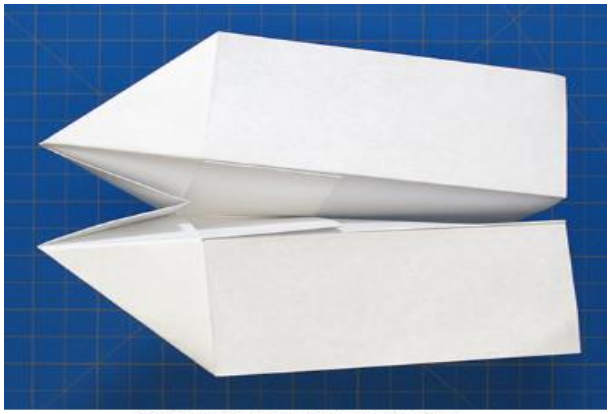
**4.** Unfold and then accordion fold the top corners in.

**5.** Fold the top flaps to the center line.

**6.** Fold the paper in half towards you.

**7.** Accordion fold the top peak in as shown.

**8.** Finally, fold both sids out to create the wings.



**Final Paper Airplane Design**

# 2) Back at Ya!

**Supplies:** tag board (1 per 2 students), pencil, scissors

**Preparation:** Cut out boomerang template on first Pics for Kids. Use to create multiple templates depending on the number of students participating.

**Learning Objective:** Students will understand uneven forces acting upon an object can affect the motion of an object, such as with a boomerang.

**Warm-Up:**

- *Yesterday, we talked about airplanes and sent our paper designs flying. Today, we are talking about something different that flies through the air. Has anyone ever thrown a* ***boomerang*** *or seen one thrown? What do you know about them?*
- ***Boomerangs*** *have been around for thousands of years. They are often thought of as an Australian invention, but similar objects have been found all over the world. They come in many different styles and are best known for their unusual ability to return to the thrower.*
- *Does anyone know how they work?* Show diagram on second Pics for Kids. *When thrown properly* (show third Pic for Kids and demonstrate throwing motion on Pics for Kids), *the blades on top move in the direction that the boomerang is moving. The blades on bottom move in opposite direction the* ***boomerang*** *is going. This causes uneven airflow between the top and bottom. Uneven forces cause the motion of objects to change. That's how the* ***boomerang*** *turns in the air and comes back towards the thrower.*
- *Let's find out how it works by making our own* ***boomerangs****!*

**Activity (Take It Outdoors!):**

1. Have students trace the **boomerang** stencil created in Preparation on tagboard and cut out. They may decorate their **boomerangs** if they wish.
2. Take students outside to practice throwing and catching their **boomerangs**. Make sure they hold them perpendicular to the ground when throwing.
3. If time allows, break students into teams. Have teams compete to see who can catch their own **boomerang** the most times in 5 minutes.

**Wrap It Up:**

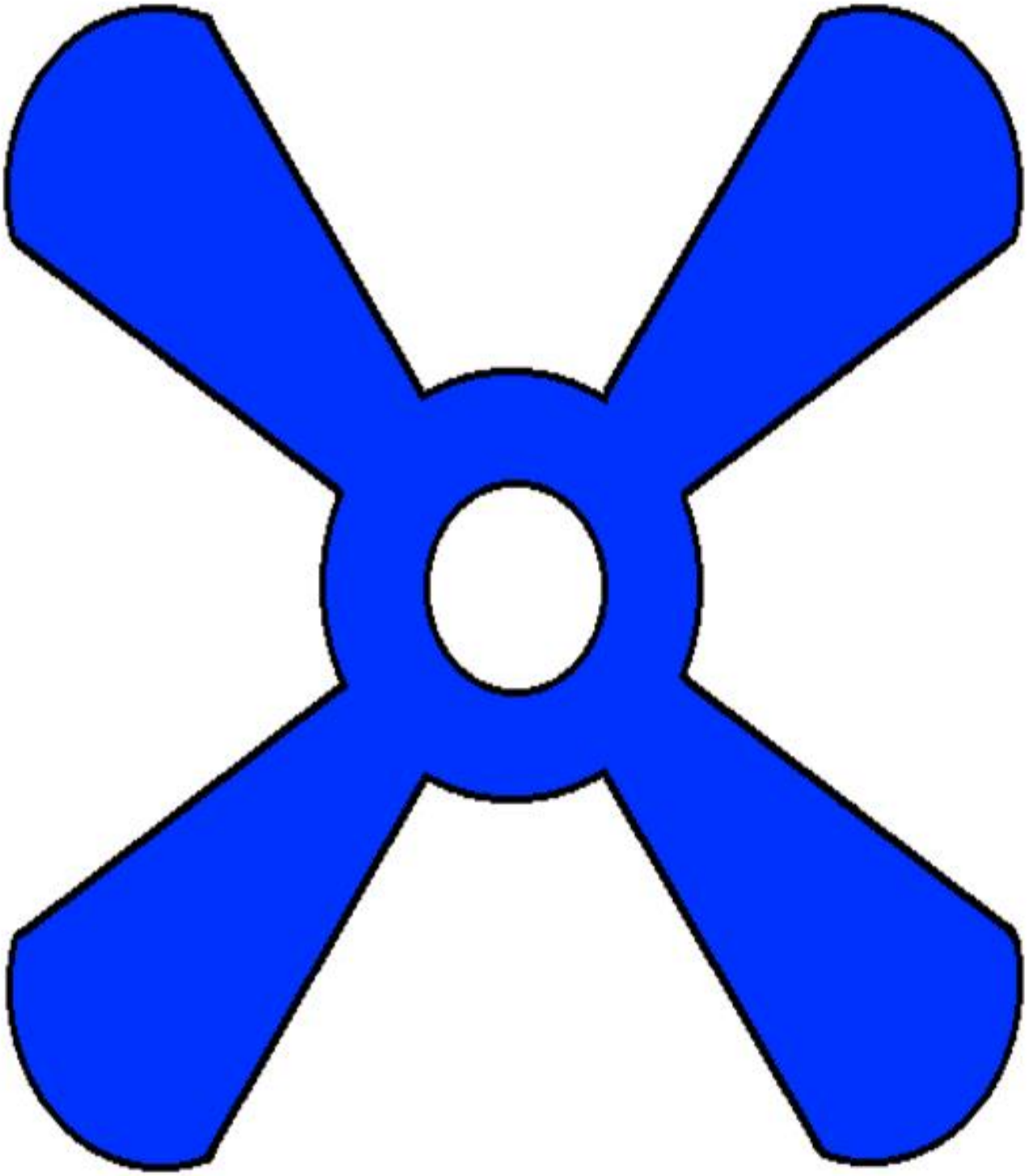
- *How did your* ***boomerang*** *move the first time you threw it?*
- *Did you change anything about the way you threw your* ***boomerang*** *after practicing? Why do you think this helped?*

