WEEK 1: BEYOND REASON?
SCIENCE, FAITH, AND THE UNIVERSE

Day 1: Introduction

Today we will set the scene for this week's study. How does the interaction of science and faith affect our lives? What are some of the challenges that atheism poses to faith?

Take 10 or 15 minutes to complete the following activities.

1. Hot topics

List some contemporary issues which involve both science and faith. For example, think about medicine, education, and politics.

_____

_____

_____

_____

As we go through this course, keep your eyes open for news stories that mention both science and faith. What issues or questions arise and what effect do they have on society?

2. True or false?

Below is a series of statements about the issues that Part 1 of the documentary will tackle. Next to each statement, put a "T" if you think it is true, an "F" if you think it is false, or a question mark if you are not sure. (As you watch the episode, you will be able to reflect on whether you might change or clarify your answers based on what you learn.)

A. Science and faith are at war. _____
B. There are some conflicts between science and faith. _____
C. Most of the first scientists in history were Christians. _____
D. When science *can't* explain something, that is evidence for the existence of God. _____
E. When science *can* explain something, you see evidence for God. _____
F. Science and faith are two different ways of looking at the same world. _____
G. Some questions cannot be answered by science. _____
H. If the universe started with a Big Bang, God lit the "fuse." _____
I. Some scientists think there are many universes. _____
J. Understanding more about nature will help us to learn more about God. _____

3. Have you heard this?

The statements below represent some typical atheist attitudes to the relationship between faith and science. If you have heard someone express a particular attitude or idea, put a check mark next to the corresponding statement. If possible, discuss with someone else (or think to yourself) how you might respond to these challenges.

A. Science has disproved God.
B. Now that we know about evolution, it's irrational to believe that God made the world.
C. I think that everything we do can be explained scientifically.
D. Religion can all be explained psychologically.
E. We're just made up of molecules—soon scientists will know how we think, and then we'll know for certain that there's no purpose in life.
F. Most scientists are atheists.
G. People used to believe in God because they couldn't explain things like lightning, but now that we know how everything works scientifically, we don't need to invent a God to believe in.
H. So-called "miracles" can all be explained scientifically; they don't really happen.
I. There's no evidence for the existence of God—soon no one will believe in him.
J. Science is about facts and religion is about faith—only superstitious people are religious.
K. The church tortured Galileo and made him give up science. Christians have always been against science and anything rational.

Watch Test of FAITH*, Part 1 (one-half hour)*

Review Part 1

The following sheet summarizes Part 1 of the DVD. To help you review what you have seen, fill in the blanks below:†

CHAPTER 1

The question we are faced with in society today is: **HAS SCIENCE DONE AWAY WITH FAITH?**

But many Christians who are also scientists have no problem reconciling their science and their faith.

The first scientists in the Western world were actually _____

The conflict we hear about in the media was mainly stirred up by Victorian scientists who wanted to get rid of the clergy who were involved in science.

One way of making sense of the difference between science and religion is to think of a boiling kettle.

How is it boiling? Because the element is heating the water.

Why is it boiling? Because I want some tea.

In the same way, _____ asks **"how?"** and _____ asks **"why?"**

CHAPTER 2

These scientists believe that God created the universe. The **"how"** is answered by science – they see evidence that the universe started with a _____

We can make sense of the world using science and mathematics.

E.g., it was even possible to predict something as strange as antimatter using mathematics – several years before there was any physical proof for it.

But **why** is it like that? Is it because the universe was created by an intelligent being?

GOD OF THE _____

There is a lot about the universe that is still unexplained.

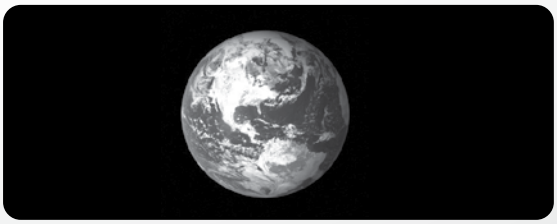
Are the unexplained parts proof for God? No, because scientists might find an explanation for these things in the future.

If we say these gaps are evidence for God, then if the evidence disappears, where is God?

It's far better to look at the whole picture and say, "What an amazing creator!"

CHAPTER 3

For example, the chances of the Big Bang resulting in a universe, and our planet that can support life, are very _____ Even those scientists who are atheists have been surprised by this.



CHAPTER 4

DO WE LIVE IN A MULTIVERSE?

Some scientists explain the existence of life on earth by saying there are _____ universes, so it's not surprising that one has turned out like ours.

