PLTW Launch Standards Connection
Fourth Grade

Connections to Standards in PLTW Launch

PLTW curriculum is designed to empower students to thrive in an evolving world. As a part of the design process when developing and updating our curriculum, we focus on connections to a variety of standards. PLTW Launch modules connect to standards in the following:

Next Generation Science Standards

Energy

4-PS3-1
Use evidence to construct an explanation relating the speed of an object to the energy of that object.

- ☐ Input/Output: Computer Systems
- ☐ Input/Output: Human Brain
- ☐ Waves and the Properties of Light
- ☐ Organisms: Structure and Function
- ☐ Earth: Past, Present, and Future
- ☐ Earth: Human Impact and Natural Disasters
- ☑ Energy Exploration

4-PS3-2
Make observations to provide evidence that energy can be transferred from place to place by sound, light, heat, and electric currents.

- ☐ Input/Output: Computer Systems
- ☐ Input/Output: Human Brain
- ☐ Waves and the Properties of Light
- ☐ Organisms: Structure and Function
- ☐ Earth: Past, Present, and Future
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4-PS3-3
Ask questions and predict outcomes about the changes in energy that occur when objects collide.

- ☐ Input/Output: Computer Systems
- ☐ Input/Output: Human Brain
- ☐ Waves and the Properties of Light
- ☐ Organisms: Structure and Function
- ☐ Earth: Past, Present, and Future
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- ☑ Energy Exploration

4-PS3-4
Apply scientific ideas to design, test, and refine a device that converts energy from one form to another.

- ☐ Input/Output: Computer Systems
- ☐ Input/Output: Human Brain
- ☐ Waves and the Properties of Light
- ☐ Organisms: Structure and Function
- ☐ Earth: Past, Present, and Future
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Waves and their Applications in Technologies for Information Transfer

4-PS4-1
Develop a model of waves to describe patterns in terms of amplitude and wavelength and that waves can cause objects to move.

- ☐ Input/Output: Computer Systems
- ☐ Input/Output: Human Brain
- ☑ Waves and the Properties of Light
- ☐ Organisms: Structure and Function
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4-PS4-2
Develop a model to describe that light reflecting from objects and entering the eye allows objects to be seen.

- ☐ Input/Output: Computer Systems
- ☐ Input/Output: Human Brain
- ☑ Waves and the Properties of Light
- ☐ Organisms: Structure and Function
- ☐ Earth: Past, Present, and Future
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- ☐ Energy Exploration

4-PS4-3
Generate and compare multiple solutions that use patterns to transfer information.

- ☑ Input/Output: Computer Systems
- ☐ Input/Output: Human Brain
- ☐ Waves and the Properties of Light
- ☐ Organisms: Structure and Function
- ☐ Earth: Past, Present, and Future
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From Molecules to Organisms: Structures and Processes

4-LS1-1
Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction.

- ☐ Input/Output: Computer Systems
- ☐ Input/Output: Human Brain
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Next Generation Science Standards

4-LS1-2
Use a model to describe that animals receive different types of information through their senses, process the information in their brain, and respond to the information in different ways.

- ☐ Input/Output: Computer Systems
- ☑ Input/Output: Human Brain
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Earth’s Place in the Universe

4-ESS1-1
Identify evidence from patterns in rock formations and fossils in rock layers to support an explanation for changes in a landscape over time.

- ☐ Input/Output: Computer Systems
- ☐ Input/Output: Human Brain
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Earth’s Systems

4-ESS2-1
Make observations and/or measurements to provide evidence of the effects of weathering or the rate of erosion by water, ice, wind, or vegetation.

- ☐ Input/Output: Computer Systems
- ☐ Input/Output: Human Brain
- ☐ Waves and the Properties of Light
- ☐ Organisms: Structure and Function
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4-ESS2-2
Analyze and interpret data from maps to describe patterns of Earth’s features.

- ☐ Input/Output: Computer Systems
- ☐ Input/Output: Human Brain
- ☐ Waves and the Properties of Light
- ☐ Organisms: Structure and Function
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Next Generation Science Standards

Earth and Human Activity

4-ESS3-1
Obtain and combine information to describe that energy and fuels are derived from natural resources and that their uses affect the environment.

- ☐ Input/Output: Computer Systems
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- ☐ Waves and the Properties of Light
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4-ESS3-2
Generate and compare multiple solutions to reduce the impacts of natural Earth processes on humans.

- ☐ Input/Output: Computer Systems
- ☐ Input/Output: Human Brain
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Engineering Design

3-5-ETS1-1
Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost.

- ☑ Input/Output: Computer Systems
- ☑ Input/Output: Human Brain
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3-5-ETS1-2
Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem.

- ☑ Input/Output: Computer Systems
- ☑ Input/Output: Human Brain
- ☑ Waves and the Properties of Light
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Next Generation Science Standards

3-5-ETS1-3
Plan and carry out fair tests in which variables are controlled and failure points are considered to identify aspects of a model or prototype that can be improved.

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Science and Engineering Practices

Asking Questions and Defining Problems

Asking questions and defining problems in 3–5 builds on K–2 experiences and progresses to specifying qualitative relationships.

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Developing and Using Models

Modeling in 3–5 builds on K–2 experiences and progresses to building and revising simple models and using models to represent events and design solutions.

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Planning and Carrying Out Investigations

Planning and carrying out investigations to answer questions or test solutions to problems in 3–5 builds on K–2 experiences and progresses to include investigations that control variables and provide evidence to support explanations or design solutions.

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Next Generation Science Standards

Analyzing and Interpreting Data

Analyzing data in 3–5 builds on K–2 experiences and progresses to introducing quantitative approaches to collecting data and conducting multiple trials of qualitative observations. When possible and feasible, digital tools should be used.

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Using Mathematics and Computational Thinking

Mathematical and computational thinking in 3–5 builds on K–2 experiences and progresses to extending quantitative measurements to a variety of physical properties and using computation and mathematics to analyze data and compare alternative design solutions.