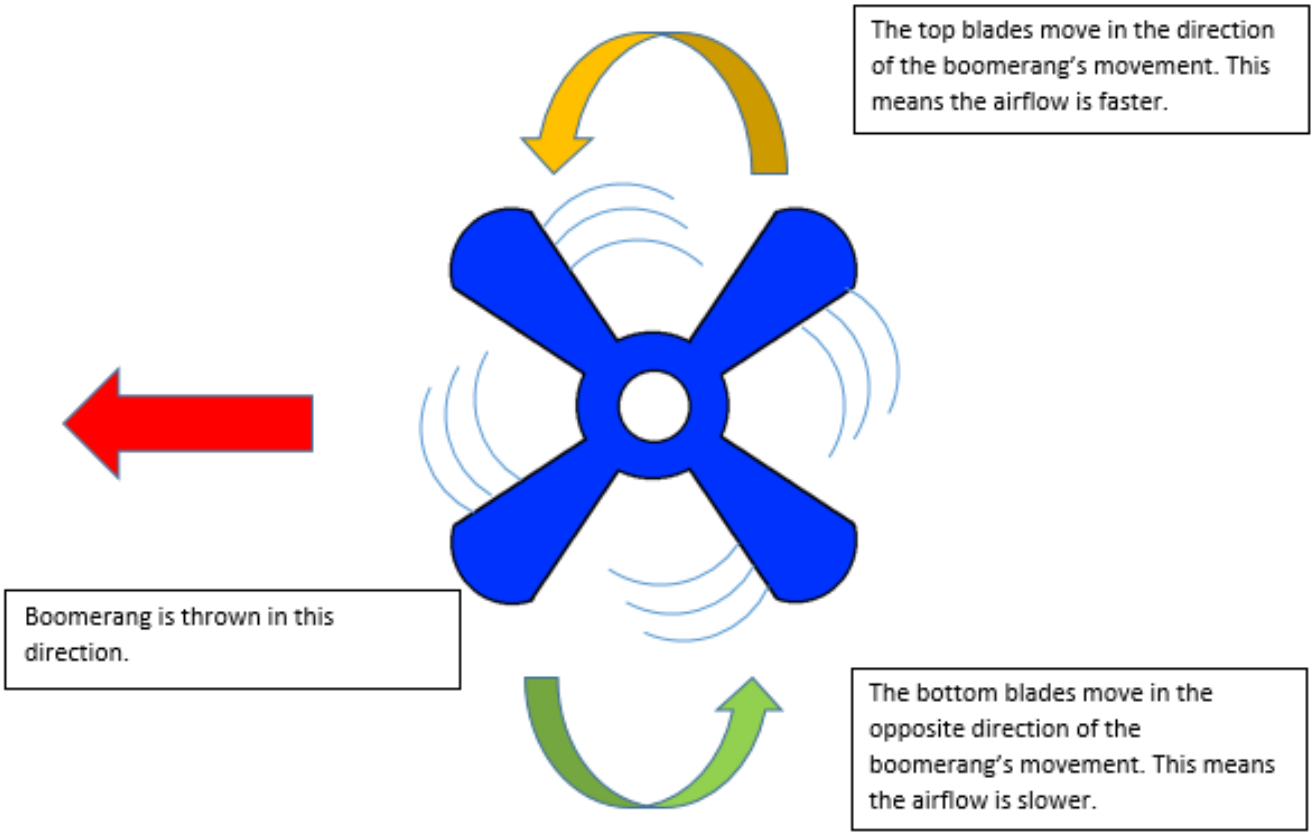
**Take It Away:**

- ***Boomerangs*** *are known for moving in unexpected ways. What other objects move in the air surprising ways? How can we learn more about why they do that?*

**Lead In:**

- *Next time we meet, instead of throwing* ***boomerangs*** *through the air, we'll throw balls as part of a fun-filled game involving construction and destruction!*






*The differences in airflow means uneven forces are acting on the boomerang.*

*That's why it turns back to the thrower!*

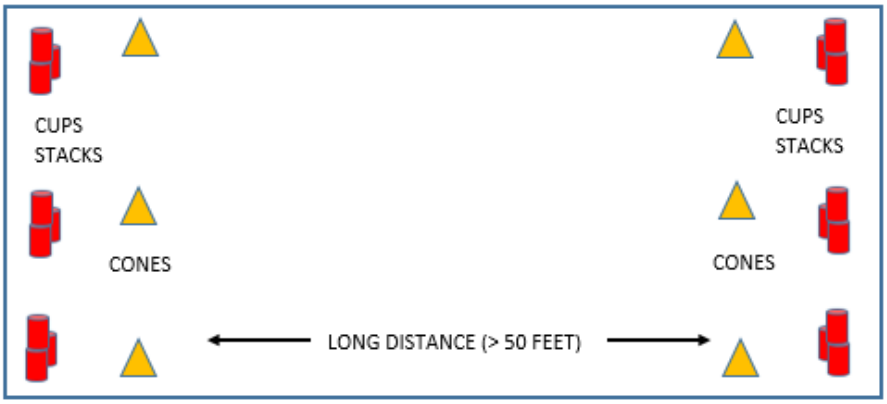
*This is the proper way to throw a boomerang.*

*Make sure to hold it perpendicular to the ground!*

# 3) Stack Attack

**Supplies:** cones, multiple balls of various sizes and shapes, plastic cups

**Preparation:** Set up field as shown on diagram below with cups stacked in groups of three.




**Learning Objective:** Students will develop social skills as they practice hand-eye coordination during a team game.

**Warm-Up:**

- *So far in Sky High, we've learned about how airplanes and boomerangs fly through the air. Today, we are going to send balls sailing through the sky.*
- *What are some games that require catching and throwing?* (baseball, football, basketball, etc.) *Catching and throwing take hand-eye coordination, aim, and most of all, teamwork. Why is teamwork so important?*
- *We are going to use all these skills today in a game that challenges us to keep the ball in the air. Let's practice with a quick game of silent speedball.* Have students stand in a circle and play a quick game tossing a ball back and forth as fast as possible without speaking or dropping the ball. Increase difficulty by adding additional balls or including a time limit on how long students can hold the ball before passing.
- *Looks like we are ready to put those throwing and catching skills to the test. Let's head outside for Stack Attack!*

**Activity (Take It Outdoors!):**

1. *The goal of Stack Attack is to have more cups stacked in your team's score zone than your opponent. Each team will get a ball and try to advance it as close as possible to the other team's scoring zone without going past the cones.*
2. *You can only advance the ball by throwing it to your teammates. When you have the ball in your hands, you cannot move. If the ball touches the ground, the other team takes possession of that ball. You may play defense to stop the other team from advancing by standing in the way of where they want to pass with your hands up, but you may not touch any other players.*
3. *When you get close to the other team's scoring zone, you will stop at the cones and try to knock over the cups by throwing the ball at them. Any cups you knock down, you can then take over to your scoring zone to stack. The team with the most cups stacked in their scoring zone at the end of the game wins.*
4. Split students into two teams. Give them 2-3 minutes to huddle up and strategize. Allow them to start playing with two balls. Introduce more balls as students get the hang of the game.
5. When time is up, signal end of game. Count each team's number of stacked cups. Determine winner.
6. Repeat with new teams or challenges, such as using only one hand. Be sure to allow time for a strategy huddle for each round.

**Wrap It Up:**

- *Did you develop any strategies to help your team as you played?*

- *Why was teamwork important in this game?*

**Take It Away:**

- *What qualities do you need to be a good teammate? What are some other times those qualities come in handy?*

**Lead In:**

- *Next time we have an aeronautical engineering challenge that will laugh in the face of danger! Are you ready to become Daredevils?*

# 4) Little Daredevils

**Supplies:** toy cars, meter stick, cardboard, books, clip boards, various building materials (Legos, Jenga pieces, tape, etc.)

