

# Family Learning Guide: Science

Marking Period 1: 11/2/20-1/29/21



# Welcome to the Family Learning Guide!



*Dear Families,*

*Thank you for reading this Family Learning Guide. We are excited to work with you as partners during these challenging times to ensure that all our students receive an excellent education.*

*As reflected in our district's strategic plan – The District Model of Excellence or DME – we are working hard every day to provide all our students with the resources that they need to thrive.*

*We have developed this resource to support student learning – especially at-home learning – and we are excited to work with you and develop more tools and resources to support your children in their learning.*

*Please reach out with any questions or concerns and suggestions on how to make this guide more useful in the future.*

*Your partners at Hartford Public Schools*



Dr. Joanna Ali – Director of  
STEM

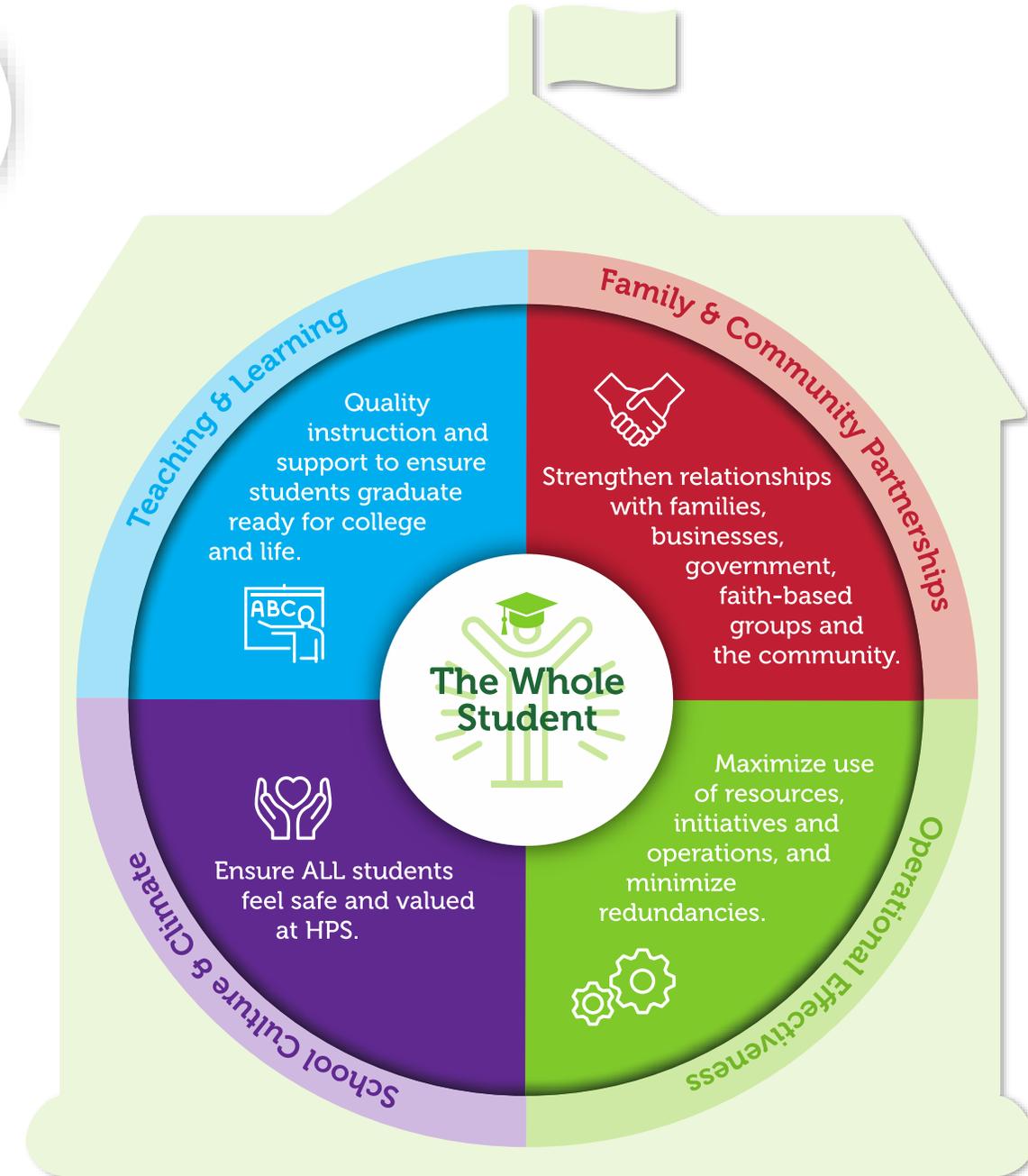
[Joanna.Ali@hartfordschools.org](mailto:Joanna.Ali@hartfordschools.org)

We are committed to excellence and equity for all our students.



