



making physics matter



Phiz Lab handbook



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Ogden Phiz Labs: an introduction

The Ogden Trust recognises the positive impact of a dedicated science teaching space within a primary school on pupils, staff and the wider community. The first Ogden Phiz Lab was installed at Shrubland Street Primary School in 2013. Since then, the Trust has worked with many more schools, setting up Phiz Labs across England as an ongoing strategy to help raise the profile of science for pupils in primary schools.

With the introduction of Phiz Labs, we aim to:

- improve the quality of teaching and learning in science.
- enable pupils to access a practical and engaging science curriculum that will inspire scientists of the future.
- create a learning environment that nurtures the imagination and curiosity of children when participating in science lessons and activities.
- engage teachers in the science curriculum and give them the confidence to deliver practical science in an environment where they can allow pupils to explore and develop their own lines of enquiry.

Welcome to the Phiz Lab family

Following your successful first year as part of an Ogden partnership, your school has now been awarded a grant to refurbish and equip your own Phiz Lab. It is important that the Phiz Lab not only enhances the school it is located in, but also the teaching and learning of science for pupils/staff within all your partnership schools. We recognise that logistics and time can be prohibitive in getting pupils from other schools to use the Lab for regular science lessons; instead we encourage Phiz Lab schools to model outstanding practice and to share that through partnership teacher CPD and special events in the Lab.

Although the Ogden funding provides a valuable financial contribution towards creating a successful Phiz Lab, support from your school's senior leadership team (SLT) is crucial. Your school must endeavour to use the Phiz Lab to engage pupils of all backgrounds and abilities across all years – early years, KS1 and KS2. The SLT must also ensure staff are developed and encouraged to teach innovative, practical science with confidence.

To ensure the Phiz Lab has an ongoing, integral role in your school's curriculum, it is important that science (and the Phiz Lab) is part of your school's long-term plan and included in the School Improvement Plan (SIP) and the Self Evaluation Framework (SEF).

This handbook gives advice on how to set up a Phiz Lab to ensure you have the best possible start on your Phiz Lab journey.



Setting up your Phiz Lab

Your Phiz Lab will develop over time and pupils' work and projects will enhance the learning environment. A well-planned Phiz Lab will help the children step into the role of scientist in a stimulating and interactive setting that allows them to think creatively and inquisitively.

Each Phiz Lab will be unique to the circumstances, facilities and requirements of the host school and their science lead. However, The Ogden Trust expects that every Lab will have the following features:

Identity

On opening the Phiz Lab, you will be provided with a Phiz Lab sign which should be displayed proudly and prominently to identify your Lab as a dedicated science teaching space.

Accessible science resources

Although resources will differ in each school, it is important that they are easily accessible to encourage curiosity, scientific thinking and pupil-led investigations.

You will find a guide to suggested resources in appendix 1.

Displays

Scientific enquiry carried out by the children within the school and the partnership should be celebrated; science displays and noticeboards can help children to develop their scientific vocabulary and thinking skills, and should support progression in working scientifically. Displays should also feature STEM role models and careers to inspire the pupils. Displays should be updated regularly to support the science learning that is currently taking place.

A clear link to the primary partnership

Although the Phiz Lab is hosted within your school, it is part of your primary partnership. Schools within the partnership should be identified; maybe their school logos can be displayed together to give a sense of shared ownership/buy in across the group? You could also display photos of collaborative enrichment activities that you have engaged in – science fairs, family learning nights, etc; display photos of partnership meetings and CPD to show how the space is used to support professional development.

Furnishing, fixtures and fittings

Every Phiz Lab has different constraints with space and layout – features in current Phiz Labs include:

- **tables and chairs/stools**
- **storage for resources**
- **lab coats and goggles**
- **appropriate flooring (that will withstand practical investigations)**
- **display boards**
- **sink/wash area**
- **an area for demonstrations**

Mini and outdoor labs for EYFS

With an increasing focus on science in Early Years Foundation Stage (EYFS), why not consider creating a mini classroom or outside lab for younger learners, if budget and space allow?

A mini lab allows children to access resources to experiment with as part of continuous provision for understanding the world. It can include lab coats and goggles to mirror those used in the main Phiz Lab and encourages even the youngest children to see themselves as scientists. An outside lab in EYFS can be used for investigations such as exploring sound with boom whackers, stretching long springs, making potions and exploring shadows or reflections in water. Don't forget to use your Ogden EYFS Science Talk cards for inspiration.

