



Glasgow Science Festival 2024: Glasgow's Transforming Primary STEAMS Activity Pack

Glasgow Science Festival 2024 will be in-person from 6th to 16th June and online from 1st to 30th June.

Please visit the website for our programme and digital content.

www.glasgowsciencefestival.org.uk

Table of Contents:

- ◆ Nature Transforming: Beautiful Butterflies
- ◆ Nature Transforming: DNA Dogs
- ◆ Nature Transforming: Gliding Butterflies
- ◆ Transforming the Climate: Create a Climate Comic
- ◆ Transforming Neighbourhoods: Build Your Own Feeder
- ◆ Transforming Space: This is Rocket Science
- ◆ STEAMS Pack Kit List
- ◆ Curriculum for Excellence Links



Nature Transforming: Beautiful Butterflies

Create your own beautiful butterfly which transforms from a caterpillar with Glasgow Science Festival.

The Science:

Did you know that butterflies start as caterpillars? Butterflies are an amazing example of a huge transformation in nature. The transformation from caterpillar to butterfly is called metamorphosis.

The first stage of a butterfly's life is as an egg which is laid on a leaf, inside this egg the caterpillar is growing.

Next the egg hatches and a baby caterpillar is born. Caterpillars actually eat their way out of the egg and continue a lifestyle of munching. Caterpillars can grow up to 100 times their original size so they eat lots and lots of leaves!

The third stage happens when the caterpillar has got big enough. The caterpillar finds a safe place like a twig or hidden part of a plant and transforms into a 'pupa'. This is like a little pouch and inside the caterpillar undergoes its amazing transformation.

The final stage happens when the pupa splits open to reveal an amazing butterfly! It takes time though before the butterfly can fly as its wings have to dry out. When ready they fly off to find flowers and other butterflies.

Fun fact: It isn't just butterflies that undergo metamorphosis, moths do this too!

Kit List:

- ♦ Paper or card (A4)
- ♦ Split pin, pipe cleaner or string
- ♦ Hole punch
- ♦ Scissors
- ♦ Colouring materials

Remember scissors and sharp objects can be dangerous, always ask an adult to help.



Nature Transforming: Beautiful Butterflies

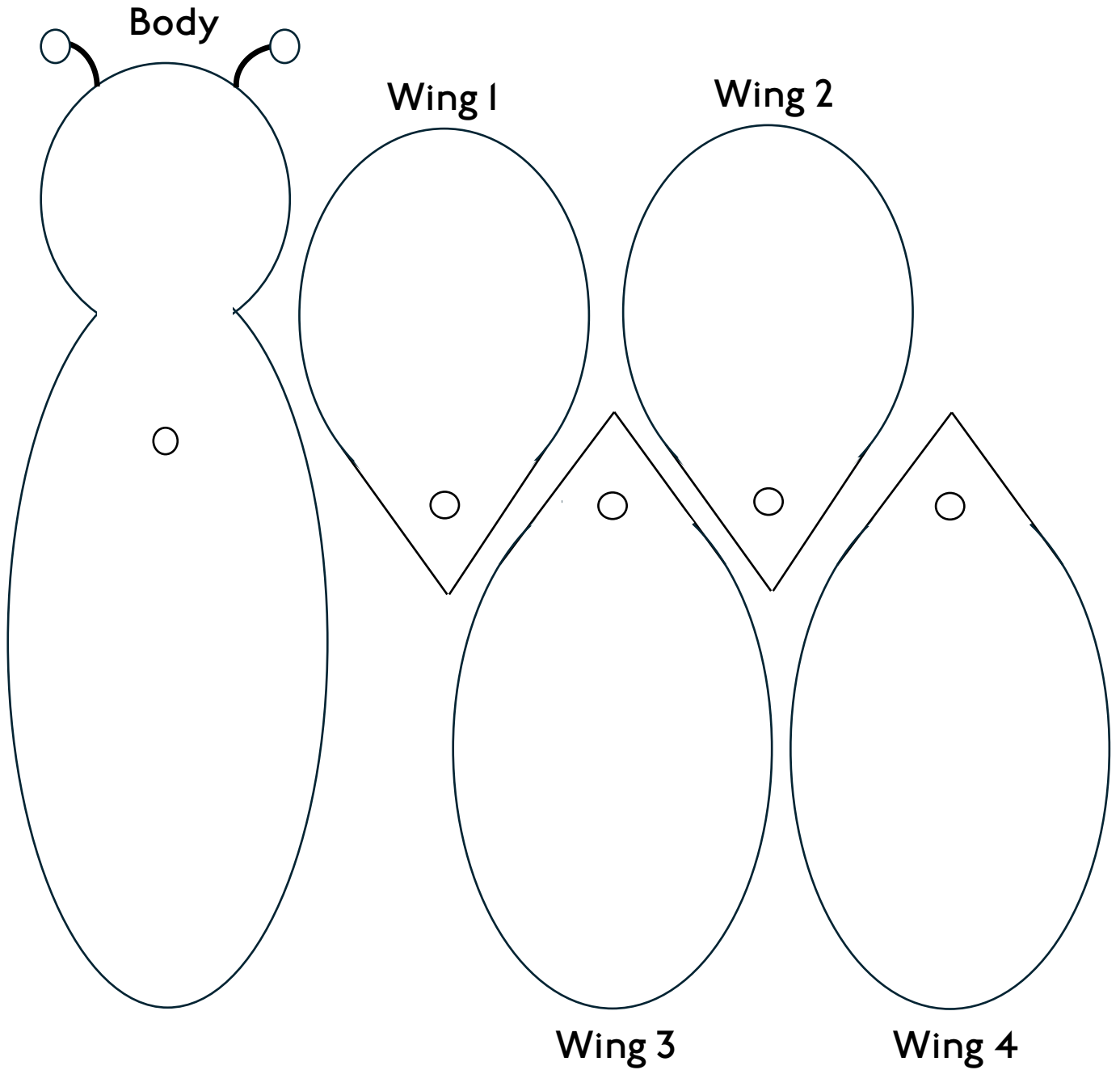
How To:

1. Print the butterfly template on paper or card, alternatively you can draw your own butterfly template.
2. Cut out the pieces, you should have one body piece, two small wings and two large wings.
3. Take either a split pin, pipe-cleaner or string to secure the wings.
4. If using a split pin - Pierce the body piece first with the flat head remaining on the blank side of the butterfly, pierce through the hole. Add each wing to the split pin starting with the two small wings followed by the 2 large wings. Split and flatten the ends of the pin to secure.
5. If using a pipe cleaner - Take a hole punch and punch a hole in the marked location of the body piece and all 4 wing pieces. Using scissors cut a small 4cm length of pipe cleaner and fold it in half. Push the folded end of the pipe cleaner through both large wings, followed by the small wings and lastly the body piece. Fold over a small end of the folded end of the pipe cleaner. Flip over your butterfly and split the ends of the pipe cleaner. Trim the ends of the pipe cleaner if necessary.
6. If using string - Take a hole punch and punch a hole in the marked location of the body piece and all 4 wing pieces. Using scissors cut a small length of string and tie a knot in one end. Thread each piece onto the string starting with the body piece, followed by the two small wings and lastly the 2 large wings. Tie a knot in the other end of the string as close to the butterfly as possible and trim the end.
7. Collapse the wings to create a caterpillar, to create a butterfly pull out the two small wings to the top and leave the two large wings lower down.
8. [Take a look at the Scottish butterfly ID sheet from the Butterfly Conservation and design your own beautiful butterfly.](#) The link can also be found on the Glasgow Science Festival website.

[Check out Glasgow Science Festival on YouTube to see a How-to video!](#)



Beautiful Butterfly Template



Nature Transforming: DNA Dogs

Discover how DNA makes puppies look like their parents by drawing your own DNA dog with Glasgow Science Festival.

The Science:

Have you ever noticed how children look like their parents?

DNA is the code that makes us who we are. DNA is divided up into sections called genes and these contain specific sets of instructions. Each person has thousands of genes which tell your body everything, for example what colour your eyes and hair should be. We look like our parents because their genes are passed onto us. The passing on of genes is known as inheritance. You inherit half of your genes from your mother and half of your genes from your father meaning you are a mix of both. Look at any relatives near you or look at photos of close relatives. Think about if you have the same eye, skin and hair colour. Another trait to look at is whether your ear lobes are attached or free.

Amazingly there are some genes that have made humans change over time, for example humans used to have tails! We are still transforming now – have you ever thought about what humans might look like in the future?

It isn't just people who inherit traits from their parents, it is all animals and dogs are a great example of this. Often dogs are bred to dogs of the same breed meaning they all look very similar, however it is becoming more common to cross breed dogs and this makes it very easy to see how puppies inherit different traits from their parents. Have a go at our DNA Dog activity and discover how dogs pass on traits to their puppy's.

Kit List:

- ♦ Paper
- ♦ Colouring materials

How To:

1. Select two dogs to be the parents.
2. Each parent dog has multiple genetic traits that makes them look the way they do. Pick only one from each parent.
3. Draw a puppy that has the traits of the parent dogs.
4. Compare your drawing to a friends or draw another dog, can you make two dogs with the same parents look different?

Choose 2 dogs to be your puppy's parents and choose one trait from each parent



Fluffy

or

Golden Fur



Short Legs

or

Long Back



Floppy Ears

or

White Chest



Spotty

or

Long Tail

Transforming Nature: Gliding Butterflies

Discover how the wing shapes of butterflies and moths help them fly by creating your own glider.

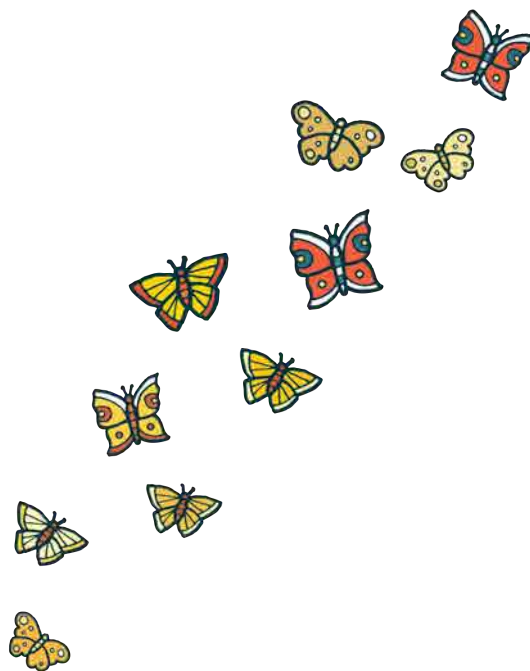
The Science:

