

Mixing Lenses

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Preface

Mixing Lenses was written by Canon Jane Brooke, Chester Cathedral. In the following blog, published on RE:ONLINE in January 2024, Jane explains what inspired her to create a set of resources for teacher exploring current thinking around science and faith:

“I will talk about a new resource called ‘Mixing Lenses’, written for Primary teachers to explore the ways scientific language and religious language can overlap. For readers who are not Primary teachers, don’t be put off- there is lots here for Secondary- age students, and you may well be asking similar questions to myself. The aim of the resource is to support pupils in making sense of the world using language at the interface of science and Christianity.

I started with some significant questions; are there new ways to approach engagement with science and faith? Can the ways that we help children to explore both science and faith be mixed together? How can we show children a meaningful intertwining of the language of science

and faith in the classroom? I have been concerned over the years when I see an 'either/ or' mentality applied to science and faith; as if pupils have to choose. Yet of course both modes of thinking offer meaning, and many people comfortably employ both.

This is nothing new – for many years we have tried to help young people understand that a believer of any faith can also be a scientist. This often involves myth- busting, for example, dispelling the myth that Genesis is read in the same way as a science book.

The Mixing Lenses resource for teachers has emerged from my work with Chester Cathedral Education Department. Workshops on science and faith were taken into schools, funded by a group called Scientists in Congregations.

Scientists in Congregations celebrates the scientists who are present in church congregations. The group seeks to understand and share ideas around science and faith, developing material for teaching and encouraging the creative and at times surprising thinking that arises from explorations in this area. Find out more on the [ECLAS website](#).

You may have heard of God and the Big Bang, a project to provide space for school students to explore science and faith in creative ways. RE Today have produced a set of teaching resources following God and the Big Bang topics for Primary and Secondary.

As my own work was with Chester Cathedral I focused on Christian faith but the questions and information could be explored with any faith.

It occurred to me that both faith and science:

- a. have language in common.
- b. use both metaphor and analogy to aid understanding of concepts.

This got me thinking, and four questions emerged which have become the basis of my planning:

1. What are the concepts within the science and RE topics?
2. What is the vocabulary to be taught in Science and RE (in my case, Christianity)?
3. What activity can be planned to link the vocabulary between the subjects and so offer deeper understanding? What question could be asked to lead the activity?
4. What questions can be asked during the activity/discussion or on completion?

The resource established the parameters of this field of thinking for teachers using learning theories such as Piaget and Vygotsky. The resource then works through some practical examples. For example, the resource connects and explores the idea of circuits in science, and discipleship in Christianity. Circuits can break, and children can explore how to keep a circuit open and running. In a Christian life, sometimes events keep people from being disciples, their circuit has broken. Children can explore what might cause someone to stray away from their path, and the help and support they can receive to find it again. The resource makes many other connections in this way, such as the idea of a sound wave, and the idea of love travelling to reach people.

This resource is free for teachers. I hope it is useful. I am also interested to know if readers think there is mileage in developing this further, with other key stages and faiths. If anyone would like to pilot the material or offer suggestions, I would be delighted!”

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Introduction

‘Mixing Lenses’ is written for Primary teachers to offer some ways to show how the scientific language and religious language can overlap. The hope is that the pupils will be helped to explain the world in which we live and our place within it by using language at the interface of Science and Christianity.

This document focusses on Upper Key stage 2 (8-11 years) and refers to the curriculum that children currently receive in Science and RE. There is no RE national syllabus, so the vocabulary expected for Christianity is taken from a variety of sources. Although Christianity is the chosen faith, the process works equally well for all faiths and none.

The aim is not to contrast the two disciplines by highlighting the differences, but to consider how they are interlinked, and so begin to understand how the two disciplines interconnect.

Different Linguistic Lenses

The language used in Science uses a certain lens to understand concepts and scientific understanding. The language used in religion uses a lens of metaphor, analogy or models. **‘Mixing Lenses’** offers a way to observe the lenses overlapping and thus creating a stronger lens to allow an intelligent questioning dialogue concerning both disciplines. Appendix 1.

1. How can the lenses of Science and Christianity be mixed?

By helping the children to work with linguistic similarities, they begin to recognise the relationship between the two disciplines.

Vygotsky said that 'thought is not merely expressed in words; it comes into existence through them.' (p101 Slobin).

The teaching of direct concepts is, as Vygotsky says, 'impossible and fruitless' (page 83 Thought and Language). He agrees with Tolstoy who says a child cannot be taught concepts but needs to acquire words from the general linguistic context. The way to plan for an understanding of concepts and any overlap in disciplines is through consideration of the language required in each subject and subsequent careful educational planning for an activity.

