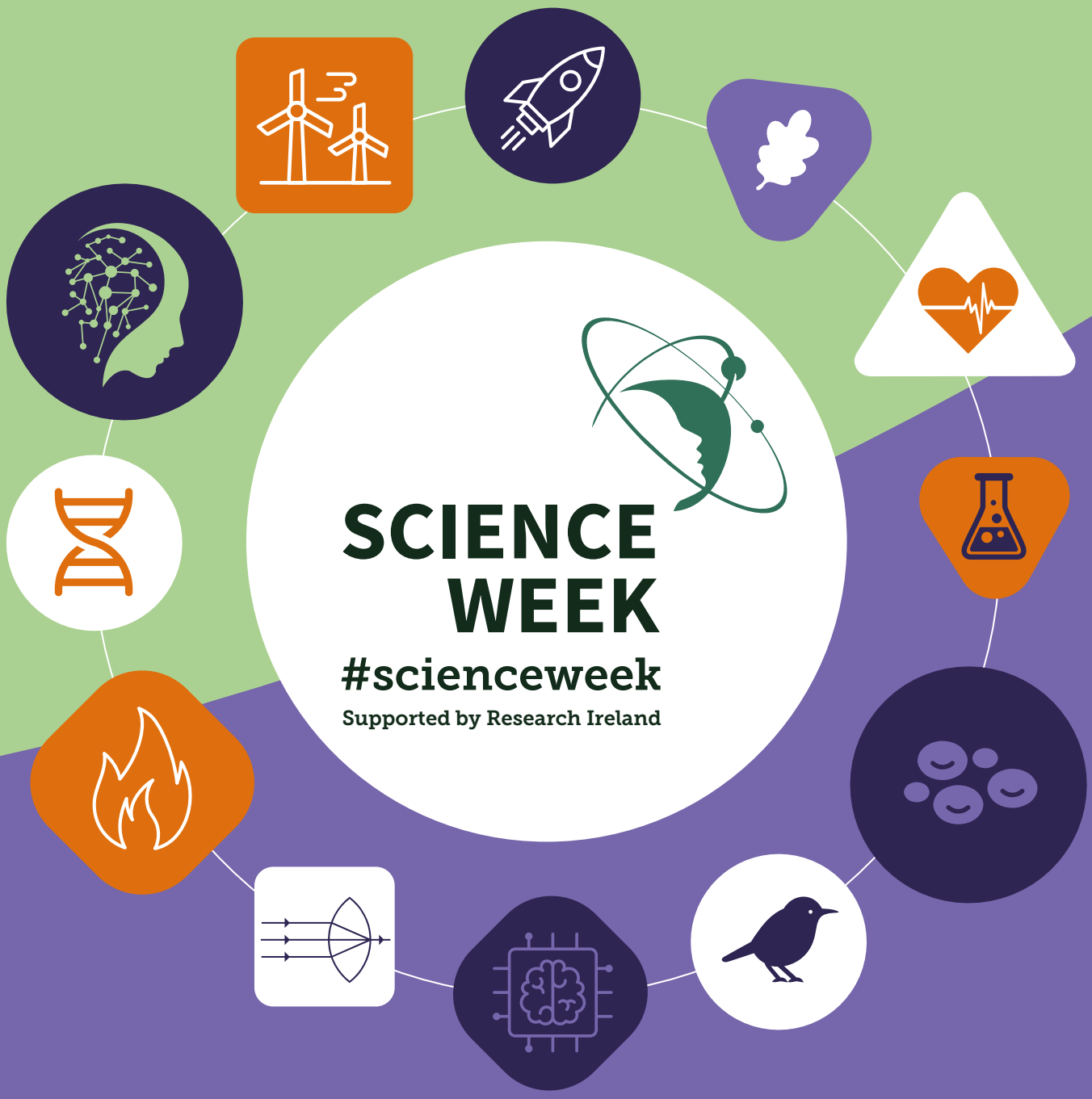
Primary Activity Pack

Activities for learners
at a primary school level

curious minds
Discover STEM

THEN. TODAY. TOMORROW.



SCIENCE WEEK

#scienceweek

Supported by Research Ireland

9th-16th November 2025

Taighde Éireann
Research Ireland

Welcome to Science Week!

It's that time of year again and Research Ireland is inviting primary schools to take the leap and get involved in Science Week!

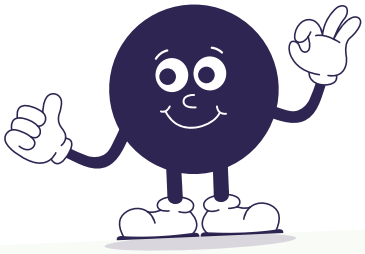
Science Week Fun!

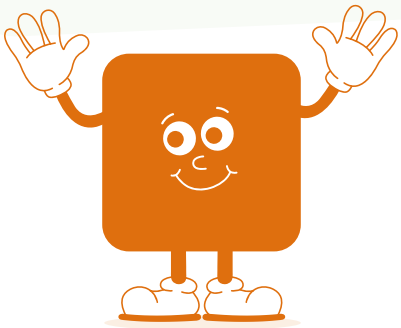
November 9th – 16th, 2025

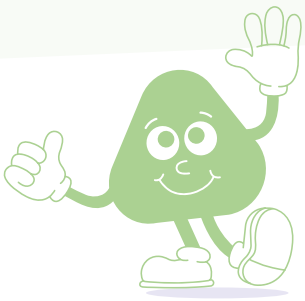
Get ready for an exciting Science Week. We'll explore how to take care of nature, find smarter ways to use materials and energy. It's all about using what we've learned in the past to create a brighter future! We've planned some fun activities for you to join in and explore the idea of Then. Today. Tomorrow. Let's reimagine our world together and celebrate our amazing strengths!

Join the conversation, see what's happening and share your Science Week celebrations using #ScienceWeek or tag @ResearchIreland

Contents



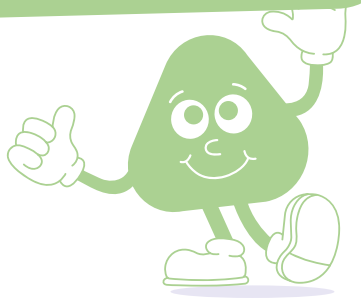




What's in this pack?