**Preparation:** Set out materials.

**Learning Objective:** Students will experiment with **estimation** and **physics** while engineering a ramp jump.

**Warm-Up:**

- *Has anyone ever watched extreme sports, like skateboarding or motocross? These athletes are known for their high-flying stunts. Skateboarder Danny Way has the world record for highest air on a skateboard at over 25 feet high, and Ronnie Renner reached over 47 feet high on his dirt bike! Olympian Kelly Clark reached 20 feet on her snowboard! Sky High, indeed!*
- *What knowledge do you think they need to be successful and stay safe flying through the air like that? Would you believe math and science?*
- *Let me explain.* Show students Pics for Kids.
- *What measurements and calculations would need to be made to pull off stunts like this?* (speed, weight, length, height, etc.). *That's right – you use math to get those measurements. Once you have them, you need to understand a bit about **physics**, in this case, how the weight of the bike will travel against the force of air across a distance. Then you can use math again to **estimate** the necessary speed going into the jump to make it across.*
- *Today, we are going to become that team of math and science experts and plan our own daredevil jump.*

**Activity:**

1. Put students in groups of 3-4.
2. *Your goal is to create a two ramp jump that will launch a toy car over the greatest distance. You may use any of the materials you see here.* Show students available materials. *The car must launch from one ramp, land safely on the next, and stop before it hits anything.*
3. *Consider the **physics** of your jump – how heavy is your car, how far can it fly, how fast should it be going into fight? **Estimate** the distance you think your car will travel. After **estimating** and testing your ramps, adjust the distance between your ramps and/or the speed of your take-off based on the results.*
4. Have students work together to build ramps for their jump. Use meter stick to measure each successful jump.

**Wrap It Up:**

- *How did you **estimate** how fast your needed to go to clear the jump? How did the weight of the car affect this **estimation**?*
- *What did you learn you from the **physics** of your initial failed attempts? What changes did you make, and how did you know what to change?*

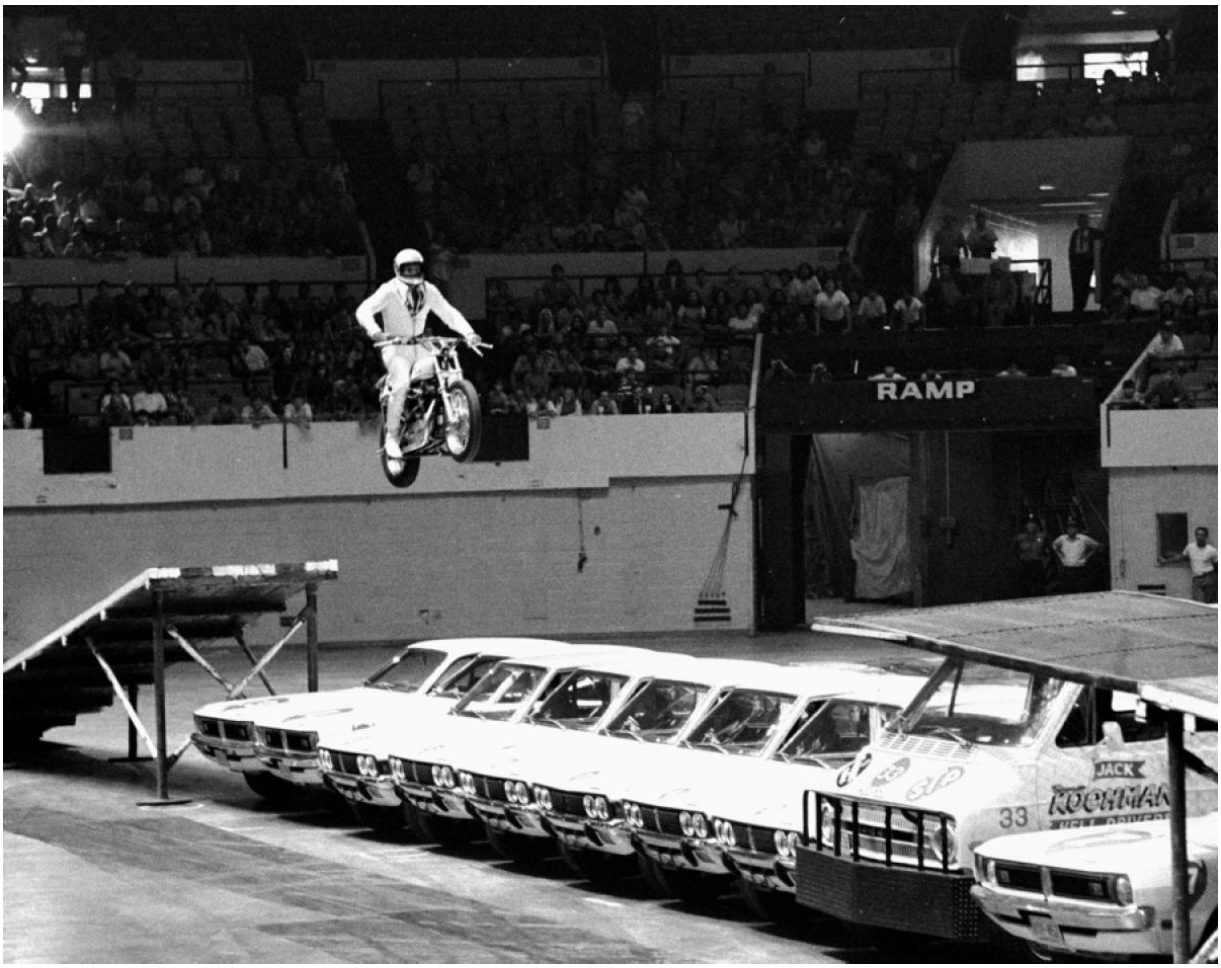
**Take It Away:**

- *Besides extreme sports, what other sports or hobbies could someone be more successful at with a better understanding of science and math?* (track and field, robotics, baking, gardening, etc.)

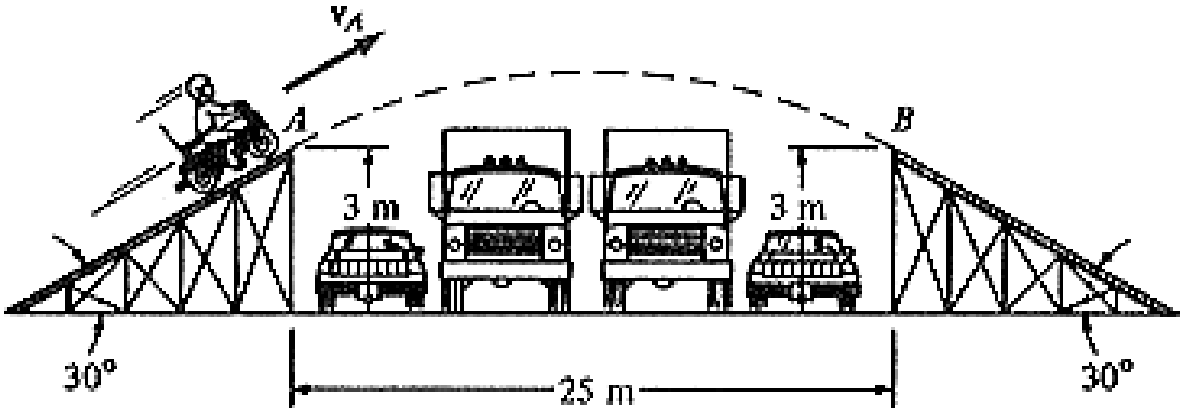
**Lead In:**

- *Next time, we look to the sky for inspiration to create some beautiful artwork.*

# *Pics for Kids*




***It takes a lot of physics, math, and engineering to make stunts like this work. What factors should be taken into consideration to make sure these daredevils stay safe?***



# 5) Aurora Artwork

**Supplies:** colored chalk, scissors, glue, white paint, scissors, black construction paper (1 per 2 students), blue construction paper (1 per student)

**Preparation:** Print out copies of the third page of Pics for Kids (instructions).

**Learning Objective:** Students will know **auroras** are caused by charged particles from the sun interacting with Earth's magnetic field and explore them through artwork.