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Constructing Explanations and Designing Solutions

Constructing explanations and designing solutions in 3–5 builds on K–2 experiences and progresses to the use of evidence in constructing explanations that specify variables that describe and predict phenomena and in designing multiple solutions to design problems.

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Engaging in Argument from Evidence

Engaging in argument from evidence in 3–5 builds on K–2 experiences and progresses to critiquing the scientific explanations or solutions proposed by peers by citing relevant evidence about the natural and designed world(s).

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Next Generation Science Standards

Obtaining, Evaluating, and Communicating Information

Obtaining, evaluating, and communicating information in 3–5 builds on K–2 experiences and progresses to evaluating the merit and accuracy of ideas and methods.

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Disciplinary Core Ideas (3-5)

Physical Science

PS3.A Definitions of Energy

• The faster a given object is moving, the more energy it possesses.

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PS3.A Definitions of Energy

• Energy can be moved from place to place by moving objects or through sound, light, or electrical currents.

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PS3.B Conservation of Energy and Energy Transfer

• Energy is present whenever there are moving objects, sound, light, or heat. When objects collide, energy can be transferred from one object to another, thereby changing their motion. In such collisions, some energy is typically also transferred to the surrounding air; as a result, the air gets heated and sound is produced.

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Next Generation Science Standards

PS3.B Conservation of Energy and Energy Transfer

• Light also transfers energy from place to place.

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PS3.B Conservation of Energy and Energy Transfer

• Energy can also be transferred from place to place by electric currents, which can then be used locally to produce motion, sound, heat, or light. The currents may have been produced to begin with by transforming the energy of motion into electrical energy.

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PS3.C Relationship Between Energy and Forces

• When objects collide, contact forces transfer energy so as to change the objects' motions.

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PS3.D Energy in Chemical Processes and Everyday Life

• The expression "produce energy" typically refers to the conversion of stored energy into a desired form for practical use.

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Next Generation Science Standards

PS4.A Wave Properties

• Waves, which are regular patterns of motion, can be made in water by disturbing the surface. When waves move across the surface of deep water, the water goes up and down in place; there is no net motion in the direction of the wave except when the water meets a beach.

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PS4.A Wave Properties

• Waves of the same type can differ in amplitude (height of the wave) and wavelength (spacing between wave peaks).

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PS4.B Electromagnetic Radiation

• An object can be seen when light reflected from its surface enters the eyes.

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PS4.C Information Technologies and Instrumentation

• Digitized information can be transmitted over long distances without significant degredation. High-tech devices, such as computers or cell phones, can receive and decode information–convert it from digitized form to voice–and vice versa.

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Next Generation Science Standards

Life Science

LS1.A Structure and Function

• Plants and animals have both internal and external structures that serve various functions in growth, survival, behavior, and reproduction.

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LS1.D Information Processing

• Different sense receptors are specialized for particular kinds of information, which may be then processed by the animal's brain. Animals are able to use their perceptions and memories to guide their actions.

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Earth and Space Science

ESS1.C The History of Planet Earth

• Local, regional, and global patterns of rock formations reveal changes over time due to Earth forces, such as earthquakes. The presence and location of certain fossil types indicate the order in which rock layers were formed.

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ESS2.A Earth Materials and Systems

• Rainfall helps to shape the land and affects the types of living things found in a region. Water, ice, wind, living organisms, and gravity break rocks, soils, and sediments into smaller particles and move them around.

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Next Generation Science Standards

ESS2.B Plate Tectonics and Large-Scale System Interactions

• The locations of mountain ranges, deep ocean trenches, ocean floor structures, earthquakes, and volcanoes occur in patterns. Most earthquakes and volcanoes occur in bands that are often along the boundaries between continents and oceans. Major mountain chains form inside continents or near their edges. Maps can help locate the different land and water features of Earth.

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ESS2.E Biogeology

• Living things affect the physical characteristics of their regions.

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ESS3.A Natural Resources

• Energy and fuels that humans use are derived from natural sources, and their use affects the environment in multiple ways. Some resources are renewable over time, and others are not.

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ESS3.B Natural Hazards

• A variety of natural hazards result from natural processes. Humans cannot eliminate natural hazards but can take steps to reduce their impacts.

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Next Generation Science Standards

Engineering, Technology, and Applications of Science

ETS1.A Defining and Delimiting Engineering Problems

• Possible solutions to a problem are limited by available materials and resources (constraints). The success of a designed solution is determined by considering the desired features of a solution (criteria). Different proposals for solutions can be compared on the basis of how well each one meets the specified criteria for success or how well each takes the constraints into account.

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ETS1.B Developing Possible Solutions

• Research on a problem should be carried out before beginning to design a solution.

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ETS1.B Developing Possible Solutions

• At whatever stage, communicating with peers about proposed solutions is an important part of the design process, and shared ideas can lead to improved designs.

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ETS1.B Developing Possible Solutions

• Tests are often designed to identify failure points or difficulties, which suggest the elements of the design that need to be improved.

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Next Generation Science Standards

ETS1.C Optimizing the Design Solution

• Different solutions need to be tested in order to determine which of them best solves the problem, given the criteria and the constraints.

- [x] Input/Output: Computer Systems
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- [x] Waves and the Properties of Light
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Crosscutting Concepts (3-5)

Patterns – Observed patterns in nature guide organization and classification and prompt questions about relationships and causes underlying them.

• Similarities and differences in patterns can be used to sort, classify, communicate and analyze simple rates of change for natural phenomena and designed products.

- [x] Input/Output: Computer Systems
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• Patterns can be used as evidence to support an explanation.

- [ ] Input/Output: Computer Systems
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Cause and Effect: Mechanism and Prediction – Events have causes, sometimes simple, sometimes multifaceted. Deciphering causal relationships, and the mechanisms by which they are mediated, is a major activity of science and engineering.