To support teachers in bringing Science Week into their busy classrooms we've put together this pack that gives you everything you need to spark learners' curiosity, through hands-on inquiry-based learning using simple materials.

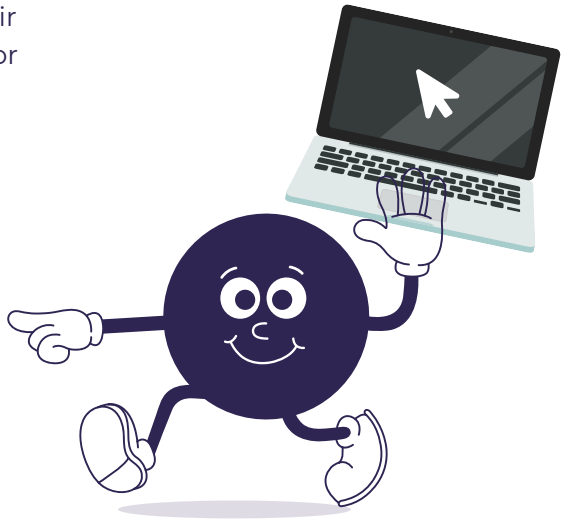
We've also included details of all the other ways you can get involved like the exciting Science Week Shows. So, what are you waiting for?

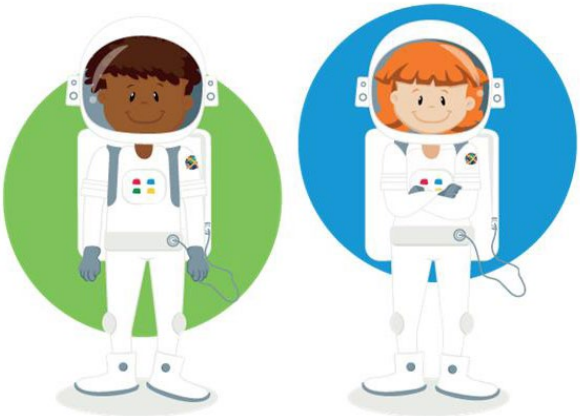


Ways to get involved

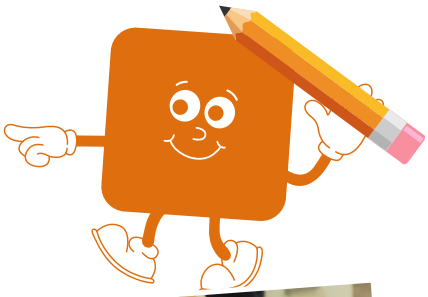
- **Use the activities in this pack** in school (in afterschool clubs or at home) to spark curiosity and get young learners thinking about science in everyday life.
- **Attend a free online Science Week Show with your class** (see page 8-9 for details).
- **Visit a Discover Centre and take part in an accredited STEM workshop** and programmes for primary schools. These centres help schools engage learners in science outside of the classroom in a curriculum-relevant, hands-on way. Find your nearest Centre here.

- **Invite a speaker into your classroom** in person or online to bring Science to life for your learners and give them the opportunity to meet people who use STEM in their jobs. You could consider asking parents to volunteer or contact one of the following organisations:
  - Space goes to school with ESERO Ireland.
  - Meet the scientist.
  - Lots of the Discover Centres offer outreach visits to schools Find your nearest Centre here.
- **Train like an astronaut during P.E. lessons** while learning about science with Mission X from ESERO Ireland (details below).
- **Check out the Science Week events happening in your area** at www.scienceweek.ie





STEM – it's not just for Science Week!



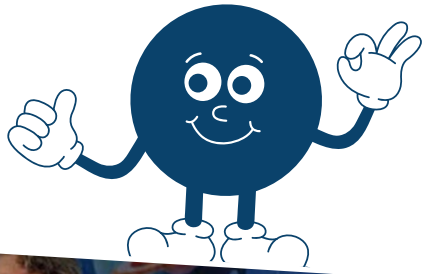
The fun and learning don't have to stop at the end of Science Week - why not get involved in the Curious Minds programme to access free CPD courses and resources teaching STEM in an inquiry-based way:

- **Carry on teaching STEM with the Curious Minds resources**
  - We have over 100 free classroom activities to support inquiry-based teaching of science, technology, engineering and maths.
  - The Curious Minds/ESERO Framework for Inquiry can be used to teach a topic or theme on the SESE Science curriculum in an inquiry based way (Watch: Curious Minds/ESERO Framework For Inquiry).

- **Not sure where to start? Use the Curious Minds support tool to guide you towards the next steps on your STEM teaching journey.** Our STEM support tool will help to identify the resources you or your school needs. Just answer a few quick questions and you will get a STEM roadmap and specific recommendations to help you achieve your goals.

- **Apply for a Curious Minds Award and get the recognition you deserve** for the amazing STEM learning taking place in your school. There are three levels of award, silver, gold and platinum so you can choose which level of Award is most suitable for your school. **And the good news - by getting involved in Science Week you are already meeting part of the criteria for the Award!**
- **Register your school for whole school continuous professional development (CPD) workshops for teachers** and see how to apply inquiry-based STEM learning to a range of subjects in a fun, hands-on way. A Curious Minds Facilitator will visit the school and deliver three workshops for staff over the course of the school year and guide you through the process of applying for a Curious Minds Award.

What's on this Science Week?

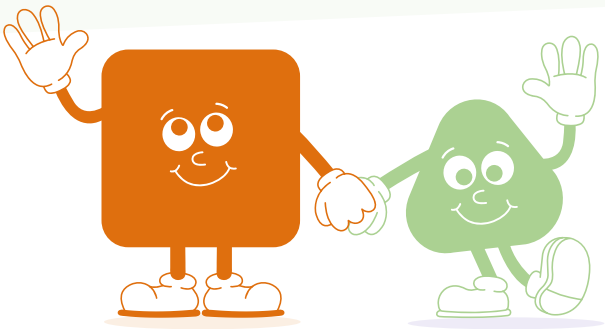


Senior Classes

Celebrate Science Week in your classroom with this 30-minute show full of exciting experiments, show-and-tells and much more!