## The District Model of Excellence is our roadmap for providing every child in Hartford with access to a high-quality public school.

We are committed to **excellence** and **equity** for all our students. This means that we cannot and will not allow the pandemic to interrupt high quality instruction for our students.



## Introducing the Family Learning Guide



### WHAT IS A FAMILY LEARNING GUIDE?

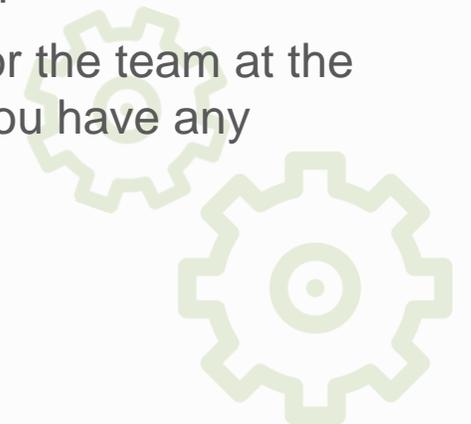
This is a resource developed by the team at Hartford Public Schools to provide you – our families – with an advance look at what your children will be learning in the coming weeks.

Learning requires partnership between families and schools. During the pandemic, this is even more true and we want to be your partner in this challenging time.



### HOW SHOULD YOU USE IT?

1. Review the sample learning objectives so that you can reinforce them at home;
2. Review the resources to support at-home learning so that you can make sure your children have the right supplies;
3. Reach out to your school or the team at the Hartford Public schools if you have any questions!





## UNIFIED ARTS FAMILY LEARNING GUIDE

**What are the marking period dates for this Family Learning Guide?**

11/2/2020 through 01/29/2021

**What are the specific units covered in this Family Learning Guide?**

1. Science for Grade K-5
2. Science for Grades 6
3. Science for Grade 7
4. Science for Grade 8
5. Integrated and Earth Science (9<sup>th</sup> Grade)
6. Biology
7. Chemistry
8. Physics



# Family Learning Guide

## Science for Grades K-5



### Unit Topic(s): Mimicking the Natural World

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

#### WHAT ARE OUR LEARNING GOALS FOR YOUR CHILDREN?

1. Students will make observations about similarities and differences in the natural and designed world.
2. Students will generate questions about how humans mimic nature.
3. Students will describe the cause effect relationships between sight, sound, touch and reaction by making and recording observations.
4. Students will investigate sense receptors to determine cause and effect relationships in relation to the phenomena
5. Students will make observations about how animals use sense receptors and how they use that information.
6. Students will use a model to identify similarities between animal sense receptors and human design
7. Students will collect evidence to identify and describe how energy is transferred and sound is produced
8. Students will develop a model to describe how light enters the eye and processes information
9. Students will construct an argument to determine how the external structures in animals help serve various functions
10. Students will use a model to describe the components of a plant and how its structures help them survive.
11. Students will collect evidence to identify and describe how electrical energy is transferred and produced
12. Students will describe observations from an investigation to determine how electrical energy is transferred from place to place and can change into other forms of energy (sound and light).
13. Students will investigate how animals use electricity to survive.

#### HOW WILL WE TEACH YOUR CHILDREN?

- Engage- to capture the student's interest and uncover previous knowledge. This includes reading books, slide shows, videos and short games.
- Explore- A hands-on or minds-on activity to encourage investigation and inquiry. This includes turn and talk, hands on lab investigations and using models.
- Explain- Students will give explanations and justifications of explore activity's discoveries or solutions. This is where vocabulary is introduced. Students can take notes, watch explanatory videos, use a vocabulary organizer or create foldables.
- Elaborate- students will apply their new knowledge to new situations. The students will also use new terms and vocabulary. Activities include a problem-solving task, investigation, stations designed to practice or play a game.
- Evaluate- Students demonstrate that they have achieved the lesson objective. This includes exit tickets, quizzes, journal task or a problem-solving task.

#### WHAT RESOURCES WILL BE NEEDED TO SUPPORT AT-HOME LEARNING?

- Access to a device and internet to follow along with the class and the teacher.

# Family Learning Guide

## Science for Grades K-5



### Unit Topic(s): Golden Jellies

Develop a model to describe the movement of matter among plants, animals, decomposers, and the environment.

