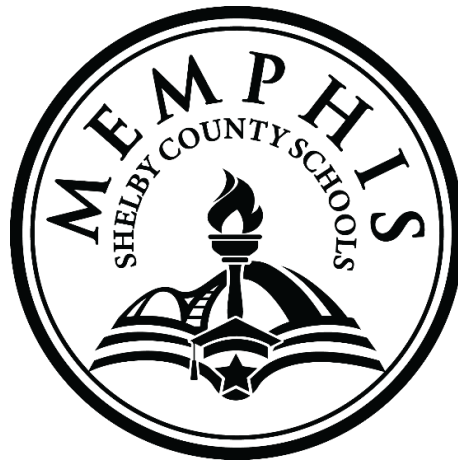


# **SUMMER SCHOOL TEACHER GUIDE**



## **Science/8<sup>th</sup> Grade**

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## Summer School Curriculum Guide

The Elementary and Middle Summer School Program will be for 20 days. Students will have a total of eighteen daily lessons and day 19 and 20 will be for reviewing lessons/quizzes and post-test.

- Eighteen (18) days of daily lessons.
- One (1) day post-test review and post-test
- One (1) day of reviewing lessons, retake daily post-tests, and makeup missed lessons.

All Students and staff will use Grade Results for their summer curriculum. Each lesson will open daily, and students will not be able to work ahead; however, students can work on previously opened lessons. Students can retake a daily post-test three times before it locks. If a student needs to retake a daily lesson post-test for a fourth time, then the teacher will have to open the lesson post-test again. Teachers should not delete any prior lesson post-test. Grade Results will post the highest grade from each students' lesson post-test.

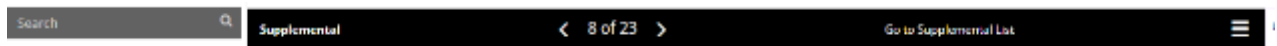
**MS Classroom Schedule** – Time below is an approximate breakdown of time.

- **Attendance in PowerSchool** -5 minutes
- **Lesson Introduction (I Do)** – 10 minutes.
- **Lesson Activities/Supplemental (We Do)** - 50 minutes.
- **Break – 10 minutes** (*Site Administrator will work with teachers on breaks*)
- **Teacher Lesson Review** – 5 minutes
- **Independent Work** – Student Lesson Review\*/Post-test (**They Do**) 40 minutes.
- **Closing/Wrap Up** – 10 minutes.
- **Total Time: 2 hours 10 minutes**

**\*Lesson Review-** Students will review lessons for essential knowledge/ information prior to the daily test.

The following will be used within **Grade Results**:

- **Lessons** with Content Area, Videos, and Activities
- **Supplemental** Teacher Resources: (**They Do**)
  - Click on Supplemental
  - Click on Resources to view (Example: Flocabulary, BrainPOP, Others)
  - Teachers will review with the students the items that need to be completed.
  - Teachers can select additional Supplemental Resources as needed if time permits.
  - To view another resource once you are in a resource, use Toggle sidebar in the top right-hand corner. It has three dashes. An example is listed below.



**Post-Test- (They Do)** Each lesson will have a daily posttest.

**Graded Work-** The Posttest will be the daily graded work. Graded work is automatically calculated by the Grade Results Software.

**Anchor Charts-** Some subjects may have Anchor Charts available with their lesson.

## Summer School Lesson Plan

Subject/Grade: Science/8<sup>th</sup> Grade

Day: 1

### Topic/Lesson Title & Grade Results #: Effects of Force and Mass Lesson 1

**Objective(s):** Students will be able to differentiate force and motion, describe the effects of a force, explain the direction of a force, and describe the effects of changing mass in a system.

**Guiding Question(s):** How do you change the direction in which an object is moving?

#### TN Curriculum Standard(s):

- 8.PS2.3 Create a demonstration of an object in motion and describe the position, force, and direction of the object.
- 8.PS2.4 Plan and investigate to provide evidence that the change in an object's motion depends on the sum of the forces on the object and the mass of the object.

**Materials/Resources Needed:** Grade Results Online Platform, Grade Results video, paper, pencil, or notes in Grade Results

**Technology:** Computer, Whiteboard, TEAMS meeting (if applicable)

#### Key Vocabulary/Terms:

- **Force-** A push or a pull upon an object that causes a change in physical quantity.
- **Motion-** A change in position of an object with respect to time and its reference point.
- **Object-** A thing that can be seen or touched.
- **Position-** A place where someone or something is located.
- **Sir Isaac Newton-** A mathematician and physicist, who is formulator of the law of gravitation.
- **Speed-** A way of measuring the distance traveled by someone.

#### Take Attendance (5 mins)

**Lesson Introduction (I Do 10 minutes) Slide1,2,3,7,12:** The teacher will go over the objectives for the lesson and introduce the lesson using an illustration of a dove sitting on a branch of a tree and a parrot flying in the air. Discuss that force is defined as a push or pull on an object. Display the animation of the horse pulling a wagon and the book being pushed to demonstrate how force works. After the introduction the following grade result content will be used during the "I Do" part of the lesson.

**Grade Result Content-** Video- Force and Motion, Force-Change in Motion, Force-Change in Direction of Motion, Video-Change in Position and Direction of Motion, Effect of the size of force, Unbalanced Force, Effect of Mass on a Balanced and an Unbalanced System, Video- Effects of Mass on a Balanced and an Unbalanced System and lesson review.

**Vocabulary (5 minutes) Slide 15:** Define and discuss the meaning of the vocabulary words from the Lesson 1 activities.

#### Lesson Activities (We Do/They Do 30 minutes) Slide4,5,6, 8,9,1,11,13:

As a whole group, complete the Practice Activities. Discuss.

**Grade Result Content-** Activity-Effect of the Size of Force, Activity-Balanced Force and Video-Interesting Facts.

**Supplemental (You Do-20 minutes) Lesson 1.2:** Please complete the supplemental activities as needed for additional support.

- **Flocabulary/Force and Motion-** Video, Vocabulary Cards, Vocabulary Game, Reading Passage, and Lyric Lab.

**Additional Teacher Resources: None**

**Break:** 10 minutes

**Lesson Review (10 minutes) Slide 14:**

- A force is a push or a pull upon an object.
- Force can cause an object to move.
- When an object moves, the object is said to be in motion.
- When an object is in motion, the position of the object changes with respect to time.
- Force can cause a change in the direction of motion of any object.
- The greater the force, the greater the speed of the object.
- Balanced forces are forces that cancel each other out when acting together on a single object.
- Forces that are not equal are called unbalanced forces.
- As the unbalanced force affects a balanced system, the change in mass affects the balanced system.

**Independent Work – Posttest (They Do 30 minutes) Lesson 1.3:** The students will work independently on their post that is located at the end of each lesson. Explain to the students that they will be assessed and will work independently. Encourage them to think critically and do their best on the Posttest. The Posttest will count as the grade for the daily lesson.

**Closing/Wrap Up/Notes Review (10 minutes):** Take a moment to reflect on the lesson of the day. Use the lesson review to close out the lesson by using an exit ticket or discussion to test the students' knowledge about the lesson. The lesson review is located under the content tab of each lesson in grade result. It is also listed above under lesson review.

## Summer School Lesson Plan

Subject/Grade: Science/8<sup>th</sup> Grade

Day: 2

Topic/Lesson Title & Grade Results #: Force and Laws of Motion II Lesson 2

**Objective(s):** Students will be able to define inertia and identify the properties of inertia of objects, describe Newton's three laws of motion, define force and explain how forces acting on an object relate to its motion, explain the relation between unbalanced force acting on an object and its acceleration based on Newton's second law, and illustrate how forces appear in pairs and not isolated in nature with the help of Newton's third law of motion.

**Guiding Question(s):** How do forces affect motion?

**TN Curriculum Standard(s):**

- 8.PS2.5 Evaluate and interpret that for every force exerted on an object there is an equal force exerted in the opposite direction.

**Materials/Resources Needed:** Grade Results Online Platform, Grade Results video, paper, pencil or notes in Grade Results

**Technology:** Computer, Whiteboard, TEAMS meeting (if applicable)

**Key Vocabulary/Terms:**

- **Acceleration:** The change in velocity with time.
- **Balanced force:** An equal pair of forces acting on opposite sides of an object that keeps the object in equilibrium.
- **Equilibrium:** The state in which all the forces acting on an object are balanced, or their net effect is zero.
- **Force:** A push or a pull upon an object that causes a change in physical quantity.
- **Free-body diagram:** A picture that shows the direction and magnitude of all forces acting on an isolated object.
- **Friction:** The force that resists the motion of an object moving over the surface of another object.
- **Inertia:** The inability of an object to change from whatever state it currently is in.
- **Resultant:** A single force that replaces the effects of all the other forces acting simultaneously on a rigid body.
- **Unbalanced force:** An unequal pair of forces acting on opposite sides of an object that causes a change in motion of an object.

**Take Attendance (5 mins)**

**Lesson Introduction (I Do 5 minutes) Slide 2:** The teacher will go over the objectives for the lesson and introduce the lesson by discussing what happens when you are boarding a car. Explain how inertia is responsible for you moving forward or backwards when a car is in motion or at rest. After the introduction the following grade result content will be used during the "I Do" part of the lesson.

**Grade Result Content:** Video-Inertia, Newton's First Law of Motion, Video-Newton's First Law of Motion, Equilibrium, Newton's Second Law of Motion, Video-Newton's Second Law of Motion, Newton's Second Law of Motion-Problems, Newton's Third Law of Motion, Video-Newton's Third Law of Motion and Lesson Review.

**Vocabulary (5 minutes) Slide 17:** Define and discuss the meaning of the vocabulary words from Lesson 2 activities.

**Lesson Activities (We Do/ They Do 35 minutes) Slides 3-15:**

As a whole group, complete the Practice Activities. Discuss.

**Grade Result Content:** Activity-Inertia, Activity-Equilibrium, Activity- Newton's Law of Motion, Activity- Newton's Third Law of Motion and Video-Isaac Newton.

**Supplemental (20 minutes) Lesson 2.2:** Please complete the supplemental activities as needed for additional support.

- **Flocabulary/Motion** Video, Vocabulary Cards, Vocabulary Game, Reading Passage, and Lyric Lab.

**Additional Teacher Resources: None**

**Break:** 10 minutes

**Lesson Review (10 minutes) Slide 16:**

- Inertia is an inherent property of all objects, and it is defined as the inability of an object to change by itself its state of rest, or of uniform motion along a straight line, or direction.
- The mass of an object is a quantitative measure of its inertia; the greater the mass, the greater it is inertia.
- Newton's first law, also known as the law of inertia, gives the proper definition of force.
- Force is an agent (a push or a pull) which can move an object from a rest position, stop an object in motion, change the direction of motion of an object, and increase or decrease the speed of an object (acceleration or deceleration).
- Newton's first law of motion states that every object continues in its state of rest or of uniform motion, along a straight line, unless it is compelled by an external force to change that state.
- According to Newton's second law, all objects undergo an accelerated motion when an unbalanced force acts on them.
- According to Newton's third law of motion, all forces appear in pairs. For every action, there is an equal and opposite reaction.

**Independent Work – Posttest (They Do 30 minutes) Lesson 2.3:** The students will work independently on their post that is located at the end of each lesson. Explain to the students that they will be assessed and will work independently. Encourage them to think critically and do their best on the Posttest. The Posttest will count as the grade for the daily lesson.

**Closing/Wrap Up/Notes Review (10 minutes):** Take a moment to reflect on the lesson of the day. Use the lesson review to close out the lesson by using an exit ticket or discussion to test the students' knowledge about the lesson. The lesson review is located under the content tab of each lesson in grade result. It is also listed above under lesson review.

## Summer School Lesson Plan

Subject/Grade: Science/8<sup>th</sup> Grade

Day: 3

Topic/Lesson Title & Grade Results #: Electrostatic Force and Gravity Lesson 3

**Objective(s):** Students will be able to define the electrostatic force and gravitational force and compare electrostatic force and gravitational force.

**Guiding Question(s):** Static electricity can make your hair stand on end. What other effects of static electricity can you think of?

**TN Curriculum Standard(s):**

- 8.PS2.2 Investigate to provide evidence that fields exist between objects exerting forces on each other even though the objects are not in contact.