But there is no evidence at all for these other universes. Neither will it mean, if they do exist, that they are outside God's creation.

Science can only answer certain questions – it doesn't tell you anything about the meaning of life.

_____ isn't threatened by science. Why should we worry about finding out more about the world God created? In fact, the more we find out, the more we can be amazed by what God has made.

†. *Test of FAITH Leader's Guide*, page 101. Reproduced with permission, Paternoster 2009, Wipf & Stock 2010.

Day 2: Chapters 1 and 2

Part 1, chapter 1: HOW DO PEOPLE SEE THE WORLD?

Introduction

Science and religion both search for, and claim to provide, knowledge of reality. Are they competing with each other or irrelevant to each other? Or are they somehow complementary?

In this episode, Ard Louis says that many people live "unexamined lives." This is a reference to the Greek philosopher Socrates, who said, "The unexamined life is not worth living." Through today's study, we will be examining our biases, assumptions, and how we come to believe that something is true.

In chapter 1 of the DVD, we will learn about

1. How we know what we know
2. Our underlying presuppositions
3. The development of modern science in Christian Europe
4. Different kinds of truth

Watch Part 1, chapter 1 (8 minutes)

Stop at John Polkinghorne: ". . . the really rich and remarkable world in which we live." (7 minutes 41 seconds)

Discussion and questions

Cool words!

Epistemology – from Greek: *episteme* means "knowledge/science" and *logos* means "study of."

1. How do I know what I know?

Before we begin to talk about science and religion, we need to think about knowledge itself—in philosophy, people refer to this as epistemology.

> *"How do I obtain reliable knowledge about the world? How do I know that something is true, or how do I know that something is false?" – Dr. Ard Louis*

A. What are some ways that you gather information about the world?

- Observable, measurable phenomena (science)
- Logical reasoning
- Personal experience
- Divine revelation (the Bible)
- Scientific experiments
- Human authority

List some examples of human authority (some authorities are more reliable than others):

- Text books
- _____
- _____
- _____
- _____

B. * (Remember, a red asterisk means that students can skip this section if necessary.)
Which of the above-mentioned "ways of knowing" makes you believe that . . .

- The earth is round?

_____

_____

- American astronauts landed on the moon in 1969?

_____

_____

- Jesus is alive?

_____

_____

NASA Apollo Archive, public domain

2. Worldviews and presuppositions

Your epistemology in turn affects your metaphysics. You build your worldview, or *metaphysic*, from your underlying assumptions about the world, along with your values and beliefs. Everyone has a worldview—but not everyone realizes it. It is important to understand your presuppositions, the things which you hold as true and from which you build your worldview.

Cool words!

Metaphysics – from Greek: *meta* means "about" or "beyond," so *metaphysics* deals with what is beyond the physical, i.e., the philosophical nature of existence. Your "metaphysic" is your way of interpreting the world.

Nihilism – a philosophy which regards life as having no purpose or intrinsic value.

*Three major worldviews inform the discussion of science and religion, and each has a different set of underlying assumptions:

- *Naturalism/scientism/atheistic materialism* – Only things which we can observe by scientific methods are real. The physical, material world is all that exists. Everything we see and experience has a solely physical, material cause. God and the spiritual realm do not exist.
- *Deism* – God and spiritual things are real, but they do not intervene in the physical world. God created or caused the physical, material world (as observable by science). Like a watchmaker, he has established natural laws and has set the universe ticking, but now he has no direct contact with, or involvement in, the world.
- *Theism* – God and spiritual things are real, and they do intervene in the physical world. God is both the Creator and sustainer of all things. The universe runs because God endowed it with natural laws, and because he is actively sustaining it at all times. God sometimes breaks into the natural order in a miraculous way (e.g., healing, prophecy, the resurrection).

Imagine that a man who suffered a debilitating knee injury in a car crash three years previously comes running into his local doctors' office, waving his crutches. Three doctors listen carefully to him as he excitedly tells his story: "This person at church prayed for me, and then, when I woke up the next morning, I found that I could bend my knee with no pain! It's a miracle!" One doctor is an atheist, one is a deist, and the other is a theist. How might each doctor "explain" this man's story?

- Atheist:

_____

_____

- Deist:

_____

_____

- Theist:

_____

_____

3. Development of science from the Christian worldview

The Christian worldview has shaped all of Western history. Ironically for those who try to use science to disprove Christianity, science as we know it today emerged out of Christian Europe. Early scholars saw no division between the study of God (theology) and the study of God's world (science).

> ***Cool words!***
>
> Theology – from Greek: *theos* means "God," and *logos* means "study of."