Since language plays an essential part in cognitive processes, if the vocabulary is always separated in each discipline, then so are the thought processes. If, however, the language is connected through learning activities, then it offers children the possibility of seeing Science and RE together through the mixed lens. Vygostky introduced the term, Zone of Proximal Development which describes concepts which are within the grasp of a child and that the child is capable of learning, but ones they haven't yet attained. As the educator intervenes with new language, linking the concepts, then the child's brain wrestles with the new learning and brings new meaning.

Vygotsky proposed that, 'the notion of scientific concept implies a position in relation to other concepts' p.93. Scientific concepts then are transferred to everyday concepts and similarly, scientific concepts can be transferred to concepts of Christianity with appropriate focused learning activities.

What is necessary for the planned learning?

Piaget and Vygotsky speak of children age 8-11 years generally being at the stage known as concrete operational. According to Piaget, thinking in this stage is characterized by logical operations, such as conservation, reversibility or classification, allowing logical reasoning. For a child to begin to look through mixed lenses, the planned learning needs to offer the child a concrete learning engagement which links the two disciplines linguistically through concepts.

Discussion during the activity

The discussion between the children and the adults during their activity, is underpinned by the common values of Science and Faith, as explored by Eckland in 'Why Science and Faith Need Each Other': Curiosity, Doubt, Humility, Creativity.

2. Concepts

a. Scientific concepts

'Learning science concepts involves the introduction of new ways of knowing through the social process of teaching, rather than making sense of the natural world through personal observation and thought' (Leach and Scott 1995 pp50-51 - NFER research introducing Scientific Concepts to children)

Learning can be structured in Science using, for example, analogy, metaphor and physical models.

Analogy: Harvey considered the human heart after looking at the behaviour of a water pump: the analogy inspired creativity and greater understanding. Analogues help learners to know the physical world in a 'new and empowering way' (Clive Sutton (1996) – NFER.)

Metaphor: An idea is encapsulated in a linguistic picture to encourage deeper meaning.

Models: Scientific theorizing links language, actions and the world through the use of models: 'models are the organizing and simplifying tools' Karl Popper (1982)

b. Religious concepts

Religious concepts too can often be expressed through metaphor, analogy, myth, symbol, model. The focus here is upon analogy, metaphor and physical models.

Analogy: helps Christians to understand the invisible/unseen e.g. Parable of the Sower and the Seed (Matthew Chapter 13)

Metaphor: A metaphor is something that can't be expressed directly. Christian faith is riddled with metaphors e.g. John 10.7 Jesus said, 'I am the door'

Models: something that represents something else and helps us understand the original e.g. a shamrock is used to explain the concept of the Trinity.

3. Language

Language games

Wittgenstein claims that science and religion have different language games. Wittgenstein speaks of a particular context in which language is used. For instance, the question of 'Was Jesus God?' requires a yes/no which depends upon which game you are in when you ask the question. A Jew or Christian might give equally valid answers because they begin in a different games which leads to conceptual relativism (P 23)

Each game has its own set of rules which is what is required for an insider to understand. Wittgenstein coined the phrase 'don't ask for the meaning, **ask for the use**'. Each language game is immune from charges of incoherence since it has its own internal criteria. Problems arise when language 'goes on holiday' and words are used outside the set of rules.

Arthur Peacocke claims that 'science and theology *aim* to depict reality; that they both do so in metaphorical language with the use of models.' (P 5 God and Science). To ensure the same 'set of rules' is being used, 'Mixing lenses' includes linguistic commonality between the two disciplines, I have selected the use of **analogy and metaphor** as the common lenses.

What happens when lenses are mixed linguistically?

'One way old knowledge can be brought to bear on the construction of a new schema or the restructuring of an existing one is by using analogies and metaphors from a different domain' Vosiniadou and Brewer (p61)

Wittgenstein (Wittgenstein 1967) explains that it is in the context of activities of a particular kind that specific language uses become meaningful and specific features of the world become significant (NFER Page 4).

When the two domains are linked by the use of analogies and metaphors then there is a congruence of the two disciplines through the lenses. The learning is enriched as learners move to a deeper level of thinking and engagement.

As the children take part in a planned activity, which links the disciplines linguistically, new learning takes place where the familiar and known in one discipline meets the familiar and known in another discipline.

a. Scientific vocabulary

Much is spoken of terminology in Science often connected with data management, but for the purposes of schools, the focus here is upon the vocabulary that teachers are expected to introduce in the science curriculum.

