Challenge your imagination

HOME LEARNING GUIDE

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This fun programme created with ZEISS aims to inspire your child to find out more about STEM (science, technology, engineering, and maths). It has been designed with the STEM curriculum at the centre and will support you to expose your child to different careers within STEM.

The programme is aimed at upper KS2 (years 5 - 6) and is open to primary schools across Birmingham. At its core are real-world problems in need of innovative engineering, technology, and computing solutions, based on the application of key engineering and science with lots of fun activities along the way.

What does the programme include?

- A digital workshop and competition launch
- Competition challenge guide
- 10 activity plans (each including a 20 min core activity that uses the pupil workbook and a 60 min extension activity)
- Supporting pupil workbook
- In-school hands on workshop
- Celebration event at the end of term for one team per school.

The student friendly guide (and workbook) contains everything that you and your child needs to know about taking part in the competition. The workbook will guide them through the background and science central to the challenge, support coming up with ideas, researching and presenting their final project idea. This guide will help you support your child though these sessions or your school may choose to run the activities as online lessons.

Access all the resources here: www.learnbydesign.co.uk/challenge-resources

Delivered by LEARN bydesign

ZEISS Seeing beyond

THE SKILLS BUILDER FRAMEWORK

The programme also links with the skills builder framework and each session plan will indicate which skills are linked to the activities.

ABOUT ZEISS

Established in 1846 by Carl Zeiss in Jena, Germany, ZEISS is an internationally leading technology enterprise operating in the optics and optoelectronic industries. They work to develop, produce and distribute innovative solutions for:

- Spectacle lenses
- Camera and cine lenses
- Binoculars
- Microscopes
- Medial technology
- Measuring technology
- Semiconductor manufacturing technology

The UK Vision Care business division is based in Birmingham.

Challenge your imagination

ACTIVITIES

Overview

These activity plans have been developed to help you support your child when developing their competition entry for the Challenge your Imagination Competition.

You do not need to complete all of the tasks included in this pack; the challenge tasks link to the student workbook, while the bonus challenges are longer activities to futher develop ideas. Some of the activities require more parental involvement than others.

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VISION AND LIGHT

1

Core Challenge - 20 min

Session aims

- Understand where light comes from and identify different sources
- Understand that light is reflected from different objects to our eyes
- Understand that our brain uses the information from both eyes to create what we see
- Understand that light travels in straight lines and shadows are formed when objects are in the way

Skills Builder links

Curriculum Links

- Science – Working scientifically
- Science – Light

Links to other activities

- See it – Solve it: robotics and optics workshops.
- Challenge sessions: 2, 3, 4, 5, 6, 7, 9

Resources required

- Paper, chalk, torches, solid objects
- Student workbook

Health and Safety

- There are no extra health & safety concerns above the normal precautions that should be in place for other sessions and workshops

Expected duration

- 20 minutes + 60-90 minutes across the day

How do we see?

1. Turn off the lights and close curtains.

   Ask your child what they can see: very little if not very clearly.

   Why is this? Because there is no light source.

   How can they make it so they can see again? Turn on the light or open the curtains. Explain that these are both sources of light, the light we are seeing is the light that is reflected off objects or that is coming directly from the source.

   Draw or write as many sources of light as they can in their challenge workbook and draw how light allows them to see an apple using arrows. (arrow from sun/lamp to apple, arrow from apple to eye)

2. After discussing the different sources of light and that they are important to see, move onto how we see things.

   What do we use to see? ***Our eyes and our brain (to put together the information).***

   Binocular vision - Roll up a piece of paper into a tube. Then ask them to look up through it like it is a telescope, closing the eye that is not looking through the tube. Get them to place their other hand next to the tube (back of their hand facing their face). Finally, ask them to open both eyes. What do they see? ***A hole in their hand.***

   Why is this? *Because our brain uses the light coming into both eyes to make the picture we see. This is called binocular vision.*

3. **Light and Shadow** - light only travels in straight lines. Give your child a torch and an object (E.g. Duplo brick). Get them to cast the light on it from different angles and heights over the object (on their piece of paper). What happens? Shadows are formed because the object is blocking the light. The closer the light source is to the object the greater the shadow.