• Cause and effect relationships are routinely identified, tested, and used to explain change.

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Next Generation Science Standards

Systems and System Models – A system is an organized group of related objects or components; models can be used for understanding and predicting the behavior of systems.

- A system is a group of related parts that make up a whole and can carry out functions its individual parts cannot.

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- A system can be described in terms of its components and their interactions.

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Energy and Matter: Flows, Cycles, and Conservation – Tracking energy and matter flows, into, out of, and within systems helps one understand their system's behavior.

- Energy can be transferred in various ways and between objects.

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Structure and Function – The way an object is shaped or structured determines many of its properties and functions.

- Different materials have different substructures, which can sometimes be observed.

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- Substructures have shapes and parts that serve functions.

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Connections to Engineering, Technology, and Applications of Science (3-5)

Interdependence of Science, Engineering, and Technology

• Knowledge of relevant scientific concepts and research findings is important in engineering.

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Influence of Science, Engineering, and Technology on Society and the Natural World

• People's needs and wants change over time, as do their demands for new and improved technologies.

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• Engineers improve existing technologies or develop new ones to increase their benefits, to decrease known risks, and to meet societal demands.

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Connections to the Nature of Science (3-5)

Science is a Human Endeavor

• Most scientists and engineers work in teams.

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Next Generation Science Standards

- Science affects everyday life.

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Scientific Knowledge Assumes an Order and Consistency in Natural Systems

- Science assumes consistent patterns in natural systems.

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- ☐ Organisms: Structure and Function
- ☑ Earth: Past, Present, and Future
- ☐ Earth: Human Impact and Natural Disasters
- ☐ Energy Exploration

Scientific Knowledge is Based on Empirical Evidence

- Science findings are based on recognizing patterns.

- ☐ Input/Output: Computer Systems
- ☐ Input/Output: Human Brain
- ☑ Waves and the Properties of Light
- ☐ Organisms: Structure and Function
- ☐ Earth: Past, Present, and Future
- ☐ Earth: Human Impact and Natural Disasters
- ☐ Energy Exploration

Computer Science Teachers Association K-12 Computer Science

In Spring 2023 PLTW submitted all necessary documentation required by the Computer Science Teachers Association (CSTA) for a crosswalk review of our Launch and Gateway curricula by the CSTA Standards Review Team. While we anticipate approval and validation by CSTA, the review is pending.

Computing Systems

Devices

1B-CS-01

Describe how internal and external parts of computing devices function to form a system.

- ☑ Input/Output: Computer Systems
- ☐ Input/Output: Human Brain
- ☐ Waves and the Properties of Light
- ☐ Organisms: Structure and Function
- ☐ Earth: Past, Present, and Future
- ☐ Earth: Human Impact and Natural Disasters
- ☐ Energy Exploration

Hardware & Software

1B-CS-02

Model how computer hardware and software work together as a system to accomplish tasks.

- ☑ Input/Output: Computer Systems
- ☐ Input/Output: Human Brain
- ☐ Waves and the Properties of Light
- ☐ Organisms: Structure and Function
- ☐ Earth: Past, Present, and Future
- ☐ Earth: Human Impact and Natural Disasters
- ☐ Energy Exploration

Troubleshooting

1B-CS-03

Determine potential solutions to solve simple hardware and software problems using common troubleshooting strategies.

- ☑ Input/Output: Computer Systems
- ☑ Input/Output: Human Brain
- ☑ Waves and the Properties of Light
- ☑ Organisms: Structure and Function
- ☑ Earth: Past, Present, and Future
- ☑ Earth: Human Impact and Natural Disasters
- ☑ Energy Exploration

Networks and the Internet

Network Communication & Organization

1B-NI-04

Model how information is broken down into smaller pieces, transmitted as packets through multiple devices over networks and the Internet, and reassembled at the destination.

- ☑ Input/Output: Computer Systems
- ☐ Input/Output: Human Brain
- ☐ Waves and the Properties of Light
- ☐ Organisms: Structure and Function
- ☐ Earth: Past, Present, and Future
- ☐ Earth: Human Impact and Natural Disasters
- ☐ Energy Exploration

Cybersecurity

1B-NI-05

Discuss real-world cybersecurity problems and how personal information can be protected.

- ☑ Input/Output: Computer Systems
- ☑ Input/Output: Human Brain
- ☑ Waves and the Properties of Light
- ☑ Organisms: Structure and Function
- ☑ Earth: Past, Present, and Future
- ☑ Earth: Human Impact and Natural Disasters
- ☑ Energy Exploration

Data and Analysis

Collection Visualization & Transformation

1B-DA-06

Organize and present collected data visually to highlight relationships and support a claim.

- ☑ Input/Output: Computer Systems
- ☑ Input/Output: Human Brain
- ☑ Waves and the Properties of Light
- ☐ Organisms: Structure and Function
- ☑ Earth: Past, Present, and Future
- ☐ Earth: Human Impact and Natural Disasters
- ☑ Energy Exploration

Inference & Models

1B-DA-07

Use data to highlight or propose cause-and-effect relationships, predict outcomes, or communicate an idea.

- ☑ Input/Output: Computer Systems
- ☑ Input/Output: Human Brain
- ☑ Waves and the Properties of Light
- ☐ Organisms: Structure and Function
- ☑ Earth: Past, Present, and Future
- ☑ Earth: Human Impact and Natural Disasters
- ☑ Energy Exploration

Algorithms and Programming

Algorithms

1B-AP-08

Compare and refine multiple algorithms for the same task and determine which is the most appropriate.

- ☑ Input/Output: Computer Systems
- ☐ Input/Output: Human Brain
- ☐ Waves and the Properties of Light
- ☐ Organisms: Structure and Function
- ☐ Earth: Past, Present, and Future
- ☐ Earth: Human Impact and Natural Disasters
- ☐ Energy Exploration

Variables

1B-AP-09

Create programs that use variables to store and modify data.

