

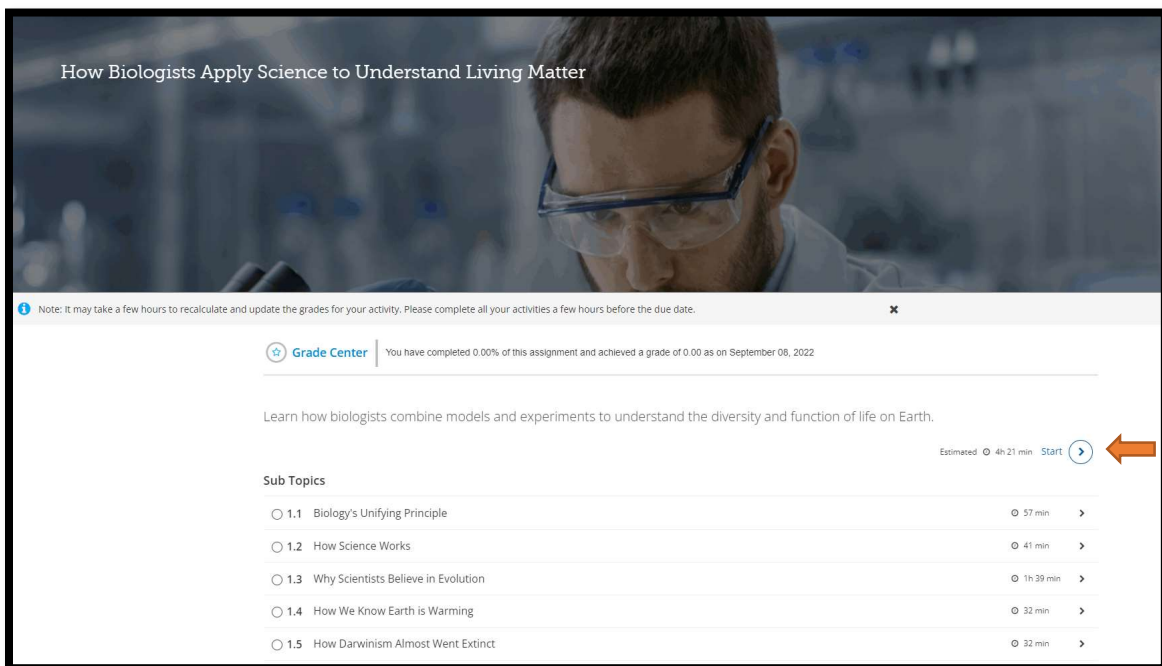
## How to navigate CogBooks

This guide will cover the basic structure and how to navigate CogBooks, as well as explain some important features. CogBooks is an adaptive learning platform with many unique features. As students work through learning activities, extra support material will provide, giving each student a unique learning path based on how well they understand the topic.

The recommended browsers for CogBooks are Chrome, Firefox, and Safari.

**Step 1: Topic Page** – Starting from the home page, find your assignment and open it. Once you have your assignment open, the first screen you will see is the topic page. Here it will list all the sub-topics that are related to that topic.

- a) To begin, click the start button on the right-hand side to start working through the sub-topics. If you do not finish all of them in one session, the next time you log in you will see a resume button and you will start where you left off.



**Step 2: Sub-Topic Page** – The next screen will be the sub-topic page. Each sub-topic is broken down into **Learning Activities**. To receive credit and gain the needed understanding, each of the learning activities will need to be completed. Click the start button to begin the first learning activity.

The theory of evolution provided insights that unified all areas of biology and explains the diversity of life.

Estimated 57 min Start

### Learning Activities

- Video: The Paradox of Diversity and Similarity - A (5 min)
- Video: The Paradox of Diversity and Similarity - B (12 min)
- Video: The Paradox of Diversity and Similarity - C (9 min)
- Video: The Paradox of Diversity and Similarity - D (5 min)
- Video: Why Americans Don't Believe in Evolution - A (14 min)
- Video: Why Americans Don't Believe in Evolution - B (7 min)
- Quiz: Irrational Worldview (5 min)

**Step 3: Learning Activities** – There are many types of learning activities you will encounter, including videos, content pages, activities, critical thinking exercises, and quizzes. Depending on how the class is set up, these quiz questions might be graded, or they can be practice problems that you will receive credit for attempting.

1.1. Biology's Unifying Principle

2 of 7 goals completed

- Video: The Paradox of Diversity and Similarity - A
- Video: The Paradox of Diversity and Similarity - B**
- Video: The Paradox of Diversity and Similarity - C
- Video: The Paradox of Diversity and Similarity - D
- Video: Why Americans Don't Believe in Evolution
- Video: Why Americans Don't Believe in Evolution
- Quiz: Irrational Worldview

Your current assignment grade is 0.00

### Video: The Paradox of Diversity and Similarity - B

**Think about it!**  
How many species currently live on Earth?

Transcript:  
Instruction:  
Test your understanding of this topic by answering the following questions.  
Why is life so incredibly diverse yet so strangely similar?  
Enter here. Provide the reasons WHY.