**Materials/Resources Needed:** Grade Results Online Platform, Grade Results video, paper, pencil, or notes in Grade Results

**Technology:** Computer, Whiteboard, TEAMS meeting (if applicable)

**Key Vocabulary/Terms:**

- **Charge:** A characteristic property of a unit of matter (atom).
- **Electric field:** A region around a charged particle within which a force would be exerted on other charged particles.
- **Electric force:** Attraction or repulsion between electric charges.
- **Electrical energy:** An electric charge that lets work be accomplished.
- **Electrostatic force:** Force of attraction or repulsion due to static charges.
- **Electrostatics:** Study of the forces acting between charge bodies at rest.
- **Force:** A push or a pull upon an object that causes a change in physical quantity.
- **Gravitation:** The phenomenon of a force of attraction between any two objects in the universe (also called gravitational force).
- **Gravity:** Force of attraction between any planet (the Earth) and an object.
- **Magnitude:** A numerical measure of physical quantity.
- **Non-contact force:** A force exerted by an object due to another object that is not physically in contact with it.
- **Permittivity:** The ability of a substance to store electrical energy in an electric field.
- **Point charge:** An electrical charge considered to exist at a single point, which has neither area nor volume.

**Take Attendance (5 mins)**

**Lesson Introduction (I Do 10 minutes) Slide 2:** The teacher will go over the objectives for the lesson and introduce the lesson by discussing the four fundamental forces in nature that play a significant role in making today's universe. Use the cards and checklist activity to give the students information about each force. After the introduction the following grade result content will be used during the "I Do" part of the lesson.

**Grade Result Content:** Gravitational Force, Video- Gravitational Force, Newton's Law of Gravitation, Electric Charge, Video- Atom and Its Constituents, Electrostatic Force and Coulomb's Law of Electrostatic Force, Video- Electrostatic Force Demonstration 1, 2 and 3, Video- Law of Electrostatics and Lesson Review.

**Vocabulary (5 minutes) Slide 11:** Define and discuss the meaning of the vocabulary words from the Lesson 3 activities.

**Lesson Activities (We Do/ They Do 30 minutes) Slides 3-10:**

As a whole group, complete the Practice Activities. Discuss.

**Grade Result Content:** Activity-Gravitation, Activity-Electric Charges and Activity- Coulomb's Law (quiz me).



**Supplemental (20 minutes) Lesson 3.2:** Please watch and discuss the additional Supplemental Videos under the Supplemental Tab in the upper left-hand corner of the Lesson for additional support on the topic. To access the videos, click on the page under the supplemental tab and click on the topic next to the page number.

- **Khan Academy Video**-Introduction to Newton's Law of Gravitation
- **Video** -Newton's Law of Universal Gravitation
- **Video** -Interaction of Charge

**Additional Teacher Resources: None**

**Break:** 10 minutes

**Lesson Review (10 minutes) Slide 10:**

- There are four fundamental forces in nature, and they all play major roles in making today's Universe. They are Gravitational force, Electromagnetic force, Strong nuclear force and Weak nuclear force.
- Every object in the universe attracts every other object. This tendency of objects to move toward each other is called gravitation.
- Gravitation is an attractive force which tries to pull two objects toward each other.
- According to Sir Isaac Newton, the gravitational force between any two objects is directly proportional to the product of their masses and inversely proportional to the square of the distance separating them.
- Newton's law of gravitation is also known as the universal law of gravitation because it acts on all the masses at all the distances and is not affected by the medium.
- The two kinds of charges (electric charges) were given the names positive and negative by the American scientist Benjamin Franklin.
- Electrons are negatively charged particles.
- Protons are positively charged particles.
- Neutrons do not possess any charge; they are electrically neutral.
- In an atom, the number of electrons equals the number of protons, so the atom in nature is electrically neutral. An electrical charge occurs whenever the number of protons in the nucleus differs from the number of electrons surrounding that nucleus. If there are more electrons than protons, the atom has a negative charge. If there are fewer electrons than protons, the atom has a positive charge.
- The law of electrostatics states that like-charged objects repel each other, whereas unlike-charged objects attract each other.
- According to Coulomb, the force of attraction or repulsion between two-point charges is directly proportional to the product of their charges and inversely proportional to the square of the distance between them.
- Since force between two electric charges is inversely proportional to the square of the distance between them, Coulomb's law is also called the "inverse square law" or "Coulomb's inverse square law."
- The electrostatic force between an electron and a proton that are separated by  $1.0 \times 10^{-10}$  m is  $F = -2.31 \times 10^{-8}$  N
- The gravitational force between an electron and a proton that are separated by  $1.0 \times 10^{-10}$  m is  $1.0 \times 10^{-47}$  N
- Gravitational force is weaker than electrostatic force.
- Gravitational force is always attractive in nature, and it does not depend upon the medium.
- Electrostatic force may be either attractive or repulsive and it depends upon the medium.

**Independent Work – Posttest (They Do 30 minutes) Lesson 3.3:** The students will work independently on their post that is located at the end of each lesson. Explain to the students that they will be assessed and will work independently. Encourage them to think critically and do their best on the Posttest. The Posttest will count as the grade for the daily lesson.

**Closing/Wrap Up/Notes Review (10 minutes):** Take a moment to reflect on the lesson of the day. Use the lesson review to close out the lesson by using an exit ticket or discussion to test the students' knowledge about the lesson. The lesson review is located under the content tab of each lesson in grade result. It is also listed above under lesson review.

## Summer School Lesson Plan

Subject/Grade: Science/8<sup>th</sup> Grade

Day: 4

### Topic/Lesson Title & Grade Results #: Relationship Between Electricity and Magnetism Lesson 4

**Objective(s):** Students will be able to define electricity, magnetism, and inductance, describe the properties and mechanisms of electricity, magnetism, and inductance, explain the phenomenon of electromagnetic force, relate electricity, magnetism, and inductance and discuss the applications of electromagnetic induction.

**Guiding Question(s):** What is magnetism? What are the properties of magnets?

#### TN Curriculum Standard(s):

- 8.PS2.1 Design and conduct investigations depicting the relationship between magnetism and electricity in electromagnets, generators, and electrical motors, emphasizing the factors that increase or diminish the electric current and the magnetic field strength.

**Materials/Resources Needed:** Grade Results Online Platform, Grade Results video, paper, pencil, or notes in Grade Results

**Technology:** Computer, Whiteboard, TEAMS meeting (if applicable)

#### Key Vocabulary/Terms:

- **Amber:** Fossilized Pine trees resin.
- **Bar magnet:** Magnet in the form of a bar with magnetic poles at each end.
- **Charge:** Physical property of matter that causes it to experience a force when close to other electrically charged matter.
- **Coil:** Arranged in a spiral or sequence of rings.
- **Commutator:** Simple device for reversing the current direction through an armature every half turn (also called a split-ring commutator).
- **Concentric circles:** Circles that share the same center.
- **Conductor:** Objects or materials that permit the flow of electric charges in one or more directions.
- **Dynamo:** An electrical generator that uses mechanical energy to produce direct current with the use of a commutator.
- **Electric motor:** Device that converts electrical energy into mechanical energy.
- **Electromagnet:** Conductor attaining magnetic property due to a passing current.
- **Electromagnetic field:** Production of a magnetic field around a conductor when an electric current flows through it.
- **Emf (Electromotive force):** Emf (Electromotive force): The energy per unit charge that is converted, reversibly, from chemical, mechanical, or other forms of energy into electrical energy in a battery or dynamo.
- **Generator:** Machine that generates electricity, converting mechanical energy into electrical energy.
- **Induce:** Bring about or give rise to.
- **Induction:** Process of generating current in a conductor by placing the conductor in a changing magnetic field.
- **Inductor:** Coil in which an EMF is induced due to electromagnetic induction.
- **Iron filings:** Ridiculously small pieces of iron that look like a light powder.
- **Loop:** Shape produced by a curve that bends around and crosses itself.
- **Permeability ( $\mu$ ):** Permeability ( $\mu$ ): The ease at which a material passes flux.
- **Power:** Rate at which energy is transferred, used, or transformed.

**Take Attendance (5 mins)**

**Lesson Introduction (I Do 10 minutes) Slide 2:** The teacher will go over the objectives for the lesson and introduce the lesson by discussing the several types of electric equipment that is in our households. After the introduction the following grade result content will be used during the “I Do” part of the lesson.

**Grade Result Content:** Electricity, Magnets, Magnetic Poles, Video-Magnetic Field, Video-Magnetic Field Due to Current, Bio-Savart Law, Electromagnet, Video-How to Build an Electromagnetic, Magnetic Field and Induced EMF, Video-Induction of Current, Electromagnetic Force Acting on a Moving Charged Particle, Magnetic Force on a Current Carrying Conduction, Self-Inductance, Faraday’s Laws of Electromagnetic Induction and Application of Inductance Motors and lesson review.

**Vocabulary (5 minutes) Slide 15:** Define and discuss the meaning of the vocabulary words from the Lesson 4 activities.

**Lesson Activities (We Do/ They Do 30 minutes) Slides 3-13:**

As a whole group, complete the Practice Activities. Discuss.

**Grade Result Content:** Quiz me at the end of each topic, Animation-A Magnetic Compass on Magnetic Lines of Force, Animation-Iron Fillings Sprinkled Around a Current-Carry and Video-How to Build an Electromagnet.

**Supplemental (20 minutes) Lesson 4.2:** Please watch and discuss the additional Supplemental Videos under the Supplemental Tab in the upper left-hand corner of the Lesson for additional support on the topic. To access the videos, click on the page under the supplemental tab and click on the topic next to the page number.

- **Video** -The Flow of Electric Charge in a Circuit
- **Video** -Magnets and Electromagnetism

**Additional Teacher Resources: None**

**Break:** 10 minutes

**Lesson Review (10 minutes) Slide 14:**

- Electricity is the flow of electrical power or charge.
- Magnetism is a force of attraction or repulsion that exists in the vicinity of a magnetic object.
- Current is defined as the rate at which electric charges move through a given area.
- Unlike poles of a bar magnet attract each other, and like poles repel each other.
- The basic equation governing the magnitude of a magnetic field due to a current distribution is given by law.
- A long straight wire bent into a coil of several closely spaced loops is called a solenoid.
- A solenoid produced strong magnetic field by combining several loops.
- Electromagnets are temporary magnets, which work on the magnetic effect of electric current.
- Induced current is produced in a circuit when the magnetic field around it continually changes.
- Electromagnetic induction is the process of producing induced current by changing the magnetic field with respect to the circuit or by moving the circuit with respect to the external field.
- Fleming's left-hand rule is also called the generator rule.
- Fleming's right-hand rule is also called the dynamo rule.
- The magnitude of the magnetic field, acting on a particle moving perpendicular to the field, is given by the formula of Lorentz law: Magnetic field  $\times$  charge of the particle  $\times$  velocity of the particle.
- The Lorentz force is the force exerted on a charged particle  $q$  moving with velocity  $v$  through an electric field  $E$  and magnetic field  $B$ .
- Lenz's law states that the direction of an induced current opposes the change in the applied magnetic field.
- Faraday's law states that whenever a conductor is placed inside a varying magnetic field, an emf is induced in the circuit. The magnitude of the emf induced in the circuit is proportional to the rate of change of flux.
- Magnitude of the magnetic force on a current-carrying straight conductor = magnitude of magnetic field  $\times$  current  $\times$  length of the conductor within  $B$ .
- An electric motor is a device that converts electric energy into mechanical energy.

- An electric generator is a device that converts mechanical energy into electrical energy.

**Independent Work – Posttest (They Do 30 minutes) Lesson 4.3:** The students will work independently on their post that is located at the end of each lesson. Explain to the students that they will be assessed and will work independently. Encourage them to think critically and do their best on the Posttest. The Posttest will count as the grade for the daily lesson.

**Closing/Wrap Up/Notes Review (10 minutes):** Take a moment to reflect on the lesson of the day. Use the lesson review to close out the lesson by using an exit ticket or discussion to test the students' knowledge about the lesson. The lesson review is located under the content tab of each lesson in grade result. It is also listed above under lesson review.

