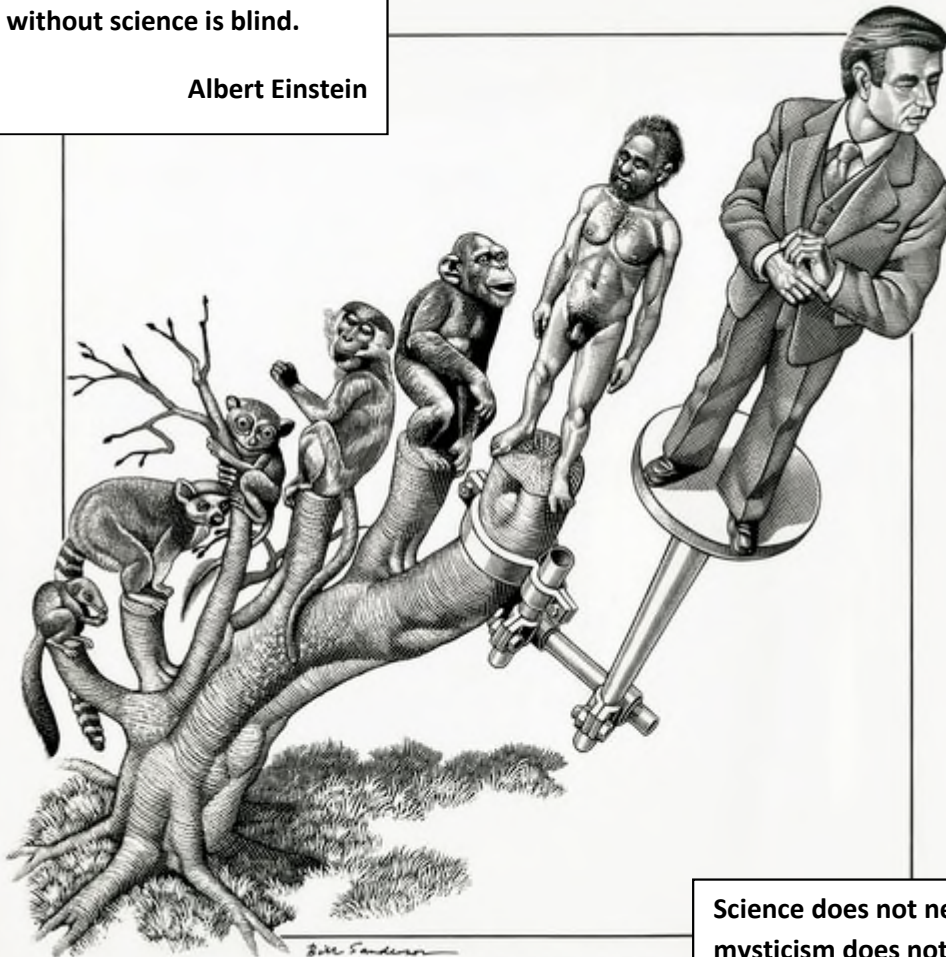


What are the origins of life?

Science without religion is lame;
religion without science is blind.

Albert Einstein



Science does not need mysticism and
mysticism does not need science, but
man needs both.

Fritjof Capra: The Tao of Physics

In this unit we will explore some answers from those who have reflected and studied in detail...

- Role of a creator.
- Distinction between literal and metaphorical interpretations of creation stories.
- The Big Bang and evolution.
- Perspectives on the compatibility between reason and faith.

Contents

Pages 2 – 4: Where did ‘it’ all come from?

Pages 5 – 9: Big Bang Theory.

Page 10: The only plausible Theory?

Where did ‘it’ all come from?

Pages 11- : Religious answers... Buddhism and other beliefs.

Pages 12 – 14: Christianity – The Creation Stories.

Pages 15 – 22: Christian interpretations and understanding of Origins.

Pages 23 – 27: Designed or Chance?

Pages 27 – 31: Scientific Knowledge.

Pages 31 – 33: Revelation & Cosmology.

Pages 33 – 35: The limits of Science and religion.

Pages 36 – 38: The Teleological Argument and responses.

Pages 38 – 47: The origins of LIFE – Scientific and Christian views/responses.

Pages 48 – 50: Appendix 1 – SQA Standards

Where did 'it' all come from?



Life, the universe, everything...

This question has been taxing the most brilliant minds for centuries. Ever since we (humanity), has had the opportunity and ability to think we have been struck by the complexity and beauty of nature and what we see around us. Rudolf Otto (a German theologian) gave this feeling a phrase the 'Numinous' describes where people are struck with a sense of mystery and awe when people, for example, gaze at the stars or consider the vastness of the universe. This experience could also occur when people are overcome with a sense of beauty and wonder of nature and may also occur when someone is struck by their own sense of helplessness in a tragic situation. Otto stated that it was:

SOURCE: 'The feeling of 'something uncanny', 'eerie', or 'weird'. It is the feeling which in the mind of primeval man, forms the starting point for the entire religious development in history.'

These thoughts for many people are the basis for humankind's belief in God: that there is something beyond the physical senses leading people to search for meaning and purpose in their lives. These questions essentially are asking questions about 'why' and religions including Christianity have sought to answer the 'why' questions, they are known as 'ultimate questions' and they seek to answer the existential questions of life e.g. 'why are we here?'

This distinction is crucial to our understanding of the physical world. The question you or I ask will depend on the response we get.

EXAMPLE:

How do you make a cup of tea?

Why do you make a cup of tea?



We get DIFFERENT answers when we ask different questions – we can think of questions like tools that we use to accomplish a task. When we use the HOW question we want to find out specific information and we realise that there is usually a right way and a wrong way. We might disagree on the METHOD of making a cup of tea to our taste but essentially we need boiling water (usually about 100 degrees C – be careful if you are making a cup of tea at high altitude as it will not taste the

same...). This water needs to be poured onto tealeaves/teabag. You can then add milk, lemon, sugar, etc. to your own taste. Job done!

If we then ask WHY did you make a cup of tea you will get a number of different answers – ALL of which can be correct because the WHY question is looking for MEANING and PURPOSE.



Different questions for different answers.

Back to the original question...

Where did 'it' all come from? Simply put if you ask 'How... did it get here?' Then you'd expect to get answers that address this.

If you ask 'Why... is it here?' then you'd expect to get others...

SOURCE: "We had the sky up there, all speckled with stars, and we used to lay on our backs and look up at them, and discuss about whether they was made or only just happened."

Mark Twain: The Adventures of Huckleberry Finn.

Was it made or did it just happen? You may, or may not actually care... However, when it comes to your assessments and exam you will care deeply!

Activities & Tasks:

- 1) In your own words explain why we get different answers depending on the questions we ask.
- 2) Have you ever had a sense of something 'other' which as caused you to question the meaning and purpose of life – give a brief description of this... OR Why do you think people look for meaning and purpose in life... is this a futile exercise?
- 3) Made... Happened...? What do you think? Ask those around you to give you their opinion and the reasons why they think this.
- 4) Does it ultimately matter what answers people give to the question 'Was it made or did it just happen?' – Give reasons why...



So... let's explore!



SOURCE: "And so, from nothing our universe begins..."

In a single blinding pulse, a moment of glory much too swift and expansive for any form of words, the singularity assumes heavenly dimensions, space beyond conception. The first lively second (a second that many cosmologists will devote careers to shaving into ever-finer wafers) produces gravity and the other forces that govern physics. In less than a minute the universe is a million billion miles across and growing fast. There is a lot of heat now, 10 billion degrees of it, enough to begin the nuclear reactions that create the lighter elements – principally hydrogen and helium, with a dash (about one atom in a hundred million) of lithium. In three minutes, 98 per cent of all the matter there is or will ever be has been produced. We have a universe. It is a place of the most wondrous and gratifying possibility, and beautiful, too. And it was all done in about the time it takes to make a sandwich."

Bill Bryson ~ A Short History of Nearly Everything.

The Big Bang theory – a scientific answer.

Big Bang Theory.¹

The Big Bang theory is an effort to explain what happened at the very beginning of our universe. Discoveries in astronomy and physics have shown beyond a reasonable doubt that our universe did in fact have a beginning. Prior to that moment there was nothing; during and after that moment there was something: our universe. The big bang theory is an effort to explain what happened during and after that moment.

According to the standard theory, our universe sprang into existence as "singularity" around 13.7 billion years ago. What is a "singularity" and where does it come from? Well, to be honest, we don't know for sure.

Singularities are zones, which defy our current understanding of physics. They are *thought* to exist at the core of "black holes." Black holes are areas of intense gravitational pressure. The pressure is thought to be so intense that finite matter is actually squished into infinite density (a mathematical concept which truly boggles the mind). These zones of infinite density are called "singularities." Our universe is thought to have begun as an infinitesimally small, infinitely hot, infinitely dense, something - a singularity. Where did it come from? We don't know. Why did it appear? We don't know.

After its initial appearance, it apparently inflated (the "Big Bang"), expanded and cooled, going from very, very small and very, very hot, to the size and temperature of our current universe. It continues to expand and cool to this day and we are inside of it. We are in fact made of stardust: incredible creatures living on a unique planet, circling a beautiful star clustered together with several hundred billion other stars in a galaxy soaring through the cosmos, all of which is inside of an expanding universe that began as an infinitesimal singularity which appeared out of nowhere for reasons unknown. This is the Big Bang theory.



¹ British astronomer Sir Fred Hoyle, who is accredited with first coining the term "the Big Bang" during a BBC radio broadcast in 1950 – poking fun at the new theory.

Our own planet came into existence about 4.6 billion years ago when a bright star in our galaxy ran out of fuel and went Supernova – it exploded! The dust and debris was pulled into the gravity of meteorites and the planets of our current solar system were created. These were then drawn into the gravitational pull of our sun – a star in its own right.

Big Bang Theory - Common Misconceptions

People tend to imagine a giant explosion. Experts however say that there was no explosion; there was (and continues to be) an expansion. Rather than imagining a balloon popping and releasing its contents, imagine a balloon expanding: an infinitesimally small balloon expanding to the size of our current universe.

Three British astrophysicists, Steven Hawking, George Ellis, and Roger Penrose turned their attention to the Theory of Relativity and its implications regarding our notions of time. In 1968 and 1970, they published papers in which they extended Einstein's Theory of General Relativity to include measurements of time and space. According to their calculations, time and space had a finite beginning that corresponded to the origin of matter and energy.

The singularity didn't appear in space; rather, space began inside of the singularity. Prior to the singularity, nothing existed, not space, time, matter, or energy - nothing. So where and in what did the singularity appear if not in space? We don't know. We don't know where it came from, why it's here, or even where it is. All we really know is that we are inside of it and at one time it didn't exist and neither did we.

What are the major evidences which support the Big Bang theory?

First of all, we are reasonably certain that the universe had a beginning.

Second, galaxies appear to be moving away from us at speeds proportional to their distance. This is called "Hubble's Law," named after Edwin Hubble (1889-1953) who discovered this phenomenon in 1929. This observation supports the expansion of the universe and suggests that the universe was once compacted.

Third, if the universe was initially very, very hot as the Big Bang suggests, we should be able to find some remnant of this heat. In 1965, Radio astronomers Penzias and Wilson discovered a 2.725 degree Kelvin (-454.765 degree Fahrenheit, -270.425 degree Celsius) Cosmic Microwave Background radiation (CMB) that pervades the observable universe. This is thought to be the remnant, which scientists were looking for. Penzias and Wilson shared in the 1978 Nobel Prize for Physics for their discovery.

Finally, the abundance of the "light elements" Hydrogen and Helium found in the observable universe are thought to support the Big Bang model of origins.



Activities & Tasks:

- 1) Using the information given and any other resources (www) produce your own timeline of events for the Big Bang Theory. Create this as a flowchart or diagram...
- 2) In your own words briefly describe the Big Bang theory and what it seeks to explain.
- 3) List and explain the EVIDENCE of the Big Bang.
- 4) What are the common misconceptions of the Big Bang Theory (BBT).

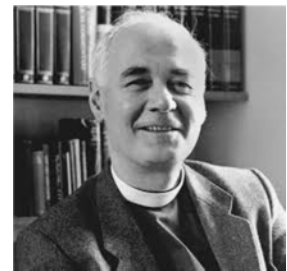


Examining the evidence:

SOURCE: “The universe we observe today originated, some 13.7 billion years ago, in the singular state of extreme density and temperature that colloquially we call the ‘big bang’. The very early universe was structurally very simple, being an almost uniform expanding ball of matter/energy. One of the reasons why cosmologists can talk with a fair degree of confidence about that early epoch is that things then were uncomplicated and they are therefore easy to model. After almost fourteen billion years of evolving process, the universe has become very complex, with the human brain (with its 10^{11} neurons and their more than 10^{14} connections) the most complicated system that science has encountered in its exploration of the world.

Evolutionary processes involve an interplay between two aspects of the natural world that, in a slogan way, can be labelled as ‘chance and necessity’. Only a very small proportion of what is theoretically possible has actually happened and ‘chance’ stands for the contingent detail of actual events. For example, in the very early universe there were slight fluctuations in the distribution of matter... The actual details of this cosmic structure were matters of chance, but the process also involved lawful ‘necessity’ in the form of the action of gravity. Slightly more matter ‘here’ implied slightly stronger gravitational attraction towards ‘here’, initiating a snowballing process by which the galaxies condensed.”²

Sir John Polkinghorne is a British particle physicist who, after 25 years of research and discovery in academia, resigned his post to become an Anglican priest and theologian. Since then he has written more than 20 books exploring the relationship of science and theology. As a physicist, he participated in the research that led to the discovery of the quark, the smallest known particle.



SOURCE: Georges Lemaître, (1894-1966), Belgian cosmologist, Catholic priest, and father of the Big Bang theory.

In 1927 proposed the idea of an expanding universe. Lemaître looked at the problem of cosmology from a physical point of view, and realised that his solution predicted the expansion of the real universe of galaxies that observations were only then beginning to suggest. Other cosmologists including Einstein had concluded that the static (non-evolving) models of the universe they had worked on for many years were unsatisfactory.

