



Focus on Science





# Science at Glenfall

# Intent: Enjoy - Enquire - Excel

We aim to:

- Develop a love and **enjoyment** of science
- Build knowledge through a broad, vocabulary-rich curriculum, with a skills-based focus that values practical opportunities and encourages the children to **enquire**
- Offer high quality teaching with **high expectations** for all
- Relate science to everyday life and maximise opportunities for it in our environment (inside and out)
- We give children a firm foundation on which they can build at secondary school
- Offer visits and visitors to further champion the subject, develop wider interests and provide a valuable insight into STEM careers

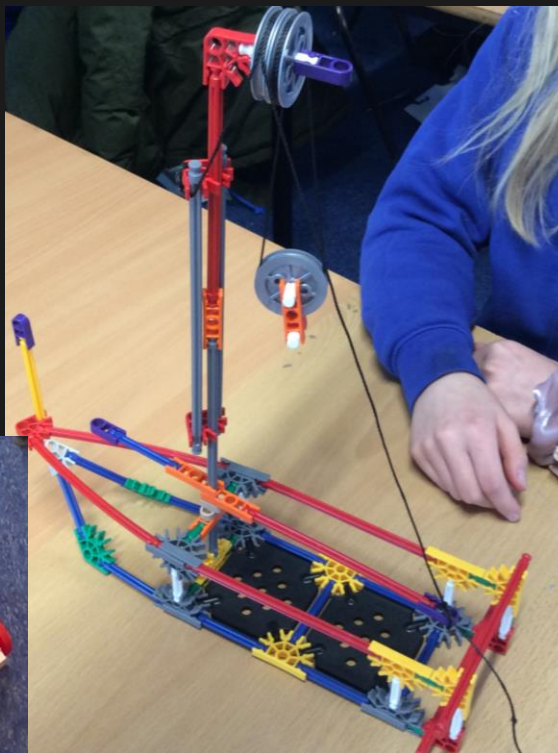
# Implementation: How? (organisation)



- Science is taught explicitly, although may make relevant links with the creative curriculum
- In EYFS and KS1, the topics are planned to be year specific, whereas KS2 follow a 2 year rolling programme
- We aim to teach a full science lesson weekly, in every class, excepting seasonal festivals. It is timetabled.
- Our curriculum is based on our values: Enjoy – Enquire - Excel



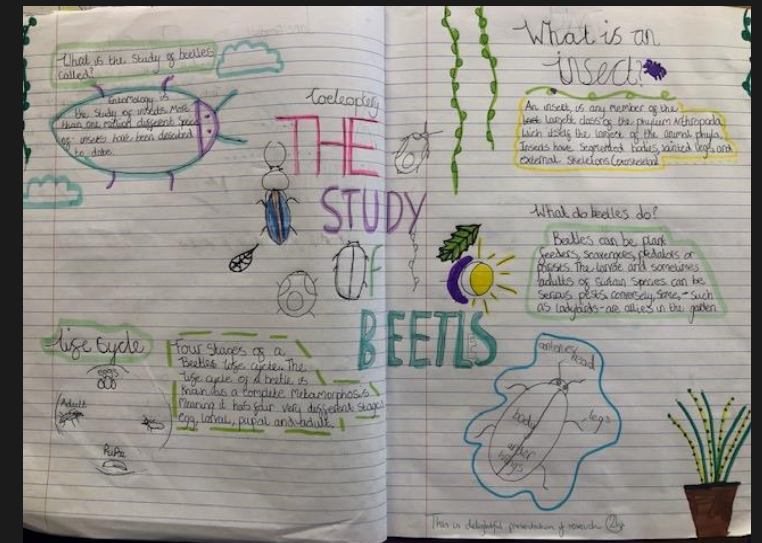
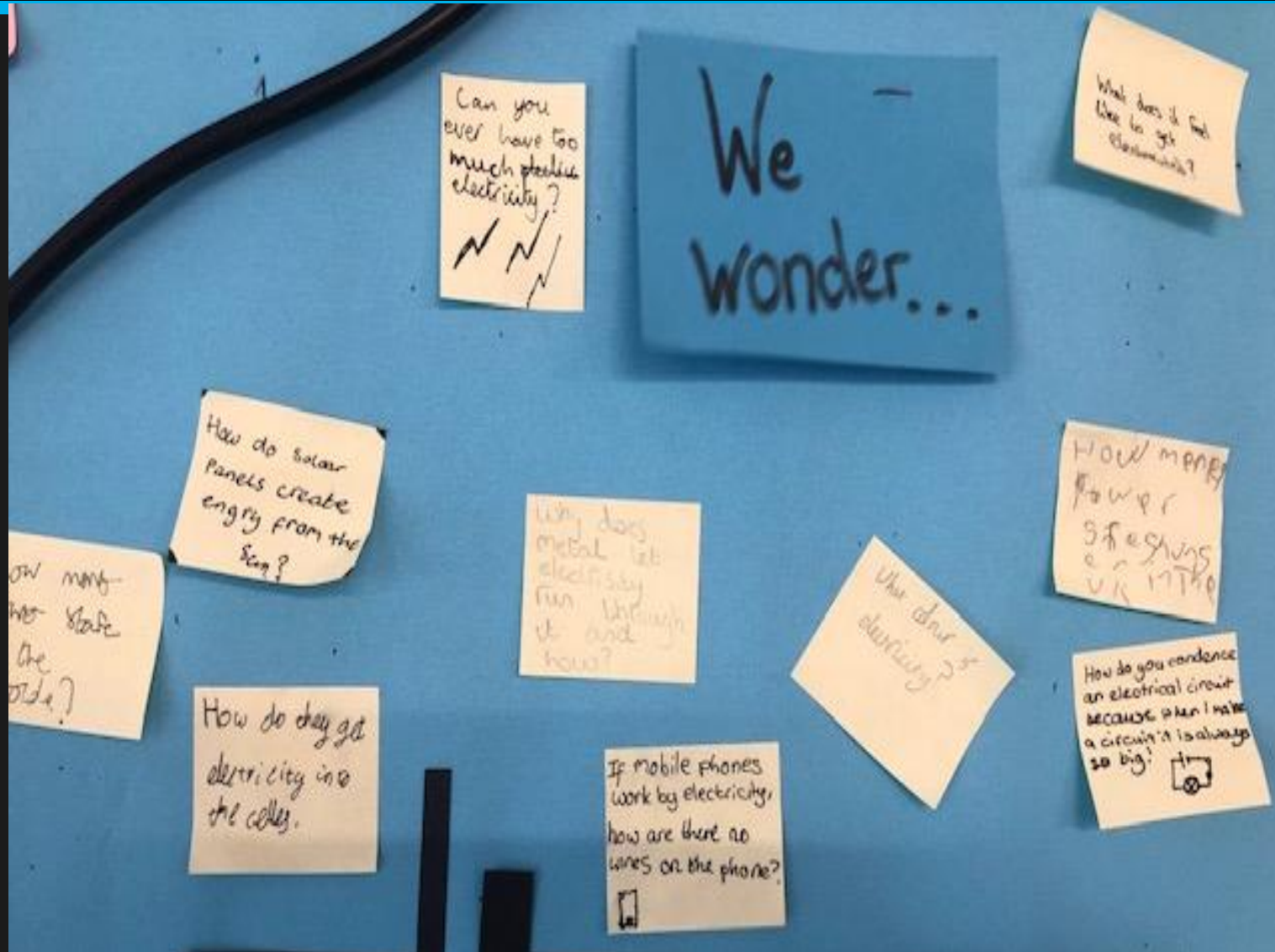
We learn science with practical and investigative experiences, that develop scientific **enquiry**, alongside content.



