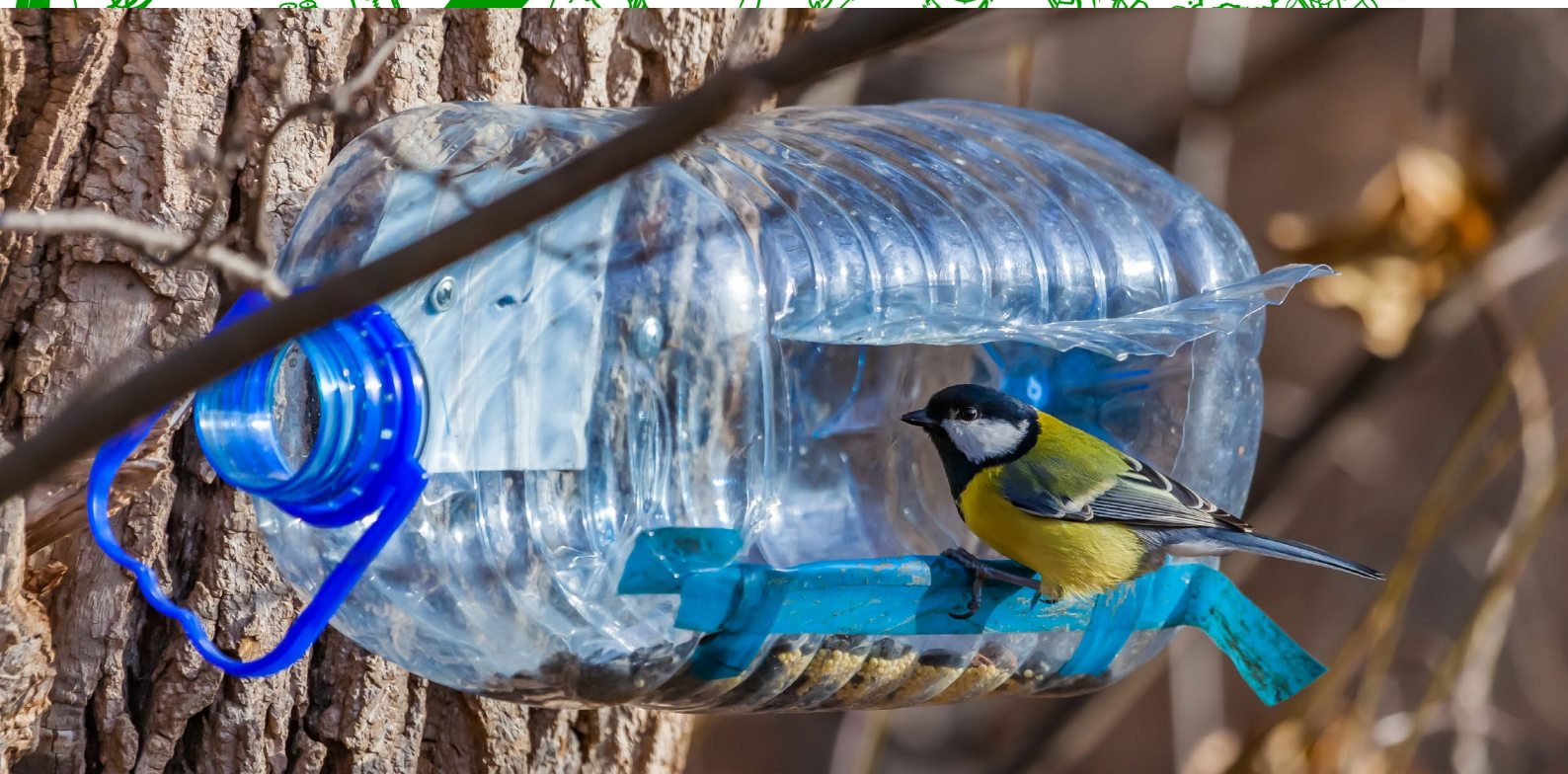
Ultimate STEM Challenge

Primary

A home for nature

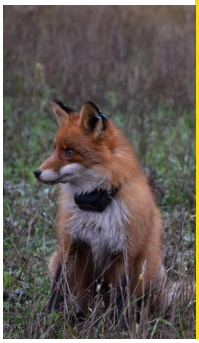
Delivery guide



This guide will help you and your pupils take part in the **Ultimate STEM Challenge 2021: A home for nature.**

The classroom activities in this guide avoid working closely in groups or pairs and are therefore appropriate for pupils in socially distanced classrooms.