## Summer School Lesson Plan

Subject/Grade: Science/8<sup>th</sup> Grade

Day: 5

### Topic/Lesson Title & Grade Results #: Electric and Magnetic Fields Lesson 5

**Objective(s):** Students will be able to explain the phenomenon of electrostatics, define a point charge and test charge, describe electric and magnetic fields, and apply Coulomb's law.

**Guiding Question(s):** Where are magnetic field lines closet together, and what does that tell you about the strength of the magnetic field?

#### TN Curriculum Standard(s):

- 8.PS2.1 Design and conduct investigations depicting the relationship between magnetism and electricity in electromagnets, generators, and electrical motors, emphasizing the factors that increase or diminish the electric current and the magnetic field strength.

**Materials/Resources Needed:** Grade Results Online Platform, Grade Results video, paper, pencil, or notes in Grade Results

**Technology:** Computer, Whiteboard, TEAMs meeting (if applicable)

#### Key Vocabulary/Terms:

- **Amber:** Fossilized pine trees' resin.
- **Bar magnet:** Magnet in the form of a bar with magnetic poles at each end.
- **Charge:** A characteristic property of a unit of matter (atom).
- **Conservative force:** A force with the property that the work done in moving a particle between two points is independent of the taken path.
- **Electric field:** A region around a charged particle within which a force would be exerted on other charged particles.
- **Electric force:** Attraction or repulsion between electric charges.
- **Electric lines of force:** Imaginary lines drawn to represent electric field due to a charge.
- **Electrical conductor:** A material that allows the flow of electrical charges in one or more directions.
- **Electrostatic force:** Force of attraction or repulsion due to static charges.
- **Electrostatics:** Study of the forces acting between charged bodies at rest.
- **Flux:** The action or process of flowing or flowing out.
- **Force:** A push or a pull upon an object that causes a change in physical quantity.
- **Geographic North Pole:** The end of Earth's axis of rotation, marking the northernmost point on Earth.
- **Geographic South Pole:** The end of Earth's axis of rotation, marking the southernmost point on Earth.
- **Iron filings:** Ridiculously small pieces of iron that look like a light powder.
- **Loop:** Shape produced by a curve that bends around and crosses itself.
- **Magnetic compass:** An instrument that uses a magnetized steel bar to indicate direction relative to Earth's magnetic poles.
- **Magnetic field:** A region around a magnetic material within which the force of magnetism acts.
- **Magnetic field lines:** An orderly pattern of lines around the magnet to represent magnetic field.
- **Magnetic force:** Attraction or repulsion between magnetic poles.
- **Magnetic pole:** Either one of the two ends of a magnet.
- **Magnitude:** A numerical measure of physical quantity.
- **Non-contact force:** A force exerted by an object due to another object that is not physically in contact with it.
- **Permeability ( $\mu$ ):** The ease at which a material passes magnetic flux.
- **Permittivity:** The ability of a substance to store electrical energy in an electric field.
- **Point charge:** An electrical charge considered to exist at a single point, which has neither area nor volume.

- **Static charge:** Electric charge remains in an object until they are discharged.
- **Tesla:** The unit of magnetic field.
- **Vector:** A physical quantity that has both magnitude and direction, often represented graphically by an arrow.

### Take Attendance (5 mins)

**Lesson Introduction (I Do 10 minutes) Slide 2:** The teacher will go over the objectives for the lesson and introduce the lesson by showing the students two scenarios. The first one with the comb and water. The second one with amber, fur and straw. Discuss that the cause of the attraction of the objects in both scenarios were due to electric charge. After the introduction the following grade result content will be used during the “I Do” part of the lesson.

**Grade Result Content:** Introduction Electric Charges, Properties of Charges, Coulomb’s Law of Electric force, Electric Field, Electric Lines of Force, Video-Electric Lines of Force, Magnets, Video-Magnets and Magnetic Poles, Magnetic Force, Video-Magnetic Force, Magnetic Field, Video-Earth Magnetic Field, Properties of Magnets, Similarities and Difference Between Electric and Magnetic Field and Lesson Review.

**Vocabulary (5 minutes) Slide 15:** Define and discuss the meaning of the vocabulary words from the Lesson 5 activities.

### Lesson Activities (We Do/ They Do 30 minutes) Slides 3-13:

As a whole group, complete the Practice Activities. Discuss.

**Grade Result Content:** Activity-Magnetic and Electric Field and Activity- Magnetic and Electric Force.

**Supplemental (20 minutes) Lesson 5.2:** Please watch and discuss the additional Supplemental Videos under the Supplemental Tab in the upper left-hand corner of the Lesson for additional support on the topic. To access the videos, click on the page under the supplemental tab and click on the topic next to the page number.

- **Video** -Electrostatics: Interaction of Charge
- **Video** -Electric Charges
- **Video** -Introduction to Magnetism
- **Video** -Magnets and Electromagnetism
- **Video** -Magnetic Field

**Additional Teacher Resources: None**

**Break:** 10 minutes

### Lesson Review (10 minutes) Slide 14:

- The charge is the basic property of a matter; it can be either positive or negative.
- The two kinds of charge (electric charge) were referred to as positive and negative by the American scientist Benjamin Franklin (1706-1790). In an atom, negatively charged particles are called electrons, and positively charged particles are called protons.
- While rubbing objects together, electrons transfer from one object to another. When an object has excess or deficiency of electrons from the normal to share, it is said to be electrically charged.
- The branch of science that deals with static charges or the behavior of charges at rest is called static electricity or electrostatics.
- Electrical phenomenon due to static charges is called static electricity.
- Principles of electrostatics are useful in a wide variety of applications such as in spraying paints, photocopy machines, computer printers, and generators.
- According to the law of electrostatics, like-charged objects repel each other, whereas unlike-charged objects attract each other.
- The attractive and repulsive interaction between any two charges is called electric force.

- The French physicist Charles-Augustine de Coulomb used Torsion Balance to study the interaction between two charges.
- According to Coulomb, the force of attraction or repulsion between two-point charges is directly proportional to the product of their charges and inversely proportional to the square of the distance between them.
- Electric field due to a charge is defined as the space around the electric charge in which any other charge experiences a force of attraction or repulsion.
- The electric field at a point in space is equal to force per unit charge exerted on an extremely small positive test charge placed at that point.
- An electric field line is a path along which a small positive test charge would move if free to do so.
- Electric lines force would always originate from a positive charge and terminate on a negative charge.
- The visual representation of electric field by lines of force allows us to infer relative field strength as well as the direction of the electric field.
- A substance that attracts all the iron and steel objects is called a magnet, and this property of the substance is called magnetism.
- Magnetism is a force of attraction or repulsion that exists in the vicinity of the magnetic object.
- A magnet has two ends or faces. They are called poles; one is called the north pole (N), and the other is called the south pole (S).
- Magnetic effect is felt the strongest at poles; iron objects are strongly attracted toward the ends of the magnet.
- Unlike magnetic poles attract each other and like poles repel each other.
- According to Coulomb, the force acting between two magnetic poles is directly proportional to the product of their pole strengths and inversely proportional to the square of the distance between their centers.
- A magnet creates a magnetic field in the space surrounding it. Therefore, magnets can exert a force on other magnetic objects.
- Just like in an electric field, we have magnetic field lines in magnetism. A magnetic field can visually be represented by magnetic field lines.
- The direction of magnetic field at a point is defined as the direction that the north pole of a compass needle would point when placed at that point.
- Magnetic field lines always point from the north toward the south pole of the magnet. They continue through the body of the magnet to form closed loops and do not intersect at any point.
- The magnetic lines of force not only provide the visual representation of magnetic field but also provide its strength. The number of magnetic lines of force crossing through a surface is called magnetic flux. The magnetic flux per unit area is proportional to the strength of the magnetic field.
- Earth behaves like a huge magnet with its magnetic poles near the geographical poles.
- The poles of a magnet cannot be separated. If a bar magnet is broken into two parts, each part will act as a separate bar magnet with poles at its ends.
- A magnetic field is strong if the magnetic field lines are close together, and it is weak if the magnetic field lines are well spaced out.
- Magnets are used in a wide variety of applications such as in burglar alarms, magnetometers, MRI scans, microphones, loudspeakers, car horns, electric bells, magnetic tapes, and disk drives.

**Independent Work – Posttest (They Do 30 minutes) Lesson 5.3:** The students will work independently on their post that is located at the end of each lesson. Explain to the students that they will be assessed and will work independently. Encourage them to think critically and do their best on the Posttest. The Posttest will count as the grade for the daily lesson.

**Closing/Wrap Up/Notes Review (10 minutes):** Take a moment to reflect on the lesson of the day. Use the lesson review to close out the lesson by using an exit ticket or discussion to test the students' knowledge about the lesson. The lesson review is located under the content tab of each lesson in grade result. It is also listed above under lesson review.

## Summer School Lesson Plan

Subject/Grade: Science/8<sup>th</sup> Grade

Day: 6

### Topic/Lesson Title & Grade Results #: Magnetic Field and Electric Current Lesson 6

**Objective(s):** Students will be able to relate electricity, magnetism, and inductance, describe electromagnet, explain the factors that affect the strength of electromagnet, investigate how electric can produce a magnetic field and that a changing magnetic field can produce an electric current, and explain the phenomenon of electromagnetic induction.

**Guiding Question(s):** What flows through an electric wire?

#### TN Curriculum Standard(s):

- 8.PS2.1 Design and conduct investigations depicting the relationship between magnetism and electricity in electromagnets, generators, and electrical motors, emphasizing the factors that increase or diminish the electric current and the magnetic field strength.

**Materials/Resources Needed:** Grade Results Online Platform, Grade Results video, paper, pencil or notes in Grade Results

**Technology:** Computer, Whiteboard, TEAMS meeting (if applicable)

#### Key Vocabulary/Terms:

- **Armature:** A moving part of an electric motor in which an electromotive force (emf) is induced by a magnetic field.
- **Commutator:** A simple device for reversing the current direction through an armature every half turn (also called split-ring commutator).
- **Electric circuit:** An unbroken loop of conductive material that allows the electrons to flow through continuously without a beginning or an end.
- **Electric field:** A region around a charged particle or object within which a force would be exerted on other charged particles or objects.
- **Electric force:** Attraction or repulsion between electric charges.
- **Electrical energy:** The energy produced by a flow of electric charge through a conductor.
- **Galvanometer:** An instrument which is useful for detecting and measuring small electric currents in a circuit.
- **Magnetic field:** An invisible force field around a magnet.
- **Magnetic force:** Attraction or repulsion between magnetic poles.
- **Mechanical energy:** The energy associated with either the motion or position of an object.
- **Permeability ( $\mu$ ):** Permeability ( $\mu$ ): The ease at which a material passes flux.

#### Take Attendance (5 mins)

**Lesson Introduction (I Do 10 minutes) Slide 2:** The teacher will go over the objectives for the lesson and introduce the lesson by discussing the importance of electricity.

Show the students the animation of electrical equipment in our home and discuss how it operates. After the introduction the following grade result content will be used during the "I Do" part of the lesson.

**Grade Result Content:** Electricity, Magnetic Field Due to Electric Current, Electromagnetism, Video-Electromagnet, Factors Affecting the Strength of an Electromagnet, Factors Affecting the Strength of an Electromagnet, Application of Electromagnetic Induction, Applications of Electromagnetic, Investigation of an Electromagnet and Lesson Review.

**Vocabulary (5 minutes) Slide 15:** Define and discuss the meaning of the vocabulary words from the Lesson 6 activities.

#### Lesson Activities (We Do/ They Do 40 minutes) Slides 3-13:



As a whole group, complete the Practice Activities. Discuss.

**Grade Result Content:** Activity-Electromagnet, Activity-Michael Faraday, Activity- Faraday’s Experiment 1 and Activity-Faraday’s Experiment 2.