**POLICY QUOTE:** We firmly believe that children learn best through first-hand experience, so we aim to provide opportunities for as much practical work as possible, aiming for a minimum of two such experiences every half term.



Pupils are encouraged to be **enquiring**, ask their own questions and be curious.



# We develop scientific terminology: word mats, vocabulary-rich displays

## Y3 and 4: FOOD CHAINS, CLASSIFICATION AND HABITATS

**A key like this can be used to sort, classify and identify things.**

**Does it live in water?**  
 Yes → **Does it have gills?**  
 Yes → **Prey** (fish)  
 No → **Does it have fur?**  
 Yes → **Consumer** (fox)  
 No → **Predator** (bird)

**VERTEBRATES have internal skeletons...**  
 fish, amphibians, reptiles, birds, mammals

**On a food chain diagram the arrow means...**  
 Producer → Consumer → Consumer → Consumer  
 ...is food for...

**Which organisms would live in this habitat?**

**Good ways humans impact on our environment...**

**Bad ways...**

**Glossary**  
 consumer - all animals are consumers - they eat either producers or other consumers  
 food chain - the link between a producer and the consumers - e.g. the rose produces food (→) for the greenfly which then becomes food (→) for the ladybird  
 habitat - the place where animals and plants live e.g. seashore, woodland etc.  
 key - a chart that places things in a logical way in order to sort and classify them  
 life cycle - the important stages in the life of an organism  
 nutrition - means food or feeding either by plants or animals  
 organism - any living creature, plant or animal  
 predator - an animal that eats other animals  
 prey - an animal that is eaten by another animal  
 producer - any green plant that makes its own food and so produces food for the food chain  
 reproduce - to make new, young organisms

## Y5 and 6: EARTH AND SPACE

**The Earth is a sphere which spins, revolves, or rotates on its axis (once every 24 hours) while it orbits the sun.**

**The Earth orbits the sun, once every 365.25 days, thus creating the year. The Earth's tilt (23.5degrees) creates the seasons.**

**A MOON is a celestial body that orbits a planet. Earth has one moon. Jupiter has four.**

**planet** - a large object that orbits a star. Planets are not sources of light  
**revolve, spin, rotate** - to turn  
**rotation** - the turning of an object such as the Earth on its axis - to rotate - verb  
**satellite** - any object which orbits another. Moons are natural satellites. Man made satellites that orbit the Earth are used for tracking, astronomy and telecommunications  
**seasons** - times of the year when there are significant differences in the amount of day-light  
**solar eclipse** - when the sun, moon and Earth are lined up such that the moon appears to cast on the Earth a shadow  
**Solar system** - our sun, Sol, and its planets and their satellites  
**sphere** - an object which is ball shaped  
**stars** - massive objects that release energy in the form of heat and light e.g. our sun  
**sunrise** - the time of day when the sun appears to rise above the horizon to begin the day  
**sunset** - the time of day when the sun appears to fall below the horizon to end the day