Raising the profile of science

In setting up a Phiz Lab at your primary school, you are acknowledging that science is a highly valued and core aspect of your curriculum. As such, it should be considered with the same rigour as English and maths, and subject leaders should quality assure all aspects of science across the school in a structured manner.

A Phiz Lab will help your school (and partnership) to fully embrace the current curriculum and will help to enhance and support a thematic approach to teaching. Science in the Phiz Lab will help you to ensure that the development of working scientifically skills is at the heart of science learning, enabling pupils to make progress in both their scientific understanding and their skills.

Incorporating the Phiz Lab into the SIP and SEF can ensure science becomes embedded in the long-term planning for your school. The school should seek to quality assure science provision through the usual means, including: work scrutiny; pupil, parent and teacher voice work; and, of course, tracking progress and attainment for all.

Working towards the Primary Science Quality Mark (PSQM) is a valuable process in developing science leadership and ensuring a clear vision for science in your school.

PSQM is a well-planned scheme in which you audit where you are, develop action plans to move on and then demonstrate the progress that you have made. The framework for PSQM is invaluable in giving science leaders a clear focus for areas of improvement and supports you in evaluating science provision in your school. It also offers opportunities to develop invaluable links between you and your senior leadership team. There are other similar programmes such as the Space Education Quality Mark (SEQM) and Eco-Schools Awards.

We would also strongly recommend having a school governor dedicated to science who can support the subject leader and the headteacher in reviewing the quality of science across the school. They can also serve as a valuable link with governors at your other partnership schools. The Ogden Trust co-ordinates a science governor group to share ideas and best practice; a dedicated School Governor Lead drives this initiative. If your school governor would like to join this group, please email: office@ogdentrust.com.

Although you will have the Phiz Lab at the heart of your science learning and physically within your school, the other partnership schools should also take measures to build science into their long-term planning with the same vision and leadership. You must also ensure that the pupils and teachers from across the partnership are able to experience the Lab for enrichment events and CPD.

Delivering the curriculum

All schools within the partnership are supported by our four-year Phizzi CPD programme, which is an integral part of our partnership scheme and has been developed to directly support the teaching of the primary science curriculum (physical processes). Each Phizzi CPD course includes a teacher guide and the necessary resources for ten investigations. Once schools have completed a full Phizzi CPD programme they will have the resources and expertise to use our Phizzi 40 in their lessons.

As the Phiz Lab host school, we expect you to help lead the partnership by example – even if you are not the partnership hub school. Over time, you should incorporate the Phizzi 40 investigations into your schemes of work and ensure that all pupils at your school have the opportunity to use the equipment and resources. Through your partnership planning and meetings, you should actively advocate use of the Phizzi 40 investigations and resources across the partnership; other partnership schools may not have immediate access to the Phiz Lab, but they do have the resources and the training for these enquiries.

The Phizzi enquiries have been developed with the curriculum in mind to transform and deepen science learning experiences for all pupils during science lessons. The enquiries are designed for specific age groups with a focus on the development of scientific knowledge and working scientifically skills that are in line with age-related expectations as defined by the National Curriculum. Ensuring that the Phizzi enquiries are referenced at the appropriate points in your school's medium-term planning for science will be a key factor in the effective implementation of the Ogden Trust resources in your school.

See appendix 2 for a summary of our Phizzi 40 with curriculum mapping and scientific enquiry type.

It is the responsibility of the subject leader at each school to ensure that all teaching staff are familiar with the plans and resources and how they are expected to be used; they should also ensure an evaluation process is in place to assess the impact of the CPD and resources, identifying strengths and areas for development. As a Phiz Lab host school, we expect you to champion the Phizzi enquiries and support the other partnership schools in their use and evaluation.

An Ogden grant has enabled us to transform an unused, derelict cottage into a Phiz Lab – a purposeful learning environment where pupils can feed their curiosities and be inspired to become the scientists of tomorrow. For a school like ours with children from very diverse backgrounds and varied starting points, this Lab has been truly monumental. There is such a buzz around the wider school community and within the partnership to use all the amazing resources in the Lab.

All the schools in the partnership have reported that the profile of science has gone through the roof! Children now talk about science regularly and pride themselves on having an outstanding scientific knowledge and a strong ability to work scientifically. We now work closely together on our curriculum planning and share ideas and resources at joint planning get-togethers.

