

SCIENCE WEEK

#scienceweek

7-14 Nov 2021

Supported by Science Foundation Ireland

CREATING OUR FUTURE: HOMES

Classroom Resource Booklet



INTRODUCTION

**CREATING
OUR
FUTURE**

Creating Our Future aims to build on the success of research and science in our battle against Covid-19 and ask the public how we can shape a better Ireland through research and science. From July to November events will be held across the country where the Irish public will be invited to share their opinions on current research being carried out, their thoughts on the direction those studies should take, and offer ideas for other research opportunities yet to be explored.

Science Foundation Ireland is inviting primary schools to get involved in the process of generating ideas. We will be introducing 6 themes over a period of 6 weeks and presenting lesson resource on these themes. Each resource will incorporate some different ideas for introducing the topic in your classroom with trigger questions to aid discussion, a related science investigation or design and make project and some ideas for carrying out your own research on the topic.

The resource is not designed as a complete lesson plan but rather some suggestions to inspire you to create your own lesson on the theme. Teachers can choose to engage with any of the resources or even all 6. At the end of the 6 weeks and as we approach Science week in November, we will then ask teachers to capture their learners' ideas and submit them to us to ensure that the ideas of Primary school pupils are incorporated into the overall project.



BACKGROUND

This week's theme is Homes. We all need a place to live and we are all very aware of homelessness and housing shortages, but with 7.9 billion people on the Earth, we also need to think about the impact of our homes on the environment and on other people. We would like to encourage learners to think about the materials we use for constructing our homes, the waste we generate, the amount of land we use, the energy we use in our homes and how we can protect biodiversity in our homes and gardens.



TRIGGER QUESTIONS FOR DISCUSSION

What is a sustainable building



Source: YouTube

What is a BER Rating? Watch the following video from SEAI to find out



Source: Sustainable Energy Authority of Ireland

Would you like to build a house with mud, straw and sand? This video from Carraig Dúlra shows you how...



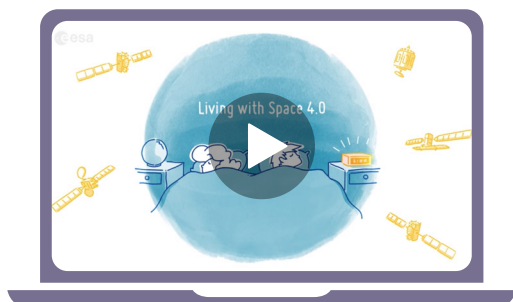
Source: YouTube - Scedia

...and here are some finished cob houses at The Hollies



Source: YouTube

Can smart technologies make our homes better?



Source: ESA

How can we design houses to use the sun's energy for heating? This book explains how a Passive Solar House works.



Source: YouTube - iPHA

What about building a house on the moon? Find out about the European Space Agency Moon Camp Challenge and watch the video here



Source: ESA



Source: YouTube - Laois Heritage

How can we look after Biodiversity in our gardens to reduce the environmental impact of our homes?

RESEARCH PROJECT IDEAS

Research the common features of houses that have a high BER rating. Draw a house that would have a high BER rating. What features would you include? What energy efficient features do you think houses will have in the future?

Carry out an energy audit on your home or school. Check out the SEAI resource for 3rd and 4th class Guzzler's House.

What features do you think developers should include when planning new housing estates to protect the environment? Insulation and energy, native trees and hedgerows, hard surfaces, dark sky appropriate lighting.





INVESTIGATION

INVESTIGATING NATIVE HEDGEROWS

A native hedgerow is a valuable addition to any home. It can provide shelter, shade and privacy to your garden, remove air pollutants and carbon dioxide from the air and regulate soil water in your garden. It is also a home for other animals and native plants. Native flowering hedgerows provide pollen and nectar for pollinators such as bees and hoverflies, fruits, nuts, berries and nesting sites for birds and shelter for many types of invertebrates. Many wildflower species also grow along hedgerows. This investigation can be used to investigate wildlife in an existing hedgerow or help you to plan and plant a new hedgerow.



INVESTIGATING HEDGEROW HABITATS

Investigation: The investigation of existing hedgerows is best suited to spring/summer when hedgerows are in full leaf, many are in bloom and insect activity is high but can be done on an uncut hedge in early autumn when leaves and fruits are still on the hedges. The planting part of the project is best suited to autumn or winter, but can be done any time of the year.

