Adopt a Scientist (NI Pilot)

Pilot scheme to assist our primary science teachers and to respond to the needs of primary science education in the World Around Us (WAU)

Declan McGeown

RSC Programme Manager, Ireland

Working together creates change.
Creating the opportunities for our members to use their expertise to assist our primary teachers to increase science capital in out future scientists.

ROYAL SOCIETY OF CHEMISTRY

MEMBERS

•Members will be “adopted” by a local primary school

•They will be provided with a “RSC Science Box”

•They will be provided with training

•Training includes the primary science curriculum, how to discuss the project to the schools and support from their Education Coordinator

•They will be provided with all the documents needed for the project

•They will be offered support to insert more science into the classroom

•They will have the opportunity to answer the pupils questions.

TEACHERS

•One particular year group cohort of teachers will be targeted.

•The preferred year group will be those starting Key Stage 2 (aged 7 -11)

•This cohort of teachers will have one year intensive interaction with the “adopted scientist”

•With teachers and members working together to ensure that more investigations will be introduced to their schemes of work

•The theory and investigations will be discussed to ensure that teacher confidence levels are raised

•They will be offered ideas on how to integrate literacy and numeracy into their lessons.

PUPILS

•Research shows that most pupils will have decided if “science is for“ them by age of 11

•Intervention can help pupils understand that science is for all

•Pupils scientific literacy will be increased

•Their science capital will increase by having confident teachers in relation to science

•Pupils will have the opportunity to talk to “real” scientists and have their questions answered by “asking the expert”.

ROYAL SOCIETY OF CHEMISTRY

ADOPT A SCIENTIST

RSC Adopt a Scientist: school

- Science coordinator of school
- Primary 5 Northern Ireland (Year 5 Scotland: Year 4 Wales and England)
- Rationale:
  - The adopted scientist to follow the year group across the remainder of the KS2 over a three year period
  - The teachers across the KS will have one years access to a scientist
  - The pupils will have support across the KS
- Evaluation:
  - Teacher evaluation pre, during and post
  - Pupil assessment scores

Questions for Adopt a Chemist project

Teacher/WAU/Both

Before intervention

1. How long have you been teaching in a primary school?
   a. 1 -3 years
   b. 4-8 years
   c. 9 + years

2. How long have you been teaching the KS2 curriculum?
   a. 1 -3 years
   b. 4-8 years
   c. 9 + years

3. How confident are you to deliver Key Stage 2 Science?

0 Very not confident	1	2	3	4 Not confident	5	6	7 Confident	8	9	10 Very Confident

4. How confident in delivering and investigating biology e.g. living things?

0 Very not confident	1	2	3	4 Not confident	5	6	7 Confident	8	9	10 Very Confident

5. How confident in delivering and investigating chemistry e.g. reactions, compounds?

0 Very not confident	1	2	3	4 Not confident	5	6	7 Confident	8	9	10 Very Confident

6. How confident in delivering and investigating physics e.g. forces, electricity?

0 Very not confident	1	2	3	4 Not confident	5	6	7 Confident	8	9	10 Very Confident

7. Have you heard of the Royal Society of Chemistry (RSC) before?
   a. Yes
   b. No
   c. Not sure

8. Please indicate what assistance the RSC could provide.
   a. Advice
   b. Support
   c. Resources
   d. Investigations
   e. Trusted colleague to for questions and suggestions
   f. Workshops

