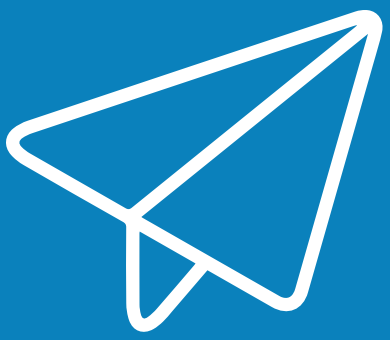


Aviation Extended

Contents:

- Overview
- Six, 45-minute lessons
- Paper helicopter patterns
- Career information cards
- Accompanying images
- List of Local, State and National Standards addressed

Afterschool Curriculum:

Thank you so much for your interest in this after school content that teaches young people about facts related to air flight and travel.

This curriculum was developed by UNL students during the Winter 2020 Design Studio

This content is provided to you free of charge. If you could please complete this short 5-question survey after you use the content, it will help us to improve the quality of the lessons. Thank you, again!

See Program Survey

Beyond School Bells
nebraskachildren

Overview

A six lesson learning unit developed by the Winter 2020 Design Studio Team

Notes to the Teacher/Site Director:

- This unit is a 6 lesson unit. Lessons 1-4 are designed for single after school sessions.
- Lesson 5 is a 2-day lesson that requires a visit (real-time or virtually) to your local airport for a tour. The lesson plan notes a website for Nebraska airport locations, manager's names and telephone numbers. It is advised to make this contact early on in the unit so that you can make details well in advance. If you cannot visit a local airport, there are virtual tour links in the lesson to use. Day 2 of this lesson is for students to work in teams to create a "new device" or combinations of technology that will solve an existing air travel related problem. For teacher background, a website that outlines 7 new technologies that might be used in the near future to solve such issues.
- Lesson 6 is a weekend, multi-hour Duncan Design Challenge.
- Additional files here include, Nebraska's DOT Airport listing, paper helicopter patterns, and a related paper airplane image.
- Each lesson starts with a Big Question(s) for whole group input followed by "Setting the Stage" with a short (4 minute) video or discussion. Then, kids will work as a team to complete a project related to the topic at hand.
- Reflections and/or enrichment activities follow each project. Those can be oral, written, or podcasty or some combination of all the above.

L1. Custom Kites

What is lift? How do kites use lift to stay in the sky?

L2. Yaw, Roll & Pitch

What is yaw, roll and pitch and how does it affect flight?

L3. Balloon Rockets

What does thrust have to do with flight? How does thrust generated from a balloon work? What's pushing the balloon forward?

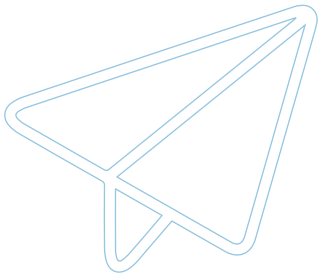
L4. Other Forms of Flight

How do helicopters work?

L5. Future Air Flight (2-day)/ Community Connection

What are some ways to improve air flight for the future?

L6. Duncan Design Challenge



Standards

In the footer of each lesson, you will find a reference to all standards addressed by each lesson.

State, Local and National Standards:

Nebraska Academic Standards

- SC8.1.3.B Design a solution or product
- SC8.1.3.C Implement the proposed design
- SC8.1.3.D Evaluate completed technological designs or products
- SC8.4.3.A Describe how energy from the Sun influences the atmosphere and provides energy for plant growth
- SC8.4.3.CDescribe atmospheric movements that influence weather and climate (air masses, jet stream)

ISTE Standards

- 4.A Know and use a deliberate design process for generating ideas, testing theories, creating innovative artifacts or solving authentic problems.

National Standards Benchmarks for Science Literacy

- 3B/E2 Even a good design may fail. Sometimes steps can be taken ahead of time to reduce the likelihood of failure, but it cannot be entirely eliminated.
- 4B/E4 Air is a material that surrounds us and takes up space and whose movement we feel as wind.
- 3B/M4B The most common ways to prevent failure are pretesting of parts and procedures, overdesign, and redundancy.

Next Generation Science Standards Grade Level Disciplinary Core Ideas

- 3-5-ETS1.B.3 Tests are often designed to identify failure points or difficulties, which suggest the elements of the design that need to be improved.
- 3-5-ETS1.C.1 Different solutions need to be tested in order to determine which of them best solves the problem, given the criteria and the constraints.
- MS-ETS1.B.3 There are systematic processes for evaluating solutions with respect to how well they meet the criteria and constraints of a problem.
- 4-ETS1.B.2 Testing a solution involves investigating how well it performs under a range of likely conditions.
- 3-5-ETS1.B.1 Research on a problem should be carried out before beginning to design a solution. Testing a solution involves investigating how well it performs under a range of likely conditions.
- MS-ETS1.B.6 Models of all kinds are important for testing solutions.
- MS-ETS1.C.4 The iterative process of testing the most promising solutions and modifying what is proposed on the basis of the test results leads to greater refinement and ultimately to an optimal solution.
- MS-ETS1.B.1 A solution needs to be tested, and then modified on the basis of the test results, in order to improve it.
- K-2-ETS1.C.1 Because there is always more than one possible solution to a problem, it is useful to compare and test designs.

Aviation
L1 Custom Kites

Big Questions: What is lift? How do kites use lift to stay in the sky?

Set the Stage: Making a simple kite, video: 2 minutes, 29 seconds

Resources: How do kites fly in the sky? video: 3 minutes, 47 seconds

Activity:

Procedure: After the intro video – Engage Let's make our kites! You may want to play the video again and pause for each step. Let's go outside and fly!

Questions to ask after flying kites:

- How does the kite stay in the air? (Wind pushing it)
- What causes lift? (Upward air pushing from below)
- Does the size of your kite affect how it flies (larger or smaller, what works best?) Answers will vary.

Other Options:

- If time permits, allow the students to make alterations to their kites that they think will help enhance its flight capabilities.
- You can create a competition to see who can make a kite that stays in the air the longest.

Reflection: If you were to make a kite again, what would you do differently? What design would you choose to increase the lift?

Materials:

- Computer, projector and access to the Internet

Per Child:

- One sheet of colored construction paper
- A bamboo skewer
- String ball
- Colored Streamers
- Pair of scissors
- Tape

Note to parents – You may choose to play the videos in reverse order, i.e. – Learning why kites fly, and then playing and stopping as needed the kite construction video.

Standards:

Standards addressed by this activity - BSB – The Do Place: Academic Standards: SC8/1/3.B, SC8/1/3.C, SC8/4/3.A, SC8/1/4.3.C, National Standards: ISTE – 4A, Benchmark: B/E2, 4B/E4, 3B/M4B, and NGSS: 3-5-ETS1.B.3, 3-5-ETS1.C.1, MS ETS1.B.3, 4-ETS1.B.2, 3-5-ETS1.B.1, MS-ETS1.B.6, MS-ETS1.B.1, and K-2-ETS1.C.1.

Aviation
L2 Yaw, Roll, and Pitch

Big Questions: How does yaw, roll and pitch affect flight? What do each of these look like?