Class Level: All levels (with adaptations)

Curriculum Links

Strand: Environmental Awareness and Care; Living Things

Strand Unit: Environmental Awareness; Science and the Environment; Caring for the Environment

Curriculum Objectives: Recognise how actions of people may impact upon the environment; Identify and discuss a local, national or global environmental issue; Explore some examples of interrelationship of living and non-living aspects of local and other environments; Realise that there is personal and community responsibility for taking care of the environment.

Skills Development: Questioning; Observing; Exploring; Predicting; Planning; Investigating; Estimating and measuring; Recording and communicating; Collaborating; Ask questions that will identify problems to be solved (how many hedging plants required).

New Words/vocabulary: Hedgerow, Biodiversity, Boundary, Predator, Wildlife Corridor, Native, Pollinator, Invasive, Herbicide, Pesticide, Fungicide, Management, Habitat, Ecosystem,

Focail nua: Sceach (hedgerow); Gnáthóg (habitat); Fiadhúlra (wildlife)

Cross curricular links: English (new words and procedural writing); Maths (capacity/weight); History (traditions around trees and plants)

Equipment/Materials

For planning hedgerow: Measuring tape (20m), metre sticks

For planting hedgerow: Hedging plants, spades, compost, Mypex (weed control fabric)



INVESTIGATING HEDGEROW HABITATS

Engage

Trigger questions/wondering

- Hedgerow biodiversity video by Tipperary Farmer (5 mins)
(https://www.youtube.com/watch?v=g9MDO_5q25U&feature=emb_logo also on <https://pollinators.ie/videos/>)
- Managing hedgerows video by Tipperary Farmer (5 mins)
https://www.youtube.com/watch?v=ZXETU0gZ9Y0&feature=emb_logo also on <https://pollinators.ie/farmland/>
- Get a copy of the *How-to-guide: Hedgerows for Pollinators* available for free download from the All Ireland Pollinator Plan website (<https://pollinators.ie/resources/hedgerows/>). Discuss this resource with the learners.
- Take a walk to a near-by park or any place within or near the school grounds with a hedgerow.
 - Ask the learners what a hedgerow is?
 - Can they find a hedgerow on the park/school grounds?
 - What kinds of plants are in hedgerows – do they recognise any of them?
 - What is the purpose of hedgerows?
- Look at your school boundary – is there a hedgerow there? If you were a small bird or mammal, how would you safely get from one side of the school to the other without being seen by predators flying overhead?
- Looking at hedgerow, imagine you were a hungry pollinator or other animal - could you find any food on the hedgerow (flowers/fruit/insects)?
- What are the benefits of planting hedgerows? Check out this poster from the Hedge Laying Association of Ireland. <https://hedgelaying.ie/wp-content/uploads/2019/11/Hedgerows-Soil-Savers-Poster.jpg>
- What animal do you think of when you hear the word 'hedgerow'?
Teachers could discuss books about the myths and folklore surrounding our native plants





INVESTIGATING HEDGEROW HABITATS

Background

A hedgerow is a living structure comprising a line of trees and shrubs usually planted at edges of fields as boundaries. They act as a substitute for woodland edges, as there is little native woodland left in Ireland. Historically, hedgerows were planted in the countryside on farms to stop cattle and sheep escaping and also to mark farm and townland boundaries many of which date back to the 8th century (Joyce 1898, *Irish Local Names Explained*).

Hedgerows are rich in biodiversity. They provide an important habitat for a wide range of animals, including, birds, mammals, and insects. They also provide a habitat for native wildflowers. Hedgerows provide food and shelter for insects, birds, bats and other wildlife.

Hedgerows act as wildlife corridors or 'highways' for animals to move safely from one habitat to another and are a vital part of our countryside and urban landscape.

Threats to hedgerows include inappropriate management such as: illegal cutting of hedgerows and spraying of chemicals (herbicides, pesticides, fungicides). The impact of cutting hedgerows at the wrong time of year includes removing essential flowers/berries/nuts before they develop, and disrupting nesting sites. Further threats include hedgerow clearance for development of land and for agricultural expansion.

In the past, species growing in our native hedgerows were used for food, drink and herbal medicine.