Hosted by Gráinne Bleasdale this show will get your class ready for Science Week 2025. The investigations from the show are available at the end of this pack. The show will go live from 10am on Monday 10 November and will be available to watch at any stage during Science Week. The ceremony will include an Irish Sign Language interpreter and captions.

For more information and to register for the show, visit **here!**



Junior and Senior Classes

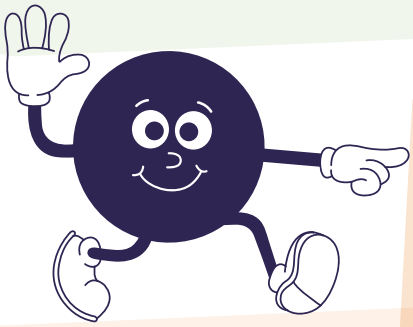
It's time to get up, move your body, and train like an astronaut!

In Mission X, you'll learn the key elements to keeping fit and staying healthy in space and on Earth. Complete physical exercises and scientific investigations developed by scientists and astronaut trainers.

Incorporate science into your P.E. lessons this Science Week with Mark Langtry's videos for astronauts in training. Watch: **www.esero.ie/missionx**.

Mission X is a collaboration between ESA and the UK Space Agency, facilitated by the ESERO Ireland and Research Ireland.

Find more information at **trainlikeanastronaut.org**.



Junior Classes

Captain Zoom and her crew of scientists have exciting experiments, curious kids and a trip to a faraway place in every episode of Let's Find Out: Protecting Planet Earth.

All Aboard the spaceship Curiosity! Watch **here!**

Made with support from Research Ireland, teachers can get lesson plans on **RTÉ Learn**.

SCIENCE WEEK

#scienceweek

Supported by Research Ireland

Science Week events are taking place right across the country.

Find out more on ScienceWeek.ie

1. CLARE
Un-Natural Frequency

2. GALWAY
- Generating Future
- Rainbow Lab
- Biodiversity in our Backyards
- Galway Science and Technology Festival

3. MAYO
Circus Science by the Sea Festival

4. SLIGO
Sligo Science Festival

5. LEITRIM
Juggling Quadratics for Queens

6. MONAGHAN
Cavan Monaghan Science Festival

7. LOUTH
- Climate Creation
- Baking in Space 2025
- Louth Science Festival

8. WESTMEATH
Festival of Sport and Health Sciences Applied Psychology

9. OFFALY
Midlands Science Festival

10. DUBLIN
- Let's Talk Science Festival
- Back to the Future: Escape Room
- BIAS-Inequality in Women's Health and Research Dublin Book Festival
- Science Week at the Ark Our Hidden Selves Smalltalk on the Big Screen
- How It's Made 2025: Unmasking AI C'Mere Till I Tell YE
- The Empathy Machine

11. TIPPERARY
Tipperary Science Festival

12. KILKENNY
Kilkenny Science Festival

13. WEXFORD
Wexford Science Festival

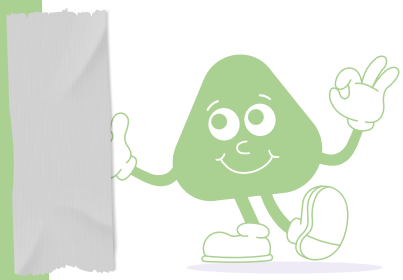
14. WATERFORD
- Coastal Cartographies
- South East Science Festival

15. LIMERICK
Limerick Science Festival

16. KERRY
Kerry Science Festival

17. CORK
- Light Laboratory
- Science at the Marina
- Otter Spotters
- Space Fest

Tips for using sustainable materials in classroom science activities



We recognise there is a growing concern for the environment and that schools are conscious of the materials they use in the classroom.

Our STEM investigations and design-and-make challenges can be carried out using everyday materials found in the classroom or at home.

Reuse and recycle

We encourage schools and learners to reuse waste materials where possible and avoid including single-use plastics or other plastics, such as glitter, in their work.

Outdoor learning

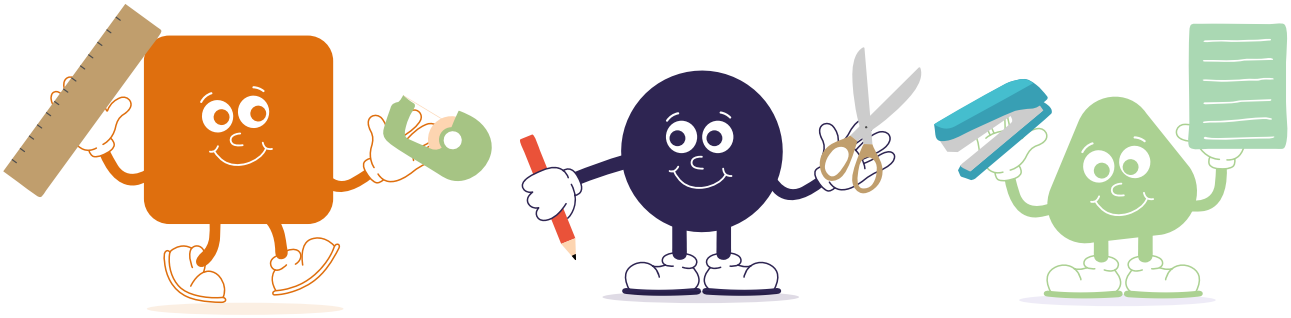
As more schools discover the benefits of working outdoors, we all have the chance to instil respect for animals and plants in our learners. We like to live by the principle: *'take nothing away and leaving nothing behind.'*

Sustainable alternatives

A growing range of school and office suppliers offer sustainable classroom equipment options.

We recommend using:

- brown paper tape (*instead of plastic sticky tape*)
- recycled paper
- A4 whiteboard (*to replace scrap paper*)
- pens and pencils made from recycled materials or sustainable sourced wood
- staplers and scissors made from recycled plastic
- eco rulers made from recycled materials or sustainably-sourced wood



Science Week Classroom Activities

We've put together a selection of the Curious Minds activities to help you and your class dive in to Science Week 2025.