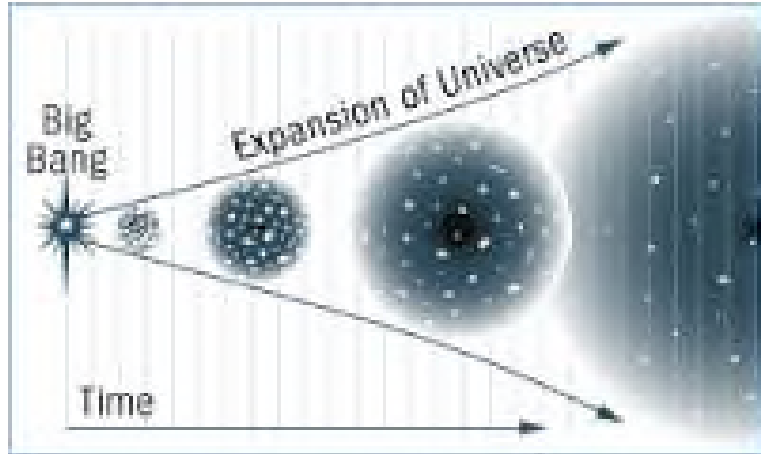
In the 1930's attention was drawn to Lemaître's 1927 paper and together with Hubble's observations using the world's largest telescope at Mt. Wilson in California, had shown that the distant galaxies all appeared to be receding from us at speeds proportional to their distances. Lemaître's paper convinced the majority of astronomers that the universe was indeed expanding, and this revolutionized the study of cosmology.

A year later, Lemaître proposed that it must have originated at a finite point in time. If the universe is expanding, he reasoned, it was smaller in the past, and extrapolation back in time should lead to an time when all the matter in the universe was packed together in an extremely dense state. Appealing to the new quantum theory of matter, Lemaître argued that the physical universe was initially a single particle—the “primeval atom” as he called it—which disintegrated in an explosion, giving rise to space and time and the expansion of the universe that continues to this day. This idea marked the birth of what we now know as Big Bang cosmology.

² https://www.faraday.st-edmunds.cam.ac.uk/resources/Faraday%20Papers/Faraday%20Paper%204%20Polkinghorne_EN.pdf



Georges Lemaître, Father of the Big Bang



Our universe sprang into existence as "singularity" around 13.7 billion years ago. There was no time before the Big Bang – space, time and matter came into existence at the same time... there was no **'before'** the Big Bang... In the words of one writer it was 'A day without yesterday...' (John Farrell)

SOURCE: In 1929, Edwin Hubble announced that almost all galaxies appeared to be moving away from us.

In fact, he found that the universe was expanding - with all of the galaxies moving away from each other. This phenomenon was observed as a redshift of a galaxy's spectrum. Red shift can easily be explained by equating sound waves with light, which more or less, follow the same rules. We all know that the pitch of sound changes with the distance to the listener - The Doppler effect. As the sound travels away from the listener, the deeper the sound...and the reverse is true when the sound approaches the listener. Light behaves similar. **As light approaches us**, its signature colour is in the blue spectrum, and **as it travels away** from the observer...it shows more red, as the light waves are of a longer wavelength. If objects in space are **static** there is no change in the wavelength of light.

E.g. At sunrise or sunset, the sun looks red. High above at zenith, it appears white. It's because the light waves coming from the horizon are farther away and are "Longer", causing the red shift in colour. While overhead, the sunlight travels

to our eyes in a shorter distance, and therefore more toward the blue spectrum...or white. A person 1000 miles away might see the same sun lower in the sky and see it orange. It's all in relation to where one is to the source.

Matter thrown off in the first moments of the event are father and moving away from us, causing them to seem reddish to us, and the opposite to objects approaching us, more bluish.³



Edwin Hubble.

³ For more details and a graphic explaining this see - <http://deskarati.com/2012/11/08/the-history-of-redshift/>

SOURCE: What is the universe made of?

The ‘Standard Model’ explains how the basic building blocks of matter interact. This model helps scientists explain why everything in the universe has ‘mass’. The research conducted at the Large Hadron Collider at the research facility CERN allowed scientists to smash particles together and explore what the universe would have looked like in the first fractions of a second after the Big Bang. As the universe cooled particles and elements formed – the very building block or ingredients of the universe. Much of the work was theoretical and based on complicated maths and quantum physics. Scientists then sought evidence of their theories. Prof Peter Higgs and Francois Englert put forward the theory of the Higgs Field and the Higgs Boson particle in 1964. After many experiments and billions of dollars (>\$10 Billion) of research scientists began to see evidence of these theories – March 2013. When Prof Higgs heard about the discovery he said “it’s very nice to be right sometimes.”⁴



Peter Higgs Francois Englert

Activities & Tasks:

- 1) What TWO processes were at work when the universe came into existence – according to Polkinghorne?
- 2) Why can cosmologists be confident of their findings?
- 3) Why is gravity such an important factor in the formation of the universe?
- 4) Why do you think Polkinghorne’s comments are informative in developing our understanding of cosmology?
- 5) Are you surprised that a number of religious people are involved in cosmology? Why do you think that they are so interested in this branch of science?
- 6) Wilson and Penzias found another piece of evidence for the Big Bang theory – find out what it was and why it was significant.
- 7) Imagine you have been invited to the Primary school to explain to them the Big Bang Theory. Write a script of what you would say (in detail but plain and simple language). You may want to create a PowerPoint presentation or graphics/diagrams to help you...



⁴ Professor Brian Cox of the University of Manchester presents an educational walk, through the fundamentals of Particle Physics. See - <http://www.youtube.com/watch?v=HVxBdMxqVX0> AND... <http://www.youtube.com/watch?v=WGWIT8SqXLM>

Big Bang Theory - The Only Plausible Theory?

Is the standard Big Bang theory the only model consistent with these evidences? No, it's just the most popular one based on the evidence we have to date. However, not all scientists agree...



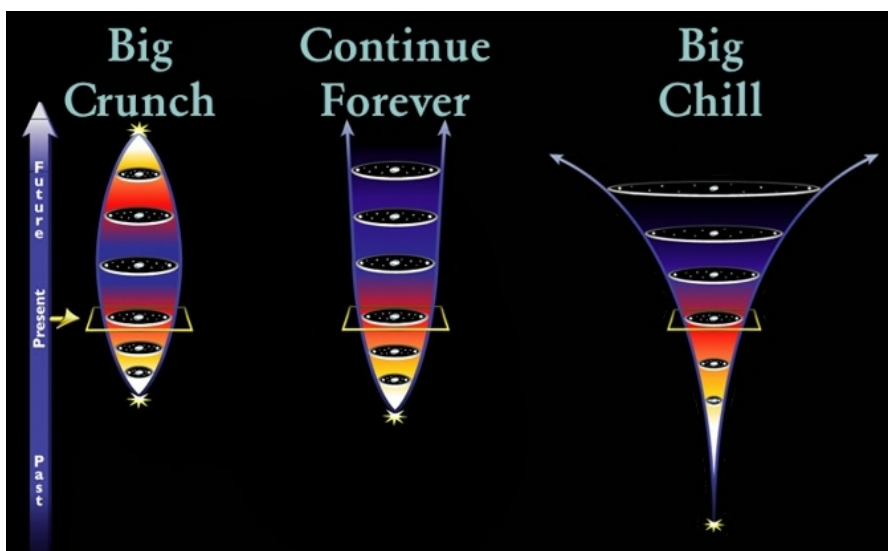
SOURCE: Internationally renowned Astrophysicist George F. R. Ellis explains: "People need to be aware that there are a range of models that could explain the observations....For instance, I can construct you a spherically symmetrical universe with Earth at its centre, and you cannot disprove it based on observations....You can only exclude it on philosophical grounds. In my view there is absolutely nothing wrong in that. What I want to bring into the open is the fact that we are using philosophical criteria in choosing our models. A lot of cosmology tries to hide that."

In 2003, Physicist Robert Gentry proposed an alternative to the standard theory - Gentry claims that the standard Big Bang model is founded upon a faulty paradigm (the expanding-space-time paradigm), which he claims, is inconsistent with the empirical data. He chooses instead to base his model on Einstein's static-space-time paradigm, which he claims is the "genuine cosmic Rosetta"⁵.

SOURCE: "As far as the future of the expanding universe is concerned Einstein's equations do not provide a unique answer. They allow for different solutions corresponding to different models of the universe. Some models predict the expansion will continue forever; according to others, it is slowing down and will eventually change into a contraction. These models describe an Oscillating universe, expanding for billions of years, then contracting to a small ball of matter, then expanding again, and so on without end. Fritjof Capra: The Tao of Physics."



Are we heading for a Big CRUNCH?!
Watch that space! Big Bang Theory could change or be rejected...



⁵ The Rosetta Stone is an ancient artefact and crucial to understanding how to read hieroglyphs.

Where did 'it' all come from? Religious answers...

Buddhism:

Questions regarding the origins of the world and such were not considered important by the Buddha and not made out to be a big deal as in other religions. In a famous story, a man called Malunkyaputta approached the Buddha and demanded that the Buddha explain the origin of the universe before he would become a disciple of the Buddha. Then the Buddha said that he would not go into a discussion of the origin of the Universe. To him, gaining knowledge about such matters was a waste of time because a man's immediate



problem was his own suffering and his task was to liberate himself from the present state of affairs. To illustrate this, the Buddha related the parable of a man who was shot by a poisoned arrow. This foolish man refused to have the arrow removed until he was told who shot the arrow, what he looks like, the kind of wood the arrow was made of and so on. The Buddha said that before the man could learn such information, he would be dead. Similarly, our immediate task is to be enlightened, not to speculate about the metaphysical (the big philosophical questions that have no firm answer (or from a Buddhist perspective the questions and answers serve no purpose in ending Dukkha)).

There are many creation stories from cultures around the world;

Celtic -

<http://www.educationscotland.gov.uk/passeportfrancophone/france/curriculum/rme/overview.asp?id=cfeflat\CfE\Religious and moral education>

Gabon creation -

<http://www.educationscotland.gov.uk/passeportfrancophone/gabon/curriculum/rme/overview.asp?id=cfeflat\CfE\Religious and moral education>

Madagascar -

<http://www.educationscotland.gov.uk/passeportfrancophone/madagascar/curriculum/rme/overview.asp?id=cfeflat\CfE\Religious and moral education>

Polynesian –

<http://www.educationscotland.gov.uk/passeportfrancophone/polynesia/curriculum/rme/overview.asp?id=cfeflat\CfE\Religious and moral education>

Egyptian -

<http://www.educationscotland.gov.uk/passeportfrancophone/egypt/curriculum/rme/overview.asp?id=cfeflat\CfE\Religious and moral education>

Christianity:

Others accept the Bible as the word of God exactly as it is without question and believe that the methods of Biblical criticism are an unworthy way to approach what God has revealed.

LITERAL CHRISTIANS... (They are also referred to as Creationists since they believe the Genesis accounts word for word).

Christians approach the Bible in differing ways. Some Christians, while accepting that the Bible is the word of God, will nevertheless explore the Bible using the methods of contemporary Biblical criticism to understand the precise nature of the writing they are dealing with. They are looking for meaning behind the text rather than take it at face value. It contains important truths but not necessarily a factual account of what happened.

PROGRESSIVE CHRISTIANS...

You **must** keep this in mind when reading what follows. The following text is taken from the Bible and relates to:

- 1) How the universe came into existence AND
- 2) How life developed/was created.

This SOURCE relates to both issues and you should refer to it often...

The story of creation: (the text is divided into CHAPTERS and the numbers in the text are the verses...)

SOURCE: Genesis 1

1 In the beginning God created the heavens and the earth.

2 Now the earth was formless and empty, darkness was over the surface of the deep, and the Spirit of God was hovering over the waters.

3 And God said, "Let there be light," and there was light. 4 God saw that the light was good, and He separated the light from the darkness. 5 God called the light "day," and the darkness he called "night." And there was evening, and there was morning—the first day.

6 And God said, "Let there be an expanse between the waters to separate water from water." 7 So God made the expanse and separated the water under the expanse from the water above it. And it was so. 8 God called the expanse "sky." And there was evening, and there was morning—the second day.

9 And God said, "Let the water under the sky be gathered to one place, and let dry ground appear." And it was so. 10 God called the dry ground "land," and the gathered waters he called "seas." And God saw that it was good.

11 Then God said, "Let the land produce vegetation: seed-bearing plants and trees on the land that bear fruit with seed in it, according to their various kinds." And it was so. 12 The land produced vegetation: plants bearing seed according to their kinds and trees bearing fruit with seed in it according to their kinds. And God saw that it was good. 13 And there was evening, and there was morning—the third day.

14 And God said, "Let there be lights in the expanse of the sky to separate the day from the night, and let them serve as signs to mark seasons and days and years, 15 and let them be lights in the expanse of the sky to give light on the earth." And it was so. 16 God made two great lights—the greater light to govern the day and the lesser light to govern the night. He also made the stars. 17 God set them in the expanse of the sky to give light on the earth, 18 to govern the day and the night, and to separate light from darkness. And God saw that it was good. 19 And there was evening, and there was morning—the fourth day.

20 And God said, "Let the water teem with living creatures, and let birds fly above the earth across the expanse of the sky." 21 So God created the great creatures of the sea and every living and moving thing with which the water teems, according to their kinds, and every winged bird according to its kind. And God saw that it was good. 22 God blessed them and said, "Be fruitful and increase in number and fill the water in the seas, and let the birds increase on the earth." 23 And there was evening, and there was morning—the fifth day.

24 And God said, "Let the land produce living creatures according to their kinds: livestock, creatures that move along the ground, and wild animals, each according to its kind." And it was so. 25 God made the wild animals according to their kinds, the livestock according to their kinds, and all the creatures that move along the ground according to their kinds. And God saw that it was good.

26 Then God said, "Let us make man in our image, in our likeness, and let them rule over the fish of the sea and the birds of the air, over the livestock, over all the earth, and over all the creatures that move along the ground."

27 So God created man in his own image,
in the image of God he created him;
male and female he created them.

28 God blessed them and said to them, "Be fruitful and increase in number; fill the earth and subdue it. Rule over the fish of the sea and the birds of the air and over every living creature that moves on the ground."

29 Then God said, "I give you every seed-bearing plant on the face of the whole earth and every tree that has fruit with seed in it. They will be yours for food. 30 And to all the beasts of the earth and all the birds of the air and all the creatures that move on the ground—everything that has the breath of life in it—I give every green plant for food." And it was so.

31 God saw all that he had made, and it was very good. And there was evening, and there was morning—the sixth day.

Genesis 2

1 Thus the heavens and the earth were completed in all their vast array.

2 By the seventh day God had finished the work he had been doing; so on the seventh day he rested from all his work. 3 And God blessed the seventh day and made it holy, because on it he rested from all the work of creating that he had done.

4 This is the account of the heavens and the earth when they were created.

When the LORD God made the earth and the heavens- 5 and no shrub of the field had yet appeared on the earth and no plant of the field had yet sprung up, for the LORD God had not sent rain on the earth and there was no man to work the ground, 6 but streams came up from the earth and watered the whole surface of the ground- 7 the LORD God formed the man from the dust of the ground and breathed into his nostrils the breath of life, and the man became a living being.

