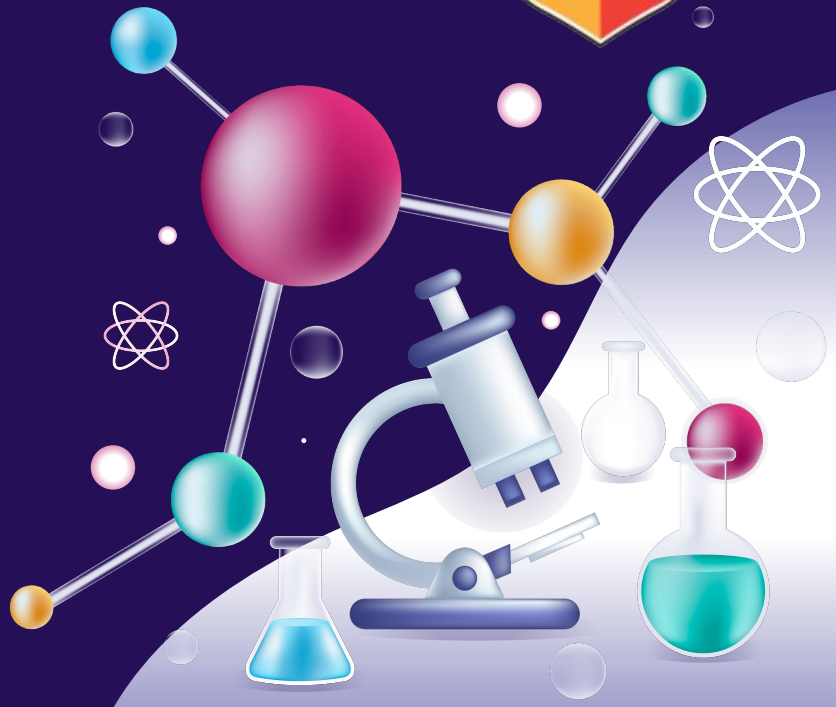
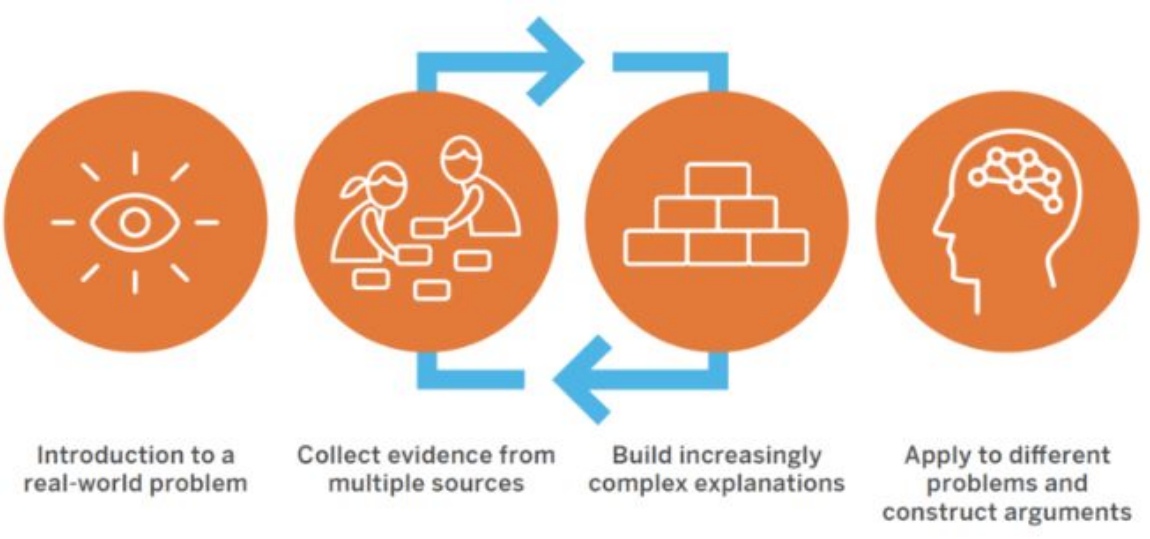
# Chester Community Charter School

# Science Education K-8



# Science Curriculum

The main component of the science curricula at CCCS is Amplify Science.




Amplify Science blends disciplinary core ideas, science and engineering practices, and cross cutting concepts into each unit for a unique learning experience.