Set the Stage: The Paper Airplane Guy, video: 11 minutes and 3 seconds, a jaw dropping video!

Resources: Paper Plane Designs, a static webpage of plane designs. Attached plane designs.

Activity:

Procedure: After the intro video – Use the link above in the resource section to view paper plane designs. They are organized into hard, medium, and easy levels.

- Allow students to customize and build their paper airplane with markers. As the students are creating their planes you can replay the "Paper Airplane Guy" video above if needed.
- After students create their paper airplane, give them time to test.
- Instruct students to cut 1 flap on each wing. Flap sizes will vary depending on students' designs.
- Show students what yaw, roll and pitch look like. (20 second video) Note: to successfully complete the stunt plane challenge, students must demonstrate Yaw, Roll and Pitch with their paper airplanes.

Materials:

- Computer and access to the Internet
- Printer Paper
- Markers

Challenge! To do this, students can be organized into groups of 2 or 3 and play "PIG" with their stunt planes. (20min):

1. The first student will announce which action they want their airplane to perform (double roll, single roll, corkscrew, upwards roll, etc.…) to their partner(s).
2. The first student will bend the flaps on their paper airplanes wings to perform the said action. The other student(s) in the group will try and perform the same action with their paper airplane.
3. If they complete the action, they are safe. If not, they get the letter "P." Go until the other student(s) in the group receive all three letters, then switch roles.

Standards:

Standards addressed by this activity - BSB – The Do Place: Academic Standards: SC8/1/3.B, SC8/1/3.C, SC8/4/3.A, SC8/1/4.3.C, National Standards: ISTE – 4A, Benchmark: B/E2, 4B/E4, 3B/M4B, and NGSS: 3-5-ETS1.B.3, 3-5-ETS1.C.1, MS ETS1.B.3, 4-ETS1.B.2, 3-5-ETS1.B.1, MS-ETS1.B.6, MS-ETS1.B.1, and K-2-ETS1.C.1.

Aviation
L3 Balloon Rockets

Big Questions: What does thrust have to do with flight? How does thrust generated from a balloon work? What's pushing the balloon forward?

Set the Stage: Have you ever blown up a balloon and then let the air out of it? What did you see? Write responses on the board.

Resources: Balloon Rocket Science Experiment, video: 4 minutes, 39 seconds

Activity:

Procedure: After the intro video – Engage
Position two chairs about 10 feet apart and grab a piece of string.

Set up:

- Tie one end of the string to one of the objects. Make sure it is securely fashioned.
- Next, get a straight plastic drinking straw. If the straw is one of the "bendy" straws with the flexible piece, cut off the flexible part so you are left with a straight straw.
- Place two pieces of tape on the straw. Note: Be sure to position the two pieces of tape near the middle of the straw. If you put them near the ends of the straw it will bend when you blow up the balloon and the rocket won't move as quickly.
- Thread the string through the straw. Tie the loose end of string to the back of your second object and make sure the string is tight. If the string isn't tight, move the objects farther apart until it is.

Materials:

- Computer, Projector and access to the Internet

Per Student Team:

- Balloon
- Drinking Straw
- String
- 2 Chairs
- Tape to share

Let's Practice! Blow up the balloon and hold the end so the air can't escape and use the two pieces of tape to secure the balloon to the straw. Move the straw and balloon to one end of the string. And once you are ready, Let go of the balloon and watch as it rockets across the string! Reinflate the balloon again and repeat again and again.

Enrichment: Tape a popsicle stick perpendicular to straw. Or, if you have a wooden skewer puncture the straw with the skewer so that equal lengths of the skewer are showing on each side of the straw. Tape balsa wood wings to skewer or popsicle stick. (Note: make sure to cut two separate wings so students can adjust them at alternating angles to perform a roll). Experiment with different wing angles and lengths to try and get the snake plane to roll. Set up chair tracks next to one another and have a competition for speed. **Reflection:** What kind of thrust does the balloon use?

Standards:

Standards addressed by this activity - BSB – The Do Place: Academic Standards: SC8/1/3.B, SC8/1/3.C, SC8/4/3.A, SC8/1/4.3.C, National Standards: ISTE – 4A, Benchmark: B/E2, 4B/E4, 3B/M4B, and NGSS: 3-5-ETS1.B.3, 3-5-ETS1.C.1, MS ETS1.B.3, 4-ETS1.B.2, 3-5-ETS1.B.1, MS-ETS1.B.6, MS-ETS1.B.1, and K-2-ETS1.C.1.

Aviation
L4 Other Forms of Flight

Big Questions: How do helicopters work? What parts do what jobs?

Set the Stage: How do helicopters work?, video: 8 minutes, 07 seconds; might need to stop and talk

Resources: Attached file. "FETCH Hang Time," helicopter pattern.

Activity:

Procedure: After the intro video – Review the words/phrases that students identified as accessed prior knowledge. Affirm what was seen and recorded on the board.
Then use the handout above "FETCH Hang Time"

Paper Helicopter - cut out the helicopter pattern, students make and then fly paper choppers.

- Make your copter. Cut out the copter printed on this page. Cut along the dotted lines. Assemble it as shown.
- Launch your copter. Hold your copter as high as you can. Let go and watch as it falls. Does it spin to the ground?
- Add the fan. ASK – What changed?
- **Have a competition! Best hang time wins!**

Materials:

- Computer, projector and access to the Internet
- Stopwatch

For each student:

- White printer paper or graph paper (kids can count the squares)
- Scissors
- Paper clips; one large and one small
- Fan or ceiling fan

Enrichment: Change your copter. Build a second copter of your own design. This time, change a feature, such as the copter's size or shape of the blades. Try using more or fewer paper clips. Then launch both the new and original copter designs and compare how they fall. What kind of difference did your change make?.

Standards:

Standards addressed by this activity - BSB – The Do Place: Academic Standards: SC8/1/3.B, SC8/1/3.C, SC8/4/3.A, SC8/1/4.3.C, National Standards: ISTE – 4A, Benchmark: B/E2, 4B/E4, 3B/M4B, and NGSS: 3-5-ETS1.B.3, 3-5-ETS1.C.1, MS ETS1.B.3, 4-ETS1.B.2, 3-5-ETS1.B.1, MS-ETS1.B.6, MS-ETS1.B.1, and K-2-ETS1.C.1.

Aviation
L5 Future Air Flight

Two-Day Lesson

Big Question: What are some ways to improve air flight for the future?

Set the Stage: Have you ever taken a tour of your local airport? What are some of the jobs you saw there? Did you notice any problems? What were they? Write your responses on the board.

Resources: DOT (Department of Transportation) website of airports here in NE along with airport manager and phone number. NE airport map provided.

Activity:

Procedure: After the discussion – Watch Kids Visit Hilton Head Island, video, 1 minute, 59 seconds. Load onto the bus!

While at the airport, sutdents should make note:

- What are some of the different jobs housed at the airport
- What are some of the things yous ee people doing?
- Are you seeing any problems that people are enountering?
- Can your tour guide outlne any current problems that are happening?

Day 2: Students work in teams of 2-3 to create a device or system for making future air flight better, faster, and/or safer. Students share out at club's close.

Enrichment: have these devices on display during an upcoming family night.