8 Now the LORD God had planted a garden in the east, in Eden; and there he put the man he had formed. 9 And the LORD God made all kinds of trees grow out of the ground—trees that were pleasing to the eye and good for food. In the middle of the garden were the tree of life and the tree of the knowledge of good and evil.

10 A river watering the garden flowed from Eden; from there it was separated into four headwaters.

11 The name of the first is the Pishon; it winds through the entire land of Havilah, where there is gold. 12 (The gold of that land is good; aromatic resin and onyx are also there.) 13 The name of the second river is the Gihon; it winds through the entire land of Cush. 14 The name of the third river is the Tigris; it runs along the east side of Asshur. And the fourth river is the Euphrates.

15 The LORD God took the man and put him in the Garden of Eden to work it and take care of it. 16 And the LORD God commanded the man, "You are free to eat from any tree in the garden; 17 but you must not eat from the tree of the knowledge of good and evil, for when you eat of it you will surely die."

18 The LORD God said, "It is not good for the man to be alone. I will make a helper suitable for him."
 19 Now the LORD God had formed out of the ground all the beasts of the field and all the birds of the air. He brought them to the man to see what he would name them; and whatever the man called each living creature, that was its name. 20 So the man gave names to all the livestock, the birds of the air and all the beasts of the field.

But for Adam no suitable helper was found. 21 So the LORD God caused the man to fall into a deep sleep; and while he was sleeping, he took one of the man's ribs and closed up the place with flesh.

22 Then the LORD God made a woman from the rib he had taken out of the man, and he brought her to the man.

23 The man said,

"This is now bone of my bones
 and flesh of my flesh;
 she shall be called 'woman,'
 for she was taken out of man."

24 For this reason a man will leave his father and mother and be united to his wife, and they will become one flesh.

25 The man and his wife were both naked, and they felt no shame.

Activities & Tasks:

- 1) There are TWO stories of how the universe began and how life developed. Summarise the main similarities and differences in a table.



SIMILARITIES	DIFFERENCES

- 2) In your own words explain your response to these two stories – what is your *reasoned* opinion of them?
- 3) Why do you think there are TWO creation stories in Genesis and what are the implications of this for understanding the Bible?



Genesis – points to ponder.

Points to be aware of and remember in relation to the creation stories in Genesis.

The stories were written in an attempt to give some explanation as to where we and the universe came from.

Many people are amazed when they consider the complexity/beauty of the universe and the world in which we live (including the complexity of life itself).

People often ask 'Where did it come from?' – This is not a modern question it has been asked by people through the ages.

The Bible's reply is 'God did it.'

The phrase CREATIO EX NIHILO ("CREATION OUT OF NOTHING") is used in relation to this.

Genesis chapter 1 to chapter 2 verse 3:

- ⇒ Genesis' first account is based on a much older story called the Enuma Elish epic.⁶ It is a Mesopotamian/Babylonian document (written on stone).
- ⇒ It was humanity's best attempt at explaining the origins of the world and life, written by the best minds of the time – without the help of modern science or its methods or evidence.
- ⇒ It is the result of people talking/discussing various ideas that seemed acceptable at the time – a time where God or the gods were involved in the creation of the world and life. There was never question about their existence it was accepted they existed.
- ⇒ The original story is about 3,500 years old.
- ⇒ Genesis 1 is very ordered – from chaos and nothing... came order and something – this was done by God saying 'Let there be...'
- ⇒ There are SIX days of creation – on the seventh God rested.
- ⇒ The Hebrew word YOM can be translated day (24 hrs) or a non-determinate/unspecified period of time.

Genesis chapter 2 verse 4 to chapter 3:

- ⇒ There is a second story/account of creation.
- ⇒ The earth was created first and then man – before any plants, animals, etc.
- ⇒ There are no days of creation – simply statements of what God did.
- ⇒ Earth.
- ⇒ Man.
- ⇒ The 'Garden of Eden' (located somewhere near where the Tigris and Euphrates Rivers are today. Between modern day Iran and Iraq.). Plants and rivers were created...
- ⇒ Animals.
- ⇒ Woman – created as a helper for the man because there was no animal suitable for this task...
- ⇒ They did not get their names until chapter 3 which continues from chapter two... obvious but it is not related to chapter 1 which stands on its own...

⁶ See <http://www.sacred-texts.com/ane/enuma.htm>

Genesis 1	Genesis 2
<p>a. This is the religious establishment's official authorized description of creation.</p> <p>b. This description was first written about 500 BCE, in or around the time the Jews returned to Jerusalem from exile in Babylon.</p> <p>c. The pre-creation situation is watery chaos because Babylon sat between the Tigris and Euphrates.</p> <p>d. Order of creation is light, sky, sea, earth, vegetation, sun and moon and stars, birds, sea creatures, land animals, and lastly, humanity.</p> <p>e. Creation of humanity is single act.</p> <p>f. The Creator is called "God."</p> <p>g. The Creator is present only through the commands that cause the creative acts to occur.</p> <p>h. One important aspect of the concept of God presented in this description is bringing order out of chaos.</p>	<p>a. The story comes from the southern storyteller of this and other stories.</p> <p>b. It was first written about 1000 BCE (before the common era, same as BC)</p> <p>c. The pre-creation situation is dry desert because that's what you find in southern Israel.</p> <p>d. Creation of humanity precedes the creation of vegetation and animal life.</p> <p>e. Man and woman, Adam and Eve, are created in two separate acts.</p> <p>f. The Creator is called "the Lord God."</p> <p>g. Creation is a hands-on experience for the Lord God.</p> <p>h. One important aspect of the concept of the Lord God presented in this story is fertility.</p>

Literalist view

The first five books of the Hebrew Scriptures were written by Moses. About 4004 BCE to 10,000 BCE, God created the heavens and the earth, including the land and sea, plants and animals, mountains, rivers, sun, moon stars, etc. All species of plants and animals were created in the beginning; dinosaurs and humans coexisted together on earth. In the Garden of Eden God created the first person, Adam, out of mud. From Adam's rib, he formed Eve, with the intent that both would live forever and remain in an intimate relationship with God. When Adam and Eve disobeyed God by eating the forbidden fruit, death, decay and degeneration entered the world for the first time.⁷ Before that time, for example, animals did not kill each other for food. Death and decay did not happen. This is a very important belief, because if Adam and Eve did not "bring sin into the world" by disobeying God, then some Christians feel that there would be no need for a saviour, and Jesus' mission would not have been pointless. Since the Bible is without error, then the creation and early history of the world occurred exactly as the Bible states. All geological formations, astronomical observations and the fossil record must reflect these truths.

HEBREWS 11:3 By faith we understand that the universe was formed at God's command, so that what is seen was not made out of what was visible.

In **Mark 10:6**, for example, Jesus declared:

“But from the beginning of the creation, male and female made he them.”

⁷ See Romans 5:12 to 19, and I Corinthians 15:21 to 22

Creationist views about the origins of the universe.

- 🌐 Every word is true and infallible (no errors and comes directly from God).
- 🌐 The bible gives us FACTS about all things including origins of the universe and life.
- 🌐 The six days of creation are six 24 hour periods.
- 🌐 There is no 'real' evidence of the Big Bang – what 'evidence' there is is not 'proof' that it took place.
- 🌐 The world was made between 6,000 and 10,000 years ago.⁸
- 🌐 Human reason is so corrupted by 'sin' that there is no way that humans could determine the truth of our origins – it has to be revealed by God in the Bible.
- 🌐 If you do not take the Genesis story literally then you question the whole Bible's authority and accuracy. This would logically lead to the doubt or removal of the existence of God Himself...
- 🌐 If Genesis is not accurate then the idea of God creating humans in His image (Imago Dei) means that there is no difference between animal life and human life – humans are not special, we are just another animal.
- 🌐 There is no mention of the Big Bang in the Bible; therefore, since the Bible is without error it cannot be true.
- 🌐 Atheist scientists do not want to consider the concept of God since there is no tangible evidence for the existence of God in their minds.
- 🌐 Creationism should be given an equal standing in schools alongside the scientific views on the origins of the universe.
- 🌐 The Genesis story also gives an explanation of how things went wrong with humanity and how 'sin' entered the world – this is known as 'The Fall.' God made everything perfect but humans chose to ignore the simple rules God put in place and they rebelled against God – this sin still happens today because people reject God...



Archbishop James Ussher - (1581-1656) concluded that the first day of creation as Sunday 23 October 4004 BC...

SOURCE: (Nov 2009) 'What God recorded in Genesis is absolutely perfect! But it is not all that God wants us to know about Him. Only the full collection of 66 inspired books is both perfect and complete. In spite of the new popularity of the so-called progressive or process creationism in evangelical circles today, there is no 67th book of divinely-inspired revelation, namely, modern science, to tell us how God really created the world! Such thinking threatens the entire Word of God, not simply Genesis 1-11. With so-called "modern science" as our final guide, no supernatural works of God, including the resurrection of Christ, will survive (see 1 Cor. 2:4-16)'.

Comment: This quote is taken from a lecture given by Prof. John D Whitcomb to celebrate the 25th anniversary of the founding of the Institute for Creation Research – they support the 6 literal day view presented in Genesis chapter 1 as the way in which the world/universe was created.

For Creationists therefore, the world cannot be the result of a random explosion known as the Big Bang. On the basis of the Bible, they will argue that God created the world in six days, but that these 'days' are actually a longer period of time than 24 hours. The world itself is too complex to be anything other than the result of a prime mover who has instilled his creative purpose in the whole of creation. Take, for example, the properties of water. The amount of water on the earth's surface,

⁸ Archbishop James Ussher - (1581-1656), was highly regarded in his day as a churchman and as a scholar. Of his many works, his chronology of the earth has proved the most durable. Based on an intricate relationship of Middle Eastern and Mediterranean histories and the Bible, he concluded that the first day of creation as Sunday 23 October 4004 BC...

estimated to be enough to form a layer over a mile deep spread evenly over the earth's surface, tends to prevent sudden increases and decreases in temperature, as for example between day and night. A rock, for instance, is very hot during the day and very cold during the night. The change in temperature of water, by comparison, is insignificant. The presence of large quantities of water in the great lakes and the oceans is responsible for the fact that that coastal cities are not as warm in the summer or as cold in the winter as inland areas: they have natural air conditioning. The Creationist Christian would argue that this is no accident but is the design of a creator God.

Accepting the Big Bang Theory would mean denying that God is the creator and preserver of the universe. Relying solely on science to provide us with accurate knowledge of how the world came to be is insufficient because it depends purely on observation and is prone to missing the bigger picture.

Why do they think this? Well, they see the problem arising with Isaac Newton who laid the foundation for understanding the world as a machine and God as a watchmaker who winds up the world up and lets it go on its own way. On this basis there was no longer any need to admit of divine intervention in sustaining the world and that any divine intervention would take place through cause-and-effect relationships. With God reduced to this level of intervention, all science has to do is provide the reason for these cause-and-effect relationships and God is gradually surplus to requirements. Humans can explain the source, meaning and purpose of the universe themselves! So, for these Christians, the Bible is the sole guide for what to believe concerning the creation of the world.

Progressive view

SOURCE: But, if we look at the story with the fresh eyes suggested by **Marcus Borg** that's not the way we'd see it. Rather than understanding the story as one about the sinfulness of disobeying God and seeking knowledge on our own, we'd see it as a story about the sacredness of existence, our place in it as the stewards of what's to be found, and the fact that we must, indeed, provide for ourselves in the world "east of Eden" – the real life world in which there is much beauty, but also much that is wrong.

The rest of the Bible is to a large extent the story of this state of affairs, the human predicament and its solution.

Why do Christians take such differing approaches to the story of creation? It all stems from the text of Genesis itself!

In day four, we see that at this point God puts lights in the sky to divide day from night, which are the sun, the moon and the stars. Now how can this happen on the fourth day if there have already been three days? Surely to have a 'day' you would need to have the sun and the moon from the beginning, to mark when the sun rises and a new day begins, and when the sun sets and the day ends? What is this thing that God puts in the sky to divide the waters above the earth from those below? Why is there water above the earth? On the sixth day God creates every type of living creature, so this must mean that evolution is nonsense since God has already created every creature that there could be! If this all happened at the beginning then nobody could have been there to witness it, so where did all these details come from?

These are very valid questions and they inevitably point us to the nature of the text that we are dealing with. Is it a text that must be taken literally or is it possible to understand the text in another way while at the same time preserving the truths that it communicates?

The great Mesopotamian account of creation is called the Enuma Elish and in this account the chaos at the beginning of creation is personified in a male god, Apsu, and a female god, Tiamat. These two are the source of all human beings, having first given life to gods who subsequently rebel against

their parents. In this conflict, Apsu is slain and Tiamat is revealed as the dragon of chaos. She gives birth to a host of demons who attack her offspring, who in turn seek protection from other gods. The god Marduk defends them, slays Tiamat and uses the carcass to form the universe. In this world the disc of the earth rests on the seas. Over this spans the sky with the stars, and above this is the place where the rain is contained. Above all this Marduk builds his heavenly palace. Man is created by mixing the blood of a slain god, an ally of Tiamat, with clay in order to carry on the worship of the gods. In this story chaos is the originator of all that is and is subsequently overcome by the creator god, Tiamat.

It is in response to this that the people of Israel formed their own account of creation, which corresponds to their belief in the one God who revealed himself to Abraham and who entered into a covenant with His people. In Genesis the sole creator is the one God, not chaos. God is in control of all things, and all that is comes to be by his command, not the fighting of demons and gods, nor the carcass of a dead god. Man is made in the image of God and is brought to life by the very breath of God, not by the blood of a slain god. Man is called to communion with God from the very beginning and not, as in Enuma Elish, to slavishly indulge gods. The God of Israel is the one God who alone is the sustainer of the universe and all that is.