The partnership CPD that myself and other members of staff have been lucky enough to take part in has been outstanding. The impact that the training and the Ogden resources have had on our curriculum has been huge.

Dan Brown, Assistant Head and Science Lead, Avonmore Primary School

Ogden network

As your Phiz Lab is established, you will find new opportunities to build contacts with science leaders from other Phiz Labs, other partnerships and within your local community. Our Phiz Lab leaders have grown a successful and easily accessible community, sharing good practice, new ideas, success stories and things that they would adapt. As new Phiz Labs and partnerships are developed, the community is continuously growing and evolving.

You should use your Phiz Lab as a lynch pin for strengthening partnership links, encouraging schools to work collaboratively in holding inter-school events (science fairs, family learning nights, etc) and creating opportunities for your pupils to work together. Once your Phiz Lab is embedded into your partnership plans, you may want to find opportunities to hold events on a multi-partnership basis.

Many of our Phiz Lab schools and partnerships have thriving junior science ambassador programmes, which bring pupils to the forefront of celebrating science; keen young scientists apply to become ambassadors, supporting their teachers with setting up science lessons and leading activities within their schools and communities. A junior science ambassadors conference can be a great way to work with other partnerships, bringing together these aspiring and inspiring young scientists – pupils thrive when carrying out scientific enquiry and practical investigations with new people, sharing their wonder and awe together.



Our junior science ambassador's programme is engaging girls in science and increasing the extra-curricular science activities we can offer across the partnership. The programme is encouraging girls to get involved and enthused by science, raising their science capital and their self-confidence. In return, they are sharing their enthusiasm and expertise with pupils across the partnership as they deliver science clubs, lunchtime lessons and community events.

Glenys Newby, Partnership Co-ordinator, Durham Ferryhill & Chilton Primary Partnership

The Durham Ferryhill & Chilton Primary Partnership is an active, highly collaborative cluster of six primary schools. At the heart of the partnership is a Phiz Lab at Chilton Academy and an enthusiastic and inspirational cohort of ambassadors from across the schools.



You may also look to invite local groups such as Scouts, Guides and Brownies to use the Phiz Lab, building science capital and ensuring more people have the opportunity to feel a sense of inclusion and belonging within the science community.

All of these things can be shared and celebrated in your Phiz Lab displays, and also through wider channels such as Twitter, Facebook, local news and stories for the Ogden Trust website.

Phiz Lab portfolios

We supply each Phiz Lab with a Phiz Lab portfolio. This is a large scrap book for photographs, examples of work and evidence of the activities within your Phiz Lab and partnership. This resource will not only help to showcase the Phiz Lab (and science) to visitors to the school, but it can also be taken to regional and national events to give people an insight into the work that you are doing. The portfolio is also a helpful resource when gathering evidence for PSQM and other quality marks.

We would expect the portfolio to:

- include samples of work that show progression in physics learning with the development of conceptual knowledge at different stages.
- show how KS1 pupils have investigated the physical properties of materials and developed their working scientifically skills.
- include samples of work from forces, electricity, light & sound, Earth and space topics from all year groups – celebrating how children’s conceptual understanding is being developed.
- feature photos and samples of work to show how working scientifically skills are being developed across the school – photos of children making measurements in different ways for fair tests, comparative tests, and pattern seeking enquiries; graphs and charts from different year groups showing progression in skills (Venn/Carroll diagrams/simple tables/tally from KS1; bar charts and table from lower KS2; tables with repeat measurements and mean averages from Year 5/6; and line graphs and scatter graphs); data logger work; conclusions/explanations at different age groups.

A Phiz Lab can enhance your partnership journey, providing a dedicated space to teach and celebrate science. With workshops, events and science ambassador’s programmes being carried out within your partnership, and often within the Phiz Lab itself, it is important that you celebrate all of the wonderful things you are doing. Remember to share your outcomes and news of events across your partnership and with The Ogden Trust so we can feature your stories on our website and in our newsletter.

The life of your Lab

Your school has made a five-year commitment to its Phiz Lab, but we hope that it will be embedded into the long-term plans and become a permanent fixture within the school, encouraging the scientists of the future.

The Phiz Lab will provide your school with a dedicated space for the delivery of the primary science curriculum through hands-on investigations and scientific thinking. Use of the space should be timetabled to make sure all pupils have regular access; we expect that, wherever possible, all teachers use the space to teach their science lessons.

Logistical practicalities mean that it will predominantly be used by the children in your school, however partnership schools must be offered opportunities to attend workshops, enrichment events and CPD.

