

Science 8, Semester B

Course Overview

Science is the study of the natural world. It relies on investigations and evidence to describe the natural events that occur around us. Science 8B is an integrated science course that covers topics selected from Earth and space science, physical science, and life science. This course discusses climate change and methods for confronting it, the physical features of waves and wave technology, and the positive and negative ways that humans and technology affect the Earth and its ecosystems. In the first unit, you'll study the factors that have led to climate change and explore scientific solutions to address these changes. In the second unit, you'll learn how waves and interactions between them can be used to develop new technologies. In the third unit, you'll broaden your knowledge of technology-based and human-based threats to the environment and find ways to reduce their negative impact.

Course Goals

By the end of this course, you will be able to do the following:

- Model the greenhouse effect using temperature as a dependent variable.
- Explain how current trends in carbon dioxide levels affect Earth's climate.
- Determine the effectiveness of different methods of addressing climate change.
- Classify waves based on their characteristics, and use mathematics to model them.
- Interpret models of interactions of light and matter.
- Assess how light from objects in space provides information about their temperature, composition, and distance.
- Compare and contrast the use of digital and analog signals in communication.
- Build a seismograph model, and engineer a model building that can withstand an earthquake.
- Analyze data to explain how technology can limit the risk of damage from natural hazards.
- Explain how the growing number of humans and their use of natural resources affect Earth's systems.
- Design methods to reduce the negative impact that humans have on the environment.
- Understand how changes to the physical or biological components of an ecosystem affect populations of organisms, and research one effect that humans have on the ocean's ecosystem.

- Evaluate solutions to maintain biodiversity in an ecosystem, and design a solution to an environmental problem in an ecosystem.

General Skills

To participate in this course, you should be able to do the following:

- Complete basic operations with word processing software, such as Microsoft Word or Google Docs.
- Complete basic operations with presentation software, such as Microsoft PowerPoint or Google Docs presentation.
- Perform online research using various search engines and library databases.
- Communicate through email and participate in discussion boards.

For a complete list of general skills that are required for participation in online courses, refer to the Prerequisites section of the Plato Student Orientation document, found at the beginning of this course.

Credit Value

Science 8B is a 0.5-credit course.

Course Materials

- notebook
- computer with Internet connection and speakers or headphones
- Microsoft Word or equivalent
- Microsoft PowerPoint or equivalent
- equipment listed in Appendix B

Course Pacing Guide

This course description and pacing guide is intended to help you stay on schedule with your work. Note that your course instructor may modify the schedule to meet the specific needs of your class.

Unit 1: Earth’s Changing Climate

Summary

In this unit, you will model the greenhouse effect using temperature as a dependent variable. You’ll learn about the processes that fuel climate change. Then you’ll study the evidence of climate change and learn how to pose formal questions to uncover truths about it. You’ll also investigate commercial and residential methods and technologies for addressing climate change. In the unit activity, you will explore the effects of climate change on Earth’s oceans.

| Day | Activity/Objective | Type |
|------------------|---|------------------------------|
| 1 day: 1 | Syllabus and Plato Student Orientation <i>Review the Plato Student Orientation and Course Syllabus at the beginning of this course.</i> | Course Orientation |
| 4 days: 2–5 | Modeling the Greenhouse Effect <i>Model the greenhouse effect using temperature as a dependent variable.</i> | Course Activity |
| 5 days: 6–10 | The Mechanics of Climate Change <i>Use data of carbon dioxide levels to explain how current trends affect Earth’s climate.</i> | Lesson |
| 5 days: 11–15 | Evidence of a Changing Climate <i>Ask questions to clarify evidence of the causes of changing global temperatures over the past century.</i> | Lesson |
| 5 days: 16–20 | Confronting Climate Change <i>Develop scientific questions to determine the effectiveness of different methods of addressing climate change, including using alternative fuels, recycling, and preserving natural habitats.</i> | Lesson |
| 5 days: 21–25 | Unit Activity and Discussion—Unit 1 | Unit Activity/ Discussion |
| 1 day: 26 | Posttest—Unit 1 | Assessment |

Unit 2: Waves

Summary

This unit focuses on the characteristics and applications of waves. In this unit, you'll learn the parts of a wave and how to represent waves mathematically. You'll explain how visible light, one type of electromagnetic wave, interacts with matter and develop a model to describe what you see. You will assess how light from objects in space gives information about their temperature, composition, and distance. Finally, you'll study a real-world application of wave technology as you compare and contrast the use of digital and analog signals in communication.