Materials:

- Computer, projector and access to the Internet
- If you can physically visit your local airport, try setting those details up.
- If not, use the lists at the DOT website above to do a virtual tour with the airport manager. If you cannot virtually visit, play this video, 2 minutes,17 sec.
- Art supplies, cardboard, paper, scissors, markers

Note to the teacher – We found this article to he helpful when thinking about the future of air flight.

Standards

Standards addressed by this activity - BSB – The Do Place: Academic Standards: SC8/1/3.B, SC8/1/3.C, SC8/4/3.A, SC8/1/4.3.C, National Standards: ISTE – 4A, Benchmark: B/E2, 4B/E4, 3B/M4B, and NGSS: 3-5-ETS1.B.3, 3-5-ETS1.C.1, MS ETS1.B.3, 4-ETS1.B.2, 3-5-ETS1.B.1, MS-ETS1.B.6, MS-ETS1.B.1, and K-2-ETS1.C.1.

Aviation
L6 Duncan Design Challenge

Three-Day Experience (Friday, Saturday, Sunday)

Purpose: The purpose of the Duncan Design Challenge is to Excite and Engage youth about the Aircraft Industry and to expose them to all of the different career opportunities it holds.

Outline:

The Duncan Design Challenge is a 3-day experience (Friday, Saturday, and Sunday during the school year) for grades 3-8. Students will be exposed to the aircraft industry design process using a full-size fuselage as their blank canvas!

- Students will learn how to work in teams and communicate across different design/engineering disciplines to come up with a cohesive conceptual aircraft design.
- At the end of the 3 day experience the Students will submit their design to the Duncan Aviation Interior Design Department for review.
- After proper documentation (pictures) of the Students Concept Aircraft, the fuselage will be disassembled and sent to the next Afterschool program.
- The Duncan Aviation Interior Design Department will skype, visit, or speak with each Afterschool program about their Aircraft design and will then pick a winner. The winning Afterschool program will get a tour of Duncan Aviation!

Materials:

- Cardboard boxes and sheets
- Aluminum Sheet Metal
- Recycled bottles and Cans
- Cloth and other Fabric
- Arts and Crafts Supplies
- Paints
- Large Rolls of Paper
- Duncan Scrap Materials (Optional)

Brainstorming Materials:

- Construction Paper or Printer Paper (Any Size)
- Pencils and Markers (Ideally, multiple colors)
- Dry Erase Boards and Markers (Optional)
- Aircraft Blueprint (Print Out)

Tools:

- "Makedo" Multiple Sets (Optional)
- Masking Tape and Duct Tape
- Paint Brushes
- Scissors and Cardboard Scissors (Optional)
- Markers
- Hot Glue (Optional)
- Tape Measurer or Ruler

Other Materials:

- Aircraft Fuselage (comes as a flat pack or preassemble kit)
- Aircraft Fuselage Blueprint (11x17 Print Out) x2
- Big Checklist
- Luggage and Carry-on Bags for reference
- Aircraft Careers Sheets
- Details career description
- Checklist

Aviation
L6 Duncan Design Challenge

Three-Day Experience (Friday, Saturday, Sunday)

Activity: 3-day Outline: School Year Plan

Procedure: Make sure you have a large open space available, ideally a gym, outside area, open classroom. arrange 3-8 tables depending on group size.

Day 1: Friday: 3:45- pm - 5 pm (1 hr 15 min Total)

- Facilitators will unload and assemble the aircraft fuselage while students are eating snack (15min). The fuselage must be in an open room with plenty of space. Setting up tables from the TMC Lab will be helpful.
- Facilitators will also gather all materials and tools needed.
- Students will enter the room and will be given basic safety instructions about the fuselage (do not climb or take apart structure etc.…). They will then be given a few minutes to explore the fuselage.
- The Facilitators will then present the Duncan Design Challenge to the students. They will get a brief overview of Duncan Aviation and the careers they will be exposed to during this challenge.

Note: Opportunity to show a short video of Duncan and the interior of an aircraft. Some students may have no experience being on an airplane so it is important to give them a visual of what they will be designing the next two days.
Students will be dismissed and told to go home and begin brainstorming ideas (sketches are welcome!).

Day 2: Saturday: 10am-3pm (5 hrs Total)

- Students will be split into 2 large groups (7-10 per group) and be assigned one facilitator as their guide.
- As a group the students will go over who their client is (Duncan Aviation) and what exactly the client is asking them to come up with.
- Utilizing the printout floor plan of the aircraft the students will get the opportunity to explore different floor plan layouts in smaller groups or on their own. Each student will get the opportunity to explain their idea to the group.
- Students will then be given multiple opportunities to rethink their floor plan ideas (after feedback from the aircraft inspectors) and at the end of the hour they will have to decide on one basic floor plan layout.
- The 2 groups will then convene and present their floor plan to one another. Students and Facilitators will get the opportunity to ask questions and comment on the design. Following presentations, the students will vote on a final design.
- Build Time! Students will then break off into smaller groups and be assigned design and engineering roles to tackle. At the front of the room there will be a big checklist of all things the aircraft will need. Items can only be checked off after an Aircraft Inspector has "O.K" the design.
- At the end of the day the Students and Facilitators will reflect on the progress made and identify what is still left to accomplish.

Aviation
L6 Duncan Design Challenge

Three-Day Experience (Friday, Saturday, Sunday)

Activity: 3-day Outline: School Year Plan

Continued...

Day 3: Sunday: 10am-3pm (5 hrs Total)

- Continue build time, safety inspections, change Design and Engineering roles, take breaks and learn about the Aviation Industry.
- During break time (if you have access to a mini projector) show short videos (in resource section) to students to inspire and expose them to new ideas. These videos will also show Aircraft Industry Professionals in action.
- Remind students that they are a part of a statewide challenge and if they win this challenge they could get the opportunity to tour Duncan Aviation (continue this motivation throughout the day).
- Towards the end of the day (1 hour left) students will be asked to wrap up the build and add finishing touches. The Duncan Interior Design Team will call, skype, or visit the Students Concept aircraft. They will ask questions and provide feedback. Students will then get the opportunity to ask the Design Team questions.
- Facilitators will take pictures and submit them to the design challenge email.

Fuselage Buildout Design Brief & Options:

Designing Middle Section of Aircraft

Note: Basic Fuselage is required in order to submit to Duncan Design Team:

Basic Fuselage

- 4 Seats
- Sleeping
- Eating
- Working
- Relaxing, Fun, Entertainment?
- 1 Walkway
- Windows
- Includes all Safety Features
- Oxygen Masks
- Exit Door
- Floatation Device
- 1 Food Cart

Upgraded Fuselage

- 1 Section of the Aircraft is Designated for "Blue Sky" Ideas

Examples:

- Trampoline
- VR Room
- Soccer Goal
- Hot Tub
- Garden

Full Package Fuselage

- Includes Basic and Upgraded Fuselage Features
- Lighting
- Upgraded Electronics
- Lounge Seats

Duncan Design Challenge

Group Structure and Design Process:

Interior Completions

1. Interior Design
   - Interior Wall Panels Color & Material
   - Floor Color and Material
   - Seat and Cabin Layout
2. Seat Design
   - Functionality and Form
   - Storage
   - Color and Material
   - Storage and Tray Tables
3. Cabinet Design
   - Luggage
   - Safety Equipment
   - General Storage
   - Misc.
4. Catering and Entertainment
   - Tray Tables
   - Food Carts
   - Movie Screens and Tech.
   - Innovate (What else would you include?)
5. Safety Team
   - Oxygen Masks
   - Floatation Devices
   - Seatbelts
   - Exit Doors
6. Innovation Team
   - Blue Sky - Big Ideas
   - What will the future of flying look like?
   - What would make flying safer, more relaxing, fun, exciting etc.

