

EDUCATIONAL OPPORTUNITIES AT WHIRINAKI WHARE TAONGA

EDUCATIONAL RESOURCE



AIR PLAYGROUND



31 Oct 2026 - 28 Feb 2027

Designed with primary aged students in mind, the Air Playground exhibition is a social and interactive space where students can explore air and all its complex behaviours. Through open ended tinkering and collaborative play, students develop key STEM skills and dispositions – test, try, fail, iterate. It's a constant experimental process, allowing students to construct their own knowledge of how a gas behaves and how objects move through gases.

Gallery and creative schedule

Welcome & Karakia

We begin our visit with a warm welcome and karakia.

Discover the Science of Air and Tāwhirimātea

We explore what air is, how it moves, and how we can see and feel its effects.

We will have chat about Tāwhirimātea, atua of the winds and weather, and explore a te ao Māori perspective on the natural world.

Explore Air Playground

Experiment, play and investigate air through the exhibition:

**Gust • Flow • Puff • Squish • Lift • Swirl • Whoosh •
Hover • Flutter • Fly**

Make a Windmill & Ribbons

Head into the classroom to create a windmill with flowing ribbons and experiment with how air can make things spin, move and flutter.

OUR BIG QUESTIONS THIS TERM

- ⇒ How do we know air is there if we can't see it?
- ⇒ What can air make move?
- ⇒ What happens when we change the way air moves?
- ⇒ How can we experiment with air to solve a problem?



New Zealand Curriculum links

SCIENCE & TECHNOLOGY	Programme Connection	Level 1–2	Level 3–4	Level 5–6	Level 7–8
Nature of Science / Science capabilities	Explore air through play: question, predict, observe, test, compare and explain what happens.	Ask questions and make observations about air and movement.	Make predictions, investigate and describe patterns.	Plan investigations, gather evidence and explain findings.	Evaluate evidence and use scientific understanding to explain results.
Physical World – Forces & Movement	Investigate how pushes, pulls, gravity and moving air affect objects.	Explore how pushes and pulls make objects move or change direction.	Investigate how forces affect the movement of objects.	Investigate and explain relationships between forces and motion.	Apply understanding of forces and motion to increasingly complex situations.
Material World – Air & Gases	Discover that although we cannot always see air, air is matter, takes up space and can exert force.	Explore the observable effects of air.	Investigate properties and behaviour of air and other materials.	Investigate properties and behaviour of gases and how they interact.	Use scientific models and evidence to explain the behaviour of matter.
Technology – Technological Practice	Use experimentation and problem-solving to explore how design, materials and shape affect movement through air.	Explore and create simple solutions through making and testing.	Develop, test and improve design ideas.	Use evidence from testing to refine technological outcomes.	Critically evaluate and refine technological solutions.
Thinking & Collaboration	Work together to experiment, problem-solve, communicate ideas and learn through play.	Share ideas, take turns and try different solutions.	Collaborate, ask questions and explain thinking.	Evaluate ideas and adapt approaches using evidence.	

VISUAL ARTS	Programme Connection	Level 1–2	Level 3–4	Level 5–6	Level 7–8
Developing Practical Knowledge	Explore colour, line, shape, pattern and movement while designing and decorating a windmill and ribbons.	Explore different art materials, colours, shapes and lines.	Experiment with visual elements and materials to communicate ideas.	Select and combine visual elements and techniques purposefully.	Refine and control materials and techniques to communicate ideas.
Developing Ideas	Make individual design choices and experiment with how the artwork will look and move in the air.	Develop ideas through play, imagination and experimentation.	Develop and revisit ideas while creating an artwork.	Generate, develop and refine visual ideas.	Develop and resolve ideas through purposeful experimentation.
Communicating & Interpreting	Talk about design choices: Why did you choose those colours, patterns or ribbons? What happens when your artwork moves?	Share ideas and feelings about their own and others' artworks.	Describe how visual choices communicate ideas.	Explain how materials and visual elements contribute to meaning.	Analyse and discuss how visual choices communicate ideas and experiences.



WHOOSH

Tamariki push a scarf into one of four fast flowing jets of air. The scarf whooshes through a tangle of tubes before ejecting and drifting to the floor. Tamariki can experiment with switching a flap to direct airflow or trying to predict where the fabric will land adding a puzzle element to the play.

Science:

Air has force, it can push. Air has volume and air resistance slows down the fall of the scarves.

HOVER

Two colourful mounds hold beach balls hovering enticingly in mid-air. A button activates air flowing out of surrounding tubes so that visitors can themselves experiment with balancing balls and objects in the airflows.

Science:

Fast-moving air flows around the curved ball, creating lower pressure that helps it hover. The upward push of the air balances gravity. Round objects hover more steadily, while other shapes can wobble as the airflow becomes turbulent.



LIFT

Tamariki press a button to turn on the fan and then adjust a dial for the speed of the fan. They can test the lifting capabilities of the airflow using the provided test objects.

Science:

Biomimicry uses ideas from nature to inspire design. Flying seeds show how shapes can spin, float and flutter by catching and moving through the air.

SWIRL

Tamariki work individually or collaboratively to activate fans which blow air to direct a ball around obstacles, into a goal. They press a button which uses air to pop the ball back out to reset. Tamariki get a feel for the chaotic way that air interacts with itself and physical items around it.

