



Test of FAITH

Science and Christianity:

An Introductory Course for Homeschoolers

www.testoffaith.com/homeschool

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This material was developed and written by Abigail McFarthing.

Design & illustrations: Contrapositive (<http://www.contrapositive.tv/>).

Layout: Abigail McFarthing.

Project management: Dr Ruth Bancewicz.

Editor: Tara Smith.

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Test of FAITH

Science and Christianity

An Introductory Course for Homeschoolers

A three-week course for high school students on science and Christianity, featuring the documentary *Test of FAITH* and including study notes, follow-up questions, and essay topics.

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A note to students and their parents/teachers

Some atheists use science as a weapon to attack faith, and some Christians use faith as a bomb-shelter to hide from science. But are faith and science really enemies? What do devout Christians working in the sciences today have to say? The *Test of FAITH* DVD and Introductory Course for Homeschoolers will help you explore the relationship between contemporary science and the Christian faith.

The course has been written from a Christian perspective, but it is up to you and your parent/teacher to discuss where you stand in terms of your faith. Our hope is that if you are a Christian, the material we cover will strengthen your belief in God and the Bible—and that if you are looking in on Christianity from the outside, this course will help you to consider the rational grounds for faith.

The *Test of FAITH* documentary offers you the opportunity to examine your assumptions and the worldviews of others. The various questions and essay assignments will encourage you to explore different topics and beliefs—not necessarily because all viewpoints are equally valid, but to push you to investigate different ideas and to begin to form your own conclusions. Completion of this course will lay a firm foundation for future intellectual pursuits and life as an informed and engaged citizen in the 21st century.

All of the scientists and theologians interviewed in *Test of FAITH* are Christians who believe that God created all things and that Jesus Christ is their savior. They affirm the historic, orthodox confessions of the Christian faith and hold a high view of the Bible's authority as the inspired Word of God. You can read a short biography of each scientist and theologian in the Bonus Features of the DVD.

Most of the contributors to this documentary accept the evidence from scientific research that the universe is billions of years old, and that stars, planets, and all life on earth developed through evolutionary processes. The DVD makes a case for this view (which is called Theistic Evolution, or Evolutionary Creationism). The main concern of *Test of FAITH* is deeper, however. It is not so much about “evolution vs. creation” as it is about defending belief in God against popular claims that modern science eliminates the plausibility of religious belief.

Many resources on Christianity and science are available for homeschoolers, most of which have been written from the standpoint of Creation Science or Intelligent Design. The *Test of FAITH* DVD and the related Introductory Course for Homeschoolers aim to complement these materials by exploring Theistic Evolution, which is the most commonly held view among Christians working in the sciences. Although many evangelical theologians and biblical scholars also hold this view, Christians and media commentators are not often familiar with Theistic Evolution. The course covers several Christian perspectives on origins, including Young Earth Creation and Intelligent Design, and we encourage you to explore them all. We do not expect everyone to agree with everything in this curriculum; please see it not as a textbook for you to memorize but as a catalyst for further thought and discussion.

If Christianity is true, then Christians should have no fear of discussion and debate. Equipping you with a thorough knowledge of the range of views held within the Christian church will strengthen your critical thinking skills and your ability to understand and defend your faith. The goal is not for you to “make up your mind” but to develop your mind.

As you go through life, you will inevitably encounter new and unsettling ideas from other Christians, non-Christians, or people who actively oppose Christianity. And some of these ideas may shake your faith. The *Test of FAITH* DVD and study guide will help you to examine some of these ideas and issues and will prepare you to live as a thoughtful believer and witness in today's society. This course will challenge you to ask yourself some hard questions about what and why you believe.

Some issues do not come with easy “black and white” answers. The Bible was written in a pre-scientific time and does not speak directly to all the issues that new technologies and scientific ideas raise—but Christians can always apply broader biblical principles to any given situation. The course material will help you discover and understand those principles. Above all, the goal of *Test of FAITH* is to encourage and reassure you that Christian belief has what it takes to pass modern science's “test of faith.”

Our prayer is that you will not be “tossed back and forth by the waves, and blown here and there by every wind of teaching” (Ephesians 4:14), but that these resources will help you give a “reason for the hope that you have” (1 Peter 3:15).

Test of FAITH

In three half-hour episodes, the *Test of FAITH* documentary examines some “tests of faith” that modern science poses:

1. Astrophysics and Cosmology (God’s existence, the Big Bang, multiverses)
2. Biology and Ecology (creation and evolution, the environment)
3. Neuroscience and Technology (religious experiences, the brain, ethical issues)

The DVD and the supporting Introductory Course for Homeschoolers explore these topics and demonstrate that we do not have to choose between science and faith, and that Christianity is a rational and coherent way of understanding our universe.

The Introductory Course for Homeschoolers

This course is designed for homeschooled high school students (ages 14–18), although advanced junior high students (ages 12–13) may also be able to tackle it. The extension essay assignments are differentiated by difficulty:

- Junior high (ages 12–13, 7–8th grades, where appropriate) – *foundation*
- Early high school (ages 14–15, 9–10th grades) – *intermediate*
- Late high school (ages 16–18, 11–12th grades) – *advanced*

We suggest that foundation level students watch the documentary with their teachers. (Of course, teachers may want to watch the documentary regardless of the level of their students.) Foundation level students may also shorten the course by skipping certain activities (marked with a red asterisk *).

Features of this course

- Ready-to-use, complete lessons.
- Teacher and student(s) can work through the lessons together from beginning to end.
- No lesson preparation is required (there is no separate teacher’s guide).
- Emphasizes personal engagement and reflection but also attempts to lay a basic academic foundation in the philosophic, theological, and scientific concepts discussed.
- Functions as a general introduction to the philosophy of science and religion and also provides opportunities for more in-depth exploration of current issues.
- Incorporates sufficient background information (descriptions and definitions of terms) to make it accessible to high school students and advanced junior high students.

What you will need

- Printout of the free PDF file for each week
- The *Test of FAITH* documentary DVD, available from [wipfandstock.com/store/Test of Faith DVD Does Science Threaten Belief in God](http://wipfandstock.com/store/Test_of_Faith_DVD_Does_Science_Threaten_Belief_in_God)
- A DVD player or computer for watching the documentary
- Internet access for research
- A Bible (preferably NIV)




Format

A typical week

The course will take three weeks, with an optional fourth week. (You also have the option to spread the course out over 7-8 weeks-- see below.) In the three-week version, the material for each week covers one of the three episodes of the DVD documentary. As a general guideline, students will need to devote one to one-and-a-half hours of work per day to the course. The schedule is the same each week:

<i>Day 1 (Monday)</i>	Introduces the episode. The student completes preparatory activities to engage his or her interest and access prior knowledge. The student then watches the whole episode. Finally, the student completes a brief exercise to review the material covered in the episode.
<i>Days 2 and 3 (Tuesday–Wednesday)</i>	Cover the episode in more detail. The student proceeds chapter by chapter. He or she learns new concepts and terms, watches the relevant chapter of the DVD, and discusses/writes short answers to follow-up questions.
<i>Days 4 and 5 (Thursday–Friday)</i>	Extend and enrich learning. The student chooses an essay question to research and writes a 1–3 page essay or prepares a 10-minute presentation to share. The essay questions are differentiated by ability level and include recommended online resources.

These symbols will help you navigate through the material:

	Watch	Watch the DVD.
	Read	Read to learn more about the concepts and key terms.
	Write	Complete the exercises to deepen your understanding of the topic.

Personalizing the course

Students will get the most out of this course by proceeding through the material linearly. Because every homeschooling family is different, however, you can adjust the course to your needs and schedule. Below are a few ideas for shortening, extending, and otherwise modifying the material.

- Use the alternative 7–8 week schedule (on pages 8–9).
- Skip the foundation level activities (**marked with a red asterisk ***) to shorten the course.
- Skip the essays on Days 4 and 5, and/or spread Days 1–3 over a whole week.
- Discuss the questions rather than writing out the answers.
- Break up Week 2 (the longest and possibly most challenging set of material). You could cover Theories of Origin (chapters 1–3 of the DVD) in one week and then cover the Problem of Suffering and Caring for Creation (chapters 4–5) the following week.
- Add a fourth week to enable the student to finish researching and writing a final essay.
- Extend the course to 6 weeks by allowing 2 weeks per episode of the DVD. You could cover Days 1–3 in one week, and Days 4–5 (researching and writing an essay) in another week.
- Choose individual topics from the course to supplement your existing curriculum (e.g., you could pull out the sections on theories of origin, the environment, or ethics, and incorporate them elsewhere). See the Course Overview for topics covered.

Course overview: 3-4 weeks

WEEK 1: *Beyond Reason? Faith, science, and the universe*

Day 1	Introduction	Starter questions and watch Episode 1 of the DVD
Day 2	DVD chapter 1.1	How do people see the world? Epistemology, worldview, truth
	DVD chapter 1.2	God of the gaps: The Big Bang and the limits of science
Day 3	DVD chapter 1.3	Fine-tuning: The Anthropic Principle
	DVD chapter 1.4	Models for relating science and faith
Days 4-5	Essay	Research and writing for extension essay assignments

WEEK 2: *An Accident in the Making? Creation, evolution, and interpreting Genesis*

Day 1	Introduction	Starter questions and watch Episode 2 of the DVD
Day 2	DVD chapter 2.1	Views on creation: Young Earth Creation, Intelligent Design, Day-Age Creation
	DVD chapter 2.2	Another view on creation: Theistic Evolution and Genesis
Day 3	DVD chapter 2.3	Random chance? Convergent evolution
	DVD chapter 2.4	The problem of suffering: Evil, death, and the hope of the gospel
	DVD chapter 2.5	Caring for creation: Christians as stewards of the environment
Days 4-5	Essay	Research and writing for extension essay assignments

WEEK 3: *Is Anybody There? Human identity and choice*

Day 1	Introduction	Starter questions and watch Episode 3 of the DVD
Day 2	DVD chapter 3.1	It's all in your head: Neuroscience and spiritual realities
	DVD chapter 3.2	Whole persons: Human identity and freedom
Day 3	DVD chapter 3.3	An ethical toolbox: Applying biblical principles to ethical issues
	DVD chapter 3.4	Believing science: Relating science and faith
Days 4-5	Essay	Research and writing for extension essay assignments

WEEK 4 (OPTIONAL)

If you have enough time and interest, you can continue one of the extension essays that you began in Weeks 1-3, or start a new one. Write a five- to ten-page paper, consulting at least five academic sources to inform your conclusions.

Alternative course overview: 7-8 weeks

EPISODE 1: *Beyond Reason? Faith, science, and the universe*

Week	Day	Section	Topic	Pages
1	Monday	Introduction exercises		11-12
	Tuesday	Watch whole episode and complete review sheet		13
	Wednesday	Chapter 1	How do people see the world?: Epistemology, worldview, truth	14-17
	Thursday	Chapter 2	God of the gaps: The Big Bang and the limits of science	17-21
	Friday	Chapters 3-4	Fine-tuning: The Anthropic Principle / Models for relating science and faith	22-25
2	Monday	Essay (or presentation)	Choose essay topic, begin research	26-29
	Tuesday		Research essay	
	Wednesday		Write essay	
	Thursday		Write essay	
	Friday		Edit and finish essay	

EPISODE 2: *An Accident in the Making? Creation, evolution, and interpreting Genesis*

Week	Day	Section	Topic	Pages
3	Monday	Introduction exercises		30-32
	Tuesday	Watch whole episode and complete review sheet		33
	Wednesday	Chapter 1	Views on creation: Young Earth Creation, Intelligent Design, Day-Age Creation	34-36
	Thursday	Chapter 2 (exercises 1-2)	Another view on creation: Theistic Evolution and Genesis (Theistic Evolution / Literary genres in the Bible)	36-41
	Friday	Chapter 2 (exercise 3)	Another view on creation: Theistic Evolution and Genesis (Interpretations of Genesis 1: A summary)	41-43
4	Monday	Chapter 3	Random chance? Convergent evolution	44-45
	Tuesday	Chapter 4	The problem of suffering: Evil, death, and the hope of the gospel	45-48
	Wednesday	Chapter 5 (exercises 1-2)	Caring for Creation: Christians as stewards of the environment (A biblical framework for stewardship / Environmental issues)	48-50
	Thursday	Chapter 5 (exercises 3-4)	Caring for Creation: Christians as stewards of the environment (Climate change / Practical implications)	50-55
	Friday	Catch up day, choose essay topic		
5	Monday	Essay (or presentation)	Research essay	56-60
	Tuesday		Research essay	
	Wednesday		Write essay	
	Thursday		Write essay	
	Friday		Edit and finish essay	

EPISODE 3: *Is Anybody There? Human identity and choice*

Week	Day	Section	Topic	Pages
6	Monday	Introduction exercises		61-62
	Tuesday	Watch whole episode and complete review sheet		63
	Wednesday	Chapter 1	It's all in your head: Neuroscience and spiritual realities	64-66
	Thursday	Chapter 2	Whole persons: Human identity and freedom	66-69
	Friday	Chapter 3 (exercises 1-3)	An ethical toolbox: Applying biblical principles to ethical issues (Being human / An ethical toolbox / Using your ethical toolbox: Cloning)	70-74
7	Monday	Chapter 3 (exercise 4), Chapter 4	An ethical toolbox: Applying biblical principles to ethical issues (Other ethical issues: Beginning of life and enhancement), Believing science: Relating science and faith	74-77
	Tuesday	Essay (or presentation)	Choose essay topic, begin research	78-80
	Wednesday		Research essay	
	Thursday		Write essay	
	Friday		Edit and finish essay	

WEEK 8 (OPTIONAL)

If you have enough time and interest, you can continue one of the extension essays that you began in Weeks 1–7, or start a new one. Write a five- to ten-page paper, consulting at least five academic sources to inform your conclusions.

Guidelines for writing essays

The goal of the “extension essays” at the end of each week is to help you *extend* your thinking. This is your chance to respond in a deeper way to some of the issues that *Test of FAITH* raises, to do some external research, and to stretch your thinking and communication skills.

The depth and length of your essay will depend on the level of your work in this course (foundation, intermediate, or advanced). We suggest that these essays be one to three pages, double-spaced (about 300–900 words), and that you use at least three outside sources for your research. For the optional fourth week, you will need to research more widely and develop one of your essays further—or begin a fourth essay on another topic that interests you. We suggest that this essay be five to ten pages (about 1500–3000 words) and that you consult at least five outside sources in the course of your research.

In lieu of any of the essays, a teacher may ask students to prepare and give a presentation. While the length and format of such presentations are up to the teacher’s discretion, we suggest that they be comparable to the essay in length and research sources.

Essay structure

The extension essay questions will generally prompt two kinds of essay:

1. Research/informational essay – You describe and explain a topic. This kind of essay requires:
 - a. A paragraph introducing the topic
 - b. Body paragraphs, based on research, which explain the topic
 - c. A brief conclusion
 - d. Citation of any sources that you use

2. Expository/argumentative essay – You take a position on a topic and defend it. This kind of essay requires:
 - a. An introductory paragraph which engages the audience’s attention. This paragraph should end with your one-sentence thesis statement (the position which you will be defending throughout the essay).
 - b. Body paragraphs which defend your position. You should include research-based evidence and, if applicable, explain and rebut conflicting views.
 - c. A concluding paragraph which sums up your position and answers the “so what?” question. What is the impact of your thesis?
 - d. Citation of any sources that you use.

For more information on writing, visit Purdue’s Online Writing Lab: owl.english.purdue.edu/owl/resource/685/1

Research and citation

In each extension essay section, we have listed suggestions for sources and further reading. We have selected these sources for their academic credibility, and all of our suggestions are online to make them easier for students to access. Of course, you can always search for other sources online. A word of warning, however: anybody can write anything on the internet, without having had their findings reviewed by professional peers or subjected to academic standards.

Make sure that you are basing your research on solid academic sources. Beware of internet articles and blogs that do not list an author. If a site does list an author, do a little research: Does this person have academic qualifications? What is his or her bias? Does this author list his or her own sources at the end of the article? The best online sources are articles written for peer-reviewed journals (where a qualified person writes a piece which other professionals then review before publication).

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

After you have done your research, you will need to use the information you have gleaned to support the points you make in your essay. Do not cut and paste quotes from your sources into your essay without giving credit to the original author—this is plagiarism. If you paraphrase a key idea or use a direct quotation, you will need to credit the author (this is called “citing your source”). We recommend that you use the American Psychological Associate (APA) style of citation. Visit the Purdue Online Writing Lab (owl.english.purdue.edu/owl/section/2) for detailed information on how to cite your sources.

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 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.

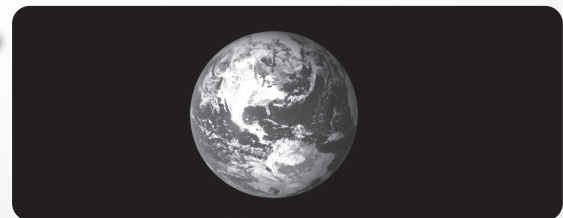
Science can only answer certain questions – it doesn't tell you anything about the meaning of life.

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.



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.



†. 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
- _____
- _____
- _____
- _____

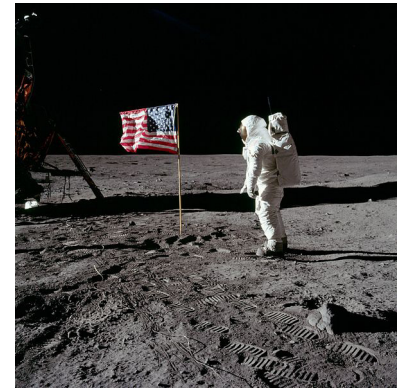
B. * (Remember, a red asterisk means that students can skip this section if necessary.)

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.

* 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).

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.

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)

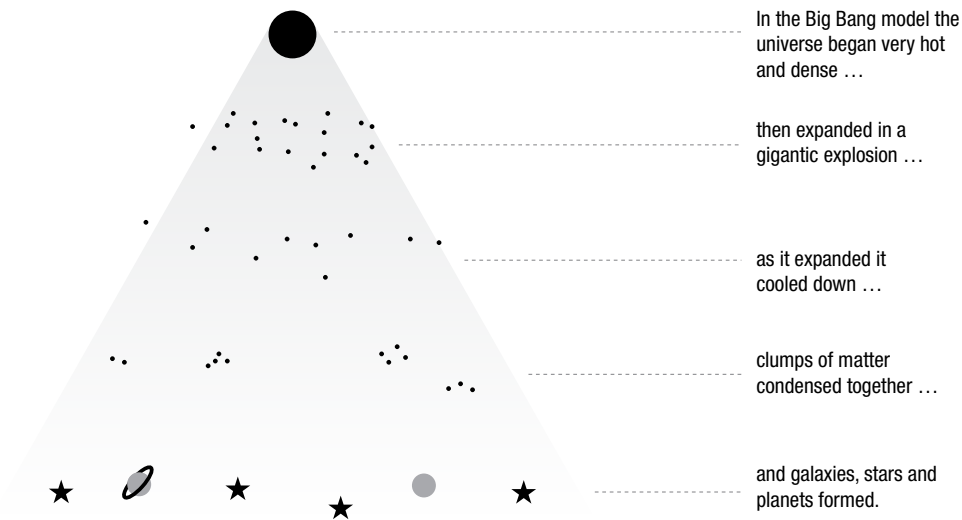


1. The Big Bang

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.”

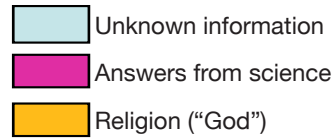
A. What kinds of questions do you think science can address? (What makes something a possible subject for scientific study?)