In Upper KS2 the scientific vocabulary introduced can include: measurement, data,

A few extracted examples of scientific vocabulary from the National Curriculum for UKS2 are:

Electricity: circuits conductors, insulators

Sound: pitch, vibrate, source

Changing state: condensations, evaporation, dissolve, solution

Earth: orbit, spin, axis

Gas: oxygen, carbon monoxide

Light: opaque, reflection, source

Food: nutrients, prey, food chain

Keeping Healthy: muscle, blood, pulse, heartbeat, circulation

Lifestyles: stigma, ovary

Microorganisms: Microbe, decay, germs, virus, germ

Reversible and irreversible changes: freezing, separating, insoluble

b. Vocabulary in RE connected with the Christian Faith (UKS2)

A few examples of vocabulary expected at Upper Key Stage 2 are:

God: Emmanuel, trinity, wonderful counsellor, creator, judge, love, covenant

Jesus: incarnation, **Metaphor:** Bread of life, Good Shepherd, Light of the World. Ascension

Discipleship: sin, reconciliation, charity, confirmation, faith, tolerance, justice

Stewardship: eco friendly, sustainable, climate change

Creation: evolution, Big Bang theory.

When is there NO connection in learning about Science and Faith?

When Science is taught along with biblical quotations e.g. an experiment showing evaporation has a quotation about ‘the water of life’ then the child sees no immediate connection between the two disciplines – only that they can be placed alongside each other linguistically. The adult may think they have connected the two disciplines because the adult already has a conceptual understanding of Christianity and Science, but the child only receives a disconnect of a story and a science experiment. The Science experiment seems more trustworthy in terms of understanding the world and truth: no learning takes place and *unintentionally* the child has the separation of the two disciplines reinforced i.e. Science is true and Christianity is fabricated.

If biblical quotations are taken out of context they will neither relate nor connect positively with scientific language.

The learning is enhanced when the teacher offers a springboard activity where the language from one discipline is connected conceptually with the other and the children are allowed to explore questions as they undertake the activity.

4. A process to help children to see through the mixed lenses of Science and RE (Christianity)

Four questions can support teachers to help children make links between Science and RE (Christianity). These questions are for the teacher to ask him/herself as the Science and RE curriculum is taught. In this case the focus is solely upon Christianity in the RE curriculum, though the questions can be applied to all faiths and none. Although the four questions are suitable for teaching any age group, the focus here is upon Science and RE for 9-11 years (Upper Key Stage 2).

Four Questions

The four questions for the teacher to ask her/himself are:

1. What are the concepts within the topic of each subject?
2. What is the vocabulary to be taught in Science? What is the vocabulary to be taught in RE (Christianity)?
3. What activity can be planned to link the vocabulary between the subjects and so offer deeper understanding? What question could be asked to lead the activity?
4. What questions can be asked during the activity/discussion or on completion?

Why those four questions?

The thinking behind the four questions is explained below using the text from above.

1. What are the concepts within the topic of each subject?

The adult/educator identifies which concepts are being taught and if there are any natural links. If the link is forced, then the child will make no positive connection e.g. water and its properties alongside the miracle of Jesus walking on the water. The miracle of Jesus walking on the water is connected with the resurrection and with recognition of the risen Jesus, but it offers no common language or concept with science. By forcing links, the gap between Science and RE (Christianity) is widened rather than narrowed and the lenses become separated.

2. What is the vocabulary to be taught in Science? What is the vocabulary to be taught in RE (Christianity)?

By identifying the vocabulary to be learnt, the teacher can discover sometimes a common language which enables the lenses to overlap. The learnt vocabulary leads to understanding and meaning within each discipline.

The two disciplines are often separated out in childrens' minds because they are delivered separately. When the language is juxtaposed in a carefully selected activity, then there may be a possibility of understanding how the two disciplines can work together.

After the common vocabulary has been identified in each discipline, then it is possible to focus upon creating a suitable learning activity.

3. What activity can be planned to link the vocabulary between the disciplines and so offer deeper understanding? What question could be asked to lead the activity?

The teacher uses his/her expertise to mix the lenses with an enquiry question to ensure a clear direction. Some activities are suggested below.

The activities below are focused upon **Analogy** or **Metaphor** or any other way that is appropriate.

During the activity, children may talk or ask questions and as the adult responds, so that the learning is embedded and the children can then raise further questions to explore.

4. What questions can be asked during the activity/discussion or on completion?

This can be done in pairs/groups/individually on post it notes.

5. How to Mix the Lenses

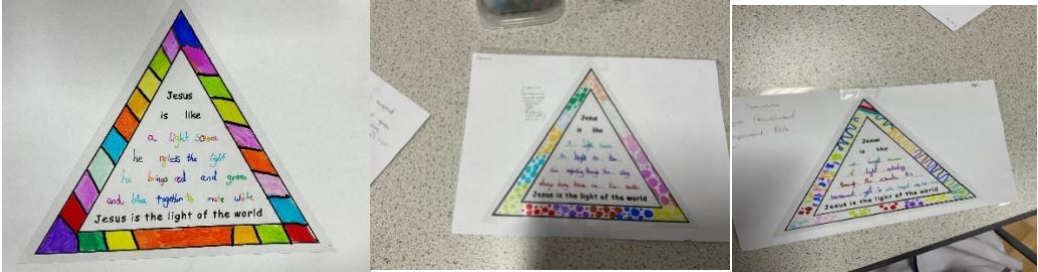
Activities to support 'Mixing the Lenses'

The table below offers some linguistic links that can be made when teaching Science and RE in parallel. Identification and introduction of common language in both disciplines (highlighted) offers a starting point for planning a learning activity to connect the two disciplines.