**Supplemental: No Supplementals**

**Additional Teacher Resources: None**

**Break:** 10 minutes

**Lesson Review (20 minutes) Slide 14:**

- Michael Faraday discovered the phenomenon of electromagnetic induction.
- The rate at which electric charges move through a given area is called electric current.
- A magnetic field can be produced by moving electric current.
- The relation governing the magnitude of a magnetic field and the current distribution is called the Law.
- The law states that magnitude of the magnetic field (dB) is directly proportional to the length of the current element (dl), current (I), and the sine of the angle ( $\theta$ ) between the current element and the point, but inversely proportional to the square of the distance (r) between the current element and the point P of the magnetic field.
- Whenever there is a flow of current through a conductor, a magnetic field will develop around that conductor. This effect is called electromagnetism.
- A conductor attaining magnetic property due to the passing current is called an electromagnet.
- Electromagnets are temporary magnets, which work on the principle of magnetic effect of electric current.
- An electromagnet acts as the magnet only so long as the current is flowing in the solenoid.
- The following are the factors that affect the strength of an electromagnet:
  1. Number of turns of the coil - increasing the number of turns of the coil increases the strength of an electromagnet
  2. Number/ voltage of batteries - increasing the current (voltage) increases the strength of an electromagnet
  3. Size of the iron core - increasing the size of the iron core increases the strength of an electromagnet
- Generating a current in the conductor by placing it in a changing magnetic field is called electromagnetic induction.
- An electric motor is a device that converts electrical energy into mechanical energy.
- An electric motor is used in electrical devices like fans, drills, mixers, washing machines, water pumps, etc.
- An electric generator is a device that converts mechanical energy into electrical energy.
- An electric generator is used in conjunction with diesel generators, windmills, etc.

**Independent Work – Posttest (They Do 30 minutes) Lesson 6.2:** The students will work independently on their post that is located at the end of each lesson. Explain to the students that they will be assessed and will work independently. Encourage them to think critically and do their best on the Posttest. The Posttest will count as the grade for the daily lesson.

**Closing/Wrap Up/Notes Review (10 minutes):** Take a moment to reflect on the lesson of the day. Use the lesson review to close out the lesson by using an exit ticket or discussion to test the students’ knowledge about the lesson. The lesson review is located under the content tab of each lesson in grade result. It is also listed above under lesson review.

## Summer School Lesson Plan

Subject/Grade: Science/8<sup>th</sup> Grade

Day: 7

Topic/Lesson Title & Grade Results #: Waves Lesson 7

**Objective(s):** Students will be able to define waves, classify waves based on the medium of propagation, distinguish between waves with respect to their mode of propagation, and discuss the characteristics of wave propagation.

**Guiding Question(s):** How can we describe a wave?

**TN Curriculum Standard(s):**

- 8.PS4.1 Develop and use models to represent the basic properties of waves including frequency, amplitude, wavelength, and speed.

**Materials/Resources Needed:** Grade Results Online Platform, Grade Results video, paper, pencil, or notes in Grade Results

**Technology:** Computer, Whiteboard, TEAMs meeting (if applicable)

**Key Vocabulary/Terms:**

- **Denser medium:** Density of the medium is more.
- **Energy:** The ability to do work.
- **Frequency:** The number of waves produced in one second.
- **Homogeneous medium:** Medium having the same properties at every point.
- **Incident ray:** A ray of light that strikes the surface.
- **Medium:** Material through which light travels (solid, liquid, or gas).
- **Normal line:** The straight line drawn perpendicular to the reflecting surface at the point where the incoming ray strikes the surface.
- **Oblique:** Neither parallel nor at right angles to a specified line.
- **Plane mirror:** A mirror with a flat reflective surface.
- **Rarer medium:** Density of the medium is less.
- **Reflected ray:** A ray of light that bounces off from the surface.
- **Reflection:** The phenomenon by which a ray of light bounces off when it strikes the surface of another medium.
- **Refracted ray:** A ray of light that undergoes a change in both speed and direction because of interaction with the material medium in which it travels.
- **Refraction:** The phenomenon of bending of light as it passes obliquely from one transparent medium to another.
- **Spectrum:** Band or group of light of different frequencies.
- **Wavelength:** Distance between two peaks of a light wave.

**Take Attendance (5 mins)**

**Lesson Introduction (I Do 10 minutes) Slide 2:** The teacher will go over the objectives for the lesson and introduce the lesson by showing the animation about what waves are. Show the video of the several types of waves and discuss them. After the introduction the following grade result content will be used during the “I Do” part of the lesson.

**Grade Result Content:** Classification of Waves, Classification of Mechanical Waves, Parts of a Transverse Wave, Longitudinal Waves, Video-Introduction to Waves, Relation Between Frequency, Wavelength and Wave Speed and Lesson Review.

**Vocabulary (5 minutes) Slide 15:** Define and discuss the meaning of the vocabulary words from the Lesson 7 activities.

**Lesson Activities (We Do/ They Do 30 minutes) Slides 3-13:**

As a whole group, complete the Practice Activities. Discuss.

**Grade Result Content:** Activity-Defining Waves, Activity-Classification of Waves, Activity-Examples of a Transverse Wave and Activity-Parts of a Transverse Wave.

**Supplemental (10 minutes) Lesson 7.2:** Please complete the supplemental activities as needed for additional support.

- **Flocabulary/Wave Properties, The Facts About Light Waves, and Waves** -Video, Vocabulary Cards, Vocabulary Game, Reading Passage, and Lyric Lab.

**Additional Teacher Resources: None**

**Break:** 10 minutes

**Lesson Review (10 minutes) Slide 14:**

- A wave is a vibratory disturbance that propagates and carries energy from the source through a medium and dissipates after a certain distance when it loses its energy to the medium.
- Waves are classified based on their ability to travel through a medium. Electromagnetic waves do not require a medium for their propagation, whereas mechanical waves require a medium for their propagation.
- Sound waves are mechanical waves that require a medium to travel and to transport energy from one location to another. Water waves and slinky waves are examples of mechanical waves.
- In longitudinal waves, the particles in the medium vibrate about their mean position along the direction of propagation of the waves. The vibration of a tuning fork produces longitudinal waves.
- The radiant energy from the Sun (solar energy) propagates in the form of electromagnetic waves. These waves do not require any material medium for their propagation and can even propagate through a vacuum. Radio waves, microwaves, infrared rays, visible light, ultraviolet rays, X-Rays, and gamma rays are forms of electromagnetic waves.
- Disturbance in a medium is propagated either by a transverse wave motion or by a longitudinal wave motion. In a transverse wave motion, the particles of the medium vibrate about their mean position in the direction perpendicular to the direction of wave propagation.
- In longitudinal waves, the particles in the medium vibrate about their mean position along the direction of propagation of the waves. The vibration of a tuning fork produces longitudinal waves.
- The propagation of sound waves in liquids and gases are examples of longitudinal waves.
- The distance between adjacent crests or troughs in a transverse wave or the distance between two adjacent compressions or rarefactions in a longitudinal wave is called wavelength, measured in meters.
- The number of waves that pass a point in space in one second is known as the frequency of the wave.
- The time it takes for one cycle to occur or a wave to move one wavelength is called the period of a wave.
- The relationship between velocity, wavelength, and frequency of a wave is given by the relation  $v = f \times \lambda$ . For a wave moving with constant velocity, an increase in the wavelength decreases its frequency and vice versa.

**Independent Work – Posttest (They Do 40 minutes) Lesson 7.3:** The students will work independently on their post that is located at the end of each lesson. Explain to the students that they will be assessed and will work independently. Encourage them to think critically and do their best on the Posttest. The Posttest will count as the grade for the daily lesson.

**Closing/Wrap Up/Notes Review (10 minutes):** Take a moment to reflect on the lesson of the day. Use the lesson review to close out the lesson by using an exit ticket or discussion to test the students' knowledge about the lesson. The lesson review is located under the content tab of each lesson in grade result. It is also listed above under lesson review.

## Summer School Lesson Plan

Subject/Grade: Science/8<sup>th</sup> Grade

Day: 8

### Topic/Lesson Title & Grade Results #: Waves and Communication Lesson 8

**Objective(s):** Students will be able to describe the evolution of digitized tools which encode and transmit information and explain the significance of wave technology in telegraph, cell phones, and wireless computer networks.

**Guiding Question(s):** How are waves used to communicate information?

#### TN Curriculum Standard(s):

- 8.PS4.3 Evaluate the role that waves play in different communication systems.

**Materials/Resources Needed:** Grade Results Online Platform, Grade Results video, paper, pencil or notes in Grade Results

**Technology:** Computer, Whiteboard, TEAMs meeting (if applicable)

#### Key Vocabulary/Terms:

- **Amplitude:** The maximum displacement of a wave from the mean position.
- **Crest:** The maximum displacement of a particle above the mean position in a transverse wave.
- **Frequency:** The number of waves produced in one second.
- **Period:** The time taken by the wave to travel a distance equal to its wavelength.
- **Slinky waves:** The waves formed in the slinky coil by vibrating the coil back and forth in either horizontal or vertical direction.
- **Trough:** The maximum displacement of a particle below the mean position in a transverse wave.
- **Wave:** A vibratory disturbance in a medium that transfers energy from one place to another without transferring the matter.
- **Wave speed:** The distance traveled in meters by a wave in one second.
- **Wavelength:** The distance traveled by a wave during the time which a particle of a medium completes one vibration.

#### Take Attendance (5 mins)

**Lesson Introduction (I Do 10 minutes) Slide 2:** The teacher will go over the objectives for the lesson and introduce the lesson by discussing how Abraham Lincoln used a telegraph to communicate with his generals in the war field. Show the students a War of Words video. After the introduction the following grade result content will be used during the “I Do” part of the lesson.

**Grade Result Content:** Video-History of Telegraph, Video-Telegraph, Two-Way Radio, Video-Two-Way Radio, Video-Radio Waves, Working of Cell Phone, Wired and Wireless Communication, Wireless Computer Networks, Wireless PANs, Wireless LANs, Wireless MANs, Wireless Wans and Lesson Review.

**Vocabulary (5 minutes) Slide15:** Define and discuss the meaning of the vocabulary words from the Lesson 8 activities.

#### Lesson Activities (We Do/ They Do 40 minutes) Slides 3-13:

As a whole group, complete the Practice Activities. Discuss.

**Grade Result Content:** Activity-Telegraph, Activity-Network, Activity-Waves and Communication, Activity-Evolution of Wave Technology-Timeline and Wrap-Up.

**Supplemental: No Supplementals**

**Additional Teacher Resources: None**

**Break:** 10 minutes

**Lesson Review (10 minutes) Slide 14:**

- Samuel F. B. Morse invented the first electrical telegraph, and the first telegraph message was sent in 1844.
- In 1858, Queen Victoria sent the first transatlantic telegraph message to President James Buchanan; the message took 17 hours and 40 minutes to transmit.
- The telegraph was a communication device that used electricity to send and receive information in the form of dots and dashes.
- A two-way radio relies on radio frequencies and can both transmit and receive an audio signal.
- Cell phones convert sound waves into radio waves, though overload can lead to scrambled signals.
- Computer networks that are not connected by cables are called wireless networks.

**Independent Work – Posttest (They Do 40 minutes) Lesson 8.2:** The students will work independently on their post that is located at the end of each lesson. Explain to the students that they will be assessed and will work independently. Encourage them to think critically and do their best on the Posttest. The Posttest will count as the grade for the daily lesson.

**Closing/Wrap Up/Notes Review (10 minutes):** Take a moment to reflect on the lesson of the day. Use the lesson review to close out the lesson by using an exit ticket or discussion to test the students' knowledge about the lesson. The lesson review is located under the content tab of each lesson in grade result. It is also listed above under lesson review.

## Summer School Lesson Plan

Subject/Grade: Science/8<sup>th</sup> Grade

Day: 9

Topic/Lesson Title & Grade Results #: Wave Principles in Technological Devices Lesson 9

**Objective(s):** Students will be able to describe the principles of wave behavior, list the technological devices that use the principles of wave behavior, and interpret the working of technological devices.

**Guiding Question(s):** How do waves help cell phones communicate?

**TN Curriculum Standard(s):**

- 8.PS4.3 Evaluate the role that waves play in different communication systems.

**Materials/Resources Needed:** Grade Results Online Platform, Grade Results video, paper, pencil or notes in Grade Results

**Technology:** Computer, Whiteboard, TEAMs meeting (if applicable)

**Key Vocabulary/Terms:**

- **Cell phone:** Cell phone: A phone with access to a cellular radio system so it can be used over a wide area.
- **Radio wave:** An electromagnetic wave used for long-distance communication.
- **Signal:** Signal: An electrical impulse or radio wave transmitted or received.
- **Telegraph:** A device used to communicate via electronic signals.
- **Wireless communication:** Wireless communication: The transmission of information over a distance without the help of wires.