- ☑ Input/Output: Computer Systems
- ☐ Input/Output: Human Brain
- ☐ Waves and the Properties of Light
- ☐ Organisms: Structure and Function
- ☐ Earth: Past, Present, and Future
- ☐ Earth: Human Impact and Natural Disasters
- ☐ Energy Exploration

Control

1B-AP-10

Create programs that include sequences, events, loops, and conditionals.

- ☑ Input/Output: Computer Systems
- ☐ Input/Output: Human Brain
- ☐ Waves and the Properties of Light
- ☐ Organisms: Structure and Function
- ☐ Earth: Past, Present, and Future
- ☐ Earth: Human Impact and Natural Disasters
- ☐ Energy Exploration

Modularity

1B-AP-11

Decompose (break down) problems into smaller, manageable subproblems to facilitate the program development process.

- ☑ Input/Output: Computer Systems
- ☐ Input/Output: Human Brain
- ☐ Waves and the Properties of Light
- ☐ Organisms: Structure and Function
- ☐ Earth: Past, Present, and Future
- ☐ Earth: Human Impact and Natural Disasters
- ☐ Energy Exploration

Computer Science Teachers Association K-12 Computer Science

Modularity

1B-AP-12

Modify, remix, or incorporate portions of an existing program into one's own work, to develop something new or add more advanced features.

- [x] Input/Output: Computer Systems
- [ ] Input/Output: Human Brain
- [ ] Waves and the Properties of Light
- [ ] Organisms: Structure and Function
- [ ] Earth: Past, Present, and Future
- [ ] Earth: Human Impact and Natural Disasters
- [ ] Energy Exploration

Program Development

1B-AP-13

Use an iterative process to plan the development of a program by including others' perspectives and considering user preferences.

- [x] Input/Output: Computer Systems
- [ ] Input/Output: Human Brain
- [ ] Waves and the Properties of Light
- [ ] Organisms: Structure and Function
- [ ] Earth: Past, Present, and Future
- [ ] Earth: Human Impact and Natural Disasters
- [ ] Energy Exploration

Program Development

1B-AP-14

Observe intellectual property rights and give appropriate attribution when creating or remixing programs.

- [x] Input/Output: Computer Systems
- [ ] Input/Output: Human Brain
- [ ] Waves and the Properties of Light
- [ ] Organisms: Structure and Function
- [ ] Earth: Past, Present, and Future
- [ ] Earth: Human Impact and Natural Disasters
- [ ] Energy Exploration

Program Development

1B-AP-15

Test and debug (identify and fix errors) a program or algorithm to ensure it runs as intended.

- [x] Input/Output: Computer Systems
- [ ] Input/Output: Human Brain
- [ ] Waves and the Properties of Light
- [ ] Organisms: Structure and Function
- [ ] Earth: Past, Present, and Future
- [ ] Earth: Human Impact and Natural Disasters
- [ ] Energy Exploration

Computer Science Teachers Association K-12 Computer Science

Program Development

1B-AP-16
Take on varying roles, with teacher guidance, when collaborating with peers during the design, implementation, and review stages of program development.

- [x] Input/Output: Computer Systems
- [ ] Input/Output: Human Brain
- [ ] Waves and the Properties of Light
- [ ] Organisms: Structure and Function
- [ ] Earth: Past, Present, and Future
- [ ] Earth: Human Impact and Natural Disasters
- [ ] Energy Exploration

Program Development

1B-AP-17
Describe choices made during program development using code comments, presentations, and demonstrations.

- [x] Input/Output: Computer Systems
- [ ] Input/Output: Human Brain
- [ ] Waves and the Properties of Light
- [ ] Organisms: Structure and Function
- [ ] Earth: Past, Present, and Future
- [ ] Earth: Human Impact and Natural Disasters
- [ ] Energy Exploration

Impacts of Computing

Culture

1B-IC-19
Brainstorm ways to improve the accessibility and usability of technology products for the diverse needs and wants of users.

- [x] Input/Output: Computer Systems
- [ ] Input/Output: Human Brain
- [ ] Waves and the Properties of Light
- [ ] Organisms: Structure and Function
- [ ] Earth: Past, Present, and Future
- [ ] Earth: Human Impact and Natural Disasters
- [ ] Energy Exploration

Social Interactions

1B-IC-20
Seek diverse perspectives for the purpose of improving computational artifacts.

- [x] Input/Output: Computer Systems
- [ ] Input/Output: Human Brain
- [ ] Waves and the Properties of Light
- [ ] Organisms: Structure and Function
- [ ] Earth: Past, Present, and Future
- [ ] Earth: Human Impact and Natural Disasters
- [ ] Energy Exploration

Computer Science Teachers Association K-12 Computer Science

Safety Law & Ethics

1B-IC-21
Use public domain or creative commons media, and refrain from copying or using material created by others without permission.

- ☐ Input/Output: Computer Systems
- ☐ Input/Output: Human Brain
- ☐ Waves and the Properties of Light
- ☐ Organisms: Structure and Function
- ☑ Earth: Past, Present, and Future
- ☐ Earth: Human Impact and Natural Disasters
- ☐ Energy Exploration

International Society for Technology in Education Standards for Students

Empowered Learner

1a
Students articulate and set personal learning goals, develop strategies leveraging technology to achieve them and reflect on the learning process itself to improve learning outcomes.

- [x] Input/Output: Computer Systems
- [x] Input/Output: Human Brain
- [ ] Waves and the Properties of Light
- [ ] Organisms: Structure and Function
- [ ] Earth: Past, Present, and Future
- [ ] Earth: Human Impact and Natural Disasters
- [ ] Energy Exploration

1c
Students use technology to seek feedback that informs and improves their practice and to demonstrate their learning in a variety of ways.