Science:

Air is complex. Mechanical turbulence is when airflow is interrupted and diverted by objects in its way, creating unpredictable swirls and eddies which then interact with each other in surprising

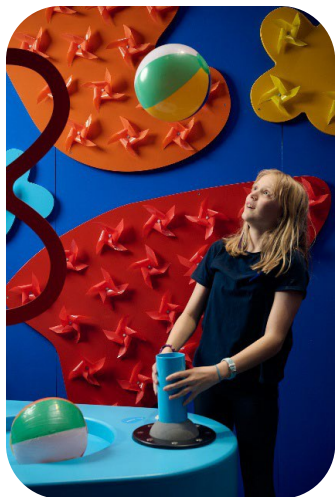


SQUISH

Tamariki use their feet, arms, in fact, their whole body to squish a huge inflatable sculpture filled with air. Where does the air go when they squish it?

Science:

Air is a gas which fills its container. This allows it to fully inflate soft containers like balloons. When you squash air in a soft container, it doesn't normally compress, it displaces and changes the shape of the container.



FLOAT

Tamariki float a ball in the airflow which they activate by pressing a button. They grip the nozzle to manipulate the ball on the air stream through the goal.

Science:

A low pressure air pocket holds the ball in place. Even if you hold the air stream to the side, the pressure difference created by the air flowing around the ball is greater than the gravitational pull.

PUFF

Tamariki work together collaboratively or work quickly individually to pump puffs of air in time to move a ball up a hill. Can you get the ball up to the top of the mountain before it rolls back down?

Science:

Air has mass and can push things. A bike pump works by compressing air through a smaller opening to create a puff of increased air pressure.



GUST

Tamariki can experience the wind swirling through their hair and gusting around them in a high-volume airflow environment generated by three large industrial fans.

Science:

The sun heats the atmosphere, creating differences in air pressure. Air moves from high to low pressure — the greater the difference, the stronger the wind.

FLOW

Tamariki connect pipe pieces to divert the airflow. Soft fabric tubes and small objects help visualise how this flow changes while a sound module helps visitors hear how the flow changes. Challenges include constructing a spinner or a launcher.

Science:

When you divert or split the airflow, the air pressure reduces. If you block one opening, the air pressure will increase in the other. Airflow in different directions will cause a structure to spin.



FLY

Tamariki follow the illustrated guides to fold a paper plane design or make their own. They can decide whether they are going for distance, for targets or for tricks.

Science:

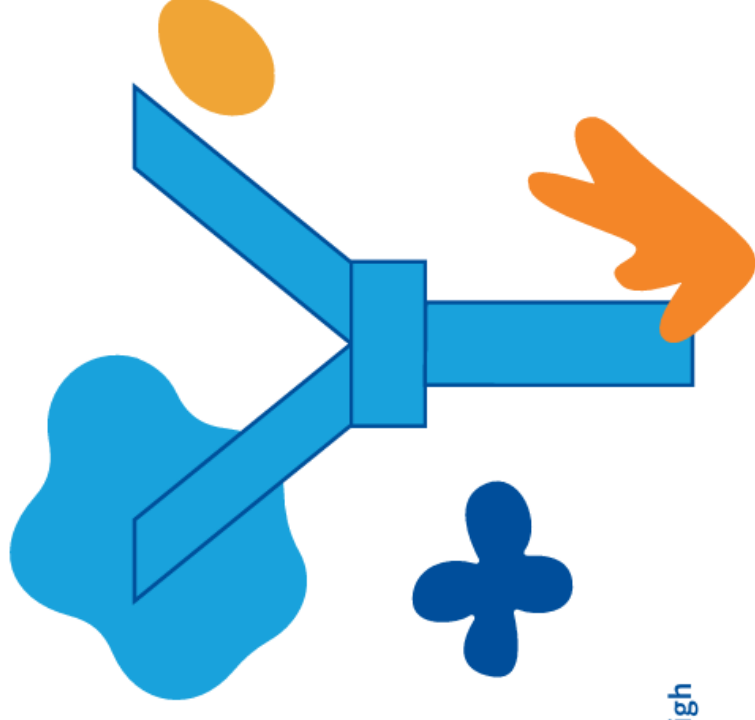
Why does a folded plane fly better than a flat piece of paper? It needs to have enough centred weight to throw easily, be streamlined to overcome air resistance and have enough surface area on the wings to help it glide.

PRE-VISIT

SPIN AND FLY

What features help something float or flutter in the breeze?

Make rotocopters with your students to begin their investigation. Use the provided templates and modify their design to test different variables.



As a class, throw the rotocopters up high and watch them spin as they drop.

Ask your students: does its flight change if you modify the

Weight (number of paperclips)

Size (we have provided small and large templates, but you could try to make a tiny or huge one)

Material (thinner or thicker paper, other materials like plastic or thin foam?)

Wing shape (does it matter how the wing is angled, if it's rectangular, curved or pointy?)

PRE-VISIT

SPIN AND FLY

3D Design Challenge

Challenge students to use TinkerCAD or Makers Empire to design their own spinning flyer.