Exterior Completions

1. Sheet Metal
   - Cladding Exterior of Plane in Sheet Metal
2. Windows
   - Cut Windows into Sheet Metal
3. Paint
   - Paint Sheet Metal Exterior
4. Graphics
   - Flight Numbers
   - Name of Aircraft
5. Innovation Team
   - Blue Sky - Big Ideas

Duncan Design Challenge

Design and Engineering Team Meeting:

"In order to design a complete and cohesive aircraft, Duncan Aviation Design and Engineering Employees are in constant communication. "

At the end of Day 1 we will gather into a group and each person/group will get to quickly present what they created for the day. You will explain what your career is and what you are in charge of. The group will give you feedback on what you accomplished so on Day 2 you will have a clear idea of what you need to do next and what everyone else is doing. You may find that you need to collaborate with other groups to complete your design."

Note to Facilitator: The goal of this group discussion is to make sure each student is aware of what everybody else is doing and how their design role/career overlaps with what others are working on.
For example: Seat designers should realize they need to talk with the entertainment designers to come up with movie screens and other technology that is integrated into the seat.

Teams and Roles:

Safety Team

- Job/Duty Description: You are in charge of all safety features that are found in aircraft. This will include oxygen masks, flotation vests, and exit door locations. You must make sure passengers can easily access all of these safety features.
- To-Do Checklist:
  Where oxygen masks are stored
  Emergency Exit location
  Flotation device storage areas
- Other Teams you talk to:
  Seat Designers
  Interior Designers
  Cabinet Shop

Sheet Metal Team (Exterior)

- Job/Duty Description: You are in charge of covering the aircraft fuselage, bottom to top, with aluminum panels (cardboard) leaving the front and back open to walk through.
- To-Do Checklist:
  Measure fuselage openings
  Find cardboard to cover openings
  Cut cardboard to size if needed
  Use make-do's and duct tape to attach cardboard to fuselage
  Tip: Make-do's will make great rivets to attach cardboard pieces together. Duct tape will work well to attach cardboard to wooden fuselage parts.
- Other Teams you talk to:
  Safety Team
  Exterior Designers

Duncan Design Challenge

Teams and Roles:

continued

Interior Design Team

- Job/Duty Description: YYou are tasked with determining the way the interior of the aircraft looks. You must create an environment passengers can relax, enjoy, and have fun in. You are in charge of colors, fabrics, and materials.
- To-Do Checklist:
  - Aircraft seat fabric/Upholstery
  - Interior Color
  - Floor fabric or Color
  - Window Size
- Other Teams you talk to:
  - Exterior Design Team
  - Safety Team
  - Cabinet Shop
  - Entertainment Design

Seat Designer

- Job/Duty Description: You are in charge of designing and building super comfortable and safe seating for the passengers and crew.

Cabinet Maker

- Job/Duty Description: You are in charge of safe and sturdy storage solutions for all things in the aircraft. You will design and build cabinets for the passengers personal belongings as well as cabinets for food, water, and safety equipment.

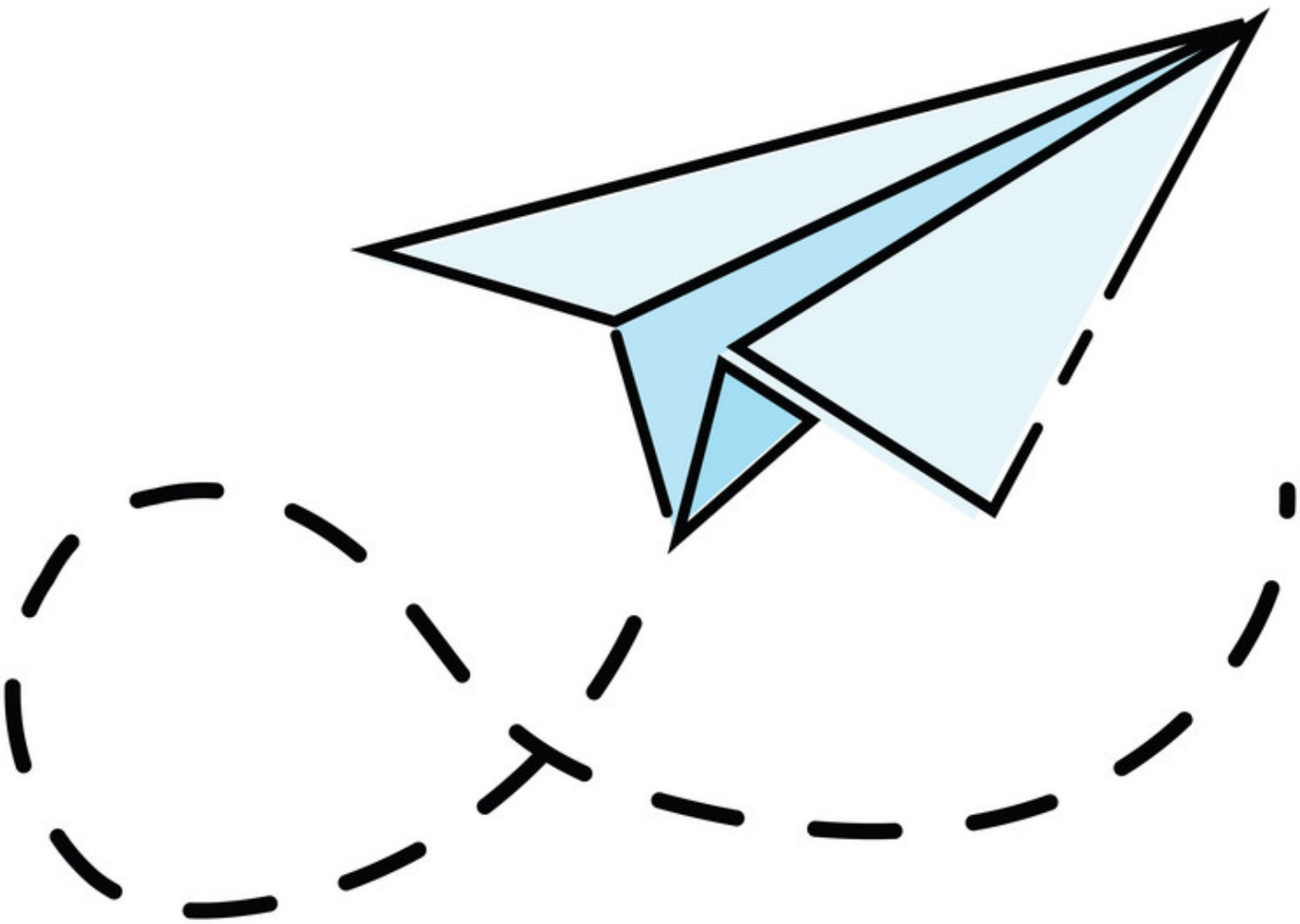
Avionics Engineer

- Job/Duty Description: You are in charge of all electronic systems in the air craft which include, navigation systems, instrumentation, landing gear, and safety. NOTE: If you would like to include the cockpit for the pilots in your aircraft design have the avionics engineer design this area.