Bonus Challenge - 1-1.15 hr

Human Shadow Clock

Go out at least 4 different times in the day (on the hour if possible).

They must:

1. Decided on an open spot in the garden where you can easily mark the floor with chalk (you could also use objects such as cones to mark the ground)
2. You will be the centre of the clock. you will need to mark this spot
3. Your child will simply draw around the shadow or mark the top of the shadow on the floor and mark the time on the floor next to the cross (if using objects to mark the shadows then you can write this down on a piece of paper)

Through the activity, pupils should recognise that the light source is the sun, that it travels in straight lines causing shadows and that because the sun is moving the shadows are in different points across the day.

Experiment questions:

Q – Ask your child to make a prediction at the start of what they think will happen.

Q – Why do they need to use the same person as the centre each time? ***It is important to make sure that only 1 thing about the experiment is changing (the position of the sun)*** – this is called a variable.

Q – What happens to the shadows if the centre person crouches down or stands up tall? Why is it important to stay in the same position? Same answer as above

Q – Does the shadow get longer or shorter, and how much by? You could use a tape measure to measure the length of the shadow.

Key takeaways

- Planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary
- Pupils learn to take measurements with accuracy and precision
- Using test results pupils make predictions to set up further comparative and fair tests
- Light appears to travel in straight lies
- Light reflects off objects enabling them to be seen
- Shadows have the same shape as objects that cast them

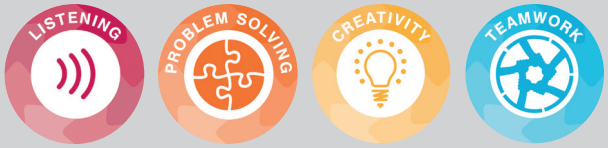
AMAZING COLOURS 2

Core Challenge - 20 min

Session aims

- Understand that light is made up of different colours
- Understand that they are our other colours which we cannot see
- We have adapted to see certain colours
- Colours are important for presenting information
- Chromatography is one way to separate out liquid solutions

Skills Builder links



Curriculum Links

- Science – Working scientifically
- Science – Properties and changes of materials
- Science – Light, evolution, filtering
- Design – Using colour to present ideas and products

Links to other activities

- Challenge sessions 1, 3, 4, 6, 7, 10
- See it – Solve it workshop: optics

Resources required

- Torch or sunlight, smooth glass or bowl, paper, student workbook
- Bonus – Filter paper, pots, water, felt tip pens, chromatography instruction sheet

Health and Safety

- There are no extra health & safety concerns above the normal precautions that should be in place for other sessions and workshops.

Expected duration

- 20 minutes + 60-90 minutes across the day

What is light made of?

1. **Make a rainbow:** Using a glass or small bowl, fill ¾ full of water and place on a piece of paper. Using a torch (or you could place it outside) shine light through the bowl.

   What can they see? A rainbow.

   Ask them to write all the colours they can see in their booklet. These are the colours of the visible spectrum (the rainbow). We can see them because the water is bending the white light.

2. Ask if they think there is any light they cannot see? Why might this be? ***Explain that our eyes have developed in a way to see these colours but there are other types of light that we cannot normally see.***

   Why is it still important to be able to see colours/ why have we developed to see different colours? ***So that we can find food, identify things, be better at hunting.***

3. In the workbook ask them to write down their favourite colour and why they like it? How does it make them feel, what do they associate with it? Colour is important when designing products, they will need to remember this when they think about presenting their competition entry.

AMAZING COLOURS 2

Bonus Challenge - 15 mins + drying time

Colourful Chromatography

This activity looks at how they can separate out the different pigments in a pen.