A. Who helped drive a wedge between science and faith, making them independent areas of study?

_____

B. If our metaphysic rests on the idea that God is rational and intelligent, what might we expect the universe to be like?

_____

_____

C. We have to go beyond the idea that God is simply a rational intelligence—otherwise we could be left with the absent god of Deism. If our metaphysic assumes that God is good and is actively involved in the universe, what might we expect to see in this universe?

_____

_____

4. Different kinds of truth

Both science and religion are searching for truth. Many different disciplines (areas of study) help us to understand different aspects of reality and different kinds of truth about the world.

A. Match each statement below to the correct category of information:

1. Humans perceive the frequency of sound waves (which we measure in hertz) as pitch.	a) Musical fact
2. Mozart's Symphony Number 29 in A makes me feel peaceful.	b) Scientific fact
3. A modern orchestra tunes to the oboe's A at 440 hertz.	c) Mathematical fact
4. In 1939 it was agreed at an international conference that concert pitch would be 440 hertz for an A.	d) Personal fact
5. The hertz, a unit of frequency defined as number of cycles per second, is often used in graphing sine waves.	e) Historical fact

As an example of different, complementary kinds of truth, John Polkinghorne describes the ways we might answer the question, "Why is the kettle boiling?" We might give a mechanistic answer that explains how "burning gas heats the water," or we might give an answer that has to do with purpose: "I want to make a cup of tea." Both of these statements are aspects of the truth and, though they are different, they fit together.

> ***"We don't have to choose between those two. In fact, if we are to understand the mysterious event of the boiling kettle, we need both those forms of explanation. Similarly, I think science tells us how the world works, but religion tells us there is a meaning and purpose, something being fulfilled in the unfolding of the history of the world. So I need both those perspectives if I am truly to understand the really rich and remarkable world in which we live." – Rev. Dr. John Polkinghorne***

B. You see a man with a black eye. You ask him, "What happened?" Write down two different ways he could answer. Hint: one has to do with the scientific mechanism (how), while the other has to do with the purpose or meaning (why).

- Answer 1:

_____

_____

_____

- Answer 2:

_____

_____

_____

Part 1, chapter 2: GOD OF THE GAPS

Introduction

Although both science and faith have a lot to say about different aspects of truth, people of faith need to be careful how they try to prove God's existence so they do not fall into the trap known as "God of the gaps." The Bible says that Jesus "upholds the universe by the word of his power" (Hebrews 1:3, ESV), so we can expect to see glimpses of him in all creation.

In chapter 2 of the DVD, we will learn about

1. Scientists' views of the Big Bang (Note: we will study the interpretation of Genesis 1–3 in Part 2 of the DVD, so, if you have questions about this now, jot them down and refer back to them when you get to Part 2)
2. The limits of science
3. The practice of "God of the gaps"

Watch Part 1, chapter 2 (6 minutes)

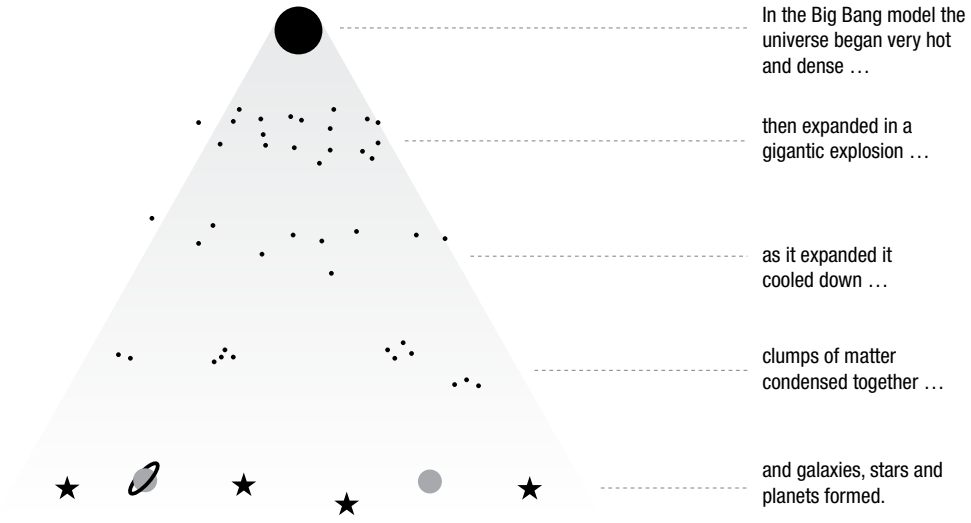
Stop at Katherine Blundell: ". . . this is a practice known as 'God of the gaps,' and it's dangerous." (14 minutes 00 seconds)

1. The Big Bang

The scientists in this chapter talk about "the Big Bang" as part of the story of creation.