For this reason, many Christians feel able to look at the Biblical account of creation and see it for what they believe it actually is: a symbolic account of God's creation, communicating very important truths about the purpose and meaning of creation. They do not believe that they have to accept this as a blow-by-blow account of what actually took place, but are rather more able to articulate their faith in God's creation of the universe with what science has to say about the emergence of the world we live in. This is not to deny what is revealed in the Bible about creation, but is rather a means of understanding the origins and context in which the writing of Genesis occurred so that it can speak to them in their own context. For these Christians then, science does not undermine faith but rather enhances faith so that it does not, in the end, matter if there was a 'Big Bang' that started the universe. These Christians believe that God could have created the Big Bang and that this is the manner in which He began the process of creation. The working out of that process leads them to see His presence in the world:

SOURCE: The question about the origins of the world and of man has been the object of many scientific studies which have splendidly enriched our knowledge of the age and dimension of the cosmos, the development of life forms and the appearance of man. These discoveries invite us to even greater admiration for the Creator, prompting us to give him thanks for all his works and for the understanding and wisdom he gives to scholars and researchers.
(The Catechism of the Catholic Church, no. 283)

SOURCE: Catholic Church no longer swears by truth of the Bible. By Ruth Gledhill, Religion Correspondent: Times newspaper (Nov 2010)
'THE hierarchy of the Roman Catholic Church has published a teaching document instructing the faithful that some parts of the Bible are not actually true. The Catholic bishops of England, Wales and Scotland are warning their five million worshippers, as well as any others drawn to the study of scripture, that they should not expect "total accuracy" from the Bible.
"We should not expect to find in Scripture full scientific accuracy or complete historical precision," they say in The Gift of Scripture'.
Comment: According to the RC church there are some things that are 'true' in the bible and others that are not. Catholic Bishops make a distinction between 'religious' matters (which are true) and 'secular' matters which we should not expect to be written with 'total accuracy' in the Bible.

Progressive Christian views about the origins of the universe.

- 📖 God communicates to people through the Bible.
- 📖 The Bible was written by people who expressed their own thoughts and ideas about God as they reflected on their experiences and how they saw the world.
- 📖 The six days in Genesis 1 are a poetic way of describing six time periods of indeterminate time.
- 📖 The evidence for the Big Bang theory is convincing and it suggests that the universe came into existence 13.7 Billion years ago and earth is roughly 4.6 Billion years old.
- 📖 Humans can use the reason when studying the world and draw their own conclusions from the evidence that they gather.
- 📖 If Genesis is read as a symbolic story and metaphorically this leaves the concept of God open since He/She is not rejected along with a non-scientific world view and that humans do have a special place because of attributes that many animals do not share – e.g. conscience.
- 📖 It is possible to believe in the Bible and in Big Bang Theory – see the Christians in Science website (www.cis.org.uk/)
- 📖 The more we learn about the universe and the development of life the more we can learn about God.

SOURCE: Sir Fred Hoyle an atheist who on discovering that ‘ground state energy levels were so ‘finely tuned’ that if the levels were 1% either way from what they actually are the life in the universe as a whole could not sustain life. The amount of carbon has to be ‘just right.’ He confessed that nothing had shaken his atheism as this single discovery...

“Would you not say to yourself, "Some super-calculating intellect must have designed the properties of the carbon atom, otherwise the chance of my finding such an atom through the blind forces of nature would be utterly minuscule. A common sense interpretation of the facts suggests that a super-intellect has monkeyed with physics, as well as with chemistry and biology, and that there are no blind forces worth speaking about in nature. The numbers one calculates from the facts seem to me so overwhelming as to put this conclusion almost beyond question.”

Activities & Tasks:

Creative task – Create two mindmaps on A3 paper:

One on Creationist views.

One on Progressive Christian views.

Summarise the main points of their views and use appropriate quotes and where possible include diagrams...

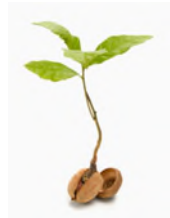


The Cosmological Argument:

For some people the reason they give for a Creator being is that something does not appear from nothing – the universe is a ‘thing’ therefore it is logical to suppose it came from somewhere. They cannot accept that there is something without a cause... since every ‘thing’ has a cause and since the universe is a ‘thing’ it must have a cause. Eight hundred years ago this was considered by a man who concluded that there must be a ‘First Cause’ – someone/something to start everything.

St Thomas Aquinas: he was 13th century theologian who came up with the ‘five proofs’ of the existence of God. The first 3 ‘proofs’ or ‘ways’ are the basis for the cosmological argument. It is an ‘a posteriori’ argument - the process of reasoning from effect to cause, based upon observation.

The **FIRST way:** Aquinas said that whatever is moved or changed must be moved or changed by another which was itself moved or changed. He said that we have to go back to something which itself was moved by no other, because infinite regression is impossible. [Infinite regress is the idea that the start of something stretches to infinity... However there **MUST** be a starting point somewhere]. Aquinas discovered that in the universe there are all sort of causes and effects, there is lots of movement and things change. Everything moves from ‘potentiality’ to ‘actuality’ – so everything has its potential, and then everything moves how it’s meant to eventually. E.g. a log has the potentiality to become a source of heat/fire or a chair – even the log has to come from somewhere, it moves from a seed to a plant, to a tree... Again, there must be someone / something to begin this process – the ‘un-moved mover’ or ‘un-changed changer’.



For Aquinas this was God.

The **SECOND way:** Every effect has a cause...Nothing can cause itself because it doesn’t exist before it is caused. Aquinas said that we cannot have infinite regression; therefore we need ‘an-un-caused causer’. This un-caused causer and First Cause has to be God.

The **THIRD way:** the argument from possibility and contingency. Contingency means something has a dependency for its existence because it need not have existed in the first place, or could have been different to what it actually is. When we look at things in the world we know that, even although they exist at this present moment, there was a time when they either did not exist or existed differently from the way in which they do now. E.g. a car in all its parts, and even the parts have parts... Everything in the world points beyond itself to something else. If all beings were contingent (dependant), then at some point there would have been nothing in existence since all things depend on something for their existence because at some time they did not exist. However, since there are things that do exist, there must be something that is not contingent (a necessary being) to be the cause for the things that are contingent (dependant). This is what people call God.

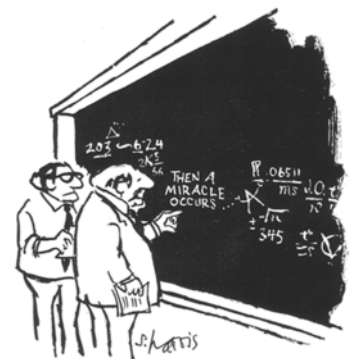


Third way simplified:

1. Some contingent beings exist.
2. Therefore, if these contingent beings exist, the necessary being which causes these to exist must exist.

Some problems with this argument:-

- You can’t prove that there is no infinite regression.
- Even if things do go back to a starting point which created everything, it doesn’t have to be in the form of the Christian idea of God.
- The world may have no cause.



"I THINK YOU SHOULD BE MORE EXPLICIT HERE IN STEP TWO."

- If we are saying that we can't infinitely regress because we can't accept infinity, there must be a starting point or a God. But then something must have created God. How can we accept that God is an infinite being if we have just rejected infinity?
- If numbers can go on and on forever then why can't regression do the same?
- This argument depends on your belief in God.
- Why does there have to be a point where nothing existed?
- Objects may come into existence and then perish, but the matter from which they are made is eternal and carries on necessarily. The world therefore could not not exist.
- There can't be/doesn't have to be a reason for everything.

Occam's razor...!



"Entities should not be multiplied unnecessarily." (14th century logician and Franciscan friar William of Ockham).

Basically 'Occam's razor' suggests that when there are two theories that propose something we should accept the most logical based on observable proof. This is because the simplest explanation is often the right one.

The criticisms of Aquinas' arguments rest on the removal of God from the argument. God as a being cannot be proved (too 'complicated') in many people's view. However for many people of faith God is the 'simplest' explanation and is applied by using 'Occam's razor' also.

Basic criticisms of Aquinas' arguments

1. Motion/Change – things change and move without proof they were 'set off' by God. E.g. planetary motion.
2. Just because there is a cause we do not have to call the cause 'God'.
3. Things are dependent on conditions but the conditions are what allow things to exist – there is no need to go any further and suggest that 'God' created the conditions. We exist because the universe exists – stop there, no need to go any further.

Activities & Tasks:

Describe the Cosmological Argument. (You could create your own poster(s) or complete this as a written task).



"There is no contradiction between the Cosmological Argument and scientific explanations for the origins of the universe."

How far do you agree?

To what extent is the Big Bang Theory compatible with the Cosmological Argument?

Designed or chance?

SOURCE: George Ellis (British astrophysicist): "Amazing fine tuning occurs in the laws that make this [complexity] possible. Realization of the complexity of what is accomplished makes it very difficult not to use the word 'miraculous' without taking a stand as to the ontological status of the word."

SOURCE: Paul Davies (British astrophysicist): "There is for me powerful evidence that there is something going on behind it all....It seems as though somebody has fine-tuned nature's numbers to make the Universe....The impression of design is overwhelming".

SOURCE: Robert Jastrow (self-proclaimed agnostic): "For the scientist who has lived by his faith in the power of reason, the story ends like a bad dream. He has scaled the mountains of ignorance; he is about to conquer the highest peak; as he pulls himself over the final rock, he is greeted by a band of theologians who have been sitting there for centuries."

SOURCE: Charles Darwin 'Another source of conviction in the existence of God...follows from the...impossibility of conceiving this immense and wonderful universe, including man with his capacity for looking far backwards and far into futurity, as the result of blind chance or necessity.'

These are just four of many voices who have wondered about the complexity and the fine-tuning of the universe. On current scientific thinking, the elements we are made of were cooked up in giant nuclear furnaces—stars—bigger than our sun. Because gravity is a weak force, these stars took thousands of millions of years to form and to make these elements. Then the stars exploded, scattering the atoms into space. (Objects near the edge of the universe are still moving away at nearly the speed of light today, so if that has been happening ever since the Big Bang, it's easy to see why the universe is now so enormous).

Some of the scattered atoms eventually became human flesh and bone— our bodies are the ashes of long-dead stars. So it seems that if the universe were not ancient and vast, the atoms of our bodies would not have been made, which rather stands the argument for insignificance on its head. It could be said that God went to an awful lot of trouble to create us!

The sense of human smallness was around long before modern astronomy. Psalm 8 in the Bible says, 'When I consider your heavens... the moon and the stars... what is man that you are mindful of him, the son of man that you care for him?' This psalm also shows why we are significant— we are important to God, who created us to enjoy a relationship with him – according to Christian teachings.

The Goldilocks' effect...

Furthermore, however the universe began, it appears to be 'fine-tuned' for our existence. If certain physical properties were minutely different, even by about one part in 10 to the power of 60, we would not be here. This is about the accuracy needed to hit a square-inch target the other side of the observable universe, about fourteen billion light years away!

The physical constants and laws of nature, like Baby Bear's bed and porridge, are 'just right' for us. This doesn't provide a knockdown argument for the existence of God, but it is fully consistent with a universe planned by God.

More than two dozen parameters for the universe must have values falling within narrowly defined ranges for life of any kind to exist. Thankfully you don't have to remember them all but they all have to be 'just right...' It might make you think as it did the person who created this. Dr Hugh Ross launched his career at age seven when he went to the library to find out why stars are hot.⁹



If you are not scientifically minded or aware of some of the terms the following list could be quite overwhelming. However as Higher RMPS students you have great ability and you can look things up... It's called research.

Activities & Tasks:

READ the following list/table and choose FOUR that you find amazing or convincing. Write them on a FOUR flash cards – you could include a picture of Goldilocks herself... (You never know your Teacher might prepare these for you if they're nice...)



⁹ <http://www.leaderu.com/science/ross-justright.html>

Evidence for the Fine-Tuning of the Universe

1. Strong nuclear force constant

- If larger: no hydrogen; nuclei essential for life would be unstable
- If smaller: no elements other than hydrogen

2. Weak nuclear force constant

- If larger: too much hydrogen converted to helium in big bang, hence too much heavy element material made by star burning; no expulsion of heavy elements from stars
- If smaller: too little helium produced from big bang, hence too little heavy element material made by star burning; no expulsion of heavy elements from stars

3. Gravitational force constant

- If larger: stars would be too hot and would burn up too quickly and too unevenly
- If smaller: stars would remain so cool that nuclear fusion would never ignite, hence no heavy element production

4. Electromagnetic force constant

- If larger: insufficient chemical bonding; elements more massive than boron would be too unstable for fission
- If smaller: insufficient chemical bonding

5. Ratio of electromagnetic force constant to gravitational force constant

- If larger: no stars less than 1.4 solar masses hence short stellar life spans and uneven stellar luminosities
- If smaller: no stars more than 0.8 solar masses, hence no heavy element production

6. Ratio of electron to proton mass

- If larger: insufficient chemical bonding

- If smaller: insufficient chemical bonding

7. Ratio of numbers of protons to electrons

- If larger: electromagnetism would dominate gravity, preventing galaxy, star, and planet formation
- If smaller: electromagnetism would dominate gravity, preventing galaxy, star, and planet formation

8. Expansion rate of the universe

- If larger: no galaxy formation
- If smaller: universe would collapse prior to star formation

9. Entropy level of the universe

- If smaller: no proto-galaxy formation
- If larger: no star condensation within the proto-galaxies

10. Mass density of the universe

- If larger: too much deuterium from big bang hence stars burn too rapidly
- If smaller: insufficient helium from big bang, hence too few heavy elements forming

11. Velocity of light

- If faster: stars would be too luminous
- If slower: stars would not be luminous enough

12. Age of the universe

- If older: no solar-type stars in a stable burning phase in the right part of the galaxy
- If younger: solar-type stars in a stable burning phase would not yet have formed

13. Initial uniformity of radiation

- If smoother: stars, star clusters, and galaxies would not have formed
- If coarser: universe by now would be mostly black holes and empty space

14. Fine structure constant (a number used to describe the fine structure splitting of spectral lines)

- If larger: DNA would be unable to function; no stars more than 0.7 solar masses
- If smaller: DNA would be unable to function; no stars less than 1.8 solar masses

15. Average distance between galaxies

- if larger: insufficient gas would be infused into our galaxy to sustain star formation over an adequate time span
- if smaller: the sun's orbit would be too radically disturbed

16. Average distance between stars

- if larger: heavy element density too thin for rocky planets to form
- if smaller: planetary orbits would become destabilized

17. Decay rate of the proton

- if greater: life would be exterminated by the release of radiation
- if smaller: insufficient matter in the universe for life

18. ^{12}C to ^{16}O energy level ratio

- if larger: insufficient oxygen
- if smaller: insufficient carbon

19. Ground state energy level for ^4He (^4He)

- if larger: insufficient carbon and oxygen
- if smaller: insufficient carbon and oxygen

20. Decay rate of ^8Be (^8Be)

- if slower: heavy element fusion would generate catastrophic explosions in all the stars
- if faster: no element production beyond beryllium and, hence, no life chemistry possible

21. Mass excess of the neutron over the proton

- if greater: neutron decay would leave too few neutrons to form the heavy elements essential for life

- if smaller: proton decay would cause stars to collapse rapidly into neutron stars or black holes

22. Initial excess of nucleons over anti-nucleons

- if greater: too much radiation for planets to form
- if smaller: not enough matter for galaxies or stars to form

23. Polarity of the water molecule

- if greater: heat of fusion and vaporization would be too great for life to exist
- if smaller: heat of fusion and vaporization would be too small for life's existence; liquid water would become too inferior a solvent for life chemistry to proceed; ice would not float, leading to a runaway freeze-up

24. Supernovae eruptions

- if too close: radiation would exterminate life on the planet
- if too far: not enough heavy element ashes for the formation of rocky planets
- if too frequent: life on the planet would be exterminated
- if too infrequent: not enough heavy element ashes for the formation of rocky planets
- if too late: life on the planet would be exterminated by radiation
- if too soon: not enough heavy element ashes for the formation of rocky planets

25. White dwarf binaries

if too few: insufficient fluorine produced for life chemistry to proceed

- if too many: disruption of planetary orbits from stellar density; life on the planet would be exterminated
- if too soon: not enough heavy elements made for efficient fluorine production
- if too late: fluorine made too late for incorporation in proto-planet

26. Ratio of exotic to ordinary matter

- if smaller: galaxies would not form
- if larger: universe would collapse before solar type stars could form

SOURCE: Paul Davies (British astrophysicist) ‘To me, the true miracle of nature is to be found in the ingenious and unswerving lawfulness of the cosmos, a lawfulness that permits complex order to emerge from chaos, life to emerge from inanimate matter, and consciousness to emerge from life, without the need for the occasional supernatural prod; a lawfulness that produces beings who not only ask great questions of existence, but who, through science and other methods of enquiry, are even beginning to find answers.’¹⁰

Davies is a scientist who acknowledges that there are different types of knowledge that come through different methods of enquiry. As you would expect the questions you ask give different answers to questions you also get different perspectives by looking at the world through different ‘goggles’. If you wear scientific goggles all the time you see scientific answers and that is all. If however you wear religious goggles, again you will only see religious answers. However, if you see the world with both you might see ‘the BIG picture’ (if there is one...).