Butterflies and moths are known for their big wings. Although it looks like they have two, they actually have four, with a hindwing and forewing on each side. Butterfly and moth wings are made of tiny-overlapping scales. These scales reflect light and that is what creates their amazing patterns. Different patterns can act as camouflage, for example some butterfly wings are shaped like dead leaves! Other patterns are brightly coloured to act as warnings to predators. Some butterflies such as the Monarch store toxins in their wings which stops them from being eaten by predators. Other butterfly wing patterns are designed to be eye-catching. These help distract predators and help attract other butterflies. Different wing shapes affect butterfly and moths abilities to fly. They can affect their speed, their ability to take-off and land and their ability to glide. Take a look at the butterfly and moth ID sheet created by the Butterfly Conservation to see examples of different wing shapes and patterns.

Kit List:

- ♦ A printout of a butterfly or moth template
- ♦ Scissors
- ♦ Pens or pencils
- ♦ Sticky tape
- ♦ A straw
- ♦ Blu-tac

Remember scissors and sharp objects can be dangerous, always ask an adult for help.



Transforming Nature: Gliding Butterflies

How To:

1. [Print out a downloadable template created by the Butterfly Conservation and colour it in.](#)
 - [You could model it on a real butterfly or moth from the butterfly ID guide](#) or create your own. You can choose a butterfly or a moth - or make both and see which glides better! Both of the above links can also be found on the Glasgow Science Festival website.
2. Carefully cut around the parts on the template. Do not cut along the dotted lines.
3. To make your shooter, fold along the dotted lines in the order they are numbered then cover the seam with a piece of tape. The non folded side should remain open.
4. Turn your butterfly or moth over so the blank side is showing. Place your shooter length ways down the body (the open end should be at the bottom) and secure it using a piece of tape big enough to cover all folded edges but leaving the non-folded edge open.
5. Insert your straw into the open end of the shooter. Only push it in about half way. You might need to give it a bit of a wiggle or your butterfly or moth wont fly.
6. Take a big breath and BLOW into your straw! Watch it go!

Next steps:

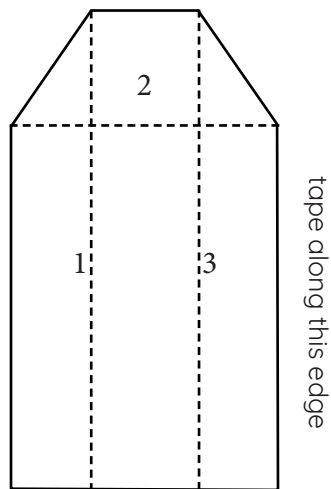
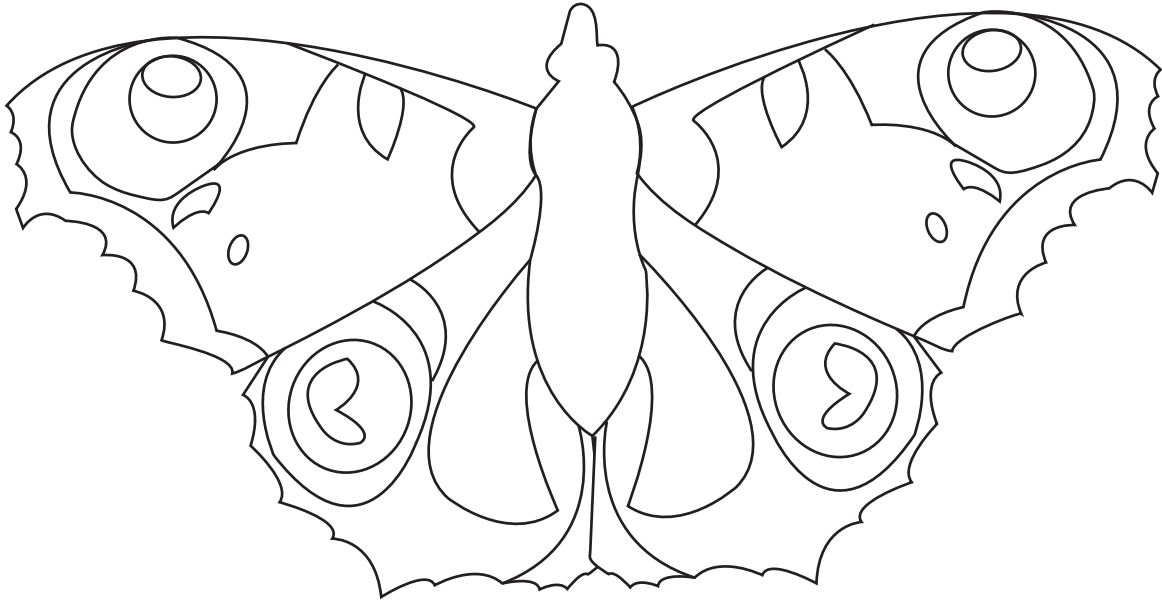
Why don't you try both templates and measure how far they glide. Do you think the shape of your glider will make a difference to how far it can fly? Why?