Investigating Wind Energy Using Simple Windmills

Investigation

Class Level - All

Curriculum Links

Strand:	Energy and Forces; Environmental Awareness and Care
Strand Unit:	Forces; Environmental Awareness: Science and the Environment
Curriculum Objectives:	Investigate how forces act on objects; become aware of and explore how moving water and moving air can make things move; become aware of the importance of the Earth's renewable and non-renewable resources; come to appreciate the need to conserve resources; identify some ways in which science and technology contributes positively to society
Skills Development:	Questioning; observing; predicting; investigating and experimenting; analysing recording and communicating
New words/ vocabulary:	Beaufort scale, kinetic energy, atmosphere, anemometer
Focail nua:	Scála Beaufort, fuinneamh cinéiteach, atmaisféar, ainéimiméadar
Cross curricular links:	• Maths: lines, angles, triangles, measures, data, averages, tables and graphs • Geography: Weather, Climate and Atmosphere • History • Art
Equipment/ materials	• Assorted types of paper • A pencil or wooden stick to form part of each windmill • A drawing pin for each windmill • A small bead for each windmill • Pencils and Rulers for drawing • Scissors • Coloured pencils, crayons or markers for decorating

Engage

Prompt questions

- Where does the wind come from?
- Could we make something to harness the energy of the wind?
- What was wind energy used for in the past?
- What is wind energy used for today?
- How is wind speed measured?
- How could we use our windmill to measure the speed of the wind?
- How could we create a square from a rectangular piece of paper? How many ways can you think of to do this?

Background information

Wind is the movement of air near the surface of the Earth caused by changes in temperature. Heat energy from the sun warms parts of the Earth's surface. This in turn warms the air and causes it to rise. Cold air then moves in to replace the warm air, forming wind. Wind affects the weather in lots of ways. Winds can bring cold air to warm places or can bring rain or snow. Some winds are very gentle while others are very strong. For the purposes of weather forecasting, wind speeds are measured using a device called an anemometer. The energy of movement is known as kinetic energy. The kinetic energy of the wind provides the force that pushes the blades of a windmill to make it work.

Real World Application

In 1806, a naval officer from County Meath called Sir Francis Beaufort came up with a way to classify wind speeds and estimate them at sea based on the appearance of the waves, or on land by the movement of trees and other objects. The Beaufort Scale goes from 0 (Calm) to 12 (Hurricane).

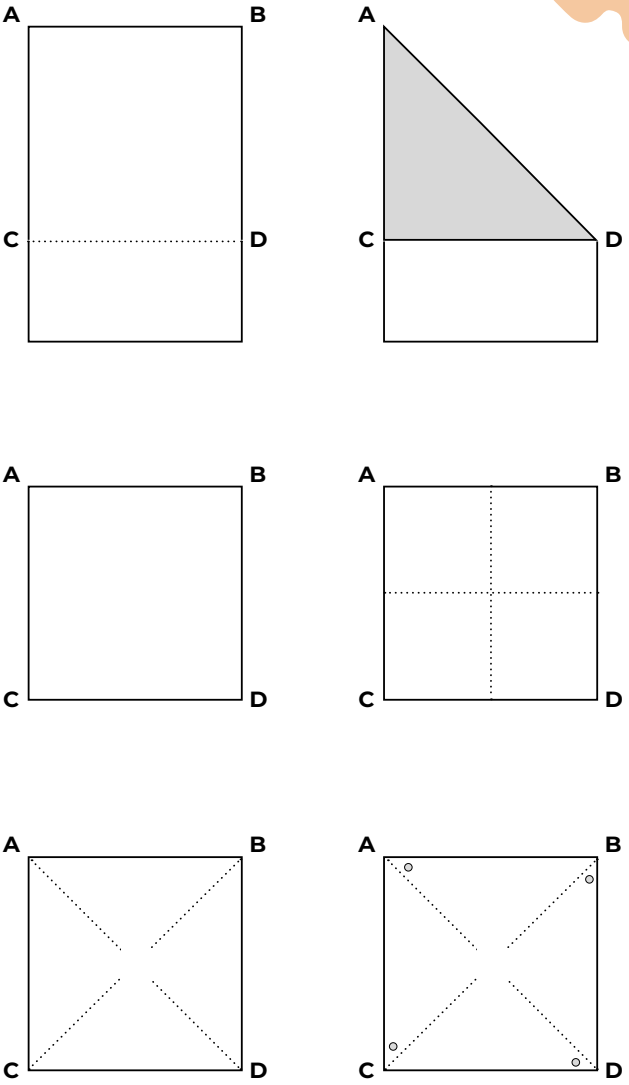
In the past, the power of the wind was used to power windmills for grinding wheat into flour or pumping water. Now, we can harness the energy of the wind in a wind turbine which turns the kinetic energy of the wind into electrical energy to power our homes, schools and businesses. We are increasing the amount of wind energy we use in Ireland every year as wind is a renewable energy resource that helps reduce our reliance on fossils fuels.

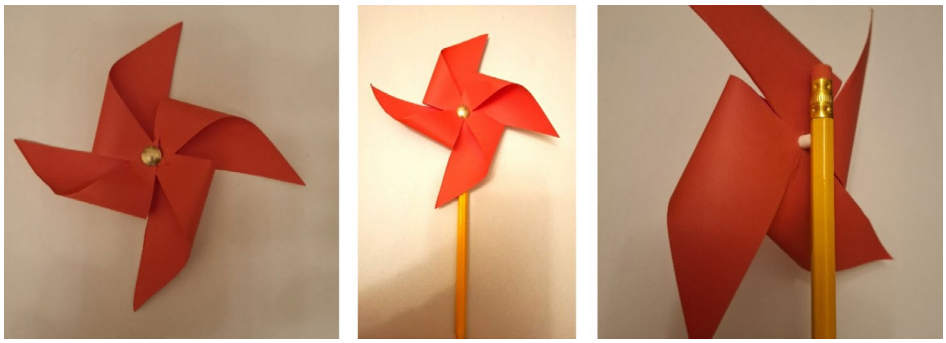
Exploring

To build a simple windmill:

Take a small square sheet of paper (you can use the method shown below to cut 4 small square sheets from a rectangular A4 page.