SOURCE: If you look with the eyes of faith you see God in nature, both in creation and in preservation. But if you look only with the eye of reason and of cause and effect you may not see Him. This is why the Creationist can see God while the man who does not look on the phenomena of nature with the same faith does not see him there.

(John W. Klotz, Creationist Viewpoints, in A Symposium on Creation, Vol.1, Baker Book House 1968, pp. 34–52)

Scientific enquiry

The word ‘science’ comes from the Latin word *scientia*, which means knowledge. Science is about gaining knowledge about ourselves and the world we live in. This means that there are obviously different types of knowledge: the study of how the human body works is called biology or physiology; the study of how various sounds are put into compositions is called music; the study of the use of colours, shapes and composition is called art; the study of numbers and formulae is called mathematics; and the study of the existence of God is called theology. These are all forms of knowledge (and there are many others also) and so they are sciences in their own right. However, today we are more inclined to view biology, chemistry, physics and maths as science because we believe that science is about observation, analysis and experimentation. Why is this?

Believe it or not, the first scientists were actually religious people! They were usually philosophers and theologians who, marvelling at the wonders of the world they lived in, sought explanations for how the work of the creator God actually functioned. As time passed, however, this common purpose and vision became fragmented so that by the sixteenth century there was a separation of religion and science. Up until this time, our understanding of the world was informed by observation and mathematical calculations based on the fact that the earth was the centre of the universe. Science basically fitted in with the Christian view of the universe as expounded through the Bible and by theologians, using the physics and philosophy of Plato and Aristotle. The reality of the universe was explained in religious terms with a specifically geocentric (earth-centred) view of the universe being taught as supported in the book of Genesis. God made the world and everything that moved therein was caused to do so by him.

¹⁰ <http://www.firstthings.com/article/1995/08/003-physics-and-the-mind-of-god-the-templeton-prize-address-24>



Strangely enough, the first person to challenge this geocentric view of the universe was a Catholic priest named Nicolaus Copernicus! He was employed by the Church to produce a new calendar and, as a good astronomer, he set about gathering evidence from his observation of the stars to be able to do this. He noticed that there was no change in the position of the stars when they were viewed from two different places on earth and so he calculated that the stars must be further away from the earth than the sun. He

published his findings in his work 'De Revolutionibus Orbium' in which he claimed that the sun was the centre of the universe and that the earth went round the sun, as did the other planets, in perfect circular orbits, once per year. This was a highly significant discovery because it challenged the geocentric view of the universe held by the Church (informed by the philosophy of Aristotle) with a heliocentric view of the universe based on mathematical calculations and observations. This suggested that the view held by the Church was wrong. This opened the way for others to develop the approach of Copernicus, especially in the thinking of a man called Galilei Galileo, which resulted in conflict between Church and science.

The key to understanding Galileo's ideas is based on the importance he gave to reason and observation in reaching his conclusions. Galileo came to the conclusion that the world was not the centre of the universe and reasserted the Copernican view that we inhabit a heliocentric universe. He believed that what occurred in the universe was based on mathematical laws and he came to these conclusions by making his observations via a telescope! Rather than support the view that the heavenly bodies were



perfect, on the basis of his observations of sunspots, the moons of Jupiter and the fact that Venus had phases, he maintained that they changed. His main work was the Dialogue Concerning the Two Chief World Systems (1632), which led to the general acceptance of Copernicus' theories but brought him into conflict with the Catholic Church. Galileo was not anti-Christian, but his theories were considered to challenge what had been revealed by God in the Bible, and, because the Christian world-view of the time was a synthesis of theology and the philosophy of Aristotle, Galileo seemed to be challenging the whole system on which the Church's world-view was based. He was inevitably put on trial as a heretic and was found guilty, forced to recant, and his works were banned. [350 years later the Vatican accepted his findings...¹¹]

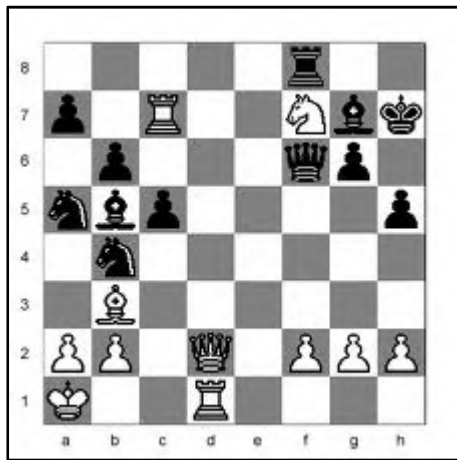
Galileo believed that in discovering more about the universe we actually discover more about God, and that science and the Bible were complementary to each other. However, by showing that we could gain knowledge about the world by observation and mathematical calculations, his theories paved the way for understanding the universe without reference to God. Scientists no longer needed to appeal to theology, the Church or the Bible as final arbiters on the way the world worked because they could determine this for themselves. This marked a massive shift in how humanity eventually came to understand its place in the world. If science can provide the answers to the great questions concerning the origins of the universe, then religion only has any use in supplying the answer to

¹¹ <http://www.nytimes.com/1992/10/31/world/after-350-years-vatican-says-galileo-was-right-it-moves.html>

questions that science hasn't managed to answer yet, but probably will do in the future. This gave rise to the view of religion as belief in a 'God of the gaps'. God was the answer to the gaps in human knowledge.

The inevitable development from Galileo's thought was the advent of modern science. This was based on the belief that the world was indeed orderly and intelligible, that knowledge could be acquired through measuring, testing observing, and that the authority of religion in this sphere of enquiry no longer held sway. The prime movers in this direction were probably Francis Bacon and Isaac Newton, who believed that knowledge started with observation of the world and, on the basis of this, the human mind could work out the laws of nature – this is known as empiricism.

This empirical approach led to specific approaches to gaining knowledge. These are known as deduction and induction.



Deduction is really all about knowing the rules. Take a game of chess. If you don't know how to play chess then it is difficult just to pick up a piece and play a game. If you know the rules of the game, however, and you know how each piece moves, then you can deduce what moves are likely to be made by someone playing the game. Deduction is fine, as long as you know what the rules of the game are and (this is very important) understand the assumptions that a given deduction is based on. Let's go back to Galileo to illustrate the point we want to make here. If you work on the assumption that the planets are perfect and that they travel around the earth in a circle because that is the perfect shape, then you will make certain deductions about the

planets based on this assumption. This is fine, until Galileo turns up and suggests that the planets do not actually travel around the earth in circles. He challenges the assumption based on his own observations and shows that the previous deductions were inaccurate!

Science uses the inductive method of enquiry by gathering as much evidence as possible, ensuring its relevance, and drawing conclusions from it in the form of what are called hypotheses. What is a hypothesis? It's quite simple: hypothesis comes from the Greek word *hypotithenai* which means to propose, suppose, or literally: put under. This means that a hypothesis is an assumption that is put under an argument to support it, or a suggested explanation for a group of facts or phenomena, accepted either as a basis for further testing or as likely to be true. As a result of a given hypothesis, scientists would logically expect other results to follow from an experiment. If this proves to be the case then the hypothesis would be taken as verified, or it would be modified according to the results of the experiment, if this was necessary. On the basis of this, a scientist would then argue for a theory which will predict what will happen if a series of events are put in place. This is how scientists work out scientific laws. This does not mean laws in the sense of those composed and imposed by a government, which seek to limit actions that would be detrimental to our country. Rather it means the description of how things behave given certain circumstances.



Now, while this seems to provide a cast-iron guarantee of certainty, this is by no means the case. What induction provides is a high degree of probability that, given x and y, z will naturally follow. But

this is not necessarily the case because it is entirely possible that an additional piece of information will nullify the hypothesis.

All of this led to a philosophical understanding of science, which has been influential on the exercise of scientific enquiry and investigation to this day. This particular school of philosophy is called logical positivism. This view was advanced by a group of philosophers who came together around 1922 and were known as the Vienna Circle. Scientists came to their conclusions based on observations, testing, measuring over a sustained period of time. In philosophy, their methodology is called empiricism because it is based on what is learned from experience. Logical positivism was actually logical empiricism because it held that the only knowledge worthy of the name was based on what was empirically verifiable. In relation to the origins of the world, logical positivism would reject any notion of a creator God because God is not something that is empirically verifiable – we cannot prove God’s existence by observation, measurement or testing. Therefore, not only does God not exist, but the concept of God is entirely meaningless since it is not verifiable! This is a view that many, though not all, scientists take today, as well as many ordinary people who believe that science has provided all the answers to questions concerning the origins of the world and human life. The problem with this view, however, is that it falls prey to its own premise of verification (testability). It cannot be verified that a statement is only meaningful if it can be verified!

What must be noted here is that, in relation to scientific enquiry as a source of knowledge, the importance of testing, observing, measuring and verifying is of the utmost importance and seems to enter into a conflict with what is claimed by religious language. It seems to be the case then that it is a matter of choosing a religious explanation of the world and risking being accused of living in the dark ages, or choosing a scientific approach to explaining the world and being accused of rejecting belief in God.

Is this the case? Well, we shall see as we progress through the remainder of this unit.



through

To sum up the scientific method...

O Only	Observation	You observe something and you want to find out how it works, how it came to be, what caused it to be the way it is...
H Hippos	Hypothesis	You gather as much evidence as is possible, making sure the evidence is relevant, and then we draw conclusions from the evidence.
E Eat	Experimentation	You carry out a number of experiments under controlled conditions to test your hypothesis and ensure that your hypothesis is correct.
V Vultures	Verification	You share your hypothesis and results with other scientists who can verify what you have found

If the experiments do not support the hypothesis then the hypothesis needs to be adapted or rejected. If at a later date new evidence comes to light to disprove a theory in science then it is rejected and a ‘Paradigm shift’ occurs when the old ideas are rejected and new ones are accepted. E.g. the earth is flat because it looks flat was rejected when ships began to sail around the earth without falling off!

The scientific method relies on **‘Empirical Evidence’** – that which can be obtained by the 5 senses...

Strengths of the method

- ⇒ It is objective not based on opinion.
- ⇒ It is based on physical evidence which we can test.
- ⇒ Science works. It has produced space travel, mobile phones and computers.

Weaknesses of Scientific Method

- ⇒ Nothing can be absolutely proved by science. A theory is considered to be the best available explanation of the data. It is always open to correction.
- ⇒ There are many different scientific methods.
 - T.S. Kuhn says that Science progresses through hunches and guesses which are not really objective.
- ⇒ Also, the progress is subjective because it can be influenced by institutional concerns and vested interests.

Activities & Tasks:



1. What is the origin of the word 'science'?
2. What professions did the first scientists work in?
3. How did they explain the existence of the universe?
4. Who was the first person to challenge the accepted geocentric view of the universe?
5. What led him to this conclusion?
6. What name is given to this view of the universe?
7. What is the key to understanding Galileo's views of the universe?
8. What were the consequences of Galileo's conclusions?
9. What did Galileo's views pave the way for?
10. What do you understand the term 'God of the gaps' to mean?
11. What is empiricism and how does it relate to scientific enquiry?
12. Explain the deductive method of enquiry and what its weakness is.
13. Explain the inductive method of enquiry and what its weakness is.
14. What is logical positivism?

Christian revelation

To understand the significance of the concept of revelation for Christians, it is important to know what revelation actually is. In the first instance revelation has been understood to mean that there are certain facts or information that can be communicated about God and expressed in sentences. This is the propositional understanding of revelation, in which individuals give their assent to certain 'truths' about who God is and what his will is.

Revelation and cosmology

Contemporary theologians tend to view revelation in a more 'personal' manner. God does not so much reveal facts about himself, but actually discloses who he is in himself. Revelation is about God making a gift of his own being to us: his self-revelation. This is more in tune with the actual meaning of the word. In this sense, revelation has a cosmological dimension, God's self-revelation is actually

tied up with the mystery of creation. Creation is not just something that happened once upon a time and is then static from that moment on, but is an ongoing process in which God is communicating his own life to the world.

When considering the developments in modern science this seems to make sense for Christians. Our universe is the product of a process, which began millions of years ago and has slowly evolved to its present state. Over a period of some 20 million years, matter has struggled to become alive, and life to become conscious. This raises a very fundamental question for many people. Does life in the universe have a purpose or is it aimlessly drifting onwards to nothingness? In response to this, many Christians believe that the only answer to this is that life must have a meaning and purpose, and that this is ultimately guided by a caring designer who reveals himself through this whole process. In this sense, Christians would say that they discern in the evolution of our universe a design or a call to the world to go beyond what it is now. The book of Genesis bears witness to this in its opening sentences when it tells us that God called the world into being. For these Christians then, creation actually communicates a promise, a promise which is in reality God's revelation of himself, guaranteeing hope of fulfilment. This hope for a future fulfilment has been passed down from generation to generation in the history of Israel and reaches a climax in the life, death and resurrection of Jesus of Nazareth. From this perspective, revelation is the full unfolding of the universe as St Paul exclaims in his letter to the Christians in Rome:

SOURCE: All of creation waits with eager longing for God to reveal his children. For we know that up to the present time all of creation groans with pain, like the pain of childbirth. (The Bible – letter to the Romans 8:19, 22)

Revelation and history

In the light of all that has been said above, it is important to understand that Christians believe that revelation also has a historical context. In other words revelation takes place at a given time, in a given place, to a given people. So, as well as believing in a universal revelation, Christians believe that God has revealed himself in the story of the people of Israel. What this means is that in the lives of significant individuals and events in the history of Israel – Abraham, Moses, the delivery from slavery in Egypt, King David, the Prophets and others – God was revealing himself in a particular way to save humankind from sinfulness. For Christians, this reaches its climax in the life death and resurrection of Jesus of Nazareth in whom they have the forgiveness of their sins and restored to their rightful relationship with God.