What you need:

Filter paper

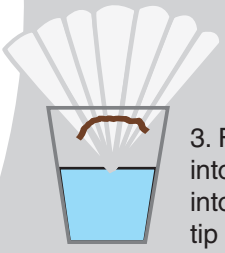
Felt tips

Glass of water

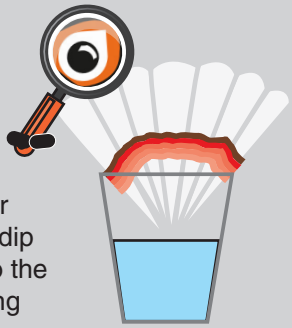
Pipe cleaners

1. Fill a small pot with water

2. Pick a single felt tip pen to draw a circle in the middle of the filter paper



3. Fold the paper into a cone and dip into the water so the tip is just touching



4. Leave the paper and watch as the pen ink start to separate

5. Once fully separated hang up to dry

6. Repeat with different coloured pens

Q – What colour do the different pens separate into? (mainly the primary pigment colours)
Why does yellow not separate much but black separates a lot?

Q – Which colours travel the furthest?

Q – Time how long it takes each colour to move through the paper.

Q – What type of paper takes less or more time?

After they have dried, and the pupils have experimented with lots of different colours. Scrunch each piece of paper in the middle and tie a pipe cleaner around it. These butterflies can then make a colourful display.

Key takeaways

- Planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary.
- Pupils learn to take measurements with accuracy and precision.
- Using test results pupils make predictions to set up further comparative and fair tests.
- Reporting and presenting findings from enquiries, including conclusions, causal relationships and explanations of and degree of trust in results, in oral and written forms such as displays and other presentation.
- Use knowledge of solids, liquids, and gases to decide how mixtures might be separated.

ADAPTING ANIMALS 3

Core Challenge - 20 min

Session aims

- Understand the key words evolution, adaptation, fossils, biomimicry, species, and variation
- Understand that not all animals need eyes
- Understand that animals' eyes have adapted in different way to best suit them
- Understand that animals have adapted their skin in ways to make them less visible

Skills Builder links

Curriculum Links

- Science – Evolution and Inheritance
- Computing
- Design and Technology

Links to other activities

- Challenge sessions 2,4,10

Resources required

- Student workbook
- Computer room for bonus challenge

Health and Safety

- There are no extra health & safety concerns above the normal precautions that should be in place for other sessions and workshops.

Expected duration

- 20 minutes + 60-90 minutes across the day

Adaptations and variations...

1. Start by asking your child to match up the key word in their workbooks (evolution, adaptation, biomimicry etc), they may need to research the keywords to help them connect to the correct definitions.

   Answers:
   Evolution = statement 5 *(The process by which living things can gradually change over time)*
   Adaptation = statement 4 *(How living things are specialised to suit their environment)*
   Fossil = statement 1 *(The preserved remains or traces of a dead organism)*
   Biomimicry = statement 3 *(A practice that learns from and mimics the strategies found in nature to solve human design challenges)*
   Species = statement 6 *(A group of living things with very similar characteristics. They can breed together to make more living things of the same type)*
   Variation = statement 2 *(The differences between living things in a species)*
   Camouflage = statement 7 *(A defence or tactic that organisms use to disguise their appearance, usually to blend in with their surroundings)*

2. Then ask them to look in a mirror and draw their head/ eyes. Get them to label the picture with all features they can think of to with their eyes (placement of eyes, shape of pupil, colour of eyes, glasses)

   Discuss if these features are adaptations or variation and why (e.g. our eyes are close together so that we can see depth well, colour of eyes is variation).

ADAPTING ANIMALS 3

Bonus Challenge - 60 mins +

Adapting animals research challenge

Ask your child to pick their favourite animal or one from the following list:

- Pigeon
- Cat
- Cuttlefish
- Snake
- Sheep
- Deer
- Eagle
- Guitarfish
- Chameleon
- Gecko
- Zebra

They should then spend around 30 minutes researching their chosen animal using computers or books. They then need to make a poster presentation about their animal that includes the following:

1. Has the animal evolved to have any unique eye adaptations? e.g. shape of pupil, eyelids, size of eye, colour filters, placement of eyes. Why have they done this?
2. Has the animal evolved to have any unique skin/coat adaptation to make them less visible to other animals? e.g. colour changing skin, lighter belly. Why does this work?
3. Could we learn anything from these animals that could help us design a product for humans?