**Take Attendance (5 mins)**

**Lesson Introduction (I Do 10 minutes) Slide 2:** The teacher will go over the objectives for the lesson and introduce the lesson by discussing how satellites communicate information from one place to another. Discuss the scenario of a telescope and how you can see things that are out of space. Explain to the students that these things are made possible because of waves and their properties. After the introduction the following grade result content will be used during the "I Do" part of the lesson.

**Grade Result Content:** Wave Behavior, Technological Devices that use the Principles of Wave Behavior, Radio and Television Broadcasting, Radar Technology, Video-Radar, Sonar Technology, Video-Sonar, Solar Cells, Video-Solar Cells, Ultrasonography, Digital Camera, Cochlear Implant and Lesson Review.

**Vocabulary (5 minutes) Slide 15:** Define and discuss the meaning of the vocabulary words from the Lesson 9 activities.

**Lesson Activities (We Do/They Do 50 minutes) Slides 3-13:**

As a whole group, complete the Practice Activities. Discuss.

**Grade Result Content:** Activity-Wave Behavior, Activity-Radio, and Television Broadcasting, and Activity-Diagnostic Imagine.

**Supplemental: No Supplementals**

**Additional Teacher Resources: None**

**Break:** 10 minutes

### Lesson Review (10 minutes) Slide 14:

- Technological devices use the principles of wave behavior and wave interactions with matter to transmit and capture information and energy.
- When a wave interacts with an object, it is either reflected, absorbed, transmitted, refracted, scattered, diffracted, polarized, or interfered with depending on the wavelength of the wave and the composition of the object.
- A microphone, a transmitter, and a transmitting antenna are the major components in radio transmission.
- A receiving antenna, a receiver, and a loudspeaker are the major components in radio reception.
- The process of superimposing the carrier wave and audio signal is called modulation.
- The process of extracting the audio signal from the modulated wave is called demodulation.
- RADAR system uses electromagnetic energy pulses to measure the position (distance), height, direction, and speed of a reflecting object.
- SONAR detects or locates an object in its surroundings using sound signals.
- Active sonar system sends out sound waves and receives echoes from the target.
- Passive sonar system only receives the echoes produced by the target.
- Solar cells use the photovoltaic effect to convert light energy into electrical energy.
- A solar cell is a p-n junction diode made of a very thin layer of p-type semiconductor and a thick layer of n-type semiconductor.
- MRI scan uses magnetic force and radio waves to capture the pictures of internal organs, tissues, etc.
- PET scan uses gamma rays to detect cancerous tumors.
- X-ray radiography uses a ridiculously small dose of ionizing radiation to capture images of the internal body structure.
- CT scan uses X-ray and advanced computer technology to capture images of the internal structure of the human body.
- Ultrasonography uses high-frequency sound waves to capture images of internal organs and tissues.
- Technologies such as RADAR, SONAR, and Ultrasonography work on the principle of wave reflection.
- A digital camera captures photographs digitally.
- Cochlear implants are surgically implanted electronic medical devices which eliminate hearing impairment.

**Independent Work – Posttest (They Do 30 minutes) Slides Lesson 9.2:** The students will work independently on their post that is located at the end of each lesson. Explain to the students that they will be assessed and will work independently. Encourage them to think critically and do their best on the Posttest. The Posttest will count as the grade for the daily lesson.

**Closing/Wrap Up/Notes Review (10 minutes):** Take a moment to reflect on the lesson of the day. Use the lesson review to close out the lesson by using an exit ticket or discussion to test the students' knowledge about the lesson. The lesson review is located under the content tab of each lesson in grade result. It is also listed above under lesson review.

## Summer School Lesson Plan

Subject/Grade: Science/8<sup>th</sup> Grade

Day: 10

Topic/Lesson Title & Grade Results #: Reflection, Transmission, and Absorption of Light Lesson 10

**Objective(s):** Students will be able to explain the behavior of light when it interacts with objects and relate an object's color to the wavelength of light.

**Guiding Question(s):** How can matter interact with light?

**TN Curriculum Standard(s):**

- 8.PS4.2 Compare, and contrast mechanical waves and electromagnetic waves based on refraction, reflection, transmission, absorption, and their behavior through a vacuum and/or various media.

**Materials/Resources Needed:** Grade Results Online Platform, Grade Results video, paper, pencil, or notes in Grade Results

**Technology:** Computer, Whiteboard, TEAMS meeting (if applicable)

**Key Vocabulary/Terms:**

- **Amplifier:** An electronic device that increases the amplitude of electrical signals.
- **Amplitude:** The maximum distance moved by a point on a wave measured from its equilibrium position.
- **Biomaterial:** Any substance, which may be natural or synthetic or combination of both, used in the medical field as whole or a part of the human system to diagnose, treat, enhance, or replace any organ, tissue, or function of the body.
- **Broadcasting:** Electronic transmission of audio and video signals to a dispersed audience.
- **Electrode:** An electrical conductor that carries current into a non-metallic part of a circuit.
- **Electromagnetic wave:** A type of radiation including visible light, radio waves, gamma rays, and X-rays, in which electric and magnetic fields vary simultaneously.
- **Electromotive force:** A term used for a generated or induced voltage, the potential difference between two points in an open electric circuit, i.e., when there is no flow of current in the circuit.
- **Frequency:** Number of waves passing through a reference point in one second.
- **Magnetic coupling:** A non-contact transfer of torque from one shaft to another using a magnetic field.
- **Magnetic field:** A region around a magnetic material within which the force of magnetism acts.
- **P-N junction diode:** A two-terminal semiconductor device that allows electric current in one direction and blocks it in another direction.
- **Radio waves:** An electromagnetic wave of a frequency between  $10^4$  and  $10^{11}$  Hz.
- **Receiver:** A device used to receive signals.
- **Semiconductor:** A solid substance with electrical conductivity that lies between that of an insulator and a conductor.
- **Sound wave:** A mechanical wave that is created from the to and from vibration of the particles of the medium through which the energy is transferred.
- **Transducer:** A device which converts energy from one form to another.
- **Transmitter:** An electronic device that produces and sends radio waves.

**Take Attendance (5 mins)**

**Lesson Introduction (I Do 10 minutes) Slide 2:** The teacher will go over the objectives for the lesson and introduce the lesson by asking the students to imagine that they are in a dark room and cannot see anything. Once they switch the light on you can see everything around you. Discuss how light is essential to view anything in this world. After the introduction the following grade result content will be used during the "I Do" part of the lesson.



**Grade Result Content:** Video- Light, Interaction of Light with Objects, Video-Reflection of Light, Video-Types of Reflection Absorption of Light, Video-Shadow, Transmission of Refraction of Light, Video-Refraction of Light, Types of Materials, Video-Types of Materials, Light and Color, color Spectrum and Color Wheel, Primary Colors of Light and Lesson Review.

**Vocabulary (5 minutes) Slide 15:** Define and discuss the meaning of the vocabulary words from the Lesson 10 activities.

**Lesson Activities (We Do/ They Do 30 minutes) Slides 3-13:**

As a whole group, complete the Practice Activities. Discuss.

**Grade Result Content:** Activity-Light, Activity-Types of Reflection and Activity-Types of Materials.

**Supplemental (20 minutes) Lesson 10.2:** Please watch and discuss the additional Supplemental Videos under the Supplemental Tab in the upper left-hand corner of the Lesson for additional support on the topic. To access the videos, click on the page under the supplemental tab and click on the topic next to the page number.

- **Video** -Light Incident on a Water-Air Interface
- **Video** -The Basic Properties of Light Waves
- **Video** -Light and Color

**Additional Teacher Resources: None**

**Break:** 10 minutes

**Lesson Review (10 minutes) Slide 14:**

- Visible light is the energy that travels in waves and is produced by hot, energetic objects.
- The objects that emit light on their own are called natural sources of light.
- The objects that emit light using electricity are called manufactured sources of light.
- When visible light interacts with an object, several things can happen.
- Visible light can be transmitted through the object, reflected, or scattered off the object, or absorbed by the object. Objects do not absorb all the light that hits on them. Different colored objects absorb different amounts of light. Dark colored objects absorb the light.
- The bouncing off light from the surface is called reflection.
- The way light is reflected from a surface depends on the smoothness of the surface.
- Light reflected from smooth, shiny surfaces, such as a mirror or water in a pond, is reflected in one direction. This is called a specular reflection.
- Light that is reflected from a rough, textured surface, such as paper or cloth, is reflected in many different directions. This is called diffuse reflection.
- When you stand in front of a flashlight, you see a sharp shadow.
- The phenomenon of bending light as it passes obliquely from one transparent medium to another is called refraction of light.
- Light travels at different speeds in different media.
- When light travels obliquely from one transparent medium to another, it deviates from its original path.
- The speed of light ray increases when it passes from a denser medium (glass) to a rarer medium (air). However, the speed of light ray decreases when it passes from a rarer medium (air) to a denser medium (water).
- Materials can be classified into three categories according to their light transmission property:
  1. Transparent material - material that transmits all light and permits objects to be seen clearly through it.
  2. Translucent material - material that transmits some light but does not permit objects to be seen clearly through it.
  3. Opaque material - material that does not transmit light but absorbs or reflects all light incidents upon it.

- Light and color are interrelated.
- The band of light that appears in a rainbow is also known as the spectrum of white light or "VIBGYOR." It is a mixture of all colors.
- The colors in visible light are characterized by different wavelengths.
- Each wavelength represents a particular color in the visible light. When you look at things, the colors you see are the wavelengths that are reflected off from the objects or transmitted through the objects.
- White light is a mixture of all colors. If an object looks white, it reflects all colors; if an object looks black, it absorbs all colors; if an object looks a combination of colors, it reflects more than one color.
- The color spectrum consists of a wide range of colors that can be obtained by mixing unusual colors.
- The color wheel is a basic tool for combining colors. It shows how to arrive at a particular color by mixing unusual colors together.
- The primary colors of light are red, green, and blue (RGB colors).

**Independent Work – Posttest (They Do 30 minutes) Lesson 10.3:** The students will work independently on their post that is located at the end of each lesson. Explain to the students that they will be assessed and will work independently. Encourage them to think critically and do their best on the Posttest. The Posttest will count as the grade for the daily lesson.

**Closing/Wrap Up/Notes Review (10 minutes):** Take a moment to reflect on the lesson of the day. Use the lesson review to close out the lesson by using an exit ticket or discussion to test the students' knowledge about the lesson. The lesson review is located under the content tab of each lesson in grade result. It is also listed above under lesson review.

## Summer School Lesson Plan

Subject/Grade: Science/8<sup>th</sup> Grade

Day: 11

### Topic/Lesson Title & Grade Results #: Technology in Exploring Space Lesson 11

**Objective(s):** Students will be able to explain electromagnetic spectrum, describe earth-based and space-based telescopes, list the several types of artificial satellites, describe spacecraft, and space probes, and differentiate a space station and a space shuttle.

**Guiding Question(s):** How can light change what people see?

#### TN Curriculum Standard(s):

- 8.ETS1.2 Research and communication information to describe how data from technologies (telescopes, spectrosopes, satellites, and space probes) provide information about objects in the solar system and universe.

**Materials/Resources Needed:** Grade Results Online Platform, Grade Results video, paper, pencil, or notes in Grade Results

**Technology:** Computer, Whiteboard, TEAMS meeting (if applicable)

#### Key Vocabulary/Terms:

- **Astronaut:** A crew member of a space exploration team.
- **Electromagnetic radiation:** Radiation transmitted through space as a wave.
- **Missile:** An object or a weapon that is fired, thrown, dropped, or otherwise projected at a target.
- **NASA:** US Government agency responsible for most space missions.
- **Orbit:** Elliptical path around another object.
- **Orbiter:** The main part of a space shuttle.
- **Radio waves:** longest wavelength wave of the electromagnetic spectrum.
- **Rocket:** A vehicle propelled by propellants.
- **Satellite:** An object that revolves around another object in space.
- **Space probe:** A spacecraft that has various instruments that can collect data.
- **Space shuttle:** A reusable spacecraft that carries a crew into space.
- **Space station:** A large artificial satellite on which people can live and work for prolonged periods.
- **Space telescope:** A telescope in orbit above the Earth's surface.
- **Spacecraft:** A vehicle designed to fly in outer space.
- **Thrust:** The force that propels a rocket.