# Science and Engineering Practices

1. Ask questions or define problems
2. Develop and use models
3. Plan and carry out investigations
4. Analyze and interpret data
5. Use mathematical and computational thinking
6. Construct explanations or design solutions
7. Engage in argument from evidence
8. Obtains, evaluate, and communicate information

# Annual Science Fair

## K-5: Grade Level Classroom Competition

## 6-8: Scholars compete individually

## 2023 Science Fair is March 28th

SCHOLARS FOLLOW THE STEPS OF THE SCIENTIFIC METHOD AND USE EXPERIMENTAL DESIGN TO ANSWER A TESTABLE QUESTION.

# Grade Level Summaries

The following slides provide a brief summary of the topics our scholars in K-8 are experience throughout the school year.
A second slide is provided for each grade level that has resources scholars can use at home for free.
All require an internet connection and most sites are mobile friendly.

In addition to the resources provided, parents are also encouraged to ask questions about science class. Ask about the problem they are trying to solve or the design they're working on. Ask them to make connections between what they are learning in science to their regular lives. Discuss advancements in science and technology that have improved the quality of life. Look for opportunities to extend what they're learning in school.

# Kindergarten

Needs of Plants and Animals: Milkweed and Monarchs. Students help a group of children figure out why there are no more monarch caterpillars in a community garden and how to bring them back. Students conduct hands-on investigations to figure out what plants need in order to live and thrive. They ask questions and learn about the system of plants and animals that live together in a habitat. They figure out patterns in the life cycles of living things by reading and analyzing photographs.

Pushes and Pulls: Designing a Pinball Machine. Students take on the role of pinball machine engineers as they explore the effects of forces on the motion of an object. They consider cause and effect and structure and function as they design and build their own pinball machines. They analyze data from their tests using mathematical thinking. Students also gather evidence of forces at work in their school.

Sunlight and Weather: Solving Playground Problems. Students work to solve the problem of why students at one fictional school are too cold during morning recess while students at another school are too hot during afternoon recess. They develop and use models to gather evidence about the effect of sunlight (energy) on Earth's surface (matter) and how flooding during wet weather can be avoided. They gather local weather data and use concepts of scale, proportion, and quantity to make
sense of it.

# At-Home Resources for Kindergarten

## Needs of Plants and Animals

Natgeo.com

## Pushes and Pulls

Force and Motion Online Games

## Sunlight and Weather

Dress for the Weather online game

# First Grade

**Animal and Plant Defenses:** Spikes, Shells, and Camouflage. Students advise an aquarium director by helping answer young visitors' questions about Spruce the Sea Turtle, who will soon be released back into the ocean. They investigate how Spruce and her offspring can survive in the ocean, particularly since sharks live in the area. Students obtain information from videos and science books about how plants and animals survive and about parents and offspring. Students make physical models and write explanations to show what they learn about the structure and function of animal defenses.

**Light and Sound**: Puppet-Theater Engineers. Students act as light and sound engineers to design and create a scene for a puppet show. Students ask questions and work to define the design problems they are asked to solve. They figure out cause-and-effect patterns related to light, shadows, and sound by conducting hands-on investigations and reading science books. They use both firsthand evidence and evidence from books to support their ideas.

**Spinning Earth:** Investigating Patterns in the Sky. In the role of sky scientists, students work to understand why the sky looks different to a young boy and to his grandma when they talk on the phone in the evening. Students plan and conduct investigations and find patterns in data to figure out what causes nighttime and daytime, and the changing position of the sun in the sky. Thinking in terms of systems helps students make sense of the Earth/sun system.

# At-Home Resources for First Grade

## Animal and Plant Defenses

Natgeo.com

## Light and Sound

ScienceWiz Online Sound Games

## Spinning Earth

NASA Space Online Games

# Second Grade

Plant and Animal Relationships: Investigating Systems in a Bengali Forest. What is the connection between chalta fruit, elephants, and droppings? Students find out as they investigate an authentic mystery that occurred in a broadleaf forest habitat in northeastern India. They plan and conduct investigations to figure out what plants need to grow and ways that many plants rely on animals to disperse their seeds. Students use mathematical thinking and concepts of proportion and quantity to make sense of their measurements and other data. They construct scientific explanations about how the parts of the Bengali forest work together as a system.

Properties of Materials: Designing Glue. Students take on the role of glue engineers and design and test a glue for use at their school. They figure out cause-and-effect relationships related to heating and cooling materials, and find patterns in the properties of substances and mixtures. Students make arguments about effective glue recipes using the evidence they have gathered from investigations and science texts.