Licenses and Attributions

2.4. Where Alleles Come From

1 of 9 goals completed

- Mutation and Proofreading when Copying DNA**
- Video: Where Alleles Come From - A
- Video: Where Alleles Come From - B
- Video: Where Alleles Come From - C
- Exercise: Major Concepts in Genetics
- Video: One in a Million - A
- Video: One in a Million - B
- Video: One in a Million - C
- Quiz: Bad Blood

Your current assignment grade is 22.22

### Mutation and Proofreading when Copying DNA

When a cell prepares to divide, it must copy its DNA such that each daughter cell ends up with all of the necessary genetic material. Biologists call this process **DNA replication**. Cells replicate DNA very accurately, but some mistakes can occur. Sometimes the enzyme that copies DNA (called **DNA polymerase**) will insert the wrong nucleotide. Other times, this enzyme might skip one of the nucleotides or add an extra one. These errors are called **mutations**. Mutations can have serious consequences for an organism. For this reason, a cell proofreads a copy of DNA and corrects mistakes. In rare cases, however, a mistake goes uncorrected. The mutation then passes to the daughter cell, resulting in a new allele.

#### How Cells Correct Mutations

Most of the mistakes during DNA replication are corrected by **DNA polymerase** (see figure below). This enzyme proofreads the newly added nucleotide before adding the next one. If the added nucleotide matches the one on the template strand of DNA, the enzyme moves to the next nucleotide. If the added nucleotide differs, the enzyme breaks the phosphodiester bond and releases the wrong nucleotide. Once the incorrect nucleotide has been removed, the correct one can be added.

Proofreading by DNA polymerase corrects errors during replication.

Some errors are not corrected until after replication. In a process called **mismatch repair** (see figure below), enzymes recognize the incorrect nucleotide, cut it out, and put the correct nucleotide in its place.

2.4. Where Alleles Come From

2 of 9 goals completed

- Mutation and Proofreading when Copying DNA
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- Video: Where Alleles Come From - B
- Video: Where Alleles Come From - C
- Exercise: Major Concepts in Genetics**
- Video: One in a Million - A
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- Video: One in a Million - C
- Quiz: Bad Blood

Your current assignment grade is 22.22

### Exercise: Major Concepts in Genetics

Instruction:  
Match the terms with their definitions.

| Term                 | Definition  |
|----------------------|---|
| <input type="text"/> | When one copy of an allele determines the phenotype of an individual.   |
| <input type="text"/> | When two copies of an allele are needed to express a certain phenotype. |
| <input type="text"/> | When an individual carries two different alleles for a gene.            |
| <input type="text"/> | When an individual carries two identical alleles for a gene.            |
| <input type="text"/> | When two chromosomes contain the same genes.                            |
| <input type="text"/> | When the variation in a phenotype depends on genes.                     |
| <input type="text"/> | When a cell contains two copies of each chromosome.                     |
| <input type="text"/> | When a cell contains one copy of each chromosome.                       |

Heritable

Submit You have 2 attempts at this question.

1.1. Biology's Unifying Principle

3 of 7 goals completed

- Video: The Paradox of Diversity and Similarity - A
- Video: The Paradox of Diversity and Similarity - B
- Video: The Paradox of Diversity and Similarity - C
- Video: The Paradox of Diversity and Similarity - D
- Video: Why Americans Don't Believe in Evolution
- Video: Why Americans Don't Believe in Evolution
- Quiz: Irrational Worldview**

Your current assignment grade is 2.77

### Quiz: Irrational Worldview

Instruction:  
Use this information to answer the questions below.  
In ancient Greece, some scholars viewed irrational numbers as heretical. These numbers could never be described perfectly because they ran on for an infinite number of decimal places. The opponents of irrational numbers argued that a perfect universe, designed by the gods, had no place for imperfect numbers. Ultimately, irrational numbers played a major role in the development of mathematics, as evidenced by their widespread use today. For example, the most famous irrational number,  $\pi$ , enables one to calculate many properties of geometric shapes.

Please answer the following questions:

- Opposition to irrational numbers was based on evidence that such numbers cannot exist.
  - a. True
  - b. False
  - c. I don't know the answer
- Opposition to irrational numbers stemmed from a worldview involving naturalistic evolution.
  - a. True
  - b. False
  - c. I don't know the answer
- The belief that irrational numbers cannot exist reflects religion more than science.
  - a. True
  - b. False
  - c. I don't know the answer

**Step 4: Using Side Navigation Panel** – You will use the side panel to help you navigate through the sub-topics and learning activities.