#### Take Attendance (5 mins)

**Lesson Introduction (I Do 10 minutes) Slide 2:** The teacher will go over the objectives for the lesson and introduce the lesson by discussing the evolution of technology. Compare the two images of the past and present to discuss the advancement of outer space technology. After the introduction the following grade result content will be used during the "I Do" part of the lesson.

**Grade Result Content:** Electromagnetic Radiation, Telescopes, rocket, Space Craft, Video-Space Probs, Satellite, Video-Using Satellites to Observe Earth, Video-The Satellite Joins the Rocket, Space Shuttle, Video-Space Shuttle Columbia, and Lesson Review.

**Vocabulary (5 minutes) Slide 12:** Define and discuss (5 meaning of the vocabulary words from the Lesson 11 activities.

#### Lesson Activities (We Do/ They Do 30 minutes) Slides 3-9:

As a whole group, complete the Practice Activities. Discuss.

**Grade Result Content:** Activity-Two Uses of Rockets and Activity-Ordering Space Mission Launches.

**Supplemental (20 minutes) Lesson 11.2:** Please watch and discuss the additional Supplemental Videos under the Supplemental Tab in the upper left-hand corner of the Lesson for additional support on the topic. To access the videos, click on the page under the supplemental tab and click on the topic next to the page number.

- **Video** -Using Telescopes to Explore Outer Space
- **Video** -Improvements in Telescope Design
- **Video** -The Hubble Space Telescope
- **Video** -Telescopes

**Additional Teacher Resources: None**

**Break:** 10 minutes

**Lesson Review (10 minutes) Slide 10:**

- Radiation is a type of energy moving through space in the form of waves.
- Electromagnetic waves travel at the speed of light (300,000 km/s).
- Electromagnetic spectrum is the orderly arrangement of waves according to their frequency or wavelength.
- A refracting telescope uses lenses, and a reflecting telescope uses mirror to collect, focus, and view light. Radio telescopes measure radio waves coming from space.
- The Hubble space telescope is located outside the Earth's atmosphere.
- Rockets are vehicles and need fuel to burn.
- Spacecraft are designed to research space.
- A space probe is an instrument which collects information from other planets and sends it back to Earth.
- A satellite is a smaller object that revolves around another larger object.
- A space station is a satellite capable of supporting crew members.
- A space shuttle is a reusable spacecraft. Radiation is a type of energy moving through space in the form of waves.

**Independent Work – Posttest (They Do 30 minutes) Lesson 11.3:** The students will work independently on their post that is located at the end of each lesson. Explain to the students that they will be assessed and will work independently. Encourage them to think critically and do their best on the Posttest. The Posttest will count as the grade for the daily lesson.

**Closing/Wrap Up/Notes Review (10 minutes):** Take a moment to reflect on the lesson of the day. Use the lesson review to close out the lesson by using an exit ticket or discussion to test the students' knowledge about the lesson. The lesson review is located under the content tab of each lesson in grade result. It is also listed above under lesson review.

## Summer School Lesson Plan

Subject/Grade: Science/8<sup>th</sup> Grade

Day: 12

### Topic/Lesson Title & Grade Results #: The Big Bang Theory Lesson 12

**Objective(s):** Students will be able to state the big bang theory, explain the origin of universe by big bang theory, list the distinct stages in the formation of the universe, and discuss the different evidence of the expanding universe.

**Guiding Question(s):** How did the universe begin?

#### TN Curriculum Standard(s):

- 8.ESS1.1 Research, analyze, and communicate that the universe began with a period of rapid expansion using evidence from the motion of galaxies and composition of stars.

**Materials/Resources Needed:** Grade Results Online Platform, Grade Results video, paper, pencil, or notes in Grade Results

**Technology:** Computer, Whiteboard, TEAMS meeting (if applicable)

#### Key Vocabulary/Terms:

- **Big Bang theory:** The theory which states that the universe was formed by the explosion of a dense, hot, and massive ball of material.
- **Doppler effect:** The apparent change in wavelength of any wave motion caused by the changing relative position of an observer versus the wave source.
- **Hubble's law:** A law which states that the spectral lines from other galaxies are changing towards the red color, showing that the galaxies move away from us (our universe).
- **Redshift:** The phenomenon where the galaxies appear to move away from us with their light waves stretched (longer) and appear to be redder.

#### Take Attendance (5 mins)

**Lesson Introduction (I Do 10 minutes) Slide 2:** The teacher will go over the objectives for the lesson and introduce the lesson by asking the students to have they ever thought how the universe was formed. Explain to them that people always wondered about the origin of the universe. Most scientists think that the universe was formed by The Big Bang Theory. After the introduction the following grade result content will be used during the "I Do" part of the lesson.

**Grade Result Content:** The Big Bang Theory, Video-The Big Bang Theory, Stages in the Formation of the Universe, Video-Creation of the universe, Redshift, Video-Redshift and the Expanding Universe, Doppler Effect, Video-Doppler Effect and Lesson Review.

**Vocabulary (5 minutes) Slide 9:** Define and discuss the meaning of the vocabulary words from the Lesson 12 activities.

#### Lesson Activities (We Do/ They Do 30 minutes) Slides 3-7:

As a whole group, complete the Practice Activities. Discuss.

**Grade Result Content:** Activity-Drag and Drop

**Supplemental (20 minutes) Lesson 12.2:** Please complete the supplemental activities as needed for additional support.

- **Flocabulary/Planets, Solar System, Expansion of the Universe, and Finding Planets Beyond Our Solar System** Video, Vocabulary Cards, Vocabulary Game, Reading Passage, and Lyric Lab.

**Additional Teacher Resources: None**

**Break:** 10 minutes

**Lesson Review (10 minutes) Slide 8:**

- The Universe was formed about 14 billion years ago from the explosion of a tiny, exceedingly dense, hot, massive ball of material with a tremendous force, which the scientists call "The Big Bang."
- The Big Bang explosion of that tiny point of matter released, within nanoseconds, vast amounts of energy that grew and expanded and built our Universe.
- It is also observed that the Universe is still expanding in a manner like the expansion of a balloon.
- Redshift, Hubble's law, and Doppler Effect are the main lines of evidence supporting the expanding universe.

**Independent Work – Posttest (They Do 30 minutes) Lesson 12.3:** The students will work independently on their post that is located at the end of each lesson. Explain to the students that they will be assessed and will work independently. Encourage them to think critically and do their absolute best on the Posttest. The Posttest will count as the grade for the daily lesson.

**Closing/Wrap Up/Notes Review (10 minutes):** Take a moment to reflect on the lesson of the day. Use the lesson review to close out the lesson by using an exit ticket or discussion to test the students' knowledge about the lesson. The lesson review is located under the content tab of each lesson in grade result. It is also listed above under lesson review.

## Summer School Lesson Plan

Subject/Grade: Science/8<sup>th</sup> Grade

Day: 13

### Topic/Lesson Title & Grade Results #: Gravity and the Solar System Lesson 13

**Objective(s):** Students will be able to start the Universal Law of Gravitation, describe the role of gravity in the formation of planets, stars, and the Solar System, and explain the motion of planets using Kepler's laws.

**Guiding Question(s):** Why is gravity important in the solar system?

#### TN Curriculum Standard(s):

- 8.ESS1.2 Explain the role of gravity in the formation of our sun and planets. Extend this explanation to address gravity's effect on the motion of celestial objects in our solar system and Earth's Ocean tides.

**Materials/Resources Needed:** Grade Results Online Platform, Grade Results video, paper, pencil or notes in Grade Results

**Technology:** Computer, Whiteboard, TEAMS meeting (if applicable)

#### Key Vocabulary/Terms:

- **Asteroids:** The smaller clumps of matter, other than the planets, found between the planets, Mars and Jupiter.
- **Astrolabe:** An instrument known from ancient times, used to make astronomical observations and measurements, typically of the altitudes of celestial bodies, and in navigation for calculating latitude, before the development of the sextant.
- **Astronomer:** An expert professional who is skilled in astronomy.
- **Eclipse:** An obscure of the light shining on one celestial body by the passage of another between it and the observer, or between it and the source of illumination.
- **Gravitational attraction:** The force of attraction between all masses in the universe.
- **Gravity:** The natural force of attraction exerted by a celestial body towards Earth's center or towards any other physical body having mass.
- **Inner planets:** The solar system's planets that are found near the Sun and are affected by the Sun's heat. They are Mercury, Venus, Earth, and Mars.
- **Nebular Hypothesis:** A theory according to which the solar system was formed from a massive cloud of dust and gas, called a nebula that condensed to form the Sun, the planets, and the other components of the solar system.
- **Nuclear fusion:** A reaction in which two nuclei combine to form a nucleus with energy release.
- **Outer planets:** The planets of the solar system that are found farther away from the Sun and are less affected by the Sun's heat. They are Jupiter, Saturn, Uranus, and Neptune.
- **Planet:** A celestial body moving in an orbit around a star.
- **Projectile motion:** A form of motion in which an object or particle (called a projectile) is thrown near Earth's surface. It moves along a curved path under the action of gravity only.
- **Protoplanet:** Protoplanet: The early stage of a planet, formed by the condensation of gases, a resultant of the hot rotating nebula that formed a protosun/Sun in the center, leaving a protoplanet around.
- **Protosun:** Protosun: The early stage of the Sun, formed by the condensation of gases, resulted from the hot rotating nebula.
- **Satellite:** Satellite: A body that revolves around a planet. For example, the Moon.
- **Sextant:** An instrument with a graduated arc of 60° and a sighting mechanism, used for measuring the angular distances between objects, and especially for taking altitudes in navigation and surveying.
- **Universe:** All existing matter, energy, and space, including Earth, galaxies, and the contents of the intergalactic space, are considered as a whole; the cosmos.
- **Wanderers:** A literal translation of the Greek "*planets*," for planets.

## Take Attendance (5 mins)

**Lesson Introduction (I Do 10 minutes) Slide 2:** The teacher will go over the objectives for the lesson and introduce the lesson by asking the students what happens when you throw an object up in the air. Explain to them that the object falls back down to earth because of gravity. After the introduction the following grade result content will be used during the "I Do" part of the lesson.

**Grade Result Content:** Motion of Heavenly Bodies in the Space and on the Earth, Video-Tycho Birches' Astronomical Data, Kepler's Laws of Planetary Motion, Laws of Planetary Motion, Video-Dynamics of Orbiting, Newton's Law of Universal Gravitation, Formation of the Solar System, Formation of the Sun, Formation of Planets and Lesson Review.

**Vocabulary (5 minutes) Slide 18:** Define and discuss the meaning of the vocabulary words from the Lesson 13 activities.

## Lesson Activities (We Do/ They Do 30 minutes) Slides 3-16:

As a whole group, complete the Practice Activities. Discuss.

**Grade Result Content:** Activity-Gravity, Activity-Instruments, Activity-Planetary Scientists, Activity-Kepler's Laws and Activity-Formation of Planets.

**Supplemental (20 minutes) Lesson 13.2:** Please watch and discuss the additional Supplemental Videos under the Supplemental Tab in the upper left-hand corner of the Lesson for additional support on the topic. To access the videos, click on the page under the supplemental tab and click on the topic next to the page number.