They could then present their findings and poster to the family.

Key takeaways

- Recognise that living things have changed over time
- Identify how animals and plants are adapted to suit their environment in different ways and that adaptation may lead to evolution
- Select, use, and combine a variety of software (including internet services) on a range of digital devices to accomplish given goals, including collecting, analysing, evaluating and presenting data and information
- Use technology safely, respectfully, and responsibly, recognise acceptable/unacceptable behaviour, identify a range of ways to report concerns about content and contact

AGING EYES

4

Core Challenge - 20 min

Session aims

- To understand that our eyes change as we age
- To recognise some of the key changes
- To identify problems
- To design possible solutions.

Skills Builder links

Curriculum Links

- Science – Animals, including humans
- Design and Technology

Links to other activities

- Challenge sessions: 1, 3
- See it – Solve it: optics

Resources required

- Student workbook. Information sheet
- Paper for designing

Health and Safety

- There are no extra health & safety concerns above the normal precautions that should be in place for other sessions and workshops.

Expected duration

- 20 minutes + 60 minutes

How do our eyes change?

Using the information sheet, your child can complete the workbook timeline of how our eyes change over time.

Using this information, they should then write down as many different challenges that humans may face with their vision over time. As part of this they can also include all the other challenges they may face which would affect how they could wear glasses or other vision correction.

You can emphasise that all good products start with a problem that needs to be solved.

AGING EYES

4

Bonus Challenge - 40 mins +

Glasses frame design

For the bonus challenge pupils are tasked to design 3 different pairs of glasses.

1. For a toddler aged 3
2. For a year 7 (aged 12)
3. For someone in their 70s

When doing this they need to consider:

Q – What design features they need?

Q – What other activities they may be doing that affect the glass they choose?

Q – What makes their glasses different?

Q – What other glasses for that age group are already available (they could look online)?

Q – What technology could be included in their design?

Key takeaways

- Pupils can describe the changes as humans develop to old age
- Use research and develop design criteria to inform the design of innovative, functional, appealing products that are fit for purpose, aimed at particular individuals or groups
- Generate, develop, model, and communicate their ideas through discussion, annotated sketches, cross-sectional and exploded diagrams, prototypes, pattern pieces and computer-aided design

VISUAL DISABILITIES 5

Core Challenge - 20 min

Session aims

- To understand what it means to have a disability
- To identify challenge an individual may face due to a physical disability
- To understand what careers are linked to supporting people with visual disabilities or impairments

Skills Builder links

Curriculum Links

- Computing

Links to other activities

- Challenge session: 4, 9, 10
- See it – Solve it: optics

Resources required

- Student workbook
- Computer room for research challenge

Health and Safety

- There are no extra health & safety concerns above the normal precautions that should be in place for other sessions and workshops.

Expected duration

- 20 minutes + 60 minutes

What is a disability?

Ask your child how they are different from a friend at school, they should try and identify 3 things that are different about themselves (height, hair colour, favourite subject). Explain that everyone is different and unique and that this is a good thing.

Ask your child what they think it means to have a disability – they can write their ideas in the workbook. The full definition is below:

"A disability affects a person's physical or mental ability and "makes it difficult or impossible for a person to walk, see, hear, speak, learn, or do other important things. Some disabilities are permanent, or last forever. Others are temporary, or last for only a short time. A disability can be something a person was born with. Or it can be the result of an illness or an accident."
https://kids.britannica.com/kids/article/disability/390729

Next ask if they can think of any specific visual disabilities or impairments that would impact someone's life. They do not need to know the exact names of these (examples: blindness, extreme light sensitivity, night blindness, loss of central vision, blurred vision, glaucoma, brain damage, amblyopia).

Finally ask them to colour in the areas of the house in their workbook that they may have difficulties with if they have a visual impairment (e.g. TV, stairs, cooking). They can also add notes of any solutions they already know of that would help.