Onboarding Catering & Entertainment

- Job/Duty Description: Your task is to make the aircraft as comfortable and fun for the passengers as possible. You must also consider the flight crew and how they will serve food to the passengers.
- To-Do Checklist:
  - Tray Tables
  - Food Carts
  - Movie Screens
  - Other Entertainment Options
- Other Teams you talk to:
  - Safety Team
  - Cabinet Shop
  - Interior Design

Innovation Shop



CABINET MAKER

JOB DESCRIPTION

You are in charge of safe and sturdy storage solutions for all things in the aircraft. You will design and build cabinets for the passengers personal belongings as well as cabinets for food, water, and safety equipment.

CABINET MAKER

TO-DO LIST

- ◯ Luggage Cabinets
- ◯ Kitchen Galley
- ◯ Air & Light Cabinets
- ◯ Bathroom Cabinets
- ◯ Interior Paneling

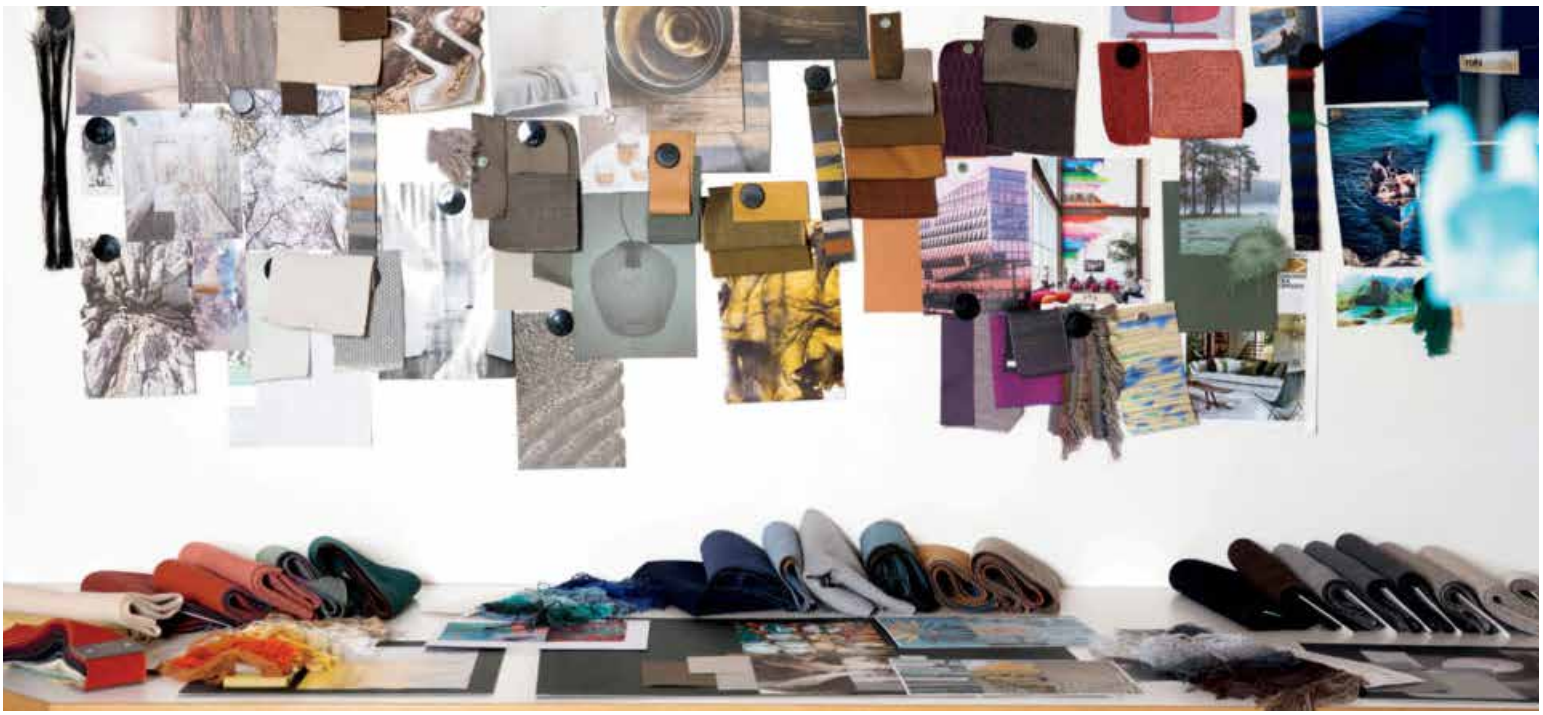
CHECK-IN WITH

- ◯ Safety Team
- ◯ Interior Design Team
- ◯ Catering & Entertainment

INTERIOR DESIGN

JOB DESCRIPTION

You are tasked with determining the way the interior of the aircraft looks. You must create an environment passengers can relax, enjoy, feel safe and have fun in. You are in charge of colors, fabrics, and materials for all things in the aircraft.



INTERIOR DESIGN

TO-DO LIST

- ◯ Color & Fabric Choice
- ◯ Seat & Cabin Layout
- ◯ Lighting*
- ◯ Flooring and Interior Panels Materials/Color

CHECK-IN WITH

- ◯ Safety Team
- ◯ Cabinet Shop
- ◯ Paint Team
- ◯ Catering & Entertainment

SAFETY TEAM

JOB DESCRIPTION

You are in charge of all safety features that are found in aircraft. This will include oxygen masks, floatation vests, and exit door locations. You must make sure passengers can easily access all of these safety features from their seat.

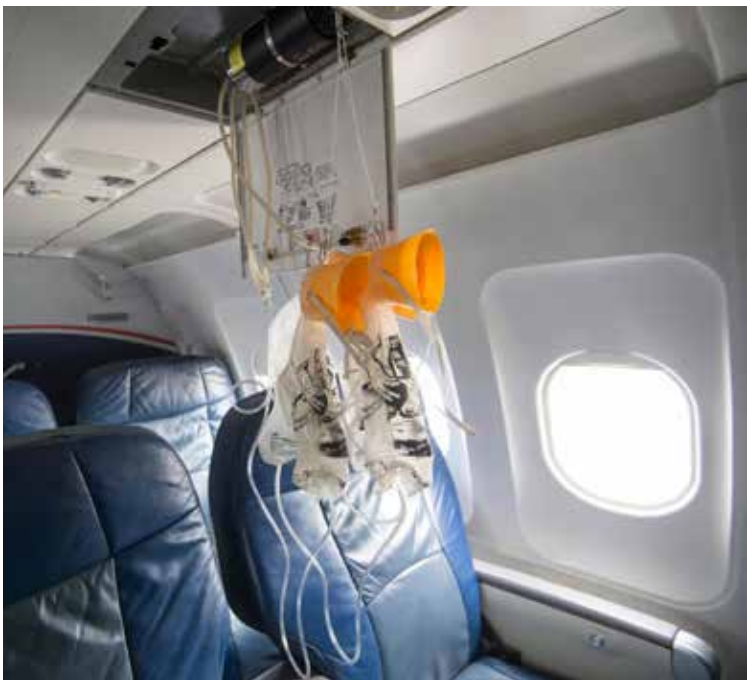
SAFETY TEAM

TO-DO LIST

- ◯ Oxygen mask storage areas
- ◯ Emergency Exit
- ◯ Flotation device storage areas

CHECK-IN WITH

- ◯ Seat Designers
- ◯ Interior Designers
- ◯ Cabinet Shop



SEAT DESIGN

JOB DESCRIPTION

You are in charge of designing and building super comfortable and safe seating for the passengers and crew.