**Glossary**  
 astronomy - the study of planets, stars and space  
 axis - an imaginary line passing through the centre of a spinning object  
 compass - a device used to locate directions - the four points of the compass - north, east, south and west  
 crescent moon - the phase of the moon when the moon appears as a thin curved, piece  
 day or day-time - the time in the day when planet Earth is facing the sun  
 full moon - the phase of the moon when the moon appears as a complete circle  
 moon - a large object which orbits a planet. Moons are not sources of light  
 night or night-time - the time of the day when planet Earth is facing away from the sun  
 orbit - the path that the moon or planet takes

**Models of The Solar System**  
 Geocentric (Ptolemy)  
 Heliocentric (Copernicus)  
**THE HELIOCENTRIC MODEL**

**Y1 OUR BODIES**

**Glossary**  
living - things that are alive.  
non-living - things that are not alive.  
compare - to look at things that are the same and things that are different.  
describe - to explain what something looks like, feels like, smells like, and how it works.

**comparisons**  
 small/smallest, large/largest, tallest, shortest, taller, tallest

**animals**  
 humans are animals too

**We hear with our ears.**

**We see with our eyes.**

**We taste with our tongues.**

**We smell with our noses.**

**eyes**  
**ears**  
**nose**  
**mouth**  
**chin**

**We touch with our skin.**

**Compass**

**Models of The Solar System**  
 Geocentric (Ptolemy)  
 Heliocentric (Copernicus)  
**THE HELIOCENTRIC MODEL**



To stimulate interest every class has a quality science learning wall that makes relevant use of:

Key questions and concepts

Key terminology and definitions (word mat?)

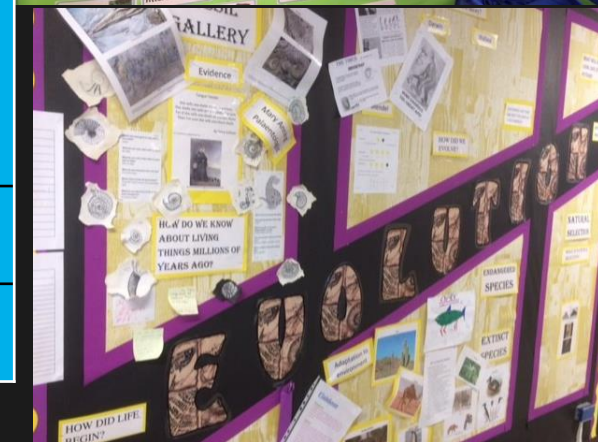
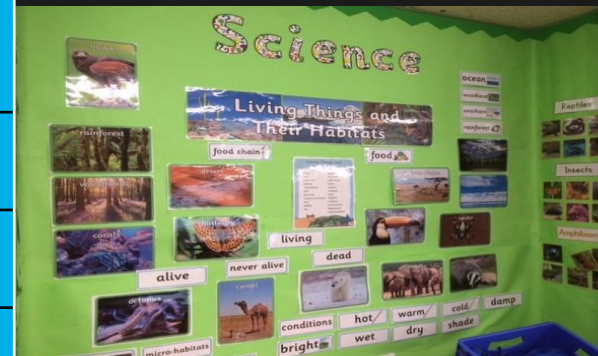
Pupil questions and thoughts