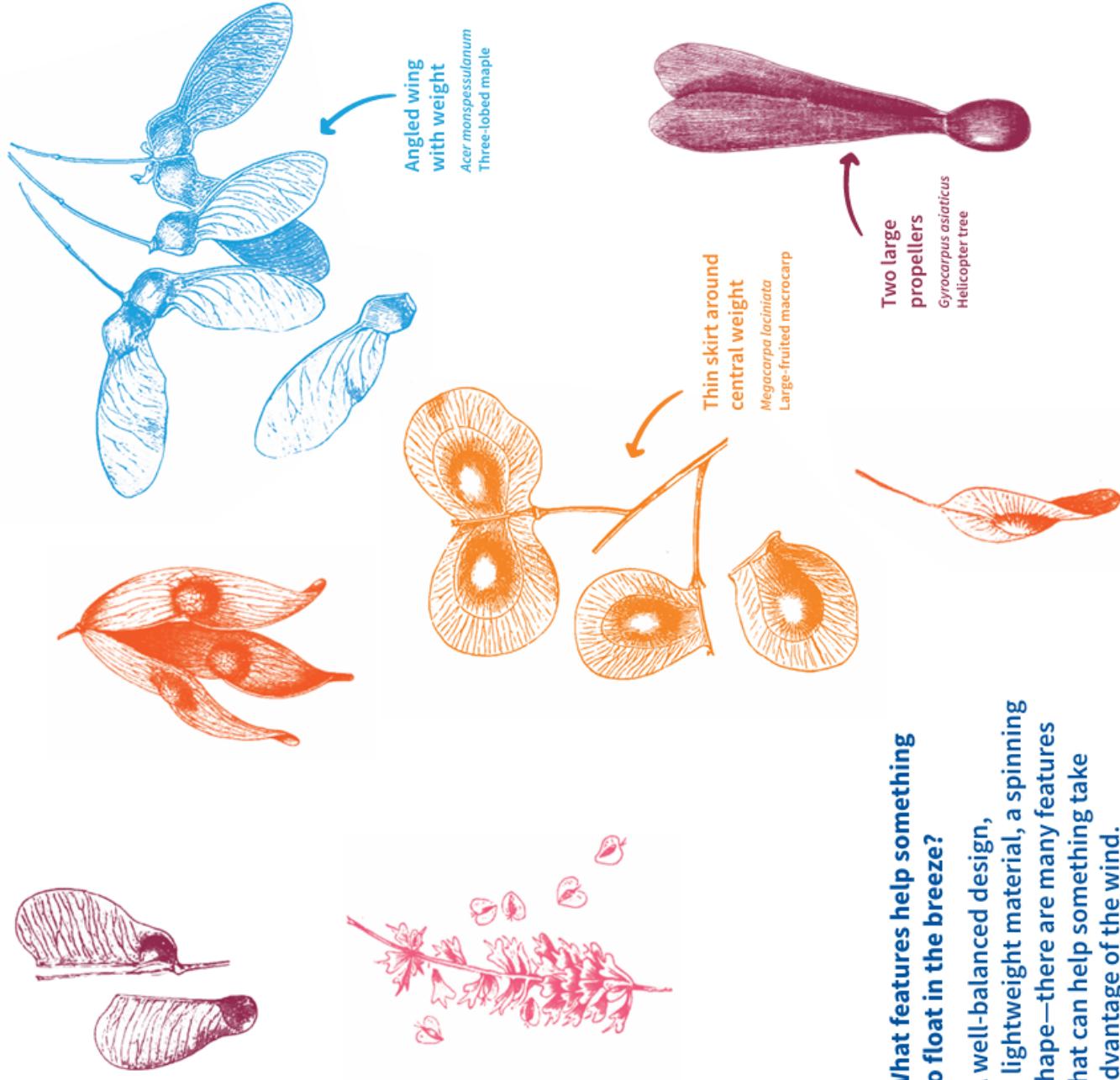
If you have a 3D printer at your school, print a design and test it on the *Lift* air table when you come to the exhibition.

If you don't have a 3D printer, students can design and build a spinning flyer from recycled materials to test on the *Lift* air table.

Seeds

Many modern flying contraptions have been inspired by nature. Ask your students to collect some seeds from the park or the school yard. Throw them up and watch how they flutter.

How does having flying seeds help the plant survive?



What features help something to float in the breeze?

A well-balanced design, a lightweight material, a spinning shape—there are many features that can help something take advantage of the wind.