Important: Throughout the session, focus on the fact that despite someone being labelled as having a disability it does not mean that they cannot do everything and that it is only one of the 3 things that makes them different.

VISUAL DISABILITIES 5

Bonus Challenge - 60 mins +

Who can help?

For the bonus challenge students are tasked to find out more about the different people that work to help people with visual disabilities. This can be done in teams or individually.

Your child can choose one of the following jobs:

- Optometrists
- Ophthalmic laboratory technicians
- Opticians
- Ophthalmologists
- Eye care assistant
- Engineer
- Orthoptist
- Visual neuroscientist
- Eye clinic liaison officer
- Guide dog trainer

They should then make a poster or leaflet about the job that includes:

- What does the job involve?
- What training do they need to do it?
- How do they help people with visual impairments?
- Do they use any special technology?
- Do they need any special skills? Are there any key subject links?

They can then present what they have learnt about the job to the family.

Key takeaways

- Select, use, and combine a variety of software (including internet services) on a range of digital devices to accomplish given goals, including collecting, analysing, evaluating and presenting data and information
- Use technology safely, respectfully and responsibly; recognise acceptable/unacceptable behaviour; identify a range of ways to report concerns about content and contact

LENSES AND MIRRORS 6

Core Challenge - 20 min

Session aims

- To understand that light travels in straight lines
- To understand that lenses and mirrors have many different uses
- To understand the basic principle of how lenses refract light
- To understand that mirrors reflect light

Skills Builder links

Curriculum Links

- Science – working scientifically.
- Science – light
- Design and technology

Links to other activities

- Challenge sessions: 1, 4, 5, 9, 10
- See it – Solve it: optics

Resources required

- Student workbook. Different lenses to look at e.g. magnifying glass, glasses, camera
- For bonuses challenge each team needs: one shoe box, sliver card (as reflective as possible), Lego/playmobile people, glue, sticky tape, and scissors, coloured pens for decoration

Health and Safety

- There are no extra health & safety concerns above the normal precautions that should be in place for other sessions and workshops.

Expected duration

- 20 minutes + 60 minutes

What are lenses for?

Light travels in straight lines, optics is the use of lenses and mirrors to bend light.

Why would we want to do this? to make things clearer and focused

Ask if they can think of anything that contains a lens or mirror (e.g. glasses, microscope, telescope, binoculars, magnifying glass, car mirrors). Next, get them to write down these different uses in their booklet along with a reason why we use/need lenses for that item (e.g. to help people see, to see small things, to see into the distance).

With all the different purposes of lenses ask if they think that all lenses work the same way. ***No: they are all designed of their specific use and we use maths and physics to work out how the light will be bent to create the best result.***

Get them to go around the house and look for different lenses and mirrors. This could be a mobile phone (with camera), a magnifying glass, a pair of glasses, a pocket mirror, binoculars etc.

Finally based on their observations ask them to complete the sentences in their workbooks about concave and convex lenses.

A convex lens bends light to a single point. An example of an item that uses a convex lens is a magnifying glass.

A concave lens bends light away. An example of an item that uses a concave lens is a torch.

LENSES AND MIRRORS 6

Bonus Challenge - 60 mins

Make a Mirrored Fun House

Explain that were lenses bend light as it passes through them. Mirrors reflect light. If the mirror is bent this can affect the reflection.

For this challenge, each team will need:

- One shoe box
- Sliver card (as reflective as possible)
- Toy people
- Glue, sticky tape, and scissors
- Coloured pens for decoration

Challenge your child to build a mirrored fun house for their toy people (explain that they may have been in one of these at a fair or seen them on tv). It may be useful to remove one short side and one long side of the box to make it easier to build (or cut the shoe box diagonally in half).

By placing and bending the card they should try and make their toy person look:

1. Longer
2. Shorter
3. Wider
4. Narrower
5. Visible from all sides

Can they explain how they achieved the above?

Depending on time they can continue to be creative by decorating the outside of their box to create a fun and appealing fun house entrance.