Read the information below to find out about the science behind the Big Bang.†

How did the universe start?



In the 1920s, Edwin Hubble discovered that the universe is still expanding. Astronomers detect that all the galaxies are moving away from us, and that more distant galaxies are moving away faster. This relationship between distance and speed means that the universe as a whole is expanding. In the 1990s, astronomers found that the expansion rate is not constant but is speeding up over time. Using the current best measure of expansion rate and how it changes over time, astronomers calculate that the universe itself must have begun about 13.5–13.9 billion years ago.

In 1965, Arno Penzias and Robert Wilson detected faint noise in a radio receiver. Further study showed that these radio waves arrive at earth from all directions, so the radiation must be coming from the universe itself. And the radiation has a thermal signature, showing that it was emitted by something hot. It is the light and heat of the Big Bang. Because of the expansion, the radiation has cooled over time to near absolute zero, consistent with predictions made before it was discovered.

How old is the universe?

Astronomers are able to measure age using several methods. Here are two of them:

Astronomers can calculate how long it will take a star to burn out, based on its size. Big stars burn faster than small stars. A "globular cluster" is a cluster of stars (of different sizes) that formed at the same time. Since the big stars die out first, when only small stars are left scientists can tell that it is an old cluster. So by looking at the size of stars still in the cluster, astronomers can measure its age. The oldest globular clusters found are at least 11 billion years old. The universe as a whole must, therefore, be older than this.

With the Hubble Telescope astronomers can see light that has travelled for about 13.3 billion years, from the very first stars. The universe must be older than this for the light to reach us today.

For further information read: http://map.gsfc.nasa.gov/universe

†. *Test of FAITH Leader's Guide*, page 102. Reproduced with permission, Paternoster 2009, Wipf & Stock 2010.

Do you think God could have used a Big Bang to start the universe? Why or why not?

2. The limits of science

Katherine Blundell says that the question of what the universe was like before the Big Bang is "outside science."

A. What kinds of questions do you think science can address? (What makes something a possible subject for scientific study?)

B. What kinds of questions are outside of science? (What makes something beyond the reach of scientific study?)

3. "God of the gaps"

> *"If you say, 'Well, science answers this much about the way the universe is, but science doesn't answer this aspect of the universe's characteristics,' and then to invoke God and to allow God to reside in that gap in our knowledge, that's dangerous because when a clever scientist comes along that gap will be filled by a deeper and richer scientific understanding. So then, where you posit that God is allowed to reside gets smaller and smaller and smaller, and this is a practice known as 'God of the gaps,' and it's dangerous." – Dr. Katherine Blundell*

The diagrams below illustrate the idea of "God of the gaps."†

Unknown information
Answers from science
Religion ("God")

†. *Test of FAITH Resources for Schools*, PowerPoint 2A. Reproduced with permission, The Stapleford Centre 2009.

We can see "God of the gaps" thinking in people's changing attitudes towards the weather. For example, many ancient peoples thought that thunderstorms were the direct action of God (or "the gods"). They could not understand lightning and thunder, so they attributed them to supernatural intervention. Today, science has discovered why lightning strikes and thunder follows. If we believed in God because we could not explain the mysterious power of thunderstorms, then, when we discovered the scientific explanation for these storms, we might conclude that there is no place for God. Our "God of the gaps" reasoning might cause us to lose our faith. This sort of thought process happened during the Enlightenment. Scientific knowledge increased and replaced many "superstitions," but because people's faith was based on the "gaps" in their understanding, many began to doubt the reality of God as science filled those gaps.

> *"Such sheets of fire, such bursts of horrid thunder,*
> *Such groans of roaring wind and rain, I never*
> *Remember to have heard: man's nature cannot carry*
> *The affliction nor the fear . . . . Let the great gods,*
> *That keep this dreadful pother o'er our heads,*
> *Find out their enemies now."*
> *– William Shakespeare, King Lear, 3.2.46-52*

A. Explain, in your own words, the practice of "God-of-the-gaps" logic.

B. Why is "God of the gaps" a dangerous practice in both faith and science?

C. * Read Colossians 1:15–17 and Hebrews 1:3a. Where in the universe do we find evidence for God? What do these passages say about this idea of not putting God in the "gaps"?

Although we should be wary of looking for God in the gaps in our understanding, on Day 3 (next page) we will examine more profound methods of seeing God in creation.