Prior knowledge

Activities and experiments: photos, work, diagrams, posters etc

Ideas for further activities

Celebration of success





# We relate science to everyday life





# We make use of the outside environment to bring science to life



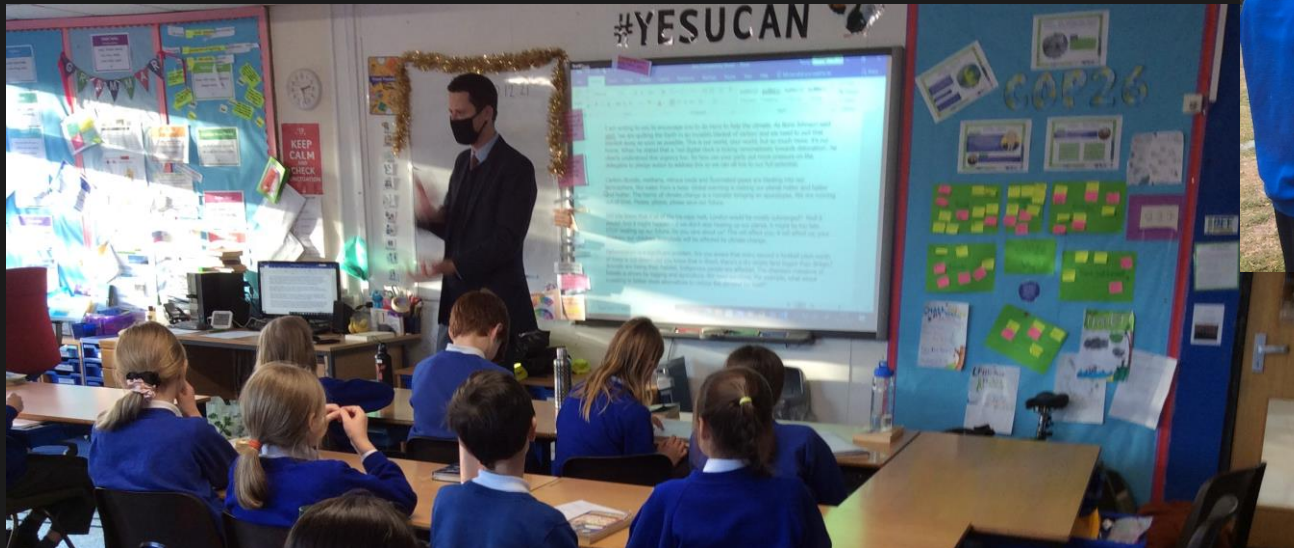


# We foster care for the environment

Planting a jubilee tree



- COP26 Year 6 class letters to local MP and Boris Johnson
- Subsequent visit from Alex Chalk to answer our environmental questions
- Wind power session with BP engineer Matt Allen
- Planting trees

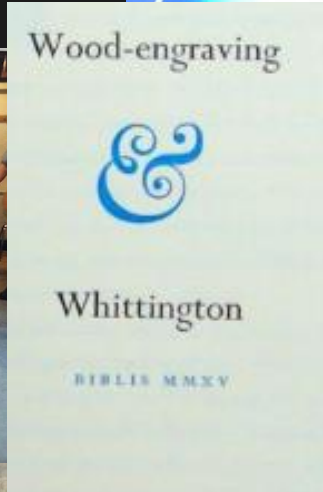


BP engineer Matt Allen



# We go on trips

**BLOOD, GUTS AND A BIT OFF THE TOP -THE TUDOR BARBER SURGEON** trip to The John Moore Museum, Tewkesbury



**CHEL TENHAM**  
**Science**  
Festival

**STEAM BRISTOL**



**EYE-TO-EYE WITH**  
**GIRAFFE**





We have lots of visitors : Roaming Reptiles, The Cheltenham Science group, Mini-professors, firefighters, dentists, midwives, health visitors, moth experts, geologists and The Black Hole



Mr Morrow from Arkk engineering



Critter encounters



The Cheltenham Science Group



Mini-professors





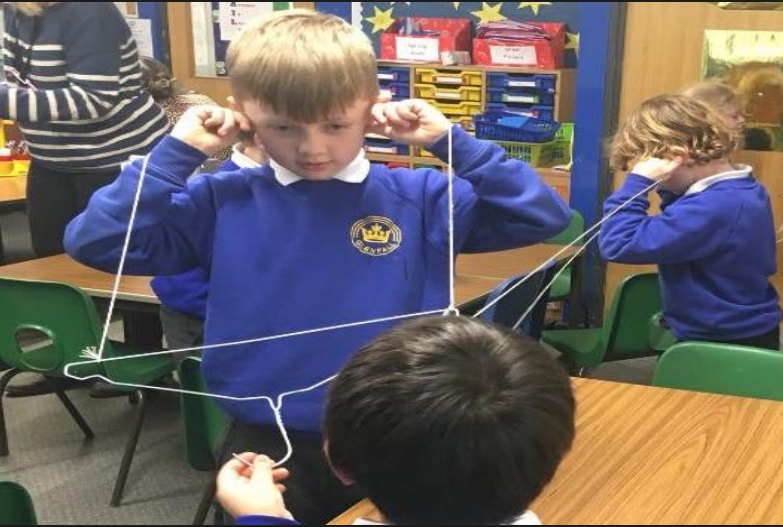
# We link with Industry

1. Spirax Sarco visits Glenfall and Glenfall visits their Cheltenham site





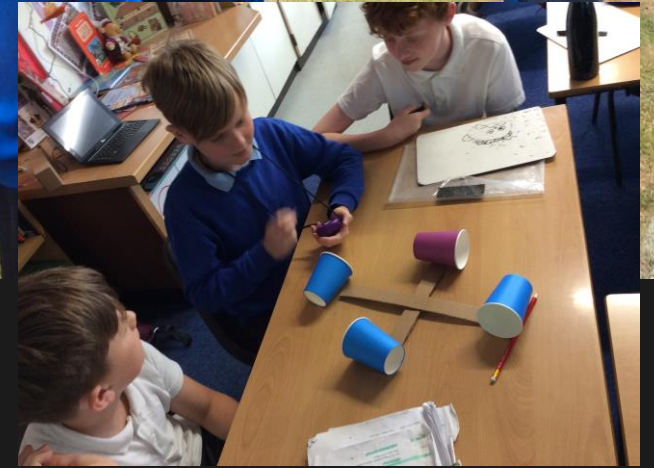
## 2. Mr Allen, BP engineer, to Year 6 Wind turbines



Sound with Y3 and 4



Lemon batteries with Y5



STEM ambassador Paul Treble  
and team make fan boats





# We have a science week – every year



Ways to Link History and Science using 1001 inventions and other resources.