In the first instance these events were handed on by word of mouth so that their importance could be preserved for future generations. However, they were consigned to writing at various times and places, and were eventually gathered together into what we now know as the Bible. Christians believe the Bible is the word of God but they can mean different things when they say this.

As we have seen before Christians approach the Bible in differing ways. Some Christians, while accepting that the Bible is the word of God, will nevertheless explore the Bible using the methods of contemporary Biblical criticism to understand the precise nature of the writing they are dealing with.

PROGRESSIVE CHRISTIANS...

Others accept the Bible as the word of God exactly as it is without question and believe that the methods of Biblical criticism are an unworthy way to approach what God has revealed.

LITERAL CHRISTIANS...

No matter what particular position Christians take on the understanding and interpretation of the Bible, they agree on one thing: the Bible gives them guidance for their lives and understanding of the world in which they live. They are able to evaluate trends in society, scientific developments, etc., by reflecting on what the Bible has to say. Obviously, there are some developments that the Biblical authors could not have envisaged, such as in-vitro fertilisation, scientific theories on the development of the universe, or the development of atomic energy. Christians can have problems trying to reconcile their faith with these developments, and this is where some Christians would look to what is called Tradition to guide them. This is the case for Catholic Christians, who understand that the word of God is embodied in Scripture and Tradition. Tradition is not habits, customs or practices, but is rather the belief that, before the Bible came into existence, the Apostles had already received from Jesus what was essential for Christian faith. They, in turn, were able to hand it on to others so that the Church had authority to teach on matters that were not committed to writing in the Bible. The New Testament itself attests to this when it states that not all the things that Jesus said and did are recorded. So, on certain questions that are not explicitly treated in the Bible, Catholic Christians can look to the Church to guide them and teach them on the correct answer to these questions.

Activities & Tasks:

1. What is the 'propositional' understanding of revelation?
2. In what way do contemporary theologians understand God's self-revelation to be tied up with the mystery of creation?
3. How would Christians respond to the question of whether or not the universe and life have a purpose?
4. What does it mean for Christians to say that revelation has a historical context?
5. How is this linked to the history of Israel?
6. Explain in detail how Christians understand the Bible to be the word of God.
7. What is the significance of 'Biblical criticism' for some Christians in understanding the Bible?
8. Why do some Christians reject this approach to the Bible?
9. What approach to the Bible would Christians have in common?
10. What is the significance of 'Tradition' for Catholic Christians?



TYPES OF KNOWLEDGE... AND THE LIMITS OF BOTH;

SCIENTIFIC KNOWLEDGE	RELIGIOUS KNOWLEDGE
<p>Science is making incredible advances and discoveries and will one day be able to provide answers to all the questions we have.</p> <p><i>There are no limits to what can be discovered by science and its method.</i> <i>Science can explain other dimensions to life.</i></p> <p>The evolutionist, Richard Dawkins likens religion to a computer virus</p> <ul style="list-style-type: none"> • Consciousness is an illusion that will eventually be explained biochemically • “Consciousness is the last great mystery” (D Dennett) <p>Religious beliefs can be explained psychologically or sociologically nowadays. “Scientific reasoning is our best route to practical certainty” (Dennett). In religion there is far too much uncertainty and disagreement. From a comparison of religion and science we can immediately see that science and its method are much more reliable than religion</p> <p>Science is</p> <ol style="list-style-type: none"> 1. Rational 2. Concerned with facts/(proof) 3. Starts with reproducible public data 4. Open to experimental testing 5. Objective 6. Neutral 7. Open-minded <p>Religion is</p> <ol style="list-style-type: none"> 1. Irrational or not always rational 2. Concerned with faith/opinions/myths 3. Lacks reproducible public data 4. Not open to experimental testing 5. Subjective 6. Requires commitment/biased 7. Closed-minded <p>In the past, when there were gaps in our understanding of how an event in the natural world took place, it seemed obvious to say God (or the gods) must be causing it. As science has advanced however we have been able to give scientific explanations for these events.</p>	<p>The assumption is that science attempts to answer all our questions – it cannot.</p> <p>Worldviews attempt to provide answers to questions about reality, but all worldviews are based on faith.</p> <p>It is really SCIENTISM (the idea that science has or will get all the answers we need) not science, which is challenging Christianity</p> <p>True science has a much more humble role. It gives us very useful information about the universe in which we live but there are limits to science.</p> <ol style="list-style-type: none"> 1. Science, because of its method, is only qualified to answer empirical questions – questions about the physical, observable world. It is not qualified to answer religious, moral or aesthetic questions 2. It cannot provide proof. Contrary to popular opinion, science is not a body of once and for all fact. It is always provisional – scientific theories are always open to correction or replacement if a better theory becomes available (e.g. Einstein’s theories on gravity replaced Newton’s) 3. Scientific knowledge is mainly obtained by the senses, however there are limitations on the information our senses can deliver – we can never get to know things as they are in their own right, only as they appear to the senses and also the senses can deceive us. 4. Heisenberg’s Uncertainty Principle shows that it is impossible to measure things in a completely unbiased and objective manner. 5. Science uses models (e.g. the billiard ball model of the atom) and models are simply analogies, not the real thing. <p>Bob Herrman says that we now see that in science there are limitations far beyond our ability to appreciate and understand. To say that science is</p>

Increasingly these gaps are being filled in. Eventually we will have no need to refer to God for any explanations. The **God-of-the-gaps** will become redundant.

Religion is outdated; superstition and religion are being swept away in the light of modern science.

Every major battle science and religion have entered into has been won by science. E.g.

- Geocentric (Church) **vs.** heliocentric solar system (Science – Galileo)
- Big bang **vs.** Creation of Universe

rock solid and that every fact is sure and secure is totally arrogant.

There are other dimensions to life, other kinds of knowledge that science does not deal with.

- Religion/the spiritual
- Consciousness, emotions, love
- Morality
- Aesthetic (beauty, art, poetry, music)

Nancy Murphy says it makes more sense to liken atheism to a computer virus.

There is nothing wrong with explaining religious beliefs psychologically or sociologically; the problem arises when people assume that this explains such beliefs away. This is called **reductionism**. Examples of this would be:

- A person is **nothing but** a collection of chemicals. A mother who was offered a heap of chemicals to replace her child would hardly accept this!
- Your joys, sorrows, memories, beliefs are **nothing but** the behaviour of a vast assembly of nerve cells and their associated molecules.

There is a place for both religion and science.

Religion answers the 'Why' questions whereas Science answers the 'How' questions.

The **Logical Positivists** said that a statement is only meaningful if it can be "**empirically verified**" (i.e. checked using the senses). Scientific statements can be empirically verified, whereas religious ones cannot, religious statements are therefore meaningless.

This has been very influential in promoting the view that science offers a more certain way of understanding reality than religion as the following statements show:

Whatever knowledge is attainable must be attained by scientific means: and what science cannot discover, mankind cannot know. (Bertrand Russell)

Truth means scientific truth
(Richard Dawkins)

	<p>Yet Logical Positivism has been largely discredited today. One argument against it is that it fails its own criterion of meaningfulness since the statement “A statement is only meaningful if it can be empirically verified” <i>is itself not capable of empirical verification.</i></p> <p>In the past religious people have used the idea of God to fill in gaps in scientific knowledge. This way of thinking confuses different types of explanation. It tries to plug up the gaps in scientific explanations with religious ones. Such thinking has been wrong and unhelpful.</p> <p>A more helpful way of thinking is to realise that there can be different levels of explanation. For example the question “ How did the universe come in to being?” can be answered by referring to:</p> <ul style="list-style-type: none"> • The big bang (scientific explanation) • God (religious explanation) <p>There is no necessary contradiction in believing both, just as there is no necessary contradiction in the following answers.</p> <p>Scientism is based on the ‘great scientific myth’ (CS Lewis)</p>
--	---

Warning...

CONFIRMATION BIAS...



SOURCE: "It is the peculiar and perpetual error of the human understanding to be more moved and excited by affirmatives than by negatives." --Francis Bacon (*Often considered to be one of the founders of the scientific method...*)

Confirmation bias refers to a type of selective thinking where someone tends to notice and to look for what confirms one's beliefs, and to ignore, not look for, or undervalue the relevance of what contradicts one's beliefs. For example, if you believe that during a full moon there is an increase in admissions to accident and emergency where you work, you will take notice of admissions during a full moon, but be inattentive to the moon when admissions occur during other nights of the month. A tendency to do this over time unjustifiably strengthens your belief in the relationship between the full moon and accidents and other lunar effects. If we become blinded to evidence disproving a favoured hypothesis, we have crossed the line from reasonableness to closed-mindedness.

Activities & Tasks:



Go to the following website where you will find a letter written by Richard Dawkins (an atheistic evolutionist) to his daughter. You could Google – ‘letter Good and bad reasons for believing’.

http://www.thirdworldtraveler.com/Dawkins_Richard/RDawkins_let_Daughter.html

TASKS

1. Write down his main arguments and a statement on whether you agree with his conclusions and why.
 2. If you agree then try to disagree giving reasons to disagree with him... OR if you disagree try to agree giving reasons for agreeing with him...
-

William Paley’s Teleological Argument

‘If you were walking across a heath and came across a stone, you would presume it had always been there, requiring no purpose or design. If you came across a watch (and you had never seen one before), however, you would naturally ask what it was and where it came from. You would examine it and see that it is very complex – glass, cogs, a chain, etc. You would conclude that such an object could not have just appeared randomly, or have just existed forever, but that someone must have made it. If you watched the watch working, you would also conclude that it was made to carry out a purpose (to tell time). Therefore, you could finally conclude that there had to be an intelligent watchmaker who designed this object with a purpose in mind...’



This argument is an analogy – comparing one thing with something similar, so the second half of Paley’s argument compares the watch with the universe. Similarly, if you look at the world we live in you will see how complex it also is. You could examine it and see that it has very complex systems – weather, gravity, etc. It also has so many complex organisms living on it, perfectly suited to their environments. You would conclude that such complexity and harmony could not have just appeared randomly, but that it must have been designed somehow (like the watch was). You might also conclude that everything seems to be working together to a similar end. Therefore, you could finally conclude that there had to be an intelligent ‘world-maker’ who designed this universe and all of life with a purpose in mind. This ‘world-maker’ must be God, as God is the only being out-with the universe, and is

the only intelligent, powerful and loving creator.

Paley’s argument is essentially an argument from design. His argument is also analogical in that it is based on analogy between a watch and the world. An argument from analogy moves from the known to the unknown and uses the following formula ‘just as... so too ...’ Paley uses the watch to demonstrate a design, or purpose, in the world. Just as the watch has been made for an intelligent purpose and has clearly been designed, so too the earth has a designer because it is clear from the way the world works that it must be the product of a designer. Paley argues this from the scientific knowledge of the time concerning the rotation of the planets etc., and believes that his argument would still stand even if you had never seen a watch before, or could not work out how some of the

parts operated. You would know by the very nature of a watch that there must be a designer, and the same applies to the world we live in.

David Hume's critique of the Teleological Argument



Hume's critiques of the Teleological Argument actually existed **before** Paley developed his own version of the argument. Hume's position was set out in his work *Dialogues Concerning Natural Religion* (1779), 23 years before Paley, which gives some indication of the lack of attention paid to philosophical arguments at the time! So how did he deal with the Teleological Argument?

We will deal with the main points that Hume makes without going into his argument in great depth.

First of all, Hume does not explicitly deny that the argument works. What he essentially does is demonstrate the fact that, from his perspective, the argument produces what can only be considered a very limited God. The fact that the world has so many imperfections (tidal waves, earthquakes, diseases, etc.) would seem to point to what he calls an 'infant deity', rather than a superior designer. Rather, all of this seems to point to a malevolent God. Moreover, he argues further that it can take many people to design and build something that is sophisticated in its operation. Why should we not also conclude that there are many gods?

Second Hume goes on to argue that it is indeed possible to argue that the universe was created by chance. He admits that there is design in the world, but he questions whether or not this actually implies the existence of a designer. Can we make the leap from admitting order in the world to a design of the world? It is entirely plausible that the world arose by chance. What Hume actually argues is that it is possible that the finite number of particles that the world is made up from could, after going through every possible combination, constitute a stable order which will naturally be realised in the world and provide the order we now experience. Order, therefore, has nothing to do with God.

In essence, what Hume does is attack the validity of the analogy that is used in the argument from design, and this is where many consider Paley to fall victim to Hume. Basically, what Hume argues is that the analogy is not close enough to really have any value whatsoever, and the result of this is that Hume claims that we should suspend judgement on the existence, or otherwise, of God because there is insufficient evidence to prove his existence. This opens the way to the theory of evolution!

SOURCE: To explain the origin of the DNA/protein machine by invoking a supernatural designer is to explain precisely nothing, for it leaves unexplained the origin of the designer. You have to say something like 'God was always there', and if you allow yourself that kind of lazy way out, you might just as well just say 'DNA was always there', or 'Life was always there', and be done with it.

(Richard Dawkins, *The Blind Watchmaker*, Penguin 1990, p. 173)

Activities & Tasks:

1. How does Paley demonstrate his analogy between the watch and the world?
2. Why does Hume believe that the argument from design essentially points to a very limited God?
3. Why does Hume believe that the world could have been created by chance?
4. What is the problem with Paley's argument from analogy in the light of Hume's critique?
5. What point is Dawkins making in the quote from the Blind Watchmaker?



Where did life come from?

We have already considered the Genesis story in our examination of the Big Bang theory and we have looked at the Christian views on this. Therefore we do not have to revisit all of this; however, we do need to recap...

Basically God did it!

In SIX days all life was created according to Genesis 1. Genesis 2 gives a different story and you need to be aware of both.

Some see the two accounts as being written by two different authors or groups of authors (scribes) at different times and different places.