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

3. “God of the gaps”

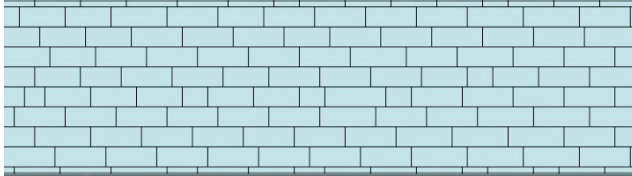
“If you say, ‘Well, science answers this much about the way the universe is, but science doesn’t answer this aspect of the universe’s characteristics,’ and then to invoke God and to allow God to reside in that gap in our knowledge, that’s dangerous because when a clever scientist comes along that gap 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.”†



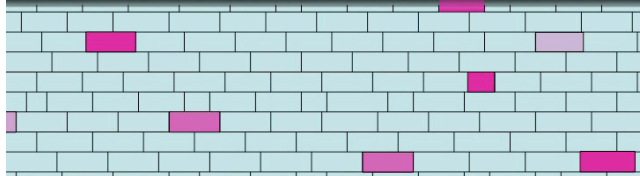
Human knowledge

- The wall below represents all that we could know about the physical world
- Each brick represents a “bit” of unknown information



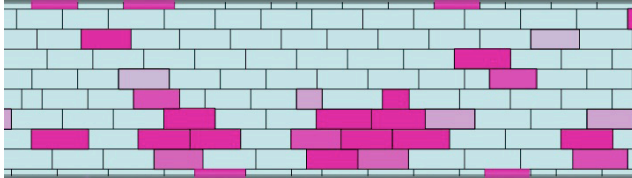
The role of science

- The role of science is to find answers to replace the “unknown” bricks



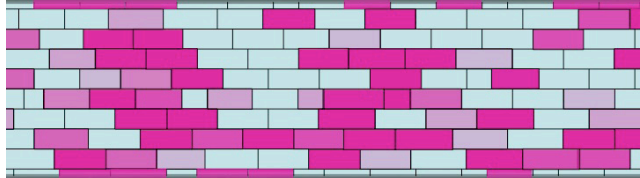
Science develops

- As science develops more answers are found and more “unknown” bricks replaced with knowledge



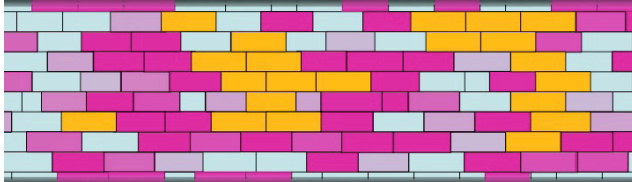
What about the gaps?

- However, there will always be “unknown” bricks
- The question is “What can I use to fill this gap?”



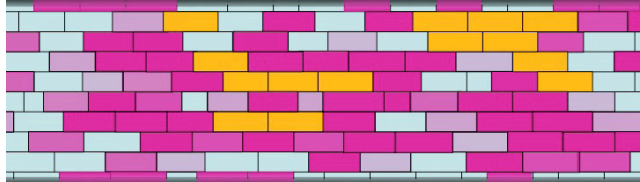
Filling the gaps

- Throughout history, people (including a few scientists) have sometimes used a religious brick to fill the “unknown” gaps



No space for God?

- Science always keeps looking for answers
- Where does that leave the “God of the gaps”?



†. *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 pothor 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 $10^{10^{123}}$. 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

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.

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.

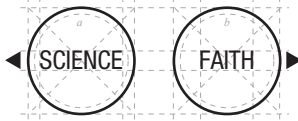
2. The relationship between faith and science

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.



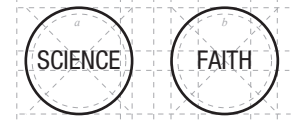
2. They're the same: *either* faith can be explained entirely by science, or science can be explained by faith.



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.

WEEK 2: AN ACCIDENT IN THE MAKING?

CREATION, EVOLUTION, AND INTERPRETING GENESIS

Day 1: Introduction

In Part 1 we examined the question, “How did the universe begin?” and looked at how faith and science interact with each other. In Part 2 we will ask, “How did life develop?” and explore ways of interpreting the Bible.

This can be a controversial subject among Christians and atheists alike, and although it is an important question, Christians must remember what is central and not allow secondary issues to divide us. We must learn to distinguish between the truths that are essential to the Christian faith and those beliefs that are a matter of interpretation. Although we may agree to disagree on how God created life, all Christians can celebrate God’s greatness as Creator and his grace as our Savior

Please note that, due to the complex nature of the topics this week, you may need to allow more time to finish each day’s assignments. You could allow more time each day (approximately 1.5 hours), skip some of the exercises (as indicated by the red asterisks), or complete Days 2 and 3 over three or four days, if your schedule permits.



Take 15 minutes to complete the following activities.

1. Different views on creation

Christians agree that God created the earth, but they sometimes hold different views about how the creation accounts in Genesis relate to scientific discoveries. What different Christian views have you heard people discuss?

2. Back to basics

Read Genesis 1. What are the most important messages of this passage? What does the passage say about God? About God’s relationship with the universe? About God’s relationship with people? Hint: You should be able to come up with at least 5 broad answers that would fit with *any* of the Christian views you may have mentioned in question 1 above.

- There is one God
- _____
- _____
- _____
- _____
- _____
- _____
- _____

3. *Models for understanding reality

Both scientists and theologians use “models” to explain aspects of reality (theologians often refer to them as illustrations, metaphors, or analogies). Models tell us something about reality, but they are limited. Everything we communicate through language necessarily involves models (descriptions that, unlike mathematics, are not 100 percent literal).

Developing models enables people to study and understand complicated subjects. A good model is fruitful—it suggests further lines of enquiry and allows fresh thinking to take place. A poor model is limited and often results in stagnation, with no new thinking emerging from it.

For example, for years scientists understood the nature of light by viewing it as particles. The particle model proved fruitful and allowed them to explain the way that light behaves. However, scientists began to observe light behaving in ways that could not be explained by the particle model. So they had to develop a new model for light’s behavior: the wave model. The actual nature of light had not changed, but as people discovered more about the way it worked, the model they used to describe light had to change. Both the particle and the wave models have limitations, but both explain some of the properties of light and help scientists in further research.

We use models in both science and faith because they help us understand scientific and theological truths. However, no model perfectly “matches” reality. We need to evaluate models and understand their limitations. Below are four statements; two of them are scientific models, and two are biblical models. Think about what makes each one a good model (similar to reality), and what makes it a limited model (different from reality). In the columns provided, fill in the similarities and differences between the models and reality. We have done the first scientific and the first biblical models for you.[†]

†. *Test of FAITH Resources for Schools*, pp. 33–34, 40. Reproduced with permission, The Stapleford Centre 2009.

Example:

The passage of electricity going along a wire is like a current of water flowing along a pipe.	
Similar to reality (a good model)	Different from reality (a limited model)
<ul style="list-style-type: none"> ○ <i>In both a wire and a pipe, resistance (a resistor or blockage) can slow the speed of flow.</i> ○ <i>Energy, like water, begins at one end and moves to the other end.</i> 	<ul style="list-style-type: none"> ○ <i>Water can be removed from a pipe, but electrons cannot be removed from a wire.</i>

A.

An atom is like a miniature solar system.	
Similar to reality (a good model)	Different from reality (a limited model)

Example

The church, the people of God, is like a body.	
Similar to reality (a good model)	Different from reality (a limited model)
<ul style="list-style-type: none"> ○ <i>Each person in the church needs the other people (and each part of the body needs the other parts).</i> 	<ul style="list-style-type: none"> ○ <i>Different parts of the body have to act together but people can act independently.</i>

B.

God is like a human father.	
Similar to reality (a good model)	Different from reality (a limited model)



Watch Test of FAITH, Part 2 (one-half hour)



Review Part 2

The following sheet summarizes Part 2 of the DVD. To help you review what you have seen, fill in the blanks below:†

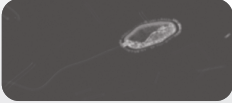
CHAPTER 1

Some evolutionary biologists say that the world is without design or purpose. They think that it came into being through a meaningless process, ruled by random chance.

The Bible says that we are made in God's

ARE THE BIBLE AND SCIENCE OPPOSED TO EACH OTHER?


Some people are skeptical of anything that predicts a very old age for the earth, and of evolutionary theory.



And some say that living things could not have evolved without any intervention by an intelligent being. They claim that the world was created by an Designer.”

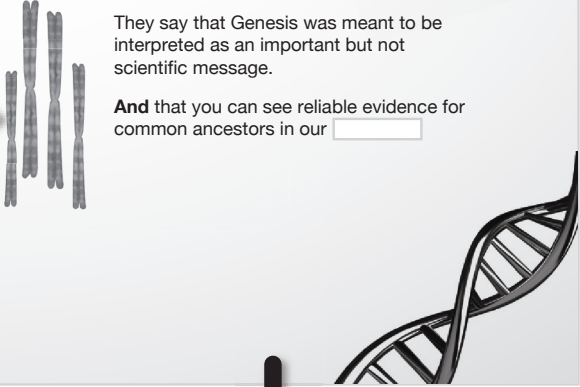
CHAPTER 2

But others say that evolution doesn't have to lead to



They say that Genesis was meant to be interpreted as an important but not scientific message.

And that you can see reliable evidence for common ancestors in our




CHAPTER 4

But evolution has other challenges for faith – **what about the and death that are part of the process?**

This is the toughest question for Christians in this area.

Some think that the process of producing fruitful life through evolution is a fitting way for God – who loves and gives his people freedom – to create.




Is disease a necessary product of a creation that is able to have life in such variety?

What we *do* know is the good news of the New Testament ...

... and that science cannot make paradise on earth. We know that it can be misused, because human beings are flawed creatures.

CHAPTER 3


Some people say that evolution is a process **totally up to chance** – like the **random** throw of a dice – at odds with a purposeful God.



But random can mean two things:

1. In day-to-day life we use it to mean “purposeless.”
2. In a scientific sense it means that the microscopic details of a process may be unpredictable – but **the overall process may be very**

So although evolution may appear random, it may be the best way of finding solutions to biological “problems.”



In fact, the Professor of Paleobiology Simon Conway Morris believes that evolution can only go in a very few directions – and if you started the process again from scratch, you would end up with very similar things – which fits with the idea that **we were meant to be here.**


CHAPTER 5

THE COMMAND GIVEN IN GENESIS WAS NOT TO FIGURE OUT EXACTLY HOW THE WORLD WAS CREATED, BUT TO

What we know about climate change must move us to action.

People in the West have benefited from cheap energy in the past. They have a moral duty to reduce their own consumption and help developing countries to develop in sustainable ways.

That change must start with the human heart.



WEEK 2

†. Test of FAITH Leader's Guide, page 105. Reproduced with permission, Paternoster 2009, Wipf & Stock 2010.

Day 2: Chapters 1 and 2

Part 2, chapter 1: VIEWS ON CREATION



Introduction

Christians attempt to account for the scientific discoveries about the world in several different ways, based on different methods of interpreting the first chapters of Genesis. This section looks briefly at a few of these views.

In chapter 1 of the DVD we will learn about

1. Young Earth Creationism
2. Intelligent Design
3. Progressive Creationism (the DVD does not mention this view, but we will explore it in the “Discussion and questions” section below)



Watch Part 2, chapter 1 (10 minutes)

Stop at Narrator: “For Young Earth Creationism and Intelligent Design, then, Darwinian evolution is an enemy to faith.” (10 minutes 5 seconds)



Discussion and questions

1. Young Earth Creationism

“I’m skeptical of anything where you’re not seeing the result directly in the laboratory, but you’re actually extrapolating back and assuming something that you were not there to see . . . What creationists believe is that God made the world as he said in the Bible in six days. So it’s taking the Bible seriously; it’s taking the Bible at its word.” – Paul Taylor

According to Young Earth Creationists, the earth is between 6,000 and 10,000 years old, based on genealogical records in the Bible. They read Genesis 1 as a historical, scientific account of the order and timing of creation and believe that God created the world in six 24-hour days. Either the scientific data which points to a much older universe is simply wrong, Young Earth Creationists would say, or the scientific data is right, but that is because God built the appearance of age into the universe, providing us with a ready-made world.

- A. According to this view, what sorts of things would God have created to give the earth/universe an appearance of age? (Think about the stars, trees, and geological formations.)

- B. Which of the models for relating faith and science (see Part 1, Day 3 on page 25) do you think Paul Taylor might hold? Which one might *he* think of himself as holding?

2. Intelligent design

“I have no problem with [a complex structure] evolving, in some sense, from some simpler precursors, but what I do have a problem with is saying that it evolved by a trial and error Darwinian tinkering process because I don’t think there’s any evidence for that. It seems to me that there are clear hallmarks of design . . . there’s got to be some information source.” – Dr. William Dembski

Intelligent Design (ID) takes as its starting point the “irreducible complexity” of certain structures in the world around us. ID holds that these structures are too complex and interdependent to have “just evolved.” Those who hold to Intelligent Design say that the camera eye (which we and many other animals possess), for example, could not have developed in the gradual stages that evolution’s genetic mutations and adaptations require.

A. What example does William Dembski use of an “irreducibly complex” structure?



Because evolutionary theory cannot currently describe how these irreducibly complex structures evolved, ID holds that they are evidence for an intelligent input into our universe. Unlike the other theories of origins which we are looking at this week, ID does not hold a specific view on the interpretation of Genesis; ID advocates seek to provide evidence for a Designer (not necessarily the Christian God).

B. Why does Denis Alexander warn that Intelligent Design might fall into the trap of “God of the Gaps”?

3. Progressive Creationism

Some Christians hold another view, called Progressive Creationism (not mentioned in the DVD). Although Progressive Creationists hold different views (see below), in general they believe that the scientific claims of an old earth do not contradict the Bible, and that God created the universe over a long period of time. Each “day” in Genesis 1 refers to an “age,” a long period of time (possibly millions or billions of years). Adaptation and change may have occurred during those ages, but God intervened at specific points to form the world as we know it today. Progressive Creationists believe that the earth is old, as the scientific evidence suggests, but they do not generally believe in “macro-evolution” (evolution that produces new species).

There are three main kinds of Progressive Creationism:

1. The “days” of Genesis 1 are not 24-hour days but represent actual ordered periods of time, or “ages” (known as Day-Age Creationism).
2. The days and all other references in Genesis 1, while not literal, match scientific understanding today. For example, “day” = epoch, “firmament/expanse” = atmosphere, etc.
3. The days and the overall structure of events in Genesis 1 may be figurative (poetic), but God separately intervened to create life, the various species (the “kinds” of Genesis 1), and human beings.

Concordism is the practice of interpreting ancient biblical models (ways of seeing and interpreting the world) as scientifically accurate according to today’s models. Progressive Creationists of types 1 and 2 above tend to be concordists in the way they interpret Scripture.

Cool words!

Concordism – from Latin: *Con* means “together, with,” and *cor* means “heart.” Concord means agreement between things.

A. Most proponents of Intelligent Design would be Progressive Creationists of which type (1, 2, or 3)?

B. Compared to Progressive Creationists, do you think that Young Earth Creationists are more or less concordist in the way they approach the Bible?

Part 2, chapter 2: ANOTHER VIEW ON CREATION



Introduction

Since other Christian resources cover Young Earth Creationism, Intelligent Design, and Progressive Creation in depth, this DVD focuses more extensively on another way that Christians make sense of both the scientific data and their belief in the Bible: Theistic Evolution (also known as Evolutionary Creationism).

Many people who hold the three views we considered above think that evolution and faith are incompatible. For different reasons, many atheists also believe that a person cannot both believe in God and accept the evidence for evolution. What we need to examine now is whether Theistic Evolution contradicts the accounts of Genesis 1–3.

In chapter 2 of the DVD we will learn about

1. Theistic Evolution
2. Literary genres in the Bible and how they affect our interpretation
3. A summary of the different ways Christians interpret Genesis 1



Watch Part 2, chapter 2 (5 minutes)

Stop at Narrator: “This marriage of Darwin’s theory and faith is known as Theistic Evolution.” (14 minutes 33 seconds)



Discussion and questions

1. Theistic Evolution

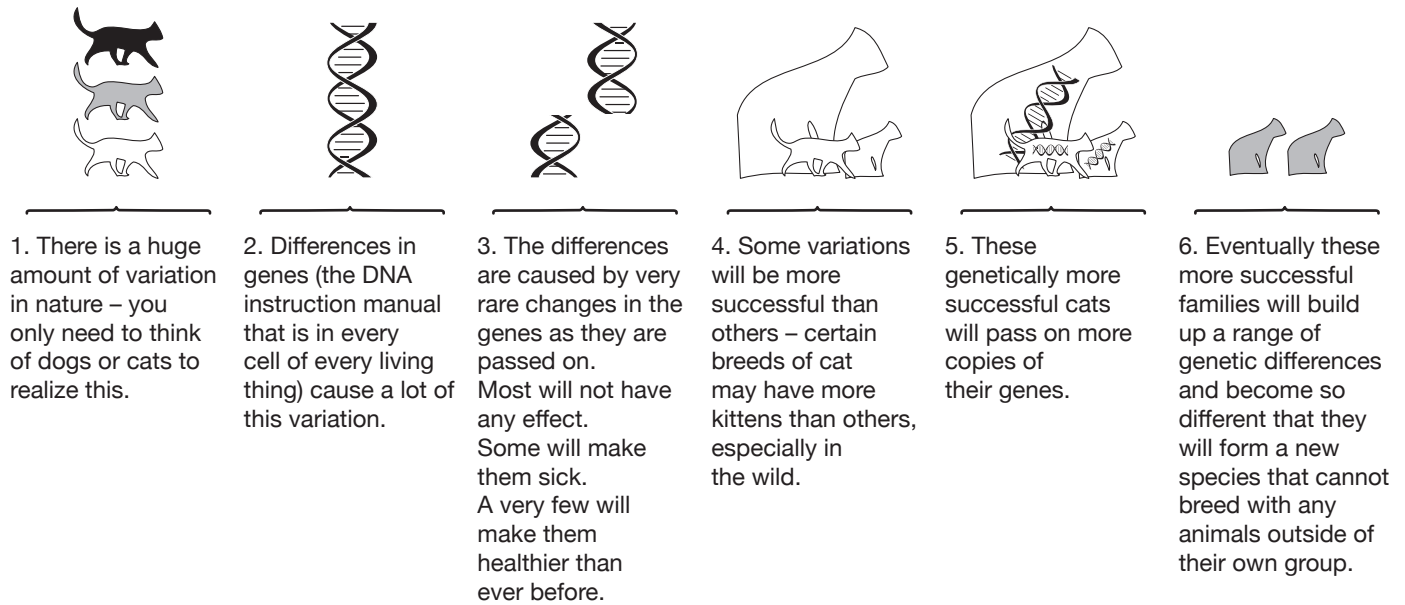
“A conclusion which is actually quite comfortable for me as a believer and for me as a scientist [is] that yes, Darwin was right, and a brilliant insight he had, but that all he was really doing was to deduce the mechanism of God’s creation.” – Dr. Francis Collins

Theistic Evolutionists believe that the Bible and the theory of evolution do not contradict each other. They would agree with the scientific data that the universe and the earth are billions of years old. They believe that God is the Creator, and that God used the evolutionary process as the mechanism (the “how”) of creation. They believe that the book of Genesis is true, and that, when we interpret it within its original context and literary genre, it provides us with a figurative (rather than a historic/scientific) account of creation.

Cool words!

Theistic – from Greek: *theos* means God, so “Theistic Evolution” simply means evolution that God initiated and guided. The Greek prefix *a-* means without, so “atheistic” means “without God.”

Francis Collins thinks that the contemporary study of genetics supports the theory of evolution. The process of evolution depends on how DNA in the nuclei of our cells replicates and sometimes mutates, as shown below:[†]



Below are two examples of the clearest and most compelling evidence for evolution.[‡]

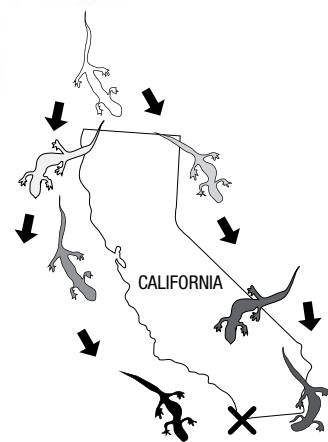
DNA	The molecule inside every cell of every living thing that carries the instructions for its growth and development.
Gene	A section of DNA that contains the instructions for making a single component (e.g., a protein) of an organism.
Chromosome	Each DNA strand in a living cell is wound up tightly into a chromosome. Apart from bacteria and the single-celled “archaea,” most living things have two copies of each chromosome. In sexually reproducing organisms, the offspring inherit one copy of each chromosome from each parent.
Species	A set of organisms that can interbreed (there are some exceptions to this rule).

Ring Species

One of the most important events in evolution is the formation of a new species, which is called “speciation.” This happens when a group of organisms becomes isolated in some way from a population of the same species. Over time, the genetic make-up of each group changes independently, with the result that members of the sub-population can no longer successfully reproduce with members of the original population. To test whether this has occurred, a biologist must normally bring organisms from the two populations together.

One of the more dramatic examples of speciation can occur when a series of populations, all from the same species, are naturally distributed over a large area. In rare cases, what is known as a “ring species” is formed. If the populations adapt to a gradually changing environment as they spread out over an area, then when the populations meet again, completing the ring, they can no longer interbreed.

We can see an example of a ring species in the salamander population of California. The salamanders spread down from the north, both along the coast and further inland. When the coastal and inland arms of the population met again in San Diego County, they could not interbreed (Mark Ridley, *Evolution* [Blackwell, 2004]).

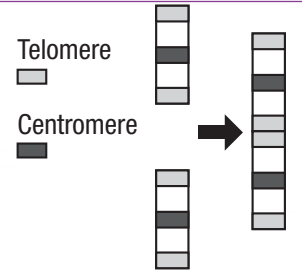


[†]. *Test of FAITH Leader’s Guide*, pp. 57–58. Reproduced with permission, Paternoster 2009, Wipf & Stock 2010.