9. What is the highest level of science education? Please indicate your educational science background. Tick all that are appropriate:
   a. GCSE or equivalent
   b. A Level Biology
   c. A Level Chemistry
   d. A Level Physics
   e. Any post-16 qualification in science (add box)
   f. Science Degree
   g. Science specialism within Education Degree

question	respondent 1	respondent 2	respondent 3	respondent 4
1. How long have you been teaching in a primary school?	9+	9+	9+	9+
2. How long have you been teaching the KS2 Curriculum?	4-8 years	9+	9+	9+
3. How confident to deliver KS2 Science?	5	5	7	7
4. How confident are you in delivering and investigating **biology**?	7	5	7	7
5. How confident are you in delivering and investigating **chemistry**?	0	5	4	4
6. How confident are you in delivering and investigating **physics**?	6	5	4	4
7. Have you heard of the RSC before?	No	no	no	no
8. Please indicate what assistance the RCS could provide?	Advice	support	advice	support
	support	resources	support	resources
	resources	investigations	resources	trusted colleague
	investigations	workshops	investigations	workshops
	trusted colleague		trusted colleague	
	workshops		workshops	
9. What is the highest level of your science education?	GCSE	GCSE	A Level Biology	GCSE

Questionnaire during intervention

1. How confident are you to deliver Key Stage 2 Science during the sessions?
   a. Very Confident
   b. Confident
   c. Not confident
   d. Very not confident

2. Is the RSC volunteer understanding of Primary School Science within the WAU?
   a. Yes; they have a very good understanding
   b. Yes; they have a good understanding
   c. No; they are finding it difficult
   d. No; they are finding it very difficult

3. Is the RSC volunteer adding to my experiences and therefore that of the children?
   a. Yes, it really helped out
   b. Yes, however some of the activities were not suited to the group
   c. Yes, however they needed a lot of support
   d. No, they did not understand our needs
   e. No, most of the activities did not suit primary science

4. Is there any other support we can offer at the moment?

Questionnaire after intervention

1. How confident are you to deliver Key Stage 2 Science during the sessions?
   a. Very Confident
   b. Confident
   c. Not confident
   d. Very not confident

2. How did you find the intervention process for your professional practice?
   a. Very good
   b. Good
   c. Poor
   d. Very poor

3. Please give reasons for your answer?

4. Are you more confident in delivering biology investigations?
   a. Yes; although I was already confident
   b. Yes; I am more confident after the invention
   c. No; however I have more resources
   d. No; I am still not confident in delivering biology

5. Are you more confident in delivering chemistry investigations?
   a. Yes; although I was already confident
   b. Yes; I am more confident after the invention
   c. No; however I have more resources
   d. No; I am still not confident in delivering chemistry

6. Are you more confident in delivering physics investigations?
   a. Yes; although I was already confident
   b. Yes; I am more confident after the invention
   c. No; however I have more resources
   d. No; I am still not confident in delivering physics

RSC Science Box

- Funding from RSC to purchase material for each class/year.
- Suppling schools with plastic beakers, measuring cylinders and safety glasses
- Science curriculum discussed with teachers and some suggestions of how to bring more of the physical sciences (chemistry and physics) into their lessons and investigations
- Small amounts of material purchased to support additional investigations
- “Ask the Expert” facility for pupils to talk to “real scientists”

RSC Adopt a Scientist: RSC Members

- Members requested to register their interest
- RSC to assist in talking with schools to get the meetings set up
- RSC to ensure that all Child and Vulnerable Adult checks are processed before members enter school (members are to meet teachers outside of teaching hours and “Ask an expert” to be facilitated by online conference calls, emails and letters)
- Full training to be mandatory for all Adoptees
- RSC Education Coordinator to facilitate initial meetings and to organise regular discussions with teachers and Adoptee; separately and together)

09:30 – 09:45	**Tea and Coffee, Welcome Angela (Regional Programme Manager, Ireland)**
09:45 – 10:00	The World Around Us
10:00 – 10:20	Child Protection
10:20 – 10:55	Adopt a Scientist NI (Pilot)
10:55 – 11:20	**Break**
11:20 – 12:20	Communicating with teachers
12:20 – 12:25	RSC resources for primary school
12:25 – 12:50	Role play: selling the project to teachers/WAU Coordinators/Principals Role-play: “it sounds good for the class but…”
12:50 – 13:30	**Lunch**
13:30 – 14:30	Getting to know the experiments for primary school
14:30 – 14:50	Role-play: “Questions from teachers” (science knowledge)
14:50 – 15:10	Review of the day: what made the biggest impression on you?
15:10 – 15:30	Questions
15:30	**End of day**