The creation account in Genesis chapter 1 (it actually finishes in the first sentence of Genesis 2:4) is believed to have been written by the 'Priestly source' (P source), based on an early Mesopotamian creation myth – 'Enuma Elish'. The 'Priestly source' was an anonymous writer(s) during or shortly after the time of the Babylonian Exile, who contributed to the Book of Genesis.

The creation account in Genesis chapter 2 (it actually starts in the second sentence of Genesis 2:4) is believed to have been written by the Yahwist source ('J source'), an anonymous author(s) who represented the traditions of the southern kingdom of Judah early in the first millennium BCE, long before the time of the Priestly source.

Similarities:

1. The major similarity is that both accounts attribute creation to the one Israelite God.
2. Experts in the Hebrew language say that in both cases the earth is pre-existing: in the first account, the ocean was already there; in the second account, there is no mention of the ocean, but the land was already there waiting for God to make it rain.

Differences:

1. In the first account, the ocean was already there, but no dry land until the third day, when God separated the waters. The origins of this story are considered to be in a maritime environment.
In the second account, there is no mention of the ocean, but the land was already there waiting for God to make it rain. This story is believed to have originated in a dry, arid environment. This is emphasised by the importance placed in this story on the four rivers that made the land fertile.
2. In the first, Man, both male and female, was created after the beasts of the earth.

In the second, Adam (male) was created first, before plants and beasts, while Eve (female) was created last of all.

3. In the first, God simply spoke things into existence.

In the second, God needed clay from which to create Adam, and could only create Eve by taking a rib from Adam.

4. In the first, man was created to have dominion over all living things.

In the second, man was created to be the servant of the earth, and the other living creatures were created to be his companions.

5. The first is very impersonal, with God simply instructing the people he created to "go forth and multiply."

The second is more personal. When Adam realised he had a wife, he waxed lyrical about her, and sex and procreation were never mentioned until after the transgression.

6. The first story is little more than a list of things God created, followed by an explanation of the Sabbath.

The second story begins a long moral tale, first by identifying the forbidden trees, the Tree of the Knowledge of Good and Evil and the Tree of Life.

7. In the first story, man is created in the image of God.

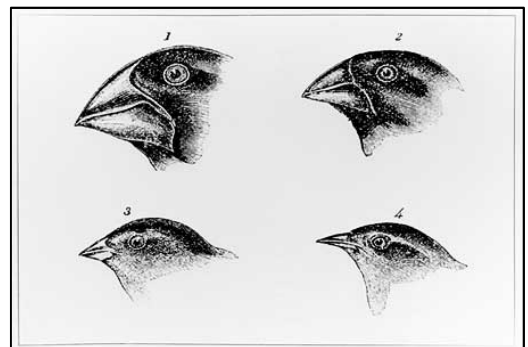
There is no suggestion in the second that man was created in the image of God - in fact God seems unaware of Adam's companionship needs. Adam only became godlike after eating the fruit of the forbidden tree (Genesis 3:22: "And the LORD God said, Behold, the man is become as one of us...")

Science and the theory of evolution

In this section we will look at the theory of natural selection, proposed by Charles Darwin in his work *On the Origin of Species by Means of Natural Selection* (1859). First of all we must be clear about what we mean when we say 'natural selection'. This is the way in which evolution takes place. The characteristics of a particular species that help it survive are passed on through the genes to the next generation of the species, and so on, until all members of the species have those characteristics. If members of the species have characteristics that don't allow them to survive, then these characteristics die with them. In this way a species evolves and changes so that, in this process of natural selection, a species develops all the characteristics necessary to survive in an ever-changing environment. This gives rise to the idea of the survival of the fittest.

What happens in the process of evolution is that primitive forms of life give way to more sophisticated forms of life so that plant and animal life today can be traced back to what might be called a common origin.¹² This means that one species can be traced to another species, although that species might be different from it. Human beings can therefore be traced back in this process of linking to a type of 'ape' species, which in turn developed from some form of mammal and so on, to the most basic form of life at the beginning of life itself.

On the Galapagos Islands in the Pacific Ocean, close to the equator, there are a variety of different finches, which vary in the shape and size of their beaks. It appears that the finches colonised the Islands from mainland South America, and then diverged in form. The distance between the islands meant that the finches on different islands could not interbreed, so the populations on the different island tended to become distinct. Different populations also



¹² See the clip relating to Darwin's finches... <http://www.bbc.co.uk/learningzone/clips/darwins-finches/13929.html>

became specialised for different food sources, birds with thin, sharp beaks eating insects and birds with large, sturdy beaks eating nuts. Darwin collected some of these finches when he visited the Galapagos Islands, and it is often stated that the finches were key to the development of his theory of evolution. They are used as evidence for his theory in many textbooks.

What Darwin's book did was provide an alternative to the argument from design, or at least it appeared that way. His book offered a way of looking at the world without any reference to God and seemed to present the world in a purely materialistic way. Life on earth is just the product of matter evolving into ever higher forms, and so human beings, rather than being a special creation of God, appear to be a product of a materialistic evolution through the process of natural selection. The implications of this for Christian belief are obvious.

Darwin came to the conclusion that random variations which gave an advantage to a plant or animal in relation to survival resulted in the survival of the fittest species. He tried to illustrate this in an imaginary way by using the example of wolves being able to maintain the ability to catch their prey, when they were struggling to find food. He argued that it would be the fittest wolves who would be able to survive because they would be in a better position to catch their prey, rather than the weaker ones who would die. He even appealed to greyhound racing, pointing out that the way a breeder could, through a process of selection, develop a faster greyhound is very similar to what naturally occurs in nature.

A contemporary supporter of Darwin's position is Richard Dawkins. In his book *The Blind Watchmaker* he dismisses any notion of their being a creator God and believes that anyone who argues for the existence of a God who creates human life is basing their belief on what he calls 'Arguments from personal incredulity'. By this he means that because a person cannot think of any other explanation for the existence of the world they simply opt for belief in God. For Dawkins, the order in the world is not due to God, but rather is due to a blind, unconscious and automatic process.

Dawkins also argues that humans have a selfish gene and that we are inherently selfish because that is the way in which we have developed to survive through natural selection. We act the way we do because we are effectively robots/machines programmed to preserve our gene pool and transfer it to the next generation.

Dawkins would reject any claims that the book of Genesis says anything of value about the origins of human life. Dawkins rejects the existence of an immortal soul in human beings, but he still accepts that there is human dignity. This comes from the way in which an individual's genetic code is passed on to future generations so that we have now reached the point where we can actually try to discover the meaning of life. This, for Dawkins, is the most marvellous aspect of human development that humans can reflect on the fact that they are in the universe!

Activities & Tasks:

Create TWO mindmaps to show the Christian views of creation and science's view on how life developed from single celled life forms into more complex beings...



The Christian response to Darwin's theory of evolution.

Major problems for Christians.

- ⇒ God, as a designer, becomes 'redundant' with evolution.
- ⇒ The authority of scripture is challenged – the Bible is not literally 'true. (Therefore what else in the Bible is not true?)
- ⇒ The universe has no purpose, evolution is an impersonal mechanism.
- ⇒ God using natural selection, as the mechanism of creation is cruel since creatures only make progress when they are forced to adapt to their environment when they suffer.

One Christian response was seen in 'Creationism' - grew as a result of the advancement of evolution that was evident after the publication in 1859 of Darwin's Origin of Species. Many religious leaders, however, feared that a less-than-literal reading of the biblical story of creation would result in a loss of faith; and well-known spokesmen for the cause--such as William Jennings Bryan--saw modern war and other purported signs of moral decay to be evidence of the damage brought about by the teaching of godless evolution.

Key area of debate is over the source of knowledge and how we can be sure of what we know... Scientists base their understanding on empirical evidence and experimental data. Creationists place their ultimate authority for knowledge of origins in the Bible.

Conservative Creationists – strict, literal interpretation of Genesis. The age of the rock strata are seen to be irrelevant – God planted the evidence to test people's faith. This dates back to the 19th century when it was debated whether the trees in the Garden of Eden had age rings in them, did Adam have a navel – if so for what purpose and so forth.

Progressive Creationists – the world was made as described in Genesis but the reference to 'day' did not literally mean a 24-hour period. The Hebrew word for day 'Yom' can mean both a 24 hour period and an indeterminate period of time. So each day should be taken as a period of time. This allows someone to accept the scientific evidence without being disloyal to Genesis account.

Response from Denis Alexander

I am a Christian biologist, as well as a passionate Darwinian. So what puzzles me is the assumption that teaching evolution should undermine religion anyway.

... "opening minds" involves the accurate teaching of science in the classroom. If that involves conflicting with religious beliefs, well tough, any religion worth its salt should be able to cope with that.

Susan Blackmore (atheist) says science teachers should not "belittle religious beliefs, or scoff at them", and "not even mention religion or creationism". Quite so. But pupils are very quick to pick up their teachers' assumptions. Good educational practice requires that teachers avoid hidden agendas in the classroom. And trying to undermine pupils' religious beliefs through biology might actually contribute to the rise of creationism.

Arguably, Dawkins-style campaigns to equate evolution with atheism have done more to promote the rise of creationism in this country than creationist campaigns themselves. If you load any scientific theory with ideological baggage, then it becomes equated with a worldview rather than with the science itself. If someone doesn't like that world-view, the scientific baby can then be thrown out along with the worldview bathwater.

The challenge for science teachers is to teach evolution as the fantastic biological theory it is, without associating it with philosophical agendas, either implicit or explicit.

Creationism is a late 20th-century phenomenon. It may not be accidental that it started to flourish just as UK society became more secularised. So the educational message that needs communicating, not in the science classroom, but in religion and history classes, is that historically mainstream religions have had little problem with evolution.

In fact, Darwinism was baptised into Christian theology soon after the publication of *The Origin of Species* in 1859. Darwin himself corresponded with 200 different clerics during his life, some of whom supplied scientific information for his books.¹³

After Darwin had sent an advance copy of *The Origin of Species* to his friend the Reverend Charles Kingsley, Kingsley replied saying, "All I have seen of it awes me".

After Darwin, Christians began to understand creation not as a series of isolated, unconnected events, but as a long historical process through which God brings about his purposes. It enriched rather than diminished their theology.

So Blackmore is incorrect in suggesting that evolution challenges the idea that God "created humans in his own image". Not at all. It is precisely the emergent properties of consciousness, language and moral responsibility that result from the evolutionary process that highlight humanity's uniqueness.

Biology teachers can teach evolution with the confidence that it represents no challenge to mainstream theology. So they can get on with the job of teaching biology effectively, without the need for hidden agendas

Intelligent Design - is the claim that "certain features of the universe and of living things are best explained by an intelligent cause, not an undirected process such as natural selection." It is a modern form of the traditional teleological argument for the existence of God, but one which avoids specifying the nature or identity of the designer. This view is held by many American 'Bible Believing' Christians. Intelligent design supporters question whether random mutation and natural selection completely explain the deep structure of life. But they do not doubt that evolution occurred.

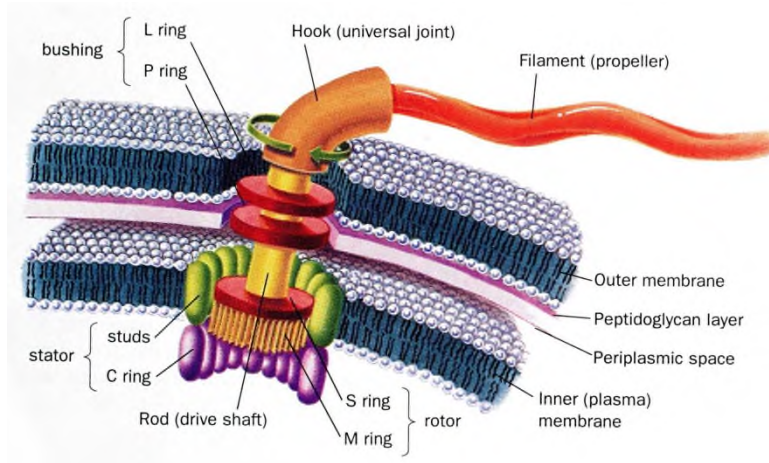
B.A. Alberts "The chemistry that makes life possible is much more elaborate and sophisticated than anything we students had ever considered. ... Indeed, the entire cell can be viewed as a factory that contains an elaborate network of interlocking assembly lines, each of which is composed of a set of large protein machines."

Francis Crick, co-discoverer of the structure of DNA, once wrote that biologists must constantly remind themselves that what they see was not designed but evolved. The resemblance of parts of life to engineered mechanisms like a watch is enormously stronger than what Reverend Paley imagined. In the past 50 years modern science has shown that the cell, the very foundation of life, is run by machines made of molecules.



¹³ See <http://www.darwinproject.ac.uk/>

Michael Behe – ‘Irreducible complexity’ is a term used to describe a characteristic of complex systems where all of their individual component parts are needed in order to function. Or it is impossible to reduce the complexity of (or to simplify) a system by removing any of its component parts and still maintain its ability to work. E.g. A typical mousetrap is made up of five integral parts: a catch, a spring, a hammer, a holding bar and a foundation. According to Behe, if any of these parts are removed without a comparable replacement (or at least a significant restructuring of the remaining parts), the entire system will fail to function.



Behe uses the e coli bacteria’s flagella system as an example of a complicated irreducibly complex system which he believes could not have evolved directly (because it is irreducibly complex) and most likely did not evolve indirectly (because it is extremely complicated). The e coli flagella system is an incredible microscopic outboard motor which e coli use to move around in their environment. It is made up of 40 individual,

integral parts including a stator, a rotor, a driveshaft, a u-joint, and a propeller. If any of these parts are removed, the entire system will fail to function. If it fails to function then it cannot evolve into the life form that it is...

If this is related to Darwin’s theory it questions the gradual development of ‘life’ over millennia.

SOURCE: Charles Darwin conceded, “If it could be demonstrated that any complex organ existed, which could not possibly have been formed by numerous, successive, slight modifications, my theory would absolutely break down” (Origin of Species, 1859, p. 158).

Activities & Tasks:

1. How have Christians responded to the scientific evidence?
2. Why was a response needed?
3. Which response do you think is the most successful and why?
4. Watch Did Darwin Kill God? TAKE NOTES...

<http://www.youtube.com/watch?v=9x3JJLFmU4>



Is there any compatibility between Christian belief and scientific theory?

The first major challenge to religion in an age of science is the success of the methods of science. Science seems to provide the only reliable path to knowledge. Many people view science as objective, universal, rational, and based on solid observational evidence. Religion, by contrast, seems to be subjective, parochial, emotional, and based on traditions or authorities that disagree with each other.