We encourage the following activity as a minimum:

- Organise a partnership meeting each term (including one annual moderation session).
- Plan and facilitate the delivery of two inter-school partnership events, such as science fairs or family learning nights.
- Facilitate CPD sessions, ensuring access for non-specialists.

As the host school, you will be required to submit reports to the Trust in the Autumn and Summer terms.

To help ensure the long-term success of the Phiz Lab, we recommend that more than one teacher/teaching assistant takes ownership of the Lab's use and management. This will help to mitigate for any problems arising from changes in personnel as careers progress or move in new directions.

The Trust offers support for teaching assistants at Phiz Lab schools to become Higher Level Teaching Assistants (HLTA) with a focus on science. HLTAs can take a proactive leadership role in the use and development of the Lab, supporting the teachers and offering additional extracurricular activities such as running science clubs and science ambassador programmes within the school.



“The HLTA course allowed me to improve my knowledge and understanding of how children learn and develop, which means I can now adapt my teaching skills to provide better support. In particular, I have been able to improve how I plan and deliver lessons in the Phiz Lab leading whole class sessions when previously I would only take groups of children.

Over the past 12 months, our partnership schools have each visited the Phiz Lab for a session on magnets and forces; the skills I have learnt on the HLTA course have helped me to improve how I delivered these sessions. The feedback from the visiting schools has been very positive and the teachers have commented how much the children who visited enjoyed carrying out the experiments.”

Matthew Bullock, Specialist Science Teaching Assistant, Springbank Primary School, Nottingham City Partnership



Health and safety advice

We want to encourage practical hands-on science in school, beginning with the early years, so it is important to emphasise the need for all practical science to be planned, risk assessed, reviewed and tested by staff before children are allowed to complete the investigations.

All schools with a Phiz Lab must be members of CLEAPSS; membership will offer access to important ideas, guidance and safe practical ethics. As a CLEAPSS member you will also find guidance on how to correctly 'risk assess' practical science sessions.

<https://www.cleapss.org.uk/>

Although resources and lesson plans are provided for the Phizzi CPD investigations, schools are still responsible for completing their own risk assessments and should ensure that they are familiar with the resources and activities before they are undertaken by the pupils.

There are numerous ideas for practical science investigations online, however, always remember that these must be sourced with care and adequately risk-assessed for suitability within your setting.

Health and safety considerations should also be applied to 'demonstrations' that are given to a class/school audience. Activities and equipment must be age appropriate and pupil-led investigations must be supervised at all times by members of staff.



Appendix 1

Equipment

Each Lab is set up in a way that suits the school and partnership so there are no set rules about which equipment you should stock – a lot of the investigations can be done using cheap, everyday materials and objects. If more significant investment is needed in equipment, local businesses and other funding bodies may be able to offer support – it is always worth contacting them.

Below is a list of suggested equipment that has been compiled based on recommendations from existing Phiz Labs. Items marked with * will be included in the resource boxes to facilitate the Phizzi 40 enquiries, but these will be supplied over the four-year Phizzi CPD programme. You may need to make initial investments in some of these resources to meet the curriculum expectations.

Physics enquiries

Magnets and magnetic materials*

Electric circuit equipment – lamps, batteries, wires, switches, motors, buzzers*

Torches*

Transparent, translucent and opaque materials

Mirrors – plane and curved

Filters – various colours

Prisms

UV beads

Sunglasses for testing

Tuning forks*

Rubber bands

Plasticine*

Slotted masses (10g and 100g)*

Chemistry enquiries

Rocks

Soils*

Fossils

Geologist eyeglasses

Plastic measuring beakers*

Plastic test tubes

Spatulas

Stirring rods

Funnels*

Filter paper*

Jugs

Pipettes*

Materials for testing*

Candles

Heating apparatus suitable for primary schools

Washing up bowls

Biology enquiries

Skeleton
Bones
Models of digestive system, circulation system and the heart
Resin blocks with various invertebrate specimens for observation
Magnifying glasses
Microscopes (including digital)
Pooters
Sample trays
Nets for bug hunting and pond dipping
Quadrats for random sampling
Identification keys

Additional resources

Safety glasses
Lab coats
Recording equipment
Reference books
Picture books (with a science theme/content)