In this table Science leads the linking but it is possible to reverse it with RE being the lead.

Subject	1.What are the concepts in Science and RE?	2.What is the common vocabulary? (Science and RE (Christianity)) Highlighted words indicate common vocabulary	3.Activity/questions to stimulate discussion to help understand the child’s place in the world
Changing Circuits:	Circuits Discipleship	Science: circuits, conductors, insulators and barriers RE: disciple - circuits - Barriers in life to stop Christians being a disciple	<p>Question: What happens when circuits are broken? How are they closed? Analogy/metaphor of a circuit Science: Electric circuit: show how circuits are open or closed and that some materials e.g. glass are less good at conductivity.</p> <p>Peter’s betrayal (Last week of Jesus’ life) Luke 22: 54-62 Metaphor of circuit Starter: What stops you being good? Have you ever said something you wished you hadn’t? How was that like a circuit being broken? How was it mended?</p> <ol style="list-style-type: none"> The circuit is broken. Children stand in a circle with Peter and a girl in the middle. The teacher tells the story: the girl asks three times, ‘You know Jesus don’t you?’ and Peter says three times, ‘I don’t know him’. At the third time, the circuit breaks by two children losing hands. Peter weeps – the circuit is broken. The circuit is completed. Children stand in a circle with Peter and Jesus in the middle. The circuit is broken by two children losing hands. The teacher tells the story: Jesus asks Peter three times, ‘Do you love me?’ and Peter says three times, ‘You know I love you Lord’. At the third time, children hold hands in a circle. The circuit connects again – it is no longer broken. <p>Activity: Draw a simple circuit using the paper on the magnets and practice how to open or close a circuit using the keys. Place cut out figures of Peter and the girl and afterwards of Peter and Jesus, inside the circuit. Reenact the story opening and closing the keys as appropriate.</p> <p>What stopped Peter from saying he knew Jesus? What was the barrier? Did he have a choice?</p>

Changing Sounds	Source	Science: Muffle/source/soundproof pitch/vibration communication	Question: What effect does a 'source' have? Analogy/metaphor Science: The source of any sound is the beginning of the wave travelling RE: Source for Christians is the love of God which leads to a love of people which stimulates the desire to help others e.g. Charity work: Tear Fund. Love travels like waves to help others. Activity: Children design a collage showing a source with waves travelling to take 'love' to other people e.g. details of the work of Tear fund as an example of taking God's love to others.
	God/Love	RE: source – God's love	
Earth, Sun and Moon	Planets	Science: Orbit/spin/axis/	Question: What difference does an axis make? Analogy Science: Orbits/ axis/spin RE: Christmas Axis of time: the birth of Jesus is so important that time is spoken of 'before and after' Jesus...Before Christ/ After Christ or Before Common Era/ Common Era, (BCE and CE). The birth of Jesus is a turning point for the calendar. What axis would you have chosen to mark/delineate time? Activity: Represent the birth of Jesus on an axis (you could use a diagram from science) as a Christmas card to show the turning point in the calendar.
	Incarnation	RE: Incarnation birth of Jesus is an axis/a turning point...	

<p>Gases around us</p>	<p>Gas</p> <p>Trinity</p>	<p>Science: air, oxygen, carbon dioxide breath</p> <p>RE: Holy Spirit: metaphor - breath of life</p>	<p>Questions: What do humans need to breathe? Metaphor Teaching about Oxygen/breath a requirement for life.</p> <p>Teaching of Trinity (especially in church schools): includes the teaching of the Holy Spirit. Acts 17:25 Christians believe that God gives to all people life and breath and all things Activity: Design a collage/representation called 'The Breath of Life' using tissue paper and glue. Planning: What colours will you choose for air/breath? What shapes will you choose for air/breath? Choose words from Science linked with gases and use black felt tip to write words over the collage. Finally add/weave the words Holy Spirit into the collage. Look at each other's work: How do you respond to them? What do they say to you? How is the Holy Spirit like oxygen to a Christian?</p>
<p>How we see things</p>	<p>Light</p> <p>Jesus</p>	<p>Science: Light/Beam/source/reflection/refraction</p> <p>RE: Jesus as the light of the world (metaphor)</p>	<p>Question: How does light help with an understanding of Jesus?</p> <p>Metaphor/simile Science: learn about aspects and the nature of light</p> <p>RE: Jesus is the light of the world – use Scientific language linked with light e.g. disperse, source, refraction, opaque, rainbow, torch to create a metaphorical poem/haiku/triangle poem, headed 'Jesus is...' to show Christian beliefs about Jesus.</p> 