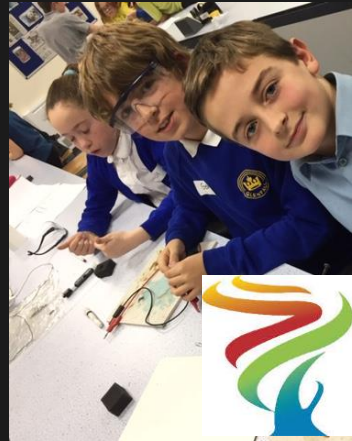




# We work with a feeder secondary schools

## What have we done?

- Y6 transition meetings
- Y5 and 6 teachers observed science Forces lesson at Balcarras
- Y4 and 5 attended course at Balcarras – Building strong foundations in primary science
- Y5 pupils attended Balcarras for Stretch and Challenge: cells, reactions
- Y5 pupil group invited to 6 Royal Institute of Mathematics in Physics, at 6 after school sessions. Teachers invited too
- Lung and heart dissections with Balcarras
- Y5 visit St Edwards for STEM day
- TSH partnership: The Balcarras Conference
- Stretch and Challenge – Year 5 group to Balcarras



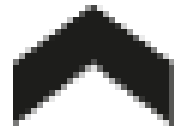






# Links with Gloucestershire University

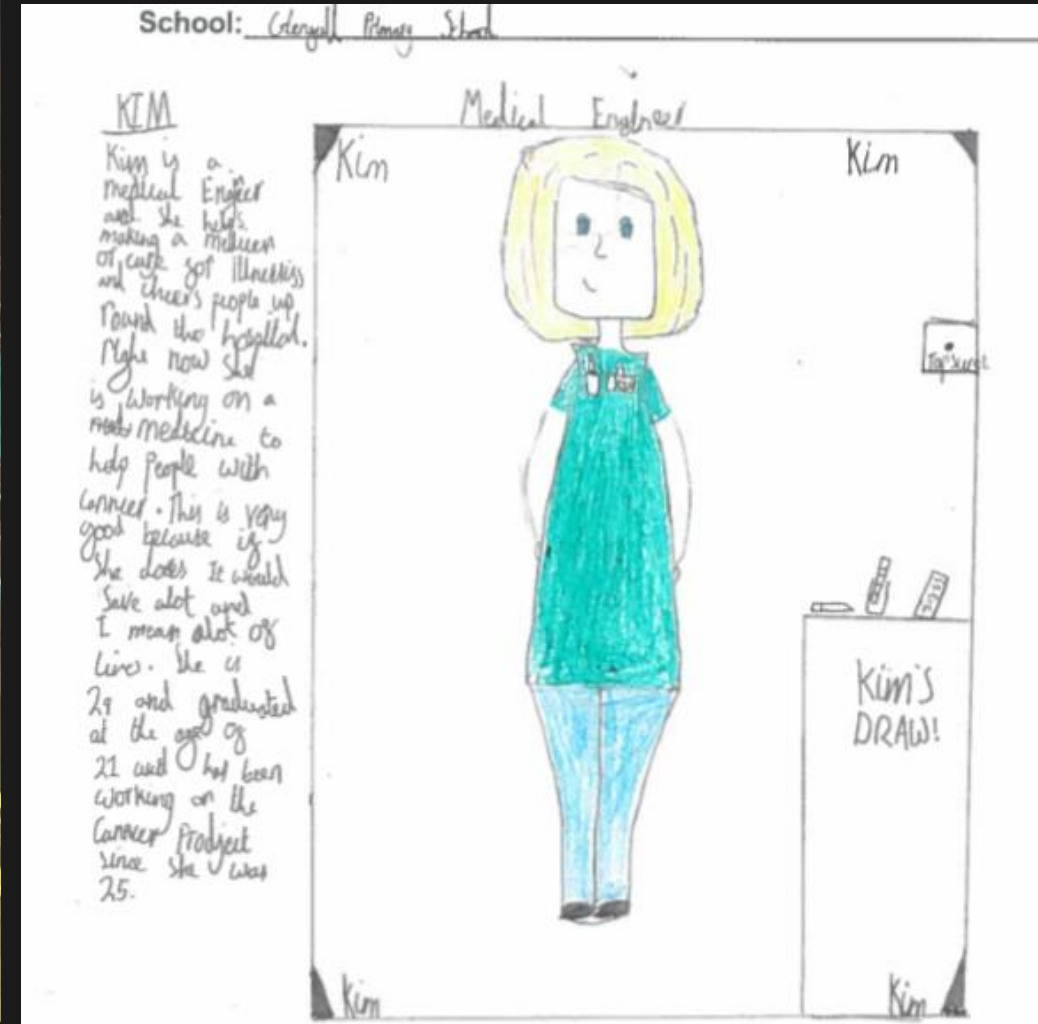
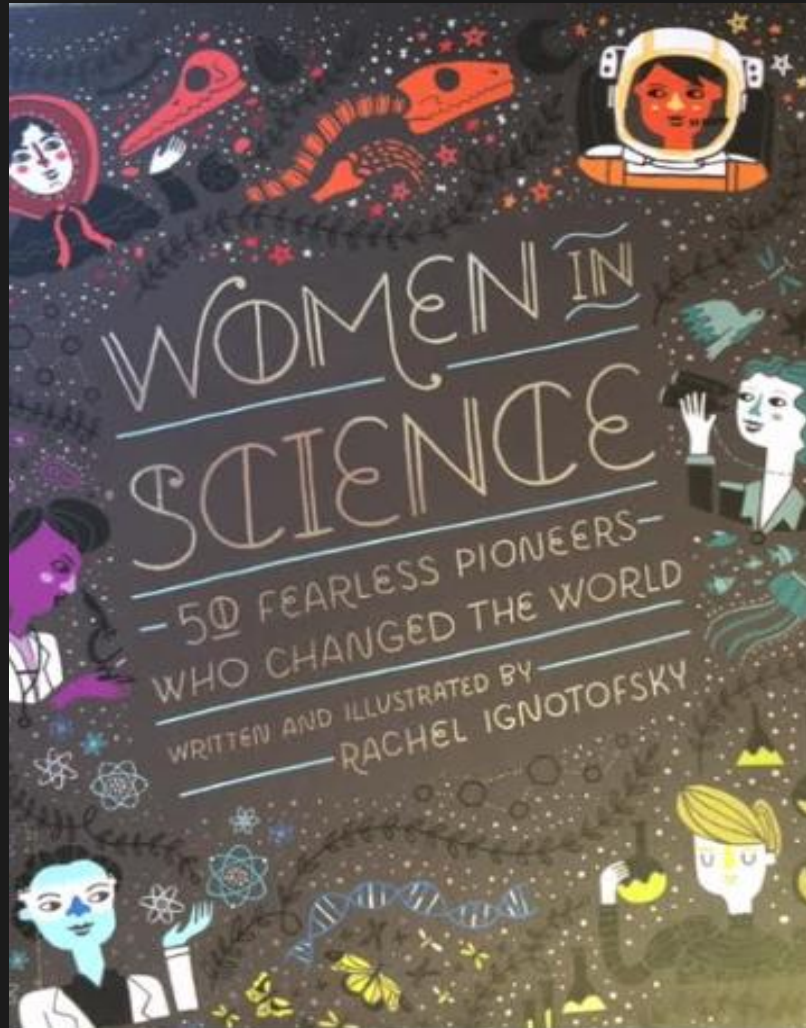
- STEM visits to Y5 to make controllable cars: Maths, Science, ICT