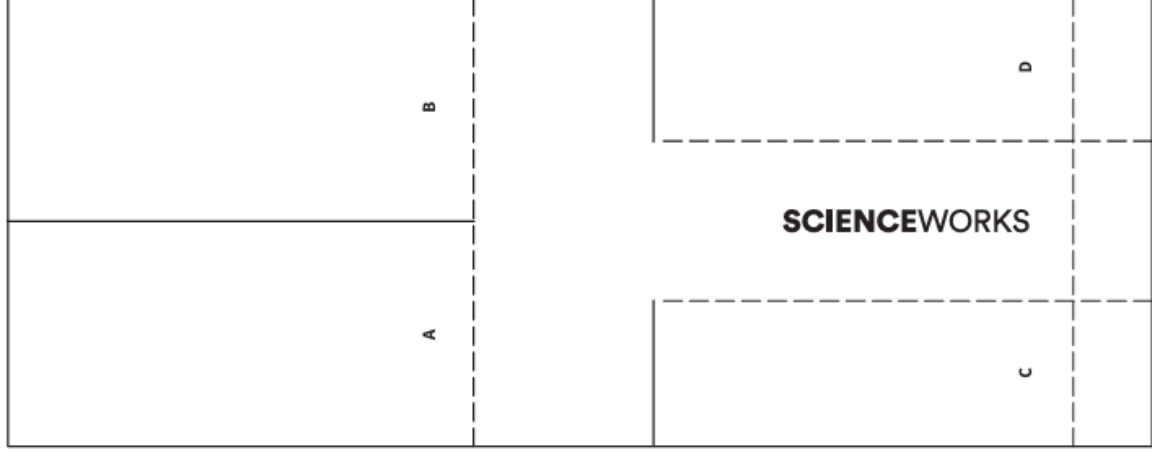
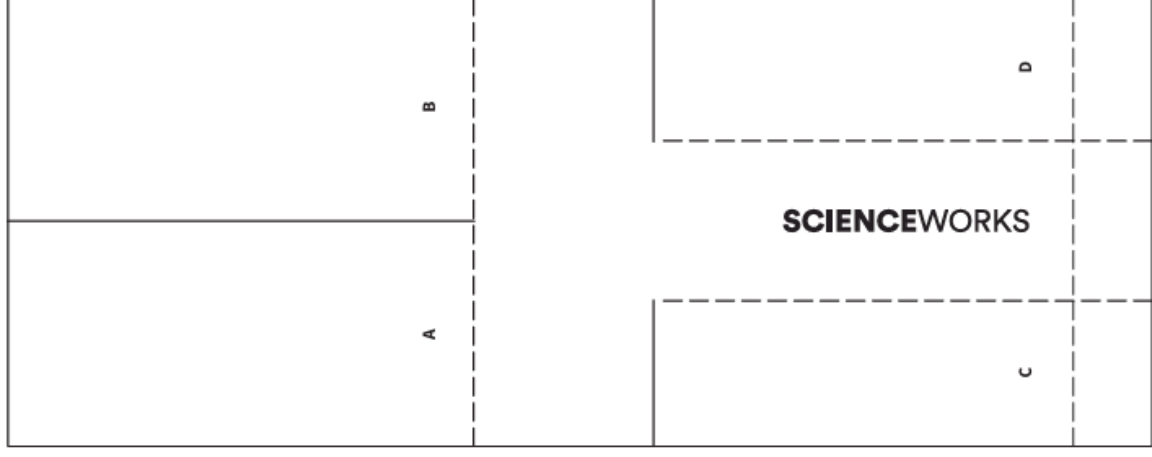
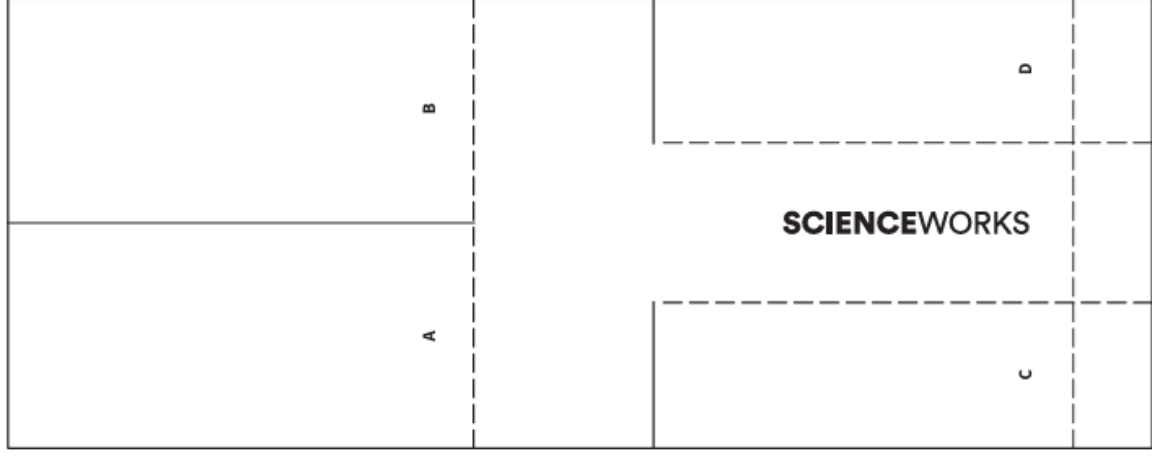
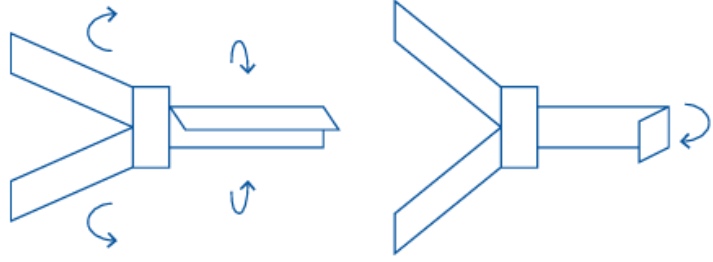
Illustrations: Unknown. Source: Anton Kerner von Marilaun. *The Natural History of Plants, Their Forms, Growth, Reproduction, and Distribution*. London, 1902.