Key takeaways

- Planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary
- Reporting and presenting findings from enquiries, including conclusions, causal relationships and explanations of and degree of trust in results, in oral and written forms such as displays and other presentation
- Recognise that light appears to travel in straight lines
- Recognise that light can be reflected
- Generate, develop, model and communicate their ideas through discussion, annotated sketches, cross-sectional and exploded diagrams, prototypes, pattern pieces and computer-aided design

ROBOTS

7

Core Challenge - 20 min

Session aims

- To understand what a robot is
- To be able to recognise the different uses for robots and why they are used
- To produce an advertising campaign for a new product

Skills Builder links

Curriculum Links

- Computing
- English

Links to other activities

- Challenge session: 10
- See it – Solve it: robotics

Resources required

- Student workbook
- Coloured pens, Akito fact sheet and design sheet

Health and Safety

- There are no extra health & safety concerns above the normal precautions that should be in place for other sessions and workshops.

Expected duration

- 20 minutes + 60 minutes

What is a robot?

This activity is about what robots are and why we use them.

Explain that robots are a machine that can perform some level of tasks by themselves (independently) based on instructions from humans or sensing their environment.

They should match up the different robots pictured in their workbook with the description and add a reason for why a robot is used for the activity over a human, e.g. a robot is used on Mars to explore the surface of the planet because people cannot survive on Mars.

This robot has helped search for survivors after earthquakes and tsunamis in Japan. Its tracks allow it to move across uneven surfaces and there is a camera attached to the extendable arm.

This robot is used to help surgeons with difficult neurosurgery.

This robot can fly and is often used for surveillance.

This robot is cute and can be easily programme by pupils to teach coding.

This robot performs repetitive tasks using its large strong arms in a factory

This robot can dive deep underwater and perform many different tasks.

This robot hoover can clean up your home by itself. It has sensors to stop it hitting the walls.

Bonus Challenge - 60 mins

Market a new toy robot

For this activity explain that some robots are created for learning and entertainment. Give your child the Akito fact sheet. This includes a picture of Akito and what its functionality is. They should first decide (15 mins):

- Who would want Akito?
- Who would buy Akito?
- How much might Akito cost?
- What is Akito's best feature?
- Does Akito have any other unique features not included on the info sheet (they can be creative here)

Once pupils have decided this, they should then create their own advertisement for the robot (30 minutes+). This could be:

- A TV advert
- A radio advert
- A poster
- A magazine article
- A dance
- A performance
- A short video for social media
- Anything else they think would work

They could then present or perform their advertisement to the family making sure the key details are included in the advert.

Key takeaway

- Understand that programming used to make a robot perform tasks

CREATIVE IDEAS

8

Core Challenge - 20 min

Session aims

- To come up with creative ideas
- To recognise unique ideas
- To understand the meaning of invention, innovation, and product
- To understand that innovations happen throughout history
- To use research skills to evaluate an innovation and present ideas

Skills Builder links

Curriculum Links

- Science – Working scientifically.
- Computing
- History

Links to other activities

- Challenge sessions: 3, 5, 9
- Students should build on their research skills from previous sessions.

Resources required

- Student workbook

Health and Safety

- There are no extra health & safety concerns above the normal precautions that should be in place for other sessions and workshops.

Expected duration

- 20 minutes + 60 minutes

How to come up with good ideas?

You can now introduce that the next few sessions will be focusing on the project brief but that it is important they do not forget what they have already learnt.

Before they come up with their idea however they can do this simple activity to test their creativity:

Give your child a single paper clip - Then say they have 5 minutes to write down as many things that the item (avoid calling it a paperclip) can be used for as possible in their workbooks. Hopefully, they will come up with some good ideas but if not, here are some suggestions:

1. Nail cuticle remover & cleaner
2. Bubble wrap popping tool
3. Carve fine details into nail polish on finger and toenails
4. Lock picker
5. Graffiti on plastic scratch tool
6. Worm hook
7. Paper note/memo hanger
8. To make pixel holes in paper
9. Narrow crack dirt remover
10. Pixel stamp
11. DVD drive opener
12. Aerial for radio
13. Aerial for small TV
14. Plastic hole maker
15. Scratch beneath a bandage or plaster of pairs cast
16. Finger/toe splint
17. Earrings
18. Make into alphabet letters
19. Make into numbers
20. Decorative string for hanging light ornaments
21. Necklace

Discuss the ideas and then explain that the best way to come up with really good ideas is to come up with lots of ideas and then pick the best one.