#### WHAT ARE OUR LEARNING GOALS FOR YOUR CHILDREN?

1. Students will make observations of the golden jellyfish in Lake Palau and identify patterns for how they are similar and different from their traditional understanding of jellyfish.
2. Students will write and refine questions about the phenomenon of the golden jellyfish.
3. Students will analyze and interpret data to determine how some abiotic factors impact an ecosystem.
4. Students will make a claim about which abiotic factor(s) most influence the mass of a tree and support their claim with evidence
5. Students will make a claim about which abiotic factor(s) most influence the mass of a tree and support their claim with evidence
6. Students will use a model to demonstrate how matter and energy move through an ecosystem by identifying the components and their interactions.
7. Students will obtain and communicate information to demonstrate how matter (both seen and too small to be seen) and energy move through food webs.
8. Students will compare and contrast patterns observed in various ecosystem food webs.
9. Students will obtain and combine information regarding the movement of the Earth and the Sun.
10. Students will develop a model showing how plants and the golden jellyfish are dependent on energy from the Sun.
11. Students will obtain and combine information about the negative impacts of humans around the world.
12. Students will create a model to test materials and propose solutions that reduce the impact of an oil spill.
13. Students will identify patterns of similarities and differences of world events and those happening at Lake Palau.

#### HOW WILL WE TEACH YOUR CHILDREN?

- Engage- to capture the student's interest and uncover previous knowledge. This includes reading books, slide shows, videos and short games.
- Explore- A hands-on or minds-on activity to encourage investigation and inquiry. This includes turn and talk, hands on lab investigations and using models.
- Explain- Students will give explanations and justifications of explore activity's discoveries or solutions. This is where vocabulary is introduced. Students can take notes, watch explanatory videos, use a vocabulary organizer or create foldables.
- Elaborate- students will apply their new knowledge to new situations. The students will also use new terms and vocabulary. Activities include a problem-solving task, investigation, stations designed to practice or play a game.
- Evaluate- Students demonstrate that they have achieved the lesson objective. This includes exit tickets, quizzes, journal task or a problem-solving task.

#### WHAT RESOURCES WILL BE NEEDED TO SUPPORT AT-HOME LEARNING?

# Family Learning Guide: Science for Grade 6



## Unit Topic(s): Bees

### WHAT ARE OUR LEARNING GOALS FOR YOUR CHILDREN?

1. Students will make observations and share prior knowledge about bees and their relationship with plants.
2. Students will ask questions about the causes of the declining bee population.
3. Students will construct an argument supported by evidence that the bee population may be on the decline due to a disruption in their ability to sense stimuli in the world and communicate with one another.
4. Students will use arguments based on evidence to support an explanation for how animal actions affect the probability of successful reproduction.
5. Students will use arguments based on evidence to support an explanation for how specialized plant structures affect the probability of successful reproduction.
6. Students will construct an explanation, supported by evidence to show the interconnectedness of flowers and bees.
7. Students will develop a model to demonstrate how asexual reproduction results in offspring with identical genetic information.
8. Students will develop a model to demonstrate how sexual reproduction produces genetically varied organisms.
9. Students will argue from evidence to explain how genetics may be causing the declining bee population.
10. Students will develop a simple model to predict the likelihood of a trait.
11. Students will use mathematical thinking to predict the likelihood of a trait.

### HOW WILL WE TEACH YOUR CHILDREN?

- Engage- to capture the student's interest and uncover previous knowledge. This includes reading books, slide shows, videos and short games.
- Explore- A hands-on or minds-on activity to encourage investigation and inquiry. This includes turn and talk, hands on lab investigations and using models.
- Explain- Students will give explanations and justifications of explore activity's discoveries or solutions. This is where vocabulary is introduced. Students can take notes, watch explanatory videos, use a vocabulary organizer or create foldables.
- Elaborate- students will apply their new knowledge to new situations. The students will also use new terms and vocabulary. Activities include a problem-solving task, investigation, stations designed to practice or play a game.
- Evaluate- Students demonstrate that they have achieved the lesson objective. This includes exit tickets, quizzes, journal task or a problem-solving task.