- [x] Input/Output: Computer Systems
- [x] Input/Output: Human Brain
- [ ] Waves and the Properties of Light
- [ ] Organisms: Structure and Function
- [ ] Earth: Past, Present, and Future
- [ ] Earth: Human Impact and Natural Disasters
- [ ] Energy Exploration

Digital Citizen

2a
Students cultivate and manage their digital identity and reputation and are aware of the permanence of their actions in the digital world.

- [x] Input/Output: Computer Systems
- [ ] Input/Output: Human Brain
- [ ] Waves and the Properties of Light
- [ ] Organisms: Structure and Function
- [ ] Earth: Past, Present, and Future
- [ ] Earth: Human Impact and Natural Disasters
- [x] Energy Exploration

2b
Students engage in positive, safe, legal and ethical behavior when using technology, including social interactions online or when using networked devices.

- [x] Input/Output: Computer Systems
- [ ] Input/Output: Human Brain
- [ ] Waves and the Properties of Light
- [ ] Organisms: Structure and Function
- [ ] Earth: Past, Present, and Future
- [ ] Earth: Human Impact and Natural Disasters
- [x] Energy Exploration

International Society for Technology in Education Standards for Students

2c
Students demonstrate an understanding of and respect for the rights and obligations of using and sharing intellectual property.

- [x] Input/Output: Computer Systems
- [ ] Input/Output: Human Brain
- [ ] Waves and the Properties of Light
- [ ] Organisms: Structure and Function
- [ ] Earth: Past, Present, and Future
- [ ] Earth: Human Impact and Natural Disasters
- [ ] Energy Exploration

2d
Students manage their personal data to maintain digital privacy and security and are aware of data-collection technology used to track their navigation online.

- [x] Input/Output: Computer Systems
- [ ] Input/Output: Human Brain
- [ ] Waves and the Properties of Light
- [ ] Organisms: Structure and Function
- [ ] Earth: Past, Present, and Future
- [ ] Earth: Human Impact and Natural Disasters
- [x] Energy Exploration

Knowledge Constructor

3a
Students plan and employ effective research strategies to locate information and other resources for their intellectual or creative pursuits.

- [ ] Input/Output: Computer Systems
- [x] Input/Output: Human Brain
- [ ] Waves and the Properties of Light
- [ ] Organisms: Structure and Function
- [ ] Earth: Past, Present, and Future
- [ ] Earth: Human Impact and Natural Disasters
- [x] Energy Exploration

3c
Students curate information from digital resources using a variety of tools and methods to create collections of artifacts that demonstrate meaningful connections or conclusions.

- [ ] Input/Output: Computer Systems
- [x] Input/Output: Human Brain
- [ ] Waves and the Properties of Light
- [ ] Organisms: Structure and Function
- [ ] Earth: Past, Present, and Future
- [ ] Earth: Human Impact and Natural Disasters
- [ ] Energy Exploration

International Society for Technology in Education Standards for Students

3d
Students build knowledge by actively exploring real-world issues and problems, developing ideas and theories and pursuing answers and solutions.

- [x] Input/Output: Computer Systems
- [x] Input/Output: Human Brain
- [ ] Waves and the Properties of Light
- [ ] Organisms: Structure and Function
- [ ] Earth: Past, Present, and Future
- [ ] Earth: Human Impact and Natural Disasters
- [x] Energy Exploration

Innovative Designer

4a
Students know and use a deliberate design process for generating ideas, testing theories, creating innovative artifacts or solving authentic problems.

- [x] Input/Output: Computer Systems
- [x] Input/Output: Human Brain
- [ ] Waves and the Properties of Light
- [ ] Organisms: Structure and Function
- [ ] Earth: Past, Present, and Future
- [ ] Earth: Human Impact and Natural Disasters
- [x] Energy Exploration

4b
Students select and use digital tools to plan and manage a design process that considers design constraints and calculated risks.

- [x] Input/Output: Computer Systems
- [x] Input/Output: Human Brain
- [ ] Waves and the Properties of Light
- [ ] Organisms: Structure and Function
- [ ] Earth: Past, Present, and Future
- [ ] Earth: Human Impact and Natural Disasters
- [x] Energy Exploration

4c
Students develop, test and refine prototypes as part of a cyclical design process.

- [x] Input/Output: Computer Systems
- [x] Input/Output: Human Brain
- [ ] Waves and the Properties of Light
- [ ] Organisms: Structure and Function
- [ ] Earth: Past, Present, and Future
- [ ] Earth: Human Impact and Natural Disasters
- [x] Energy Exploration

International Society for Technology in Education Standards for Students

4d
Students exhibit a tolerance for ambiguity, perseverance and the capacity to work with open-ended problems.

- ☑ Input/Output: Computer Systems
- ☑ Input/Output: Human Brain
- ☐ Waves and the Properties of Light
- ☐ Organisms: Structure and Function
- ☐ Earth: Past, Present, and Future
- ☐ Earth: Human Impact and Natural Disasters
- ☑ Energy Exploration

Computational Thinker

5a
Students formulate problem definitions suited for technology-assisted methods such as data analysis, abstract models and algorithmic thinking in exploring and finding solutions.

- ☑ Input/Output: Computer Systems
- ☐ Input/Output: Human Brain
- ☐ Waves and the Properties of Light
- ☐ Organisms: Structure and Function
- ☐ Earth: Past, Present, and Future
- ☐ Earth: Human Impact and Natural Disasters
- ☐ Energy Exploration

5b
Students collect data or identify relevant data sets, use digital tools to analyze them, and represent data in various ways to facilitate problem-solving and decision-making.

- ☑ Input/Output: Computer Systems
- ☑ Input/Output: Human Brain
- ☐ Waves and the Properties of Light
- ☐ Organisms: Structure and Function
- ☐ Earth: Past, Present, and Future
- ☐ Earth: Human Impact and Natural Disasters
- ☐ Energy Exploration

5c
Students break problems into component parts, extract key information, and develop descriptive models to understand complex systems or facilitate problem-solving.