SEAT DESIGN

TO-DO LIST

- ◯ Seat Layout
- ◯ Seat Functionality
- ◯ Comfy Seats
- ◯ Upholstery
- ◯ Seat Belts

CHECK-IN WITH

- ◯ Interior Design Team
- ◯ Safety Team
- ◯ Catering & Entertainment

CATERING & ENTERTAINMENT

JOB DESCRIPTION

Your task is to make the aircraft as comfortable and fun for the passengers as possible. You must also consider the flight crew and how they will serve food to the passengers.

CATERING & ENTERTAINMENT

TO-DO LIST

- ◯ Tray Tables
- ◯ Food Carts
- ◯ Movie Screens
- ◯ Other Entertainment

CHECK-IN WITH

- ◯ Interior Design Team
- ◯ Safety Team
- ◯ Cabinet Shop

EXTERIOR DESIGN TEAM

JOB DESCRIPTION

Your task is to complete the exterior of the aircraft fuselage. Your first job is to clad the aircraft with sheetmetal and to decide where and how big the windows will be. You will also be in charge of paint and graphics.

EXTERIOR DESIGN TEAM

TO-DO LIST

- ◯ Sheet-Metal Cladding
- ◯ Window Design
- ◯ Paint
- ◯ Graphics

CHECK-IN WITH

- ◯ Interior Design Team
- ◯ Safety Team
- ◯ Cabinet Shop

INNOVATION TEAM

JOB DESCRIPTION

As the Innovation Team you will spend your time dreaming up the future of airplane travel. You will be tasked with drawing out big ideas and building prototypes to explain your ideas to others. Your creation has got to have the “WOW Factor!”

INNOVATION TEAM

TO-DO LIST

- ◯ Dream Big
- ◯ Sketch Ideas
- ◯ Prototype Ideas
- ◯ “WOW Factor” Design

CHECK-IN WITH

- ◯ Interior Design Team
- ◯ Safety Team
- ◯ Cabinet Shop
- ◯ Catering & Entertainment

Activity Sheet

Hang Time

FETCH! with Ruff Ruffman™

Time to drop everything. Really! Build some copters and race them. The winner hits the ground LAST. Look out below!

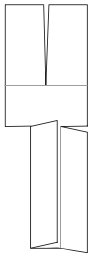
What to Do

1. **Get what you need.**
   - A few sheets of paper • Scissors
   - Paper clips (1 large and 1 small)

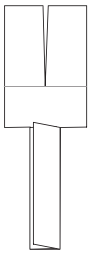
2. **Make your copter.** Cut out the copter printed on this page. Cut along the **dotted** lines. Assemble it as shown.

3. **Launch your copter.** Hold your copter as high as you can. Let go and watch as it falls. Does it spin to the ground?

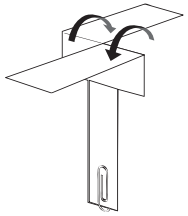
4. **Change your copter.** Build a second copter of your own design. This time, change a feature, such as the copter's size or shape of the blades. Try using more or fewer paper clips. Then launch both the new and original copter designs and compare how they fall. What kind of difference did your change make?



Fold Tab A over Tab B.



Fold Tab C over Tab B.



Fold blades D and E in opposite directions. Slip on a paper clip.

Chew on This

When you drop your copter, its blades hit the air. The air pushes back on the blades, giving each one a little push forward. Notice how the blades are not exactly across from each other. This means that one blade is nudging one side of the copter around while the other blade is nudging the other side around. These two pushes work together to spin the copter around its center point. The spinning blades hit a lot of air on the way down, and all this air pushes back on the blades. The more air you can get to hit your blades (i.e., the more push-back you can create), the slower your copter will fall.

D E

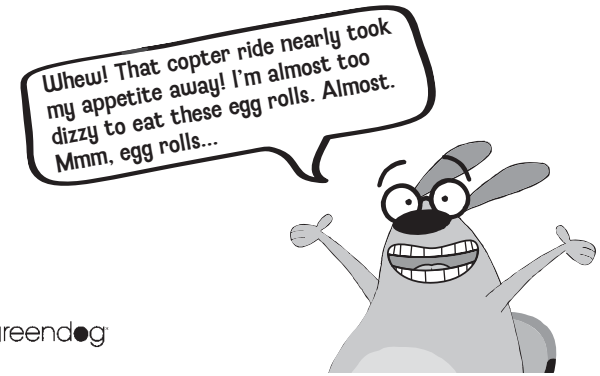
A B C

Dig Deeper

* Experiment with the size of your copter. How big or small can you make it and still have it spin as it falls to the ground?
* Does your copter always spin in the same direction? Mark one blade with a bold color. Then watch as your copter falls to the ground. Now, figure out how to make it spin in the opposite direction.
* Attach a thread to Tab B and pull the copter along behind you like a kite.
* Like contraptions that spin as they fly? Get the Hoop Glider challenge from the ZOOM Web site at pbskids.org/zoom/activities.

PBS KIDS GO!

Watch FETCH! on PBS KIDS GO! (check local listings) and visit the FETCH! Web site at pbskidsgo.org/fetch.



WGBH nsf Arby's greendog

Fold

FETCH!

Hang Time

Why did I think I'd be good at snowboarding? This hill is too steep! How am I supposed to get to the lodge now!?! WALK? Oh, there's got to be a better way. I know! Build me a helicopter whirligig that will deliver me to the lodge. And I should get there just in time for that fresh batch of egg rolls they're making. Mmm, egg rolls...

GOOO FETCH!

D E

A B C

Hoja de actividades

Tiempo de vuelo

Fetch! with Ruff Ruffman™

Todo queda en el aire. ¡En serio! Arma un par de helicópteros y hazlos competir. El ÚLTIMO en tocar el suelo gana. ¡Suerte!

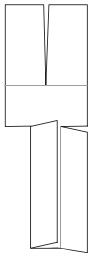
Qué hacer

1. **Esto es lo que necesitas.**
   - Varias hojas de papel • Tijeras
   - Dos clips (1 grande y 1 pequeño)

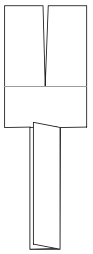
2. **Construye el helicóptero.** Recorta el helicóptero que ves acá a la izquierda. Recorta por las líneas **punteadas** y ármalo según las instrucciones.