<p>Interdependence and Adaptation</p>	<p>Adaptation</p> <p>Zaccheus</p>	<p>Science: adaptation/ Food chain/fertiliser/nutrients/consumer</p> <p>RE: adaptation:</p>	<p>Question: How do people adapt to live? Analogy Science: learn about adaptation</p> <p>RE :</p> <p>a. What do you depend upon in your life? What makes you grow inside? What makes you change into a different person - sometimes a better person sometimes a worse person ... Zaccheus (Luke 19: 1-10) Story: how did Zaccheus change? How did he adapt? Was it for the better or worse? Why? Use clay to show a shape to represent 'greediness' use the same clay to change it to 'generosity'.</p> <p>b. Year 6: How did the church adapt/change when there was division/split between churches at the Great schism in 1054. Note: this is on a few RE Syllabi</p>
<p>Keeping Healthy</p>	<p>Living</p> <p>Prayer</p>	<p>Science: Circulation/diet/starches/heart pulse rate/muscle</p> <p>RE: reducing pulse rate to find inner peace</p>	<p>Question: What makes the pulse rate rise or slow down? Analogy Science: fast and slow pulse rate</p> <p>RE: How to relax Do you ever get angry? Upset? How do you keep yourself well so you can keep calm? How do you lower your pulse rate? When Christians pray, they often to ask for help in silence. Their pulse rate lowers. Teacher offers a variety of prayers on cards covering many subjects, including prayers from the Iona community/children's prayers/arrow prayers. Which prayers do you think would lower a pulse rate most for a Christian? Why?</p>

Life cycles	Growth	Science: germinate/stamen/r eproduce/ dispersion	Question: How is dispersion important for Christians? Analogy Science: Dispersion:
	Gospel	RE: image of dispersion for distributing the gospel	RE: The Great Commission: a way of dispersing the story of Christ. Matthew 28:20 'Go therefore and make disciples of all nations'. Create an image/metaphor showing how the message of Jesus was dispersed across the world using an effective disperser from nature e.g. dandelion. Create a visual image to show the story of Jesus' life being dispersed across the world? Is there an image/metaphor from the 21 st century which would represent the dispersing of the gospel?
Micro organisms	Virus	Science: Microbe, decay, mould, germ, virus	Question: How can goodness/evil be spread rapidly? Analogy Science: Virus spreads rapidly e.g. covid locally and across the world
	Mother Teresa/Mandela (study of a person)	RE: metaphor of the power of a virus to show the effect it can have globally	RE: Small organisms/viruses can be very powerful... both evil and good can grow like a virus across the world e.g. evil - Nazism or good - Mother Teresa's work. Small kindnesses can affect people...? Consider 'Pay it Forward.' The parable of the Good Samaritan (Luke 10) shows the power of a kindness – how might it spread to others? Might it make someone who hears the story be kind too?

<p>More about Dissolving</p>	<p>Dissolve Nature of God</p>	<p>Science: dissolve, solution, RE: dissolving in water is an illustration of the nature of God</p>	<p>Question: How can dissolving help Christians to understand the nature of God? Analogy Science: teach dissolve RE: Demonstration of how to understand the concept of God: When salt is added to water – it dissolves. Is it still there? Can you see it? Christians believe God is in the world but not visible. If you taste the solution, you can taste the salt. Do you think Christians can taste God? (<i>open ended question for discussion</i>)</p>
<p>Reversible and Irreversible Changes</p>	<p>Reversible and irreversible Joseph</p>	<p>Science: Separating, burning, reversible, irreversible RE: Is behaviour reversible/irreversible?</p>	<p>Question: Is everything irreversible? Analogy Science: Experiments showing reversible and irreversible RE: Have you done anything you wish you hadn't? What happened? Was it reversible? Joseph and his brothers: Was the behaviour of the brothers reversible? Irreversible? Actions are irreversible – they can't be changed. How does forgiveness help with actions that people are sorry about? What if Joseph hadn't forgiven them? How would the story be different? Does it make a difference to someone if he/she knows they are forgiven?</p>

Extra: Air resistance/ gravity	Force	Science: force (air pushing up to create a spin)	Question: How do people experience an invisible force? Analogy Science: Make a gyro helicopter and find out which is slowest. Why do you think that is? RE: Existence of God When have you felt helped/supported in your life? e.g. parents helping to ride a bicycle/friend helped when you couldn't do something. Force of help from another person. How do you feel that force? Christians believe an invisible force is holding/supporting them in their lives Discussion: Do you think it is possible to experience an invisible force like God?
	God	RE: unseen force God	

6. Two detailed further examples of how to 'mix the lenses', linked with God and the Big Bang.

There are two plans for teaching, 'Rocks and Fossils': **Section A** is dependent upon prior learning and **Section B** which explores the philosophical nature of 'Searching for Truth'.