Day 3: Chapters 3 and 4

Part 1, chapter 3: FINE-TUNING

Introduction

How does the amazing fine-tuning of our universe provide proof (or not) for a creator? Can we actually *prove* the existence of God?

In chapter 3 of the DVD, we will learn about

6. The Anthropic Principle
7. The difference between proof and evidence

Watch Part 1, chapter 3 (5 minutes)

Stop at Alister McGrath: ". . . there's a correspondence between the theory and the observation." (18 minutes 54 seconds)

Discussion and questions

1. The Anthropic Principle

John Polkinghorne tells the story of Fred Hoyle's discovery of the resonance that allows carbon to form. This resonance provides one example of the many physical laws and constants—basically, the "default settings" of the universe—that exist at the precise levels necessary to allow life to exist. Taken all together, these fine-tunings of physical properties in nature have led many to formulate the "Anthropic Principle," which is also known as the "Goldilocks Principle": our world is "just right" for life.

* Many different factors in our universe have to be exactly right—otherwise we could not be here. These details have amazed scientists, whether they are religious or not, because we currently have no good scientific explanation for why these factors should all be "set" at such precise values. Here are just a few examples:†

1. **Carbon** is an essential element for life. The **strong nuclear force** holds the particles that make carbon together. If the strong nuclear force were any weaker, carbon would never form. If it were any stronger, all the carbon would turn into oxygen. As it is, this balance is tuned exactly so that both elements are present.
2. The number of **dimensions** in our universe is right for life. You can only have planets with stable orbits if you have three dimensions in space. Any more than three and things would become very unstable, and we could not survive.
3. The amount of **matter** and **energy** present at the time of the Big Bang had to be very finely balanced. If this balance had not been exactly right, the universe would either have collapsed as soon as it began because of the strength of gravity, or it would have blown apart too quickly. The amount of matter and energy present had to be correct to an accuracy of 1 in 10^{60} (one with sixty zeros after it).
4. In the universe, **disorder** always increases. The universe must have been much more ordered when it began in order for it to be as organized as it is now. Roger Penrose, a former professor of mathematics at Oxford, calculated that the chance that our universe would have this amount of order randomly is one in 10^{123}. This number is so large that if you were to write a zero on every atom in the visible universe, you would run out of atoms before you ran out of zeros.

> ***Cool words!***
>
> Anthropo – a Greek prefix meaning "having to do with humans" (e.g., anthropology, the study of humanity). The Anthropic Principle does not mean, however, that the universe is fine-tuned for *human* life, just carbon-based life in general.

†. *Test of FAITH Leader's Guide*, page 103. Reproduced with permission, Paternoster 2009, Wipf & Stock 2010.

5. The **cosmological constant**, often called "**dark energy**," acts as a kind of anti-gravity force, pulling the universe apart. It has to have a very small value. If it were much greater than it is, the universe would fly apart so rapidly that no stars or planets could form.
6. Atoms are made up of **protons** and **electrons**. The mass of a proton must be almost exactly 1,840 times the mass of an electron in order for the building blocks of life, such as DNA, to exist and be stable.

* Science cannot explain *why* the physical set-up of the universe should be so perfectly tuned as to allow life to exist. Does this mystery point to God? By using it as "proof for God," are Christians simply shoe-horning God into another "gap" in our knowledge?

2. Proof vs. evidence

> *"I think it's fair to say that nothing that we observe in nature, for example, its regularity, or indeed these remarkable anthropic phenomena, prove that there is a God, but the really important point is they are absolutely consistent with belief in God, and therefore I'd like to suggest that we don't think about nature proving that there is a God; that's how an earlier generation might have approached this. For me the really important thing is that the world as we observe it corresponds with what Christians would say the world ought to be like, that there's a correspondence between the theory and the observation." – Prof. Alister McGrath*

Alister McGrath draws a distinction between proof and evidence. Christians cannot prove God, but just as a scientist would, we have a "theory" (our belief in God) and we have our observation of the universe (through science), and we can see that they correspond (match up). Thus, as in a good detective story, the theory is a good fit for the evidence. We will never prove God's existence—that would eliminate the need for faith—but we can provide some good evidence, such as the Anthropic Principle.

Part 1, chapter 4: SCIENCE AND FAITH

Introduction

Cutting-edge theories about multiple universes may seem to challenge Christians' use of the Anthropic Principle as evidence for a creator. However, Christians working in science encourage us that the more we see of God's creation, the more we can marvel at his power and creativity. Our proper response should be worship and exploration: "O LORD, our Lord, how majestic is your name in all the earth! You have set your glory above the heavens" (Psalm 8:1).