**Warm-Up:**

- *The sky is full of beautiful sights. Sunsets, clouds, and stars have inspired art for generations. One such natural display of beauty is known as the **auroras***. Show students the first two pages of Pics for Kids.
- *The **auroras** occur near the North and South Poles. **Auroras** near the North Pole are called **Aurora Borealis** or the **Northern Lights**. **Auroras** near the South Pole are called **Aurora Australis** or the **Southern Lights**.*
- *For centuries, the **auroras** were the cause of many theories, mythology, and speculation. Over the years, it's been theorized they were caused by spirits, giant fires, or fluorescent glaciers. They are actually caused when charged particles from the sun interact with Earth's magnetic field.*
- *You can even tell how high above Earth the **aurora** is based on the color.*
    - *Red – 150 miles above earth*
    - *Green – 100 miles above earth*
    - *Purple or Blue – 60 miles above earth*
- *Today, we are going to make some Sky High art inspired by this beautiful natural wonder.*

**Activity:**

1. Share directions on the third Pics for Kids with students.
2. Give them materials. Take them step-by-step through the process, assisting when needed.

**Wrap It Up:**

- *Who would like to share their artwork?*
- *How high above the earth is your **aurora**?* Consult color guide in Warm-Up, if needed.

**Take It Away:**

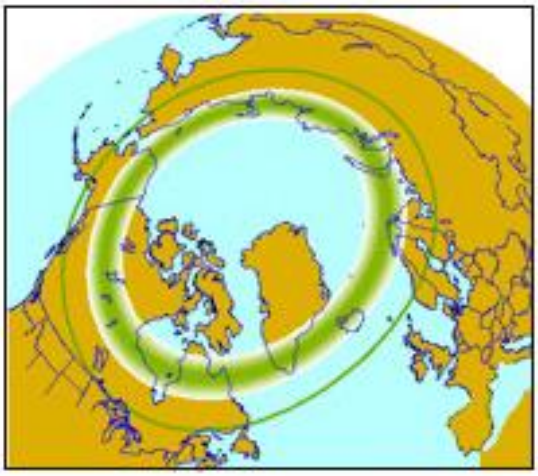
- *Which natural phenomena inspire you? Why?*
- *How could you learn more about it or represent that artistically?*

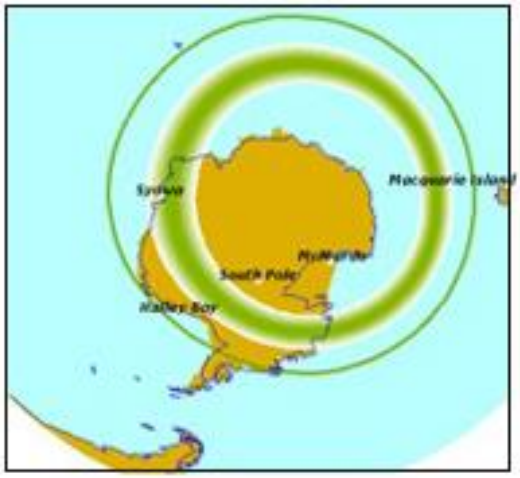
**Lead In:**

- *Tomorrow, we'll learn a very strange way that one animal stays safe while flying through the sky!*

# *Pics for Kids*

*Charged particles from the sun get pulled into Earth's magnetic field, causing a beautiful light show we know as auroras!*

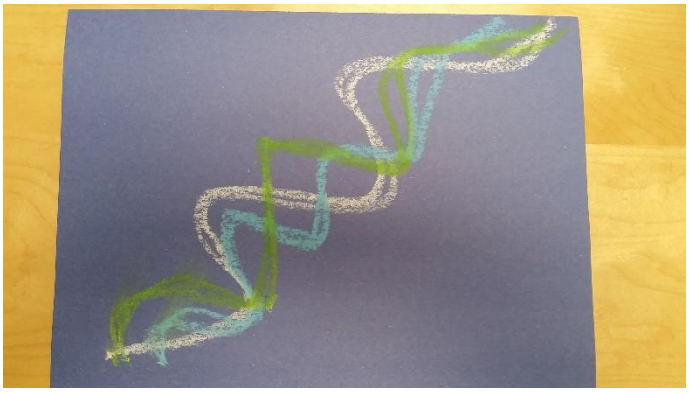




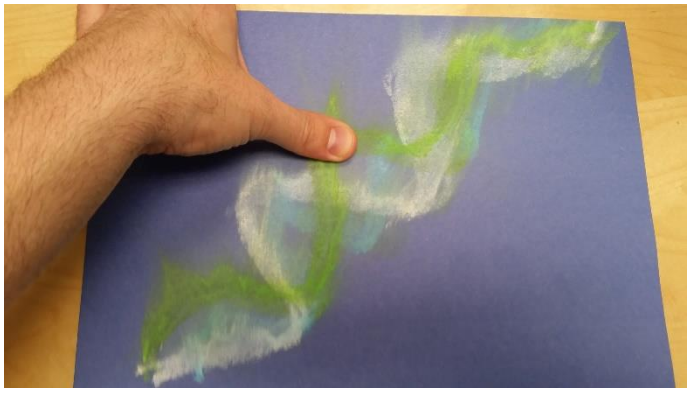

*The map above shows where arouras can be seen around the North Pole (left) and the South Pole (right).*

*Check out the Arora Borealis as seen from space!*

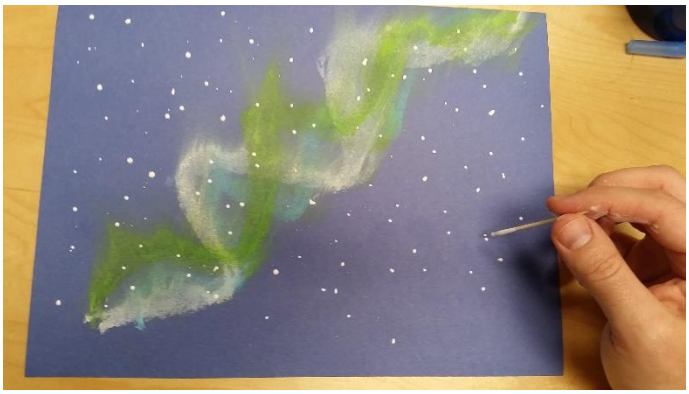
# *Pics for Kids*



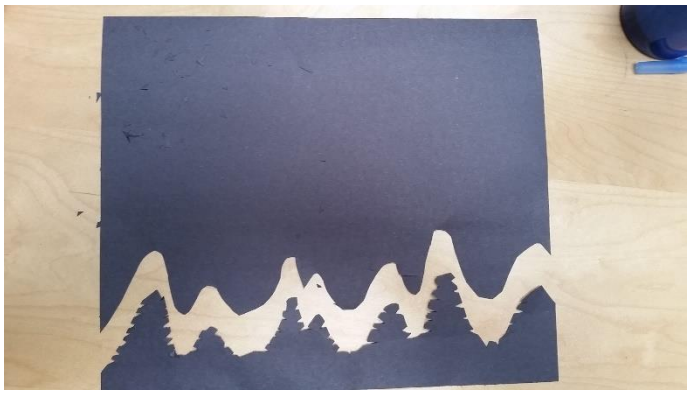
1. Draw a few squiggly lines using chalk on a blue sheet of construction paper.