### WHAT RESOURCES WILL BE NEEDED TO SUPPORT AT-HOME LEARNING?

- Access to a device and internet to follow along with the class and the teacher.
- Paper and Pencil

# Family Learning Guide: Science for Grade 7



## Unit Topic(s): Biome in a Bottle

### WHAT ARE OUR LEARNING GOALS FOR YOUR CHILDREN?

1. Students will define the criteria and constraints of the bio bottle.
2. Students will develop a model to describe the bio bottle.
3. Students will use evidence and reasoning to describe how the stability of an ecosystem is dependent upon the biological and physical components.
4. Students will identify patterns of change of the earth's ecosystem through the use of qualitative and quantitative data.
5. Students will explain how organisms and their populations are dependent on their interactions with other living things as energy and matter flow through an ecosystem
6. Students will create a model to show the movement of energy from producers to consumers and the cycling of matter.
7. Students will recognize that the laws of conservation of energy and matter are demonstrated in the chemical reaction of photosynthesis.
8. Students will identify the key role of sunlight as the initial source of energy in most ecosystems.
9. Students will create a model to describe how matter, made of atoms, and energy move through an ecosystem as it cycles into and out of living and nonliving parts of an ecosystem.
10. Students will create a model of a food web to demonstrate how matter, made of atoms, and energy move through an ecosystem.

### HOW WILL WE TEACH YOUR CHILDREN?

- Engage- to capture the student's interest and uncover previous knowledge. This includes reading books, slide shows, videos and short games.
- Explore- A hands-on or minds-on activity to encourage investigation and inquiry. This includes turn and talk, hands on lab investigations and using models.
- Explain- Students will give explanations and justifications of explore activity's discoveries or solutions. This is where vocabulary is introduced. Students can take notes, watch explanatory videos, use a vocabulary organizer or create foldables.
- Elaborate- students will apply their new knowledge to new situations. The students will also use new terms and vocabulary. Activities include a problem-solving task, investigation, stations designed to practice or play a game.
- Evaluate- Students demonstrate that they have achieved the lesson objective. This includes exit tickets, quizzes, journal task or a problem-solving task.

### WHAT RESOURCES WILL BE NEEDED TO SUPPORT AT-HOME LEARNING?

- Access to a device and internet to follow along with the class and the teacher.
- Paper and pencil

# Family Learning Guide:

## Science for Grade 8



### Unit Topic(s): Waves

Use mathematical representations to describe a simple model for waves that includes how the amplitude of a wave is related to the energy in a wave.

#### WHAT ARE OUR LEARNING GOALS FOR YOUR CHILDREN?

1. Students will create a model of how sound is transmitted.
2. Students will consider how an audio spectrum is able to be seen.
3. Students will test a variable to determine its effect on the period of a pendulum.
4. Students will identify the period, frequency, and amplitude of a wave.
5. Students will design and construct a 1-second pendulum.
6. Students will collect data and use it to calculate changes needed in their 1-second pendulum design.
7. Students will identify and explain the characteristics of light related to refraction, reflection, absorption and transmission.
8. Students will explain the differences between sound and light waves and how they travel.
9. Students will investigate the properties of waves and how they travel.
10. Students will investigate the electromagnetic spectrum and waves that are visible and not visible.
11. Students will recognize that invisible wavelengths of light can have visible effects on both living and nonliving things (sunburn, microwave cooking, etc.)
12. Students will explore the science behind color as they look at the bending of light through a medium such as a prism that separates the individual colors.
13. Students will gather sufficient evidence to support a claim that includes the idea that using waves to carry digital signals is a more reliable way to encode and transmit information than using waves to carry analog signals.
14. Students will be able to demonstrate their understanding of sound and light waves by creating a model of an orchestrated production that will include music synchronized with light (the model will be displayed on a tri-fold chart or students will culminate their learning in an authentic performance).

#### HOW WILL WE TEACH YOUR CHILDREN?

- Engage- to capture the student's interest and uncover previous knowledge. This includes reading books, slide shows, videos and short games.
- Explore- A hands-on or minds-on activity to encourage investigation and inquiry. This includes turn and talk, hands on lab investigations and using models.
- Explain- Students will give explanations and justifications of explore activity's discoveries or solutions. This is where vocabulary is introduced. Students can take notes, watch explanatory videos, use a vocabulary organizer or create foldables.
- Elaborate- students will apply their new knowledge to new situations. The students will also use new terms and vocabulary. Activities include a problem-solving task, investigation, stations designed to practice or play a game.
- Evaluate- Students demonstrate that they have achieved the lesson objective. This includes exit tickets, quizzes, journal task or a problem-solving task.