Scientific materialism is at the opposite end of the theological spectrum from biblical literalism. But they share several characteristics. Both believe that there are serious conflicts between contemporary science and classical religious beliefs. Both seek knowledge with a sure foundation -- that of logic and sense data, in the one case, that of infallible scripture, in the other. They both claim that science and theology make rival literal statements about the same domain, the history of nature, so that one must choose between them.

Scientific materialism makes two assertions: (1) the scientific method is the only reliable path to knowledge; (2) matter (or matter and energy) is the fundamental reality in the universe.

According to this view the scientific method is the only reliable form of understanding. Science starts from reproducible public data. Theories are formulated and their implications are tested against experimental observations. Additional criteria of coherence, comprehensiveness, and fruitfulness influence choice among theories. Religious beliefs are not acceptable, in this view, because religion lacks such public data, such experimental testing, and such criteria of evaluation. Science alone is objective, open-minded, universal, cumulative, and progressive.

Many Christians believe that their faith and scientific theory can go together. E.g. John Polkinghorne and Denis Alexander. They believe that, rather than disproving the existence of God, science actually points to His existence and Christian belief and science shed light on the same truths. This is because they are asking different questions but their aim is to find answers to similar problems.

It is a fact the universe has a beginning – infinite regress is NOT an option. 13.7 billion years ago there was an expansion of the singularity that we now call the Big Bang.

If we look at these pages we know that we can actually trace their origin back to the Big Bang. They are on paper, and the paper came from a tree, and the tree grew from seeds from another tree and the whole species of the tree came from an even simpler plant, which in turn evolved from even simpler plant life, right back to the beginning of life on earth. We know that life was caused by a complex arrangement of chemicals which, in turn, can be traced all the way back to the initial explosion of energy about 10 billion–20 billion years ago. At this point we run out of causes in the universe.

This does not exhaust the questions for some Christians. They believe we can still ask **why** the universe exists and why it is the way that it is. The universe is contingent and this has been shown by scientific developments in modern times that allow us to describe the behaviour of the universe as a whole. Not only do the things in the universe obey the laws of science, the universe itself obeys them! This means that the Big Bang must point beyond itself to a cause because if the universe obeys the laws of science then the cause of the universe cannot be part of the universe itself but must be outside of the universe. This would seem to suggest for these Christians that there is indeed a creator God who sets the whole process of the origins of the cosmos in motion through the Big Bang.

SOURCE: My conclusion then is that the physical universe is not compelled to exist as it is; it could have been otherwise. In that case we are returned to the problem of why it is as it is... We have no choice but to seek an explanation in something beyond our outside physical world – in something metaphysical – because, as we have seen, a contingent physical universe cannot contain within itself an explanation for itself.
(Paul Davies, *The Mind of God: Science and the Search for Ultimate Meaning*, Penguin 1992, pp. 170–1)

This seems to take us back to St Thomas Aquinas, and so it does, but these Christians are trying to produce a synthesis between what St Thomas had argued about the need for a first cause and what science says about the Big Bang. In response to the argument put forward by some scientists that we do not need a first cause if the chain of causality is infinitely long, these Christians would respond that because a chain is infinitely long it does not mean that it has to exist. If the chain does not have to exist, then it needs a reason for its existence. Moreover, because science has revealed that the world is not infinitely old, then infinite chains must be ruled out as logically impossible. Therefore, as far as these Christians are concerned, God is not someone dreamt up by humans to fill in the gaps in their knowledge. Rather, God is **necessary** if we are to make sense of the existence of the universe at all!

These Christians also take another very interesting approach to demonstrating compatibility between Christian faith in a creator God and the Big Bang. They do this by arguing for a Unity Law, which is based on the scientific fact of the existence of harmony and order in the universe. When Sir Isaac Newton 'discovered' gravity, what he actually did was discover the universality of gravitation. The force that makes the apple fall to the earth is the same force that makes the moon stay in orbit around the earth and makes the earth orbit the sun. Gravity, therefore, is not just something on the earth, but is found throughout the universe. Scientists have now discovered that this same gravity is responsible for the formation of the stars and the formation of the universe as a whole from the time of the Big Bang onwards.

Scientists have now shown, through investigations in physics, that all the fundamental laws in the universe are actually aspects of two laws – quantum mechanics and general relativity. This points to the very real possibility that there will be a Grand Unified Theory that is the foundation of all the variations that exist in the universe, which these Christians would call a 'Unity Law'. This would clearly demonstrate that the whole physical universe is not just the accidental development of the Big Bang, but is rather an ordered unity because it obeys a single law of unity.

Thus science is discovering a single law or principle behind or above the material universe, a law which brings about everything that exists and everything that happens in the universe. This is of the greatest importance, because this discovery

is remarkably similar in many ways to the idea of God. God the creator is a unity, who causes everything that exists and everything that happens in the universe. This is really strong evidence that science is rediscovering God...

However, there is a crucial difference between the Unity-Law and God himself. No law of science can exist by itself. The laws of science are properties of matter; they just describe how matter behaves. So the laws only exist where matter exists. Consequently, the laws of science cannot explain how matter comes into existence...

**Rev. Dr. John Polkinghorne,
a physicist, theologian, and
Anglican priest.**



'...religion isn't just a question of shutting your eyes, gritting your teeth, and believing impossible things on some unquestionable authority... I think, under the skin, science and religion are cousins in the search for truth.'

Scientists suggest we do not need a first cause if the cause of the Big Bang was an infinite time ago – based on expansion, deflation, expansion models of the universe (the one we are in is the product of many, many others before it).

Christians have responded to this by saying: If the chain of 'causality' (*what caused the universe*) is infinitely long then it does not mean that the universe has to exist...

- Therefore, the universe needs a reason to exist...
- There is no way of proving the expansion deflation theory – all that can be proved using empirical evidence is the fact that the universe as we know it had a beginning.
- Therefore for many Christians God is not simply the 'God of the gaps'...
- God is necessary to make sense of the question why there is a universe, with scientific laws that can be discovered rather than nothing at all.
- The Bible; letter to the Colossians 1:17 - ***He existed before anything else, and he holds all creation together.***

SOURCE: The last sentence of his book... "If physics is the product of design, the universe must have a purpose, and the evidence of modern physics suggests strongly to me that the purpose includes us."

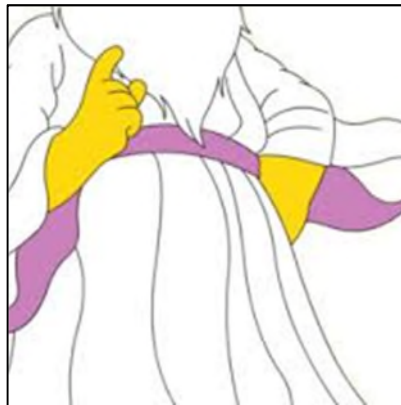
Paul Davis, Superforce--The Search for a Grand Unified Theory of Nature.

SOURCE: The only answer is that where there is a law there must be a lawgiver. The law itself cannot be the cause of the universe. God is the lawgiver, the First Cause. The Unity-Law is the expression of the wisdom of God. It shows us that God's creation manifests his supreme intelligence.

(David Barrett and Stephen Dingley (eds), Can we be sure God exists?

Faith-Keyway Publications, p. 9 at www.faith.org.uk)

For many Christians, science does not put an end to belief in a creator God. Rather the complexity of the universe, as revealed through scientific investigation, points to the existence of God. The Bible, in its own way, teaches that God is the creator of all that is, and so reveals the purpose of creation.



Similarities and differences between Science & Religion.

SIMILARITIES	DIFFERENCES
<ul style="list-style-type: none"> • Both have similar epistemologies (ways of knowing). Observation, imagination, intuition, reliance on the authority of others and reason are all called for. • Both are provisional. Religions often claim to have absolute truth on their side but history shows, that like science, they change and develop over time. Religions are considered to move from polytheism (belief in many gods) to monotheism (belief in one God) to internalised monotheism (God as something inside people as opposed to being something out-there). • Both can be turned into absolute systems (<i>Fundamentalism and Scientific Materialism.</i>) with bad consequences. • Both use models, symbols, analogies and paradigms. • Neither is objective since both work on assumptions. This is obvious for religion but scientists also work on assumptions; e.g. that the world makes sense and is predictable 	<p>Science: -</p> <ul style="list-style-type: none"> • Concerned with how things occur. • Answers empirical questions. • Concerned with is - the way the world actually is. • Analyses events back to more fundamental causes but tends to be silent about ultimate causes. (Science can take us back to the first milliseconds of the Big Bang, however because the laws of physics start to break down here science can't tell us about the ultimate cause of the Universe.) • Until recently science has tended to be reductive - tries to solve problems by taking things apart and examining their constituents. • Operates at the level of empirical reality. Beliefs based on physical Evidence <p>Religion: -</p> <ul style="list-style-type: none"> • Concerned with why the universe is here and the search for meaning, value and purpose. • Answers existential questions. • Concerned with OUGHT- how the world ought to be. • Concerned with ultimate causes. • Concerned with the search for liberation. • Tends to be holistic - looking for a common pattern behind the various dimensions of life- looking for the "big picture" which will make sense of it all. • Beliefs usually based on "faith", scriptures, authoritative individuals and institutions.

Activities & Tasks:

1. Why do some Christians think that the Big Bang does not pose a threat to their faith?
2. Why do some Christians argue that the Big Bang actually points to the existence of God?
3. Explain in your own words the argument that Paul Davies puts forward in defence of a creator God.
4. In what way do some Christians argue that it is not possible to have a chain of infinite events?
5. What is meant by the Unity Law?
6. How does the fact of a Unity Law open up the possibility of a creator God?
7. Why do the laws of science fail to explain why matter comes into existence?



Appendix 1: Standards.

Outcomes and assessment standards

Outcome 1

The learner will:

1 Apply knowledge and understanding of religious and philosophical questions, by:

1.1 Explaining a religious and philosophical question, in depth and explaining relevant theoretical or abstract ideas

1.2 Explaining the significance of the question to people's lives, in depth

Outcome 2

The learner will:

2 Critically analyse a religious and philosophical question and responses, by:

2.1 Explaining a religious response and a non-religious response to the question, in depth and explaining relevant theoretical or abstract ideas

2.2 Comparing and contrasting the two responses, in depth and explaining relevant theoretical or abstract ideas

2.3 Presenting a detailed, reasoned and well-structured conclusion on the question and responses, explaining supporting evidence and responding to contrasting viewpoints

The following terms are used within the Unit Specifications for this Course:

◆ **explaining, in depth** - will involve the learner providing evidence that they fully understand an idea, issue, religious practice etc., and are able to present a full and accurate description of its features. They will also be able to demonstrate that they understand the connections between an idea, belief, issue or source.

◆ **theoretical or abstract knowledge and understanding**- refers to knowledge and understanding that goes beyond being able to describe or explain factual elements of an issue, belief, source etc. This covers a wider variety of different ideas, depending on the context. For example, in relation to the World Religion Unit this may involve a learner being able to explain the concept of reincarnation. In relation to the Morality and Belief Unit it may include ideas like Utilitarianism, or the sanctity of life. In relation to the Religious and Philosophical Questions Unit it will encompass ideas like free-will, cause and effect.

◆ **presenting reasoned and well-structured conclusions** - will involve learners in being able to go beyond simply stating a conclusion. They will be required to provide a coherent line of argument involving, for example, a clear position, description of supporting evidence and responses to potential challenges.

◆ **interpreting features in the World Religion Unit** - will involve learners showing that they can understand, process and communicate information from a source. This will involve higher-order thinking skills as they apply knowledge to understand the source's meaning and relate this to knowledge and understanding of the source's context. In some cases, this may involve learners being able to understand and explain the meaning of a source that may not be immediately clear, or where the meaning is subtle or nuanced. Equally, it may involve learners being able to recognise different readings of a source, and think about what these mean and how a single source may have different meanings to different people. There is no requirement for learners to produce personal interpretations of sacred texts.

◆ **in-depth comments/conclusions** - will involve the learner in providing a conclusion on a relevant topic, theme, source etc. that brings together accurate factual information with an explanation of relevant theory or abstract concepts. The learner need not provide a conclusion which is unique, or personal. The conclusion must clearly explain a point of view on the topic/theme etc. The requirement for accuracy will require the learner to state a conclusion which, although it may be incomplete, is unambiguous.

Applying, Analysing and Evaluating

At Higher learners will be required to apply their knowledge and understanding of factual elements of religious moral and philosophical issues and questions. They will also be required to link these with underlying theoretical or abstract ideas which will require a greater depth and detail of understanding. For example, when studying the question of freewill they would be required, in addition to explaining the question and the responses in factual terms, to demonstrate that they have understood the concept of freewill, and that this is incompatible with a view that sees our actions as pre-determined. In the World Religion Unit, they would need to refer to the concepts of nibbana or dukkha and explain their meaning and importance in informing elements of Buddhist practices.

The Course will involve learners in using different sources of information including literature, religious sources, newspaper or online articles, blogs etc. Any piece of information, or source, is capable of yielding more or less relevant input to a study, depending on the skills of the learner. However, teacher/tutors should direct more able learners to more complex, and potentially richer sources of information. This will be for the individual teacher or lecturer to judge. It will be important to maintain a balance between individual research and directing learners towards valuable sources that allow them to demonstrate and practice their individual skills.

Level	Possible learner responses	Possible question types
Higher	Extended response Explanation and analysis required Clear and structured expression of complex ideas Able to consider different perspectives on an issue Able to make judgements	... Discuss To what extent ... How far ... Assess ... Critically examine ... Comment on ...

National 5	Detailed response Description and explanation required Clarity in expression of ideas Use of appropriate exemplification	Describe, in detail, ... Explain, in detail, ... To what extent ... How important ...
------------	---	--

Religious and Philosophical Questions	
The general aim of this Unit is to critically analyse religious and philosophical questions and responses. Learners will develop in-depth factual and theoretical knowledge and understanding of religious and philosophical questions and responses.	
The origins of life: mandatory content for Course assessment	Examples of coverage
<p>All learners should study the relevant question and responses, including religious responses. They should be able to apply the skills as described in the <i>Course Assessment Specification</i>. The content in each Part describes ideas and arguments which may feature in both religious and non-religious responses. The range of possible responses will be wide, and is not specified.</p> <p>What are the origins of life?</p> <ul style="list-style-type: none"> ◆ Role of a creator. ◆ Distinction between literal and metaphorical interpretations of creation stories. ◆ The Big Bang and evolution. ◆ Perspectives on the compatibility between reason and faith. 	<ul style="list-style-type: none"> ◆ God’s role as creator of a life/the universe. ◆ Overview of big bang as an origin of all existence. ◆ Overview of evolution and its implications. ◆ Examples of metaphorical

Religious and Philosophical Questions Unit assessment will focus on...

critically analysing religious and philosophical questions and responses.