2. Use your thumb to smoosh the chalk up, towards the top of the paper.



3. Create stars by dabbing white dots of paint all over the page, including starts that shine though the aurora borealis.



4. Cut out a tree line or city skyline using black construction paper.

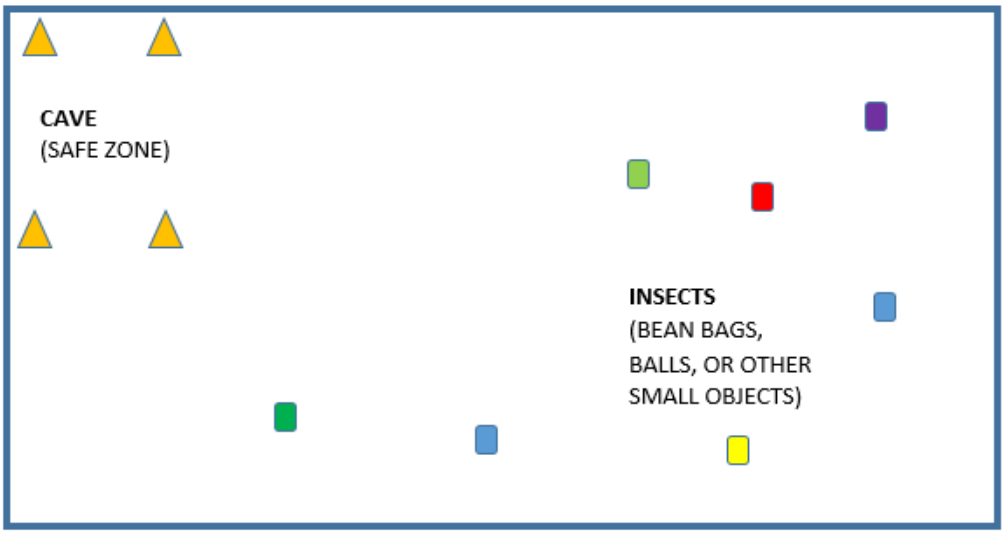
5. Glue your skyline to the background to complete your masterpiece!

6. Gather with your Right Club friends to make a Sky High display for parents!

# 6) Going Batty

**Supplies:** large open space, cones, small balls/bean bags/other small objects

**Preparation:** Set up cones as shown below. Spread small objects around open space as shown.




**Learning Objective:** Students will know many animals use teamwork to survive, and practice using teamwork themselves in a gross-motor game simulating bat survival technique.

**Warm-Up:**

- *The sky is full of interesting creatures. What are some of your favorites?*
- *What do you know about bats? They are fascinating creatures. Bats are the only mammal capable of sustained flight. They can fly for great lengths of time without interruption or becoming tired. Where do they live?* (In caves and other dark, hollow places)
- *Many types of bats feed on insects. This requires them leaving the safety of their homes. When they do, falcons, hawks, and other birds of prey hunt them. Luckily, bats have a very smart technique that helps keep most of them safe.*
- Show students Pics for Kids. *These bats are all flying in a group in the same circular pattern. This confuses the birds hunting them. Why is this better than just flying around alone?* (predators can't focus on one prey at a time, strength in numbers)
- *We are about to experience how this works for ourselves by going outside to play a game that pits birds against bats!*

**Activity (Take It Outdoors!):**

1. *This is a tag game. Two of you will be birds of prey; the others will be bats. The goal of the bats is to collect insects (beanbags) and return them to their cave (safe zone marked by cones).* Show students location of "cave" and what "insects" look like. *The goal of the birds is to tag the bats.*
2. *Bats will start in the cave. Try to collect all of the insects and bring them back to the cave. Birds will try to tag the bats before they do that.* Demonstrate how to tag someone in a safe manner.
3. *If a bat gets tagged, they must kneel down and wait for two or more bat friends to run around them in a circle twice. Once that happens, they are back in the game. Birds cannot tag bats that are moving in a circle with 2 or more bat friends.*
4. *If a bat is being chased, they can jump in with any other bats they see moving in a circle. But bats, you can't circle constantly. You're hungry! You may not circle more than 4 times in a row before you have to go try for more insects. Any questions?*

5. Have students play a few rounds. The round is over if all the bats are tagged out or all of the insects are moved to the cave. Have students change roles between rounds.

**Wrap It Up:**

- *Bats use teamwork to stay safe while flying through the sky. How did you use teamwork today?*
- *Can you think of other animals that live in groups to stay safe?* (School of fish- when fish swim in groups, it's harder for them to be hunted; a dazzle of zebras - they travel in groups so their stripes confuse predators; a pack of wolves – they live together for hunting and safety.)