In chapter 4 of the DVD, we will learn about

1. The concept of a multiverse
2. Different ways of relating science and faith

Watch Part 1, chapter 4 (7 minutes)

Watch to the end of the episode.

Discussion and questions

1. Multiverse

A. Why is the image of fish swimming in hundreds of fishbowls a potentially misleading illustration for a multiverse?

_____

_____

B. The scientists in the film respond differently to the idea of a multiverse; however, they all affirm that this theory does not threaten Christian faith. Why are Christian faith and the possibility of a multiverse not necessarily contradictory?

_____

_____

_____

Katherine Blundell points out that, ironically, atheists who use the multiverse as a way to eliminate the need for a creator (by saying that our universe randomly drew "the winning ticket" for life) have moved out of the realm of science and into the realm of faith. Into the "gap" in their understanding, they have put a multiverse instead of God.

C.* Why might the idea of a multiverse be outside of science?

_____

_____

_____

At the moment, the multiverse is a conjecture and science cannot verify it. However, researchers (including Christians) are exploring ways to test the concept of the multiverse. If and when scientists can propose testable hypotheses, science will examine the possibility of a multiverse—but it does not pose a threat to Christianity.

Cool words!

Cosmology – from Greek: *kosmos* means order, and "the cosmos" commonly refers to the universe. *Logos* means "study of."

Materialism – in this context, materialism/ist means the belief that the physical, material, scientifically observable world is all that exists.

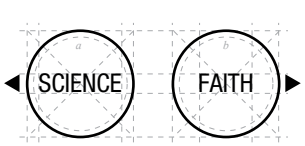
2. The relationship between faith and science

Now that you have had the chance to explore various issues surrounding science and faith, you will be better able to think about how the two ways of knowing (epistemologies) relate to each other.

There are different "models" (frameworks for understanding) that help us visualize the relationship between science and faith. We will look at four of them. None of these models is the "right" answer—but some provide a more helpful way of looking at the issues.

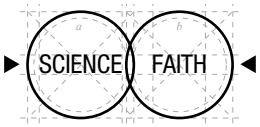
The following diagrams represent the most common ways of relating science and faith:†

1. They're in conflict: they ask the same questions and get different results.

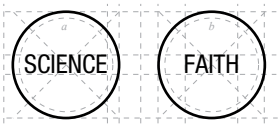


2. They're the same: *either* faith can be explained entirely by science, or science can be explained by faith.

3. They're complementary: science and faith ask different questions, and there are some areas where they can overlap and interact.



4. They're non-overlapping: they ask different questions.



Some atheists and some Christians take the conflict view ("You cannot believe in both the Bible and science"). New age/Eastern philosophy can take a fuzzy view that science and religion are one and the same. Some atheists and Christians take the non-overlapping/independent view, that science and faith have nothing to say to each other. John Polkinghorne's kettle illustration is a good example of the complementary view, in which science and faith answer different questions but must fit together to help us arrive at truth.

A. Which of these models do you most agree with, and why?

B. If you can think of a different way of relating science and faith, sketch your diagram below:

†. *Test of FAITH Leader's Guide*, page 24. Reproduced with permission, Paternoster 2009, Wipf & Stock 2010.

Days 4 and 5: Extension

Choose one of the following questions and write a 1–3 page (300–900 word) essay in response. Essay questions are divided into three levels based on difficulty.

The effective essay will contain an engaging introduction, a well-argued and organized body, and a solid conclusion. Where appropriate, use quotations and cite your sources.

Alternatively, you could prepare and give a presentation rather than write an essay.

Resources to help you in your research are listed beneath some of the more specific questions. General resources are listed at the end of this section.

Please use discernment as you research. Teachers should oversee the websites students are accessing. Test of FAITH *may not necessarily endorse all the material on the websites recommended below.*

1. Choose one of the scientist-believers from history on page 29 and research his life. (A number of female scientists were working during this period, but since their writings are less well known, to write about them would not be the subject of a foundation level essay.) Write/present a brief biography of your chosen scientist, highlighting his Christian faith and his contribution to science. *(Foundation)*
    - Faith Alive Christian Resources. (2011). "Scientists of faith." <www.faithaliveonline.org/origins/pdf/Origins_02-01.pdf>.