A. Rocks and Fossils

Subject	1.What are the concepts in Science and RE?	2.What is the common vocabulary? (Science and RE (Christianity)) Highlighted words indicate common vocabulary	3.Activity/questions for discussion to help understand the child's place in the world
Section A This activity would be placed after learning about the rock cycle and discussion of the meaning of eternity/infinity and after encountering the account of creation in Genesis as poetry (see 2. Searching for Truth) in RE			

Rocks and Fossils	Science: change, Time, cycle RE: God	Science: fossils, time, change, rock cycle RE: God as eternal /infinity/time/circle/change	<p>This Activity assumes that the children have understood Genesis as a form of poetry (see the learning in ‘Searching for truth’)</p> <p>Question: How is the relationship between God and time understood by Christians? Analogy</p> <p>Creating a Moebius strip Resource: strip of paper, double sided sticky pads/tape, pencil/pen Draw onto the strip of paper the rock cycle and create a moebius strip with a twist. The strip is a symbol of infinity/time and so of God and the rock cycle indicates a perpetual cycle. The words ‘One God’ could also be written on the moebius strip.</p> <p>What questions can be asked having completed the activity/discussion? – post it notes/verbal</p>
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Section B

Rocks and Fossils	Science: Rocks and Fossils RE: God	Science: Vocabulary: Fossils, rock cycle, change, time RE: God as eternal /infinity/time/circle/change	<p>Question: How important is time in the Genesis account? This activity is based upon an analogy.</p> <p>Activity 1: Ask the children to make up a story about how the world began, then ask them to identify the main point of their story.</p> <p>Activity 2: Using childrens’ creativity with the Genesis account: 7 groups are given a day of creation and make sounds for that day. One group takes on the ‘chorus’ of ‘it was evening and it was morning.’ After they have prepared their ‘day’, the words are read aloud sequentially.</p> <p>Question: What is the story saying about who made the world? Who starts it off? How important are the 7 days? (The teacher may use the term ‘Myth’ if the children are familiar with it.) The teacher draws out of the children that the creation story is about ‘One God’ (monotheism)</p> <p>Story: Remind the children of the story ‘The very hungry caterpillar’ What is most important in this story? (<i>Eating more and more to become a butterfly</i>). How important are the numbers in the story? How important are the days? Could he eat every other day? Could he eat different foods? Would that change the point of the story? What is most important in the story? (<i>The teacher draws out the transformation to a butterfly after eating</i>)</p> <p>Genesis creation account: what is most important? (God as the one who began/created the world.) God as the ‘starter’ (initiator – first mover). Do the number of days matter? Does the</p>
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			<p>order matter? Reinforce ONE God. In groups, children make a line of dominoes standing up – push one over and they all follow – they could record it on i-pads. <i>(Teacher could introduce the term ‘the first mover’)</i></p> <p>What questions can be asked having completed the activity/discussion? – post it notes/verbal</p> <p>Reflect together: How important is time in the Genesis account?</p>
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B. Searching for Truth

This process offers a way through the planned learning to introduce the concept of truth.

Subject	1.What are the concepts in Science and RE?	2.What is the common vocabulary? (Science and RE (Christianity)) Highlighted words indicate common vocabulary	3.Activity/questions for discussion to help understand the child’s place in the world
<p>Evolution</p> <p>Genesis</p>	<p>Creation,</p> <p>Truth</p>	<p>Science: Change, Evolution, Truth</p> <p>RE: Creation, Evolution, Truth</p>	<p>Overarching question: How can a Christian know the Genesis story of creation and also agree with evolution?</p> <p>Question: What is truth? Based upon analogy</p> <p>Possible process: Which of these are true? Voting system of true/false. Are they always true? What are your reasons?</p> <ol style="list-style-type: none"> 1. 2+2=4 2. There is life on other planets 3. A brick will always fall downwards if dropped from a great height 4. Your favourite colour is red 5. There will be another day tomorrow