- **Flocabulary/Gravity** Video, Vocabulary Cards, Vocabulary Game, Reading Passage, and Lyric Lab
- **Video** -Sir Isaac Newton Publishes His Landmark Scientific Works
- **Video** -Birth of Solar System

**Additional Teacher Resources: None**

**Break:** 10 minutes

## Lesson Review (10 minutes) Slide 17:

- Newton concluded that every object in the universe attracts every other object. This tendency of objects to get attracted and move toward each other is called gravitation.
- The works of Galileo, Kepler, Newton, and other astronomers follow the same laws that govern the motion of objects on Earth, such as golf balls, fired cannonballs, etc.
- Tycho Brahe observed the Sun's eclipse on August 21, 1560, and vowed to become an astronomer. He observed two planets in conjunction - that is, located at the same point in the sky.
- Johannes Kepler then discovered the three mathematical laws that describe every planet and satellite's behavior in the solar system.
- Kepler's first law: The path of each planet around the Sun is an ellipse, with the Sun at one focus. The other focus is symmetrically located at the opposite end of the ellipse.
- Kepler's second law: Each planet revolves so that an imaginary line connecting it to the Sun sweeps over equal areas in equal time intervals.
- Kepler's third law: The square of the length of time it takes a planet to orbit the Sun (orbital period,  $T$ ) is proportional to the cube of its mean distance to the Sun ( $a$ ). It can be represented in mathematical expression as  $T \propto a^3$ .
- Newton developed the Universal Law of Gravitation to explain the existence of a force between objects.
- The universal law of gravitation states that the gravitational force between any two objects is directly proportional to their masses' product and inversely proportional to the square of the distance separating them. The relationship gives the gravitational force between two masses  $m_1$  and  $m_2$ :



- The force of gravity acts as the inward centripetal force in the Solar System. Without the force of gravity, the planets continue to remain in straight-line motion. The force of gravity keeps the planets and moons in their elliptical orbits.
- The Nebular Hypothesis proposed by Kant and Laplace states that the solar system is formed from a massive cloud of dust and gas called a nebula, which is later condensed to form the Sun, the planets, and the asteroids.
- The hot rotating nebula began to collapse due to its gravitational force towards its center. This led to the flattening of the nebula to form a huge disk, the Sun, whose gravitational force again led to the fusion of hydrogen atoms in the protosun to form helium.
- The leftover gases and other matter continued to spin around the Sun and formed the planets, satellites, and asteroids.
- The planets near the Sun are so hot (temperatures are so high); they are mostly composed of rocky materials, metals, and silicate minerals. These planets are called inner planets, and they are Mercury, Venus, Earth, and Mars.
- The planets farther from the Sun are less affected by the Sun's heat. They retained their lightweight gases, such as hydrogen and helium, and grew to enormous sizes. They are called outer planets, and they are Jupiter, Saturn, Uranus, and Neptune.

**Independent Work – Posttest (They Do 30 minutes) Lesson 13.3:** The students will work independently on their post that is located at the end of each lesson. Explain to the students that they will be assessed and will work independently. Encourage them to think critically and do their best on the Posttest. The Posttest will count as the grade for the daily lesson.

**Closing/Wrap Up/Notes Review (10 minutes):** Take a moment to reflect on the lesson of the day. Use the lesson review to close out the lesson by using an exit ticket or discussion to evaluate the students' knowledge about the lesson. The lesson review is located under the content tab of each lesson in grade result. It is also listed above under lesson review.

## Summer School Lesson Plan

Subject/Grade: Science/8<sup>th</sup> Grade

Day: 14

Topic/Lesson Title & Grade Results #: Cause and Effects of Tides Lesson 14

**Objective(s):** Students will be able to explain tides and their types, describe the causes of high and low tides, and list the effects of tides.

**Guiding Question(s):** What causes tides?

**TN Curriculum Standard(s):**

- 8.ESS1.2 Explain the role of gravity in the formation of our sun and planets. Extend this explanation to address gravity's effect on the motion of celestial objects in our solar system and Earth's Ocean tides.

**Materials/Resources Needed:** Grade Results Online Platform, Grade Results video, paper, pencil or notes in Grade Results

**Technology:** Computer, Whiteboard, TEAMS meeting (if applicable)

**Key Vocabulary/Terms:**

- **Algae:** Unicellular or multicellular organism with no roots, stems, or leaves.
- **Biodiversity:** The variety of life forms within an ecosystem.
- **Gravitation:** The force of attraction between any two bodies in the universe.
- **High tide:** The highest water levels during a day, due to the gravitational pull of the Moon.
- **Intertidal zone:** The shoreline area with the tidal range.
- **Low tide:** The lowest water levels during a day, due to the gravitational pull of the Moon.
- **Neap tide:** A tide that occurs due to conflicting pull by the Sun and the Moon.
- **Salinity:** The relative proportion of salt in a solution.
- **Spring tide:** A tide that occurs due to the maximum pull of the Moon and the Sun together.
- **Tidal pool:** Rocky pools on the seashore filled with sea water.
- **Tidal range:** The difference between the successive high and low tide in a day.
- **Tide:** The periodic rise and fall in the level of the water bodies on the oceans caused by the gravitational forces of the Sun and Moon.

**Take Attendance (5 mins)**

**Lesson Introduction (I Do 10 minutes) Slide 2:** The teacher will go over the objectives for the lesson and introduce the lesson by showing a video of a sandcastle on a beach that got washed away by high rising water. Explain to the students that their high rising water is an example of a tide. After the introduction the following grade result content will be used during the "I Do" part of the lesson.

**Grade Result Content:** Tide, Video-Tide, Video-High and Low Tide, Causes of Tide, Video-Causes of Tides, Tidal Range, Video-Tidal Range, Spring and Neap Tide, Effects of Tides, Video-Effects of Tides and Lesson Review.

**Vocabulary (5 minutes) Slide 14:** Define and discuss the meaning of the vocabulary words from the Lesson 14 activities.

**Lesson Activities (We Do/ They Do 40 minutes) Slides 3-12:**

As a whole group, complete the Practice Activities. Discuss.

**Grade Result Content:** Activity-Tide, Activity-Causes of Tides, Activity-Tidal Range and Activity-Crossword.

**Supplemental (10 mins) Lesson 14.2:** Please watch and discuss the additional Supplemental Videos under the Supplemental Tab in the upper left-hand corner of the Lesson for additional support on the topic. To access the videos, click on the page under the supplemental tab and click on the topic next to the page number.

- **Video** -Low Tide

**Additional Teacher Resources: None**

**Break:** 10 minutes

**Lesson Review (10 minutes) Slides 3-12:**

- The alternate rise and fall of large bodies of water are called tides.
- Tides are the vertical movement of water in the ocean.
- There will be two tides a day, due to the Earth's rotation.
- Tides are caused by the variation in the gravitational interaction between the Earth and the Moon. I
- n a day, if any region of the Earth experiences a rise in water, then it is said to be high tide; if the Earth experiences a decrease in the water level, then it is said to be low tide.
- The difference in height between the high tide and low tide water is called the tidal range.
- Spring tide occurs when the Sun, the Moon, and the Earth are on the same line.
- Neap tides occur when the Moon is in the first quarter and the third quarter.
- During high tide, ocean water brings in sediments, nutrients, and sea life into estuaries.
- The intertidal zone is the area between the high tide and low tide lines.
- Tide pools are rich in biodiversity and have varying temperature and salinity.
- Organisms in tide pools will have to adapt to extreme changes in temperature and salinity.

**Independent Work – Posttest (They Do 30 minutes) Lesson 14.3:** The students will work independently on their post that is located at the end of each lesson. Explain to the students that they will be assessed and will work independently. Encourage them to think critically and do their best on the Posttest. The Posttest will count as the grade for the daily lesson.

**Closing/Wrap Up/Notes Review (10 minutes):** Take a moment to reflect on the lesson of the day. Use the lesson review to close out the lesson by using an exit ticket or discussion to evaluate the students' knowledge about the lesson. The lesson review is located under the content tab of each lesson in grade result. It is also listed above under lesson review.

## Summer School Lesson Plan

Subject/Grade: Science/8<sup>th</sup> Grade

Day: 15

Topic/Lesson Title & Grade Results #: Rock Cycle and Surface Events Lesson 15

**Objective(s):** Students will be able to describe the patterns of the rock cycle and relate them to surface and sub-surface events.

**Guiding Question(s):** What is rock? What processes change rock?

**TN Curriculum Standard(s):**

- 8.ESS2.3 Describe the relationship between the processes and forces that create igneous, sedimentary, and metamorphic rocks.

**Materials/Resources Needed:** Grade Results Online Platform, Grade Results video, paper, pencil or notes in Grade Results

**Technology:** Computer, Whiteboard, TEAMS meeting (if applicable)

**Key Vocabulary/Terms:**

- **Erosion:** The removal of soil or land surface by the action of water, wind, or ice.
- **Extrusive igneous rocks:** The igneous rocks formed above the Earth due to rapid cooling and solidification of the erupted magma called lava.
- **Geological materials:** The materials like rocks and sediments that make up the land.
- **Igneous rocks:** The rocks formed from the solidification of molten material called magma. It can be extrusive or intrusive by nature.
- **Intrusive igneous rocks:** The igneous rocks formed beneath the surface of Earth due to the slow cooling and solidification of magma.
- **Magma:** Molten rock beneath the surface of the earth.
- **Metamorphic rock:** The rock altered by hot temperature and pressure conditions that exists underneath Earth.
- **Plate tectonics:** A theory stating that the Earth is divided into several crustal plates that move independently over the underlying mantle and interact with each other by colliding or sliding with their adjacent plates.
- **Rock cycle:** A group of changes that slowly change rocks from one kind to another.
- **Sedimentary rock:** The rock formed from the consolidation of sediments derived from the erosion and deposition of igneous or metamorphic rocks.
- **Subduction:** The process that takes place at convergent boundaries, where one tectonic plate moves under another tectonic plate and sinks into the mantle.
- **Weathering:** A natural process of breaking down of rocks into smaller particles called sediments.

**Take Attendance (5 mins)**

**Lesson Introduction (I Do 10 minutes) Slide 2:** The teacher will go over the objectives for the lesson and introduce the lesson by explaining that rock is the most common material on Earth. Use the chocolate chip cookie illustration and ingredients to demonstrate the composition of a rock. After the introduction the following grade result content will be used during the “I Do” part of the lesson.

**Grade Result Content:** Types of Rocks, Video-Types of Rocks, Rock Cycle, Video-The Rock Cycle and Uses of Tocks, Rock Cycle and Surface Events, Rock Cycle and Sub-Surface Events and Lesson Review.

**Vocabulary (5 minutes) Slide 9:** Define and discuss the meaning of the vocabulary words from the Lesson 15 activities.

**Lesson Activities (We Do/ They Do 30 minutes) Slides 3-7:**

As a whole group, complete the Practice Activities. Discuss.

**Grade Result Content:** Activity-Matching, Activity-Three Main Types of Rocks and Activity-Drag and Drop.

**Supplemental (20 minutes) Lesson 15.2:** Please watch and discuss the additional Supplemental Videos under the Supplemental Tab in the upper left-hand corner of the Lesson for additional support on the topic. To access the videos, click on the page under the supplemental tab and click on the topic next to the page number.

- **Video** -Introduction to “All About Rocks and Minerals”
- **Flocabulary/Types of Rocks-** Video, Vocabulary Cards, Vocabulary Game, Reading Passage, and Lyric Lab.

**Additional Teacher Resources: None**

**Break:** 10 minutes

**Lesson Review (10 minutes) Slide 8:**

- Rocks are hard substances of various shapes, sizes, and colors. These are made up of two or more minerals and are the building blocks of Earth.
- The three major groups of rocks are igneous rocks, sedimentary rocks, and metamorphic rocks. Rock cycle is the group of changes that slowly change the rocks on Earth from one kind to another.
- Weathering and erosion are major surface events that play a significant role in the rock cycle.
- Weathering and erosion break down the rocks and form a cause for the change in Earth's surface.
- Plate tectonics is the driving force of the rock cycle. The changing rate of plate movement helps in the rock cycle.

**Independent Work – Posttest (They Do 30 minutes) Lesson 15.3:** The students will work independently on their post that is located at the end of each lesson. Explain to the students that they will be assessed and will work independently. Encourage them to think critically and do their best on the Posttest. The Posttest will count as the grade for the daily lesson.

**Closing/Wrap Up/Notes Review (10 minutes):** Take a moment to reflect on the lesson of the day. Use the lesson review to close out the lesson by using an exit ticket or discussion to test the students’ knowledge about the lesson. The lesson review is located under the content tab of each lesson in grade result. It is also listed above under lesson review.

## Summer School Lesson Plan

Subject/Grade: Science/8<sup>th</sup> Grade

Day: 16

### Topic/Lesson Title & Grade Results #: Effects of Mantle Convection Lesson 16

**Objective(s):** Students will be able to describe heat transfer within the Earth's surface, describe the different plate boundaries and their effects, and list the effects of subduction zones.