2. "All truth is God's truth." Discuss this statement in light of the different kinds of truth. What do we learn about God's character from the truths found in nature/science? Why is exploration through science a "divinely Christian activity"? (Hint: Both Galileo Galilei and Johannes Kepler wrote on this subject, so you could try using them as sources.) *(Foundation)*

3. Defend the statement "Modern science emerged from Christian Europe" by choosing three scientists of faith from page 29 and showing how their beliefs and worldview influenced their scientific discoveries. *(Intermediate)*
    - Davis, T. (n.d.). "Christianity and science in historical perspective." Test of FAITH. <www.testoffaith.com/resources/resource.aspx?id=623>.
    - Harrison, P. (2010, February 4). "Religious influences in the founding of the royal society." Faraday Institute for Science and Religion, and Christians in Science [Lecture]. <www.st-edmunds.cam.ac.uk/faraday/Lectures_old.php?Mode=Add&ItemID=Item_Multimedia_339>.
    - McMullin, E. (2009, April). "The Galileo affair." Faraday Institute for Science and Religion. Faraday Paper Number 15. <www.st-edmunds.cam.ac.uk/faraday/Papers.php>.
    - Russell, C. (2007, April). "Science and faith in the life of Michael Faraday." Faraday Institute for Science and Religion. Faraday Paper Number 13. <www.st-edmunds.cam.ac.uk/faraday/Papers.php>.
    - Faith Alive Christian Resources. (2011). "Scientists of faith." <www.faithaliveonline.org/origins/pdf/Origins_02-01.pdf>.
    - Test of FAITH. (n.d.). "Briefing sheet session 1: The Christian roots of science." <www.testoffaith.com/resources/resource.aspx?id=307>.

4. Which of the four models for relating science and faith do you think is best? In your own words, describe each of the four models and examine the benefits and potential downfalls of each. Finally, explain which one you think best represents how science and faith fit together, and why. *(Intermediate)*
    - Alexander, D.R. (2007, April). "Models for relating science and religion." Faraday Institute for Science and Religion. Faraday Paper Number 3. <www.st-edmunds.cam.ac.uk/faraday/Papers.php>.
    - Crawley, W. (2011, June 10). "Science and religion: duet or duel?" *Will and Testament*. BBC [web log]. <www.bbc.co.uk/blogs/ni/2011/06/science_and_religion_duet_or_d.html>.
    - Poole, M. (2006). "God and the big bang." Christians in Science. <cis.org.uk/upload/Resources/Universe/Poole_bang.pdf>.
    - Test of FAITH. (n.d.). "Briefing sheet session 1: Ways of understanding science and religion." <www.testoffaith.com/resources/resource.aspx?id=246>.

5. In your own words, explain the Anthropic Principle and discuss it. Is the Anthropic Principle another "gap" that Christians are filling with God? Does the amazing fine-tuning in the universe prove God? Why or why not? *(Advanced)*

    - Holder, R.D. (2007, April). "Is the universe designed?" Faraday Institute for Science and Religion. Faraday Paper Number 10. <www.st-edmunds.cam.ac.uk/faraday/Papers.php>.
    - Polkinghorne, J. (2007, April). "The Anthropic Principle and the science and religion debate." Faraday Institute for Science and Religion. Faraday Paper Number 4. <www.st-edmunds.cam.ac.uk/faraday/Papers.php>.
    - Poole, M. (2006). "God and the big bang." Christians in Science. <cis.org.uk/upload/Resources/Universe/Poole_bang.pdf>.
    - --. (n.d.) "Big and old and dark and cold." Science and Religion Forum. <www.srforum.org/articles/big--old--dark--cold>.

6. Research a few different multiverse theories and explain them in your own words. Why would atheists choose to believe in a multiverse? What do you think is an appropriate Christian response to the concept of a multiverse? *(Advanced)*

    - Ellis, G.F.R. (2007, November 6). "The multiverse, ultimate causation and God." Faraday Institute for Science and Religion [Lecture]. <www.st-edmunds.cam.ac.uk/faraday/Lectures_old.php?Mode=Add&ItemID=Item_Multimedia_190>.
    - Holder, R.D. (2007, April). "Is the universe designed?" Faraday Institute for Science and Religion. Faraday Paper Number 10. <www.st-edmunds.cam.ac.uk/faraday/Papers.php>.
    - --. (2006, October 19). "God, the multiverse, and everything." Christians in Science. <cis.org.uk/upload/Resources/Universe/rodney_holder_multiverse.pdf>.