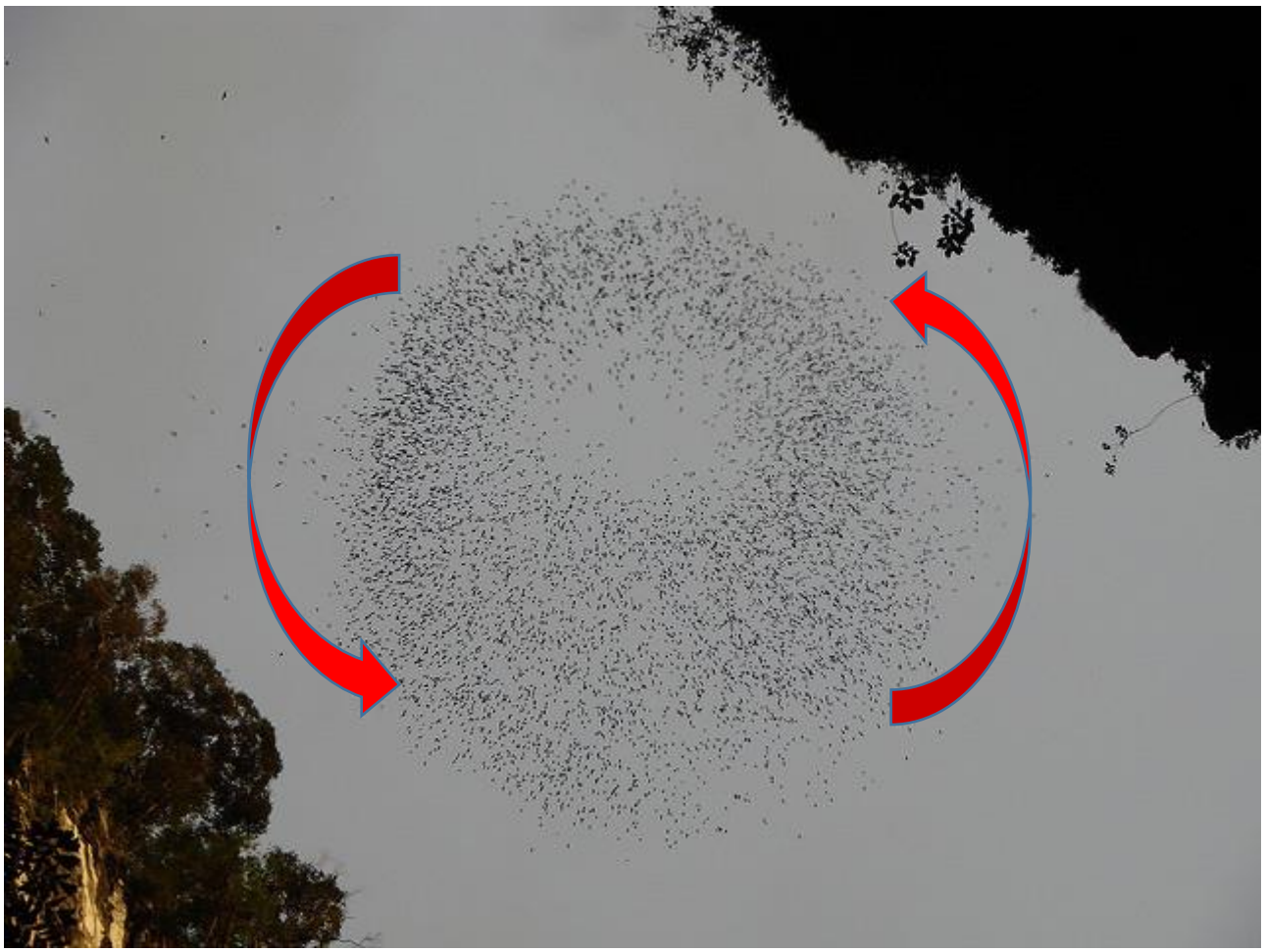
**Take It Away:**

- *What other challenges do night bats face in the wild? How could teamwork help them with these challenges? What challenges do you face that teamwork would help?*

**Lead In:**

- *Get ready to blast off! Next, we will create a toy that's out of this world!*

# *Pics for Kids*



*Bats fly as a group in a circular pattern forming a donut-like shape to confuse predators. This makes it much more difficult for predators to focus in on a single bat when the group moves this way.*

# 7) Rockin' Rockets

**Supplies:** straws, rubber bands, tape, large paper clips, scissors, craft sticks, cardstock or file folders

**Preparation:** Create an example slingshot rocket using directions on Pics for Kids.

**Learning Objective:** Students will experiment with **elastic potential energy** as they convert it to **kinetic energy** with rubberbands.

**Warm-Up:**

- *Not all things start in the sky – they have to be launched! Think about a rocket - in order for rockets to get up so high, they need to have a lot of energy. What energy do they use?* (fuel, combustion)
- *Have you ever shot a rubber band into the air? How does it work? What could you do to make it travel even farther?* (pull back farther)
- *Let's try.* Have a student point a rubber band away from other students, pulling just tight enough to barely stretch the rubber band. *How far do you think it will go when he/she lets go?* Repeat this time pulling back harder.
- *Rubber bands have **elastic potential energy**. That means it has stored energy just waiting be put into motion. The further we pull back on it, the more **elastic potential energy** it has. When we let go, that **elastic potential energy** is turned into **kinetic energy**, or the energy of motion.*
- *Today, we are going to experiment with **elastic potential energy** and **kinetic energy** by making slingshot rockets!*

**Activity (Take It Outdoors!):**

1. Give students access to necessary materials. Lead them step-by-step through the instructions as shown on Pics for Kids. Do not go onto the next step until the prior step has been completed by all students.
2. Take students outside to launch their Slingshot Rockets. Line students up and have them point their slingshot rockets in the same direction. **Be sure to instruct them to only shoot away from other students**.
3. Encourage students to experiment with varying how hard they pull back when they launch their rockets. *How does this change in **potential energy** affect the amount of **kinetic energy** released?*

| *HELPING ALL STUDENTS SUCCEED!* |
|---|
| • Younger students may need assistance with steps that require fine motor skills. Folding the paper clip and taping on wings may be especially difficult. Pair students that need assistance with an older student. |

**Wrap It Up:**

- *What happened when you pulled back harder on your launcher?*
- *Was their more or less **elastic potential energy**?* (More) *Was there more or less **kinetic energy**?* (More)

**Take It Away:**

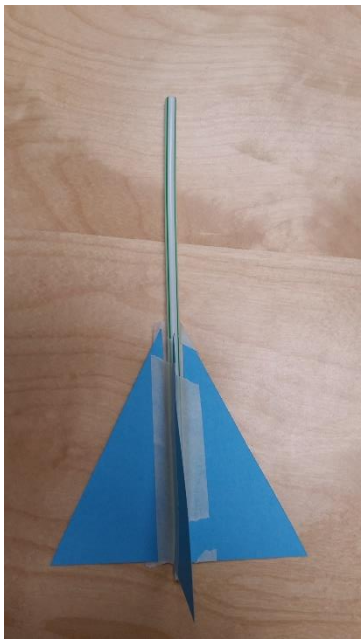
- *When else do you see **elastic potential energy** transformed into **kinetic energy**?* (springs, bow and arrows, trampoline, etc.) How can we apply what we learned about **potential energy** affecting **kinetic energy** to make an arrow go further when shooting with a bow? Or to jump higher on a trampoline?

**Lead In:**

- *Tomorrow, will explore some incredible patterns in the sky above us that we can use to make amazing art!*

# *Pics for Kids*

1. Cut 4 congruent right triangles out of card stock or file folders about half the length of the straw.



2. Tape 4 triangles to straw all the way around to form wings.

3. Fold a large paper clip as shown.

4. Tape paper clip to end of straw opposite where the wings were taped.

5. To create the launcher, tape a rubber band to a craft stick. Reinforce with an extra piece of tape.

6. Hook the paper clip to the rubber band, pull back, and watch the rocket soar!

# *8) Cloudy with a Chance of Inspiration*

**Supplies:** paper, paint, table covers, cups w/ water, brushes, pencils

**Preparation:** Cover tables. Set out materials. Print copies of second and third page of Pics for Kids and cut pictures so each student has one picture.

**Learning Objective:** Students create an artistic representation inspired by **Cirrus**, **Cumulus**, and **Stratus** clouds.

**Warm-Up:**

- *Who knows what a cloud is made of?* (Clouds are condensed water vapor hanging in the atmosphere.) *Have you ever looked up at the clouds and thought about what they look like?* Show students the top picture on Pics for Kids. Cover up the bottom. *What do you see in these clouds?*
- *This is what one artist saw.* Show students bottom picture.
- *Different kinds of clouds have different shapes. The three main types are **Cirrus**, **Cumulus**, and **Stratus**.* Show Pics for Kids that label the three cloud types.
- ***Cirrus** clouds are thin and delicate looking. What do they look like to you?*
- ***Cumulus** are big and fluffy. They look like puffy cauliflower to me. What do you think?*
- ***Stratus** clouds are closer to the ground and cover the sky like a blanket of fog. Do you see any unusual shapes?*
- *I'm going to give each of you a picture of a cloud. Draw on top of it, just like in the first pictures I showed you, to show the rest of us what you see!*
- Allow students to quickly sketch what they see on top of the picture. Who would like to share? What did the people with **Cirrus** Clouds see? **Cumulus**? **Stratus**?
- *Now that we've had some practice, let's find out what we see in the clouds outside!*

**Activity (Take It Outdoors!):**

1. Take students outside to a place with a good view of the sky. If weather prohibits this, use photos on Pics for Kids.
2. *Take a look at the clouds above. Turn your head to get a different perspective. Use your imagination! What do you see? Do a quick sketch on your paper. When everyone's done, we'll go inside and paint our sketches.*
3. Take students inside to paint their sketches.