Try folding or bending the tips of the wings slightly, to make a paper aeroplane, or making the butterfly using different types of paper. You could add some weight to different parts using small blobs of blu tac. Does that make it glide better or further?

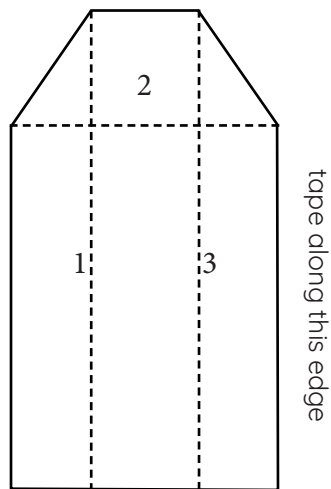
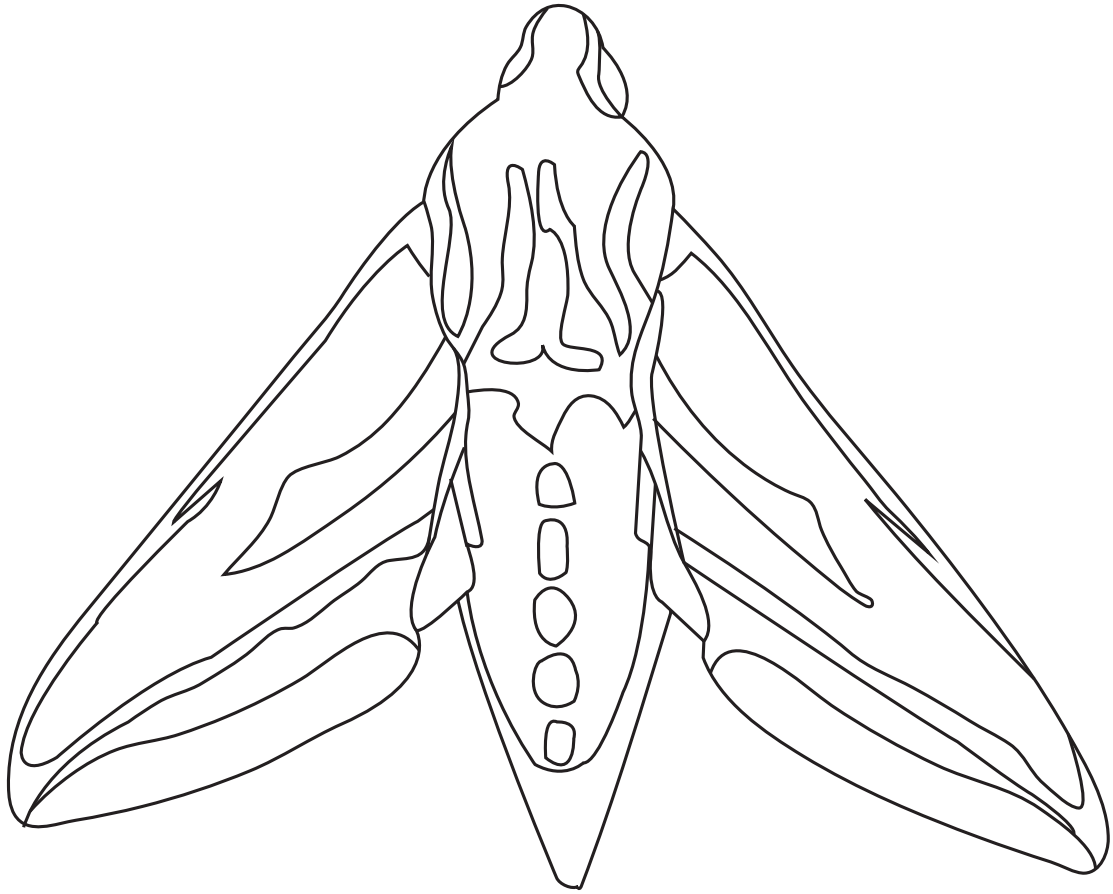
Can you come up with a design of your own that could beat these?



Peacock butterfly glider



Hawk moth glider



Transforming the Climate: Create a Climate Comic

Create your own comic and help the Global Warming Warrior defeat the Climate Change Creator.

The Science:

Climate change and Global warming are two terms used to describe that the Earth's temperature is increasing. Climate change is caused by several human activities.

- Burning Fossil Fuels: Fossil fuels such as oil and gas contain lots of carbon, so burning these produces lots of carbon dioxide.
- Farming: When cows digest their food they build up methane which is released into the atmosphere.
- Deforestation: Trees absorb carbon dioxide from the atmosphere and release oxygen, so chopping them down means less carbon dioxide is being absorbed from the atmosphere.

The build-up of greenhouse gases such as carbon dioxide and methane results in a blanket forming around the Earth. So, heat energy which is produced by the sun which would normally escape, is getting trapped in. This is like keeping a hot water bottle under the duvet cover – trapping in the heat warms up the air under the duvet. This is affecting the planet because the increased temperature is causing the amount of rainfall to increase, seasons are changing, ice is melting and consequently sea levels are rising. This is having a huge effect by disrupting animals' habitats and causing both droughts and floods which are affecting people's homes and production of food. However, it's not too late to make a difference by reducing deforestation and switching to renewable energy sources rather than fossil fuels. But you can make a difference at home too by turning off electrical items which aren't in use and avoid using single use plastics.