Pupils working remotely, can complete the lesson tasks independently and enter the competition from home.



This guide includes:

1. bp's Ultimate STEM Challenge and building science capital

bp is a long-term supporter of STEM and continues to encourage and energise every generation; helping them gain a better understanding of how important STEM subjects are for the industry and for their futures. The Ultimate STEM Challenge is designed to help young people develop their creativity, problem-solving skills and employability by tackling real-world challenges.

The competition is based on insights from the ground-breaking 'Enterprising Science' research which shows that the more science capital (science-related qualifications, interest, literacy and social contacts) a young person has, the more likely they are to pursue a STEM career.

Science capital is a measure of our engagement or relationship with science, how much we value it, and whether we feel it is 'for us' and connected with our life. It recognises the significance of what we know, how we think, what we do and who we know in shaping our relationship with science. It also helps to shape and frame experiences which are designed to support STEM engagement.

About bp

bp is in the process of transforming its business from an international oil company focused on producing resources to an integrated energy company focused on delivering solutions for customers, and has the ambition to become a net zero company by 2050 or sooner and help the world get to net zero. bp understands that transformative change is needed and recognises there is also an intrinsic link between the need for global action on biodiversity and climate change. As part of its purpose to reimagine energy for people and the planet, bp is taking action to restore, maintain and enhance nature.

2. Challenge summary

The USC theme for 2020 is 'A home for nature'.

We rely on the intricate balance between animals and plants to provide us with all of the things we need to survive and thrive on Earth, but with animal and plant species in decline all over the world, that balance is in danger.

So this year, the bp Educational Service Ultimate STEM Challenge invites young people across the UK to come up with a design for an amazing wild area, that includes natural and technical solutions for improving biodiversity in school grounds, at home or in the community, and helps to tackle the decline in our native wildlife.

The challenge is open to 9 to 14-year olds across the UK. Entries will be judged in two categories: age 9-11 and age 11-14. Students may enter as individuals or teams of 3-4. A winner will be chosen from each age category, as well as an overall challenge winner. The overall winner will receive a £3,000 prize to spend on creating their home for nature, while the category winners will receive £1,000 each.

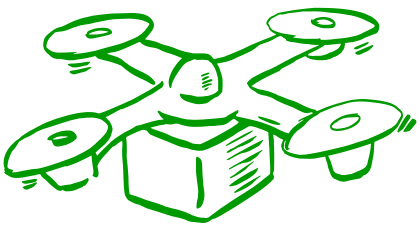
Terms and Conditions apply. Go to https://bpes.bp.com/usc-terms-and-conditions

3. Curriculum links

The Ultimate STEM Challenge can support pupils to develop their skills and knowledge in several curriculum areas including science (plants, animals, living things and habitats) geography, design and technology/technologies and computing. Taking part in the challenge will help your pupils use their scientific knowledge and understanding, to create natural and technological solutions and can also help pupils develop:

- **New scientific knowledge and conceptual understanding** when finding out about biodiversity, its importance, reasons for its decline and how we can improve it.
- **The knowledge** required to understand the uses and implications of science, today and for the future.
- **Essential skills:** listening, speaking, problem-solving, creativity, staying positive, aiming high leadership and teamwork.

For more about essential skills go to skillsbuilder.org



4.Step-by-step guide to taking part

Step 1: Lesson 1
Introduce the challenge, help pupils find out about biodiversity and set the homework task.