LARGE ROTOCOPTER TEMPLATE

Cut on solid lines, fold on dotted lines.

Add paperclips for weight once C and D are folded on top of one another.

Fold back A and B away from each other.

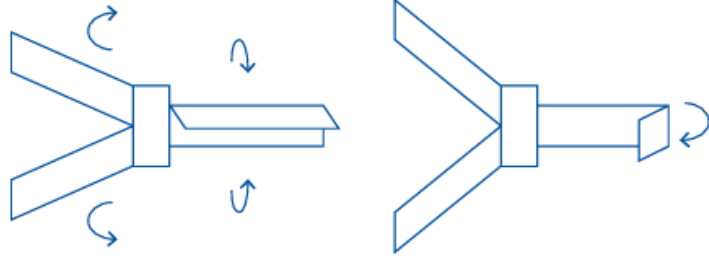


SMALL ROTOCOPTER TEMPLATE

Cut on solid lines,
fold on dotted lines.

Add paperclips for weight once C and D are folded on top of one another.

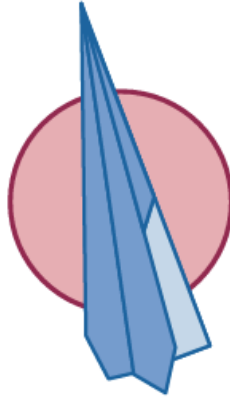
Fold back A and B away from each other.

[illegible]

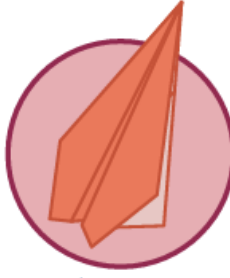
PRE-VISIT

PAPER PLANES

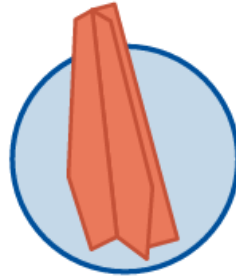
In the *Air Playground* exhibition, visitors are provided instructions to make four different types of paper planes:



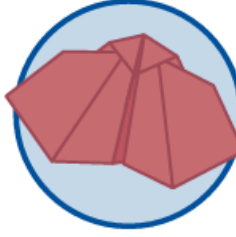
Classic Dart



Suzanne Glider



Blunt Nosed
Glider



Flapping Bat

Before you visit Air Playground, ask your students to practise making them with the instructions on the next few pages.



Questions to facilitate student thinking:

Which plane has the most streamlined shape?

Which has the **biggest** wings for its size?

Which has a centre of gravity (the heaviest part) closest to a quarter of the way from tip to tail?

Which one **flies the furthest**?

With how much force and at what angle do you throw each design for the best distance?

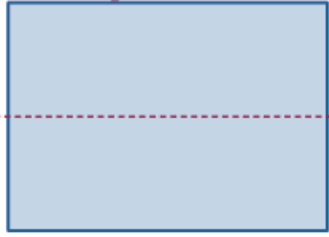
Does **size or thickness** of the paper make a difference?

CLASSIC DART

SIMPLE

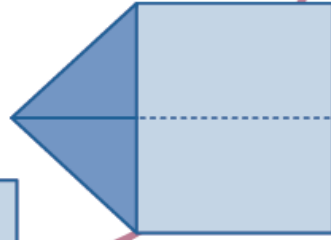
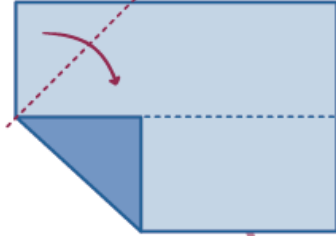
1

Fold and open to crease the centre length ways.



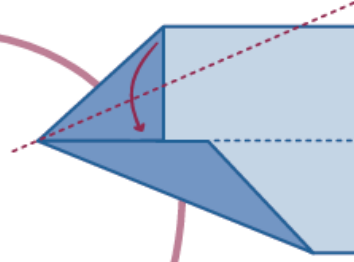
2

Use the crease as a guide to fold the top corners in.



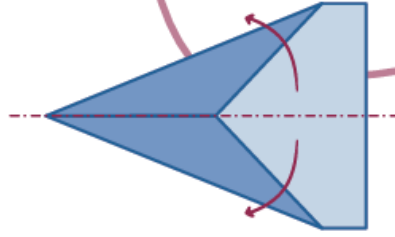
3

Fold the edges to the centre crease.



4

Fold in half along the centre crease. The folds should be on the outside.



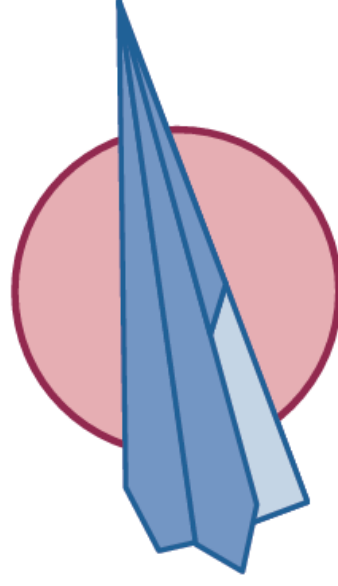
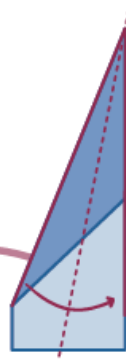
5

Flip and rotate.