**Wrap It Up:**

- *What kinds of clouds did you notice outside? **Cirrus**, **cumulus**, or **stratus**?*
- *Who would like to share their artwork?*

**Take It Away:**

- *What can the type of clouds we see tell us about the weather? Over the next week, see if you can spot different types of clouds during different kinds of weather.*

**Lead In:**

- *Clouds stay up in the air on their own, but next time, we have a game that will test our ability to keep something in the air. Prepare for Balloon Battle!*

# *Pics for Kids*

*These are the three main types of clouds.*
*What does each one look like to you?*

*Cirrus Cloud*

*These are the three main types of clouds.*
*What does each one look like to you?*

*Cumulus Cloud*

*These are the three main types of clouds.*
*What does each one look like to you?*

*Stratus Cloud*

# 9) Balloon Battle

**Supplies:** balloons (**Note:** latex-free schools can use Ziplocks filled with air), cones, large open space

**Preparation:** Blow up at least one balloon per student. Find large open space. Separate into two equal space with cones.

**Learning Objective:** Students will explore communication and teamwork through competitive, active play.

**Warm-Up:**

- *What happens when you put helium in a balloon?* (It floats up). *How do hot air balloons go up?* (They use fire to heat the air inside to make it rise.) *Today, we are going to keep balloons in the air, only we'll use quick reflexes and teamwork to keep them up.*
- *To start off today's activity, I'd like to play a little game. I'm going to bump a balloon in the air and call out a name. The person I call needs to come and hit the balloon back into the air and call out a third person's name.* Bump balloon and call out a student's name. Introduce a new balloon after a few students have hit the first.
- *Why was it important to call out a name? What might have happened if we didn't?* (balloon would hit the ground, people might run into each other) *Communication is important when playing games to help your team be successful and to make sure everyone stays safe. Can you think of another example?* (baseball players calling for a pop fly, coaches calling plays, etc.)
- *We are going to practice communication by playing a new game called Balloon Battle!*

**Unit-Long Project Note:**

Remind students working on the unit-long project that they will be presenting their project to the group tomorrow. Allow them the opportunity to plan how they would like to do that.

**Activity (Take It Outdoors!):**

1. *In just a moment, I'm going to split you into two teams. Each team will have the same number of balloons. The goal of each team is to keep your balloons in the air. Throughout the game, I'll give you different commands about how you can do that.* Share a few examples from list below:
    - *No hands*
    - *Feet and legs only*
    - *Elbows only*
    - *Clap (once, twice…) before hitting*
    - *Spin before hitting*
    - *Cannot touch the same balloon twice in a row*
    - *Both teams must switch zones*
    - *BALLOON BATTLE START!*
    - *BALLOON BATTLE STOP, back to your zone!*
2. *You cannot hold the balloon. You must bump it in the air to keep it active. To keep from running into each other, you'll need to call out, "Got It!" When a balloon touches the ground, it is no longer in play. Each team will have their own zone and must stay in it. The team with the most balloons still up in the air at the end wins.*
3. *I can also say, "Balloon Battle!" At that point, if you do not have a balloon, you may go into the other team's zone and try to knock the other team's balloons down without touching the other players. If you touch someone from the other team, your team loses two balloons. Don't forget you are also trying to keep your team's balloons in the air.*
4. Have students spread out in their own zone. Pass out balloons. Start off slowly, introducing a few commands at a time. As students become comfortable with the game, add more commands.
5. Give students a countdown before signaling the end of the game. The team with the most balloons still in the air is the winner. Mix up teams and start a new game if time permits.

**Wrap It Up:**

- *What made communication a challenge in this game? How did it help you succeed as a team?*
- *Why is it important to be aware of your surroundings in a game like this?*

**Take It Away:**

- *How is communication used when working as a team on a school project?*
- *How can you be a strong communicator with your peers and family?*

**Lead In:**

- *Next time, we conclude Sky High as we build one of history's most popular flying toys!*

# *10) Kite Flight*

**Supplies:** paper (lighter paper, like copier paper or tissue paper work much better than construction paper), elastic cord or string, crayon, pencil or pen

**Preparation:** Set out materials.

**Learning Objective:** Students will learn kites fly due to a variety of factors, including **weight**, **lift**, **thrust**, and **drag**.

**Warm-Up:**

- *Who has flown a kite before? What kind of kite was it? What did it look like?*
- *There are many different types of kites.* Show students first Pics for Kids. *What do these kites have in common?* (similar materials, lightweight, air can travel around the design, etc.) *These are important factors that help the kites fly.*
- *What other factors might affect how a kite flies?* (wind, weight, the way air moves around the surface of the kite, and the tension of the line attached to the kite)
- Show students third page of Pics for Kids. *Kites, just like planes, birds, and other flying objects, are acted upon by four forces:* ***lift***, ***thrust***, ***drag***, *and weight.* ***Lift*** *is provided by the design of the kite.* ***Thrust*** *is provided by the person running.* ***Drag*** *slows the kite down due to air pushing against its movement.* ***Weight*** *of the kite pushes it back towards earth if it's too heavy.*
- *Kites have been around since at least the 5th century. They were first invented in China by a couple of Chinese philosophers. At the time, they were much more than toys. What do you think they used kites for?* (communication, testing wind, measuring distances, etc.)
- *Do you think the person that invented kites was successful the first time they tried to fly the original design? What do you think the inventor did next?* (make adjustments, test different designs, etc.) *Adjusting your design is part of the process. Each trial is a learning opportunity.*
- *Today, we are going to build our own kites. Let's go!*

**Unit-Long Project Presentation:**

Invite students that worked on the unit-long project an opportunity to present to the group.

**Activity (Take It Outdoors!):**

1. Share directions on second Pics for Kids with students. Demonstrate step-by-step how to construct their own kite.
2. Give students materials. Allow them to create their own kite.
3. Take students outside to fly their kites. To fly them, students should run with kite trailing behind on the ground. Adjust the length of string as necessary.
4. If they struggle to get their kite airborne, adjust where the wing connects to body of the kite. This may require some trial-and-error.

**Wrap It Up:**

- *What did you learn about kites through testing out your own?*
- *How did you adjust your design to fly better? Did you adjust* ***lift***, ***thrust***, ***drag***, *or* ***weight****? Did it help? Why?*

**Take It Away:**

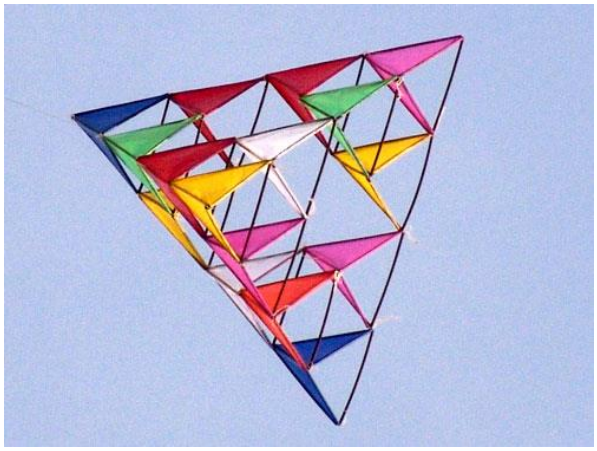
- *Which topics discussed in Sky High (airplanes, flying animals, rockets, kites, etc.) interested you most?*
- *What kinds of jobs or careers are associated with that topic? What should you do if you'd like to pursue a job or career in that field?*

**Lead In:**

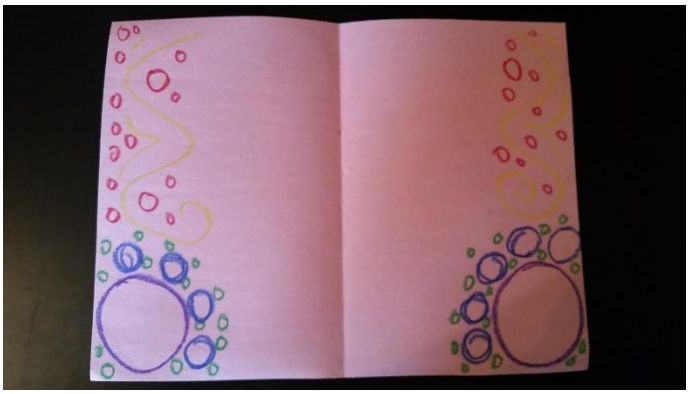
- *Next time, we head outside for some fun in the sun in our next unit – Summer Sports!*