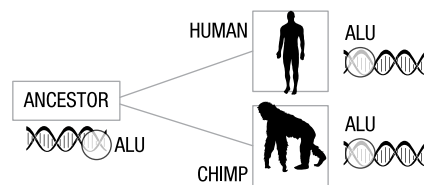
[‡]. *Test of FAITH*. Briefing Sheet Session 2: Evidence for Evolution. Reproduced with permission. www.testoffaith.com/resources/resource.aspx?id=248.

DNA Fossils

Many indicators of common ancestry are hidden in the DNA of every organism. These are “DNA fossils,” or mutations that do not affect the organism’s health, which are preserved in the DNA from generation to generation. Some of these mutations are so rare that any organisms that share them are likely to be descended from a common ancestor in which the mutation first occurred. By analyzing thousands of such mutations, evolutionary biologists can map out the evidence for relationships between organisms. Two examples are given below.



Humans have 23 different chromosomes, while chimpanzees have 24. Every chromosome has a sequence at each end called a “telomere” and one in the middle called a “centromere.” Twenty-two of the chromosomes from chimps and humans are very similar, and, when you put the two non-matching chromosomes from a chimp end to end, they look very much like the remaining human chromosome: chromosome 2. Human chromosome 2 has the remnants of an extra centromere, and in the middle of the chromosome there are two telomeres stuck together. From this you could conclude that chromosome 2 in humans is a fusion of two chromosomes, and that an ancestor of humans had 24 different chromosomes. Evolutionary biologists use this as part of the evidence to show that chimpanzees and humans share a common ancestor.



About 50% of human DNA is made up of repetitive sequences, most of which are “jumping genes” that contain just enough genetic information to copy and paste themselves anywhere within a chromosome. “Alu” sequences comprise one of the largest groups of jumping genes. Most Alu sequences are now inactive. The individual carrying them suffers no harmful effects and is able to produce offspring, so the Alu sequence is passed from generation to generation. Nearly all Alu sequences are in exactly the same position in all humans, showing that we all have a common ancestor.

Nearly all of these are also shared by all humans and great apes (including chimpanzees and bonobos), and for evolutionary biologists this is compelling evidence that the three species share a common ancestor.

- A. When you compare the evolutionary “story” as told above with the biblical story of Genesis, what questions and concerns come to mind? Use the box below to jot down your thoughts. (Another way to think about this question is to ask yourself, “What sorts of issues do Christian evolutionists need to grapple with in order to reconcile their faith with their scientific convictions?”)

Some Christians are wary of evolution because many atheists have used the theory to argue that we now have no need to believe in God. Simon Conway Morris makes the point, however, that evolution and atheism do not necessarily have to go together. Remember our overview of metaphysics and worldviews in Part 1? Evolution is a theory, not a worldview (though some atheists hold it as an all-encompassing worldview). No theory can exist on its own; it has to be embedded in a metaphysical framework. Simon Conway Morris says that evolution can fit into either the Christian or the atheist metaphysical framework—but he argues that Christianity (not purposeless, atheist nihilism) is the framework which is most congruent with the scientific evidence.

Cool words!

Congruent – from Latin: *congruere* means to come together or agree. In mathematics, “congruent figures” have the same size and shape. If a theory is “congruent with” reality, then the theory and reality “match up” or agree with each other.

B. If someone tells you his or her religious worldview, can you tell what view that person has of how life developed? Give a reason for your answer.

In the last 150 years, people have used the theory of evolution to justify many different worldviews, ideologies, and movements—many of which have been evil and destructive (and many of which, ironically, conflict with each other).

C. * What are some of the worldviews/ideologies/movements that people have used evolution to support?

Just because some of these movements have been wrong does not mean that the original scientific concept people used to support them is false. We have to be careful not to commit errors of logic in our reasoning. Otherwise, we could end up concluding (as some people have) that because people have used the Bible to justify something evil like slavery, the Bible must be false. Sinful human beings will exploit concepts and ideas, whether scientific or theological, in order to promote their own agendas; we need to be careful to interpret both scientific and theological ideas and their applications carefully.

2. Literary genres in the Bible

For many people, the barrier to thinking that the theory of evolution is a reasonable model for understanding our origins lies in the book of Genesis. If the Bible is the word of God, they argue, we should believe in it regardless of what science says. Scientist-believers would agree that the Bible is true and worthy of our full trust.

“To find out who Adam and Eve were [or any of these other questions of origin], we need to start with the biblical text. We do not start with the evolutionary narrative and then try to impose it on the biblical text, but rather do the reverse—listen to what the Bible has to say and then see whether there are any interesting resonances with the evolutionary account.”
— Dr. Denis Alexander, *Creation or Evolution: Do We Have to Choose?*, p. 191

The question then becomes: What is the best way to interpret Genesis? Hermeneutics, the area of study that looks at how we interpret the Bible, requires that we find out the historical and literary context of a passage. This simply means that, in order to understand any passage in the Bible, we need to know who the text was written to, why it was written, and what type (or genre) of writing it is. These considerations influenced how the original readers understood the Bible, so they should influence our understanding of the text as well.

A. In our everyday lives, we read texts differently depending on what genre they are. Different genres are written in different styles. What genres of literature (or types of writing) can you think of?

- Biography
- _____
- _____
- _____
- _____
- _____
- _____

Cool words!

Hermeneutics – from Greek: the mythic deity Hermes brought messages from the gods, and he was also believed to have invented language and speech. Hermeneutikos means skilled in interpreting.

Genre – French for “kind” or “sort” (originally from Greek, *genos*).

B. Match the Bible passages below to the correct genre.

- | | |
|---------------------|----------|
| ○ Deuteronomy 24:17 | history |
| ○ Psalm 148 | law |
| ○ Luke 11:2–4 | letter |
| ○ Ecclesiastes 6:7 | prayer |
| ○ 2 Timothy 1:1–2 | poetry |
| ○ Luke 2:1–2 | prophecy |
| ○ Isaiah 61:1–2 | parable |
| ○ Matthew 13:44 | proverb |

Cool words!

Metaphor – from Greek: *meta* means “along with,” *phore* means “bearer/carrier,” and *metaphora* means a transfer. In metaphorical language, we transfer or carry meaning from one thing to another; for example, the phrase “A mighty fortress is our God” applies the image of a strong fortress to God.

Scholars estimate that about 40% of the Old Testament is poetry,[†] which uses pictorial language to describe truth. Other, “non-poetic” parts of the Bible also use figurative language to express ideas. We do the same thing in our conversations (“That was so funny—I died laughing!” “It’s raining cats and dogs!” “He turned as white as a sheet.”). None of these statements is literally true, but each one conveys what the speaker wants to say. Similarly, the poetic parts of the Bible are just as “true” as the historic parts—we just need to read carefully enough to discover the truth the author was trying to convey through the poetic imagery.

C. * Do you think we should read the following verses literally or metaphorically, and why? If metaphorically, what is the idea that the writer is trying to express?

- The mountains and hills will burst into song before you, and all the trees of the field will clap their hands. (Isaiah 55:12)

- Jesus sat down at the right hand of God. (Hebrews 10:12)

- At Caesarea, there was a man named Cornelius, a centurion. (Acts 10:1)

Now that you know a bit more about genres, you will be able to understand the way in which many Theistic Evolutionists interpret Genesis. They see the first chapters of the Bible as examples of a poetic, story-telling style, rather than as history. The Israelites passed the story of creation down to their children by telling stories aloud. The repetition in Genesis (“And God said . . . and it was so”; “and there was evening, and there was morning”; “And God saw that it was good”) would have helped them to remember the story. In their oral culture, the stories were written in memory, not on a page.

†. *NIV Study Bible*, note on Genesis 1:27.

The ancient Hebrews understood that the point of Genesis 1 was not to teach them the exact order and timing of creation, but rather, that there is one God supreme over creation (a radical idea in the ancient Middle East), who created all things good and personally made humans in his image as the pinnacle of his creation. When we try to put ourselves in the shoes of the original recipients of Genesis, the timeless truths that God is teaching us through it become clearer.

“I think it’s worth pointing out that Genesis was written by a non-scientist for non-scientists, and so it’s a bit of an abuse of Scripture to pretend, or to treat it, as though it’s a scientific textbook that can only be understood by people in the latter half of the 20th century or the early 21st century. Treating it as a scientific textbook is silly. It’s wrong; it’s not trying to be that.”
– Professor Katherine Blundell

Remember our exercise on models from Day 1 of this week (page [31](#))? Theistic Evolutionists would say that God revealed truth to the original audience using a model of the cosmos that they understood. Although scientific research helps us to understand the physical structure of the universe according to a different model, the truths of God’s creation and power are as important for us as they were for the ancient Hebrews.

3. Interpretations of Genesis 1: A summary

Having looked at these different positions on creation within Christianity, let’s put some of the pieces together by comparing how the different views interpret Genesis 1.

Study the following Venn diagram and answer the questions below:[†]

GOD IS CREATOR

1 We should read Genesis 1 as a historical and scientific, common-sense statement of the facts. The six days in Genesis are twenty-four hours long, so in total God created the world in 144 hours, about 10,000 years ago.

This is the only way to take the Bible seriously. The Sabbath commandment in Exodus that refers to the creation week, and the genealogy of Jesus in Luke, support this view.

Advocates of this view look for scientific evidence that the earth is much younger than mainstream science claims, and that evolution cannot have happened.

This view is incompatible with modern mainstream science and says that mainstream science has interpreted the evidence wrongly because of false assumptions about the physical laws (i.e., that they are always the same through time and space).

For example, there is the idea that small changes may have taken place in animal populations (microevolution) but new species could never form, and that gaps in the fossil record back this up.

ASSUME MIRACLES IN CREATION

2 The days of Genesis 1 refer to long periods of time. The Hebrew word *yom* has as many different meanings as *day* does in English. Hebrew does not have a word for a long period of time (era, epoch, etc.), so *yom* was used instead.

The biblical support for this view comes from the seventh day of God's activity, which is never said to end. This is used by Jesus to clarify the Sabbath law and as a theological theme about heaven by the author of Hebrews. In addition, Scripture teaches that for God a day is like a thousand years, showing that God measures time differently than we do.

In this view, the events of natural history happened in the order given in Genesis 1, but were stretched out over much longer periods of time. This is consistent with the billions-of-years time frame of mainstream science, but the order of events is somewhat different. God miraculously intervened at some points during the development of creation, such as the creation of plants or birds. (These were not created in the order suggested by evolutionary biology.)

VERY OLD UNIVERSE, LONG TIMESCALE OF CREATION

3 There are different types of literature in the Bible: history, songs, poems, parables, etc. Genesis 1 should be interpreted with an eye for literary devices such as repetition and figurative language, and with an understanding of cultural, historical and biblical context.

For example, the sun and moon are not called by their proper names, because these names also referred to gods in the surrounding pagan cultures. Instead, they are called *big lamp* and *small lamp* to emphasize that there is only one God. The narrative is structured around God creating spaces by separating things, then filling those spaces:

SEPARATION	FILLING
Day 1, Light and darkness	Day 4, Sun and moon
Day 2, Sky and sea	Day 5, Birds and fish
Day 3, Sea and dry land	Day 6, Animals and humans

In this view, Genesis is not a scientific text. We should look first at what the text meant to the first audience to learn its non-scientific message (the *who* and *why*), then at modern science to understand how and when God created the universe, the earth and life.

Note: The diagram does not include *Intelligent Design*, because ID makes no claim to be a religious view. It is compatible with certain forms of all three of these views.

A. What belief do all three of these views share in common?

[†] Test of FAITH Leader's Guide, page 106. Reproduced with permission, Paternoster 2009, Wipf & Stock 2010.

A theologically important part of the creation account is that God created humans in the *imago dei* (Latin for the “image of God”). Within the views represented above, there are three main interpretations for Genesis 1:27.

1. God specially created us as we are—evolution had no part to play.
2. God took evolved *Homo sapiens* and chose them to bear his image by divine fiat (decree).
3. There was a growing spiritual awareness in *Homo sapiens*.

In all three of these interpretations, there is a point when humans come into relationship with God. The image of God is something God gives to us and has nothing to do with our own abilities. It would be impossible to know the details for any of these possibilities, but whatever happened, at least as far as the second and third positions are concerned, at some point a pair or group of creatures came into personal relationship with God.

Note: We will be examining the “image of God” in more detail in Part 3.

The concept of models gives us another way of expressing the three views (Young Earth Creation, Progressive Creation, and Theistic Evolution). Each view is a model for interpreting both the biblical and scientific information.

B. * Below are a series of statements taken from Genesis 1–3. For the three models, decide into which column each statement would fit. (For example, how would a Young Earth Creationist view statement 1? How would a Progressive Creationist view it? A Theistic Evolutionist?) Thus you should enter all the statements three times, one for each model. (You may use the reference numbers rather than trying to squeeze the sentences into the boxes. We have done statements 1 and 2 for you.)

1. God made the universe from nothing.
2. God made the universe in six days/ordered periods (this answer fits in more than one column for Progressive Creationists).
3. God existed before creation and is independent from his creation.
4. God made the universe in an orderly way.
5. God made light before he made the sun and the stars.
6. Different species exist.
7. God is powerful.
8. God made his creation good.
9. Humans came last in the order of creation.
10. God formed Adam out of the dust of the earth, and Eve out of Adam’s rib.
11. God made people in his image.
12. People care for creation at God’s command.

	Similar to my understanding of reality (literal)	Eternal truths (general principles)	Different from my understanding of reality (figurative)
Young Earth Creationism	2.	1.	
Progressive Creationism	2. (6 ordered periods)	1.	2. (Ages, not days)
Theistic Evolution (Evolutionary Creationism)		1.	2.

Amid all of these competing models and viewpoints, we can keep a sense of perspective by focusing on the timeless truths that unify us. Christians believe in God as the sovereign, loving Creator who has sent his Son, Jesus, for us—and he is the source of our unity and our hope.

Day 3: Chapters 3, 4, and 5



Part 2, chapter 3: RANDOM CHANCE?



Introduction

Many people think that evolution equals purposelessness and random chance. This view of evolution would contradict what we know about God from the Bible—that he rules sovereignly and lovingly over all creation. So how do believing scientists reconcile their faith with evolution’s seeming lack of purpose? Ard Louis and Simon Conway Morris shed light on this question.

In chapter 3 of the DVD we will learn about

1. The concept of randomness in science
2. The theory of convergence



Watch Part 2, chapter 3 (4 minutes)

Stop at Simon Conway Morris: “. . . are they themselves in any way congruent with those world pictures?” (18 minutes 27 seconds)



Discussion and questions

1. Randomness in science

A. What are the two meanings of the word “random” that Ard Louis describes?

- _____
- _____

B. Which meaning does he say fits with evolution? _____

2. *Convergence†

Simon Conway Morris explains that because the process of evolution *seems* to be open-ended (everything seems equally likely to evolve and therefore anything could happen), some atheists make a metaphysical assumption that everything *is* accidental. However, the field of convergent evolution questions this purposelessness by hypothesizing that there is actually a sort of pattern within evolution. It may be that, instead of random mutations going off in any direction, evolution actually leads down a few well-defined roads.

Simon Conway Morris thinks that there are only so many ways that the process of evolution (on any planet) could “make” things. The evidence he points to is “convergence.”

We can see one example of convergence in North American and Australian mammals. The fossil record shows that certain types of mammals evolved independently in these two continents; we can deduce this because the North American versions were placental mammals, and the Australians were marsupials (with pouches like kangaroos).

Cool words!

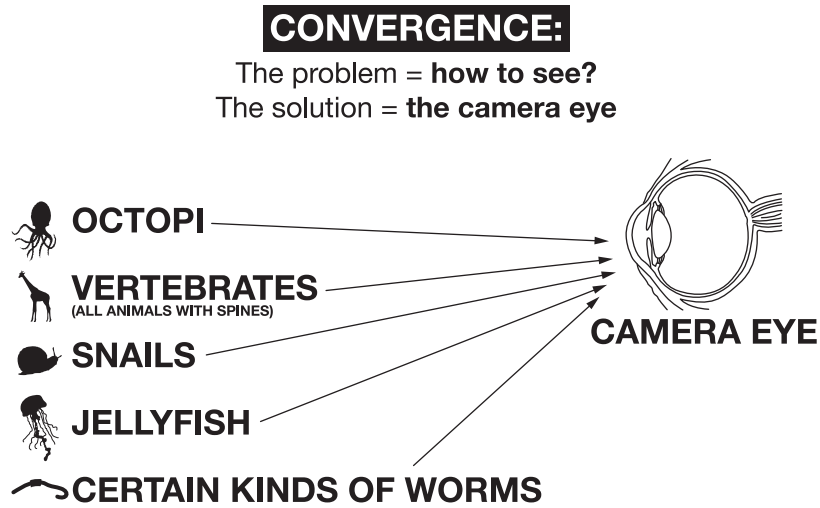
Convergence – from Latin: the prefix *con* (“with, together”) has been added to *vergere* (“to bend”). “To converge” means to come together, to approach each other.

†. Excerpts from *Test of FAITH Leader’s Guide*, page 107. Reproduced with permission, Paternoster 2009, Wipf & Stock 2010.

However, even though these mammals evolved separately, they acquired remarkably similar characteristics. So in Australia there were marsupial moles, flying squirrels, wolves, and mice, to match their placental North American counterparts.

This example demonstrates that the process of evolution is not completely random, but that natural selection *converges* on certain solutions to a problem (such as how to “make” effective diggers, treetop dwellers, or predators).

Conway Morris mentions another example of convergence, the camera eye:



Convergence shows that evolution is not completely “random” and purposeless; rather, it points to order and structure in the universe.

Does Simon Conway Morris say that convergence proves God? Why or why not?

Part 2, chapter 4: THE PROBLEM OF SUFFERING



Introduction

The early chapters of Genesis are important not only because they teach us about God as Creator, but also because they help us understand human nature and the origins of sin and suffering. The “problem of evil” has forced theologians and philosophers over the centuries to grapple with the question, “How could a loving and all-powerful God allow suffering?” The questions of sin, suffering, and death pose an additional challenge to Christian supporters of Theistic Evolution, because the mechanism of natural selection over millions of years involves genetic mutations and the death of organisms as a natural part of the process.

How do these “imperfections” square with Genesis accounts of a pre-fall paradise, and with the doctrine that death entered the world through sin (with the fall of Adam and Eve)? And, with the reality of death and sin in our fallen world, how can we have hope?

In chapter 4 of the DVD we will learn about

1. How some Theistic Evolutionists address the problem of physical evil
2. How human death fits into the evolutionary and biblical accounts
3. The hope of the gospel

Cool words!

Doctrine – from Latin: *doctrina* means “teaching” (from *doctor*). Christian doctrine means the body of teaching that Christians believe.



Watch Part 2, chapter 4 (8 minutes)

Stop at Alister McGrath: “. . . and until science confronts that enigma, we’re stuck.” (26 minutes 00 seconds)



Discussion and questions

1. Physical evil

If evolution were the mechanism by which God created the world, how could he include suffering and death as part of his creative process? Francis Collins’s explanation is that perhaps some of the suffering in the world is unavoidable, a consequence of the physical nature of our world. For example, the shifting of the tectonic plates (which causes earthquakes and tsunamis) is perhaps the best way to make the earth, as God created it in his infinite wisdom, stable and fit for life. Similarly, evolution requires mutations in DNA, which are good and necessary for the adaption of species even in a non-evolutionary sense—but which also inevitably cause cancer and various genetic disorders.

A. What are some of the causes of suffering in the world around us? Try to come up with a few examples of evil and suffering caused by people, nature, or both.

People	Nature	Both
<i>Corruption</i>	<i>Droughts</i>	<i>People starving</i>

Collins makes a distinction between the pain and suffering we experience as a result of “physical evil” and that which we experience as a result of human sinfulness (although, as you saw above, the lines can sometimes be blurred). Some Theistic Evolutionists might say that while physical evil was part of the world before the fall, evil due to human sin only entered the world after the fall.

B. What are the two possible explanations for the existence/origin of physical evil?

- _____
- _____

How could pain and suffering be part of God’s original plan for us in a world God declared to be “good”? There are several possible ways of looking at this:

- What if people did not experience physical suffering as evil before the fall?
- What if God protected people from physical suffering in the Garden of Eden?
- What if the “good world” was not meant to be a perfect paradise, but the place where people are made ready for eternal life in the new creation?

C. * What do you think? Do you think that Adam and Eve, even if they hadn’t fallen, would have experienced pain and suffering?

2. Human death

Over and above pain and suffering, how does death figure into both the biblical and evolutionary pictures? The process of evolution depends on death (at least in the plant and animal kingdom). Did plants and animals die before the fall? If the fall had not occurred, would Adam and Eve have eventually experienced physical death? The Bible talks about three types of death:

- Physical death (Genesis 25:8)
- Spiritual death (Colossians 2:13)
- Eternal spiritual death, or the second death (Matthew 10:28)

Which type of death do you think resulted from Adam and Eve's disobedience? When or how did it happen?