6

Fold each wing down, matching the wing edge to the bottom.



Follow along
with our video!



BALANCED BLUNT NOSED GLIDER

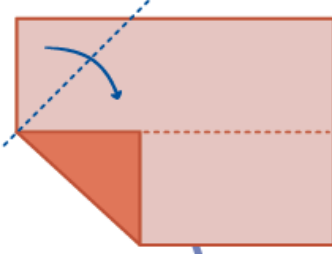
1

Fold and open to crease the centre length ways.



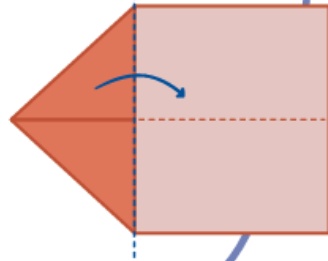
2

Fold edges to centre crease to make a triangle.



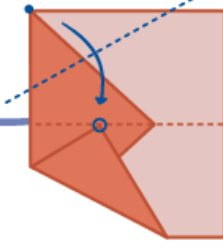
3

Fold triangle down.



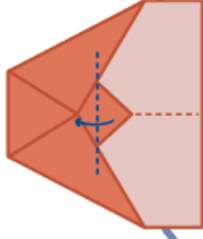
4

Fold corners so that they meet at the centre crease.



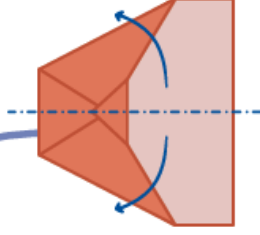
5

Fold the point of the triangle up.



6

Fold in half along centre crease. The folds should be on the outside.



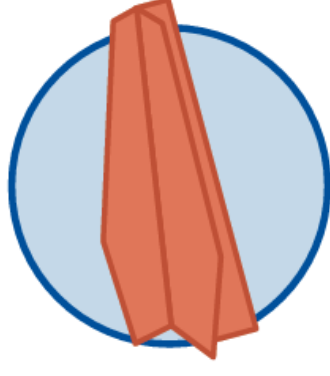
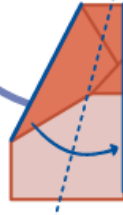
7

Rotate and flip.



8

Fold each wing down, matching the wing edge to the bottom.



Follow along
with our video!

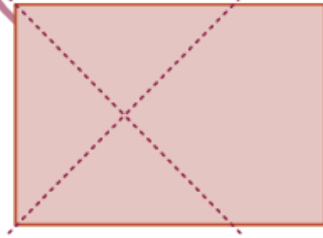


DISTANCE

SUZANNE GLIDER

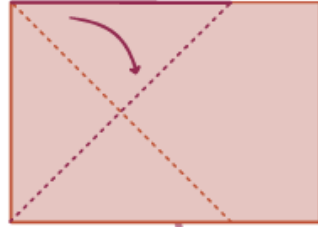
1

Fold the top edge of the page so it meets each side to create a cross at the centre.



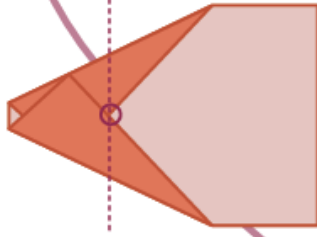
2

Fold the side edges so they meet the **opposite** crease. The folded flaps should overlap.



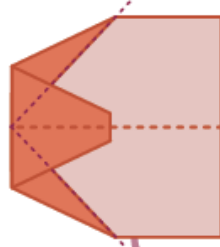
3

Fold the top down where the two flaps meet at a point.



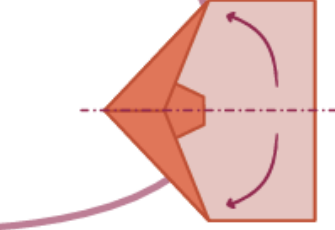
4

Fold top corners to centre crease.

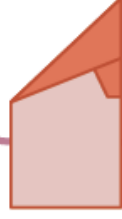


5

Fold in half along the centre crease. The folds should be on the outside.

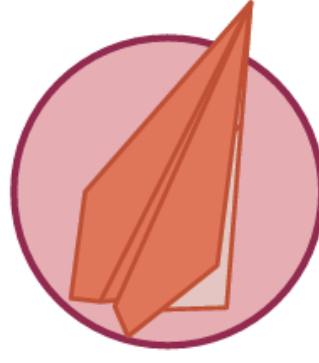
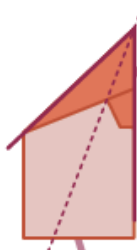


6
Flip and rotate.



7

Fold the wings down on each side, matching the diagonal edge to the bottom.



Follow along with our video!