#### WHAT RESOURCES WILL BE NEEDED TO SUPPORT AT-HOME LEARNING?

- Access to a device and internet to follow along with the class and the teacher.
- Paper and Pencil

# Family Learning Guide: Integrated and Earth Science



## Unit Topic(s): Apophis Asteroid

Analyze data to support the claim that Newton's second law of motion describes the mathematical relationship among the net force on a macroscopic object, its mass, and its acceleration.

### WHAT ARE OUR LEARNING GOALS FOR YOUR CHILDREN?

1. Students will ask questions about the information needed to prevent/reduce the impact of the impending asteroid.
2. Students will develop and use a model to explain the role of motion and position of an object as it relates to the energy of that object
3. Students will use mathematical and computational thinking to describe that the total momentum is conserved during a collision within a system.
4. Students will analyze data to support the claim that Newton's second law of motion describes the mathematical relationship among the net force on a macroscopic object, its mass and its acceleration.
5. Students will use mathematical and computational thinking to describe the patterns between two celestial objects when they interact.
6. Students will use mathematical and computational thinking to predict (scale, proportion and quantity) the motions of orbiting objects around the sun.
7. Students will apply their understanding of energy, momentum, Newton's laws, gravitation and Kepler's Law to design a solution to minimize the effects of a collision between Apophis and Earth and present their solution.
8. Students will evaluate the merits of each presented solution and write an argument defending one using claim, evidence and reasoning.

### HOW WILL WE TEACH YOUR CHILDREN?

- Engage- to capture the student's interest and uncover previous knowledge. This includes reading books, slide shows, videos and short games.
- Explore- A hands-on or minds-on activity to encourage investigation and inquiry. This includes turn and talk, hands on lab investigations and using models.
- Explain- Students will give explanations and justifications of explore activity's discoveries or solutions. This is where vocabulary is introduced. Students can take notes, watch explanatory videos, use a vocabulary organizer or create foldables.
- Elaborate- students will apply their new knowledge to new situations. The students will also use new terms and vocabulary. Activities include a problem-solving task, investigation, stations designed to practice or play a game.
- Evaluate- Students demonstrate that they have achieved the lesson objective. This includes exit tickets, quizzes, journal task or a problem-solving task.

### WHAT RESOURCES WILL BE NEEDED TO SUPPORT AT-HOME LEARNING?

- Access to a device with audio and internet to follow along with the class and the teacher.
- Paper and Pencil

# Family Learning Guide: Biology



## Unit Topic(s): Wolves

Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms.

### WHAT ARE OUR LEARNING GOALS FOR YOUR CHILDREN?

1. Students will create an initial model of changes across many dimensions in an ecosystem in response to a change at one trophic level
2. Students will ask questions about what else they need to understand in order to make predictions about changes in an ecosystem.
3. Students will develop an initial model that describes the relationships and dynamics among the components of an ecosystem.
4. Students will create models to apply their understanding of systems to how the stability of a living system depends on self regulating (feedback) mechanisms.
5. Students will figure out how the structures of a system function independently, yet come together for the functioning of the system as a whole.
6. Students will identify trends of population size within an ecosystem.
7. Students will figure out how a limited amount of resources will affect the interactions across all levels of an ecosystem.
8. Students will mathematically represent how carrying capacity limits the number of organisms and populations within an ecosystem
9. Students will analyze mathematical representations of factors that determine population size and their effect on the biodiversity of an ecosystem.
10. Students will develop a model of a changing ecosystem and identify the interactions of its parts.
11. Students will develop a model of a system showing how the parts work together to respond to fluctuations or maintain stability and biodiversity.

### HOW WILL WE TEACH YOUR CHILDREN?

- Engage- to capture the student's interest and uncover previous knowledge. This includes reading books, slide shows, videos and short games.
- Explore- A hands-on or minds-on activity to encourage investigation and inquiry. This includes turn and talk, hands on lab investigations and using models.
- Explain- Students will give explanations and justifications of explore activity's discoveries or solutions. This is where vocabulary is introduced. Students can take notes, watch explanatory videos, use a vocabulary organizer or create foldables.
- Elaborate- students will apply their new knowledge to new situations. The students will also use new terms and vocabulary. Activities include a problem-solving task, investigation, stations designed to practice or play a game.
- Evaluate- Students demonstrate that they have achieved the lesson objective. This includes exit tickets, quizzes, journal task or a problem-solving task.

### WHAT RESOURCES WILL BE NEEDED TO SUPPORT AT-HOME LEARNING?

- Access to a device with audio and internet to follow along with the class and the teacher.
- Paper and Pencil

# Family Learning Guide: Chemistry



## Unit Topic(s): Climate Change

Develop a model to illustrate that the release or absorption of energy from a chemical reaction system depends upon the changes in total bond energy.