Kit List:

- ♦ Printer to print off the comic (optional)
- ♦ Ruler (if not printing the comic)
- ♦ Colouring/drawing materials

How To:

1. If you have access to a printer you can print off the comic template
2. If not draw a big grid (6x6) on a sheet of A4 paper
3. Redraw your own version of tile one and then get creative filling in the blanks

The Adventures of Captain Climate Change

Illustrated by:

Professor Pollution has been causing havoc. They have been chopping down trees, burning fossil fuels and dumping plastic in the ocean. This has increased carbon emissions and Earth is getting hotter and hotter! The oceans are rising and people's homes might wash away - what are we going to do!!



Only Captain Climate Change can stop Professor Pollution. Captain Climate Change to the rescue!

Draw Captain Climate Change.

To stop Professor Pollution first Captain Climate Change must stop trees getting chopped down and plant new ones in their place.

Captain Climate Change's next mission is to stop Professor Pollution from burning fossil fuels.

Draw Captain Climate Change stopping trees getting cut down and planting new ones.

Draw Captain Climate Change stopping fossil fuels from being burned however you see best.

Captain Climate Change's work is not done! They have one final mission to defeat Professor Pollution.

SUCCESS!! Captain Climate Change has defeated Professor Pollution, and he couldn't have done it without your help. The Earth's temperature has stopped rising and the sea levels are stable. Everyone is saved.

Draw Captain Climate Change doing something that you think will help prevent global warming.

Draw Captain Climate Change defeating Professor Pollution.

Transforming Neighbourhoods: Build Your Own Feeder

Create your own feeders to transform rubbish into something for your garden. Choose and you can attract birds or butterflies with these feeders.

The Science:

Having healthy green spaces is important because plants are amazing at cleaning our air, making it healthier for us. Wildlife plays a really important role in helping to maintain these healthy greenspaces. For example, having birds is important because they eat hungry caterpillars and aphids which can damage plants. Butterflies play an important role in keeping green spaces healthy too. Butterflies eat the nectar made by flowers, and when they do this pollen gets stuck to them. Then when they fly off to the next flower, they take this pollen with them. This fertilises the flower meaning it can later produce fruit and seeds which then allows new plants to form.

We can attract birds and butterflies to green spaces to improve them. Both will be drawn in by tasty treats and bright colours. Amazingly both animals can see ultraviolet light which is invisible to humans! A fun fact about butterflies is that they can taste with their feet. You can attract the most birds from March – July, and most butterflies from April – July.

Choose between creating a bird feeder or a butterfly feeder using recycled materials where you can, to transform a green space near you.

Kit List: Butterfly

- ♦ UV pen (optional)
- ♦ Paper template
- ♦ Colouring in materials
- ♦ Paper sauce containers
- ♦ A skewer or garden cane
- ♦ Glue stick
- ♦ Sellotape
- ♦ Scissors
- ♦ Butterfly food e.g. cotton wool with sugar water or soft fruit like banana

Remember scissors and sharp objects can be dangerous, always ask an adult to help.

Kit List: Bird

- ♦ Toilet roll inner
- ♦ 2 wooden BBQ skewers
- ♦ String or ribbon
- ♦ Hole punch
- ♦ Sticky things birds can eat: Peanut butter, almond butter, cashew butter, sunflower seed butter, suet, lard or jam
- ♦ Bird seed or make your own with any of the following: sunflower seeds, dried fruit, raisins, nuts, crumbled stale bread, grated cheese, cooked pasta or rice, pet food, cooked potatoes, sugar free cereal.

Transforming Neighbourhoods: Build Your Own Feeder

How To: Butterfly Feeder

1. Cut out four leaves and a petal piece.
2. Colour in as brightly as possible as butterflies love bright colours.
3. Optional: if you have a UV pen write a secret message for the butterfly.
4. Glue the 4 leaves onto the back of the flower.
5. Take a skewer and tape this onto the back to be the stem.
6. Take a paper container and glue this onto the front of your flower.
7. When you are ready to feed the butterflies either: add some old soft fruit such as oranges, bananas, berries, pineapple, melon, pears or plums. Or soak a piece of cotton wool in sugar water and place this into the paper container at the centre of your flower.
8. Put in soil in a safe, dry not windy space outside – butterflies will not fly in the wind or rain.
9. Watch to see if any butterflies stop by for a munch. Fun fact: Butterflies taste with their feet!