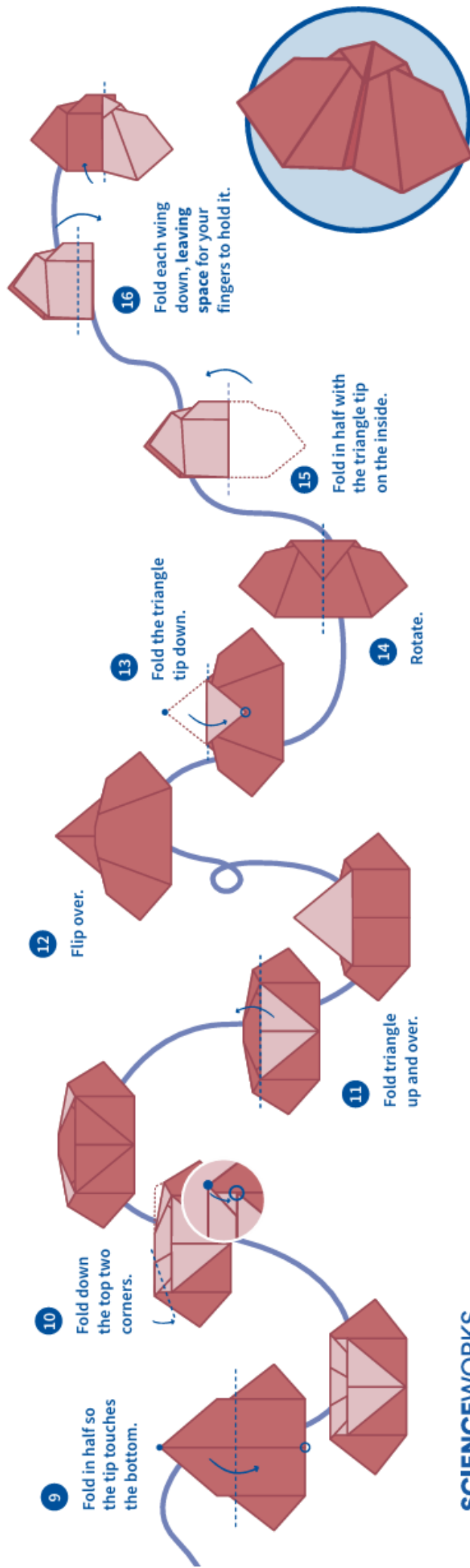
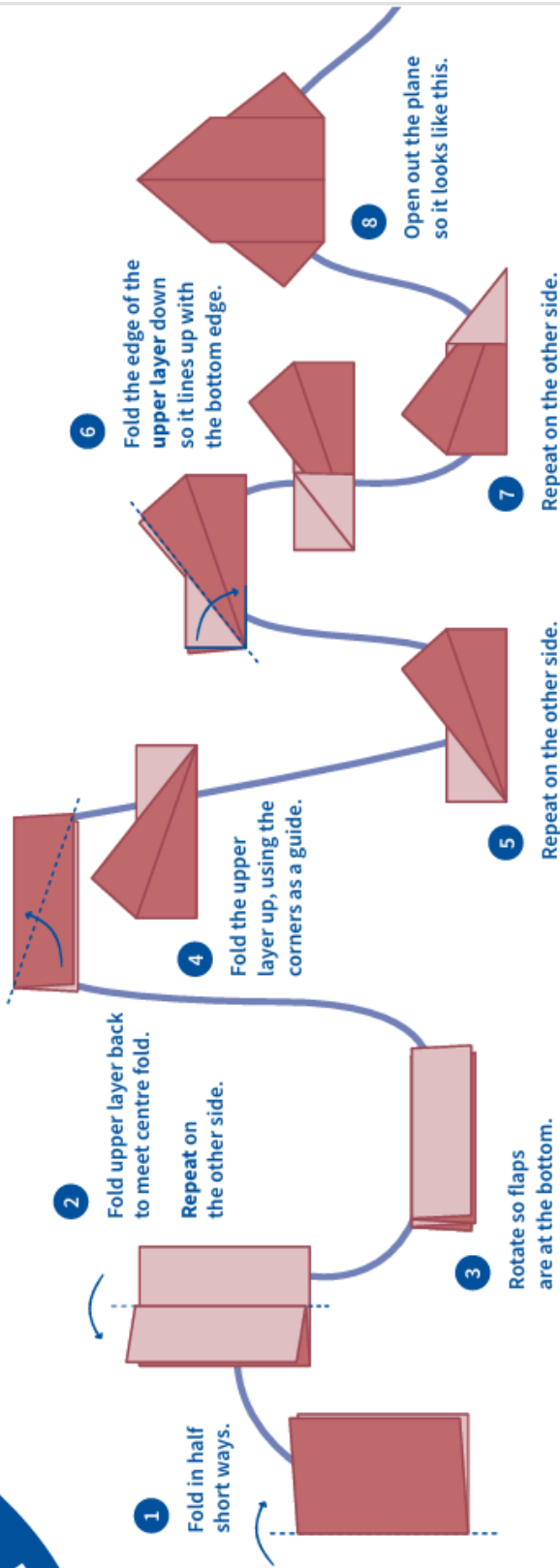


FLAPPING BAT

TRICKY



Follow along
with our video!



PRE-VISIT

PAPER PLANES

What makes a paper plane fly further than a piece of paper?