Intended Learning Outcomes

- At the end of the day I will know:
- the rationale of the Adopt a Scientist Pilot Programme
- issues related to Scientists interaction with pupils/teachers (Child Protection)
- how science fits into the World Around Us (WAU)
- how to communicate with primary teachers effectively (do’s and don'ts)
- the primary resources from the RSC
- Experience of role-playing for common scenarios

Sucess Criteria

- At the end of the training I will be successful if:

- At the end of the training you will be asked to write down what you think success criteria will be (what did you learn), for example;

- Aware of the WAU and its components

- What else did you learn?

-

ROYAL SOCIETY OF CHEMISTRY

World Around Us (WAU)

- - WAU: Science, Geography, History and Technology
- 4 strands: Interdependence, Movement & Energy, Place, Change over time
- Skills across the curriculum: Communication, Using Mathematics, Using ICT and Thinking Skills and Personal Capabilities
- It is a statuary requirement and science has not been dropped from the curriculum….however numeracy and literacy are the big areas
- ETI: An evaluation of the implementation of The World Around Us in primary schools

ROYAL SOCIETY OF CHEMISTRY

Science and Technology
Progression Guidance

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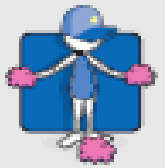
Thinking Skills and Personal Capabilities

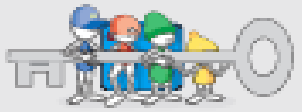
Managing Information (MI)

Thinking, Problem-Solving and Decision-Making (TPSDM)



Being Creative (BC)

Working with Others (WWO)



Self Management (SM)

