Syllabus

Science 6, Semester A

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 6A is an integrated science course that covers topics selected from Earth and space science and physical science. This course discusses the structure and properties of matter, force interactions between objects, and Earth and space systems. In the first unit, you'll explore the composition of matter and atomic arrangements of substances. In the second unit, you'll identify forces and analyze the motion of objects using words, equations, and graphs. In the last unit, you will study interactions in the solar system and the role that gravity plays in the motion of celestial bodies.

Course Goals

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

- Apply the steps of the scientific method to explain phenomena involving matter and energy.
- Classify matter by its composition and properties.
- Model atomic and molecular structures of substances.
- Explain the relationship between thermal energy and states of matter.
- Describe the Bohr model of an atom.
- Research historical models of the atom developed by scientists.
- Identify and sketch forces that act on real-world objects.
- Analyze the motion of objects using words, equations, and graphs.
- Explain how the concepts of force and motion are related.
- Analyze input and output forces in simple machines.
- Solve problems involving work and power.
- Design, build, test, and modify a device that uses one or more simple machines.
- Develop and use a three-dimensional model of the Moon phases.
- Construct a model of the solar system, and explain how its parts interact.
- Develop and use a model to describe the role of gravity in the universe.
- Explain the cyclic patterns of the seasons, the lunar phases, and eclipses of the Sun and the Moon.
- Compare and contrast properties of planets, moons, stars, asteroids, and comets.

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 6A 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: Structure and Properties of Matter

Summary

This unit begins with an introductory lesson where you'll learn about the scientific method and the kinds of phenomena studied in physical science. You will classify matter by its composition and properties, including matter that you find around your home. You'll develop models for the molecular structure of matter and explain how matter changes state with the addition or removal of thermal energy. Finally, you'll describe the model of the atom developed by Niels Bohr and explain how the model of the atom has changed over time based on the work of Bohr and other scientists.

Day	**Activity/***Objective*	Type
1 day: 1	**Syllabus and Plato Student Orientation** *Review the Plato Student Orientation and Course Syllabus at the beginning of this course.*	Course Orientation
4 days: 2–5	**Introduction to Physical Science** *Apply the steps of the scientific method, and identify the kinds of phenomena studied in physical science.*	Lesson
3 days: 6–8	**Examining Matter** *Carry out an investigation to compare properties of common household materials.*	Course Activity
4 days: 9–12	**Matter Around Us** *Classify matter by its composition and properties.*	Lesson
2 days: 13–14	**Building Models of Atomic Arrangements** *Develop models of atomic arrangements of substances.*	Course Activity
4 days: 15–18	**Energy and Changes in State** *Explain how the motion of particles of matter changes when thermal energy is added or removed.*	Lesson
2 days: 19–20	**Observing a Change in State** *Carry out an investigation to predict changes in the state of water when thermal energy is added or removed.*	Course Activity
4 days: 21–24	**Atoms and Elements** *Describe the Bohr model of the atom, and explain how the model of the atom has changed over time.*	Lesson
5 days: 25–29	**Unit Activity and Discussion—Unit 1**	Unit Activity/ Discussion
1 day: 30	**Posttest—Unit 1**	Assessment

Unit 2: Forces and Motion

Summary
This unit focuses on the relationship between force and motion. You'll identify and sketch forces that act on objects and predict how the objects will move. You'll analyze the motion of objects using words, equations, and graphs. You will apply the concepts of force and motion to design a car bumper that will reduce the force on riders during a collision. Finally, you'll analyze the forces involved in simple machines that make our lives easier and solve problems involving work and power.

Day	**Activity/***Objective*	Type
2 days: 31–32	**Exploring Forces** *Identify and sketch forces that act on real-world objects.*	Course Activity
4 days: 33–36	**Motion and Motion Graphs** *Analyze the motion of objects using words, equations, and graphs.*	Lesson
4 days: 37–40	**Using Forces to Predict Motion** *Identify forces exerted on an object, and predict the object's motion.*	Lesson
4 days: 41–44	**Investigating Forces and Motion** *Plan and carry out an investigation to determine how force and motion are related to each other.*	Course Activity
4 days: 45–48	**Collisions** *Identify force interactions between two objects, and predict the motion of the objects.*	Lesson
3 days 49–51	**Designing a Car Bumper** *Design a car bumper that will reduce the force on riders during a collision.*	Course Activity
4 days: 52–55	**Simple Machines** *Analyze input and output forces in simple machines, and solve problems involving work and power.*	Lesson