Real World Application

Hedgerows sequester and store carbon which helps mitigate climate change.

It is illegal cut hedgerows between 1st March and 31st August (Wildlife Act 1976). Cutting hedgerows during this period is potentially lethal to chicks nesting. It also removes vital food sources for our insects (including our pollinators), birds and other animals. Hedgerow cutting is only permitted during this period in cases of road safety concerns, i.e. hedgerows obscuring road signs, or impacting pedestrians, cyclists and motorists safe use of the road.

For creating a new hedgerow, hedging plants can be bought from nurseries/growers as bare root young plants (saplings). These saplings are dug up to order and are delivered bare rooted, i.e. not in a pot. This is a much cheaper way to purchase a large quantity of hedging plants. In garden centres, the hedging plants are usually more mature and are in compost in plastic pots, i.e. the roots are not exposed.

When planting a hedgerow, it is best to plant in two rows that are staggered and to have a variety of native species. This will result in a fuller and thicker hedgerow which will provide a better and safer wildlife corridor and provide food and shelter for wildlife throughout the seasons.



INVESTIGATING HEDGEROW HABITATS

Real World Application (continued)

Often when new housing/retail developments are planned and built, the planting of hedges or other planting schemes doesn't include many native plants or pollinator friendly plants. Gardeners and developers should always include native pollinator-friendly plants. Native Irish plants and animals have evolved together and are hugely dependent upon each other. Introductions of non-native (and potentially invasive) species can interfere with this delicate ecosystem.

Many companies and businesses have committed to support the All Ireland Pollinator Plan (AIPP). The AIPP brings many sectors of the community together to try to create an Ireland where pollinators can survive and thrive, including farmers, local authorities, schools, gardeners and businesses. Native hedgerow planting is one of the recommended actions of the AIPP.

Explore

Once you have identified a hedgerow, allow the learners to walk along the hedgerow to explore. This is a great opportunity to use hand lenses or magnifying glasses to see the detail of the leaves, flowers, fruit, bark, insects, lichens, etc.. Remind the learners to be careful of any thorny plants and nettles (don't grab at plants – examine them first for thorns before touching).

- How many different species of plant are growing there? (it is not necessary to know names, as the difference can be seen in the leaves/flower/fruit etc...).
- Are there any insects on the underside of the leaves or on the bark?
- Are there thorns on any of the plants?
- Are the leaves all the same shape and colour?
- What are the flowers/fruit like?
- How high is the hedge? (learners can estimate the height of the hedge using their own body height).
- Learners can count the number of individual plants along a specified length of hedgerow (look at the base of the hedge to see the individual trunks).
- Does the hedgerow connect to another habitat?
- Who is responsible for cutting the hedge?
- Do they like the hedge? Does it make the park/school look better than if there was none? Why?

If there is no hedge in the school grounds, the learners could consider where one could be planted. What method would you use to measure the area for planting a hedgerow?





INVESTIGATING HEDGEROW HABITATS

Investigate

Starter Question

How much would it cost to plant a hedgerow along the school boundary? (Even if there is a hedgerow in place, the calculation can be carried out based on that hedgerow).

The learners will be investigating three aspects of hedgerow planting in order to calculate the cost:

- 1) What is the length of the school boundary where a hedgerow could be planted?
- 2) How many plants are needed to plant a hedgerow along this boundary?
- 3) How much will it cost?

Prediction

Estimate the length of the school boundary where the hedgerow could be planted. It is important at this point to determine where the school boundary is and what part of it will be considered for hedgerow planting. Choose a start and finish point and then make the predictions.

Estimate the number of plants required and the estimated cost.

HEDGEROW SIZE AND COST CALCULATIONS		ESTIMATE	ACTUAL
Length of school boundary	Distance in metres		
Total number of plants needed (remember we will need a double row of hedging)	2 plants per metre		
Total cost of plants for hedgerow	*Cost per plant (€)		

* Learners should estimate the cost of hedgerow plants.

Investigation

The start and finish point of the hedgerow has already been determined. Prior to starting the investigation, and number of factors need to be considered – measurement method and cost per plant.