Timings: 1-2 hours

Resources to help you:

- Kick off biodiversity video lesson (Approx. 20 mins)
- Delivery notes for lesson 1
- About biodiversity activity sheet
- Homework task sheet

Step 2: Lesson 2
Help pupils record their designs.

Resources to help you:

- Kick off biodiversity video lesson (final part)
- Delivery notes for lesson 2
- Entry form

Step 3: Send in your pupils' entries
The competition closes **Wednesday 3 March 2021**.

Entries can be submitted by:

Email: bpusc@nationalschoolspartnership.com

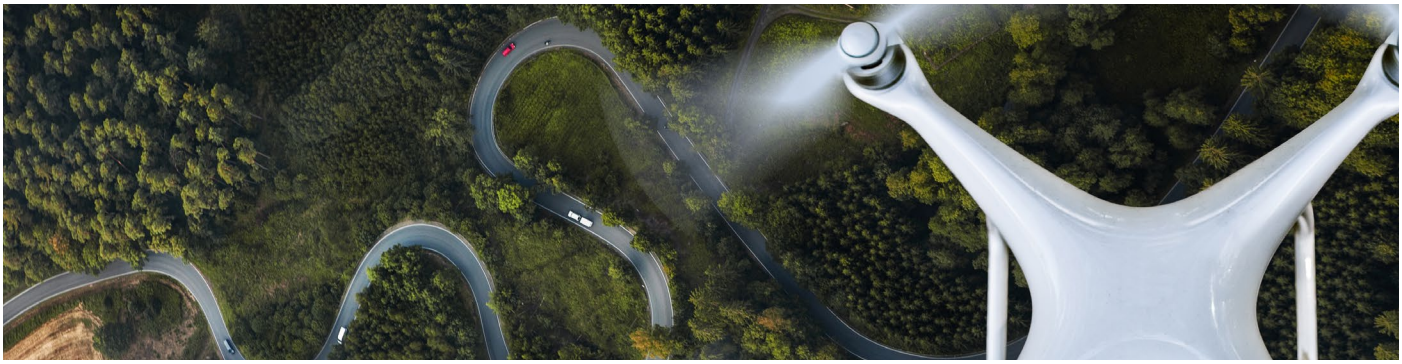
Fax: 020 7509 6651

Freepost: We Are Futures, Ultimate STEM Challenge, 1-2 Paris Garden, London, SE1 8ND

Resources to help you:

- Freepost label

Remember, you can download everything you need from bp.com/bpes



5. Lesson 1: activities and resources

In this lesson you will:

- Watch the video lesson to find out about the challenge and biodiversity.
- Complete the About biodiversity activity sheet
- Set the homework task

Timings: 1-2 hours

You will need:

- Kick-off biodiversity video lesson (25 mins)
- About biodiversity activity sheet
- Homework task sheet

Lesson activities

1. Tell pupils that they're going to watch a video lesson in which wildlife presenter, Michaela Strachan, introduces them to a challenge. Explain that there are prizes to be won (see section 8. Rules, conditions, judging and prizes at the end of this guide) and children all over the UK are taking part. Give each pupil an About biodiversity activity sheet to record the things they find out in the video lesson.

You can either watch the Kick-off biodiversity video lesson all the way through as a 20 minute programme, or you can watch it as five sections. The sections are:

- About the Challenge
- What's biodiversity and why does it matter?
- What's happening to biodiversity?
- What can we do to improve biodiversity?
- Your challenge

The following guidance assumes that you watch the video lesson section by section and pause after each section.

2. Watch the first section: About the Challenge. Pause the video clip at the end of this first section and ask pupils to tell you what they've learnt about this year's challenge.
3. Remind pupils that the theme for the challenge is biodiversity and tell them they are going to learn more about biodiversity. Explain what a species is (a group of plants or animals whose members have the same main features and are able to breed with each other) and read the definition of biodiversity, on the top right of the About biodiversity activity sheet. Ask pupils to brainstorm as many plant and animal species as they can in 2 minutes and to record their lists on the activity sheet. Explain to pupils that scientists believe that there are around 8.7 million species of plants and animals on Earth and they all depend on each other.