- ☑ Input/Output: Computer Systems
- ☑ Input/Output: Human Brain
- ☐ Waves and the Properties of Light
- ☐ Organisms: Structure and Function
- ☐ Earth: Past, Present, and Future
- ☐ Earth: Human Impact and Natural Disasters
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International Society for Technology in Education Standards for Students

5d
Students understand how automation works and use algorithmic thinking to develop a sequence of steps to create and test automated solutions.

- [x] Input/Output: Computer Systems
- [ ] Input/Output: Human Brain
- [ ] Waves and the Properties of Light
- [ ] Organisms: Structure and Function
- [ ] Earth: Past, Present, and Future
- [ ] Earth: Human Impact and Natural Disasters
- [ ] Energy Exploration

Creative Communicator

6a
Students choose the appropriate platforms and tools for meeting the desired objectives of their creation or communication.

- [x] Input/Output: Computer Systems
- [x] Input/Output: Human Brain
- [ ] Waves and the Properties of Light
- [ ] Organisms: Structure and Function
- [ ] Earth: Past, Present, and Future
- [ ] Earth: Human Impact and Natural Disasters
- [x] Energy Exploration

6b
Students create original works or responsibly repurpose or remix digital resources into new creations.

- [x] Input/Output: Computer Systems
- [x] Input/Output: Human Brain
- [ ] Waves and the Properties of Light
- [ ] Organisms: Structure and Function
- [ ] Earth: Past, Present, and Future
- [ ] Earth: Human Impact and Natural Disasters
- [x] Energy Exploration

6c
Students communicate complex ideas clearly and effectively by creating or using a variety of digital objects such as visualizations, models or simulations.

- [x] Input/Output: Computer Systems
- [x] Input/Output: Human Brain
- [ ] Waves and the Properties of Light
- [ ] Organisms: Structure and Function
- [ ] Earth: Past, Present, and Future
- [ ] Earth: Human Impact and Natural Disasters
- [x] Energy Exploration

International Society for Technology in Education Standards for Students

6d
Students publish or present content that customizes the message and medium for their intended audiences.

- [x] Input/Output: Computer Systems
- [x] Input/Output: Human Brain
- [ ] Waves and the Properties of Light
- [ ] Organisms: Structure and Function
- [ ] Earth: Past, Present, and Future
- [ ] Earth: Human Impact and Natural Disasters
- [x] Energy Exploration

Global Collaborator

7a
Students use digital tools to connect with learners from a variety of backgrounds and cultures, engaging with them in ways that broaden mutual understanding and learning.

- [x] Input/Output: Computer Systems
- [x] Input/Output: Human Brain
- [ ] Waves and the Properties of Light
- [ ] Organisms: Structure and Function
- [ ] Earth: Past, Present, and Future
- [ ] Earth: Human Impact and Natural Disasters
- [x] Energy Exploration

7b
Students use collaborative technologies to work with others, including peers, experts or community members, to examine issues and problems from multiple viewpoints.

- [x] Input/Output: Computer Systems
- [x] Input/Output: Human Brain
- [ ] Waves and the Properties of Light
- [ ] Organisms: Structure and Function
- [ ] Earth: Past, Present, and Future
- [ ] Earth: Human Impact and Natural Disasters
- [x] Energy Exploration

7c
Students contribute constructively to project teams, assuming various roles and responsibilities to work effectively toward a common goal.

- [x] Input/Output: Computer Systems
- [x] Input/Output: Human Brain
- [ ] Waves and the Properties of Light
- [ ] Organisms: Structure and Function
- [ ] Earth: Past, Present, and Future
- [ ] Earth: Human Impact and Natural Disasters
- [x] Energy Exploration

International Society for Technology in Education Standards for Students

7d
Students explore local and global issues and use collaborative technologies to work with others to investigate solutions.

- [x] Input/Output: Computer Systems
- [x] Input/Output: Human Brain
- [ ] Waves and the Properties of Light
- [ ] Organisms: Structure and Function
- [ ] Earth: Past, Present, and Future
- [ ] Earth: Human Impact and Natural Disasters
- [x] Energy Exploration

Common Core State Standards English Language Arts - Fourth Grade

Reading Informational Text Standards

Key Ideas and Details

CCSS.ELA-LITERACY.RI.4.1

Refer to details and examples in a text when explaining what the text says explicitly and when drawing inferences from the text.

- ☐ Input/Output: Computer Systems
- ☑ Input/Output: Human Brain
- ☐ Waves and the Properties of Light
- ☑ Organisms: Structure and Function
- ☐ Earth: Past, Present, and Future
- ☑ Earth: Human Impact and Natural Disasters
- ☑ Energy Exploration

Key Ideas and Details

CCSS.ELA-LITERACY.RI.4.2

Determine the main idea of a text and explain how it is supported by key details; summarize the text.

- ☐ Input/Output: Computer Systems
- ☑ Input/Output: Human Brain
- ☐ Waves and the Properties of Light
- ☐ Organisms: Structure and Function
- ☐ Earth: Past, Present, and Future
- ☐ Earth: Human Impact and Natural Disasters
- ☑ Energy Exploration

Key Ideas and Details

CCSS.ELA-LITERACY.RI.4.3

Explain events, procedures, ideas, or concepts in a historical, scientific, or technical text, including what happened and why, based on specific information in the text.

- ☑ Input/Output: Computer Systems
- ☐ Input/Output: Human Brain
- ☐ Waves and the Properties of Light
- ☑ Organisms: Structure and Function
- ☑ Earth: Past, Present, and Future
- ☑ Earth: Human Impact and Natural Disasters
- ☑ Energy Exploration

Craft and Structure

CCSS.ELA-LITERACY.RI.4.4

Determine the meaning of general academic and domain-specific words or phrases in a text relevant to a grade 4 topic or subject area.