UNIVERSITY OF  
GLOUCESTERSHIRE



# We promote women in science





# Assemblies promote science

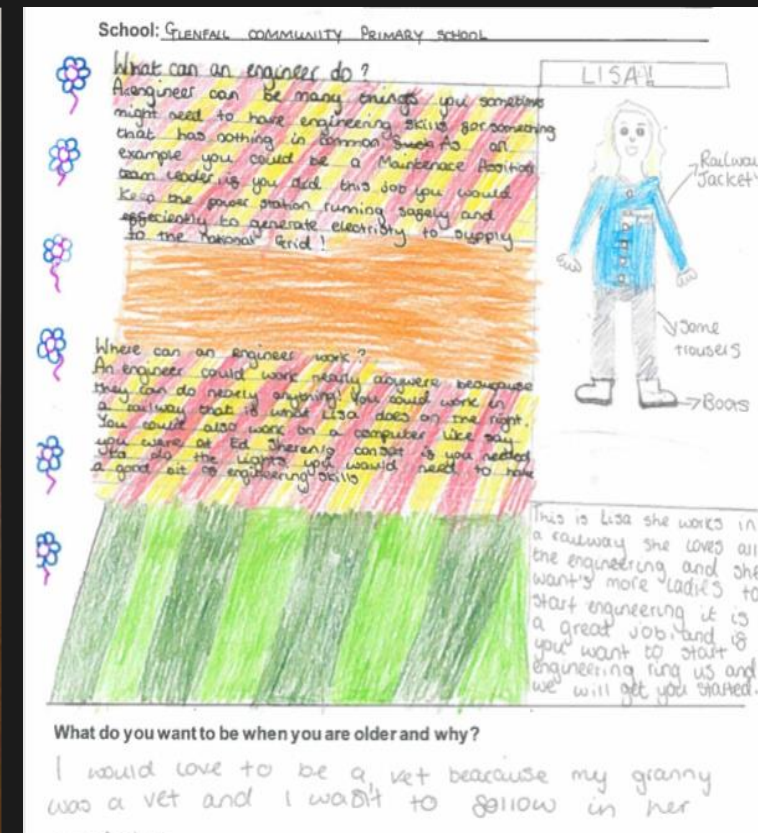
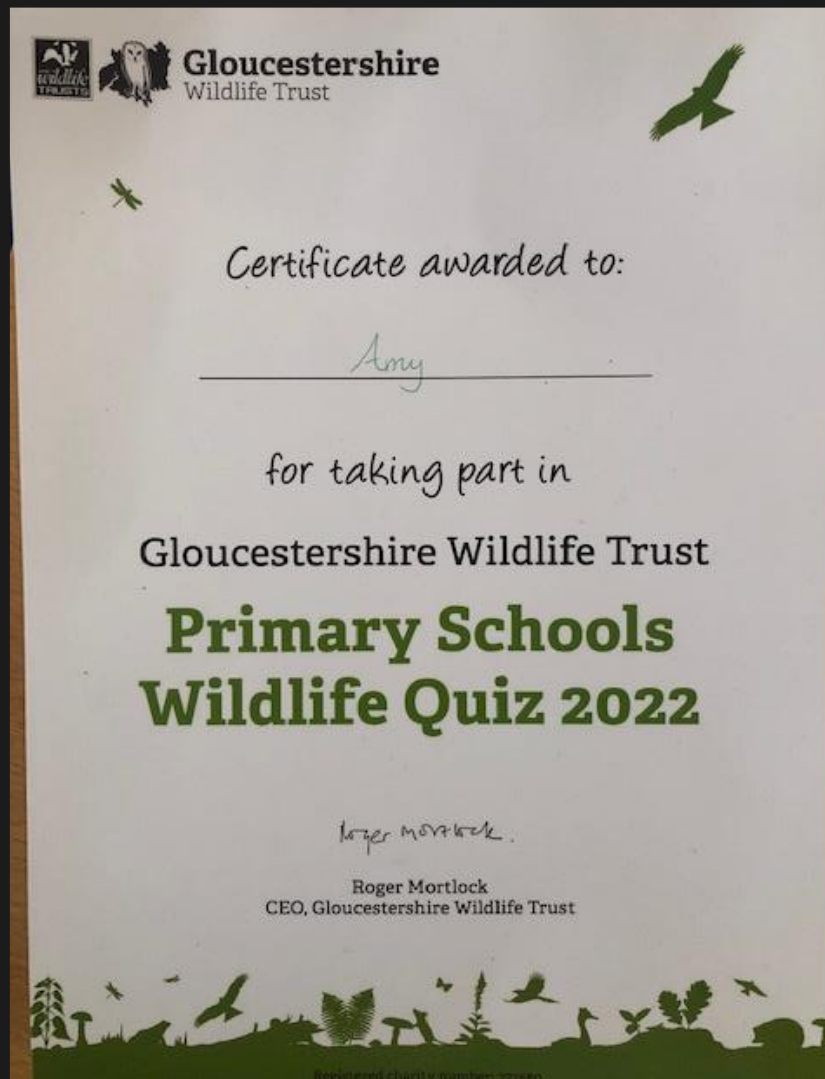
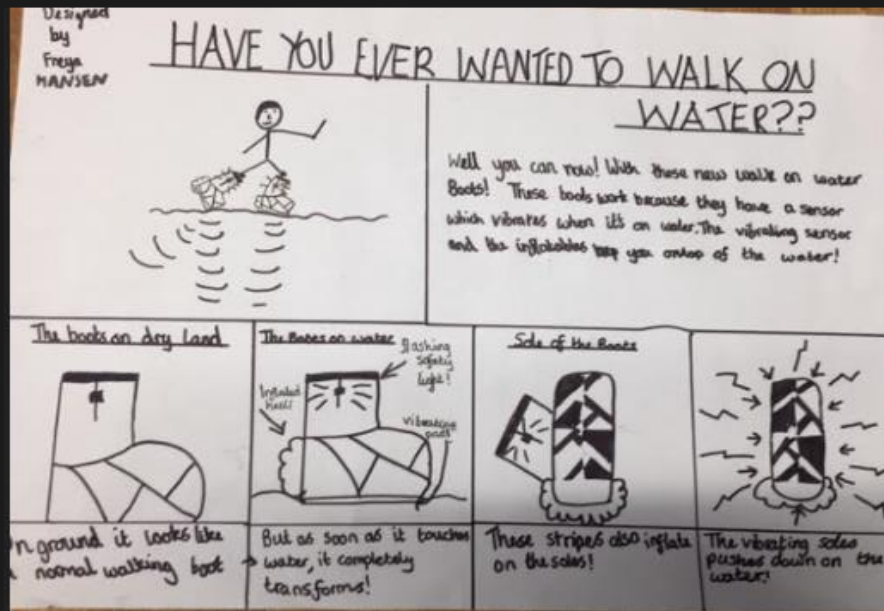
- **Junior News Assembly** - weekly – always includes science
- E- bug assembly
- Oceans Assembly
- Carbon Footprints
- Moth specialist, Jacqui Brown
- Live ECG and oximeter reading
- COP26 assembly
- Harvest Assembly
- Science week assembly – famous scientists





# WE ENTER COMPETITIONS

- WOMEN IN ENGINEERING
- ENGINEERING WITH GLOS UNI
- DINOSAURS – MR MULLIGANS
- THE WILDLIFE QUIZ





# Extra-curricular science

- Gardening/vegetables
- Bikes to school – annually
- Bikeability
- Recycling: batteries, paper
- Plastic water bottles reused, milk cartons collected
- Litter picking - termly
- WWF fundraise and animal adoption
- Links with school-council





# We use a TAPS focussed assessment – every topic

Scientific enquiry using a TAPS unit termly, which we discuss and moderate at staff-meetings

Scientific knowledge through work.

- Whole school book look at progression and TAPS experiences
- TAPS samples gathered for examples