			<p>6. Arsenal is the best football team 7. J K Rowling is a brilliant writer 8. Unicorns exist 9. When people die they go to another life 10. God exists</p> <p>How do you find truth? Sometimes we only understand/see part of the truth – a partial truth. What is this poem saying about truth?</p> <p>A poem: The 6 men of Hindustan It was six men of Hindustan To learning much inclined, Who went to see the Elephant (Though all of them were blind) That each by observation Might satisfy the mind.</p> <p>The First approached the Elephant And happening to fall Against his broad and sturdy side At once began to bawl: “Bless me, it seems the Elephant Is very like a wall.”</p> <p>The Second, feeling of his tusk, Cried, “Ho! What have we here So very round and smooth and sharp? To me 'tis mighty clear This wonder of an Elephant Is very like a spear.”</p> <p>The Third approached the animal, And happening to take The squirming trunk within his hands, Then boldly up and spake:</p>
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			<p>“I see,” quoth he, “the Elephant Is very like a snake.”</p> <p>The Fourth reached out an eager hand, And felt about the knee. “What most this wondrous beast is like Is mighty plain,” quoth he; “’Tis clear enough the Elephant Is very like a tree!”</p> <p>The Fifth, who chanced to touch the ear, Said: “E’en the blindest man Can tell what this resembles most; Deny the fact who can, This marvel of an Elephant Is very like a fan!”</p> <p>The Sixth no sooner had begun About the beast to grope, Than, seizing on the swinging tail That fell within his scope, “I see,” quoth he, “the Elephant Is very like a rope!”</p> <p>And so these men of Hindustan Disputed loud and long, Each in his own opinion Exceeding stiff and strong, Though each was partly in the right And all were in the wrong.</p> <p>Now we are Six — Do you think this poem is true? Why? Why not?</p> <p>When I was one I had just begun When I was two</p>
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			<p>I was nearly new When I was three I was hardly me When I was four I was not much more. When I was five I was just alive But now I am six I'm as clever as clever, So I think I'll be six for ever and ever AA Milne</p> <p>Discussion: What is truth? Genesis account of creation: Searching for truth: Poetry - what truth is there in the story of creation? Why was it written? For Christians/Jews, the Genesis account (poetry) demonstrates that ONE God created the world (monotheism). Evolution: What truth is there in evolution? (Teacher note: It is the currently agreed understanding that human beings evolved over time) Question: How can a Christian know the Genesis story of creation and also agree with evolution? Activity/demonstration through 'role play' The Leader invites two people to stand up in front – one holds sign saying 'EVOLUTION' and says, 'I know about evolution and how we became human.' The other holds a sign saying GENESIS and says, 'I know the story of creation in Genesis.' Can they both be said honestly by a Christian? How? Activity: The children draw on strips of paper - two twists of DNA and join the twists together with lines, leaving space to write on the strands. Children write some of the timeline of evolution on one strip and 'monotheism' on the other.</p>  <p>4.What questions can be asked having completed the activity/discussion? Post-it notes/verbal</p>
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Appendix 1

The plans below are a result of an award from Scientists in Congregations to Chester Cathedral. Jen Stratford (Education Officer) and Jane Brooke (Vice Dean) worked on how to take the workshop into schools where Science and Faith were introduced through mixed lenses: 'Amazing Light' and 'Mysterious Materials'.

Amazing Light

Aim:

- To offer a workshop on Amazing Light which links Science and Faith in Primary schools using the theme of light in Physics and light as a metaphor in the Bible: Jesus is the Light of the World

Objective:

Investigate how objects are seen.

Children will:

- recall what a light source is and what the main source of light is in the world.
- think about how they see objects and what is required for them to see.
- investigate how light travels through surfaces and objects and how light is reflected.
- hypothesise and then carry out the experiment to see whether their hypothesis was correct.
- be able to recall the difference between reflection and refraction after making observations using acrylic blocks.

Awe and Wonder

Children will investigate how colour changes how we see.

Children will:

- investigate how the image that we see can be altered depending on the filter it passes through or reflects from.
- use colour filters to see how an image changes depending on the colour of the filter, the combination of the coloured filters and the number of coloured filters.
- investigate the number of colours that can be seen with visible light and a prism looking through a prism can we split the white light.

- Use LED torches to investigate the effect of putting the different colours together to show secondary colours and how they combine to make white light.

Jesus the light of the world

New ways of looking.


Light travels in straight lines children will investigate how seeing round corners is possible.

- Children will use mirrors to see round corners
- They will recall how mirrors are used to see round corners in real examples.
- They will show how this can happen by constructing a periscope.
- Children will investigate a light pipe and draw conclusions as to how it works

Creation of a pyramid poem about Jesus is the light of the world.

Churches have used light and colour over centuries to help people worship both as a means of reflection or telling the story.

- Children in Y5 and above will think about what the use of a metaphor in “Jesus is the Light of the World”
- The Number 7 was an important number in the Bible: How many colours are in the spectrum?
- Using a template headed ‘Jesus is...’ they recall the scientific words of light and write them on their template to describe Jesus as the light of the world. Children then share what they have written and can add to their list.
- They create a black and white cartoon on their template using the scientific words of light to create their pyramid poem using a pencil. They transfer their design onto the acetate using fine sharpie pens.
- The windows are then be displayed on a window in their classroom.