3. The hope of the gospel

Now that we have thought through how some Theistic Evolutionists might respond to the various issues that evil and suffering present, Alister McGrath helps us see the big picture.

- A. Some atheists might look to science and technology as a way to overcome the evil around us. Why does McGrath say that we cannot ultimately look to science to save our world? (What is the "enigma"?)

McGrath says that although evolution may explain how we got here, it cannot form a Christian's philosophy of life.

"As I read the New Testament I see a whole series of value statements that are completely opposed to Darwinism. . . . Maybe the gospel actually is saying to us we need to articulate a system of values which contradict those that we see in nature around us; that the way nature behaves is not the way things are meant to be; that just because species are in competition, we don't need to be in competition with each other. It's about a higher ethic than that." – Dr. Alister McGrath

- B. What are some of the "value statements," virtues, and commands from the New Testament that oppose a philosophy of "survival of the fittest"? (Hint: If you are stuck, look up Matthew 5:3–10; Matthew 19:30; Luke 20:45–47; Philippians 2:3–11; 1 Corinthians 12:22–23; Galatians 6:2; James 2:1–5.)

C.* Whether we think that suffering was part of the world from the beginning or entered the world as a result of the fall, the bottom line is that we live in a world where God allows suffering. However, Christians believe that God does love us. God shows his love in many ways and cares for us by helping us to cope with suffering. What kind of help does God give us to face suffering?

Read Revelation 21:1–4.

D. What is God's ultimate purpose for creation?

Part 2, chapter 5: CARING FOR CREATION



Introduction

The book of Genesis not only explains our origins, but it also gives us a place and a role within our world. God gave Adam and Eve a command, known as the “creation mandate,” to rule and look after the earth. Humans, however, have not always fulfilled this mandate very well. Christians today carry that same responsibility to care for our planet, as we look forward to the day of Jesus’ return when God will redeem and renew the earth. In this chapter we will explore general principles of stewardship and then apply them to a few specific issues.

In chapter 5 of the DVD we will learn about

1. Developing a biblical framework for stewardship
2. Environmental issues in our world today
3. The specific issue of climate change
4. The practical implications of stewardship for our lives



Watch Part 2, chapter 5 (3 minutes)

Watch to the end of the episode.



Discussion and questions

1. A biblical framework for stewardship

“When we go back to Genesis and the command that we are given . . . God doesn’t give us the command: get everything right about the age of the earth or exactly what happens in biology. . . . The command we have is to look after the earth, to be good stewards of the earth, to care for the earth in the right kind of way.” – Dr. Denis Alexander

The idea that God has put us on the earth to look after it is called “stewardship.” A steward rules and manages a kingdom on behalf of the king—just as we are called to care for the earth as God’s representatives and image-bearers. What does this stewardship look like? If we want to address the practical concerns of stewardship, we need to learn what the Bible says about how and why God wants us to care for creation. Starting with the truths of the Bible helps us to build what is called a biblical framework.



Look up the following Bible passages and write down answers to the questions.

A. Psalm 65:5–13; Psalm 104:24–31; Psalm 145:9. What is God’s attitude towards and involvement with his creation?

B. Genesis 1:28–31; Genesis 2:8, 15; Psalm 8:3–8. What role and responsibilities does God give to humans?

C. Matthew 25:14–30. What is expected of a servant, or steward?

D. Romans 8:19–23. What is the state of creation now? What will it be in the future?

2. Environmental issues

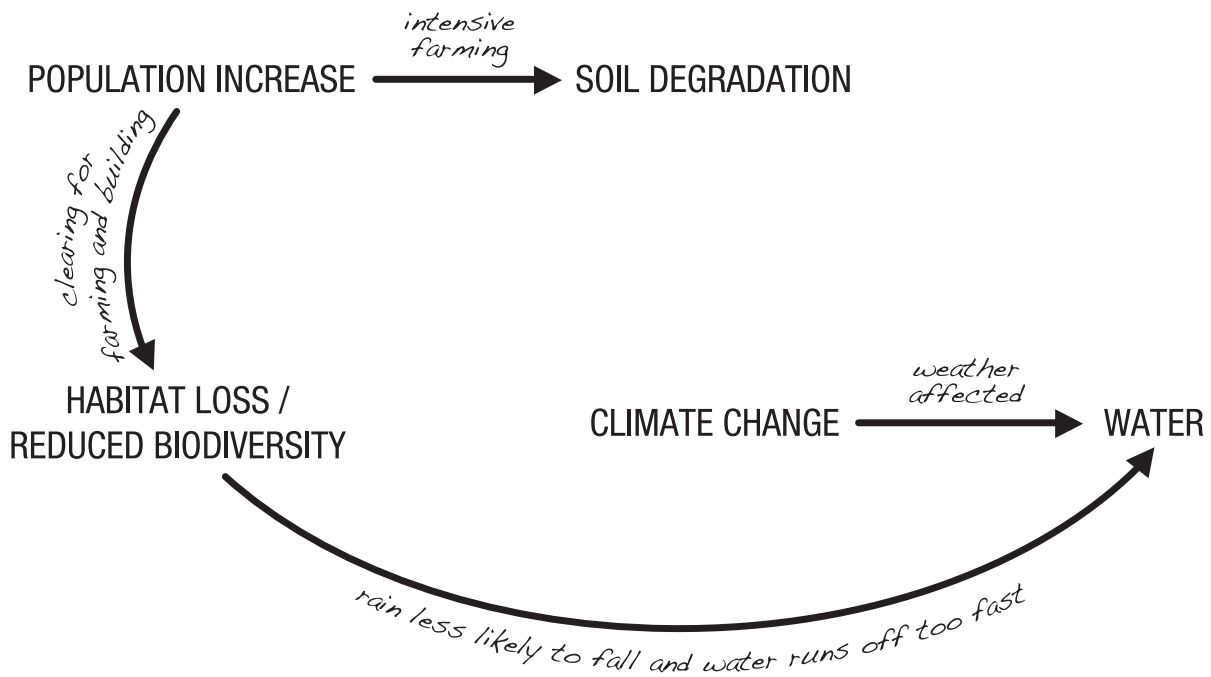
This framework of stewardship, along with Jesus’ command to love our neighbor as ourselves, must inform how we approach environmental issues. These issues not only affect the earth, which God created and loves, but they also have a great impact on the poor. The following problems are most likely to harm people in developing countries:[†]

- **Population size** – The population of the world has more than doubled in the last 50 years, raising concerns about whether there will be enough food and water for everyone. (World population in 2011: 7 billion; and in 1965: 3.34 billion.)

[†]. *Test of FAITH Leader’s Guide*, p. 72. Reproduced with permission, Paternoster 2009, Wipf & Stock 2010.

- **Climate change** – A small increase in the overall temperature of the earth’s atmosphere has a huge effect on the weather.
- **Water** – A growing population creates challenges for the provision of clean water. Changes in climate can bring devastating drought or floods.
- **Soil degradation** – Overgrazing and deforestation mean that soil is washed from exposed land.
- **Habitat loss and reduced biodiversity** – Human population expansion can destroy places where living things usually grow, which causes a reduction in the number and variety of living things growing in the world.

*These issues are often interconnected. Can you map out how they might be related? (We have given you a few arrows and labels to get you started.)



3. Climate change

How seriously do you think we should take the issues above? (circle your answers)

A. General environmental issues:

Not a problem

A minor problem

A major problem

An urgent problem

B. Climate change:

Not a problem

A minor problem

A major problem

An urgent problem

Many people do not agree about the causes and extent of climate change. In order to discuss and address these issues we have to find answers to questions such as the following: What effect has human activity had on the global temperature increase? How much of this increase is due to natural causes? Will the temperature continue to rise? If it does, what will the future hold for plants, animals, and people?

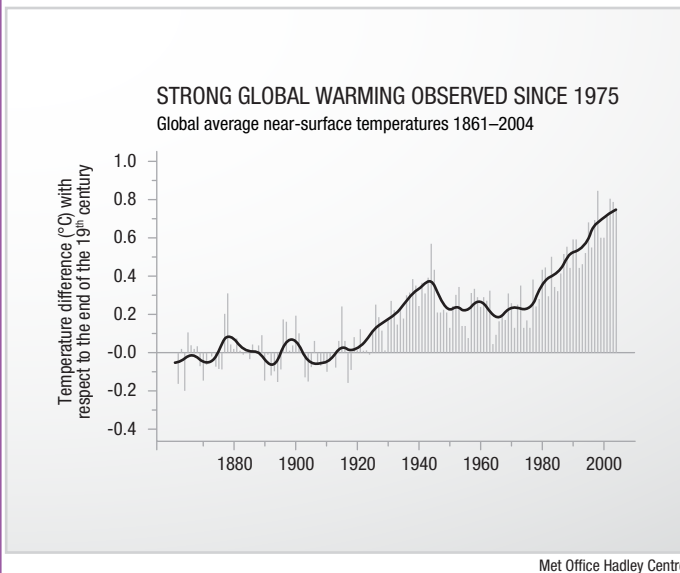
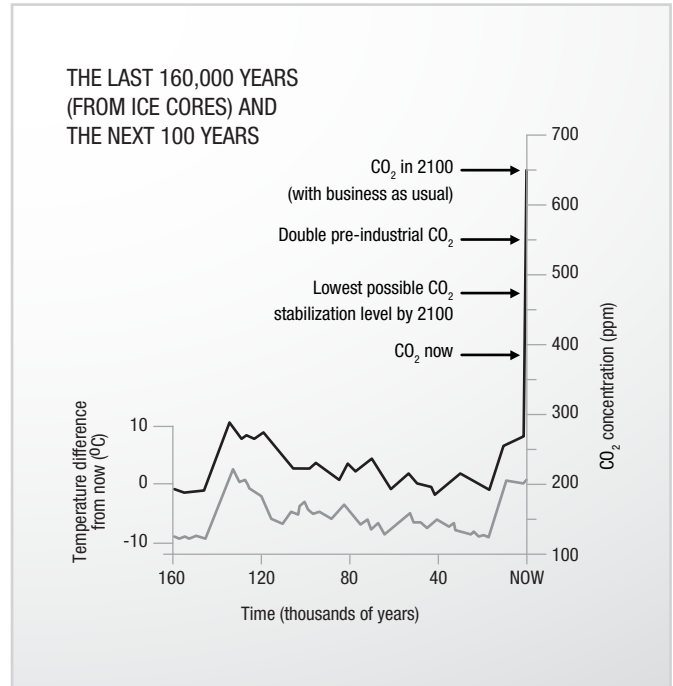
To explore some of these questions, read the information below.[†] Some hype surrounds the effects of global warming, so we have been careful to present scenarios based on the most accurate predictions and to leave out any that are more speculative.

The Science behind Climate Change

“Greenhouse gases” in the earth’s atmosphere such as water vapor, carbon dioxide or methane, trap heat and keep the earth warm. This “greenhouse effect” keeps the earth 20 – 30°C warmer than it would otherwise be and is essential for our survival. But the greenhouse effect is increasing. We have a record of what the weather was like in the past, and of the gases in the air at that time, preserved for us in the ice caps in Greenland and the Antarctic. Scientists can drill down through the layers of ice that have built up over thousands of years and analyze the bubbles of gas trapped in each layer. From this we can see that, since the beginning of the industrial revolution in the 1750s, the amount of carbon dioxide in the atmosphere has increased by nearly 40%. With chemical analysis we can see that this is mostly because of the burning of fossil fuels (coal, oil and gas).

The average temperature on earth has risen over the last century. There is strong evidence that most of this rise has been caused by the increase in greenhouse gases, and especially carbon dioxide. Scientists predict that, during the twenty-first century, the average temperature will rise by 2 – 6°C. This doesn’t sound like very much, but the difference in average temperature between the middle of an ice age and a warm period is only about 5 – 6°C. The predicted temperature rise could have a huge impact.

As water heats it expands, so as temperatures continue to increase the sea level will rise, flooding low-lying coastal areas around the world. The temperature changes already produced by humans will take hundreds of years to feed into the deep ocean, so the sea level will continue to rise for hundreds of years even if we stopped producing any more greenhouse gases overnight. Warmer temperatures will also cause greater evaporation of fresh water on land, leading to more water vapor in the atmosphere and more rain or snow. This will cause drought in some areas and flooding in others. There is no evidence that hurricanes will become more common, but it is possible that they will become more severe as the surface temperature of the sea increases.



All of these changes in the weather will affect the ability of humans, plants and animals to survive. The worst impact will be felt in developing countries. In the short term, crop yields will increase in colder countries, but the damaging effects in warm countries, flooding and storms will far outweigh these advantages. Eventually crop yields will decrease worldwide as temperatures increase further. If we cut down our production of greenhouse gases now, the harmful effects will be greatly reduced. It has been argued that developed countries, which have benefited from burning huge amounts of fossil fuels, should make the biggest efforts to cut down and allow developing countries to continue to develop.

[†] *Test of FAITH Leader’s Guide*, p. 109. Reproduced with permission, Paternoster 2009, Wipf & Stock 2010. (Based with permission on the JRI briefing paper by Sir John Houghton, “Global Warming, Climate Change and Sustainability: Challenge to Scientists, Policy-makers and Christians” [2007] www.jri.org.uk.)

Climate Change Questions†

Q1: The earth's climate always varies. Aren't we just in a natural period of warming?

A: The earth's climate varies due to many different factors, including cycles of ice ages caused by changes in the distance between the earth and the sun, volcanic eruptions and changes in the sun itself. However, none of these factors is enough to explain the rapid changes in the last 100 years.

Q2: There isn't enough carbon dioxide in the atmosphere to cause any significant change, is there?

A: Although there isn't a big volume of carbon dioxide (CO₂) in the atmosphere, it can have a significant effect. It has a direct effect because it traps heat very strongly. It also has an indirect effect because, as the earth warms up, water evaporates more quickly from lakes and the sea. This increases the amount of water vapor in the atmosphere, which causes an even stronger greenhouse effect.

Q3: Isn't the increase in carbon dioxide in the atmosphere the result of climate change, rather than the cause?

A: As the oceans and soil warm up they do release carbon dioxide into the atmosphere. Scientists can find the origin of carbon dioxide in the atmosphere through chemical analysis. Most of the increase in CO₂ levels comes from burning fossil fuels.

Q4: I thought that the observations of weather balloons and satellites were inaccurate?

A: In the early 1990s there were errors both in the way that data was collected and in the way it was analyzed. These errors have been corrected, and now the data from weather balloons and satellites agrees with data collected by other methods.

Q5: Aren't computer models of the climate inaccurate?

A: Although the climate is very complex, scientists have been able to create increasingly accurate models of the way it works. These computer models have been used to simulate changes in the climate over the course of the last century, and their simulations have matched what actually happened. Using these models scientists can give general predictions about the course of the climate in the future on a global scale, based on different predictions about human behavior.

Q6: Isn't climate change caused by the sun becoming more active?

A: The sun's activity does play a role in shaping climate. However, that alone is not enough to explain the recent warming. Also, there has been very little change in the sun's activity over the last three decades, so this cannot account for the observed warming.

Q7: Surely it's not a big deal. Aren't climate scientists exaggerating?

A: The earth's ecosystems are very finely balanced. Even a change of 2 – 3°C would be greater than has been seen for ten thousand years, and many species would find it very difficult to adapt. The people most affected will be those in developing countries and the poor, creating greater inequalities in access to food, clean water and medical treatment.

†. *Test of FAITH Leader's Guide*, p. 110. Reproduced with permission, Paternoster 2009, Wipf & Stock 2010. (Adapted with permission from "Climate Change Controversies: A Simple Guide," The Royal Society [2007] <http://royalsociety.org>)

C. Respond in the box below to the information you have just read. Which area of the debate interests you or raises questions in your mind? Which issues would you like to explore and research further?

4. Practical implications

As stewards of creation, we should be informed and concerned about all of these issues. As believers in a sovereign God, however, we do not have to live in fear or despair because of them. Some environmental activists have used “doom and gloom” to try to scare people into action. By contrast, Christians can act out of a positive motivation: God loves creation and has delegated its care to us. Our hope amid these environmental problems is that God will one day redeem this fallen world—and in the meantime, we can faithfully fulfill our role as caretakers of creation. As we do so, we will be loving our neighbors and letting our lights shine.

A. What are some ways you can care for the environment where you live?

B. Complete the “personal lifestyle audit” below (not all of these options may be available to you, depending on where you live).[†] These questions provide a measure for checking out your lifestyle and thinking with reference to the environment. Your answers and scores should be a stimulus for discussion and action, so be as honest as you can! Use the definitions below to clarify the questions. Please check a box for each question. What is your score?

“What on earth am I doing?” A personal lifestyle audit

I (or my family members) buy:	I do it	I think about it	It doesn't cross my mind
Environmentally friendly laundry detergent			
Items with less packaging (whenever possible)			
Items with less transport miles (when aware)			
Recycled paper / envelopes / toilet paper / paper towels			
I (or my family members) recycle:			
Newspapers / waste paper			
Glass			
Aluminum or steel cans			
Plastic			
Garden waste (by composting)			
Kitchen waste (by composting)			
Clothes / books (by taking them to a thrift store)			
I (or my family members) make a point of:			
Using local stores instead of out-of-town supermarkets			
Using public transportation or carpooling			
Riding a bike or walking instead of driving			
Using energy-saving light bulbs			
Turning off electrical items when they are not in use (not leaving them on stand-by)			
Eating vegetables/fruits which I have grown myself			
I (or my family members) support:			
Local conservation groups			
National environmental organizations			
Birds, by providing food in my garden and putting bells on any cats I own			
Local wildlife, by gardening organically			
Add up your scores in their columns. Each point is worth:	2	1	0
Grand total		+	=

[†] Test of FAITH Leader's Guide, pp. 79–80. Reproduced with permission, Paternoster 2009, Wipf & Stock 2010. (Adapted with permission from Ruth Valerio, author of *Life for Lifestyle: Christian Living that Doesn't Cost the Earth* [IVP, 2008].)

Scores and Definitions

0–13	Being a Christian doesn't impact your lifestyle or thinking about these issues much. Choose an issue which interests you and discover how you can make a difference.
14–28	You're thinking about making a difference, but getting around to it remains a challenge. It's time to do those things you've been putting off!
39–42	Your lifestyle reflects that you've made changes. Challenge yourself to find out more and keep going!

Environmentally friendly means being sensitive to the need to reduce the use of natural resources, considering pollution and the amount of energy used by producing or using a product.

Transport miles refer to the mileage covered by an item from the producer of the raw ingredients to the shop floor. For example, a locally grown potato may travel to a washing center and then to a distribution center before it reaches your local superstore, however the local market will sell it dirty direct from the farm! More transport is used, and therefore more congestion and pollution are produced, by shopping at superstores.

Recycling is the idea of using materials again. If an item cannot be re-used in its present form, it can be broken down and the materials used again. This process uses far less energy and fewer natural resources than using raw materials each time.

Carpooling makes use of spare seats in cars when two or more people are travelling to the same destination at the same time.

Bicycling is a far more environmentally friendly means of transportation than driving. For example, a bicycle can be pedalled for up to 1037 km on the energy equivalent of a quarter of a gallon of gas (nearly 300 mpg). In addition, a regular adult cyclist on average exhibits the fitness levels of someone ten years younger.

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. (Question 1 is not an essay.)

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.