ROYAL SOCIETY OF CHEMISTRY

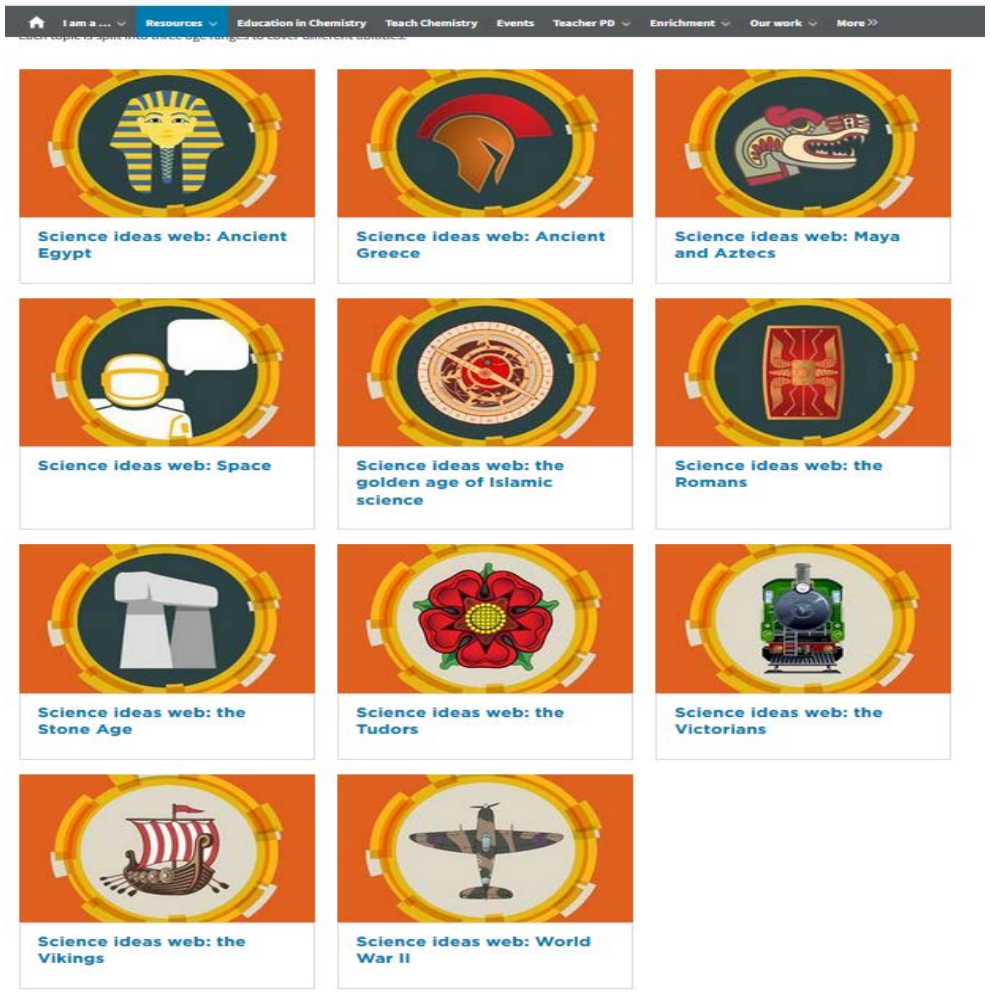
Suggested line of progression

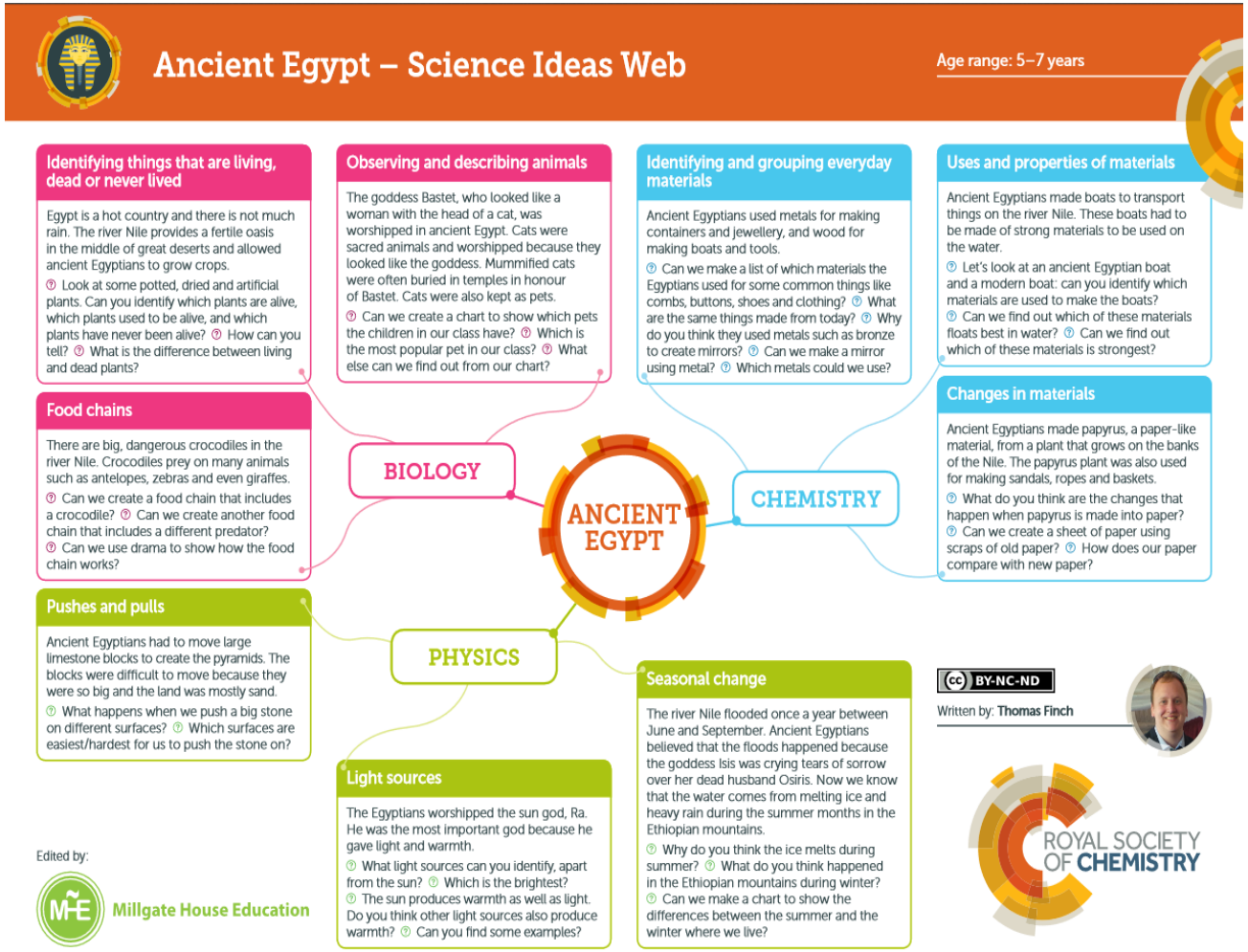
	From	Towards	To
OBSERVATION	Use the senses to make observations and provide descriptions of what they notice. 	Use the senses to observe and describe, identifying similarities and differences by making simple comparisons and connections. 	Use the senses to observe and describe. Suggest reasons for significant observations by examining evidence and making links between possible cause and effect. 
QUESTIONING	Ask different types of questions. Be curious, ask and respond to questions about the world around them. 	Ask more focused questions and suggest ideas for enquiry. 	Be able to ask deeper and wider questions. Recognise the differences between why, what, where, when, how and what if questions. Learn from and build on their own and others' ideas and experiences. 
PLANNING	Begin to plan by talking about what they might do. Suggest ways to obtain information from the questions they have formulated. 	Set goals for their work, break tasks into smaller parts and plan the next steps, using their own and others' ideas to identify, locate and select various sources of information. 	Be able to plan and set goals. Select the most appropriate methods for a particular task. 