1. Bring corner B across to meet corner C
2. Fold along line AD to form a right-angled isosceles triangle
3. Cut along line CD to leave a large square
4. The larger square can be folded as shown and cut into 4 small squares
5. Using one of the smaller squares, draw 2 diagonal lines across the small square leaving a space in the middle as shown, and cut along these lines
6. Take each of the 4 corners shown by grey dots and fold them into the centre of the square making sure to overlap them
7. Push a drawing pin through the centre of the paper making sure that all 4 windmill blades are secured as seen below (this is tricky and might need to be redone a few times before all blades are secure).
8. The drawing pin should be pushed into the top end of a pencil or wooden stick (not into the eraser but the wood below it)
9. It can be difficult to get the windmill to spin if the paper rubs against the pencil. To overcome friction and allow the blades to spin freely, something like a small bead can be placed between the paper and the pencil as shown below. It will need to be small enough to allow the drawing pin to still stick into the pencil.





Test the windmill to see if it spins and adjust as necessary.

Investigate

Once the learners have tested their windmills and have managed to get them to spin, encourage them to design a fair test investigation using their windmills.

Prompt question

For a younger class, the teacher might assign a question to investigate, or the class might agree on one question following a class discussion. Older classes should be encouraged to work in groups to come up with their own question. Examples might include but are not limited to:

- Which type of paper makes the windmill spin fastest? (try different types of thicker or thinner paper)
- Does the windmill spin faster closer to the ground or higher above the ground? (holding it while sitting on the ground or while standing up)
- Which part of the school has the fastest wind speed?
- Does the size of the windmill affect how well it spins?

Predicting

Based on their chosen question, the learners should make a prediction on the outcome and give a reason for their prediction.

Conducting The Investigation

For each question they investigate, the learners should think about how they will make it a fair test i.e. changing only one variable at a time and keeping everything else constant. For example, if they are changing the type of paper, they should make a few windmills the same size and test them all in the same place and the same way.

Most questions will involve measuring the speed at which the windmill is spinning. This can be calculated as rotations per minute. Ask the learners to figure out how to test this and come up with their own solutions. They might need to consider things such:

- Colouring one blade a different colour to make it easier to count how many times it rotates in one minute.
- If the windmill is spinning too fast to count the rotations, they might video it and play it in slow motion.

Sharing data/results

Groups should decide how they will record their results and present them to the class. Will they draw a table of results, draw a graph, video the results?

Especially for older classes, the windmills can be used for a variety of practical maths activities to include:

- Identifying a right-angled isosceles triangle when folding paper to get a square. Measuring lines and angles.
- Counting or calculating the number of rotations per minute.
- Calculating averages by repeating each investigation a number of times.
- Ratios: Using different sized squares to make their windmills, they might work out the ratio of the width of the initial sheet to the diameter of the finished windmill.
- Data collection: for each different starter question, data can be gathered, and learners can choose how to represent it in graphs or tables. Can they come to any conclusions based on their data?
- For 5th and 6th class, they might fit their finished windmill into a circle to calculate the distances travelled in each rotation. The diameter of the circle will be equal to the distance from one blade tip to the opposite one and if they use this to calculate the circumference, this will be the distance travelled in each rotation. If they know the distance travelled and the number of rotations per minute, they could potentially work out the speed in metres per second.

Take the Next Step

Adapt for home:

This is a very simple investigation that can easily be replicated at home without any adaptation.

Adapt for Junior/Senior level:

Junior classes might make the windmills and carry out a simple investigation. For older classes, the level of maths and science can progress.

Follow-up challenge/project/citizen science link:

Investigating wind and weather

- Using the Class Weather Station resource from esero.ie, make an anemometer and other weather instruments to record the weather and compare to Met Eireann data
- Using the classroom resources and energy statistics from The Sustainable Energy Authority of Ireland at seai.ie, find out more about Ireland's use of wind energy
- Use technology to make a video of your windmill's rotation to help with calculating speeds

History

- Research Sir Francis Beaufort and the Beaufort Scale
- Find out about how windmills were used to grind flour in the past.

Art

- Get creative with the design of your windmill! If you decorate the page before making the windmill, how will the design appear once it is finished?

Design and make bird feeders suitable for birds with different features

Design Challenge

Class Level - Junior/ Senior

Curriculum Links

Strand:	Living things
Strand Unit:	Plants and Animals
Curriculum Objectives:	Observe, identify and investigate the animals and plants that live in local environments; Group and compare living things into sets according to their similarities and differences; Identify the interrelationships and interdependence between plants and animals in local and other habitats; Observe and explore some ways in which plant and animal behaviour is influenced by, or adapted to, environmental conditions
Skills Development:	Working scientifically (Investigating and Experimenting, Observing, Questioning)
New words/vocabulary:	Bird populations, monitor
Focail nua:	Beathadán éan (Bird feeder)
Cross curricular links:	Geography, Art, construction. Maths, presentation of results. ICT, (can use construction apps for design)
Equipment/materials	• 500ml empty plastic bottle with cap • Twine • Seeds and nuts (Sunflower, pumpkin, nyger, corn, peanuts, flax, porridge oats etc). Lard. Recycled materials (Bottles, containers, yogurt pots, egg boxes etc.) • Natural materials such as pinecones • Pencils, twigs or lollipop sticks for perches • Scissors Visit the Birdwatch Ireland website for lots of great resources to help you identify common garden birds and for tips on and how to feed them

Engage

Prompt questions

Look at photos of different birds. The Birdwatch Ireland website is a great source of pictures and information on Ireland's birds.

- What do birds eat?
- Where do birds find their food?
- Are different birds adapted to eat different types of food?
- How can we help birds to find food?
- Will the same type of garden bird feeder be suitable for all birds?
- What birds visit our school yard?
- What other types of habitat do birds live in?
- Where would we go to see other types of bird?
- Do the birds that live in cities also live in the countryside?