Creation

1. The Bible is full of poetry which conveys both truth and emotion. The biblical authors wrote their poetry based on what they knew about the natural world; now, however, science has enlarged our scope for wonder at God’s creation. Combine what you know from the Bible about God as Creator with more recent discoveries from science to write your own modern “psalm” praising God. For biblical examples, look at Psalm 104, Psalm 148, and Job 38–41. For scientific discoveries on which to focus your poetic imagery, think about what we now know about the size of the universe, the workings of atoms and cells, the variety of species on earth, the intricacy of the human body, etc. (*Foundation*)
2. Research and describe two or three of the structures that Intelligent Design says are irreducibly complex. Include the objections from other scientists who say that these structures have evolved. Which explanation do you think makes most sense? (*Foundation*)
 - Discovery Institute. <www.discovery.org>.
 - Map of Life: Convergent Evolution Online. <www.mapoflife.org>.
 - Miller, K.R. (2004, July 12). “The flagellum unspun: The collapse of ‘irreducible complexity.’” In W.A. Dembski and M. Ruse (eds.), *Debating Design*. Cambridge University Press. <www.millerandlevine.com/km/evol/design2/article.html>.
3. Both Intelligent Design and convergent evolution point to the camera eye as a marvel of intricacy. Research and describe the camera eye. How does it work? (You may need to provide or create some visuals for this.) What is so amazing about the camera eye? Why would both an ID advocate and a convergent evolutionist say that it is the best solution for seeing? (*Intermediate*)
 - Discovery Institute. <www.discovery.org>.
 - Map of Life: Convergent Evolution Online. <www.mapoflife.org>.
4. The famous evolutionist, Charles Darwin, wrestled with questions of faith throughout his life. How did Darwin’s “God of the gaps” thinking and his experience of suffering affect his faith? (*Intermediate*)
 - Darwin Correspondence Project. (Search “Themes” to find out what Darwin wrote about religion.) <www.darwinproject.ac.uk>.
 - Spencer, N. (n.d.). “Darwin’s test of faith.” Test of FAITH. <www.testoffaith.com/resources/resource.aspx?id=251>.
 - Spencer, N., and D. Alexander. (2009). “Rescuing Darwin.” Theos. <<http://campaigndirector.moodia.com/Client/Theos/Files/RescuingDarwin.pdf>>.
5. Research the Human Genome Project. What are some of the discoveries that this project has made about our genetic material? Look at viral insertions into the human genome, and at similarities between the human genome and other organisms. How do you think that this data fits with how God created the world? (You might want to engage with Francis Collins’s questions: Are these similarities simply due to the fact that God used common motifs in his creation? Would God make our genes seem to point to a common ancestor in order to “test our faith”? Or does the evidence show that we do in fact share a common ancestor with primates?) (*Advanced*)

- Finlay, G. (2009, April). "Human genomics and the image of God." Faraday Institute for Science and Religion. Faraday Paper Number 14. <www.st-edmunds.cam.ac.uk/faraday/Papers.php>.
- National Human Genome Research Institute, Education page. <www.genome.gov/10001772>.
- Test of FAITH. (n.d.). "Briefing sheet: Evidence for evolution." <www.testoffaith.com/resources/resource.aspx?id=248>.

5. Research and summarize the theory of convergence within evolution. What are some examples of convergent evolution? What does convergence imply about the world around us and the process of evolution? How does this developing field of evolution fit with the metaphysical framework of atheism? (What would an atheist say about convergence?) How does convergent evolution fit with the metaphysical framework of Christianity? (What would a Theistic Evolutionist say about convergence?) (*Advanced*)

- Map of Life: Convergent Evolution Online. <www.mapoflife.org>.

6. Choose a view on creation *different* from the one which you hold or know most about, and interpret Genesis 1–3 through that lens. You will need to research what this viewpoint says and present the best possible arguments that you can find for it. Either (A) provide a general overview that reconciles the scientific evidence with the Genesis 1–3 account, or (B) choose one "tricky bit" of the biblical text to research and explain in more depth, from the perspective of your chosen view. (Questions you may want to address include: What was the mechanism/timing for God's creation of the world? Who were Adam and Eve? What does the "image of God" mean? What happened at the fall? Did physical evil, suffering, and death exist before the fall, or did they enter the world as a result of the fall?) If you wish, at the end of your paper you may critique the view, stating the difficulties with that view from a scientific and/or theological standpoint. (*Advanced*)

As a starting point for your research, see the general resources page on creation (next page). For specific articles on Theistic Evolution, see the following:

- Keller, T. (2009, November). "Creation, evolution, and Christian laypeople." BioLogos Foundation. White Paper No. 5. <biologos.org/uploads/projects/Keller_white_paper.pdf>.
- Lucas, E. (2007, April). "Interpreting Genesis in the 21st century." Faraday Institute for Science and Religion. Faraday Paper Number 11. <www.st-edmunds.cam.ac.uk/faraday/Papers.php>.
- Test of FAITH. (n.d.). "Briefing sheet: Reading Genesis." <<http://www.testoffaith.com/resources/resource.aspx?id=244>>.

The environment

1. What is one practical way that you could make a difference in helping to take care of the environment? Make an action plan for yourself and/or your family. (*Foundation*)
2. Choose an environmental issue to research. What are the causes? What are the effects? What could be done on a broad scale and/or on a local level to address this issue? (*Intermediate*)
3. The physicist Albert Einstein said, "Science without religion is lame; religion without science is blind." Science specializes in knowledge, but wisdom begins with the "fear of the Lord" (Proverbs 9:10). How might the Bible and science work together to provide some possible solutions to environmental issues? Choose an environmental issue; research and describe the issue, and then discuss how scientists and believers might come together and contribute their different strengths to address this issue. (*Advanced*)
4. Research and explain the evidence for and against the reality of climate change. Why should Christians be concerned about climate change? Or, why should they not be concerned? Take a position and defend it, using research to back up your conclusions. (*Advanced*)

General resources: Creation

Websites

- www.asa3.org/ASA/topics/evolution/index.html. The American Scientific Affiliation's Creation and Evolution page, which includes many articles from different Christian perspectives (see especially "Biblical/Theological Papers," "A Spectrum of Creation Views Held by Evangelicals," and "Evolution Basics").
- www.answersingenesis.org. Answers in Genesis (Young Earth Creationism).
- biologos.org/questions. BioLogos Foundation (Theistic Evolution).
- www.counterbalance.org. Counterbalance online library, see pages on "Origins," "Where did we come from?" and "Was the universe designed?"
- www.discovery.org. The Discovery Institute (Intelligent Design).
- www.mapoflife.org. Simon Conway Morris's database on Convergent Evolution.
- www.reasons.org. Reasons to Believe (Progressive Creation).
- www.testoffaith.com/resources. 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.
 - Short articles
 - Spencer, N. (n.d.). "Darwin's test of faith."
 - Briefing sheets
 - "What does the 'image of God' mean?"
 - "Reading Genesis"
 - "The age of the earth"
 - "Evidence for evolution"
 - "Intelligent design"
 - "Random chance?"
 - Interview clips
 - Denis Alexander: 10 clips on Young Earth Creationism, evolution, Adam and Eve, the fall, evil and suffering.
 - Simon Conway Morris: 8 clips on convergent evolution, randomness, Intelligent Design, neo-Darwinism, wastage and death in evolution.
 - Darrel Falk: 5 clips on the age of the universe, Genesis 1–3, Intelligent Design.
 - Ard Louis: Young Earth Creationism, Intelligent Design, randomness.
 - Francis Collins: "Practical applications of the Human Genome Project," evolution, altruism, and the problem of suffering.
 - Deborah Haarsma: Genesis narrative in cultural context, randomness.
 - John Bryant: "Is the Bible scientifically accurate?"
 - Alister McGrath: Adam and Eve.
 - Jennifer Wiseman: 2 clips on the age of the universe, 2 clips on stardust.

Articles:

- Lucas, E. (2007, April). "Interpreting Genesis in the 21st century." Faraday Institute for Science and Religion. Faraday Paper Number 11. <www.st-edmunds.cam.ac.uk/faraday/Papers.php>.
- White, B. (2007, April). "The age of the earth." Faraday Institute for Science and Religion. Faraday Paper Number 8. <www.st-edmunds.cam.ac.uk/faraday/Papers.php>.

General resources: The environment

Websites:

- www.blessedearth.org. Evangelical, educational nonprofit with many resources and worksheets.
- www.creationcare.org. Evangelical Environmental Network.
- www.climatestewards.net. A carbon footprint calculator and carbon offset program.
- www.jri.org.uk. Resources, articles, and briefing papers on many topics.
- notbluenotred.com. Answers to common questions and objections about climate change.
- www.pbs.org/wgbh/nova/secretlife/scientists/katharine-hayhoe. Videos from an evangelical climate scientist, Katharine Hayhoe.
- temagami.tosm.ttu.edu/khayhoe/resources.html. Katharine Hayhoe's resource page.
- www.testoffaith.com/resources. Interview clip from Jennifer Wiseman on stewardship.
- www.skepticalscience.com. Arguments against climate change skepticism.

Articles:

- Blessed Earth. (2009). "Creation care themes throughout scripture." <www.blessed-earth.org/resources/creation-care-scripture>.
- Boorse, D. (2011). "Loving the least of these: Addressing a changing environment." National Association of Evangelicals. <www.nae.net/lovingtheleastofthese>.
- Houghton, J. (2009, September). "Global warming, climate change and sustainability." John Ray Initiative. JRI Briefing Paper, Number 14. <www.jri.org.uk/brief/Briefing_14_3rd_edition.pdf>.
- The Royal Society. (2010, September 30). "Climate change: A summary of the science." <royalsociety.org/policy/publications/2010/climate-change-summary-science>.
- --. (2007, June 30). "Climate change controversies: A simple guide." <royalsociety.org/policy/publications/2007/climate-change-controversies>.
- U.S. Global Change Research Program. (2009). "Global climate change impacts in the U.S." <www.globalchange.gov/publications/reports/scientific-assessments/us-impacts/full-report/about-this-report>.
- White, R. (2006, December). "A burning issue: Christian care for the environment." Jubilee Centre. Cambridge Paper, Volume 15, Number 4. <www.jubilee-centre.org/document.php?id=53>.

Bonus interview clips on Test of FAITH DVD:

- John Houghton – Environmental issues (climate change, scientific honesty)
- John Houghton – The putrefied world (climate change and the poor)
- Alister McGrath – The purified world (stewardship, restoration of creation)
- Ian Hutchinson – What do we do? (population and consumerism)
- Catherine Cutler – What do we do? (carbon footprint)
- John Houghton – What do we do? (standard of living)

WEEK 3: IS ANYBODY THERE?

HUMAN IDENTITY AND CHOICE

Day 1: Introduction

Having explored the immensity of the universe and the question of our origins, we now turn to the most complex and mysterious part of God's creation: ourselves. The study of neuroscience has uncovered many mysteries about how our brains work, provoking new questions about our identity. What makes us human? Are our apparently free choices simply the products of our genes and environment? Are spiritual experiences merely "in our heads"? Now more than ever, Christians must be equipped to address these questions, along with the ethical questions that medicine and research raise. How should we use the new technologies that are emerging?



Take 10 or 15 minutes to complete the following activities.

1. What makes you you?

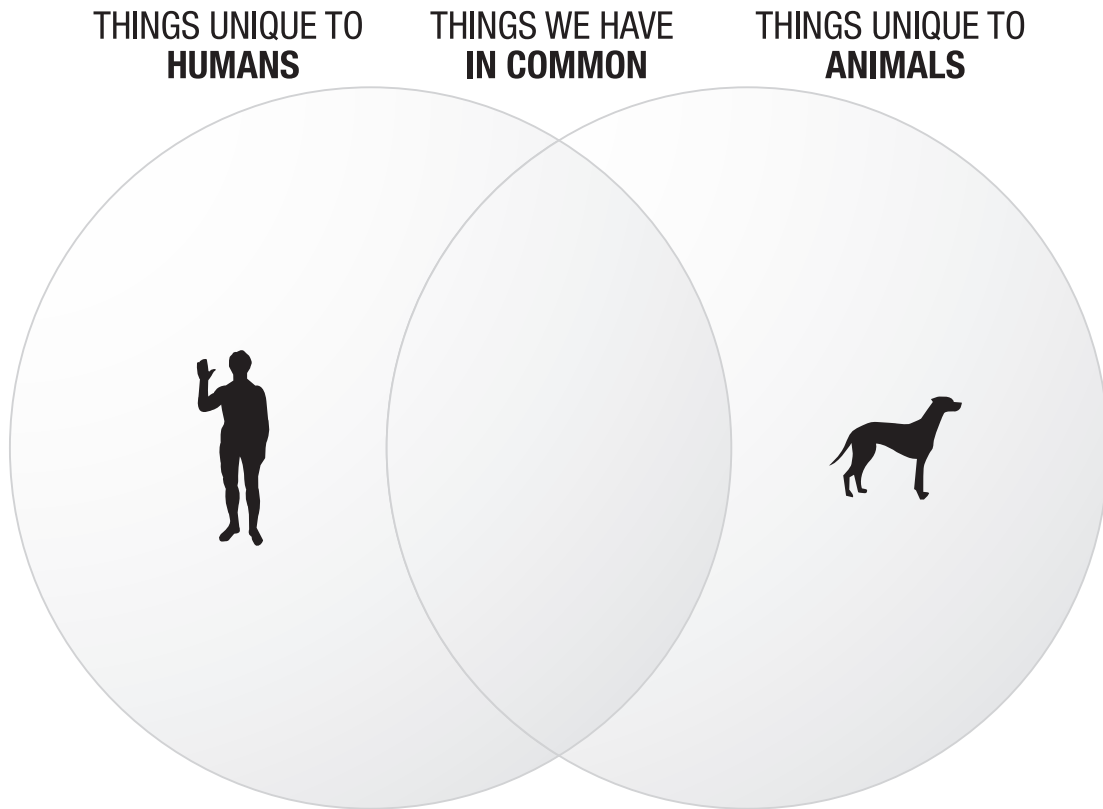
Think about what makes you who you are (your physical characteristics, talents, interests, likes and dislikes).

List a few personal traits that you might share with a family member. Do you think these traits were passed on to you in your genes or through the way you were raised?

List a few personal traits that you think came from another source (something learned, an experience you have had, something from your physical or cultural environment).

2. What makes you human?

Fill in the Venn diagram below to illustrate some similarities and differences between humans and other animals.



Based on your brainstorming, write a brief definition of what makes someone “human”:

3. Decisions, decisions

How do people make ethical decisions (decide what is right and wrong)? List some sources of people’s ethics below.

Specifically Christian sources	Other sources (Christians might also use some of these)



Watch Test of FAITH, Part 3 (one-half hour)



Review Part 3

The following sheet summarizes Part 3 of the DVD. To help you review what you have seen, fill in the blanks below:†

CHAPTER 1

Some scientists claim that we run on rails determined by our physical characteristics, and that spiritual experiences are just a by-product of our

But neuroscientists who are also Christians believe that we are made in the image of God.

When we are having a religious experience, something happens in our brains.

But that doesn't prove that religious experience is **just** what is in our brain. The experience also means something else.

And it is possible to artificially stimulate certain parts of the brain, and make someone feel angry or sad.

But that doesn't mean that it isn't possible to feel happy or sad for genuine reasons!

CHAPTER 2

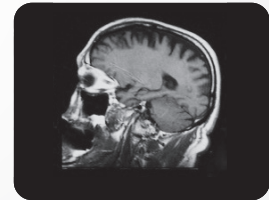
We are not just determined by our biology.

Our experiences and the live in also play a role in shaping who we are.

And these scientists believe that the brain is more than the sum of its parts.

You could say that **our minds and personalities** **from the complex structure of the brain.**

But they can't be defined by just looking at the cells in the brain.



It's like music that emerges from the strings of an instrument – it can be described in a mechanical way, but it has a much deeper meaning than vibrations of strings.



CHAPTER 4

To really understand things in a meaningful way, theology and neuroscience need to talk to each other.

We need to read both the book of the Bible and the book of and not be afraid of asking new questions.

We need to use the tools of **both** faith and science to explore the world.

And, **for Christians, science increases their sense of wonder at what God has created.**



CHAPTER 3

With genetic technology, we now have the ability to enhance or even clone ourselves.

But **even a genetic clone would be more than the sum of its DNA.**

We are

We have the ability for moral reasoning

We make meaningful

These abilities seem to go far beyond our biological make-up.



†. Test of FAITH Leader's Guide, page 111. Reproduced with permission, Paternoster 2009, Wipf & Stock 2010.

Day 2: Chapters 1 and 2

Part 3, chapter 1: IT'S ALL IN YOUR HEAD



Introduction

As you read this sentence, the brain cells (neurons) inside your skull are crackling with nerve impulses. Our complex neuronal networks are constantly sending electrochemical signals, which scientists measure using imaging technology. Neuroscience is the study of how different parts of our brains and nervous system work together when we think. Some neuroscientists are reductionists. They believe that their studies can reduce our religious beliefs down to the mere firing of our neurons. They argue that there are no spiritual realities external to us; it's all in our heads.

“Dr. Michael Persinger, a prominent neuroscientist and author, can stimulate your right temporal lobe [in your brain] and quite possibly cause you to experience a sense that something God-like is in the room. Persinger draws no small conclusions from this. ‘What is the last illusion that we must overcome as a species?’ he asks. And he answers: ‘That illusion is that God is an absolute that exists independent of the human brain—that somehow we are in his or her care.’ Other scholars and commentators have . . . [concluded] that modern neuroscience undermines belief in a monotheistic God or in the Bible. Still others maintain that brain imaging studies fit perfectly with support for ‘militant atheism.’” – Professor Steven Goldberg†

In chapter 1 of the DVD, we will learn about

1. Two kinds of reductionism
2. How reductionists interpret spiritual experiences, and how Christian neuroscientists respond



Watch Part 3, chapter 1 (6 minutes)

Stop at Alasdair Coles: “There may well be more to it that isn’t accommodated by the scientific method.” (5 minutes 20 seconds)



Discussion and questions

1. Reductionism

When studying the complexities of the human person, scientists use something called reductionism. Reductionism can mean two things. First, *methodological* reductionism takes a complex system or behavior and breaks it down into its parts. So scientists’ *methods* might be reductionist simply because they can gain a better understanding of the whole by examining each part and how it fits into the whole. We use this kind of reductionism in many different disciplines.

Think of some complicated structures that we need to break down (or analyze) in order to gain understanding:

- In music, we understand more about the whole symphony by studying the musical parts for each section of instruments.
- In literature, we understand more about the whole _____ by studying _____.

†. Quotation from S.P. Goldberg (2010, January 15). “Neuroscience and the free exercise of religion,” in M. Freeman, ed., *Law and Neuroscience: Current Legal Issues*. Oxford University Press, 2010. Georgetown Public Law and Legal Theory Research Paper No. 10-01. Available at SSRN: <http://ssrn.com/abstract=1537355>.

- In _____, we understand more about the whole _____ by studying _____.

The second kind of reductionism goes deeper, however, and extends from methods to metaphysics. *Metaphysical* reductionists say that the whole is *nothing but* the sum of its parts (a kind of reasoning sometimes referred to as “nothing buttery” by reductionism’s critics![†]). Metaphysical reductionism implies three interconnected beliefs concerning human identity, free agency, and spiritual experiences:



Photo by Steve Karg

- Human identity – People are purely physical beings. They are “nothing but” their chemistry, biology, and genetics. They are not qualitatively different from animals.
- Free agency – If one reduces the identity and uniqueness of people to their biology, then their choices are “nothing but” the products of their brains, which are programmed for survival. A person’s genetics and environment predetermine his or her decisions; there is no “I” making a free and meaningful choice.
- Spiritual experiences – Similarly, one can then reduce people’s spiritual experiences to “nothing but” neurons firing in the brain. There is no supernatural world; the evolutionary process has simply hard-wired humans to believe in God as a way of coping with their environment.

2. Spiritual experiences

How do we think about and experience God? Christians believe that God speaks to and interacts with his creation: we think of prayer, worship, hearing from God for guidance, feeling God’s presence, and the work of the Holy Spirit in changing our character as examples of Christian experience and practice. Some people, however, have seen visions, heard voices, or experienced a change in their personality as a result of brain injuries. Are these spiritual experiences “real”? And if not, what does that say about our own experiences of God?

Scientists can also stimulate the brain using electromagnetic waves or chemicals, causing people to see visions, sense a spiritual presence in the room, or have a feeling of transcendence. Some neuroscientists claim that these cases of brain injury or brain manipulation prove that so-called “spiritual experiences” are only by-products of our physical brains. They say that the physical phenomena of our neurons cause the mental phenomena (epiphenomena) of our religious thoughts. These religious thoughts have no reality in themselves, they say, but are the result of the physical activity of our brains.

In one sense, these reductionist scientists are right: our physical condition does affect our mental state.

Cool words!

Epiphenomena – from Greek: *phenomena* are events we can observe, and the prefix *epi* means “above” or “attached to.” (*Phenomena* is the plural, and *phenomenon* is the singular.)

- A. List some physical factors and/or substances that could affect your mental activity (your thoughts, emotions, and beliefs):

[†] D.M. MacKay, *The Clockwork Image: A Christian Perspective on Science* (Inter-Varsity Press, 1974).

Does this relationship between the physical and the mental mean that our thoughts, emotions, and beliefs depend *entirely* on our physical state? To push the question further, does the fact that neuronal activity in my brain *correlates* with my religious experience mean that my neurons *caused* my religious experience?

Cool words!

Correlate – to be placed in a mutual, reciprocal relationship; to be linked, have an orderly connection (can also be a noun, pronounced differently).

- B. * To help you answer these questions, think about our emotions as an analogy for spiritual experience. Neuroscientists can fabricate an emotion (such as anger or pain) in someone's head by stimulating parts of their brain. Some could argue, based on this fact, that our naturally-occurring emotions are similarly "fake." However, we know that our "real" emotions are responses to actual external events. How would you apply this reasoning to spiritual experiences?

- C. * If the spiritual world is real, how might you expect it to "intersect with" the physical world? How does God influence, guide, or speak to us?