Focus: Change over Time

From (Foundation Stage) Pupils are learning the following:	Towards (Key Stage 1) Pupils are learning the following:	To (Key Stage 2) Pupils are learning the following:
The local physical environment is made up of a variety of materials with a range of observable features. PL1, PL3	Materials have a range of properties which are related to their uses. PL2, PL3	The origins of all materials can be traced back to the earth, the air, the water, or living things (plants and animals). PL1
Materials have a wide variety of uses. PL3	Materials can be sorted according to these properties. PL2	
Materials can be changed in a variety of ways which may alter their look or feel. CoT1, CoT2	Heating or cooling materials can be used to bring about change. CoT1	Materials can exist in different states. CoT2
Some materials change by rotting. CoT1, CoT2	Materials can interact with each other – some mix and combine whilst others don't. CoT1	States of materials can be changed from one to another. CoT2
	Changes in materials can be either desirable or undesirable. CoT1	Changes in materials can be temporary or permanent. CoT2
		Some mixtures can be separated. CoT2
	Decay is a process of change in some materials. CoT1	Decay can be accelerated or slowed. CoT1, CoT2

Practical activities and resources





Ancient Egypt – Science Ideas Web

Age range: 7–9 years

Key organs in the body

When preparing a dead body for mummification, ancient Egyptians removed different organs such as liver, intestines, lungs and stomach from the body. They put these organs into Canopic jars because they believed that dead people needed these organs in the afterlife.

? Can we draw around someone on a big piece of paper and stick on where each of the main organs is? ? Can we create a table to show the organs and their functions?

Conditions for growing plants

Egypt is a hot country with many deserts. There weren't many places where ancient Egyptians could grow crops. The banks of the Nile were a good place for growing plants as the river provided water and nutrients by flooding its banks once a year.

? What happens if we plant a seed in different soils? ? Which soil seems to be the best for growing plants? ? Can we create a graph showing how much each plant has grown over a period of time? ? What else do you think the plants need to grow and survive?