Background

In winter some people like to put birdseed out in their gardens as it is difficult for birds to find insects, worms, seeds, and berries.

Not all birds eat the same types of food. Some seabirds eat shellfish and other types of birds even eat animals! Not all birds can land on or feed from a bird feeder as they are different sizes, have different beaks or different types of feet. For example, a bird with webbed feet like a duck would not be able to perch on a bird feeder.

Real World Application

As there are less and less green areas and wild habitats available for birds, certain species are finding it increasingly difficult to find food during the winter months (and indeed, at other times of the year as well). By providing bird feeders, local populations of wild birds can be sustained and protected. Bird feeders should only be a secondary source of food. It is far more important to provide natural sources of food, water and shelter for birds by protecting wild areas and making space for native trees, plants and insects in our schools, gardens and local areas.

Design challenge

Explore:

Look at the Birdwatch Ireland website to learn about Irish birds. See which ones learners can recognise. Study features such as size, body shape, beak type, feet, wings. The book Robby the Christmas Robin by Dale Treadwell is a great introduction to different birds and the food they like to eat.

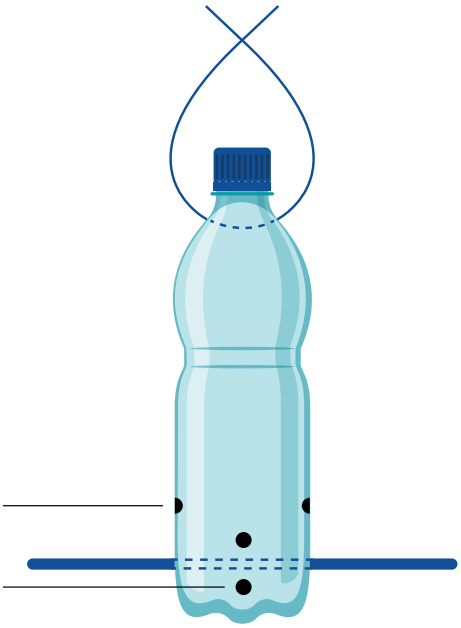
- Observe the birds in your school yard. How many different types are there?
- Record what they look like, can you identify them?
- What types of beak/feet/wings do they have? Are they large or small?
- What food do you think they would need to eat to have a healthy diet? Are there any foods that we want to avoid? This will give you a baseline of which bird species you can expect to encounter before you create and test your feeders.

Plan:

- Which type of local bird do you want to create a feeder for? What size beak/type of feet do they have?
- What will go into the feeder? Think about the type and size of food and how the bird will access it.
- Think about where you will place the feeder so the birds will have easy access to it, but that will not cause an obstruction to others e.g. it should be placed away from busy areas.
- Will the feeder be attached to anything so it won't be carried away by another animal e.g. will it be safely hung from a tree, railing, balcony or other structure?
- What size opening does the feeder need to have to suit the beak of the bird, how big does the platform need to be to suit thebird's foot size. Ideally different designs should be used to test which design features are best suited to which garden birds.
- Discuss the materials you will use and draw a plan for your feeder.
- If available, learners can use construction apps to design their feeder such as SOLIDWORKS® Apps for Kids.

Make:

- Make a feeder suitable for your bird out of recycled materials such as plastic bottles and cartons or natural materials. Ensure the materials are washed in soapy water before use.
- Fill your feeder with the food suitable for your bird and place it in the yard in a safe place where it can be easily observed from a distance.



Evaluate:

Monitor the feeders and record how many birds and what species of bird visit them. Remember to try and make it a fair test. If you have different types of feeders, you could use the same food. If you have very similar feeders, you could use different types of food. Learners can present the results in bar charts or pictograms.

Take the Next Step

Adapt for home:

Create another feeder for your garden at home (or bring your feeder home). Explore what birds are enjoying your feeder at home? Are they different to the ones you saw in school or are they the same?

Adapt for Senior level:

Using your feeders and a garden bird identification key, try and identify each species of bird that visits your bird feeder. Use characteristics like colour, beak shape, size to help. Identifying birds can be a difficult but hugely rewarding learning experience. Visit the Birdwatch Ireland website for lots of great resources to help you identify common garden birds.

Follow-up challenge/project/citizen science link

- Based on your bird investigations you can create a bird species guide for your school or home. You will often see these posters at the entrances to parks to help people learn what birds and animals live there. Now you can have a special bespoke one for your school. Feel free to update the poster when new birds are identified.
- Investigate bird adaptations.
- Take part in the Irish Garden Bird Survey by Bird Watch Ireland from December to February.

Investigating Chemical Energy: Make a Pop Rocket

Investigation

Class Level - All

Curriculum Links

Strand:	Energy and Forces; Materials
Strand Unit:	Forces, Properties and Characteristics of Materials; Materials and Change
Curriculum Objectives:	Investigate how forces act on objects; Explore how objects may be moved; recognise that a gas, such as air, occupies space, has mass and exerts pressure; investigate how materials may be changed by mixing; identify and discuss a local, national or global environmental issue
Skills Development:	Questioning; observing; predicting; investigating and experimenting; analysing: recording and communicating
New words / vocabulary:	Chemical reaction, carbon dioxide, greenhouse gases, combustion
Focail nua:	Imoibriú ceimiceach (chemical reaction), dé-ocsaíd charbóin (carbon dioxide), gás ceaptha teasa (greenhouse gas emissions)
Cross curricular links:	Maths: measures, data, tables and graphs
Equipment / materials	• Effervescent vitamin tablets, Alka seltzer or similar • Vitamin tablet containers or small bottles with a pop off top such as Benecol

Engage

Prompt questions:

- How are rockets launched?
- Why is a long cylinder the best shape for a rocket?
- Why does the rocket have a nose cone?
- Why does the rocket have fins?
- What are rockets used for?

Background information

The rocket works because of chemical energy. The tablet contains a mixture of two chemical substances: citric acid found in citrus fruits such as oranges and lemons and sodium bicarbonate also known as bread soda which is used for bread making. When water is added to the tablet, it causes the two chemicals to combine and create a chemical reaction. As part of this chemical reaction, carbon dioxide is released.