"To do science, people will reduce a complicated human behavior to something that can be tested and measured. So, [they reduce] the complicated behavior of religious experience to something that can be measured in an image on a particular scan. That's methodological reductionism to make it easier to do science. So spiritual experience is associated with a neural correlate, but that does not mean that religious experience is nothing but a neural correlate; there may well be more to it that isn't accommodated by the scientific method." – Rev. Dr. Alasdair Coles

Alasdair Coles says that the scientific method (reductionism) cannot accommodate certain areas of life. For example, literature students break a poem down into lines and words to gain understanding of the whole, but they cannot reduce great poetry to the individual meanings of the words in the poem. Similarly, people might try to be "scientific" about deciding whom they will marry. They might fill out checklists and compatibility tests and seek opinions from other people—but, in the end, they cannot guarantee a happy marriage by having all the right "ingredients." Science can analyze art and love, as well as spiritual experiences, but the scientific method cannot completely understand these things.

Part 3, chapter 2: WHOLE PERSONS



Introduction

Metaphysical reductionism can cause us to doubt whether we truly have a "mind" that exists apart from our physical brain—which in turn causes some to claim that we cannot make free choices at all. This philosophy, that everything is "pre-set," is called determinism. The theory of emergence counters determinism and helps shed light on these questions.

In chapter 2 of the DVD we will learn about

1. Determinism versus free agency in human behavior
2. The concept of emergence in human identity
3. The importance of seeing humans as whole persons



Watch Part 3, chapter 2 (7 minutes)

Stop at John Polkinghorne: “. . . not as collections of quarks and gluons or whatever it might be.” (12 minutes 51 seconds)



Discussion and questions

1. Determinism versus free agency

This chapter of the DVD starts with Bill Newsome’s “camera analogy,” which illustrates the inadequacy of the reductionist view.

- A. Why does Newsome say that reductionist explanations of the camera are impoverished, and how does he link this to reductionist explanations of the human person?

But what about the decisions that we make? Reductionists would say that the decision-making “mind” (separate from our physical brain) does not exist. They say that our seemingly free choices are completely determined by our brains, which in turn are “pre-set” by genetics, conditioned for survival, and dependent on our physical bodies and experiences. Free agency is a myth; everything is “determined” (set) in causal relationships: one thing causes another, which causes something else to happen, leading to an eventual (and inevitable) conclusion.

Cool words!

Determinism – from Latin: *Terminare* means end or boundary. *De + terminare* means to bound, or limit. So to determine an outcome means to limit it to one possible conclusion.

“Genetic determinism is the idea that analyzing every gene, and knowing the consequence of every mutation, will enable us to build a complete picture of a person’s physique, appearance and even their personality. Genes don’t just make you tick, they determine who you are.”
– Dr. Peter Moore, 2000[†]

- B. What are the dangers of this type of thinking? (How would this type of thinking affect parents considering having a baby? How would a very talented person feel if their talent was thought to be completely genetic? What about a person with bad behavior?)

Of course, as Bill Newsome points out when he describes Tiger Woods and Michael Jordan (in chapter 3), our genes *do* limit or enhance certain traits. However, the way our parents raise us, the experiences we have, and the choices we make play a major part in our development. This debate over whether genetics or environment plays a greater role in forming our identity is known as the “nature/nurture debate.” Evidence points to a complete and complex interaction between these two factors—but even so, the question remains: are we entirely “determined” by these things outside of our control? Do we have any free choice?

[†]. Quotation from *Test of FAITH Resources for Schools*, page 51. Reproduced with permission, The Stapleford Centre 2009.

The Bible tells a different story from reductionist science. Though Scripture emphasizes God’s sovereign power, it also teaches that humans are morally responsible creatures. In commands like “choose for yourselves this day whom you will serve” (Joshua 24:15), God underlines human free will and responsibility, giving us practical guidance for living that counters the “nothing buttery” and determinism of some scientists.

Look up the following verses: Deuteronomy 30:19–20; Proverbs 1:28–29; John 7:17; James 4:4.

C. What do these verses say about human free will (our choices and their consequences)?

2. Emergence

How do we reconcile reductionist science’s deterministic perspective with biblical teaching about free will? We need to go back to the distinction between the *brain* and the *mind*.

A. What do the scientists on the DVD mean by the word “brain”? By the word “mind”?

- Brain = _____
- Mind = _____

In order to make free choices, we need to possess a conscious mind which can choose. The theory of emergence helps explain the concept of “mind.”

Emergence occurs when the whole system takes on properties that the individual parts did not possess. For example, hydrogen and oxygen, on their own, are just gases. But together they take on a completely different property that could never have been predicted: wet-ness! Many scientists now take this idea of emergent properties as an essential part of their field. This is known by philosophers as *epistemological emergence*, because studying emergence gives us a *way of knowing* (epistemology). In order for us to understand the whole system, we have to understand the individual parts (reductionism), as well as the overall pattern and properties (emergence). Some examples of epistemological emergence are the surprising properties that crystals, icebergs, and snowflakes display.

Cool words!

Emerge – from Latin: e- (a variant of ex-) means “out, forth” and *mergere* means “to immerse or dip.” So, to emerge means to come out of being immersed in something (the opposite of “submerge”).

B. To truly understand a snowflake, scientists must understand its parts and the way those parts relate together to form the whole.

- What are the basic “parts” of a snowflake that scientists need to understand?

- What are the emergent properties that the snowflake as a whole exhibits?

* A more philosophical (and controversial) kind of emergence is known as *ontological emergence*. In this view, the emergent properties are not just a way of knowing, they are a new *kind of being* altogether. They have a separate identity from the more basic properties that give rise to them. Those who support ontological emergence would argue that not only do the basic parts of the system affect the emergent properties (upward causation), but the emergent parts can in turn affect the basic properties (downward causation). For example, letters and words combine to form this sentence that you are reading now—which takes on properties of meaning and purpose that the individual letters did not contain. Not only that, but the meaning of a sentence can summon up an idea or image in your mind, which is completely separate from the letters which formed it.

The scientists interviewed on *Test of FAITH* think that our minds emerge out of the physical realities that involve trillions of synaptic connections between the neurons in the brain, in addition to the interactions of the brain with the rest of the body and its wider

environment—in particular its interactions with other minds. They would say that this is an example of *ontological emergence*: our minds are really there and are qualitatively different from our brains, though they depend on them. Something emerges in us that is more than the sum of its parts. This emergent property (our mind) can affect and change the physical properties of other things. Try it and see! Just choose to stretch out your arm to pick up a pencil. That was your mind interpreting the words on this page, resulting in the top-down causation of the movement of physical objects.

3. Whole persons

This idea of emergence helps us to think of human beings as whole persons, and not just collections of atoms (as some reductionists think) or spirits that happen to be attached to inconsequential bodies (as some Christians believe).

The Bible emphasizes this holistic view of the human being. It teaches us that we are spiritual beings, and it shows us that our bodies are important as well.

A. Read Mark 12:28–30. Why are our physical bodies important?

B. Read Luke 24:36–44 and 1 John 3:2. What do these passages tell you about our physical bodies?

We are not simply machines; neither are we disembodied souls with no real connection to our physical bodies. We are souls, minds, and bodies—all intimately connected and combined to make a whole person. These Bible passages tell us that our bodies are important and influence our spiritual lives—and will be part of our identity as humans for all eternity.

Day 3: Chapters 3 and 4

Part 3, chapter 3: AN ETHICAL TOOLBOX



Introduction

Chapter 3 of the DVD discusses cloning. New discoveries in science have raised many ethical issues, including cloning. It is vital for Christians to be informed about current technologies and their implications, as well as to learn to think biblically about those technologies. Though God's Word does not give specific guidance about modern technologies, we can derive principles from the Bible and apply them to cloning and other ethical issues.[†]

In chapter 3 of the DVD we will learn about

1. What makes humans different from other animals
2. Biblical principles (an "ethical toolbox") for making decisions
3. Putting biblical principles into practice regarding the issue of cloning
4. Other ethical issues



Watch Part 3, chapter 3 (10 minutes)

Stop at John Polkinghorne: ". . . it's not the whole story about us. We are more than computers made of meat, or something like that." (22 minutes 11 seconds)



Discussion and questions

1. Being human

"We have to be careful not to allow reductionist interpretations of [human beings] to just take over. Neuroscience isn't going to tell us all about the human person. It's going to tell us interesting, important things—we're embodied people; how our bodies work is important—but it's not the whole story about us. We are more than computers made of meat." – Rev. Dr. John Polkinghorne

Before we examine cloning and other ethical issues that stem from new technologies, we need to understand what it is that actually makes us human.

A. What are three of the characteristics that the scientists mention that show we are not just "computers made of meat"?

- _____
- _____
- _____

The characteristics you wrote down hold true for humanity as a whole, but what about people who do not possess them? Are they still counted as human beings? Look back at your definition of human beings from Day 1 of this week (page [62](#)). Did you remember to include babies? Elderly people? People with disabilities? People in a vegetative state due to head injuries?

[†] These sections have been adapted in large part from *Test of FAITH Leader's Guide*, pp. 86–96. Reproduced with permission, Paternoster 2009, Wipf & Stock 2010.

B. How would you define “being human” so that you include all of these people? In other words, what is it about us as humans that makes us different from other living creatures? (*Hint: Who created us?*)

Read Genesis 1:26–28 and 2:15–17.

C. * Based on these verses, what do you think the phrase “made in the image of God” means? If you get stuck, watch the bonus interview clip with David Wilkinson (3.1, found in the main menu of the DVD).

People with no religious faith would generally agree that we should protect and respect human life—but without a foundation in God’s Word, it is difficult to define who “counts” as a human and whom, therefore, we are responsible to protect.

2. An ethical toolbox

God’s Word not only helps us find our identity as human beings, but it also helps us think clearly about tough issues. To tackle ethical issues from a Christian perspective, you first need to construct a moral framework (or “ethical toolbox”) from biblical principles.

The Bible teaches principles that can function as “tools” to help you deal with ethical dilemmas. What moral principles can you draw from the following Bible passages?

- Galatians 3:26–29; Romans 12:4–8 –

- Mark 12:31; Philippians 2:3–4 –

- Deuteronomy 10:18 –

- Matthew 25:31–46 –

- Psalm 127:3–5 –

- Psalm 139:13–16 –

Cool words!

Ethics – from Greek (*ethikos*): the moral principles or rules of conduct of a group or individual.

3. Using your ethical toolbox: Cloning

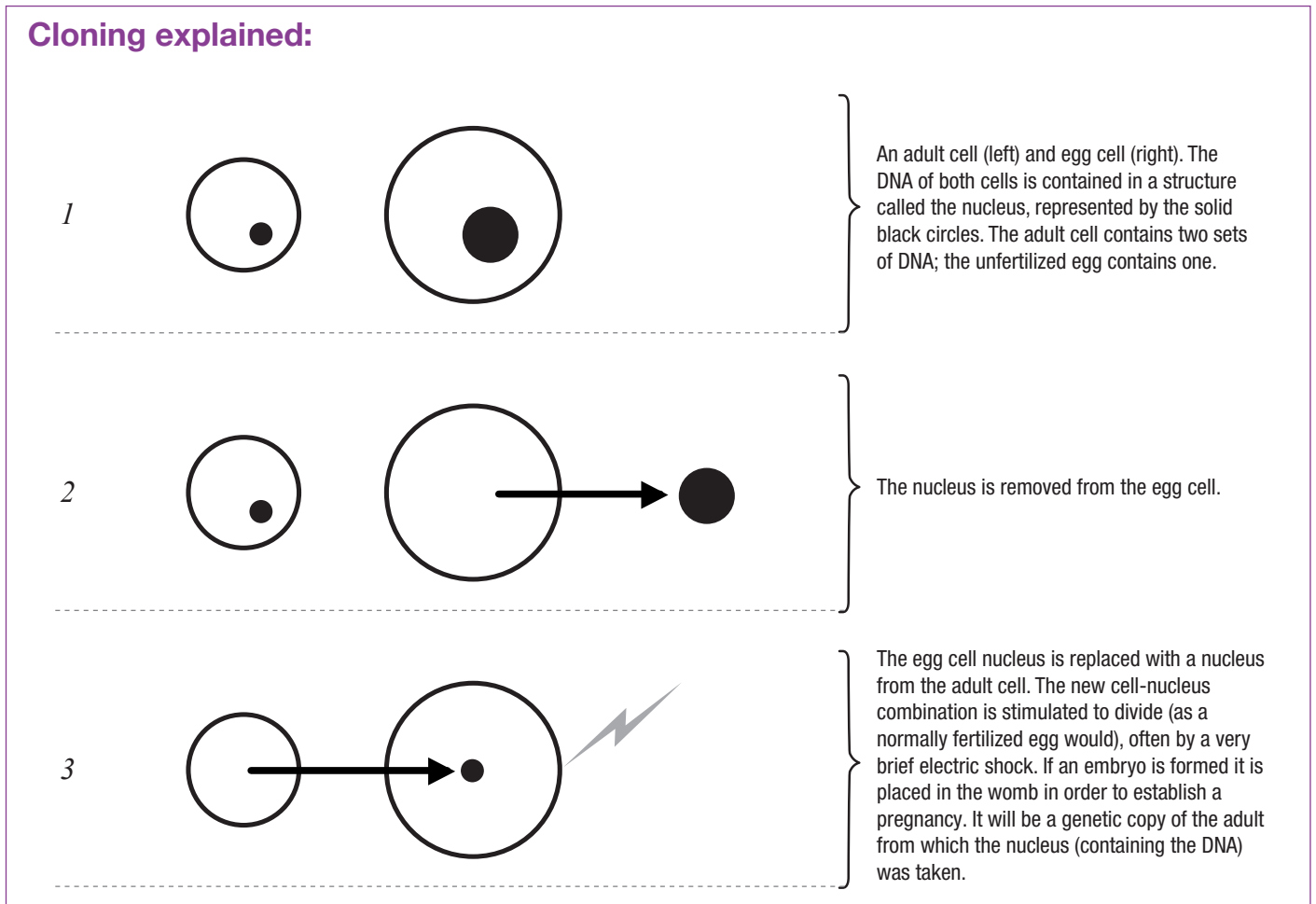
While the Bible does not specifically address cloning, genetic enhancement, abortion, or other such issues, we can take the appropriate tools (biblical principles) and apply them to a given situation. Let's open our toolbox and think about the issue of cloning.

Cloning (often called "reproductive cloning") means making a genetic copy of a person. The process would be like taking a cell from someone's body and using it as a seed to grow a new person.



Photo by JM <http://www.logodesignweb.com/stockphoto>

The following diagram explains the process of reproductive cloning:[†]



Among other questions, cloning raises the question of who the clone's parent would be. If an adult cloned him- or herself, the child's "biological parents" would actually be his or her grandparents.

Another question arises: what about the soul of a clone? Some babies born naturally are genetic clones of each other—also known as identical twins! If you have met any identical twins you know that, although they share many similarities, each one is a unique individual. (As we discussed yesterday, other factors besides our genes make up who we are.) Likewise, a clone would be a "real person," a unique image-bearer of God.

[†]. *Test of FAITH Leader's Guide*, page 91. Reproduced with permission, Paternoster 2009, Wipf & Stock 2010.

A. Why do you think someone might want to artificially clone a person?

Read the case study† and answer the questions that follow, bearing in mind your “ethical toolbox.”

Case Study

The fog on Interstate 95 was exceptionally dense as the Robinson family drove towards New York on November 20th, 2012. Their only child Susan, aged four, was playing happily with her dolls on the back seat. After years of unsuccessfully trying to have a baby, the Robinsons had eventually decided to use in vitro fertilization to have Susan, so she was especially cherished. Her long eyelashes and dimples were the spitting image of her mom, whereas even at that young age her long limbs held great promise of future athletic prowess, or so her proud father liked to think.

Suddenly a pile-up loomed out of the fog in front of them. Mr. Robinson slammed on the brakes. His quick responses prevented their car from diving into the mangled heap of wrecked cars ahead, but unfortunately the truck driver behind was not so alert. The truck slid into their rear with a sickening thud. Seconds later the shocked parents found themselves clutching Susan’s lifeless form as they huddled on the side of the road waiting for help to arrive.

Minutes later, after a short but fevered discussion, Mrs. Robinson called CLON777 on her cell phone and, as the fog began to clear, a helicopter landed in a nearby field, CLONE-AID emblazoned across its fuselage. A white-coated medical technician leapt from the helicopter and was soon taking tiny skin samples from Susan’s limp body. Minutes later the samples were being stimulated in a nearby CLONE-AID laboratory to establish cell cultures.

Several months went by while the Robinsons grieved for little Susan, but finally they could contain themselves no longer. They wanted a replacement Susan and they wanted her now. Fortunately Mrs. Robinson already had viable eggs frozen down as a result of her cycle of in vitro fertilization. The great day came. In the CLONE-AID laboratory, with its picture of Dolly the sheep proudly displayed on the wall, the process of “nucleus transfer” began. A nucleus was removed from one of Susan’s cultured skin cells.

This single nucleus contained the cell’s DNA with its genetic instructions to build a new Susan. Carefully the nucleus was placed in a small dish with one of Mrs. Robinson’s eggs from which the nucleus had been removed. A small electric current was zapped through the cell suspension and the nucleus fused with the egg cell to produce a tiny embryo. This procedure was repeated multiple times to generate several embryos that were carefully screened over the next few days to check for any abnormalities before one of them was implanted in Mrs. Robinson. Nine months later the Robinsons held in their arms a pink and gorgeous looking “replacement Susan,” complete with dimples, long eyelashes, and long limbs.

B. Can you anticipate some of the consequences of cloning this child? How might it affect the resulting clone and her family?

†. Extract with permission, from D. Alexander and R.S. White, *Beyond Belief: Science, Faith and Ethical Challenges* (Lion, 2004), as quoted in *Test of FAITH Leader’s Guide*, page 91. Reproduced with permission, Paternoster 2009, Wipf & Stock 2010.

C. * How might cloning affect our society's view of human beings? Of families?

The procedure of cloning poses huge medical risks:

- Cloned fetuses have a very high miscarriage rate.
- The cell from the cloned person is “old,” and the new child made from that cell will inherit that age (including cancer risks), rather than having his or her “clock” re-set by the process of egg formation. Biologists do not understand this process fully, so it is difficult to predict the results or reduce the risk.
- Normally, when a human body makes eggs or sperm, certain genes in the eggs or sperm are switched on and off. A clone whose “parent” is a fully developed cell may not inherit the correct switching required for normal development.

Cool words!

Bioethics – from Greek: *bio* means life and *ethikos* means moral principles, so “bioethics” means the moral principles that govern medical and biological research.

Most motivations for cloning do not involve saving lives (apart from creating organs for transplant, which is an extreme example of commodification of humans), so most bioethicists argue that cloning is not worth the risk.

Look back at the Bible verses and principles that we used to form our “ethical toolbox.”

D. Choose a couple of verses and the principles you derived from them and explain how they could apply to the issue of cloning.

4. Other ethical issues: Beginning of life and enhancement

One thing we did not mention in describing the ethical issues involved in cloning (and it's something you may have already thought about) is the creation and potential destruction of embryos that the process requires. This issue takes us to the question of when life begins, which is a foundational question for many current issues in bioethics (cloning, *in vitro* fertilization, genetic testing of embryos to screen for disease or defects, stem cell research, and abortion, to name a few). Thinking clearly about the question of when life begins will help you approach these other issues.

Read the following summary of the main views people hold on when human life begins:[†]

When does human life begin?

A) Human life begins at fertilization (0–6 hours)

Biblical/theological arguments

- The Bible names Jesus and other people by this stage.
- This is the origin of a “personal history.”
- This is when Jesus became incarnate as a man.
- Relationship with God is established.
- In the Bible the Hebrews believed life began as soon as they were aware of it being there. The message is that life begins as soon as there is something there. With our knowledge today, this means conception.

Biological arguments

- Fertilization provides a fairly precise moment of beginning.
- The genetic make-up of the individual is specified during this stage.

B) Human life begins at implantation (7–10 days)

Biblical/theological arguments

- Physical relationship with the mother begins – she can become aware of her pregnancy. Part of what defines us as human is being in relationship.
- Twinning may occur between the “blastocyst” (hollow ball of cells) stage and implantation, so until implantation there isn’t “one” individual present to relate to God.
- This is what passages about the unborn refer to because this is the time when pre-scientific societies became aware of pregnancy.

Biological arguments

- There is a high rate of embryo loss before implantation (70–80%).
- Until implantation, it is impossible to tell what parts will become the embryo and what will become the placenta.

C) Human life begins at the primitive streak stage (14 days)

Biological argument

- The development of the primitive streak marks where the nervous system will begin to develop. The capacity for sensation and pain are important in defining humanness and in determining how we treat others.

D) The beginning of human life is a continual process

This is the view that all of the above “milestones” are not that critical, since the development of human life is a continual process from fertilization through to birth and onwards. Human life deserves our care and protection all the way through, although prenatal care will increase in line with development.