Michaela Strachan is a wildlife presenter with a passion for our natural world. She has travelled all over the world filming animals and conservation projects. She is best known for presenting wildlife programmes such as 'The Really Wild Show'. 'Animal Rescue Squad', 'Countryfile', 'Springwatch', 'Autumnwatch' and 'Winterwatch'.

4. Tell pupils that they are going to learn more about biodiversity and why it's important to life on Earth. Watch the second part of the video lesson: What's biodiversity and why does it matter? Pause the video clip at the end of this section and ask pupils to fill in question 2. Why does biodiversity matter? on the activity sheet. (Example answers: Biodiversity gives us the air we breathe, food, medicines, materials, clean water, fertile soils, stable climate and beautiful places for recreation).
5. Watch the third part of the video lesson: What's happening to biodiversity? Recap the facts from the clip with the whole class; number of animals has fallen by nearly two thirds in the last fifty years; 1 million global plant and animal species, a quarter of all UK mammals and half of birds, are at risk of extinction; scientists calling this a period of mass extinction. Ask pupils if they are aware of any wildlife disappearing in their local area. Ask pupils to complete question 3. What's happening to biodiversity? on the activity sheet. (Statements a, b, and d are true).
6. Now, watch the fourth part of the video lesson: What can we do to improve biodiversity? Discuss the natural and technological solutions in the clip and ask pupils to complete question 4. What can we do to improve biodiversity? on the activity sheet. Discuss pupils' own experiences; have they seen any natural or technological solutions for improving biodiversity, in their own area, online or on TV? Have they already got some good ideas about how they might increase biodiversity in their local area?

Building science capital It is important to elicit and value pupils' own experiences to build science capital. Encourage pupils to speak about their own experiences of plants and animals in natural areas and that of their families and friends. Encourage them to talk about any changes they noticed during lockdown.

7. Finally, watch the end part of the video lesson: Your challenge. Tell pupils that they will spend the next lesson coming up with their design for a 'home for nature' and need to complete the homework task before that lesson.
8. Give each pupil a homework task sheet to complete before the next lesson. The homework task sheet asks them to:
    - Talk about biodiversity to family and friends.
    - Find out how the natural spaces in their local area have changed over time.
    - Find out about existing natural and technological solutions for improving biodiversity, in their local area.
    - Compile a list of ideas for their 'home for nature' ready for discussion in the next lesson.

6. Optional extra activities

These optional activities can be used to extend pupils' understanding of biodiversity and help them to experience role-models and careers in the field of biology, nature, conservancy, technology and engineering.

- **Invite an expert**
  Ask someone with a passion for gardening, wildlife or protecting our environment, into school, or to join a video-conference, so they can talk about biodiversity and their experiences of creating homes for nature. Invite guests from your local community so that pupils have role models that they can relate to (for example, people who grew up in the same area, from similar cultural backgrounds).

Building science capital Research into science capital has found that encountering people who work in science-related jobs is a powerful way to challenge stereotypes and show that a diverse range of people use and benefit from science skills and knowledge.

- **Talk about careers**
  Talk to pupils about Michaela Strachan's career as a wildlife presenter and discuss her essential skills (speaking, listening, problem-solving, creativity, staying positive, aiming high, leadership, teamwork).

For more about essential skills visit skillsbuilder.org

Explain to pupils that there are many people who have careers linked to our natural world. Give examples including naturalist, conservationist, biologist, gardener, landscaper, countryside ranger, ecologist, forest manager, farmer, vet, zookeeper. Talk about the role that engineers, technologists and designers play, in creating new technologies to maintain and improve biodiversity. Ask pupils if any of their friends and family have jobs in this field.

For more about careers visit startprofile.com

- **Go on a wildlife hunt**
  Take pupils outside to look at species biodiversity in their local area. Take them to areas with rich and poor diversity so they can compare. Use identification tools to help pupils name what they find.