- This navigation panel view shows you all the learning activities for this particular sub-topic. These core activities are part of the **Primary Learning Path**. You will start from the top and work your way down till all are completed.

**1.2. How Science Works**

2 of 6 goals completed

- The Nature of Science
- Designing a Sound Experiment
- Video: How We Know Anything
- Quiz: How We Know Anything
- Scientists Must Have Faith
- Quiz: Seeing in the Dark

Your current assignment grade is 23.52

## The Nature of Science

**Biology** is a science, but what exactly is science? And what features does the biology share with other scientific disciplines?

**Science** literally means "knowledge", being derived from the Latin word *scientia*. As with other scientific disciplines, such as physics or chemistry, biology is the pursuit of knowledge about our world. More specifically, biology is the pursuit of knowledge about life.

Discoveries in biology emerge from a community of researchers who work individually or collaboratively using **standardized methods**. In this sense, biology is a social enterprise driven as much by the personalities of people as by rules of investigation.

Scientists use the following methods:

- careful observation
- record keeping
- mathematical reasoning
- experimental tests
- review by peers
- communication to the public

Science also requires considerable creativity and imagination. For instance, scientists often describe a well-designed experiment as elegant or beautiful. Some areas of science have great practical implications, such as the prevention of disease or the production of food. Other areas of science stem largely from curiosity about how things work. Whatever the

b) When you click on the blue icon, it opens up a larger table of the content view. In this example, 1 and 2 represent topics, and 1.1 through 1.5 represent the sub-topics.

**1.2. How Science Works**

0 of 2 topics completed

- 1. How Biologists Apply Science to Unde
  - 1.1 Biology's Unifying Principle
    - 3 of 7 goals completed
    - Video: The Paradox of Diversity anc
    - Video: The Paradox of Diversity anc
    - Video: The Paradox of Diversity anc
    - Video: The Paradox of Diversity anc
    - Video: Why Americans Don't Believe
  - 1.2 How Science Works
  - 1.3 Why Scientists Believe in Evolu
  - 1.4 How We Know Earth is Warmin
  - 1.5 How Darwinism Almost Went E
- 2. Why Offspring (Usually) Resemble Th

## The Nature of Science

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Science also requires considerable creativity and imagination. For instance, scientists often describe a well-designed experiment as elegant or beautiful. Some areas of science have great practical implications, such as the prevention of disease or the production of food. Other areas of science stem largely from curiosity about how things work. Whatever the goal, sciences such as biology have transformed our world and will continue to do so for as long as humans persist.

### Theories, models, and hypotheses

The **scientific method** consists of steps that combine reasoning and observations. We shall examine the steps of the scientific method later, but let's first consider one of the major features of this method: a model or a hypothesis. A **hypothesis** is a suggested explanation for an event, which can be tested through observations. In many cases, a hypothesis takes the simple form of "X causes Y because of Z". The first part, "X causes Y", defines a hypothetical relationship between two variables. The second part, "because of Z", identifies a hypothetical mechanism for the relationship. When a hypothesis takes this form, one can also refer to it as a **theoretical model**. Indeed, a model simply illustrates a hypothesis in detail, even using graphs or mathematics to define the relationship and mechanism.

When scientists have a collection of models that address a common phenomenon or problem, they call this collection a **scientific theory**. Well-tested theories are the foundation of knowledge. We use them to predict major events and develop new technologies. The most general of theories (those that apply to virtually all circumstances) are sometimes called **scientific laws**. However, few theories endure long enough to be considered true laws, because exceptions usually emerge after careful study. For instance, Newton's law of gravity breaks down as objects approach very high speeds.

**Step 5: Self-Assessing and Support Material** – At the end of a learning activity, you will have an opportunity to self-assess how well you understand the material that was presented. If needed, additional support will be provided.

a) At the bottom of an activity page, you will see a slider bar that you will move to indicate how well you understand the material.

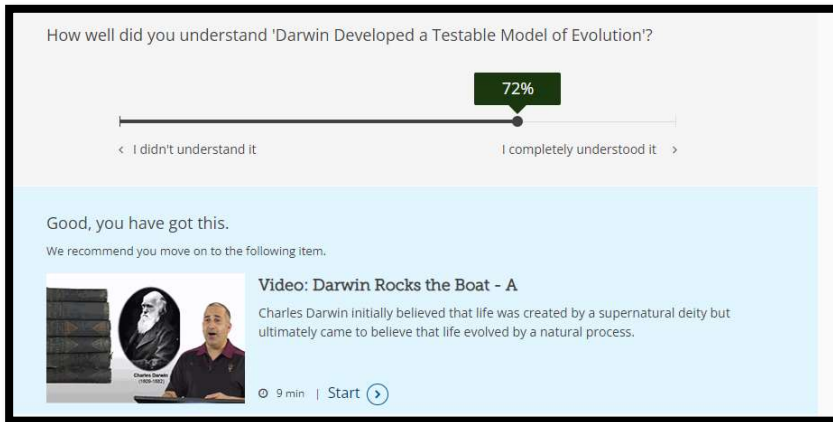
How well did you understand 'Darwin Developed a Testable Model of Evolution'?