How To: Bird Feeder

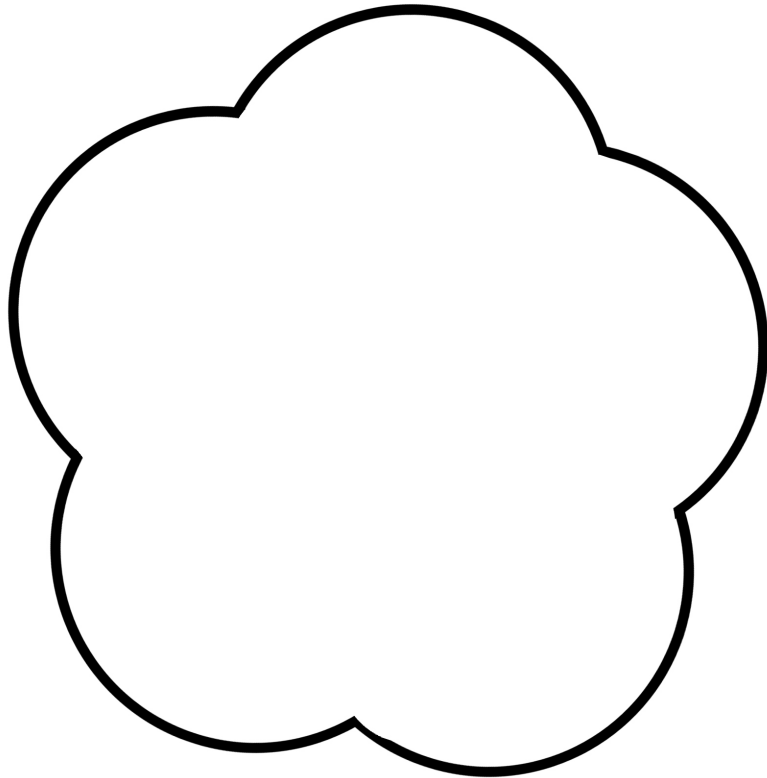
1. Take the inside of a toilet roll and pierce 2 holes in the top using a hole punch opposite each other.
2. Using a hole punch, punch 4 holes at the other end of the toilet roll (bottom), these could be evenly spaced apart and opposite each other.
3. Take a piece of string or ribbon and tie each end to the two holes at the top. You will use this to hang up your bird feeder.
4. Roll the toilet roll in something yummy and sticky for the birds. They really like peanut butter but see our kit list for other options.
5. Next roll the toilet roll in bird seed or any of the other tasty treats in the kit list.
6. Take 2 wooden skewers and push the skewers through the holes at the bottom, the skewers should form a cross. This is for the birds to stand on.
7. Hang up in your garden and watch to see what birds have a nibble.

Next Steps:

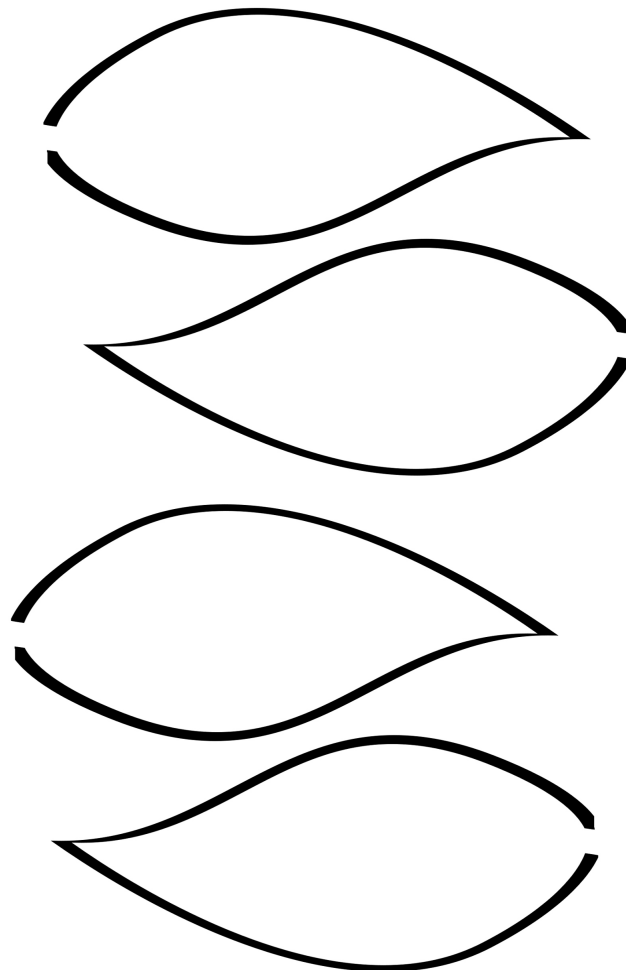
Can you identify the birds and butterflies you attract, perhaps you can keep a tally and discover the most common types?

Butterfly Feeder Template

Petals



Leaves



Transforming Space: This is Rocket Science

Create your own Transforming Rocket and discover how carefully rockets are designed to make sure they can blast off into space.

The Science:

Rockets must be very carefully designed to be successfully launched into space. There are lots of elements scientists must consider.

Firstly, to blast into space there must be an engine. Before launching rockets are loaded up with lots of fuel inside a chamber. When this fuel is mixed with oxygen and ignited it produces gas. This gas is pushed out and the gas pushing down causes the rocket to be pushed up.

However, there are also forces which are acting to push the rocket down produced by the air, this is called air resistance. Scientists must minimise air resistance so that the upward force is greater than the downward force otherwise the rocket will not launch.

Firstly, the design of the rockets nose is important. The rocket nose has to come to a point to minimise air resistance, the smaller and pointier the nose the less air resistance the rocket experiences. Another way of minimising air resistance is having a small diameter, or narrow rocket. A big wide rocket will experience more air resistance.

Another thing scientists must consider is keeping the rocket going in a straight line. A pointy narrow rocket, although great at minimising air resistance, puts the rocket at risk of wobbling off course. To keep rockets straight fins are added. These act like feathers on an arrow and keep it in a straight line.