For example, Spot-it sheets:

Simple print out guides to help identify minibeasts, mammals, birds, trees, pondlife, nuts and seeds, from the RSPB (Royal Society for Protection of Birds)

https://www.rspb.org.uk/fun-and-learning/for-teachers/lesson-plans-and-supporting-resources/spot-it/

iNaturalist app: One of the world's most popular nature apps, iNaturalist helps you identify the plants and animals around you. Get connected with a community of over 400,000 scientists and naturalists who can help you learn more about nature.

App Store: https://apps.apple.com/us/app/inaturalist/id421397028

Google Play: https://play.google.com/store/apps/details?id=org.inaturalist.android&hl=en_GB

Building science capital Personalising and localising are about making science content personally relevant to pupils. Find out about parents and family members who are interested in or work in this field. Invite them into the classroom to talk to pupils (if safe to do so and in line with current social distancing guidance).

- **Find out more**
  Encourage pupils to go outside, to museums, to look at books, newspapers, TV and online and find out more about the natural world and biodiversity.

Here are some useful links:

- RSPB's planting plans for wildlife gardens- useful advice and tips for increasing biodiversity in your local area

https://www.rspb.org.uk/birds-and-wildlife/advice/gardening-for-wildlife/plants-for-wildlife/planting-plan-for-wildlife-gardens/

- WWF Biodiversity explainer – facts and figures

https://www.wwf.org.uk/sites/default/files/2020-02/WWF_Biodiversity_Schools_Explainer_0.pdf

- Biodiversity in schools

https://www.biodiversityinschools.com/

- Extinction: The Facts – TV special from David Attenborough

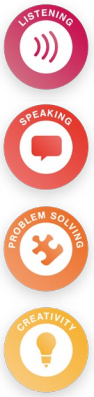
https://www.bbc.co.uk/programmes/m000mn4n

- Anthropocene, the age of humans, from the Natural History Museum

https://www.nhm.ac.uk/discover/anthropocene.html

Building science capital Encourage pupils to regularly watch science documentaries on TV or online, and to read science-related news and articles. Then draw upon these during science lessons.

7. Lesson 2: activities and resources



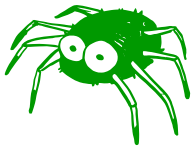
Help pupils record their designs

In lesson 2 you will:

- Review the homework activity
- Remind pupils about sketches, plans and labelled diagrams
- Give pupils their entry forms
- Share the challenge rules and conditions and judging criteria with pupils
- Guide pupils as they complete their 'home for nature' design ideas on the entry form

Resources to help you:

- Completed homework task sheets
- Kick off biodiversity video lesson (final section: Your challenge)
- Entry form
- Delivery notes for lesson 2



Lesson activities

1. Ask pupils to share their findings and ideas from the homework tasks with the class and each other.
2. Watch the final part of the Kick off biodiversity video lesson: Your challenge, again and remind pupils about the challenge.
3. Help pupils to decide on their final idea by encouraging them to answer the following questions:
    - What part of your local area will you choose for your home for nature?
    - Will you choose your own garden, balcony or roof? Will you choose part of the school grounds or a piece of neglected land in your local community? Or maybe you've identified an area next to a construction site?
    - What plant and animal species are already living there, and which new ones would you like to introduce? Why have you chosen them? Will you use any technologies to identify and monitor species?
    - How will you help all of these species flourish in their new home? Will you use natural solutions, structures or new technologies? Or maybe you've got ideas for new inventions of your own?
4. Give pupils their entry forms.
5. Remind pupils that they can draw a sketch, plan, labelled diagram, painting or computer model. Talk through the features of each one and explain that some (plan, labelled diagram and computer model) give more technical detail, like scale, measurements, materials etc.
6. Run through the rules, conditions and judging criteria (below). Explain that the judges will use these criteria to assess if entries are successful or not so everything they design and write should be focussed around these criteria.
7. Excite your pupils by reminding them about the prizes and how they are contributing to the health of our planet, for future generations.