3. **Lanza el helicóptero.** Levanta el helicóptero al punto más alto que puedas alcanzar. Suéltalo y obsérvalo al caer. ¿Va dando vueltas mientras cae?

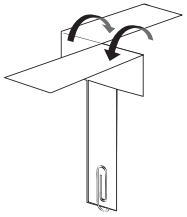
4. **Cambia de helicóptero.** Construye otro de tu propio diseño. Esta vez, cámbiale algo, digamos el tamaño del helicóptero o la forma de las palas. Aumenta o reduce el número de clips. Después, lanza el helicóptero original junto con el nuevo, y compáralos en su manera de caer. ¿Qué consecuencias tuvo el cambio que hiciste?



Dobla la tira A sobre la tira B.



Dobla la tira C sobre la tira B.



Dobla las palas D y E en sentidos contrarios. Ponle un clip al extremo.

Masticalo bien

Al dejar caer el helicóptero, sus palas se mueven contra el aire, desplazándolo. El aire responde ejerciendo un impulso sobre las palas y dándole a cada una un leve empujón. Observa que las dos palas no están precisamente alineadas. Así, mientras una pala impulsa un lado del helicóptero para que gire, la otra pala impulsa el lado contrario. Estos dos impulsos se combinan para hacer girar el helicóptero alrededor de su eje central. Al girar, las palas chocan contra mucho aire mientras el helicóptero va cayendo, y ese aire responde con el impulso que ejerce sobre las propias palas. Cuanto mayor sea la cantidad de aire que choca contra las palas (es decir, mientras más fuerte el impulso que ejerce el aire sobre las palas), más lenta será la caída del helicóptero.

Escarbemos

* Experimenta con el tamaño del helicóptero. ¿Qué tan grande o qué tan pequeño puede ser sin que deje de girar mientras cae?
* ¿Gira el helicóptero siempre en el mismo sentido? Marca una de las palas con un color vivo. Después, obsérvalo mientras cae. Luego, procura que gire en el sentido contrario.
* Pégale un hilo a la tira B y corre con el helicóptero detrás de ti, como si fuera una cometa o un papalote.
* ¿Te gustan las cosas que giran mientras vuelan? Acepta el reto *Hoop Glider* en la sede de ZOOM en Internet, en pbskids.org/zoom/activities.

PBS KIDS GO!SM

Veamos FETCH! en PBS KIDS GO! (consulta el horario local). Visita la sede de FETCH! en pbskidsgo.org/fetch.

WGBH nsf Arby's greendog

Doblar

FETCH!

Tiempo de Vuelo

¿Cómo fue que se me ocurrió hacer *snowboard?* ¡Este cerro está muy empinado! Y ahora, ¿cómo lo vuelvo a subir? ¿A pie? Tiene que haber otra forma... ¡ah, ya sé! Constrúyeme un helicóptero que me lleve hasta la cima. Me urge porque allá hay un restaurante que sirve unas empanaditas riquísimas. Ay, cómo me encantan...

VAMOS FETCH!