Next make sure they are happy with the definition of invention, innovation, and product. **Get them to complete the definition in their workbooks.** You could look them up together in a dictionary or research online.

Definition answers:

Invention = is the creation of a new idea or concept, e.g. a ball point pen

Innovation = is the process of turning a new concept into something you can buy or that has widespread use, e.g. creating the brand biro

Product = A thing that is produced and sold, e.g. an individual Bic Biro

CREATIVE IDEAS 8

Bonus Challenge - 60 mins +

Incredible Innovations

For this research challenge pupils need to look back in time and find an innovation that used lenses or mirrors.

Your child should research the innovation and then write a page about it (with a pictures) that includes:

- What the innovation is?
- When it was first made/ produced/ came about?
- Who was in the team that created the innovation?
- What problem did it solve?
- Was there more than one version?

Some examples they could look up are: the telescope, the microscope, the camera.

They could then present their findings to the family.

Key takeaway

- Identifying scientific evidence that has been used to support or refute ideas or arguments.
- Select, use, and combine a variety of software (including internet services) on a range of digital devices to accomplish given goals, including collecting, analysing, evaluating and presenting data and information.
- Use technology safely, respectfully and responsibly, recognise acceptable/ unacceptable behaviour, identify a range of ways to report concerns about content and contact.
- The study of an aspect or theme in British history that extends pupils' chronological knowledge beyond 1066.

DEVELOPING AN IDEA 9

Core Challenge - 30 min +

Session aims

- To understand that a good product should solve a problem
- Most students should generate a product idea
- Most students should sketch their product idea
- Some students should build a prototype of their product idea in teams
- To understand the engineering design process
- To understand that their idea will go forward into their competition entry

Skills Builder links

Curriculum Links

- Design and Technology

Links to other activities

- Challenge sessions: 1, 2, 4, 5, 6, 7, 8, 10
- See it – Solve it workshops
- Digital welcome workshop

Resources required

- Student workbook.
- Craft materials

Health and Safety

- There are no extra health & safety concerns above the normal precautions that should be in place for other sessions and workshops.

Expected duration

- 20 minutes + 60 minutes

Design Idea

The aim of this session is for your child to come up with their competition entry idea.

First, get your child to **write around the brief any problem a lens or robot could help solve**. Examples include visual disabilities, things in the distance, servery, building very small things, seeing inside the body. Around 5-10 minutes.

Next, they should **come up with as many ideas** a possible for a product that use lenses or mirrors to solve these problems. 5-10 minutes.

Finally, they should **select their favourite idea and write it in their booklet**.

If time, they could also do an initial sketch of their idea in their workbook.