| Day | Activity/Objective | Type |
|------------------|---|------------------------------|
| 5 days: 27–31 | Exploring Waves <i>Classify waves based on their characteristics, and use mathematics to model them.</i> | Lesson |
| 3 days: 32–34 | Describing How Light Interacts with Matter <i>Observe interactions of light and matter, and develop a model that describes your observations.</i> | Course Activity |
| 4 days: 35–38 | Interactions of Light with Matter <i>Use models to describe interactions of light and matter.</i> | Lesson |
| 5 days: 39–43 | Light and Information About the Universe <i>Assess how light from objects in space provides information about their temperature, composition, and distance.</i> | Lesson |
| 5 days: 44–48 | Unit Activity and Discussion—Unit 2 | Unit Activity/ Discussion |
| 1 day: 49 | Posttest—Unit 2 | Assessment |

Unit 3: Technology and Human Impacts on Earth

Summary

This unit focuses on how advancements in technology and human actions can affect Earth's systems in positive and negative ways. You'll build a mock seismograph and engineer a model building that can withstand an earthquake. Your models will show how humans can use technology to limit the risk of damage from natural hazards. You'll study how the growing number of humans and their use of natural resources affect Earth's systems, including our oceans' ecosystems. Next, you will use evidence to argue how changes occurring in parts of an ecosystem can affect the populations of organisms living in the system. You'll find effective ways to maintain biodiversity in an ecosystem for the health and welfare of its species. At the end of the unit, you'll look at methods to reduce the negative impact that humans have on the environment.

| Day | Activity/Objective | Type |
|------------------|--|-----------------|
| 4 days: 50–53 | Earthquake Tools and Engineering <i>Build a seismograph model, and engineer a model building that can withstand an earthquake.</i> | Course Activity |
| 5 days: 54–58 | Technology and the Changing Earth <i>Analyze and interpret data on natural hazards to explain how technology can limit the risk of damage.</i> | Lesson |
| 5 days: 59–63 | The Human Population <i>Explain how the growing number of humans and their use of natural resources affect Earth's systems.</i> | Lesson |
| 4 days: 64–67 | Human Effects on Ocean Ecosystems <i>Research one effect that humans have on the ocean's ecosystem.</i> | Course Activity |
| 5 days 68–72 | Biodiversity and Population Size <i>Use evidence to argue that changes to physical or biological components of an ecosystem affect populations of organisms.</i> | Lesson |
| 5 days 73–77 | Protecting Ecosystems <i>Evaluate solutions for maintaining biodiversity in an ecosystem.</i> | Lesson |

| Day | Activity/Objective | Type |
|-----------------|--|------------------------------|
| 5 days 78–82 | Taking Care of Our Planet <i>Design methods to reduce the negative impact that humans have on the environment.</i> | Lesson |
| 5 days 83–87 | Unit Activity and Discussion—Unit 3 | Unit Activity/ Discussion |
| 1 day: 88 | Posttest—Unit 3 | Assessment |
| 1 day 89 | Semester Review | |
| 1 day 90 | End-of-Semester Test | Assessment |

Appendix A: Safety Notes and Disclaimer

Each Course Activity and Unit Activity that includes a lab/experiment component will highlight key safety guidelines using the safety icon (⚠️), which appears directly in the activity. In addition to adhering to those guidelines, you must ensure that you follow these general safety practices:

- Work slowly and safely at all times, and abide by the safety notes and icons.
- Pay attention and be alert at all times. Limit any distractions.
- Keep your hands away from your nose, eyes, mouth, and skin. Wash your hands before and after experiments.
- If you don't understand something, ask a teacher or an adult before proceeding.
- Wear the required protective gear.
- Adult supervision is required for all activities involving an experiment/lab component.
- Do not perform experiments that have not been approved. Follow the procedure.
- Follow good housekeeping practices. Keep your work area clean.
- Abide by all disposal instructions and icons to protect yourself and our planet.
- Report any problems or complications to an adult.