Some Bible passages that are relevant to this discussion

These highlight the fact that human development is shaped and purposed by God from the beginning:

- Jesus’ incarnation – Luke 1:31–33
- God establishes a relationship with Isaiah and Jeremiah before birth – Isaiah 49:5; Jeremiah 1:5
- God’s knowledge of us in the womb – Psalm 139:13–16 and Job 10:8–12
- An important marker of new life was “quickening,” when a baby kicked for the first time – Luke 1:44
- Being in relationship is an important part of personhood – Genesis 2:18
- Care of pregnant women – Exodus 21:22–23

[†]. Test of FAITH Leader’s Guide, page 112. Reproduced with permission, Paternoster 2009, Wipf & Stock 2010.

A. What do you think of these different views?

B. How might the “toolbox” principle you derived from Deuteronomy 10:18 apply to the question of when life begins?

A final ethical dilemma about which Christians need to think carefully is human enhancement.

The following are examples of some enhancement technologies:

- Genetic modification, or GM (e.g., “gene doping” in athletes) (*a speculation for the future*)
 - To cause an effect in an individual.
 - To change the genes in someone’s eggs or sperm so that the future generation is affected.
- Prosthetics or implants (e.g., an artificial leg, brain implant, living tissue implant) (*many present realities*)
- Chemicals or drugs (e.g., to enhance memory) (*present realities or will be with us soon*)

Christians believe that we have a mandate to bring God’s care and healing to the world. We can think of healing as restoration to what is normal for most of the population.

C. Look at the list of potential treatments below and plot the numbers on the spectrum, deciding where they should be on the line from healing to enhancement.

1. Vaccination
2. Caffeine tablets
3. A memory implant (in a normal functioning person)
4. A third arm
5. GM to treat muscular dystrophy
6. Drugs to enhance concentration
7. GM to make someone taller
8. Glasses

Healing (acceptable)

Enhancement (unacceptable)

D. How might enhancement affect an individual and his or her relationship with the rest of society?

- Effects on individual: _____

- Effects on society: _____

You will have the opportunity to explore how the “beginning of life” and the “enhancement” questions apply to current technologies in the Extension section, if you choose.

Part 3, chapter 4: BELIEVING SCIENCE



Introduction

The final chapter helps us “zoom out” again to the big picture, reminding us of the relationship between science and faith. We need both perspectives in order to be whole persons and to pursue truth.



Watch Part 3, chapter 4 (4 minutes)

Watch to the end of the episode.



Discussion and questions

A. What two ways of discovering truth does Francis Collins mention?

- _____

- _____

B. * What warning does Collins give about using these two ways of discovering truth?

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 on ethical issues (for questions 2, 4, and 5) 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. What is the biggest influence on a person’s identity? Scientific research seems to swing between two poles: genetics or upbringing. This is known as the “nature/nurture debate.” Research this issue and write about what you find. What studies and evidence support the “nature” side of the debate? The “nurture” side? Finally, give your own opinion about how much nature and nurture contribute to a person’s identity. (*Foundation*)

- Bryant, J. (2005, September 1). “Don’t my genes determine my behaviour?” Evangelical Alliance, UK. <www.eauk.org/resources/idea/bigquestion/archive/2005/bq9.cfm>.
- Counterbalance website. “Are we free?” page <www.counterbalance.org/quest/free-frame.html>.
- Habgood, J. (n.d.). “All in the genes.” Science and Religion Forum. <www.srforum.org/articles/all-in-the-genes>.
- Science and Religion Today. Genetics topics. <www.scienceandreligiontoday.com/topic/genetics>.
- Test of FAITH interview clips. <www.testoffaith.com/resources/subcategories.aspx?id=13>.
 - John Bryant – Genetic determinism of behavior
 - Francis Collins – Did my genes make me do it?
 - Bill Newsome – 3 clips on the brain, “hardwiring,” human responsibility

2. When does life begin? Choose a position (refer back to Day 3 from this week, page 74) and defend it, using biblical and scientific resources. Explain the opposing arguments and provide counter-arguments to strengthen your position. (*Foundation*)

3. For decades, neuroscientists tried to find a “God Spot” in the brain—the part of the nervous system that controlled (or responded to?) our spiritual experiences. Current research shows that there is no single “spot” associated with spirituality; multiple parts of the brain are involved in the complex interaction of our beliefs and experiences. Research and respond to the following questions: What studies have been done to investigate the brain’s involvement in spiritual experiences? How might atheists interpret these studies? How might Christians respond? (*Intermediate*)

- Brown, W.S. (n.d.). “Neuroscience of religion.” The International Society for Science and Religion. <www.issr.org.uk/neuroscience-of-religion.asp>.
- Coles, A. (2008, July). “God, theologian and humble neurologist.” *Brain*, 131 (7), 1953–1959. Oxford University Press. <brain.oxfordjournals.org/content/131/7/1953.full>.
- Counterbalance website. Psychology and neuroscience page. <www.counterbalance.org/neuro/index-frame.html>.
- Test of FAITH interview clips. <www.testoffaith.com/resources/subcategories.aspx?id=13>.
 - Alasdair Coles: 8 clips on the brain and spiritual experience
 - Bill Newsome: 7 clips on the brain, neuroscience

4. Where is the line between acceptable enhancements and ethically unacceptable enhancements? Imagine you are at a conference of scientists and ethicists. Your task is to develop guidelines to regulate the “enhancement industry” and clarify the boundary between what is acceptable and what is unacceptable. Try to come up with general principles rather than specific rules as to what

is “in” or “out,” because new technologies will continue to emerge and you want these guidelines to still be applicable. (You will need to research what enhancement technologies are coming our way in the future. In addition to bioethical questions, think also about questions of justice and money—to whom are these new technologies going to be available?) (*Intermediate*)

5. Research a new technology that carries ethical implications. Describe the science behind the technology (i.e., how the technology works). Then apply biblical principles from your ethical toolbox to this technology, weighing up the pros and cons. Finally, give your conclusion on whether this technology might be acceptable or not from a Christian standpoint. (*Intermediate-Advanced*)

Possible technologies to research include (but are not limited to):

- a. stem cell research
- b. *in vitro* fertilization
- c. genetic testing of embryos to screen for disease or defects
- d. genetic modification (GM) of crops
- e. GM and transhumanism

6. Some Christians use emergence to counter the “nothing buttery” of reductionism. Research and write about the concept of emergence within neuroscience. What is the difference between epistemological and ontological emergence? How does emergence relate to reductionism? Finally, discuss emergence from a Christian perspective. Does emergence give us a helpful way of looking at the human person? Why or why not? What does the concept of emergence say about the soul? (*Advanced*)

- Mckenzie, R. (n.d.). “Emergence: The whole is greater than the sum of the parts.” Test of FAITH. <<http://www.testoffaith.com/resources/resource.aspx?id=627>>.
- Polkinghorne, J. (n.d.). “More than a body? Science and Religion Forum.” <www.srforum.org/articles/more-than-a-body>.
- Poole, M. (2007, April). “Reductionism: Help or hindrance in science and religion?” Faraday Institute for Science and Religion. Faraday Paper Number 6. <<http://www.st-edmunds.cam.ac.uk/faraday/Papers.php>>.
- *Test of FAITH*
 - Bonus interview clips on DVD – 3.5, 3.6, 3.7 Bill Newsome: Emergence.
 - Briefing sheet: “Mechanism and meaning.” <www.testoffaith.com/resources/resource.aspx?id=243>.
 - Interview clips on website. <www.testoffaith.com/resources/subcategories.aspx?id=13>.
 - Alasdair Coles – Emergence.
 - Bill Newsome – Ontological emergence.

General resources: Ethical issues (questions 2, 4, and 5)

Test of FAITH:

- Bonus Interviews on DVD
 - 3.3 Denis Alexander: Genetic testing.
 - 3.4 John Bryant, Francis Collins, and John Polkinghorne: Enhancement.
- Online Interview Clips. <www.testoffaith.com/resources/subcategories.aspx?id=13>.
 - Denis Alexander: 4 clips on enhancement, ethics.
 - John Bryant: 13 clips on bioethics, transhumanism, cloning, embryos, IVF.
 - Francis Collins: Genetic enhancement.

Articles:

- Alexander, D. (2009, June). “Enhancing humans or a new creation?” Jubilee Centre. Cambridge Papers, Vol. 18 No. 2. <www.jubilee-centre.org/document.php?id=320>.

- --. (1997). "Genetic engineering in God's world." Jubilee Centre. Cambridge Papers. <www.jubilee-centre.org/document.php?id=17>.
- Bryant, J. (2007, April). "Ethical issues in genetic modification." Faraday Institute for Science and Religion. Faraday Paper Number 7. <<http://www.st-edmunds.cam.ac.uk/faraday/Papers.php>>.
- Deane-Drummond, C. (n.d.). "Genetic engineering: Foe or friend?" Science and Religion Forum. <www.srforum.org/articles/genetic-engineering-foe-or-friend>.
- Goddard, L. (n.d.). "Bioethics: A Christian perspective." Test of FAITH. <www.testoffaith.com/resources/resource.aspx?id=252>.
- *Test of FAITH*. (n.d.). "What does the 'image of God' mean?" <www.testoffaith.com/resources/resource.aspx?id=242>.

Websites:

- www.asa3.org/ASA/topics/ethics/default.html. American Scientific Association, ethics page.
- www.bioethics.ac.uk. BioCentre (UK).
- cbhd.org. Center for Bioethics and Human Dignity.
- www.cmda.org/wcm/CMDA/Public_Policy/Ethics_and_Position_Statements/CMDA/PublicPolicy2/EthicsPositionStatements/CMDA_Ethics_Position.aspx?hkey=150c638e-719e-45bd-92ed-6c0d20387d1b. Christian Medical and Dental Association (USA), ethics and scientific statements.
- www.cmf.org.uk/publicpolicy. Christian Medical Fellowship (UK), ethics and public policy page.
- ethicsforschools.org. Ethics and issues page for UK high-school-aged students, published by the Christian Medical Fellowship.
- www.counterbalance.org. Online library of articles and media related to science and religion. See the subjects "Genetics" and "Ethics."

SUGGESTED ANSWERS

WEEK 1: Beyond Reason? Science, faith, and the universe

Day 1: Introduction

1. Stem cell research, cloning, *in vitro* fertilization, creation/evolution in schools, sustainability and the environment.
2. *This is a self-reflection exercise to stimulate thought.*
3. *This is a self-reflection exercise to stimulate thought.*

Review sheet: Answers to fill-in-the-blanks:

Box 1 – Christians, science, religion

Box 2 – Big Bang, gaps

Box 3 – small

Box 4 – many, faith

Day 2: Chapters 1 and 2

Part 1, chapter 1

- 1.A. Teachers, parents, pastors, friends, movies, newspapers, internet.
- 1.B. *This is a self-reflection exercise to stimulate thought.*
2. *Atheist:* There is a natural, physical explanation for this. Perhaps something in his joint clicked into place during his sleep, and it is mere coincidence that it happened after prayer.
Deist: It is nice that someone prayed for this man (perhaps the psychological effect of being prayed for had a positive influence on him), but God does not intervene in the natural world in this way. My explanation would be similar to the atheist's.
Theist: Perhaps there is a simple, “natural” explanation for this recovery—which was used by God in response to prayer. Or perhaps God just changed the natural order by acting supernaturally—a miracle!
- 3.A. Thomas Huxley.
- 3.B. Orderly, follows natural laws, intelligible and understandable.
- 3.C. A world we can live in, fine-tuned to be fit for life, miracles, providential intervention, answered prayer.

4.A. 1 – b. 2 – d. 3 – a. 4 – e. 5 – c.

4.B. *Answer #1: Something like . . .* “The force of a sudden impact caused trauma to the capillaries around my eye, causing bruising and swelling to the area.”

Answer #2: Something like . . . “I was defending my wife and kids from a burglar, who hit me in the eye” or “I drank too much and ended up getting in a fight.”

Part 1, chapter 2

1.A. *This is a self-reflection exercise to stimulate thought.*

2.A. Science can answer “how” questions. It can study things which are measurable and often repeatable. It studies the physical, natural world.

2.B. Science cannot address “why” questions about meaning, purpose, and value.

3.A. *This is a self-reflection exercise to stimulate thought.*

3.B. “God of the gaps” is dangerous to faith if people rest their belief in God on “gaps” in scientific knowledge. As the gaps shrink, they might think that God is not so powerful, or they might lose their faith altogether. “God of the gaps” is dangerous to science because filling the unknowns with supernatural intervention might stifle scientific research and exploration into the natural causes of events.

3.C. We can see God’s glory in the *whole* world, not just in gaps in our understanding.

Day 3: Chapters 3 and 4

Part 1, chapter 3

1. The Anthropic Principle could point to a creator, but not prove his existence. Using the Anthropic Principle to point to God is not “God of the gaps”—fitting God into a gap in science which may eventually be filled by science—because the gap is not in the *how* (the science) but in the *why*. The *why* question is outside of science anyway and is properly the domain of faith.

Part 1, chapter 4

1.A. There should only be a fish in one bowl, symbolizing our universe which is able to sustain life; the rest of the bowls should be empty.

1.B. We believe that God is generous and powerful, able to create hundreds of billions of stars and galaxies, so a multiverse would enable us to marvel anew at his greatness.

1.C. Science can only deal with questions within our universe that can be tested and observed; a multiverse is, at the moment, un-testable.

2.A. *This is a self-reflection exercise to stimulate thought.*

2.B. *This is a self-reflection exercise to stimulate thought.*

SUGGESTED ANSWERS

WEEK 2: An Accident in the Making?

Creation, evolution, and interpreting Genesis

Day 1: Introduction

1. *Answers may vary, but may include:* Six-day, Young Earth Creationism; Progressive Creationism; Day-Age and/or Old-Earth Creationism; Intelligent Design; Theistic Evolution (i.e., Evolutionary Creationism).
2. *Answers may vary, but may include:* God existed before creation and is the “first cause” of creation, the reason creation exists; God actively created the world; God is independent of creation and has complete power over it; God cares about creation; God’s creation is good; God made us in his image; God cares about us; we care for creation at God’s command.
3. A.

An atom is like a miniature solar system.	
Similar to reality (a good model)	Different from reality (a limited model)
Like the solar system, an atom is mainly space. Both the nucleus (center of the atom) and the sun (center of the solar system) are where most of the mass is concentrated.	Within the atom, forces are electrical (not gravitational). The center of the atom (the nucleus) does not shine like the sun.

B.

God is like a human father.	
Similar to reality (a good model)	Different from reality (a limited model)
Children owe their being to their father (and we owe our being to God). God loves, cares for, and disciplines his children, as a good father should.	Fathers can be cared for by their grown-up children, but God does not need us to look after him. Some fathers get drunk; some abuse their children. God never does. God never fails, but a father can fail.

Review sheet: Answers to fill-in-the-blanks:

Box 1 – image, Intelligent

Box 2 – atheism, DNA

Box 3 – predictable

Box 4 – suffering

Box 5 – look after it

Day 2: Chapters 1 and 2

Part 2, chapter 1

- 1.A. Fossils already in the ground; light from stars light-years away already reaching the earth; full-grown trees with rings in them; mountain ranges already formed, etc.
- 1.B. *Answers may vary.*
- 2.A. The bacteria's flagellum—a miniature “outboard motor.”
- 2.B. The gap in scientific understanding is how these “irreducibly complex” structures could have evolved; ID fills that gap with “the Designer” [God]; if that gap shrinks through further scientific discoveries, our idea of God then shrinks as well.
- 3.A. Type 3.
- 3.B. More concordist.

Part 2, chapter 2

- 1.A. *This is a self-reflection exercise to stimulate thought.*
- 1.B. No. The DVD has shown Christians who hold three very different views.
- 1.C. Nazism, eugenics, slavery, Marxism.
- 2.A. *Answers may include:* Essay, novel, recipe book, short story, poetry, history, newspaper, drama, romance, sci-fi, textbook, detective story, fantasy, fairy tale, email, text message, blog, business letter, thank-you note.
- 2.B. Deuteronomy 24:17 – law. Psalm 148 – poetry. Luke 11:2–4 – prayer. Ecclesiastes 6:7 – proverb. 2 Timothy 1:1–2 – letter. Luke 2:1–2 – history. Isaiah 61:1–2 – prophecy. Matthew 13:44 – parable.
- 2.C. *Isaiah 55:12* – Metaphorically. The genre of most of the Prophets is poetry. The author personifies mountains, hills, and trees to convey the prosperity and gladness that God's people will enjoy when he establishes his kingdom.
- Hebrews 10:12* – Metaphorically. Jesus has a physical resurrection body, but God is spirit and does not literally have hands. Sitting “at the right hand” was a cultural image of authority and honor. The writer of Hebrews is expressing the theological truth that Christ has completed his work, has ascended to the position of highest honor, and is now ruling with the Father.
- Acts 10:1* – Literally. The genre of Acts is history.
- 3.A. God is Creator.
- 3.B. *Answers may vary, but you should notice that Young Earth Creationists tend to fill in columns “similar” and “eternal truths”; Progressive Creationists tend to be split among “similar,” “eternal truths,” and “different”; and Theistic Evolutionists tend to fill in columns “eternal truths” and “different.” Note: We think that statements 1, 3, 4, 7, 8, 11, and 12 would be “eternal truths,” because we presume that Christians who hold these three viewpoints would agree with them.*

Day 3: Chapters 3, 4, and 5

Part 2, chapter 3

- 1.A. *Meaning of random #1:* In day-to-day life we use it to mean “purposeless,” which carries a worldview/metaphysics connotation.
- Meaning of random #2:* In a scientific sense it means that the microscopic details of a process may be unpredictable, but the overall process may be very predictable. The scientific sense does not necessitate belief in a particular worldview.
- 1.B. The second meaning.
2. The scientific data merely shows that the world is structured, but it does not prove God. We must then stand back and ask “why?” using metaphysics. We must ask which worldview is congruent with the facts.

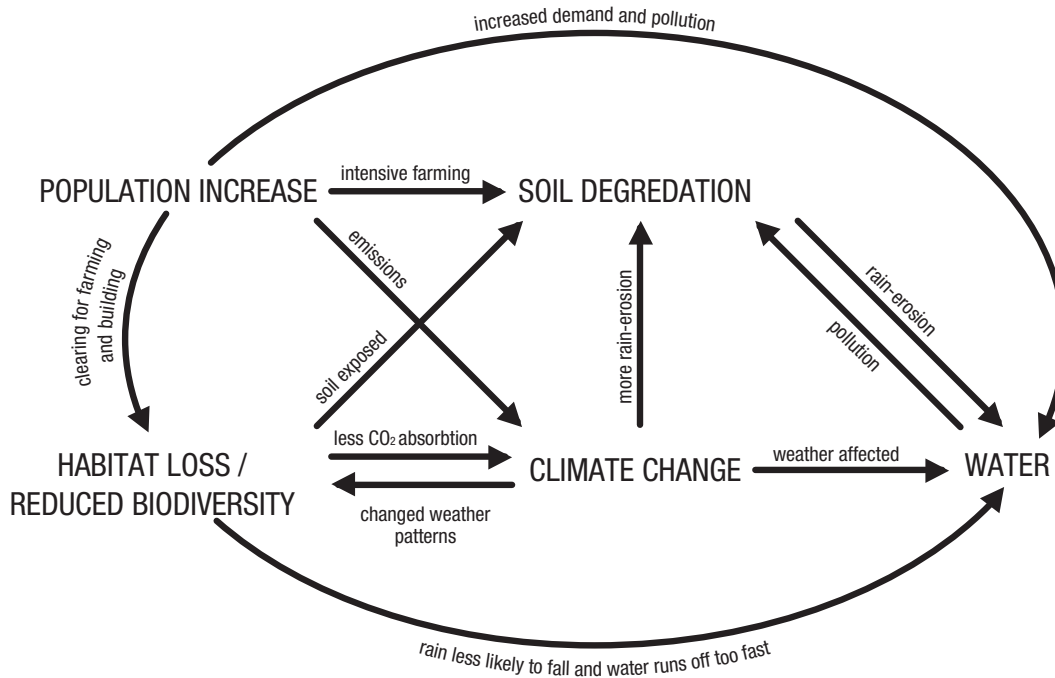
Part 2, chapter 4

- 1.A. *Answers may vary, but may include:*
- People* – crime, abuse, pollution, building/living in disaster-prone areas, poverty.
- Nature* – hurricanes, disease, tornadoes, earthquakes, tsunamis, floods, animal attacks.
- Both* – poverty, sickness, homelessness, fires.
- 1.B. Either physical evil was always present in creation, or it happened as a consequence of the fall.
- 1.C. *This is a self-reflection exercise to stimulate thought.*
2. *This is a self-reflection exercise to stimulate thought.*
- 3.A. Sinful human nature.
- 3.B. The poor and meek shall be blessed; the last shall be first; don’t seek status in the world’s eyes; put others’ needs before your own and do not grasp honor and position; honor the weaker parts of the body; bear one another’s burdens; do not show favoritism to the rich.
- 3.C. We can remember how Jesus endured suffering; he understands and he has triumphed. We can remember the sovereignty of God, exemplified in the story of Job. We can rejoice in the hope that one day God will right all wrongs. We can talk to God and hear from him in prayer. We can receive comfort from the family/community/church in which God has put us. We ask for forgiveness when we have done wrong, and we can ask God to help us forgive those who have wronged us.
- 3.D. There will be a new earth. God will be with the created world, and the world will be with him forever. There will be no more suffering or evil.