Resources to support data analysis in enquiries

Graph paper
Squared paper
Calculators
Rulers
Protractors

Measuring equipment

Thermometers (digital and analogue)*
Newton meters*
Rulers (30cm & 1m) and tape measures
Trundle wheels
Protractors
Measuring scales (digital, analogue, stand-on)
Electric balance*
Stop watches*
Measuring cylinders (various sizes)*
Simple sand timers for KS1 classes
Multimeter for testing electric circuits*
Data loggers with various sensors – including light, sound and temperature
iPad or similar tablet with measuring apps – sound and light

Consumables

Bicarbonate of soda
Various sugars (icing, cubes, granulated, caster)
Salt and vinegar

Amazing extras

Demo bench
Hoverboard
pH paper strips
Telescopes
Binoculars

Remember, equipment should be appropriate for KS1 and KS2 enquiries and you should always make sure that all teachers are aware of any health and safety considerations that apply to particular pieces of equipment.

Appendix 2

Phizzi 40

The following tables summarise the 40 enquiries that are included in the Phizzi CPD programme. There are enquiries for each year group from Year 1 to Year 6 and the intention is that these enquiries will be incorporated into every school's science curriculum and form a key component of the work that your pupils follow in your Phiz Lab.

Year 1

Everyday materials			
Activity	Big question	Type of enquiry	Working scientifically skill to develop
Phizzi Forces – magnetic materials	Which materials will attract to a magnet?	Identifying and classifying	To plan a simple test to group and classify things. To perform simple tests. To record data in a tally chart. To use Venn and Carroll diagrams to analyse observations.
Phizzi Electricity – static butterflies	Which material makes the best wings for a static butterfly?	Identifying and classifying	To plan a simple test to group and classify things. To use simple equipment to make observations. To gather and record data to help answer questions.
Phizzi Light & Sound – bear cave	Which materials are easier to see in the dark?	Identifying and classifying	To gather data to answer questions by carrying out a simple comparative test. To gather and record data to help answer questions.

Year 2

Use of everyday materials			
Activity	Big question	Type of enquiry	Working scientifically skill to develop
Phizzi Forces – floating and sinking	Which materials would be best for building a boat?	Identifying and classifying	To plan a simple test to group and classify things. To use scientific language to communicate method. To use Venn and Carroll diagrams to analyse observations.
Phizzi Forces – floating and sinking	Which plasticine boat design will hold the largest mass?	Pattern seeking	To gather and record data, to notice patterns about what makes the most effective boat designs. To record data in a table. To use scientific language to communicate ideas.
Phizzi Electricity – close the gap	Which household materials could fix the torch?	Identifying and classifying	To plan a simple test to group and classify things. To record data in a tally chart. To use Venn and Carroll diagrams to analyse observations.
Phizzi Light & Sound – curtains	Which material makes the best curtains?	Comparative test	To gather data to answer questions by carrying out a simple comparative test. To use scientific language to communicate what was done in the test. To record data in a tally chart and block diagram. To gather and record data to help answer questions.
Phizzi Earth & Space – astronappy	Which material is most absorbent?	Comparative test	To gather data to answer questions by carrying out a simple comparative test. To use simple equipment to collect data and record it in a table and block diagram. To gather and record data to help answer questions.

Year 3

Light			
Activity	Big question	Type of enquiry	Working scientifically skill to develop
Phizzi Light & Sound – Sun shadows	How do shadows change over the day?	Observing over time Modelling	To set up a simple enquiry to observe changing shadows over time. To use a ruler/tape measure to collect data. To record data in a table. To use the data collected to draw a simple conclusion.
Phizzi Light & Sound – the brightest torch	Which type of torch produces the brightest light?	Comparative test	To plan a test to compare the brightness of different light sources. To use appropriate scientific vocabulary to describe methods of enquiry. To use a data logger/light meter app to measure the brightness of light. To record data in a table. To display data in a bar chart. To use straightforward evidence to answer questions.
Phizzi Light & Sound – periscope	How can we use mirrors to see around corners and over crowds?	Problem solving	To draw a labelled diagram to illustrate how a periscope works. To use scientific vocabulary to explain how a periscope works.
Forces and magnets			
Phizzi Forces – making contact	How can we organise types of forces into groups?	Identifying and classifying	To answer scientific questions by grouping and classifying things. To record observations using labelled scientific diagrams. To create an identification key for types of forces.