Changing Landforms: The Disappearing Cliff. Students act as geologists helping a recreation center director understand what is happening to a nearby cliff, which appears to have changed. They ask questions about landforms, water, and wind, and use hands-on models to figure out how small scale changes to landforms can add up to large-scale changes over long periods of time. As they obtain information about erosion, they figure out how rock that appears stable in the short-term can actually change a lot over time. They create diagrams to communicate their findings.

# At-Home Resources for Second Grade

## Plant and Animal Relationships

Natgeo.com

## Properties of Materials

Legends of Learning online games

## Changing Landforms

PBS Island Explorer Video and Games

# Third Grade

**Balancing Forces:** Investigating Floating Trains. Scientists and engineers have figured out a way to build a train that actually floats on air as it goes cruising down the track at high speeds. Students work to explain how this train works in order to reassure residents of a town that the train is safe. Students figure out ideas about magnetic force, gravity, and how forces can cause an object's movement to change or stay stable. They communicate their ideas by making digital and physical models and by writing explanations.

**Environments and Survival:** Snails, Robots, and Biomimicry. Students play the role of biomimicry engineers studying a population of snails. They analyze data to figure out why some organisms are more likely to survive in their environment. They think about the systems made of organisms and the environment in which the organisms live to understand how the environment affects organisms' likelihood of survival. Students apply what they learn about the structure and function of animals' body parts to plan, make, and test designs that solve problems, such as a robot that can remove and grind up invasive plants.

**Weather and Climate**: Establishing an Orangutan Reserve. In the role of meteorologists, students investigate weather and climate patterns in order to make scientific arguments about where to establish an orangutan reserve. They use mathematical thinking to find patterns in weather data, and consider scale, proportion, and quantity as they learn to make reliable measurements of weather. They also define and work to solve an engineering problem related to natural hazards.

# At-Home Resources for Third Grade

## Balancing Forces

Legends of Learning Online Game Playlist

## Weather and Climate

Legends of Learning online games  Playlist

## Environments and Survival

Legends of Learning online games Playlist

# Fourth Grade

**Energy Conversions:** Blackout in Ergstown. Students take on the role of systems engineers for Ergstown, a fictional town that experiences frequent blackouts, and explore reasons why an electrical system may fail. They obtain information from science books and system models to learn about types of energy, energy sources, energy transfer, and energy conversion. They define engineering problems related to the town's electrical system and design wind turbines using what they have learned about energy and matter.

**Earth's Features**: Mystery in Desert Rocks Canyon. In the role of geologists, students investigate a fossil and the geologic history of the area where the fossil was found. Students write scientific arguments about how the fossil formed and what the environment of that area was like in the past. They gather evidence for their arguments by finding patterns in rock layers, reading science books, and using digital and physical models. They analyze rock layers to draw conclusions about times of stability and times of change in the environments of a particular place.

**Patterns of Earth and Sky:** Analyzing Stars on Ancient Artifacts. Students take on the role of astronomers, helping a team of archaeologists explain the illustrations on a recently discovered, thousand-year-old artifact with a missing piece. Students use mathematical thinking to make sense of patterns in the sky, which they figure out by using physical and digital models and obtaining information from science books. They plan and conduct investigations to figure out how the spin and orbit of our planet are the cause of the daily and yearly patterns of stars we see in the sky

# At-Home Resources for Fourth Grade

## Energy Conversions

Legends of Learning Online Game Playlist

## Earth's Features

Legends of Learning online games  Playlist

## Patterns of Earth and Sky

Legends of Learning online games Playlist

# Fifth Grade

**Modeling Matter**: The Chemistry of Food. In the role of food scientists, students work to identify a potentially hazardous food dye in a food coloring mixture, then to create a good-tasting and visually appealing salad dressing. They engage in hands-on investigations and use physical and digital models to gather evidence about mixtures at the observable scale and at the scale of molecules. They develop visual models and write explanations about mixtures, including whether they are likely to change or remain stable.

**The Earth System**: Investigating Water Shortages. In the role of water resource engineers, students ask questions and investigate what makes East Ferris, a city on one side of the fictional Ferris Island, prone to water shortages while a city on the other side is not. Students develop and use system models that help them figure out how water cycles through parts of the Earth system at the nanoscale and at the observable scale. They apply their understanding of condensation and evaporation to design freshwater collection systems as a possible solution for East Ferris' water shortage problem.