Hang Time

FETCH! with Ruff Ruffman™


NEBRASKA
Airport Map
SOUTH DAKOTA
WYOMING
COLORADO
KANSAS
IOWA
MISSOURI
Chadron City
Chadron Municipal
Gordon Municipal
Modisett
Miller Field
Butte Village
Ainsworth Regional
Bassett City
O'Neill City
South Sioux City
Alliance City
Thomas County
Norfolk City
Scottsbluff City
Hyannis Village
Norfolk Regional/Karl Stefan Memorial Field
Harrisburg
Garden County
Broken Bow City
Columbus City
Fremont City
Eppley Airfield
Kimball City
Columbus Municipal
Omaha City
Billy G Ray Field
Searle Field
North Platte City
Bellevue City
Central Nebraska Regional
Offutt AFB
J&J
Plattsmouth City
Grand Island City
Seward City
Lexington City
Grant Municipal
Lincoln
Kearney City
Hastings City
Holdrege City
Beatrice Municipal
McCook City
McCook Ben Nelson Regional
Beatrice City
LEGEND
State Boundary
County Boundary
State Capital
Airport
City
0 50 100 KM
0 50 Miles
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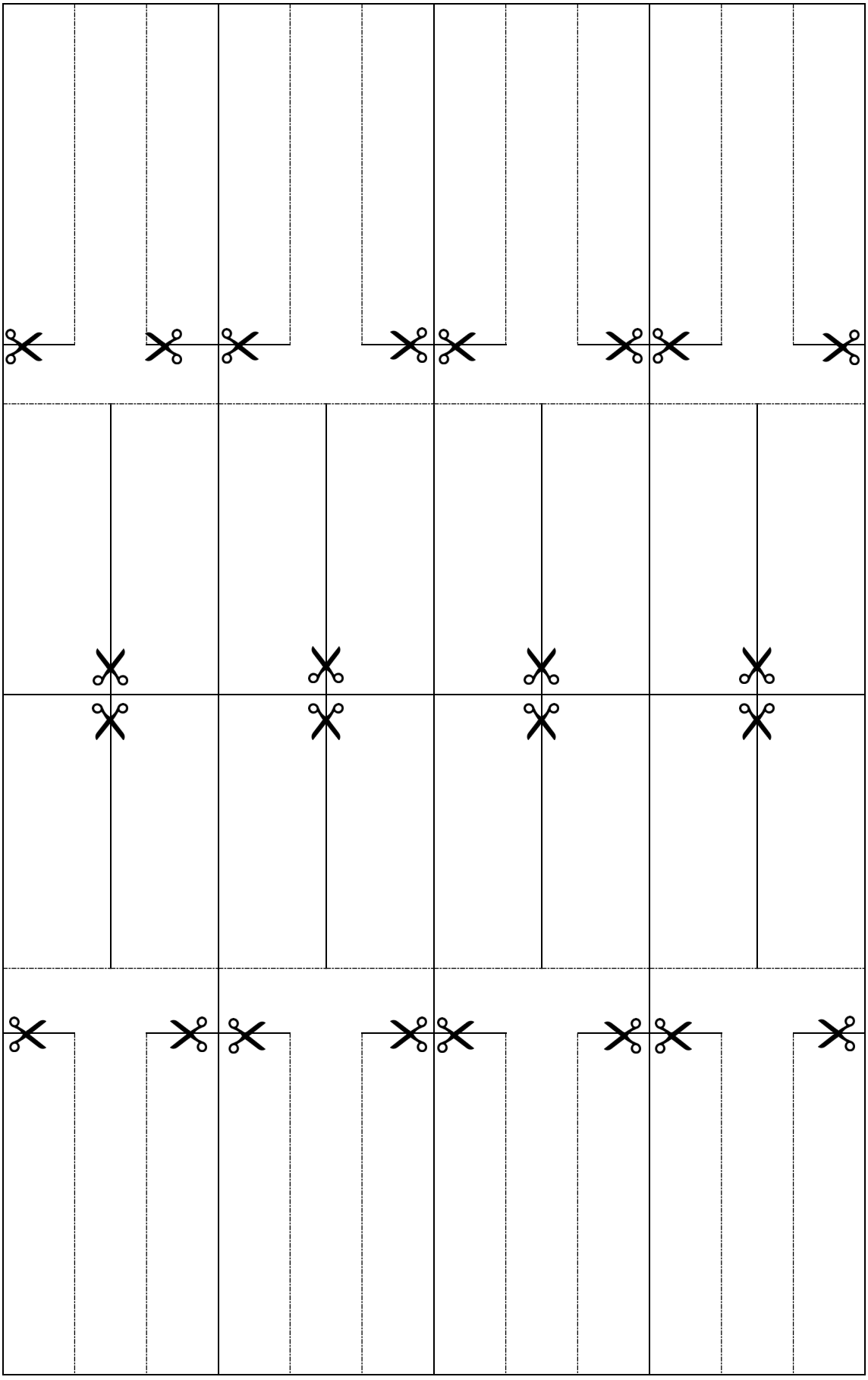
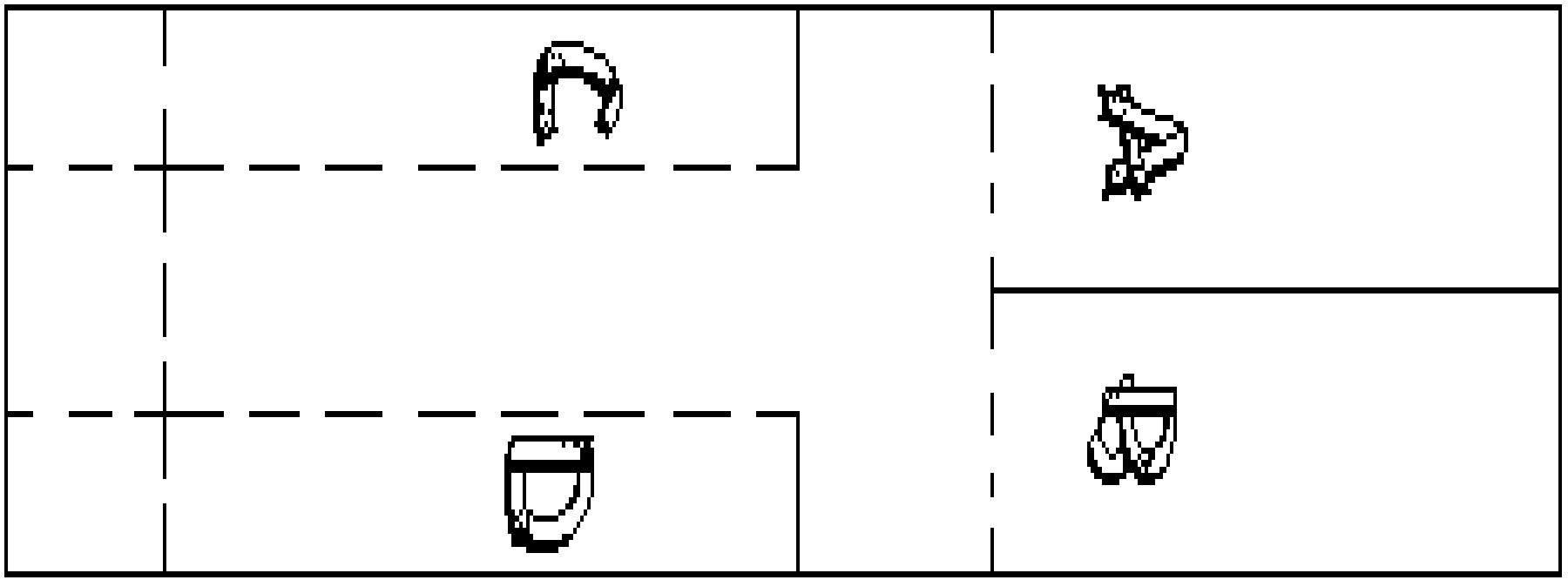
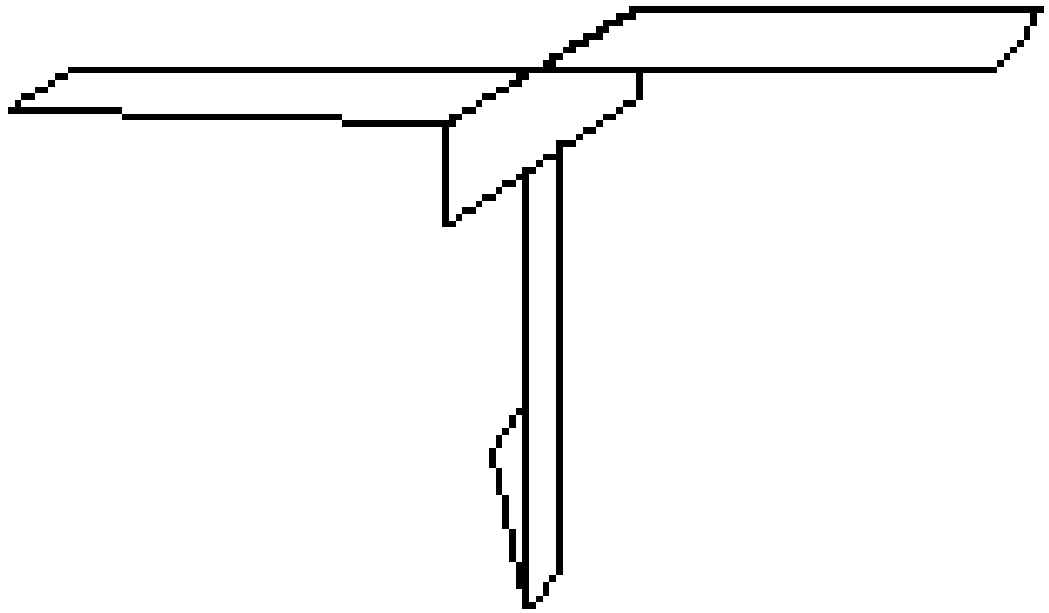
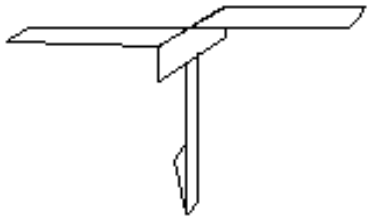


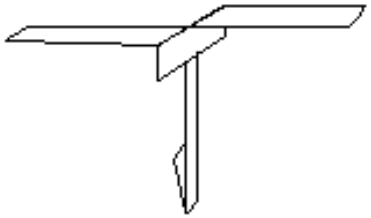




http://www.paperairplanes.co.uk/paper-airplane-video-heliplan.php



Paper helicopters



1. Cut along all the solid lines on the diagram to the right.
2. Fold flap A forward and flap B to the back.
3. Fold flaps C and D both forward along the dotted lines.
4. Fold along the line E upward to give a weight at the bottom.
5. Now this should look like the diagram at the top.
6. You can scale up this model as much as you want. You just drop the model with the blades facing upwards and the weight at the bottom facing downwards for the best results.

Results for paper helicopters

Number of paper clips	Height (m)	Time taken to fall
1		
2		
3		
4		
5		