- ☑ Input/Output: Computer Systems
- ☑ Input/Output: Human Brain
- ☐ Waves and the Properties of Light
- ☑ Organisms: Structure and Function
- ☑ Earth: Past, Present, and Future
- ☑ Earth: Human Impact and Natural Disasters
- ☑ Energy Exploration

Common Core State Standards English Language Arts - Fourth Grade

Integration of Knowledge and Ideas

CCSS.ELA-LITERACY.RI.4.7
Interpret information presented visually, orally, or quantitatively (e.g., in charts, graphs, diagrams, time lines, animations, or interactive elements on Web pages) and explain how the information contributes to an understanding of the text in which it appears.

- ☐ Input/Output: Computer Systems
- ☑ Input/Output: Human Brain
- ☐ Waves and the Properties of Light
- ☐ Organisms: Structure and Function
- ☑ Earth: Past, Present, and Future
- ☐ Earth: Human Impact and Natural Disasters
- ☑ Energy Exploration

Integration of Knowledge and Ideas

CCSS.ELA-LITERACY.RI.4.9
Integrate information from two texts on the same topic in order to write or speak about the subject knowledgeably.

- ☐ Input/Output: Computer Systems
- ☐ Input/Output: Human Brain
- ☐ Waves and the Properties of Light
- ☐ Organisms: Structure and Function
- ☐ Earth: Past, Present, and Future
- ☑ Earth: Human Impact and Natural Disasters
- ☐ Energy Exploration

Writing Standards

Text Types and Purposes

CCSS.ELA-LITERACY.W.4.1.B
Provide reasons that are supported by facts and details.

- ☐ Input/Output: Computer Systems
- ☐ Input/Output: Human Brain
- ☐ Waves and the Properties of Light
- ☑ Organisms: Structure and Function
- ☐ Earth: Past, Present, and Future
- ☐ Earth: Human Impact and Natural Disasters
- ☐ Energy Exploration

CCSS.ELA-LITERACY.W.4.2
Write informative/explanatory texts to examine a topic and convey ideas and information clearly.

- ☑ Input/Output: Computer Systems
- ☑ Input/Output: Human Brain
- ☐ Waves and the Properties of Light
- ☐ Organisms: Structure and Function
- ☑ Earth: Past, Present, and Future
- ☑ Earth: Human Impact and Natural Disasters
- ☑ Energy Exploration

Common Core State Standards English Language Arts - Fourth Grade

CCSS.ELA-LITERACY.W.4.2.D
Use precise language and domain-specific vocabulary to inform about or explain the topic.

- ☐ Input/Output: Computer Systems
- ☑ Input/Output: Human Brain
- ☐ Waves and the Properties of Light
- ☑ Organisms: Structure and Function
- ☐ Earth: Past, Present, and Future
- ☐ Earth: Human Impact and Natural Disasters
- ☐ Energy Exploration

CCSS.ELA-LITERACY.W.4.2.E
Provide a concluding statement or section related to the information or explanation presented.

- ☐ Input/Output: Computer Systems
- ☑ Input/Output: Human Brain
- ☐ Waves and the Properties of Light
- ☐ Organisms: Structure and Function
- ☐ Earth: Past, Present, and Future
- ☐ Earth: Human Impact and Natural Disasters
- ☐ Energy Exploration

CCSS.ELA-LITERACY.W.4.3
Write narratives to develop real or imagined experiences or events using effective technique, descriptive details, and clear event sequences.

- ☐ Input/Output: Computer Systems
- ☑ Input/Output: Human Brain
- ☐ Waves and the Properties of Light
- ☐ Organisms: Structure and Function
- ☐ Earth: Past, Present, and Future
- ☐ Earth: Human Impact and Natural Disasters
- ☐ Energy Exploration

Production and Distribution of Writing

CCSS.ELA-LITERACY.W.4.4
Produce clear and coherent writing in which the development and organization are appropriate to task, purpose, and audience.

- ☑ Input/Output: Computer Systems
- ☑ Input/Output: Human Brain
- ☐ Waves and the Properties of Light
- ☐ Organisms: Structure and Function
- ☐ Earth: Past, Present, and Future
- ☐ Earth: Human Impact and Natural Disasters
- ☐ Energy Exploration

Common Core State Standards English Language Arts - Fourth Grade

Research to Build and Present Knowledge

CCSS.ELA-LITERACY.W.4.7
Conduct short research projects that build knowledge through investigation of different aspects of a topic.

- ☐ Input/Output: Computer Systems
- ☑ Input/Output: Human Brain
- ☐ Waves and the Properties of Light
- ☐ Organisms: Structure and Function
- ☑ Earth: Past, Present, and Future
- ☑ Earth: Human Impact and Natural Disasters
- ☑ Energy Exploration

CCSS.ELA-LITERACY.W.4.8
Recall relevant information from experiences or gather relevant information from print and digital sources; take notes and categorize information, and provide a list of sources.

- ☐ Input/Output: Computer Systems
- ☑ Input/Output: Human Brain
- ☐ Waves and the Properties of Light
- ☑ Organisms: Structure and Function
- ☑ Earth: Past, Present, and Future
- ☑ Earth: Human Impact and Natural Disasters
- ☐ Energy Exploration

CCSS.ELA-LITERACY.W.4.9
Draw evidence from literary or informational texts to support analysis, reflection, and research.

- ☐ Input/Output: Computer Systems
- ☐ Input/Output: Human Brain
- ☐ Waves and the Properties of Light
- ☐ Organisms: Structure and Function
- ☑ Earth: Past, Present, and Future
- ☑ Earth: Human Impact and Natural Disasters
- ☑ Energy Exploration

Speaking and Listening Standards

Comprehension and Collaboration

CCSS.ELA-LITERACY.SL.4.1
Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 4 topics and texts, building on others' ideas and expressing their own clearly.