8. Rules, conditions, judging and prizes

1. Rules and conditions

- Entries can be from individuals or teams of 3-4.
- The design and all descriptive information should be given on the supplied entry form sheet only and should be clear and understandable.
- The home for nature must demonstrate how it improves biodiversity and uses natural and technological solutions, and this should be explained on the entry form.
- The design should be the individual/team's own work, and not copied.
- The design can be a hand-drawn or computer-aided design. (All entries will be marked equally regardless of method used to create the designs).
- The more creative, unique and wild the design, the more likely it will catch the judges' eyes.
- The judges' decisions are final.

2. Judging criteria

Explain to pupils what the judges will be looking for and ensure they have covered all the criteria and the challenge rules and conditions. Judges will score all entries out of 30, with 5 marks for each of the following:

- Does the entry fulfil all rules and conditions?
- Is the design and description clear, concise and easily understandable?
- Does the design really help improve biodiversity and help animals and plants to thrive?
- How creative and innovative is the design?
- How impressive is the reason/purpose/back story to this design?
- Does the team seem to have gone beyond their school education to come up with the design?

Judges will also consider

- The use of recyclable and imaginative materials
- Imaginative use of sustainable technologies
- A personal touch to the design, a personal reason for elements that have been included

They will be looking for creativity, innovation and ingenuity, and the scoring scale looks like this:

5 marks or below: Has potential but needs much more work and support.

6-10 marks: An okay project. The ideas are there but needs to be communicated better and/or there is little thought given to improving biodiversity and may not be an original idea.

11-15 marks: Good project. Some thought has gone into the design process and how to improve biodiversity. Some unique ideas.

16-20 marks: Very good project. Great potential, lots of enthusiasm and clearly communicated. Understands how to improve biodiversity with natural or technological solutions. Unique ideas.

21-25 marks: Great project and possible winner. Good understanding of how to improve biodiversity with natural and technological solutions and good communication of their unique ideas. Some evidence of extracurricular STEM learning.

26-30 marks: Excellent design and likely winner. Excellent understanding of how to improve biodiversity with natural and technological solutions and great communication of their unique ideas. Evidence of background research and extracurricular STEM learning.

3. Prizes
A winner will be chosen from each age category, as well as an overall challenge winner. The overall winner will receive a £3,000 prize to spend on creating their home for nature, while the category winners will receive £1,000 each. Terms and conditions apply.
Go to bpes.bp.com/usc-terms-and-conditions

9. How to submit entries

The competition closes **Wednesday 3 March 2021**. Entries can be submitted by:

- Email: bpusc@nationalschoolspartnership.com
- Fax: 020 7509 6651
- Freepost: We Are Futures, Ultimate STEM Challenge, 1-2 Paris Garden, London, SE1 8ND

Use the Freepost label and submit your entries free of charge.

Label available at bp.com/bpes

10. More ideas!

Entering the Ultimate STEM Challenge is just the start! Here are some more ideas to help you take your pupils and their designs to the next stage, to develop their interests in biodiversity and to keep building science capital:

- Set up a class competition where pupils display or present their design ideas and class members/ members of the school community vote for an overall winner.
- Invite experts and STEM Ambassadors into your school or onto a video conference, to discuss ways in which pupils can take steps towards creating their designs. Allocate time so that pupils can ask questions about the experts' skills and jobs.
- Ask members of the school community who have an interest in biodiversity and natural areas, to come and talk about their experiences. Perhaps they can support a small group of students in a school-club, to develop and maintain a new home for nature.
- Keep pupils informed about natural places to visit and biodiversity events and exhibitions taking place locally or around the country. Remind them about TV programmes to watch e.g. David Attenborough's 'Extinction: The Facts'. https://www.bbc.co.uk/programmes/m000mn4n
- Introduce pupils to the idea of citizen science projects and encourage them to join projects that use tech to monitor plants and animals all over the world. Go to zooniverse.org to find out more.
- Dedicate a classroom display board to biodiversity and encourage pupils to bring in newspaper articles, images and other resources, to keep everyone up-to-date with statistics and solutions.