Drag Me

< I didn't understand it I completely understood it >

Telling us how well you understood this page helps us recommend the best page for you to take up next.

- b) If the slider bar is moved to above 50%, indicating a good understanding of the topic, then you will be recommended to move on to the next learning activity.



How well did you understand 'Darwin Developed a Testable Model of Evolution'?

72%

< I didn't understand it I completely understood it >

Good, you have got this.

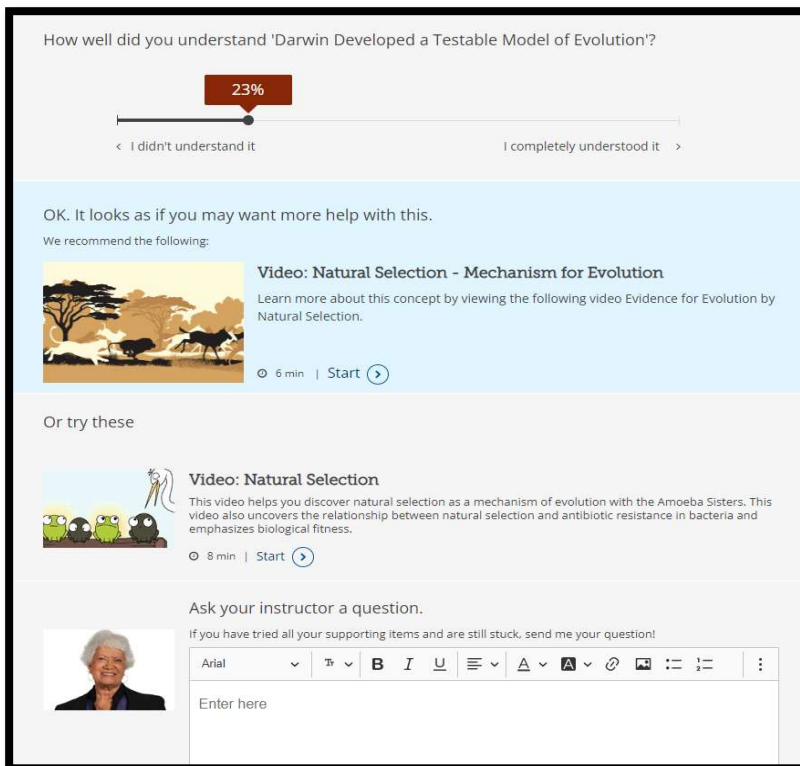
We recommend you move on to the following item.

**Video: Darwin Rocks the Boat - A**

Charles Darwin initially believed that life was created by a supernatural deity but ultimately came to believe that life evolved by a natural process.

9 min | Start >

- c) If the slider bar is positioned below 50%, it indicates a lack of understanding, and additional related support items will be provided. Also, you can send a question to the instructor.



How well did you understand 'Darwin Developed a Testable Model of Evolution'?

23%

< I didn't understand it I completely understood it >

OK. It looks as if you may want more help with this.

We recommend the following:

**Video: Natural Selection - Mechanism for Evolution**

Learn more about this concept by viewing the following video Evidence for Evolution by Natural Selection.

6 min | Start >

Or try these

**Video: Natural Selection**

This video helps you discover natural selection as a mechanism of evolution with the Amoeba Sisters. This video also uncovers the relationship between natural selection and antibiotic resistance in bacteria and emphasizes biological fitness.

8 min | Start >

Ask your instructor a question.

If you have tried all your supporting items and are still stuck, send me your question!

Arial

- d) These additional support items are part of the **Support Path** and will be separate from the **Primary Learning Path**. As you look at the side navigation panel, you will see that these items are branched off below the original learning activity. In this example, two additional items were viewed before moving on to the next learning activity.

1.3. Why Scientists Believe in Ev

3 of 12 goals completed

- ✓ Darwin Developed a Testable Model of Evolution
- ✗ Video: Natural Selection - Mechanism for Evolution
- ✓ Video: Natural Selection
- ✓ Video: Darwin Rocks the Boat - A
- Video: Darwin Rocks the Boat - B
- Video: Darwin Rocks the Boat - C
- Video: Why Scientists Believe in Evolution - A
- Video: Why Scientists Believe in Evolution - B
- Video: Why Scientists Believe in Evolution - C
- Quiz: Converging on Evolution
- Video: Pretty Pigeons, Dappled Dogs - A

## Video: Darwin Rocks the Boat - B

**True or False?**  
Darwin's worldview when leaving England would best be described as **Creationism**.