Changes of state

Egypt is a hot country with temperature as high as 40 degrees Celsius in summer. Water was extremely important to the ancient Egyptians because it helped them grow crops. In hot weather water evaporates quickly.

? Can you find a good way to stop water evaporating quickly on a hot, sunny day? ? Are some containers better than others for holding water in hot weather?

Soils for growing plants

Ancient Egyptians used the banks of the river Nile to grow their crops. Every year, the river would flood the banks and make the soil on the river banks more fertile, ready for the new season's crops to be planted. The annual flooding was very important to the Ancient Egyptians, and they divided the year into three seasons: *akhet* (flooding), *peret* (growth), and *shemu* (harvest).

? Can we make two tables, one showing what soil is made from and one showing what plants need to grow? ? Can you explain how flooding might affect the soil and make it more fertile?

Habitats and environment

In ancient Egypt, some animals were respected and represented as gods or goddesses; others were domesticated and used for farming. Some animals were dangerous so people feared them.

? What can we find out about which animals lived in ancient Egypt? ? Can we make a table to show which animals were respected, which were used for farming and which were feared? ? What would the table look like for animals living in Britain today? ? Which animals do children in our class fear? ? Why?

BIOLOGY

ANCIENT EGYPT

CHEMISTRY

PHYSICS

Uses and properties of materials

In ancient Egyptians poor people made houses out of mud bricks. Pharaohs, however, wanted their pyramids to last for a long time, so they made them out of stone bricks.

? Can we make a table to compare the properties of mud and brick? ? Do you think that hard stone or soft stone would be best for building the pyramids? ? What are the disadvantages of each type of stone?

Effects of forces between two objects

When they were creating the pyramids, the ancient Egyptians had to move large limestone blocks across different surfaces such as sand and stone. It was easier to move the blocks on some surfaces than others.

? Can we find out on what kind of surface is easiest for moving a large stone? ? Can you identify which surfaces around school would be best to move the stone on? ? Is it easier to push or pull the stone?

Day and night, the Earth and sun

In ancient Egyptian times the sun was thought to be a disk protected by the falcon-headed god Ra, who took it for a journey in a boat across the sky every day. Every evening Apophis, the god of chaos, would consume Ra and his sun boat. This meant that Ra had to travel though the underworld at night to be reborn in the East every morning.

? Can we create a sun dial that keeps track of the sun's position in the sky throughout the day? [SAFETY NOTE: Don't look at the sun directly as this can cause loss of vision or blindness.] ? How do we know that the ancient Egyptians were wrong in thinking that the sun moves in a boat across the sky?

Seeing things and light sources

Pyramids contained different chambers. The sarcophagus (a container for a dead body) and other burial items would be placed in the different chambers. Pyramids had no windows and it was very dark inside the chambers.

? Why do you think the Ancient Egyptians couldn't see anything without natural light? ? What ideas can you think of for how the Ancient Egyptians could have allowed natural light into different parts of the pyramids?

Written by: **Thomas Finch**

Edited by:

Millgate House Education

ROYAL SOCIETY OF CHEMISTRY

Ancient Egypt – Science Ideas Web

Age range: 9–11 years

Healthy life choices

The *Sed* festival was a big event in ancient Egyptian times. The pharaoh had ruled for 30 years, and he needed to prove his fitness and ability to lead by taking part in a race.

? Why was it important for the pharaoh to be fit and healthy? ? How do the children in our class stay fit and healthy? ? Can we do a survey to find out what types of exercise are most common in the class?

Environments and animal adaptation

Dromedaries (Arabian camels) were used in ancient Egyptian times for transport in the desert. Dromedaries only need water every ten to 15 days and can store fat in the hump on their back.

? Can we make a list of how dromedaries have adapted to suit a desert climate? ? How do each of these adaptations help the animal survive? ? Choose another animal that lives in Egypt, but not in a desert. Can we make a list of how this animal has adapted to its environment? ? Can we use a world map to match different animals to where they live?