Part 2, chapter 5

- 1.A. God powerfully controls creation. He is intimately involved in every detail. He rejoices in what he has made. He is good and merciful to his creatures, and he provides for them.
- 1.B. God told humans to fill the earth, subdue it, and rule over creation—which implies cultivating creation and taking care of it. God gave humans a privileged position, making them rulers over his creation.
- 1.C. Servants should use wisely what their master has given them. They should invest their resources and look after them. They should be faithful with what he has entrusted to them.
- 1.D. Creation is subject to frustration and in bondage to decay. Creation itself is waiting, even groaning, for redemption.

2. There are many different ways to draw this, but here is one:[†]



- 3.A. This is a self-reflection exercise to stimulate thought.
- 3.B. This is a self-reflection exercise to stimulate thought.
- 3.C. This is a self-reflection exercise to stimulate thought.
- 4.A. This is a self-reflection exercise to stimulate thought.
- 4.B. This is a self-reflection exercise to stimulate thought.

[†]. Test of FAITH Leader's Guide, page 73. Reproduced with permission, Paternoster 2009, Wipf & Stock 2010.

SUGGESTED ANSWERS

WEEK 3: Is Anybody There? Human identity and choice

Day 1: Introduction

1. *This is a self-reflection exercise to stimulate thought.*
2. *This is a self-reflection exercise to stimulate thought.*
3. *Specifically Christian sources:* the Bible, church teaching, conscience/conviction by the Holy Spirit, the wisdom and informed opinions of others.

Other sources: gut feelings/emotions, reason/logic, conscience/guilt, consensus (following the crowd, media, peers), utilitarianism (consequences, the best outcome), relativism (that's true for you), human authorities.

Review sheet: Answers to fill-in-the-blanks:

Box 1 – brains

Box 2 – environment, emerge

Box 3 – creative, choices

Box 4 – nature

Day 2: Chapters 1 and 2

Part 3, chapter 1

1. *Answers could include:* In literature, we understand more about the whole novel/book/poem by studying the chapters/the characters/the lines/the words.
For the second question, any pair of answers is correct, as long as it illustrates the whole/part relationship.
- 2.A. *Answers could include:* Food, sugar, caffeine, alcohol, drugs, sleep or lack of sleep, hormone levels, depression, mental illness, pain and physical health, head injuries. *Note: Though these things do affect a person's mental and spiritual life, Christians believe that God is gracious and gives us his Holy Spirit to help us, regardless of our physical or mental state.*
- 2.B. Although neuroscientists can simulate spiritual experiences, we believe that the religious experiences of millions of people find their source in a real, external spiritual world.
- 2.C. If the spiritual world is real, we would expect it to affect the physical world—and perhaps at times the intersection occurs in the workings of our brain. When we hear from God through prayer, reading the Bible or talking to wise people, something physical happens (in our brains) *and* something real happens in our relationship with God.

Part 3, chapter 2

- 1.A. To say that the camera is “just” metal and plastic does not take into account the purpose for which it was made and the way in which it is used, as well as the agency of the person operating the camera. Similarly, to say that humans are “just” DNA or biochemical reactions does not fully explain questions of meaning and purpose.
- 1.B. People might start to try to change the genes of other people (e.g., their children). Human beings might lose their value as persons. Talented people, or people with “great genes,” might feel under a great deal of pressure to perform. Also, they might not feel a sense of worth based on any self-discipline or effort they put forth, because they might think, “It’s just my genes.” On the other hand, people who have “normal” or “bad” genes might feel unable to achieve or be successful; they might just give up. People with bad behavior, or criminals, might be able to evade responsibility for their actions and say, “My genes made me do it!”
- 1.C. We have real choices to make, and God will hold us to account for them.
- 2.A. *Brain* = the physical organ in your skull, made up of neurons and built by genetics.
Mind = the conceptual “I”; the agent that chooses and acts; consciousness.
- 2.B. *Basic “parts” could include:* atoms; hydrogen and oxygen; protons, neutrons, and electrons.
Emergent properties could include: Crystal structure, six-sided pattern.
- 3.A. Loving God.
- 3.B. Jesus was raised with a real physical body: he was able to be touched and he ate fish. We will be raised with a body like his. We will have resurrection bodies in eternity—so they must be important!

Day 3: Chapters 3 and 4

Part 3, chapter 3

- 1.A. Creativity, moral reasoning, the ability to make choices. The scientists also mentioned the moral law, altruism, creating “useless” things like art, and our capacity for self-reflection.
- 1.B. We are made in the image of God. This is a gift, and it has nothing to do with our abilities. We can be in a relationship with God—or, more importantly, God is in relationship with us.
- 1.C. God gave us responsibility to rule the earth, and also the gift of a personal relationship with him. We believe that even infants and people with disabilities have souls with the capacity for relationship and responsibility.
2. *Galatians 3:26–29; Romans 12:4–8* – Each individual is important, regardless of his or her abilities and whether or not these are genetically based.
Mark 12:31; Philippians 2:3–4 – Love your neighbor as yourself; look to the interests of others.
Deuteronomy 10:18 – Protect and care for the vulnerable.
Matthew 25:31–46 – Care for the suffering.
Psalms 127:3–5 – Children are gifts from God.
Psalms 139:13–16 – God knows us—implying that we are people—while we are still in our mother’s wombs.

- 3.A. *Answers could include:* Infertility—although the child would only be the child of one parent. To replace a child or person who died. Duplication of talented individuals. To allow a homosexual couple to have a child—again, the child would only be the child of one parent. Curiosity. A source of compatible tissue for organ transplants. The cult called the Raelian Movement believes that cloning will bring immortality.
- 3.B. *Answers could include:* The child might struggle with huge expectations to be just like the deceased child. The child might have medical complications due to his or her genes not being “switched on/off” in the right way. The parents will probably be disappointed that the clone is not like the original child. The financial cost will be enormous.
- 3.C. *Answers could include:* One risk is making people commodities that you can buy. It allows people to control and create life in more powerful and dangerous ways. Cloning is another way for children to be born outside of a family; people might come to think that families are no longer important.
- 3.D. *Answers may vary.*
- 4.A. *This is a self-reflection exercise to stimulate thought.*
- 4.B. Christians have a calling to protect and care for the vulnerable; embryos and babies are very vulnerable and cannot speak for themselves. Christians have a responsibility to protect them.
- 4.C. *This is a self-reflection exercise to stimulate thought.*
- 4.D. *Effect on individual:* There will be expectations (from others and themselves) for that person to perform.
Effects on society: Justice – is this enhancement available to all, or does it cause a wider rift between rich and poor? Enhancement increases differences between people, which could lead to conflict (e.g., jealousy or social injustice causing anger and conflict).

Part 3, chapter 4

- A. The book of the Bible and the book of nature.
- B. We need to ask appropriate questions of faith and science. Use the right tools to answer our questions. (E.g., don't ask science to answer questions of meaning or value; don't expect the Bible to be a scientific textbook.)

GLOSSARY

altruism – Unselfish concern for others (which may involve self-sacrificial acts).

Anthropic Principle – The idea that the universe has been finely tuned to allow for the existence of life. (See also *fine-tuning*.)

anthropo – A Greek prefix meaning “having to do with humans.”

antimatter – Has the same physical properties as matter (e.g., mass) but the opposite electrical charge. For example, the antimatter equivalent of an electron is a “positron,” which has positive electric charge. When matter and antimatter come together they annihilate, giving out a lot of energy in the process.

astrophysicist – A scientist who uses the laws and theories of physics to study stars and other celestial objects.

astrophysics – The branch of astronomy that studies stars and other objects in space, using the laws and theories of physics.

atheist – Someone who believes that no gods exist.

automata – Machines that direct themselves according to preprogrammed instructions.

bacterial flagellum – A long “tail” that bacteria use to propel themselves around, rather like an outboard motor.

Big Bang – The current scientific understanding of the origin of the universe. Many Christians believe that the Big Bang is compatible with the Genesis account. The Big Bang was the beginning of the expansion of the universe from its initial hot, dense state, and it is still proceeding (the expansion is actually accelerating). Space is expanding at the same rate in all directions.

biochemistry – The study of the chemistry of living things.

bioethics – The moral principles that govern medical and biological research. (See also *ethics*.)

biology – The study of living things.

bottom-up – The effect that the “building blocks” of an object have on its overall properties (e.g., bricks make a strong house). (See also *top-down*.)

British Meteorological Office – Known as the Met Office, this is the UK’s national weather service.

Cambrian – A geological term for the period of time from about 542 to 488 million years ago during which there was a large increase in biological diversity in the fossil record.

camera eye – The type of eye that humans and many other animals have. It works in a similar way to a camera, including a lens, iris, and detector.

caveat – A warning or exception.

cell – The unit that makes up a living thing. Animal cells consist of a membrane enclosing whatever components that particular type of cell needs to do its job. For example, a fat cell contains fat, a bone cell contains a hard substance, a red blood cell contains a substance that carries oxygen around the body, and the long spindly nerve cells are able to pass electrical signals along their length.

chromosome – Each DNA strand in a living cell is wound up tightly into a chromosome. Depending on how human chromosomes are processed in the lab, they can sometimes look like “x” shapes or pairs of striped socks.

climate change – A significant and long-term change in the weather patterns of the planet.

cloning – Creating a genetically identical copy of a living organism by replacing the nucleus of an unfertilized egg cell with the nucleus of an adult cell.

cognitive ability – The ability to think and experience things.

commodification – The treatment of something as a mere product that can be bought and sold. For example, slavery is a commodification of human beings.

complementary – A word to describe things or ideas that combine in such a way as to enhance each other.

conception – The act of conceiving a child (creating an embryo by fertilizing an egg).

concord – Agreement, harmony.

congruent – In agreement.

conjecture – An idea based on incomplete information.

constants (physical) – Numbers that are important to the scientific understanding of physical and chemical processes which have been discovered through experiment. These numbers do not change (they remain constant). There seems to be no obvious reason why physical constants should be set at certain values, but in this universe they just are (e.g., an electron always has the same charge).

convergence – see *evolutionary convergence*

correlate (verb) – To relate in such a way that one thing affects or depends on another.

cosmologist – A scientist who studies the origin, development, and overall shape and nature of the universe.

cosmology – The study of the origin, development, and overall shape and nature of the universe.

dark energy – A hypothetical energy associated with the fabric of space, which could be the force that increases the expansion of the universe.

dark matter – Hypothetical matter which makes up around 22% of the mass of the universe. Dark matter is thought to have mass but no electric charge, making it very difficult to detect. The nature of this matter is disputed: some say it is made up of massive subatomic particles.

Darwinism – The theory of the evolution of species by natural selection, based on the ideas of Charles Darwin (1809–1882).

deism – The belief in a supreme being which created the universe but has then had no further involvement with it.

delegate (verb) – To entrust a responsibility to someone else.

determinism – The belief that things/forces outside ourselves determine all events, including our actions. This belief can imply that individuals have no free will and are not morally responsible for their actions.

developing country – A financially poor country, usually dependent on agriculture, which is becoming more advanced economically and socially.

DNA – The chemical molecule (or strand) inside every cell of every living organism that carries the instructions for that organism's growth and development.

doctrine – A set of teachings and beliefs.

early church fathers – The theologians in the early centuries of Christianity who wrote down the various doctrines found in Scripture and explained them.

ecology – The branch of biology that studies the relationships of species to one another and to their environment.

elements (chemical) – The basic building blocks of everything on earth. The elements include hydrogen, helium, oxygen, carbon, and beryllium.

embryo – An unborn human, especially in the first eight weeks after conception (after the fertilized egg has implanted into the wall of the womb, but before all the organs have developed). (See also *fetus*.)

emerge – To move out of something and become visible.

emergence – The idea that complex structures have properties that you couldn't predict if you looked at their individual parts.

empirical – Observed or based on experiment.

enigma – Something that is mysterious or difficult to understand.

epiphenomena – An effect which arises from a process; a side effect.

epistemology – The theory of knowledge – especially with regard to our methods of gaining knowledge, how we test whether knowledge is valid, what the limits of our knowledge are, and the distinction between justified belief and mere opinion.

ethics – Moral principles that govern a person’s behavior. (See also *bioethics*.)

evolution – Often used to simply mean change over time. Evolutionary theory in biology refers to the changes in living things that occur over long periods of time and eventually result in new species.

evolutionary convergence – The idea that, because of conditions in the natural world (see *constants* and *Anthropic Principle*), evolutionary processes find similar solutions to similar problems, so certain characteristics of living things have evolved many times, independently of each other (e.g., the camera eye).

Evolutionary Creationism – see *Theistic Evolution*

extrapolate – To extend an idea to a future situation by assuming that existing trends will continue.

fall, the – The biblical account of how people began to disobey God.

fertilization – The action or process of fertilizing, in which male reproductive material is introduced to female reproductive material, leading to the development of a new individual (whether plant or animal).

fetus – An unborn human being, more than eight weeks after conception. (See also *embryo*.)

fideistic – Something that is based solely on faith or revelation, ignoring reason or intellect.

figurative – Not a literal use of words; metaphorical.

fine-tuning – The idea that the physical constants of the universe are set at the precise values necessary for the existence of biological life. (See also *Anthropic Principle*.)

gene – A unit of heredity which is transferred from a parent to offspring and determines some characteristic of the offspring. Found in the nucleus of a cell, the gene forms part of a chromosome.

genealogical – Relating to the study of family descent. A genealogical record traces the lines of a family tree.

genetics – The study of inherited characteristics and the variation of inherited characteristics among populations.

genre – A style or category of art, music, or literature.

geologist – A person who studies the physical structure and history of the earth.

germ cells – Eggs and sperm.

gluon – see *quarks and gluons*

God of the gaps – An argument which says that when we can’t explain something in nature scientifically, that is proof that God exists.

God Spot, the – The place (or network of places) that is active in the brain when someone is having a religious experience. Some reductionists say that this religious experience is simply a side effect of other processes in the brain that makes someone feel that God exists.

hermeneutics – The branch of knowledge that studies how we interpret the Bible and literary texts.

holistic – Having to do with the whole person; characterized by the belief that the parts of something are intimately interconnected to the whole.

Human Genome Project – The international project to “read” the whole of the human DNA code (the genome).

hypothesis – An explanation of phenomena made on the basis of limited evidence, as a starting point for further investigation. (plural *hypotheses*)

ideology – A system of ideas, especially one which forms the basis of economic or political policy.

implantation – The attachment of the fertilized egg, or blastocyst, to the wall of the womb at the start of pregnancy.

inorganic molecules – Molecules which do not contain carbon. Plants turn carbon dioxide (CO₂) into organic molecules, and all organisms are capable of mixing these with “inorganic” elements to make new “organic” molecules.

Intelligent Design (ID) – The idea that some parts of living things are too complex to have evolved, coupled with the idea that the information contained in DNA cannot have arisen by any unguided material process, so providing evidence for “design.”

irreducible – Not able to be simplified.

irreducibly complex – Something which could not have evolved from simpler precursors (in Intelligent Design).

IVF (*in vitro* fertilization) – A method by which an egg is fertilized by a sperm cell outside the mother’s body (*in vitro* means “in glass,” since this procedure originally occurred in test tubes or on petri dishes). IVF is a common method of helping couples conceive a baby who are not otherwise able to conceive.

Jurassic – A geological term for the period of time between about 199 and 145 million years ago.

laws of nature – Descriptions of the way things behave in nature (e.g., Boyle’s law describes the behavior of gases under certain conditions).

malignant – Bad or harmful, often used with regards to cancer; the opposite of benign (harmless).

mandate – An official order or commission to do something.

materialism – The belief that nothing exists except matter.

materialist – Someone who believes that nothing exists, or is important, except the material world.

mechanism – The process by which something takes place or is brought about.

mechanistic – Relating to theories that explain everything around us based on a merely physical or deterministic worldview.

metaphor – A figure of speech in which a word or phrase draws a comparison between seemingly unrelated things by asserting that they are the same, though this is not literally the case.

metaphysic – Any particular way of interpreting the world.

metaphysical –Philosophical or abstract ways of thinking that are impossible to test by experiment.

methodological reductionism – Studying an object by breaking it down and looking at its parts.

model – A simplified description of a system or process, developed in order to assist calculations and predictions.

molecular biology – The study of biology at a molecular level, especially DNA and the cellular machinery that makes proteins.

multicellular – An organism made up of more than one cell. (Bacteria are “unicellular.”)

multiverse theory – The idea that there are multiple universes. Some people use this theory to argue that if there are many universes, it is not so surprising that one of them is “fine-tuned” for life.

muscular dystrophy – An inherited condition that involves weakening and wasting of the muscles over time.

mutation – A change in the DNA code that occurs during the life cycle of a living thing. Mutations can be caused by a toxic chemical or other environmental disturbance, or by a mistake in copying the DNA when new cells are made.

NASA – The National Aeronautics and Space Administration, an agency of the US government responsible for the US space program.

naturalistic – Something explained with reference to the natural world only, with no allowance for a supernatural explanation.

Near East, the – A term archaeologists and historians use for the Middle East.

nervous system – The network of nerve cells which carries nerve impulses to different parts of the body.

neural correlate – The physical state of the brain associated with a mental state or thought.

neurons – The “nerve cells” that carry messages in the nervous system and the brain.

neuroscience – The study of the brain and nervous system.

nihilism – Lack of belief in morality or meaning in life.

order of magnitude – Most commonly used to mean ten times larger (e.g., 5,000 is two orders of magnitude larger than 50).

paleontologist – Someone who studies fossils.

parallel universes – Other universes that exist at the same time as the one we see (this is important for some forms of multiverse theory).

particle physics – The study of the tiny particles that make up atoms.

phenomenon – A fact or situation that is observed to exist or happen; an observable event. (plural *phenomena*)

pre-implantation genetic diagnosis – DNA testing of IVF embryos.

precursor – Something that comes before another thing of the same kind; a forerunner.

primitive streak – The faint streak which is the earliest trace of the developing embryo in the fertilized egg.

principle – A general scientific theorem or law.

prosthetic – Relating to an artificial body part.

quantum mechanics – The principles underlying the fundamental laws of physics, such as the dual wave-like and particle-like behavior of matter and radiation.

quarks and gluons – Subatomic particles. Gluons are particles thought to bind quarks together to form larger particles such as protons and neutrons.

radiometric dating – If you measure the amount of a specific radioactive chemical (isotope) present in something, you can calculate its age based on two things: 1. The half-life of that radioactive chemical: after a specific amount of time (the half-life), half of the original radioactive isotope atoms will have broken down into other elements. 2. The amount of the isotope that would have been present when the object was formed. It is possible to calculate this through other means. So if you know how much of a certain isotope is left in the sample, you can calculate how old it is.

reductionist – Someone who thinks that you can explain anything by reducing it to its most basic physical properties.

resonance [in the origin of carbon] – Several more basic atomic building blocks can react together to form a new element. If the combined energy of the nuclei that are crashing together is just greater than the resonance level (or nuclear energy level) of the resulting nucleus, the reaction is more efficient. It is this effect that made it possible for carbon to be formed.

Schrödinger equation – An equation that describes the behavior of the tiny particles that make up atoms. It describes how a quantity called the wave function changes with time. The probability that a measurement will give a particular result is derived from the wave function.

sedimentary rock – Rock formed by laying down and compressing layers of sediment (dust, ash, sand, etc.).

somatic cells – All the cells in the body except eggs and sperm.

special relativity – Einstein's theory about space and time: the speed of light in a vacuum is the same for all observers.

synapse – A tiny gap between two nerve cells across which nerve impulses pass.

tectonic plates – Rigid structures which make up the earth's outer crust. They float on top of a layer of magma (molten rock). They separate, collide, and rub against each other, causing volcanoes, earthquakes, and tsunamis. They also allow nutrients, minerals, and gases from the interior of the earth out onto the surface and into the atmosphere.

theism – Belief in a personal God who created the world and who also sustains and continues to be involved in it.

Theistic Evolution (or *Evolutionary Creationism*) – The belief that God created life through the process of evolution.

theology – The study of God, his attributes, and his relationship to the world.

top-down – The effect an object or whole has on the parts of which it is made. (See also *bottom-up*.)

transcendence – Existence or experience beyond the physical level.

transhumanism – The desire to enhance human abilities with technology in extreme ways.

vertebrates – Animals with a spinal cord: amphibians, birds, fish, mammals, and reptiles.

Young Earth Creationism – The belief that Genesis should be interpreted as a literal, historical, and scientific account, and therefore that God created the world between 6,000 and 10,000 years ago in six twenty-four-hour days.