Activity	Big question	Type of enquiry	Working scientifically skill to develop
Phizzi Forces – attract repel	How do magnets affect other magnets?	Pattern seeking	<p>To make systematic and careful observations using a plotting compass.</p> <p>To record observations as scientific diagrams.</p> <p>To use observations to draw simple conclusions.</p>
Phizzi Forces – slippy shoes	Which type of surface is most slippy?	Comparative test	<p>To plan a simple test to compare how things move on different surfaces.</p> <p>To use a newton meter (force meter) to measure forces.</p> <p>To record data in a table.</p> <p>To display data in a bar chart.</p>
Phizzi Forces – magnetic strength	Which magnet will be most useful in retrieving a valuable coin?	Comparative test	<p>To record data in a table.</p> <p>To display data in a bar chart.</p> <p>To use data to draw simple conclusions.</p>
Research cards – friction	How have our ideas about friction changed throughout history?	Ideas over time	<p>To answer scientific questions by finding things out from a range of secondary sources of information.</p> <p>To use appropriate scientific language to communicate findings.</p> <p>To describe and evaluate other people's scientific ideas.</p>

Year 4

Sound			
Activity	Big question	Type of enquiry	Working scientifically skill to develop
Phizzi Light & Sound – sound circus	Can you group instruments based on what is causing their sound?	Identifying and classifying	To use a Venn diagram to record findings from the enquiry. To report on findings from the enquiry using written explanations and scientific diagrams.
Phizzi Light & Sound – string telephones	Which type of string is most effective for a string telephone?	Comparative test	To plan a simple comparative test. To use appropriate scientific vocabulary to describe methods of enquiry. Use straight forward evidence to answer questions. To suggest improvements to the simple tests.
Phizzi Light & Sound – investigating pitch	How does changing the length of sound tubes/tuning fork prong affect its pitch?	Pattern seeking	To record findings using tables and scatter graphs. To use results to make predictions and raise further questions. Use straightforward scientific evidence to answer questions.
Phizzi Light & Sound – can you hear me?	How does the volume of a sound change with distance?	Fair test	To set up a simple fair test. To repeat measurements and record them in a table. To present data in a line graph with support. To use results to draw simple conclusions.

Rocks			
Activity	Big question	Type of enquiry	Working scientifically skill to develop
Phizzi Earth & Space – space soil	Which type of soil is most effective at absorbing water?	Comparative test	To set up a simple comparative test, recognising variables to change, measure and control. To record data in tables and bar charts. To use results to draw simple conclusions.
Phizzi Earth & Space – craters	How does the size of a meteor/asteroid affect the size of the crater it produces?	Fair test	To plan and carry out a fair test, recognising variables to change, measure and control. To record data in tables and line graphs. To use tables and graphs to draw simple conclusions and make further predictions.
Electricity			
Phizzi Electricity – circuit analyst	Can you group these circuits into ones that will work when the switch is closed and ones that will not?	Identifying and classifying	To plan an approach to an identifying and classifying enquiry. To record data using scientific diagrams and tables. To report findings from enquiries in written forms.
Phizzi Electricity – close the gap	Which materials are conductors, and which are insulators?	Identifying and classifying	To use appropriate scientific vocabulary to describe methods of enquiry. To record data in tables. To report findings from enquiries in written forms.
Phizzi Electricity – switch it on!	Can you design a switch that can turn a circuit on and off?	Problem solving	To communicate solutions to problems in scientific diagrams. To evaluate how well a problem has been solved and suggest improvements.
Phizzi Electricity – buzz off!	What circuit would be needed for a door alarm?	Problem solving	To communicate solutions to problems in scientific diagrams. To evaluate how well a problem has been solved and suggest improvements.

Year 5

Earth & Space			
Activity	Big question	Type of enquiry	Working scientifically skill to develop
Phizzi Earth & Space – Moon phases	How does the Moon appear to change over a month?	Observing over time Modelling	To make observations over different periods of time and record observations in scientific diagrams. To develop explanations based on their observations. To use appropriate scientific vocabulary to describe methods of enquiry.
Phizzi Earth & Space – Kepler's laws	How does the distance of a planet from the Sun affect the length of its orbit?	Pattern seeking	To record data in tables and line graphs. To use data to identify and describe patterns. To use data to make predictions and suggest further lines of enquiry.
Research cards – Earth and space	How have our ideas about the solar system changed throughout history?	Research	To answer scientific questions by finding things out from a range of secondary sources of information. To describe and evaluate other people's scientific ideas.
Forces			
Phizzi Forces – planetary landings	How does changing the shape of a space probe affect the time it takes to fall through liquid?	Comparative test	To plan and set up a simple comparative test, recognising variables to change, measure and control. To repeat accurate and precise measurements. To record data in tables and bar charts. To use results to draw simple conclusions.
Phizzi Forces – balloon race	Which string is best for racing balloon rockets across the playground?	Comparative test	To set up a simple comparative test, recognising variables to change, measure and control. To repeat accurate and precise measurements. To record data in tables and bar charts. To use results to draw simple conclusions.