### WHAT ARE OUR LEARNING GOALS FOR YOUR CHILDREN?

1. Students will ask questions and define problems to determine cause and effect relationships between molecular structure and bulk scale properties.
2. Students will communicate and organize scientific and technical questions related to the unit anchoring phenomenon.
3. Students will identify patterns to develop a model that shows how the number of valence electrons, valence energy level, and ion charges depend on an element's position on the periodic table.
4. Students will use evidence about the reactivity of elements to evaluate the statement that atoms with 8 valence electrons are unreactive (octet rule).
5. Students will generate graphs that depict changes in trends in the periodic table and use them to identify properties of various groups.
6. Students will use data from experiments to establish a relationship between reactivity and electron configuration.
7. Students will use mathematical representations to explain the causes in the variation in magnitude of an electric field, and that the forces involved can be either attractive or repulsive.
8. Students will plan and conduct an investigation to demonstrate 1.) that electrical charges are carried by matter and 2.) the effect of distance and charge on the magnitude of electrical forces.
9. Students will use the periodic table as a model to predict the types of bonds and number of bonds formed between atoms based on patterns of electrons in the outermost energy level of atoms.
10. Students will make models to demonstrate bonding and will discuss energy transfer in bonds.

### HOW WILL WE TEACH YOUR CHILDREN?

- Engage- to capture the student's interest and uncover previous knowledge. This includes reading books, slide shows, videos and short games.
- Explore- A hands-on or minds-on activity to encourage investigation and inquiry. This includes turn and talk, hands on lab investigations and using models.
- Explain- Students will give explanations and justifications of explore activity's discoveries or solutions. This is where vocabulary is introduced. Students can take notes, watch explanatory videos, use a vocabulary organizer or create foldables.
- Elaborate- students will apply their new knowledge to new situations. The students will also use new terms and vocabulary. Activities include a problem-solving task, investigation, stations designed to practice or play a game.
- Evaluate- Students demonstrate that they have achieved the lesson objective. This includes exit tickets, quizzes, journal task or a problem-solving task.

### WHAT RESOURCES WILL BE NEEDED TO SUPPORT AT-HOME LEARNING?

- Access to a device and internet to follow along with the class and the teacher.
- Paper and Pencil

# Family Learning Guide:

## Physics



### Unit Topic(s): Natural Disasters

Develop a model to illustrate how Earth's internal and surface processes operate at different spatial and temporal scales to form continental and ocean-floor features

#### WHAT ARE OUR LEARNING GOALS FOR YOUR CHILDREN?

1. Students will observe footage of natural disasters and begin questioning the mechanics of those systems.
2. Students will mathematically model how energy is transformed between kinetic and potential to predict the behavior of the system.
3. Students design and construct a device that converts energy from one form to another while describing the changes in terms of energy input and output.
4. Students will develop a model of the Earth's interior to describe how energy and matter cycles drive surface changes on earth.
5. Students will analyze geoscience data to develop a model for how feedback systems can result in large scale changes to the Earth's systems
6. Students will plan and conduct an investigation that demonstrates how the properties of water affect the structure and function of the Earth and its systems.
7. Students will plan and conduct an investigation to create a model for how thermal energy is transferred between materials.
8. Students will use a model to describe how variations in the flow of energy into and out of Earth's systems result in a change of climate.
9. Students will plan and conduct an investigation of the properties of water and its effects on Earth materials and surface processes.

#### HOW WILL WE TEACH YOUR CHILDREN?

- Engage- to capture the student's interest and uncover previous knowledge. This includes reading books, slide shows, videos and short games.
- Explore- A hands-on or minds-on activity to encourage investigation and inquiry. This includes turn and talk, hands on lab investigations and using models.
- Explain- Students will give explanations and justifications of explore activity's discoveries or solutions. This is where vocabulary is introduced. Students can take notes, watch explanatory videos, use a vocabulary organizer or create foldables.
- Elaborate- students will apply their new knowledge to new situations. The students will also use new terms and vocabulary. Activities include a problem-solving task, investigation, stations designed to practice or play a game.
- Evaluate- Students demonstrate that they have achieved the lesson objective. This includes exit tickets, quizzes, journal task or a problem-solving task.

#### WHAT RESOURCES WILL BE NEEDED TO SUPPORT AT-HOME LEARNING?

- Access to a device and internet to follow along with the class and the teacher.
- Paper and Pencil