Day	Activity/*Objective*	Type
5 days: 56–60	**Unit Activity and Discussion—Unit 2**	Unit Activity/ Discussion
1 day: 61	**Posttest—Unit 2**	Assessment

Unit 3: Earth and Space

Summary

This unit begins with a course activity in which you will study the phases of the Moon over the course of three weeks. Afterward, you'll build a three-dimensional model of the phases. You'll also explore what natural systems are in the context of our solar system. You'll create and use a model to show how gravity holds planets and moons in orbit and holds the entire universe together. Later, you'll study the interactions between Earth, the Moon, and the Sun. You'll also analyze data to find the properties of celestial objects in space, which include planets, moons, stars, asteroids, and comets.

Day	Activity/*Objective*	Type
1 day: 62	**Modeling the Moon Phases, Task 1** *Observe the phases of the Moon for three weeks. (One day is used for preparation.)*	Course Activity
4 days: 63–66	**Earth and Space Systems** *Develop a model of the solar system, and explain how the parts of the solar system interact.*	Lesson
4 days: 67–70	**Gravity's Role in the Universe** *Develop and use a model to describe the role of gravity in the motions within galaxies and the solar system.*	Lesson
3 days: 71–73	**Interactions of the Earth, Moon, and Sun** *Develop and use models to describe the cyclic patterns of the seasons, the lunar phases, and eclipses of the Sun and Moon.*	Lesson

Day	**Activity/***Objective*	Type
2 days: 74–75	**Modeling the Moon Phases, Tasks 2–3** *Develop and use a model of Moon phases to draw conclusions about the positions of the Earth, Moon, and Sun during various times of the lunar cycle. (This follows three weeks of observations.)*	Course Activity
4 days 76–79	**Planets and Moons** *Analyze and interpret data to compare and contrast properties of planets and moons.*	Lesson
4 days 80–83	**Stars, Asteroids, and Comets** *Analyze and interpret data to compare and contrast properties of stars, asteroids, and comets.*	Lesson
4 days: 84–87	**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: Examining Matter *Task 4 of this activity may need to be carried out in a school lab.	Task 1: Mixing Substances	• liquid measuring cup • 2 small clear containers (glasses or plastic cups) • 2 drops of food coloring • 1 piece of plain white paper • apron (optional)

		Task 2: Comparing Appearance, Relative Density, and Solubility	• safety goggles
			• small, clear container (glass or plastic cup)
			• liquid measuring cup
			• ¼-teaspoon measuring spoon
			• ¼ teaspoon each of these materials:
			  ○ baking soda
			  ○ baking powder
			  ○ salt
			  ○ sugar
			  ○ white flour
			  ○ white vinegar
			  ○ cooking oil (any kind)
			  ○ paper towels or napkins

Unit	Activity Name	Task	Equipment List
		Task 3: Comparing pH	• 2 tablespoons chopped or shredded red cabbage • 2 small glass or stainless steel bowls • heat source (stove or hot plate) • small pan • oven mitt or hot pad • strainer (if not available, just carefully pour off the red cabbage juice) • apron • white ice cube tray (or a small, clear container that you reuse) • 8.5 × 11-inch piece of paper (for labeling) • rubber gloves • ½-teaspoon measuring spoon • 1-teaspoon measuring spoon (or a regular-size spoon) • ½ teaspoon of each of these materials: white vinegar, water, ammonia (if not available, use ¼ teaspoon of baking soda) • four or more additional household materials for pH testing, such as lemon juice, apple juice, hand soap, citrus cleaner, milk, or dishwasher soap
		Task 4: Measuring Density	• 10 mL graduated cylinder (mL stands for milliliter) • gram scale • water • 6 metal paper clips of the same size and material
1	Course Activity: Building Models of Atomic Arrangements	Task 1: Building an Atomic Model of Salt	• 4 regular-size marshmallows • 4 mini marshmallows (if not available, tear 2 regular-size marshmallows in half) • 12 toothpicks • 1 sheet of 8.5 × 11-inch paper to build the model on