7. Discuss prayer and miracles. In order to practice science properly, scientists must assume that there is a physical/material cause for the things that they observe (an approach known as *methodological naturalism*). If you were a scientist (and a Christian), how would you reconcile your pursuit of scientific explanations with your belief that God answers prayers and acts in the world today? *Does* God actually intervene in the physical world he created—and what does the Bible say? *(Advanced)*

    - Humphreys, C. (2004, March 2). "Can scientists believe in miracles?" Faraday Institute for Science and Religion [Lecture]. <www.st-edmunds.cam.ac.uk/faraday/Lectures_old.php?Mode=Add&ItemID=Item_Multimedia_1>.
    - Poole, M. (2006). "God and the big bang." Christians in Science. <cis.org.uk/upload/Resources/Universe/Poole_bang.pdf>.
    - Wright, T. (2007, May 15). "Can a scientist believe the resurrection?" Faraday Institute for Science and Religion [Lecture]. <www.st-edmunds.cam.ac.uk/faraday/Lectures_old.php?Mode=Add&ItemID=Item_Multimedia_151>.

Extra *Test of FAITH* resources

Website

Test of FAITH's resource page includes downloadable articles and briefing sheets, as well as footage from interviews with scientists which did not appear on the DVD: www.testoffaith.com/resources

Short articles

- Davis, T. (n.d.) "Christianity and science in historical perspective."

Briefing sheets

- "The Christian roots of science"
- "Science and knowledge of God"
- "Ways of understanding science and religion"

Interview clips

- Denis Alexander: 5 clips on the relationship of science and faith, atheism.
- Simon Conway Morris: Miracles.
- Deborah Haarsma: Fine-tuning, multiverse, 4 clips on the relationship of science and faith.
- Ian Hutchinson: 4 clips on the relationship of science and faith (warfare model, levels of explanation).
- Ard Louis: Limits of the scientific method ("Is science the whole story?"), history of science and religion, 3 clips on the relationship of science and faith.
- Alister McGrath: The Anthropic Principle, atheism, 6 clips on the relationship of science and faith.
- Bill Newsome: 2 clips on the relationship of science and faith.
- Jennifer Wiseman: Multiverse, fine-tuning, characteristics of God, a personal God, 2 clips on the relationship of science and faith.

Bonus interview clips on DVD

- Ard Louis and John Polkinghorne – Facts and faith
- Ard Louis – Intelligibility
- John Polkinghorne and Katherine Blundell – A personal God
- Deborah Haarsma – The Big Bang
- David Wilkinson – The Big Bang
- Deborah Haarsma – The multiverse
- David Wilkinson – The multiverse
- David Wilkinson – Supporting Christians in science

Scientists of Faith†

Roger Bacon (c.1214–1294)

Roger Bacon was a Franciscan monk who was important right at the beginning of the development of modern science. He believed it was very important to have an empirical (observed or based on experiment) basis for beliefs about the natural world. He contributed to the idea of 'laws of nature'. He studied mathematics, optics, the making of gunpowder, astronomy, and the anatomy of the eye and brain.

Johannes Kepler (1571–1630)

Johannes Kepler was an astronomer who formulated the laws of planetary motion that were based on the observations of Tycho Brahe (a Danish astronomer). These are still used to calculate the approximate position of artificial satellites, the outer planets, and smaller asteroids. He also did a lot of work in the field of optics, and invented a new type of telescope which was used to confirm the discoveries of Galileo.

Galileo Galilei (1564–1642)

Galileo Galilei was one of the early supporters of a sun-centred (heliocentric), view of the solar system. He was censured and imprisoned by the Church, but this was mostly because of the way he spoke to people in power. His imprisonment was house arrest, and he was never tortured (as Huxley would have had us believe). He never abandoned his faith, and contributed to many areas of science, including understanding of the physics of motion and sound.

Michael Faraday (1791–1867)

Michael Faraday was a chemist and physicist and also an elder in his church. He established the basis for the electromagnetic field concept, electromagnetic induction, and established that electromagnetism could affect rays of light. He discovered benzene, and invented the first working electric motors. Some people think he was the greatest experimenter in the history of science.

James Clerk Maxwell (1831–1879)

James Clerk Maxwell was a physicist who formulated classical electromagnetic theory in 'Maxwell's equations', which synthesised all of the previously unrelated work regarding electricity, magnetism and light into one coherent theory. He demonstrated that electricity and magnetism travel in waves at the speed of light. He also created a statistical way to understand the kinetic motion of gases and laid the foundation for special relativity. Many scientists think that he was as important as Einstein and Newton.

Gregor Mendel (1822–1884)

Gregor Mendel was an Augustinian priest and is known as the 'Father of Genetics'. He studied inherited traits in pea plants, and discovered that inheritance follows certain laws. His work went largely unappreciated until the turn of the 20th century.

†. *Test of FAITH Resources for Schools*, page 21. Reproduced with permission, The Stapleford Centre 2009.