Mysterious Materials	Year 5/6
<p>Aim - To compare three types of materials on the basis of three properties hardness, flexibility and porosity then for each property make a decision as to whether God can be described by that property (characteristic).</p> <p>Success criteria. To be able to describe a material's properties. To be able to sort and compare materials according to their properties. To be able to describe God or the nature of God in terms of each property or characteristic.</p> <p>Key Words - Hardness, Flexibility, Porosity. God</p>	 <p>CHESTER CATHEDRAL EDUCATION</p>
<p>Settler task – children investigate three different metal shapes looking for similarities and differences. Resources:-Three metal shapes, one at a time, drink shaker, a slinky and a metal flow ring kinetic toy.</p>	
<p>Hardness</p> <ul style="list-style-type: none"> - Share key ideas on how to test a material for its hardness. <p>Practical</p> <ul style="list-style-type: none"> - Children discuss with partner what they might do using previous knowledge. - Children then separate the materials into groups and decide what the groups are. - Children then test different materials for their hardness <p>Children wear safety glasses through the test. Children test each material in turn pressing with their finger, with their fingernail and scratching with a metal nail. Observations are made and recorded.</p> <p>God and Hardness</p> <ul style="list-style-type: none"> - Introduce the idea - Is God Hard? - Share possible ways of looking at the question - Children then share their ideas with each other and then the group. <p>Flexibility</p> <ul style="list-style-type: none"> - Share key ideas on how to test a material for flexibility <p>Practical</p> <ul style="list-style-type: none"> - Children discuss with partner what they might do using previous knowledge. - Children then separate the materials into groups as previous. - Children then test different materials for their flexibility <p>Children wear safety glasses through the test.</p>	<p>Resources required Lab coats, iPads</p> <p>Hardness A box of materials for each pair containing a piece of metal, thin wood thick wood and different fabrics, a pair of safety glasses for each child, a tray to test on and a metal nail. Laminated results sheet and white board pen and cloth to clean.</p> <p>Flexibility Tray white board pen and safety glasses as above. Fresh box of materials with metal disc and metal wire and thin and thick wood and cork, three types of fabric. Laminated sheet for results</p>

<p>Children test each material in turn by gently bending each material. Observations are made and recorded.</p> <p>God and Flexibility</p> <ul style="list-style-type: none"> - Introduce the idea - Is God flexible? - Share possible ways of looking at the question - Children then share their ideas with each other and then the group. <p>Porosity</p> <ul style="list-style-type: none"> - Share key ideas on how to test a substance for porosity <p>Practical</p> <ul style="list-style-type: none"> - Children discuss with partner what they might do using previous knowledge. - Children then separate the materials into groups as previous. - Children then test different materials for their porosity <p>Children test each material in turn by blowing into each material to see if air passes through. Each material is then placed onto of the beaker in turn and 3 drops of water are deposited on top. Observations made and recorded. .</p> <p>God and porosity</p> <ul style="list-style-type: none"> - Introduce the idea - Is God porous? - Share possible ways of looking at the question - Children then share their ideas with each other and then the group. 	<p>Porosity</p> <p>Tray and white board pen as above.</p> <p>Fresh box of materials all large sheets the same size. A plastic beaker, plastic dropping pipette, small bottle of water. Laminated sheet for results.</p>
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<p>Is God?</p> <ul style="list-style-type: none"> - Children decide whether they think God is Hard? - They write God is Hard on their dowel if they agree. - Children decide whether they think God is Flexible? - They write God is Flexible on their dowel if they agree. - Children decide whether they think God is Porous? - They write God is Porous on their dowel if they agree. <p>Music</p> <ul style="list-style-type: none"> - Children then transform their dowel into a simple musical instrument using pipe cleaners and bells taking care with the sharp metal ends. - The dowel is then decorated with sharpie pens. - Sounds 	<p>Resources</p> <p>Small dowels 15cm length x 1.5cm diameter With 4 holes drilled through in the top section 4 pipe cleaners, 8 bells, sharpie pens, clean tray for each child.</p>
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<ul style="list-style-type: none"> - Experimentation with how the instrument sounds is carried out for hardness, flexibility and porosity to show God is Hard, Flexible and Porous. - Time to develop a simple tune. 	
<p>Chester Cathedral, hard, flexible, porous and music.</p> <ul style="list-style-type: none"> - Children are encouraged to think about what in the Cathedral produces music that is made of metal, wood and fabric and uses the properties of hardness, flexibility and porosity. 	<p>Pictures on the presentation to help</p>
<p><u>Support:</u> children are provided with a presentation on an iPad (per group) with all the steps outlined and a laminated table for each property to record their findings. Each pair to complete at least one of each type of material</p> <p><u>Extend:</u> Children are able to test a wider selection of the materials</p>	
<p>Science and Faith Chester Cathedral 2023</p>	

Note: Originally, I considered the image of a ‘a bridge between the two disciplines’, rather than an image of lenses, but I was influenced by a lecture on ‘Science and the future of critical religious thinking’ by Arthur Peacocke where he states concerning a bridge, ‘that picture represents only the Christian medieval enterprise of relating natural philosophy to a revealed theology’ (p3)

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