Unit	Activity Name	Task	Equipment List
		Task 2: Building an Atomic Model of Water	• 4 regular-size marshmallows • 8 mini marshmallows (if not available, tear 4 regular-size marshmallows in half) • 8 toothpicks • 2 sheets of 8 × 11-inch paper to build the model on
		Task 3: Building an Atomic Model of Copper	• 9 regular-size marshmallows • 8 straws, cut in half (small-diameter coffee or hot chocolate straws are best; if using larger straws, flatten both ends when connecting them to the marshmallows) • scissors • 1 sheet of 8 × 11-inch paper to build the model on
1	Course Activity: Observing a Change in State	Task 1: Prepare and Predict	• 1 small sealable plastic bag, approximately 3 × 6 inches • 1 teaspoon • 1 empty ice cube tray • tap water
		Task 2: Observe and Explain	• ice made in task 1 • 2 pieces of foil, each 12 inches square
1	Unit Activity: Structure and Properties of Matter	Task 1: Planning and Creating a Presentation	None

Unit	Activity Name	Task	Equipment List
2	Course Activity: Exploring Forces	Task 1: Contact Forces	• safety goggles • cleared space on a smooth, durable table that is at least 3 feet in length • 12-inch ruler • ball made of a hard material, such as a baseball, tennis ball, pool ball, lacrosse ball, whiffle ball, or ping-pong ball • large, heavy book or box to use as a barrier • piece of plastic or wood with a broad, flat surface, such as a three-ring binder or a cutting board • area rug, carpet, or piece of fabric with nap
		Task 2: More Contact Forces	• safety goggles • 2 sheets of paper that are the same size • small rubber band • 1-foot piece of string or rope
		Task 3: Forces Exerted Over a Distance	• safety goggles • 4 or more identical clothes hangers • any kind of tape • 2 bar magnets with labeled or colored ends • 2 balloons • 2 (2-foot) pieces of thread or string • wool or fur to charge balloon (can use wool yarn, a sweater, or even your hair to create the charge) • 2-foot piece of plastic wrap

Unit	Activity Name	Task	Equipment List
2	Course Activity: Investigating Forces and Motion	Task 1: Set Up the Experiment	• goggles • square piece of cardboard, about 8 inches per side • ruler • hole punch or scissors • 36 inches of string or strong thread • large paperclip to use as a hook • 1 nonbreakable object to be placed on top of the cardboard (e.g., plastic or metal kitchen utensils such as spatulas and large spoons) • 2 nonbreakable objects to hang on the paperclip hook (e.g., small or large kitchen utensils with holes in the handles such as ½- and 1-cup measuring cups) • a table at least 24 inches wide • 1 square meter of floor space next to the table, covered with a rug, mat, or carpet
		Task 2: Plan and Observe	• goggles • the experimental setup from task 1 • one more nonbreakable object to be placed on top of the cardboard (e.g., another kitchen utensil) • table at least 24 inches wide • 1 square meter of floor space next to the table, covered with a rug, mat, or carpet
		Task 3: Analyze and Extend	None
		Task 4: Calculate Velocity and Acceleration	None

Unit	Activity Name	Task	Equipment List
2	Course Activity: Designing a Car Bumper	Task 1: Set It Up	• goggles • a ruler at least 12 inches long • scissors • tape • glue • a 6 × 7-inch piece of heavy cardboard • a small box, about 5 × 7 inches on one side and 2.5 inches deep (e.g., a 1-pound pasta box or similar) • a board or a piece of stiff cardboard, at least 30 inches long, for the ramp • 6 (8-inch) disposable straws • a ball (golf, tennis, lacrosse, or similar) • uncarpeted floor space, about 2 × 6 feet • an 8- to 12-inch-high support for the ramp (e.g., a heavy box, a stool, or a stack of books)
		Task 2: Design, Build, and Test Bumper Prototypes	• goggles • a ruler at least 12 inches long • scissors • tape • glue • balloons • thick and thin pieces of scrap cardboard • setup from task 1
2	Unit Activity: Forces and Motion	Task 1: Analyze a Tool	• goggles • any tool that uses one or more simple machines

		Task 2: Design, Build, and Test a Prototype of a Tool	• materials you find around the house • repurposed toys and other objects
3	Course Activity: Modeling the Moon Phases	Task 1: Recording the Phases of the Moon	• 1 pencil • 1 notebook
		Task 2: Simulating the Phases of the Moon	• 1 small, white foam ball (or equivalent) • 1 pencil • 1 black marker • 1 pen • 1 notebook or 10 sheets of paper • 1 lamp with the shade removed
		Task 3: Analyzing Your Model	None
3	Unit Activity: Earth and Space	Task 1: Categorizing Stars Using the H-R Diagram	None
		Task 2: A Voyage to Proxima Centauri	None