Overview of TAPS plans for Focused Assessment of Working Scientifically <i>(Any focus can be chosen for open-ended enquiries, these are only suggestions)</i>						
	Plan		Do		Review	
	Ask Qs and plan enquiry	Set up enquiry	Observe + Measure	Record	Interpret + Report	Evaluate
<b>KS1</b> (age 5-7) <i>Develop close obs</i>	Ask simple Qs and recognise that they can be answered in different ways*.	Perform simple tests.	Observe closely, using simple equipment.	Gather and record data to help in answering questions.	Identify and classify. <i>Use appropriate scientific language to communicate ideas.</i>	Use their observations and ideas to suggest answers to questions.
<b>Y1 TAPS plans</b>	Materials: reflection tests	Materials: floating and sinking	Plants: structure	Seasons: seasonal change	Animals inc Humans: animal classification	Animals inc Humans: body parts
<b>Y2 TAPS plans</b>	Materials: waterproof	Materials: rocket mice	Plants: compare growth	Living things: woodlice habitats	Living things: nature spotters	Animals inc Humans: handspans
<b>Lower KS2</b> (age 7-9) <i>Develop systematic approach</i>	Ask relevant questions and use different types* of scientific enquiries to answer them.	Set up simple practical enquiries, comparative and fair tests.	Make systematic and careful observations and, where appropriate, take accurate measurements using standard units, using a range of equipment, including thermometers and data loggers.	Gather, record, classify and present data in a variety of ways to help in answering questions. Record findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables.	Report on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions. Identify differences, similarities or changes related to simple scientific ideas and processes.	Use results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions. Use straightforward scientific evidence to answer questions or to support their findings.
<b>Y3 TAPS plans</b>	Animals inc Humans: investigating skeletons	Forces: shoe grip Forces: strongest magnet	Plants: measuring plants	Light: making shadows Forces: cars down ramps	Rocks: rock reports	Plants: function of stem Forces: balloon rockets
<b>Y4 TAPS plans</b>	Sound: investigating pitch	Materials: drying materials	Materials: measure temperature	Living things: local survey	Electricity: conductors Sound: string telephones	Animals inc Humans: <b>teeth</b> <b>eggs</b> in liquids
<b>Upper KS2</b> (age 9-11) <i>Develop independence</i>	Plan different types* of scientific enquiries to answer <i>their own</i> questions, including recognising and controlling variables where necessary.	Use test results to make predictions to set up further comparative and fair tests.	Take measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate	Record data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs.	Report and present findings from enquiries, inc conclusions and causal relationships, in oral and written forms such as displays and other presentations, using <i>appropriate scientific language</i> .	Explain degree of trust in results. Identify and evaluate scientific evidence ( <i>their own and others</i> ) that has been used to support or refute ideas or arguments.
<b>Y5 TAPS plans</b>	Materials: dissolving Materials: nappy absorbency	Materials: insulation layers	Animals inc Human: growth survey Forces: spinners	Materials: sugar cubes Space: craters	Materials: champion tapes Living things: life cycle research	Forces: aquadynamics
<b>Y6 TAPS plans</b>	Electricity: bulb brightness	Animals inc Humans: heart rate	Light: investigating shadows	Living things: outdoor keys	Living things: invertebrate research	Evolution: fossil habitats Evolution: egg strength

\*Types of enquiry including: observing changes over time, noticing patterns, grouping and classifying, comparative and fair tests, using secondary sources.

Plan for Focused Assessment of Science		
<b>Topic:</b> Materials	<b>Year 2</b> Age 6-7	<b>Title:</b> Waterproof materials
<b>Working Scientifically Plan:</b> Ask simple questions and recognising that they can be answered in different ways	<b>Conceptual Knowledge</b> Use knowledge and understanding of properties of materials to compare suitability for different uses	
<b>Assessment Focus</b>		
<ul style="list-style-type: none"> <li>• Can children discuss/use different ways to test how waterproof materials are?</li> <li>• Can children compare materials on the basis of waterproofness?</li> </ul>		
<b>Activity</b> <i>Today we are materials engineers.</i>		
Provide a collection of different types of materials. Discuss which could be the 'best' material – draw out that need to know best for what. Today we want to know the 'best' for waterproof coat/umbrella/cover for summer fair cakes etc – choose appropriate context. Pupils discuss how to compare how waterproof the different materials are, for example:		
<ul style="list-style-type: none"> <li>• Drip water onto the material</li> <li>• Pour water onto the material</li> <li>• Wrap up a cotton ball in the material &amp; put into water</li> </ul>		
Children will plan and carry out a simple test to measure the waterproofness of different materials – groups try difference ways to answer the question. Children sit in a circle and consider one group's investigation – was this a good test? Why? Do you agree with their results? Adult collect utterances or ask target children or those who have not worked with an adult.		



The science coordinator completes a MER cycle annually, reporting to SMT and the science governor.

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- Pupil voice
- Book look
- Teacher questionnaire
- Observations
- Learning walk
- Resources



# WE TALK ABOUT SCIENCE AT STAFF-MEETINGS AND INSET - FOR EXAMPLE

1. Science week
2. TAPS
3. Time allocation and timetabling
4. Conclusion and evaluation mats for guidance
5. Refresh types of variable: control, dependent and independent
6. Resources organised
7. TAPS - look at focus; is it meeting it?
8. What do we do at Glenfall in science? ppt discussion
9. Launching 1001 Inventions Science Week
10. Links with maths, scientific enquiry word mats

# Quality CPD

- Staff-meetings and inset
- Subject leadership courses 3x year
- Balcarras observations
- Balcarras transition
- Opportunity to join Royal Institute session at Balcarras
- Engagement with Teaching School Hub





We are well resourced



# IMPACT - evidence

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At Glenfall, we have **enquiring, motivated, resilient learners**, who speak of their love of science, with enthusiasm, the majority of which reach ARE.

Science **lessons** are fun, packed with practical opportunities for scientific enquiry and rich with scientific vocabulary.

The school **environment** is inspiring – both inside and outside.

STEM expert **visits and visitors** inspire.