# *Pics for Kids*

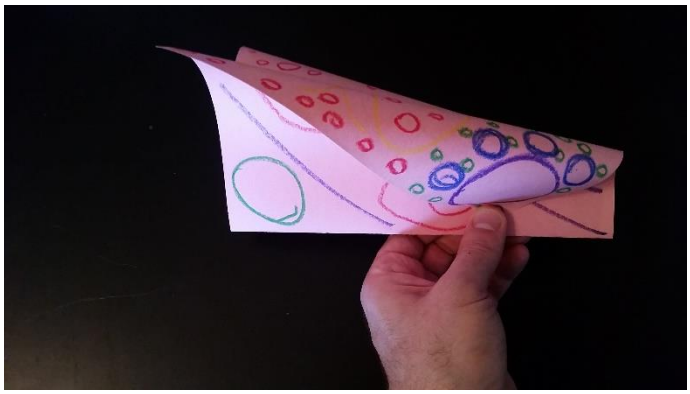
## *There are lots of different kinds of kites. What do they all have in common?*



# *Pics for Kids*

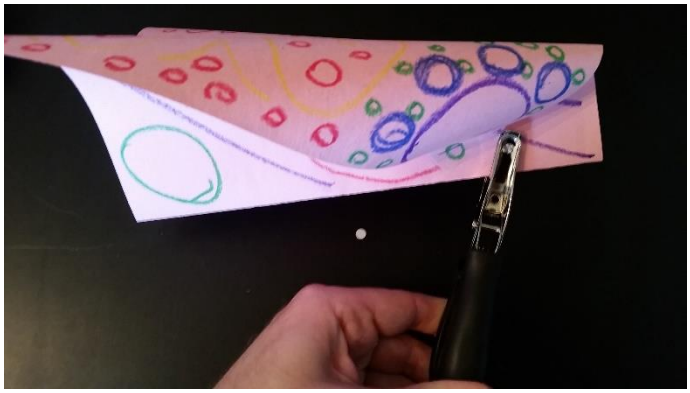


1. Crease paper width-wise and decorate both front and back of paper. It is not necessary to decorate the middle.

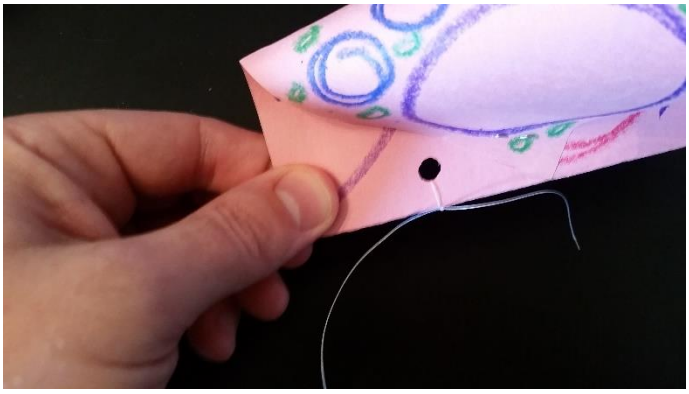


2. Fold along crease. Bend the front corner of the paper outward to some point in the front ½ of the plane. Do not *fold* the wings, only *bend*.

3. Check to see that air is still able to flow through wings. Once in position, tape or staple wings into positon.



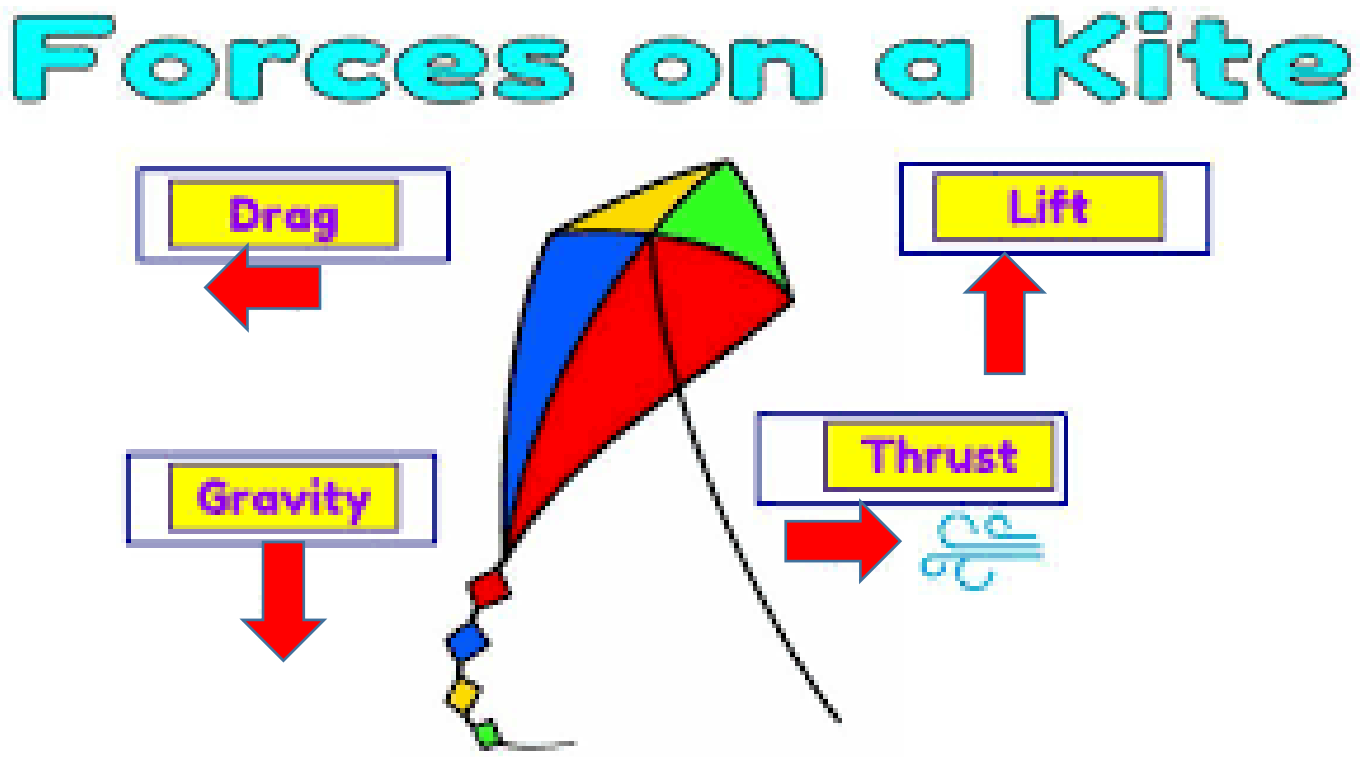
4. Poke one hole just in front of where wings touch body of the kite using either a hole punch or pencil.



5. Cut a piece of string at least as 5 feet long. Tie to hole.

6. Wind other end of string to pencil or pen. Now go outside and test it out!

# *Pics for Kids*




*These forces are acting on your kite while in flight.*

*How can you create more thrust?*

*How can you fight drag?*