If the tablet is placed in a glass of water, the carbon dioxide bubbles would rise to the surface and be released out into the surrounding air. When the lid is placed on the container, the carbon dioxide is produced inside. The container is already full of water and air, and the carbon dioxide that is produced takes up space. As there is not enough space for the carbon dioxide, it is under pressure and eventually builds up enough energy to push the lid off the container and escape.

Real-world application

Real rockets work through a chemical reaction known as combustion. Most of the rocket is filled with fuel and oxygen. When the fuel is mixed with the oxygen and set alight it turns into a hot gas. The gas is pushed out of the bottom of the rocket. Isaac Newton's third Law of Motion states that for every action, there is an equal but opposite reaction. The gas being expelled from the bottom of the rocket exerts a pushing force against the Earth. The Earth then pushes back against the rocket, causing it to be launched into the air.

The main gas produced from the burning of fuel is Carbon Dioxide. Fossil fuels such as oil, gas, peat and coal are burned, not only for launching of rockets but also for most forms of transport most of our heating and for electricity generated in power stations. This is the same gas that is produced from the chemical reaction in our pop rocket.

Carbon Dioxide is a greenhouse gas which means that it acts like the glass in a greenhouse to trap some of the sun's energy and help to keep the Earth warm. When we burn too many fossil fuels, we trap too much heat around the Earth, and we call this Global Warming. This excess heat causes changes in the way air and water move around the Earth which can lead to extreme weather events and long-term changes in climate. This is known as Climate Change.

Exploring

Watch a video clip of a rocket launch. Discuss the shape of the rocket, the fuel that was used and the forces that allowed the rocket to be launched.

Half fill the container with water. Add a vitamin tablet. Replace the lid firmly and stand back. Watch as the lid is launched into the air. This initial demonstration could be done in groups or could be done as a whole class demonstration with groups then choosing starter question and carrying out their own investigation using rockets.

Note: *To ensure that the vitamin tablets remain dry, the containers always have silica gel beads inside the lid held in place by a cardboard disk. Before using the vitamin tablet containers for rockets, it is best to remove the cardboard disk and spill the silica gel beads into the bin.*

Investigate

Starter question:

Once they have observed the lid popping off the container, ask the learners to come up with their own starter questions for an investigation. These are some examples, but many variations on these questions can be tested.

- Does the amount of liquid in the container affect the time taken for the lid to launch?
- Will the lid be launched as high if we only add half a tablet?
- If we turn the container upside down, will there be enough force to launch the container instead of the lid?
- Will a lighter container be launched higher than a heavier container?

Predicting:

Ask the learners to make predictions based on their chosen question. For each question, they should record their prediction.

Conducting The Investigation:

For health and safety reasons and because the sticky liquid can be messy, this investigation should be done outdoors.

Always ensure that everyone stays back from the rocket once the lid has been placed on it. Never shake the container. It may take some time to build up enough gas to launch the rocket. Don't pick it up to check that it is working.

Learners should work in groups to choose their starter question. Once they have chosen their starter question, they should discuss how to make it a fair test and how they will measure their results.

If they are checking how high the lid or container is launched, learners will need to discuss how they will measure this. For instance, they might put chalk marks on a wall every 10cm.

If they are checking the time it takes for the rocket to launch, they will need a stopwatch or timer.

Video is a good tool to help measure both of these variables.

Older classes could incorporate more advanced maths into their investigations. With the use of a fine scales, they could break or crush the tablets and calculate the volume of water and amount of tablet needed for different container volumes if they want to keep the ratios the same.

As this investigations is quite short, groups might investigate a number of variables in turn and record their results for each.

If the container is placed upright and doesn't fall over, the lid can be replaced several times and will pop off again. Learners can count the number of times they can get the lid to pop off and observe how high it goes each time.

Sharing data/results:

Learners should record their starter questions before carrying out their investigations. They might make a table with each of their questions, their predictions and the results. They could make a video of their investigations and the results of each one. Videos could be slowed down to make it easier to determine how high the rocket travelled in each case

Various graphs could be drawn e.g.

- Volume of water v height of launch
- Amount of tablet v time taken to launch

Take the Next Step

Adapt for Home:

This is a very simple investigation that can easily be replicated at home without any adaptation.

Adapt for Junior/Senior level:

Junior classes might concentrate on a simple, investigation based on the amount of water added and the time taken for the rocket to launch. Senior students can include higher levels of maths and measure and calculate volume, ratios etc. and also concentrate more on the chemical reactions happening and the forces involved in launching the rocket.

Follow-up challenge/project/citizen science link:

- Research the history of rockets. When were they first used and what were they used for?
- Research the history of space exploration. Who first proposed that rockets could be used for space travel? When were they first used?
- Discuss the benefits of space exploration?
- Are there any disadvantages of space exploration? How do we overcome these problems? Discuss how space exploration could be more sustainable.
- Discuss the role of Carbon Dioxide in causing Climate Change.
- Bake soda bread. Discuss the chemical reaction that allows the bread to rise. This is the same reaction that occurs in our rocket.

Teacher Handout | **SPECTROSCOPE**

Dear Teacher

We have a colourful STEM challenge for you. We would like you and your class to make a SPECTROSCOPE. These instructions are to guide you rather than tell you exactly what to do – we want you and the class to create your own unique designs!

We would really like to see your designs! If you have time, send a photo of your creations to craftmaker@mic.ul.ie or tag the CRAFT Maker Space, Research Ireland and, Science week across our many social media channels.

Science Content Included in this Activity:

Light refraction and dispersion

White light is made up of all the colours in the rainbow. If you shine white light through a prism, it slows down and **bends (refracts)** and this bending causes the light to separate into its component colours (all the colours of the rainbow). This is called **dispersion.**

When you see a rainbow, you are seeing rays of light from the sun that bend (refract) and disperse, into its component colours, when it passes through rain drops.

How Does a Spectroscope Work

Light hitting the shiny underside of a CD reflects in a different way. All the colours reflect but each one bounces off in a different direction. The different colours spread out to form a spectrum.

A viewing window lets you see and examine the spectrum or range of colours present in the light.