Create your own transforming rocket and think about these important design elements including the nose, fins and engine. What would happen to your rocket without each component? It's rocket science!

Transforming Space: This is Rocket Science

Kit List:

- ♦ Paper or card (A4)
- ♦ Split pin or something from home – pipe cleaner or string (you will need a hole punch if you are using a pipe cleaner or string).
- ♦ Scissors
- ♦ Colouring materials

Remember scissors and sharp objects can be dangerous, always ask an adult for help.

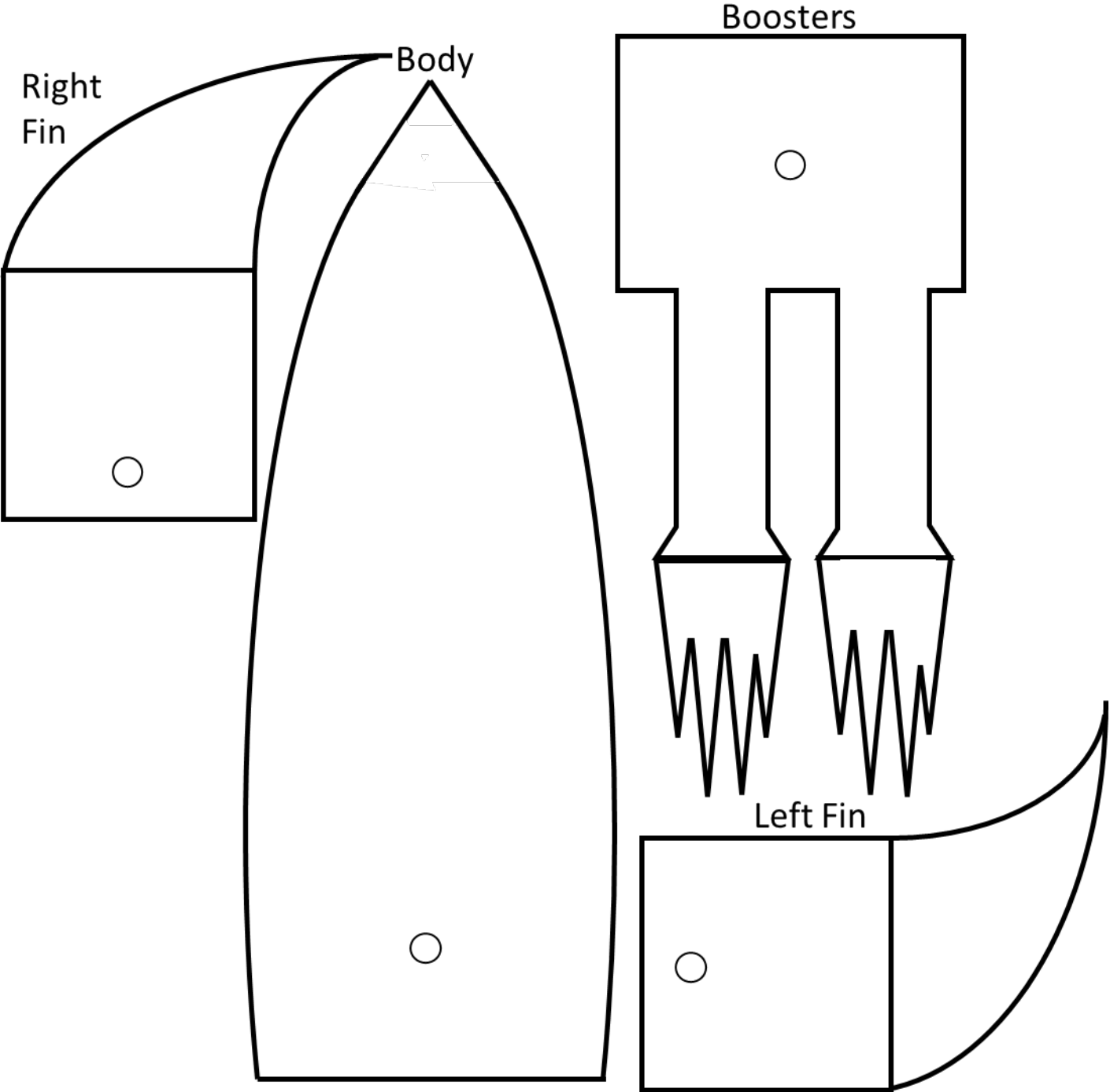


[Check out Glasgow Science Festival on YouTube to see a How-To video demonstration!](#)

How To:

1. Print the rocket template on paper or card, alternatively you can draw your own rocket template.
2. Cut out the pieces, you should have one body piece, a right fin, a left fin and a booster.
3. Take either a split pin, pipe-cleaner or string to secure the pieces together.
4. If using a split pin - Pierce the body piece first with the flat head remaining on the blank side of the rocket, pierce through the marked circle. Next add the booster piece to the split pin followed by each fin. Split and flatten the ends of the pin to secure.
5. If using a pipe cleaner – Take a hole punch and punch a hole in the marked location of the body piece, the fins and the booster. Using scissors cut a small 4cm length of pipe cleaner and fold it in half. Push the folded end of the pipe cleaner through both fins, followed by the booster and lastly the body piece. Fold over a small end of the folded end of the pipe cleaner. Flip over your rocket and split the ends of the pipe cleaner. Trim the ends of the pipe cleaner if necessary.
6. If using string - Take a hole punch and punch a hole in the marked location of the body piece, the fins and the booster. Using scissors cut a small length of string and tie a knot in one end. Thread each piece onto the string starting with the body piece, followed by the booster and lastly the two fins. Tie a knot in the other end of the string as close to the rocket as possible and trim the end.
7. Get creative and transform your rocket into something eye catching.
8. Think about what happens when you remove each piece of the rocket. How important is each part? Could you improve the design?