- ☑ Input/Output: Computer Systems
- ☑ Input/Output: Human Brain
- ☐ Waves and the Properties of Light
- ☑ Organisms: Structure and Function
- ☑ Earth: Past, Present, and Future
- ☑ Earth: Human Impact and Natural Disasters
- ☑ Energy Exploration

Common Core State Standards English Language Arts - Fourth Grade

CCSS.ELA-LITERACY.SL.4.2
Paraphrase portions of a text read aloud or information presented in diverse media and formats, including visually, quantitatively, and orally.

- [x] Input/Output: Computer Systems
- [ ] Input/Output: Human Brain
- [ ] Waves and the Properties of Light
- [x] Organisms: Structure and Function
- [ ] Earth: Past, Present, and Future
- [ ] Earth: Human Impact and Natural Disasters
- [ ] Energy Exploration

CCSS.ELA-LITERACY.SL.4.3
Identify the reasons and evidence a speaker provides to support particular points.

- [ ] Input/Output: Computer Systems
- [ ] Input/Output: Human Brain
- [ ] Waves and the Properties of Light
- [ ] Organisms: Structure and Function
- [ ] Earth: Past, Present, and Future
- [ ] Earth: Human Impact and Natural Disasters
- [x] Energy Exploration

Presentation of Knowledge and Ideas

CCSS.ELA-LITERACY.SL.4.4
Report on a topic or text, tell a story, or recount an experience in an organized manner, using appropriate facts and relevant, descriptive details to support main ideas or themes; speak clearly at an understandable pace.

- [ ] Input/Output: Computer Systems
- [x] Input/Output: Human Brain
- [ ] Waves and the Properties of Light
- [x] Organisms: Structure and Function
- [x] Earth: Past, Present, and Future
- [x] Earth: Human Impact and Natural Disasters
- [x] Energy Exploration

CCSS.ELA-LITERACY.SL.4.5
Add audio recordings and visual displays to presentations when appropriate to enhance the development of main ideas or themes.

- [ ] Input/Output: Computer Systems
- [ ] Input/Output: Human Brain
- [x] Waves and the Properties of Light
- [x] Organisms: Structure and Function
- [x] Earth: Past, Present, and Future
- [ ] Earth: Human Impact and Natural Disasters
- [x] Energy Exploration

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Measurement and Data

Geometric measurement: understand concepts of angle and measure angles.

CCSS.MATH.CONTENT.4.MD.C.5

Recognize angles as geometric shapes that are formed wherever two rays share a common endpoint, and understand concepts of angle measurement.

- ☐ Input/Output: Computer Systems
- ☐ Input/Output: Human Brain
- ☑ Waves and the Properties of Light
- ☐ Organisms: Structure and Function
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- ☐ Energy Exploration

CCSS.MATH.CONTENT.4.MD.C.6

Measure angles in whole-number degrees using a protractor. Sketch angles of specified measure.

- ☐ Input/Output: Computer Systems
- ☐ Input/Output: Human Brain
- ☑ Waves and the Properties of Light
- ☐ Organisms: Structure and Function
- ☐ Earth: Past, Present, and Future
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- ☐ Energy Exploration

Geometry

Draw and identify lines and angles, and classify shapes by properties of their lines and angles.

CCSS.MATH.CONTENT.4.G.A.1

Draw points, lines, line segments, rays, angles (right, acute, obtuse), and perpendicular and parallel lines. Identify these in two-dimensional figures.

- ☐ Input/Output: Computer Systems
- ☐ Input/Output: Human Brain
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Mathematical Practices

CCSS.MATH.PRACTICE.MP1

Make sense of problems and persevere in solving them.

- ☑ Input/Output: Computer Systems
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CCSS.MATH.PRACTICE.MP2
Reason abstractly and quantitatively.

- [x] Input/Output: Computer Systems
- [x] Input/Output: Human Brain
- [x] Waves and the Properties of Light
- [ ] Organisms: Structure and Function
- [ ] Earth: Past, Present, and Future
- [x] Earth: Human Impact and Natural Disasters
- [ ] Energy Exploration

CCSS.MATH.PRACTICE.MP3
Construct viable arguments and critique the reasoning of others.

- [x] Input/Output: Computer Systems
- [x] Input/Output: Human Brain
- [x] Waves and the Properties of Light
- [x] Organisms: Structure and Function
- [x] Earth: Past, Present, and Future
- [x] Earth: Human Impact and Natural Disasters
- [x] Energy Exploration

CCSS.MATH.PRACTICE.MP4
Model with mathematics.

- [x] Input/Output: Computer Systems
- [x] Input/Output: Human Brain
- [x] Waves and the Properties of Light
- [ ] Organisms: Structure and Function
- [ ] Earth: Past, Present, and Future
- [x] Earth: Human Impact and Natural Disasters
- [ ] Energy Exploration

CCSS.MATH.PRACTICE.MP5
Use appropriate tools strategically.

- [x] Input/Output: Computer Systems
- [x] Input/Output: Human Brain
- [x] Waves and the Properties of Light
- [x] Organisms: Structure and Function
- [x] Earth: Past, Present, and Future
- [ ] Earth: Human Impact and Natural Disasters
- [x] Energy Exploration

CCSS.MATH.PRACTICE.MP6
Attend to precision.

- [ ] Input/Output: Computer Systems
- [ ] Input/Output: Human Brain
- [x] Waves and the Properties of Light
- [x] Organisms: Structure and Function
- [x] Earth: Past, Present, and Future
- [ ] Earth: Human Impact and Natural Disasters
- [x] Energy Exploration

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CCSS.MATH.PRACTICE.MP8
Look for and express regularity in repeated reasoning.

- [x] Input/Output: Computer Systems
- [ ] Input/Output: Human Brain
- [ ] Waves and the Properties of Light
- [ ] Organisms: Structure and Function
- [ ] Earth: Past, Present, and Future
- [ ] Earth: Human Impact and Natural Disasters
- [ ] Energy Exploration

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