Scientists use a spectroscope to study the range of colours (the spectrum) in different kinds of light.

Chemists can identify which different elements are in different substances by using spectroscopes to study the light they give off when burned. Sodium burns: Yellow, Copper burns: Bluish/Green, Lithium burns: Crimson Red.

Astronomers also use spectroscopes to study light from stars. From lines in the spectrum, they can tell which elements are present and so they can investigate the chemicals found in objects trillions of kms away.

The Challenge

Design and build a spectroscope to observe and examine the spectrum of light from a light source.

The Engineering Design teams will be required to brainstorm, imagine and draw their possible designs, build their prototypes, test them, modify where necessary, and re-test their spectroscope.

Questioning

What do you think a spectroscope does?
Why do you think we are using a CD in the design?
Why do you think the black card is needed?
What do you think will happen when light travels down through the tube and hits the CD?

Identify Criteria & Constraints

Engineers look at challenges through the lens of criteria (what does my device have to do?) and constraints (what are the limitations I face in making, testing, and using the device?). Discuss what the criteria and constraints of this challenge are.

The Spectroscope must

- Split light into a visible spectrum: show the colours such as red, orange, yellow, green, blue, violet.
- Be safe to use: no sharp edges or dangerous materials.
- Be portable and easy to carry: small enough to hold or carry.
- Allow clear viewing of the spectrum: the user should be able to see the colours clearly.
- Include a light entry slit and a viewing window.
- Be designed using only the materials provided.

How to Make Your Spectroscope

1. Gather all your materials

- Black electric tape
- Scissors
- Torch
- Pencil
- Old CD
- Black card
- Cardboard tube
- Ruler

2. Imagine

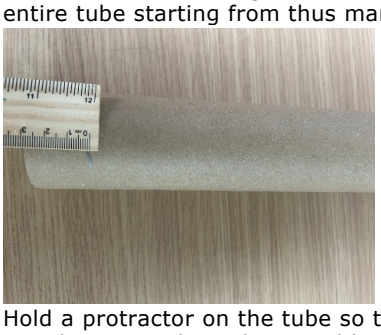
Using the materials provided, ask the Engineering Design teams to imagine and sketch their designs.

3. Plan and Design
Gather all materials and plan how your design will be constructed.

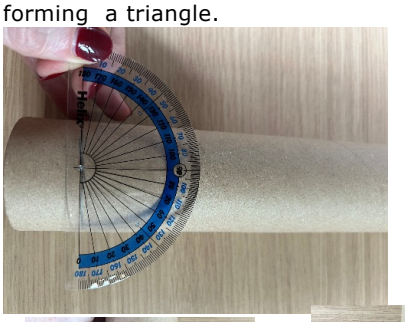
4. Create
It is time to build the spectroscope.

Watch the Science Week video from the CRAFT Maker Space at Mary Immaculate College.

Part 1:
Using a pencil, mark 3 cm from one end of the cradboard tube. Wrap black card around the tube at this mark. Use it as a guide to draw a line around the entire tube starting from thus mark.



Hold a protractor on the tube so that the protractor's zero line runs along the pencil line on the tube. Mark the angle at 30 degrees. Move the protractor and mark another 30 degree angle in the other direction. Extend both lines (30 degree angles) so that they meet the line that goes around the cardboard tube, forming a triangle.



On the oppositite side of the tube from the triangle, draw a rectangle 2cm high and 1 cm wide above the pencil line.

Cut along the two slanted lines so that you end up with an angled slot. This is where you will slide in the CD.
Now carefully cut out the small rectangle (viewing window) at the other side of the tube.
Push the CD into the angled slot with the shiny, bottom surface facing upwards.

Secure the CD in place using black electrical tape.
Using strips of tape to close off the end of the cardboard tube closest to the CD. Make sure no light can get into the tube.

Part 2:
Draw around the open end of the tube onto a black piece of card using a pencil. Cut out around the circle ~ 2cm beyond the circle drawn.
This circle of card will cover the open end of the tube. To make a slit in the circle that will leave in light, fold the circle in half and cut a line in the middle of the circle using the fold as a guide. Unfold the circle and cover the open end of the tube with the circle, securing it with black tape.

Questioning
What challenges are you facing while building? How are you solving them?

Your spectroscope is now ready to use! Shine a torch

Safety

When you use your spectroscope hold it close to your eye and cover your other eye with your hand. Never look directly at bright lights. Never use the spectroscope to look at the sun.

5. Test and Evaluate

Questioning

What do you see when you look at a light source through your spectroscope?

6. Modify (if required)
Think about:

- *What part of your spectroscope could be improved to make the spectrum clearer?*
- *If you could add one new feature to your design, what would it be and why?*
- *Could we make the inside of the tube darker?*

The teams can also add any other decorations to the outside of the spectroscope at this point.

The design could be improved by sticking black card to the inside of the tube or painting the inside of the tube black before the challenge.

Extension Activities

Think about:

- Try using different light sources?
- Do they all show the same spectrum?

The CRAFT Maker Space at Mary Immaculate College Limerick

CRAFT at MIC is a dynamic STEAM engagement centre that delivers inclusive, hands-on educational experiences to children, families, educators, and communities across the Mid-West Region of Ireland and beyond.

Through workshops, camps, CPD courses, and public events—delivered both on-campus and in schools, libraries, and community spaces, CRAFT promotes equity of access and builds capacity among educators. Activities include engineering challenges, coding, robotics, 3D printing, and much, much, more.

To find out more and to avail of our STEAM workshops for your school click on our website at: https://stemcraft.mic.ul.ie/

This resource was created by Dr. Maeve Liston & Dr. Eleanor Walsh, Mary Immaculate College.

The Curious Minds programme has hundreds of other captivating classroom investigations you can choose from: https://www.sfi.ie/engagement/curious-minds/teacher-resources/classroom-resources/

Delivered by

curious minds
Discover STEM

www.curiousminds.ie

SCIENCE WEEK
#scienceweek
Supported by Research Ireland

www.scienceweek.ie

Ireland esero

www.esero.ie

Supported by

Taighde Éireann
Research Ireland