Measurement method

Three methods of measurement will be used, with the results compared between groups at the end of the investigation. The learners will work in groups. Each group will use one method of measurement. These methods are:

1. Foot steps
2. Fence/wall widths
3. Measuring tape



INVESTIGATING HEDGEROW HABITATS

Measurement method (continued)

Method 1 - Footsteps: Using the metre sticks, the learners calculate how many footsteps are in one metre. This is best done with the learner using their normal walking stride, e.g. 2 strides per metre. They then walk the proposed boundary counting strides. One learner should do the walking and one should record. The learners should decide in advance how best to do this, as it is easy to lose count when walking a long distance.

HOW MANY FOOTSTEPS IN 1 METRE?	HOW MANY FOOTSTEPS IN TOTAL?	TOTAL LENGTH IN METRES

Method 2: Using the metre sticks, the learners calculate how many metres in one fence panel width (or between two wall pillars). Then count how many fences/wall pillars are in the proposed hedgerow area. The learners need to determine if all fences are the same width (or distance between wall pillars is equal). If there is a smaller fence/wall width at the end of the boundary, the learners need to decide how to include this in their calculations.

WIDTH OF ONE FENCE IN METRES	HOW MANY FENCES	TOTAL LENGTH IN METRES

Method 3: Using a 20m measuring tape (or whatever size is available), the learners calculate the length of the boundary for the hedgerow.

Cost per plant

The learners can be told the cost by the teacher, or they can research the cost of native hedging plants online.

The learners need to remember that the hedgerow will be planted as double rows and should include this in their final calculation.

Sharing: interpreting data/results

Did the results match the predictions?

Was there much difference in the final results between the methods of measurement?

How to present individual group data?

How to present all groups data together?

Were you surprised at the number of plants needed and/or the total cost.





INVESTIGATING HEDGEROW HABITATS

Take the Next Step

Are there other ways to measure the school boundary? Laser distance measure? GPS? Distance measuring wheel?

Having calculated the cost of a hedgerow for the school – compare the cost difference between bare root and potted hedging plants. Costs of both types can be researched online.

What are the advantages/disadvantages of bare root v potted hedging plants. Bare root plants are cheaper to buy as they are planted in the ground at nurseries, require minimal maintenance and are dug up to order. Potted plants are more expensive as they are typically more mature when sold and it costs more money to plant them in pots and to maintain them in a garden centre. Once delivered, bare root plants need to be planted immediately as their roots will dry out otherwise. Potted plants can be planted at a later date as the compost will keep the roots moist.

Having learned about the function of hedgerows, do you think it matters when a hedgerow is cut?

Could you plant a virtual hedgerow on Minecraft?

Learners could look up how to make nettle tea and elderflower cordial. This could be carried out as an activity.

Adapt for Home

This could be adapted to home if there is garden space to plant a small number of hedging plants. However, the calculation for hedging can be carried out in any space.

Adapt for Junior/Senior level

Junior learners can carry out the hedgerow exploration as outlined for Senior learners. Junior learners can count how many footsteps there are in a specified length of the school boundary/fence.

Follow-up challenge/project/citizen science link

A hedgerow planting project is a fantastic project for the whole school. This allows the learners to take ownership of the hedgerow. This is a big project, so it is best undertaken with the help of an expert. The Heritage in Schools Scheme, which is run by the Heritage Council, has a list of experts that the school could contact. Be sure to use the *How-to-guide: Hedgerows for Pollinators*.

Can you find out if any companies/businesses in your area have committed to support the All Ireland Pollinator Plan (AIPP)? Has your school committed to implemented any of the actions of AIPP? Learners can access the Junior All Ireland Pollinator Plan online to learn about the actions they could implement in their school. It doesn't have to be a hedgerow! There are many simple ways to help our pollinators and native plant species.



INVESTIGATING HEDGEROW HABITATS

Follow-up challenge/project/citizen science link (continued)

Check out the craft of hedge laying on the Hedge Laying Association of Ireland website (hedgelaying.ie). This craft of hedgerow management was a widespread method of rejuvenating hedges in the middle of the 20th century, having since mostly died out. The current emphasis on hedgerow planting, management and conservation has resulted in a revival of this traditional country craft.