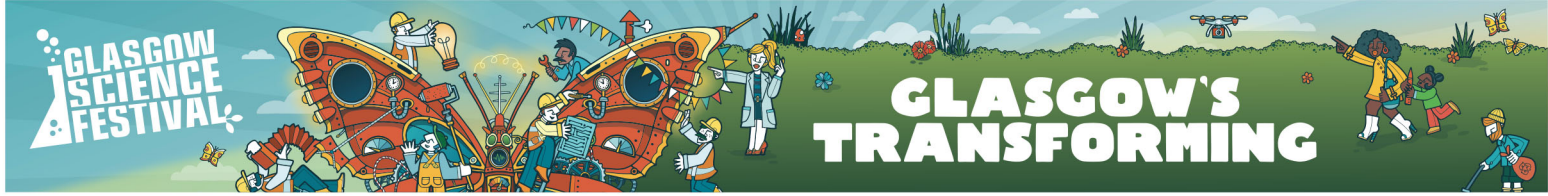
This is Rocket Science Template





STEAMS Pack Kit List

Kit	Beautiful Butterflies	DNA Dogs	Gliding Butterflies	Climate Comic	Feeders	Rocket Science
Paper	x	x				x
Split Pin	x					x
Pipe Cleaner	x					x
String	x				x	x
Hole Punch	x				x	x
Scissors	x		x		x	x
Colouring Materials	x	x	x	x	x	x
Template	x		x	x	x	
Tape			x		x	
Straw			x			
Blu-Tac			x			
Ruler				x		
UV Pen					x	
Paper Sauce Cups					x	
Skewer					x	
Glue Stick					x	



STEAMS Pack Kit List

Kit	Beautiful Butterflies	DNA Dogs	Gliding Butterflies	Climate Comic	Feeders	Rocket Science
Toilet Roll Inner					x	
Bird Food					x	
Butterfly Food					x	

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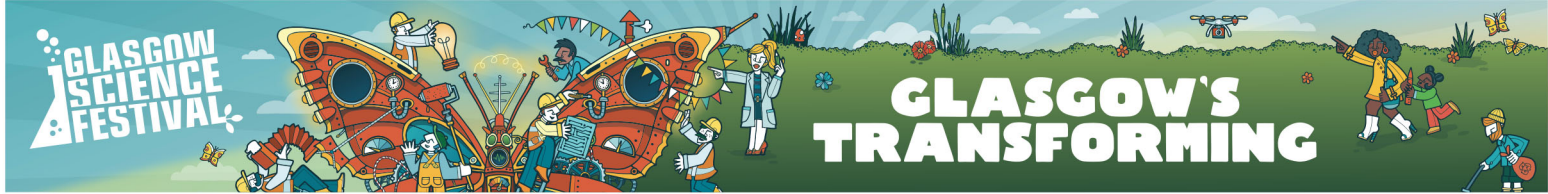
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Curriculum For Excellence Links

Curriculum Link	Beautiful Butterflies	DNA Dogs	Gliding Butterflies	Climate Comic	Feeders	Rocket Science
I can create and present work that shows developing skills in using the visual elements and concepts. EXA 2-03a	x	x				x
By investigating the lifecycles of plants and animals, I can recognise the different stages of their development. SCN 2-14a	x					
By exploring the characteristics offspring inherit when living things reproduce, I can distinguish between inherited and non- inherited characteristics. SCN 2-14b		x				
Through observing and recording from my experiences across the curriculum, I can create images and objects which show my awareness and recognition of detail. EXA 2-04a	x	x	x	x		x
I can develop and communicate my ideas, demonstrating imagination and presenting at least one possible solution to a design problem. EXA 2-06a		x				
Inspired by a range of stimuli, I can express and communicate my ideas, thoughts and feelings through activities within art and design. EXA 0-05a / EXA 1-05a / EXA 2-05a	x	x	x	x	x	x
I can discuss the environmental impact of human activity and suggest ways in which we can live in a more environmentally responsible way. SOC 2-08a				x	x	
I can analyse how lifestyles can impact on the environment and Earth's resources and can make suggestions about how to live in a more sustainable way. TCH 2-06a				x		
I can make suggestions as to how individuals and organisations may use technologies to support sustainability and reduce the impact on our environment. TCH 2-07a				x		
I can recognise basic properties and uses for a variety of materials and can discuss which ones are most suitable for a given task. TCH 2-10a					x	
I can report and comment on current scientific news items to develop my knowledge and understanding of topical science. SCN 2- 20b				x		



Curriculum For Excellence Links

Curriculum Link	Beautiful Butterflies	DNA Dogs	Gliding Butterflies	Climate Comic	Feeders	Rocket Science
By investigating how friction, including air resistance, affects motion, I can suggest ways to improve efficiency in moving objects. SCN 2-07a			x			x

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