Activity	Big question	Type of enquiry	Working scientifically skill to develop
Phizzi Forces – simple machines	Which simple machine would be most useful in moving a heavy rocket to the launchpad?	Comparative test	<p>To set up a simple comparative test, recognising variables to change, measure and control.</p> <p>To repeat accurate and precise measurements.</p> <p>To record data in tables and bar charts.</p> <p>To use results to draw simple conclusions.</p>
Phizzi forces – pendulum swing	How does the area of a pendulum swing affect how long it will swing for?	Fair test	<p>To plan and carry out a fair test, recognising variables to change, measure and control.</p> <p>To record data in tables and line graphs.</p> <p>To use tables and graphs to draw conclusions and identify causal relationships.</p>
Phizzi Forces – slippery shoes	How does the area of a shoe/depth of grip affect the friction between the shoe and the floor?	Fair test	<p>To plan and carry out a fair test, recognising variables to change, measure and control.</p> <p>To record data in tables and line graphs.</p> <p>To use tables and graphs to draw conclusions and identify causal relationships.</p> <p>To develop scientific explanations to support or refute ideas.</p>
Properties of materials			
Phizzi Earth & Space – thermal properties of materials	Which material would be useful for keeping an astronaut warm in space?	<p>Comparative test</p> <p>Observing over time</p>	<p>To plan and set up a simple comparative test, recognising variables to change, measure and control.</p> <p>To use appropriate scientific vocabulary to describe methods of enquiry.</p> <p>To make and repeat precise measurements.</p> <p>To record data in tables and bar charts.</p> <p>To develop scientific explanations.</p>

Year 6

Light			
Activity	Big question	Type of enquiry	Working scientifically skill to develop
Phizzi Light & Sound – investigating shadows	How does the distance of an object from the screen affect the size of its shadow? How does the distance of a light source from an object affect the size of its shadow?	Fair test	To plan and carry out a fair test, recognising variables to change, measure and control. To record data in tables and line graphs. To use tables and graphs to draw conclusions and identify causal relationships. To develop scientific explanations to support or refute ideas.
Phizzi Light & Sound – Sun shadows	How does the length and direction of our shadow change over the day?	Observing over time	To use scientific equipment to take accurate and precise measurements with repeats where appropriate. To record data in tables and line graphs. To draw conclusions and raise further questions based on data.
Electricity			
Phizzi Electricity – spin yourself silly	What is the relationship between the number of batteries in a circuit and how fast a motor spins?	Fair test	To plan and carry out a fair test, recognising variables to change, measure and control. To record data in tables and line graphs. To use tables and graphs to draw conclusions and identify causal relationships and share these orally. To report practical approaches to enquiries in written forms.
Phizzi Electricity – Christmas lights	How does the voltage of the batteries in a circuit affect the brightness of the lamps in a string of Christmas lights?	Fair test	To carry out a fair test, recognising variables to change, measure and control. To record data in tables and line graphs. To use tables and graphs to draw conclusions and identify causal relationships. To report findings and conclusions from enquiries in written forms.

Activity	Big question	Type of enquiry	Working scientifically skill to develop
Phizzi Electricity – turn it up	What is the relationship between the number of batteries in a circuit and the volume of a buzzer?	Fair test	To carry out a fair test, recognising variables to change, measure and control. To record data in tables and line graphs. To use tables and graphs to draw conclusions and identify causal relationships. To develop scientific explanations using scientific evidence to support or refute ideas.
Research cards – electricity	How have our ideas about electricity changed over history?	Research	To answer scientific questions by finding things out from a range of secondary sources of information. To use appropriate scientific language to communicate findings. To describe and evaluate other people's scientific ideas.
Phizzi Electricity – electrical games	How can an electric circuit be used to make a game?	Problem solving	To communicate solutions to problems in scientific diagrams. To evaluate how well a problem has been solved and suggest improvements. To use scientific evidence to support or refute ideas and arguments.





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