Changes in materials

When preparing a dead body for mummification, ancient Egyptians removed different organs such as liver, intestines, lungs and stomach from the body. They put these organs into Canopic jars and preserved them with natron salt. The jars were kept with the mummified body to keep the organs safe for the afterlife.

? Can we find out how much salt was needed to preserve organs? ? We could use a tomato instead of a real body organ and see how long the tomato lasts in different conditions. ? Can we find out how salt helps to preserve things?

Changes in materials: environmental influence

Today, many people visit King Tutankhamun's tomb in Egypt. So many people visit the tomb that it is harmful to the delicate wall paintings, which have started to fade and crumble. People can now visit a replica tomb, which opened in 2014, just one mile away from the original site.

? Can we find out what happens in different conditions to a painting that is painted on stone? ? Does the painting keep better in hot or cold, wet or dry conditions? ? Why do you think paintings fade when lots of people visit them?

Keeping teeth healthy

Rich people in ancient Egypt ate plenty of meat. Poor people ate more fruit and bread, and these often contained sand and dirt, which wore down their teeth.

? Can we make a list of things that people eat today that might wear down or damage their teeth? ? Can you identify and name the different kinds of teeth we have? ? What are their jobs?

BIOLOGY

ANCIENT EGYPT

CHEMISTRY

PHYSICS

Separating mixtures

Ancient Egyptians made their own food such as bread, which they made from wheat flour. To get the grains that contain the flour, Egyptians had to separate them from the plant's inedible parts, the straw and the chaff; this process is known as threshing.

? Can you think of a good way to separate wheat grains from straw and chaff? ? What kind of tools or equipment will you need to do this?

Forces: pulleys and levers

Ancient Egyptians moved huge stones to build the pyramids. These stones were difficult to move so make this task easier, Egyptians created pulley systems to move and lift them into different places.

? Can we create a pulley system to help lift a heavy book or a water-filled bottle?

Day and night

Ancient Egyptians created obelisks, tall structures made out of a solid piece of stone. Obelisks were covered in hieroglyphs to tell stories about things that had happened. They created shadows based on where the sun was at different times of the day; this helped people tell the time.

? Can we use a shadow to work out what time of day it is? ? Can we work out at what time of day the shadow is shortest? ? When is the shadow longest? ? Which direction does the shadow move in?

Seeing things and light sources

Ancient Egyptians experienced different seasons just like we do. In summer the Nile would flood while the winter was drier.

? Why do you think there are different seasons? ? Can we make a model, using different sized balls, to explain how we get seasons?

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ROYAL SOCIETY OF CHEMISTRY

Science Strand	Science Idea	Investigation	Resources	Learning Strand
Physics	**Sound: pitch and volume** Sound is created when something vibrates. The vibration can be the air, sting or drum. Air: blowing into a bottle which has various amounts of water (and therefore various amounts if air). When the is less air (i.e. when the is more water in the bottle) then the blowing air vibrations cause the pitch to be higher and when there is more air (less water) the vibrations are going to cause a lower pitch. When the force of blowing or striking is increased then the sound will be louder.	What changes the pitch and loudness of a sound?	BBC Science Clips Changing Sounds an interactive webpage Plastic bottles and water Drums that are able to have their tension changed. A stringed instrument that can have their strings tightened and loosened	Energy and movement:
	Balanced forces A Moment is how we describe a turn force around a hinge (pivot or fulcrum). It is measured in Newton Meters (Nm). To find the moment we use the equation: Moment = force of the object x distance of the force from the pivot. To find the force (weight) we use the following equation	Seesaw investigation The pupils will probably have investigated this with seesaws while playing. They will intuitively know how they work and how to balance the seesaw. Have a wood metre ruler and have a hole drilled into it at the 50cm point. This will be the pivot point. Try and balance the seesaw. Record the distance from the pivot on each side and the mass of the object (if you wish you can	Metre ruler with a hole at 50cm for the pivot. A broom handle could also be used and then measured. A set of know masses that need to hang of the metre ruler. Pencils, papers	Energy and movement: Interdependence

Any questions?

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