TOTAL LENGTH OF MEASURING TAPE	NUMBER OF MEASURING TAPE LENGTHS	TOTAL LENGTH IN METRES

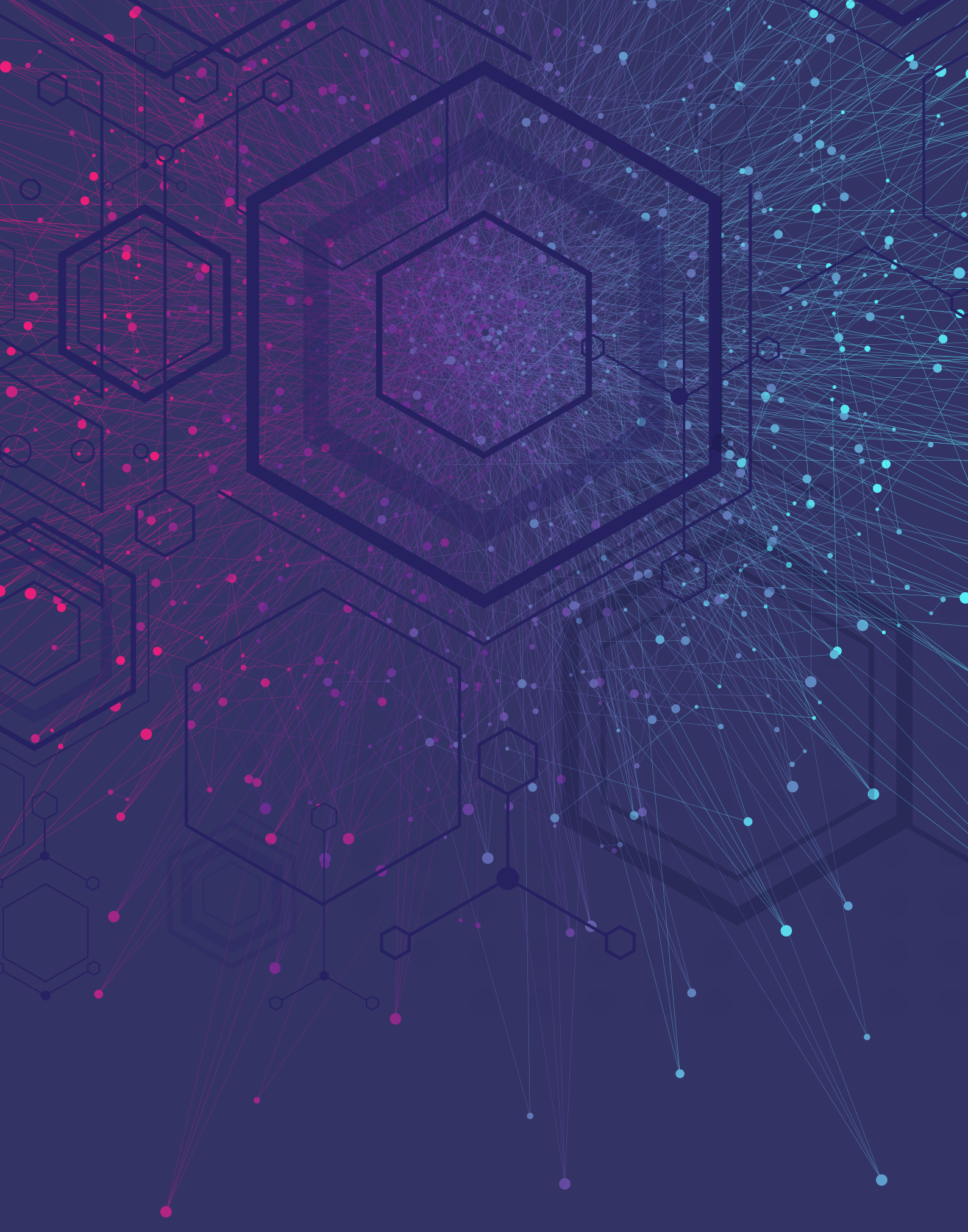
SDG



Have your ideas heard!

Now that you have discussed your ideas for Homes, collect the classes ideas using this [template](#) and email them to creatingourfuture@sfi.ie





Science Foundation Ireland
3 Park Place,
Hatch Street Upper, Dublin 2.
t: +353 1 6073221 | scienceweek@sfi.ie

Science
Foundation
Ireland **sfi**
For what's next

CREATING
OUR
FUTURE