A good paper plane is a well-balanced design:

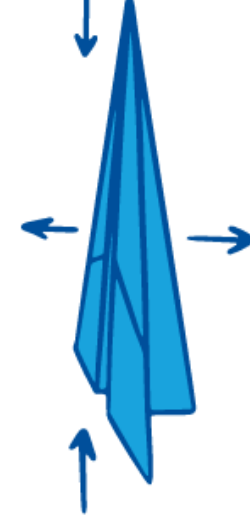
- It is strong enough to survive the initial thrust
- It has big enough wings to maximise drift and floating
- It has its centre of gravity about a quarter of the way from tip to tail
- It is symmetrical so it will fly in a straight line

LIFT

Lift is the force that pushes the plane up. A real plane has curved wings which means that air moving over the top is faster and has less pressure than the air underneath the wing, causing the plane to lift. A paper plane doesn't experience as much lift but a large wing surface area and an angled throw could help maximise air time.

THRUST

Thrust is the forward movement of the plane. The initial thrust comes from the throw as the paper plane is launched. Some plane designs like the Dart requires a powerful throw whereas other designs need only a gentle release to glide.



DRAG

Objects that move through air experience drag, also known as air resistance. A plane which is more streamlined will have less drag. This is why a pointy tipped plane with flat wings flies better than a piece of paper

WEIGHT / GRAVITY

Gravity is a force that pulls objects towards the Earth. When planes are made out of a lighter material, they weigh less and require less lift to overcome gravity. Where the centre of gravity is on the plane (its balance point) also affects how it flies.



SCIENCEWORKS

AIR CANNON

Push and pull with air!

1. Gather your materials: paper cup, thick pencil, tape, balloon, scissors, something light (feathers, pom poms, confetti, glitter, seeds or small bits of paper).
2. Use the pencil tip to push a hole in the bottom of the cup.
3. Tie the end of the balloon to make something to pull on and cut off the top on the other end.
4. Stretch the balloon over the mouth of the cup, making sure that the balloon handle is in the middle. Tape it to the cup to secure.
5. Point the hole of the cannon towards something light. Hold on to the cannon while you pull back and let go of the balloon handle. Watch the invisible air push things around!



For upper primary and secondary students who might like to improve on the basic design

Check out the activity from Science Friday: *Design a Better Vortex Cannon*
<https://www.sciencefriday.com/educational-resources/design-a-better-vortex-cannon/>

AT SCHOOL AIR CANNON



AT SCHOOL DESIGN AN AIRCADE GAME

STEM Design Challenge

As a class, watch *Caine's Arcade* and have a play with the games in the *Air Playground* exhibition when you visit Scienceworks.

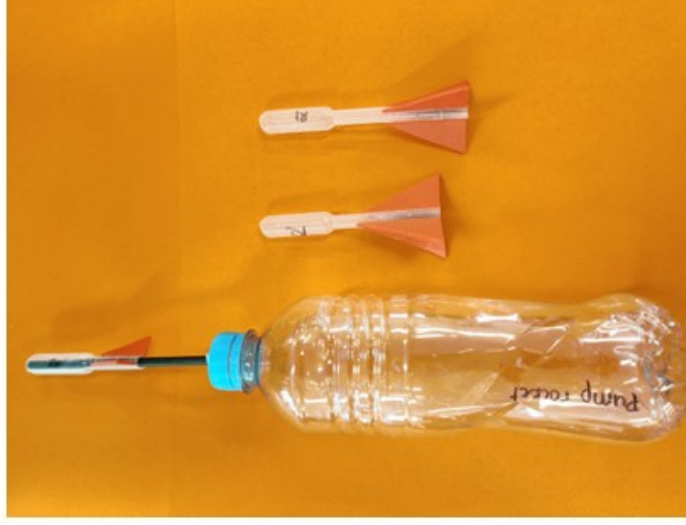
Challenge students to design their own arcade game out of recycled or easily found materials inspired by the *Air Playground* exhibition and *Caine's Arcade*.

Materials could include: cardboard boxes, balloons, paper cups, bottles, yoghurt tubs, table tennis balls, straws, pipecleaners, foam, bubble wrap, etc.

You can also look for ideas online featuring:

- Air cannons
- Pump rockets
- Pneumatics with syringes and tubes
- Fans – make your own with a motor, battery pack and paper for the fan-blades
- Air hockey with a balloon, cork and old CD

A student design brief template has been provided but please repurpose as suits your classroom needs.



LEARNING INTENTIONS

- Students become familiar with a STEM design process
- Students create designed solutions through an interactive process
- Students investigate how objects move and the physical properties of materials

Stuck for ideas? Check out the following builds by the Scienceworks team

SCIENCEWORKS

DESIGN YOUR OWN AIRCADE GAME

What is the aim of the game?

Describe what players have to do:

How many players can play at once?

Do they play collaboratively (with each other) or competitively (against each other?)

How is air used?

List all the materials you might need:

DESIGN YOUR OWN AIRCADE GAME

1 Draw your design

Did you test it? What can you change?

2 Draw your improved design

Get someone else to test it.
What can you change?

3 Draw your final design

What's fun or challenging
about your game?

Made something cool in class? Send your designs to museumteachers@museum.vic.gov.au to be featured on the Scienceworks page!

SCIENCEWORKS