DEVELOPING AN IDEA 9

Bonus Challenge - 60 mins +

Develop and model

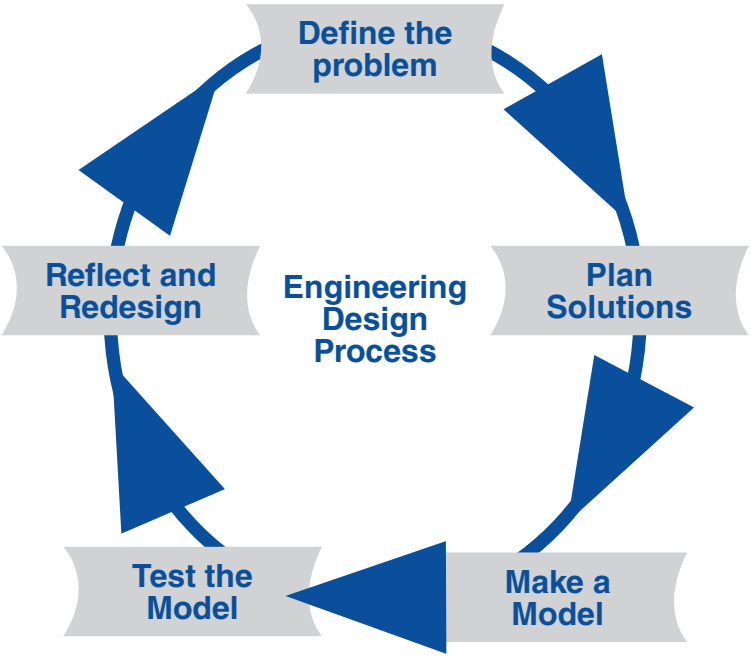
For this challenge, your child should develop their idea further but using the engineering design process. Hopefully, they have been able to define the problem and come up with their idea/solution. The next step is to create a model (prototype of their product).

They should spend around 15 minutes sketching their product. When they are ready, they can then move onto modelling (around 20-40 minutes).

Using any paper, cardboard and other craft materials available, encourage students to build a model of their design. The models should be able to demonstrate how it would work and what areas involve robots or lenses.

Get your child to present their model to you or the family. Feedback with questions and comments. Then allow 15 minutes for them to make changes to their model or write notes on how they would improve them further.

Depending on how much time you have available they could continue developing their model, sketches, and booklet section across a week or longer.



Key takeaway

- Use research and develop design criteria to inform the design of innovative, functional, appealing products that are fit for purpose, aimed at particular individuals or groups
- Generate, develop, model, and communicate their ideas through discussion, annotated sketches, cross-sectional and exploded diagrams, prototypes, pattern pieces and computer-aided design
- Select from and use a wider range of tools and equipment to perform practical tasks accurately
- Select from and use a wider range of materials and components, including construction materials and textiles according to their functional properties and aesthetic qualities
- Evaluate their ideas and products against their own design criteria and consider the views of others to improve their work

PRESENTING YOUR IDEAS 10

Core Challenge - 20 min

Session aims

- To understand what an elevator pitch is
- To write a short pitch about their idea
- To practice presenting their pitch in small groups
- To learn simple tips to develop their presentation skills
- To recognise their strengths within a team

Skills Builder links

Curriculum Links

- English

Links to other activities

- Challenge sessions: 3, 5, 6, 7, 8, 9
- Students should have their confidence presenting to the class through previous sessions and work in this session to put together the skills and knowledge they have gained throughout the challenge sessions.

Resources required

- Student workbook

Health and Safety

- There are no extra health & safety concerns above the normal precautions that should be in place for other sessions and workshops.

Expected duration

- 20 minutes + 60 minutes

Write the Pitch

In this session your child should write their elevator pitch.

Explain that an 'elevator pitch' comes from the idea that you get into an elevator (lift) with an important person and you only have 2 minutes (the time it takes for the elevator to reach its destination) to convince them of your idea.

To do this they should answer each of the questions as clearly as possible.

Once they have done this, they should practice presenting their pitch.

PRESENTING YOUR IDEAS 10

Bonus Challenge - 60 mins +

Practice the Pitch

For the bonus challenge they should try and develop their pitch more.

Start by going through some presentation tips.

1. Get your child to move to either side of the room based on whether they think something is a good presentation tip or bad:
    - Start by introducing yourself (yes, but don't waste too much time introducing each team member. Wear name tags instead)
    - Use list of three (yes)
    - Make up facts (no)
    - Thank the audience at the end (yes)
    - When presenting as a group: talk over each other (no)
    - Have nominated people of answer different questions (yes)

You can also introduce the idea of power poses to feel more confident ahead of a presentation. Play musical statues but when the music stops pupils need to do a power pose. Here are some example poses.

Here are some example poses:

Teapot | Roar | Trump | Wonder Woman | Bolt

There is space in the workbook for students to add more tips to the presenting your ideas page.

For the remainder of the time students should practice their presentation and try and use the different strategies to improve their pitch.