**Ecosystem Restoration:** Matter and Energy in a Rain Forest. Students take on the role of ecologists to figure out why a reforested section of the Costa Rican rain forest ecosystem is failing—the jaguars, sloths, and cecropia trees in the area are not growing and thriving. Students use a digital model and terrariums as models to figure out the ways that animals and plants in an ecosystem get the matter and energy they need to grow. They analyze data about the ecosystem, and use evidence to make scientific arguments about what is causing the problem and to design restoration plans to address it.

# At-Home Resources for Fifth Grade

## Modeling Matter

Legends of Learning Online Game Playlist

## Earth's Systems

Legends of Learning online games  Playlist

## Ecosystem Restoration

Legends of Learning online games Playlist

# 6th Grade Science Units

| Unit | Anchor Phenomenon | Scholar Role |
|---|---|---|
| Microbiome | The presence of 100 trillion microorganisms living on and in the human body may keep the body healthy. | Microbiologists |
| Metabolism | Elisa, a young patient, feels tired all the time. | Medical Researchers |
| Metabolism EI | Designing health bars with different molecular compositions can effectively meet the metabolic needs of patients or rescue workers. | Food Engineer Interns |
| Traits and Reproduction | Darwin's bark spider offspring have different silk flexibility traits, even though they have the same parents. | Biomedical Scientists |
| Thermal Energy | One of two proposed heating systems for Riverdale School will best heat the school. | Thermal Scientists |
| Weather Patterns | In recent years, rainstorms in Galetown have been unusually severe. | Forensic Meteorologists |
| Ocean, Atmosphere, & Climate | During El Niño years, the air temperature in Christchurch, New Zealand is cooler than usual. | Climatologists |
| Earth's Changing Climate | The ice on Earth's surface is melting. | Climatologists |
| Earth's Changing Climate EI | Designing rooftops with different modifications can reduce a city's impact on climate change. | Civil Engineer Interns |

# 7th Grade Science Units

| Unit | Anchor Phenomenon | Scholar Role |
|---|---|---|
| Geology of Mars | Analyzing data about landforms on Mars can provide evidence that Mars may have once been habitable | Planetary Geologists |
| Plate Motion | Mesosaurus fossils have been found on continents separated by thousands of kilometers of ocean, even though the Mesosaurus species once lived all together. | Geologists |
| Plate Motion Engineering Internship | Patterns in earthquake data can be used to design an effective tsunami warning system. | Mechanical Engineer Interns |
| Rock Transformations | Rock samples from the Great Plains and from the Rocky Mountains — regions hundreds of miles apart — look very different, but have surprisingly similar mineral compositions. | Geologists |
| Phase Change | A methane lake on Titan no longer appears in images taken by a space probe two years apart. | Chemists |
| Phase Change Engineering Internship | Designing portable baby incubators with different combinations of phase change materials can keep babies at a healthy temperature. | Chemical Engineer Intern |
| Chemical Reactions | A mysterious brown substance has been detected in the tap water of Westfield. | Forensic Chemists |
| Populations and Resources | The size of the moon jelly population in Glacier Sea has increased. | Biologists |
| Matter and Energy in Ecosystems | The biodome ecosystem has collapsed. | Ecologists |

# 8th Grade Science Units

| Unit | Anchor Phenomenon | Scholar Role |
|---|---|---|
| Harnessing Human Energy | Rescue workers can use their own human kinetic energy to power the electrical devices they use during rescue missions. | Energy Scientists |
| Force and Motion | The asteroid sample-collecting pod failed to dock at the space station as planned. | Student Physicists |
| Force and Motion Engineering Internship | Designing emergency supply delivery pods with different structures can maintain the integrity of the supply pods and their contents. | Mechanical Engineer Interns |
| Magnetic Fields | During a test launch, a spacecraft traveled much faster than expected. | Student Physicists |
| Light Waves | The rate of skin cancer is higher in Australia than in other parts of the world. | Spectroscopists |
| Earth, Moon and Sun | An astrophotographer can only take pictures of specific features on the Moon at certain times. | Astronomers |
| Natural Selection | The newt population in Oregon State Park has become more poisonous over time.. | Biologists |
| Natural Selection Engineering Internship | Designing malaria treatment plans that use different combinations of drugs can reduce drug resistance development while helping malaria patients. | Clinical Engineers |
| Evolutionary History | A mystery fossil at the Natural History Museum has similarities with both wolves and whales. | Paleontologists |

# At-Home Resources for Middle School

## Legends of Learning

Search by topic.
All scholars have a login.
Parents can create a free account.

## IXL

Search by topic.
All scholars have a login.

## Science News For Students

Search by topic.
Free Resource for anyone!