Note: *Edmentum assumes no liability for personal injury, death, property damage, equipment damage, or financial loss resulting from the instruction included in this course.*

Appendix B: Equipment List for Course Activities and Unit Activities

| Unit | Activity Name | Task | Equipment List |
|------|---|--|--|
| 1 | Course Activity: Modeling the Greenhouse Effect | Task 1: Modeling the Greenhouse Effect | <ul style="list-style-type: none"> • 2 empty 2-liter plastic bottles (or similar-sized plastic containers), rinsed • 2 thermometers (not mercury) that will each fit inside a bottle • lamp with a 150-watt incandescent bulb (if direct sunlight is not available) • measuring cup • 4 cups of soil • roll of plastic wrap • scissors or utility knife • clear tape • 1 rubber band • 6–8 ice cubes (all the same size) |
| | | Task 2: Carbon Dioxide's Effects on Temperature | <ul style="list-style-type: none"> • 2 empty 2-liter plastic bottles (or similar-sized plastic containers with tight-sealing lids), rinsed • 2 thermometers (not mercury) • 1 liter of water at room temperature • a ball of clay, about 2 inches in diameter (needed only if using 2-liter plastic bottles) • 2 sodium bicarbonate tablets (such as Alka-Seltzer) • lamp with a 150-watt incandescent bulb (if direct sunlight is not available) |
| 1 | Unit Activity: Earth's Changing Climate | Task 1: Testing the Effect of Temperature on Carbon Dioxide Solubility in Water | <ul style="list-style-type: none"> • 2 (1-quart) glass bowls • hot tap water and cold tap water • 2 colors of food coloring • spoon • 2 tall, narrow drinking glasses or vases (about 14 inches high) • 2 effervescent antacid tablets |

| Unit | Activity Name | Task | Equipment List |
|------|---|---|--|
| | | Task 2: Testing the Effects of CO ₂ on the pH of Water | <ul style="list-style-type: none"> • 1 measuring cup (2 cup or larger) • 1 cup of water at room temperature • pH test strips • plastic straw |
| | | Task 3: Testing the Effects of Acidification on Seashells | <ul style="list-style-type: none"> • 3 (16-ounce) clear plastic cups • 2 cups of water at room temperature • 2 tablespoons of table salt • spoon • 1 cup of vinegar • pH test strips • 3 seashells (any size) or 6 tablespoons of seashell pieces |
| 2 | Course Activity: Describing How Light Interacts with Matter | Task 1: Light Reflection and Absorption | <ul style="list-style-type: none"> • room that can be made completely dark • 3 pieces of construction paper: 1 red, 1 blue, and 1 green • masking tape • flashlight |
| | | Task 2: Light Transmission | <ul style="list-style-type: none"> • room that can be made completely dark • piece of white paper • masking tape • flashlight • 4-inch square piece of clear plastic wrap (or a square cut from the side of a food storage bag) • 4-inch square piece of waxed paper (or a square of sheer fabric) |
| | | Task 3: Light Refraction | <ul style="list-style-type: none"> • clear drinking glass or resealable plastic bag • water • pencil • small container or bowl that is opaque (not transparent) • penny • masking tape |
| 2 | Unit Activity: Waves | Task 1: Writing a Research Paper | None |

| Unit | Activity Name | Task | Equipment List |
|------|--|---|---|
| 3 | Course Activity: Earthquake Tools and Engineering | Task 1: Building a Seismograph | <ul style="list-style-type: none"> • cereal box or similar-size cardboard box • scissors • 6- or 12-inch ruler • roll of 2-inch-wide calculator paper • plastic, paper, or foam coffee cup with a tight-fitting lid • pencil • small wad of clay (optional) • about 2 feet of string • ½ cup of sand or a material of similar weight • sheet of cardboard about the same size as the front of the cereal box or larger • glue |
| | | Task 2: Designing a Building to Withstand an Earthquake | <ul style="list-style-type: none"> • small box of toothpicks • 10.5-ounce bag of mini marshmallows |
| 3 | Course Activity: Human Effects on Ocean Ecosystems | Writing a Research Paper | None |
| 3 | Unit Activity: Technology and Human Impacts on Earth | Task 1: Developing a Model of an Oil Spill | <ul style="list-style-type: none"> • 3 cups dry sand • 8 × 8-inch disposable or metal baking pan (larger or rectangular pans can be substituted, but you'll need to adjust the amounts of water and sand) • 4 cups room temperature water • ruler • ¼ cup vegetable oil • dark-colored food coloring (optional, for making the oil darker so that it's easier to see) • 2 quill-type bird feathers (white or other natural colors, undyed) • 1 cup hot water • 1 cup cold water • spatula |

| Unit | Activity Name | Task | Equipment List |
|------|---------------|--|--|
| | | Task 2: Designing Solutions for an Oil Spill | <ul style="list-style-type: none"> • 3 small bowls • 3 cups room temperature water • 6 tablespoons vegetable oil • food coloring (for the oil, optional) • materials of your choice |