**Guiding Question(s):** What are the three types of plate boundaries?

#### TN Curriculum Standard(s):

- 8.ESS2.4 Gather and evaluate evidence that energy from the earth's interior drives convection cycles within the asthenosphere which creates changes within the lithosphere including plate movements, plate boundaries, and seafloor spreading.

**Materials/Resources Needed:** Grade Results Online Platform, Grade Results video, paper, pencil, or notes in Grade Results

**Technology:** Computer, Whiteboard, TEAMs meeting (if applicable)

#### Key Vocabulary/Terms:

- **Asthenosphere:** The highly viscous layer of the Earth, below the lithosphere, forming a part of the upper mantle, between 80 and 200 km below the Earth's surface.
- **Convection:** Transfer of heat by the circulation or movement of the heated parts of a liquid or gas.
- **Convergent boundary:** The place where two tectonic plates move towards each other.
- **Crust:** A hard outer layer of the Earth.
- **Divergent boundary:** The place where two tectonic plates move away from each other.
- **Earthquake:** A sudden shaking of the ground due to earth's crust or volcanic action.
- **Island arc:** An arc of volcanic islands rising from a tectonic plate margin.
- **Lithosphere:** The crust and upper mantle of Earth.
- **Magma:** Molten rock beneath the surface of the earth.
- **Mantle:** A specialized layer of tissue covering the internal organs as they are grouped together in the visceral mass.
- **Ocean basins:** Area of the deep ocean floor between the continental margin and the oceanic edge.
- **Plate boundary:** The place where two tectonic plates meet.
- **Plate tectonics:** A theory stating that the Earth is divided into several crustal plates that move independently over the underlying mantle and interact with each other by colliding or sliding with their adjacent plates.
- **Ring of Fire:** An area around the margins of the Pacific Ocean, where many earthquakes and volcanic eruptions occur.
- **Subduction:** The process that takes place at convergent boundaries, where one tectonic plate moves under another tectonic plate and sinks into the mantle.
- **Transform boundary:** The place where tectonic plates slide past each other.
- **Volcano:** A mountain that expels magma, lava, ash, cinders, dust, and hot gas.

#### Take Attendance (5 mins)

**Lesson Introduction (I Do 10 minutes) Slide 2:** The teacher will go over the objectives for the lesson and introduce the lesson by showing the animation of the way water heats up in an open container. Explain that the process of heat moving from place to place by the movement of fluid, such as air or water is called convection. After the introduction the following grade result content will be used during the "I Do" part of the lesson.

**Grade Result Content:** Heat Transfer Inside the Earth's Surface, Tectonic Plates, Video-Tectonic Plate Collisions, Types of Plate Boundaries, Effects of Subduction Zones, Video-How the Earth Was Made: Ring of Fire Volcanoes and Lesson Review.

**Vocabulary (5 minutes) Slide 9:** Define and discuss the meaning of the vocabulary words from the Lesson 16 activities.

**Lesson Activities (We Do/ They Do 30 minutes) Slide 3-7:**

As a whole group, complete the Practice Activities. Discuss.

**Grade Result Content:** Activity-Events, Activity-Identify the Type of Boundary, Activity-Matching and Activity-Drag and Drop.

**Supplemental (20 minutes) Lesson 16.2:** Please complete the supplemental activities as needed for additional support.

- **Flocabulary/Earth Layers and Plate Tectonics-** Video, Vocabulary Cards, Vocabulary Game, Reading Passage, and Lyric Lab.

**Additional Teacher Resources: None**

**Break:** 10 minutes

**Lesson Review (10 minutes) Slide 8:**

- The unequal distribution of heat within Earth causes the thermal convection in the mantle that drives plate motion.
- The movement of Earth's plates releases tremendous energy that can transform Earth's surface, forming volcanoes, causing earthquakes, and forming oceanic trenches, mountains, subduction zones, etc.
- Most earthquakes and volcanoes occur at the boundaries between the lithospheric plates.
- The convergence of two continental plates generates collision. During continent-continent collisions, mountain chains such as Himalayas are formed.
- Volcanoes form along with the mid-ocean ridges, where two plates move apart. It also forms along the diverging plate boundaries on land.
- When two continental crusts move apart, oceanic crust is subsequently formed between them.

**Independent Work – Posttest (They Do 30 minutes) Lesson 16.3:** The students will work independently on their post that is located at the end of each lesson. Explain to the students that they will be assessed and will work independently. Encourage them to think critically and do their best on the Posttest. The Posttest will count as the grade for the daily lesson.

**Closing/Wrap Up/Notes Review (10 minutes):** Take a moment to reflect on the lesson of the day. Use the lesson review to close out the lesson by using an exit ticket or discussion to test the students' knowledge about the lesson. The lesson review is located under the content tab of each lesson in grade result. It is also listed above under lesson review.

## Summer School Lesson Plan

Subject/Grade: Science/8<sup>th</sup> Grade

Day: 17

### Topic/Lesson Title & Grade Results #: Continental Drift Theory Lesson 17

**Objective(s):** Students will be able to discuss the formation of Pangea and Panthalassa, describe the divisions of lithospheric plates, discuss the continental drift theory, and explain the evidence for the continental drift theory.

**Guiding Question(s):** What evidence suggests that continents move?

#### TN Curriculum Standard(s):

- 8.ESS2.5 Construct a scientific explanation using data that explains the gradual process of plate tectonics accounting for A) the distribution of fossils on different continents, B) the occurrence of earthquakes, and C) continental and ocean floor features (including mountains, volcanoes, faults, and trenches).
- 8.ESS3.2 Collect data, map, and describe patterns in the locations of volcanoes and earthquakes related to tectonic plate boundaries, interactions, and hotspots.

**Materials/Resources Needed:** Grade Results Online Platform, Grade Results video, paper, pencil, or notes in Grade Results

**Technology:** Computer, Whiteboard, TEAMS meeting (if applicable)

#### Key Vocabulary/Terms:

- **Antarctic plate:** A tectonic plate containing the continent of Antarctica and extending outward under the surrounding oceans and adjacent ocean basins.
- **Cambrian:** The first period in the Paleozoic era, between the end of the Precambrian eon and the beginning of the Ordovician period.
- **Carboniferous:** The fifth period of the Paleozoic era, between the Devonian and Permian periods.
- **Continent:** A major landmass of the Earth, contrasted with islands.
- **Continental drift:** Horizontal movement of the lithospheric plates of the Earth on a vast scale.
- **Continental drift theory:** The theory that encompasses the concepts of continental drift and sea floor spreading.
- **Cretaceous:** The last period of the Mesozoic era, between the Jurassic and Tertiary periods.
- **Devonian:** The fourth period of the Paleozoic era, between the Silurian and Carboniferous periods.
- **Equator:** The imaginary great circle around the Earth's surface, dividing the Earth into northern and southern hemispheres and constituting the parallel of latitude 0°.
- **Eurasian Plate:** A major tectonic division of the Earth's crust, comprising the continents of Europe and Asia as well as several sub-oceanic basins.
- **Fauna:** The animals of a particular region, habitat, or geological period.
- **Flora:** The plants of a particular region, habitat, or geological period.
- **Fold mountains:** Mountain ranges that are formed when two of the tectonic plates that make up the Earth's crust push each other together at their border.
- **Geodetic survey:** A survey of a large area of land in which corrections are made to account for the curvature of the Earth.
- **Geology:** The science that deals with the Earth's origin, physical history, and structure.
- **Glossopteris:** The largest and best-known genus of the extinct order of seed ferns, known as Glossopteridales. A plant fossil found in South America, Africa, India, Australia, and Antarctica, which helped to prove that these continents were derived from a single historical continent.
- **Gondwanaland:** A split block from Pangea, considered a hypothetical land that is believed to have once connected the Indian subcontinent and the landmasses of the southern hemisphere.
- **Island arcs:** An arc-shaped curved chain of volcanic islands, such as the Aleutian Islands, the Hawaiian Islands, or the Japanese Islands, located at a tectonic plate margin, typically with a deep ocean trench on the convex side.
- **Jurassic:** The second period of the Mesozoic era, between the Triassic and Cretaceous periods.



- **Landmass:** A large body of land that is a distinct part of some continent.
- **Laurasia:** A split block from Pangaea and a hypothetical landmass in the Northern Hemisphere of Earth near the end of the Paleozoic era.
- **Lithosphere:** The Earth's outermost layer.
- **Meteorology:** The science concerned with the process and phenomena of the atmosphere and its weather.
- **Mid-oceanic ridge:** An elevated, mid-oceanic ridge that consists of various mountain ranges (chains), typically having a valley known as a rift running along its spine, formed by magma extruded from the rift between receding tectonic plates.
- **North American Plate:** A major tectonic plate of the Earth's crust, covering most of North America, Greenland, Cuba, Bahamas, and parts of Iceland and the Azores Islands.
- **Ordovician:** The second period of the Paleozoic era, between the Cambrian and Silurian periods.
- **Pacific plate:** One of the major tectonic divisions of the Earth's crust, comprising four sea-floor basins; separated from the Nazca, Cocos, and North and South American plates by the East Pacific Rise and the San Andreas fault, and bounded in the Western Pacific Ocean by a series of major ocean deeps, including the Kuril, Japan, Mariana, Kermadec, and Tonga trenches.
- **Paleomagnetism:** The branch of geophysics concerned with the magnetism in rocks that was induced by the Earth's magnetic field at the time of their formation, a study that helps to find the distance of the rocks from the poles, and the time of rock formation, by looking at their magnetic fields' orientations.
- **Pangaea:** A giant landmass that drifted apart from the single Earth landmass Panthalassa when it broke into pieces; also called the supercontinent.
- **Panthalassa:** The ocean surrounding the historic supercontinent (Pangaea).
- **Permian:** The last period of the Paleozoic era, between the Carboniferous and Triassic periods.
- **Physiography:** The study of physical geography.
- **Silurian:** The third period of the Paleozoic era, between the Ordovician and Devonian periods.
- **South American Plate:** A tectonic plate which includes the continent of South America, and a sizeable region of the Atlantic Ocean seabed, extending eastward to the Mid-Atlantic Ridge.
- **The African plate:** A major tectonic plate that includes the continent of Africa, as well as oceanic crust which lies between the continent and various surrounding ocean ridges.
- **Triassic:** The earliest period of the Mesozoic era, between the Permian and Jurassic periods.

### Take Attendance (5 mins)

**Lesson Introduction (I Do 10 minutes) Slide 2:** The teacher will go over the objectives for the lesson and introduce the lesson by displaying the illustration of the globe. Ask the students why the continents in the animation look like one big landmass. Explain to the students that the earth was once a single landmass that broke up into larger pieces that drifted apart. The giant landmass is called Pangaea. After the introduction the following grade result content will be used during the “I Do” part of the lesson.

**Grade Result Content:** Pangaea: A Super Continent, Activity-Pangaea: A Super Continent, Earth’s Major Plates, Continental Drift Theory, Evidence for the Continental Drift and Lesson Review.

**Vocabulary (5 minutes) Slide 12:** Define and discuss the meaning of the vocabulary words from the Lesson 17 activities.

### Lesson Activities (We Do/They Do 30 minutes) Slides 3-10:

As a whole group, complete the Practice Activities. Discuss.

**Grade Result Content:** Activity-Pangea: A Super Continent, Activity-The Earth’s Major Plate, Activity-Continental Drift and Activity-Drag and Drop.

**Supplemental (20 minutes) Lesson 17.2:** Please watch and discuss the additional Supplemental Videos under the Supplemental Tab in the upper left-hand corner of the Lesson for additional support on the topic. To access the videos, click on the page under the supplemental tab and click on the topic next to the page number.

- **Flocabulary/Earth Layers and Plate Tectonics-** Video, Vocabulary Cards, Vocabulary Game, Reading Passage, and Lyric Lab.
- **Video - Continental Drift Theory**

**Additional Teacher Resources: None**

**Break:** 10 minutes

**Lesson Review (10 minutes) Slide 11:**

- The Earth once had a single landmass break up into large pieces into Pangaea and Panthalassa.
- The Earth's outermost layer, the lithosphere, is broken into several plates and spreads in different directions with different speeds to form the present map of Earth.
- The lithospheric plate is divided into seven major plates and some minor plates.
- The evidence for continental drift theory was collected from physiographical, geological, and meteorological observations.
- The main drawback of the continental drift theory was that it could not explain how the continents were able to move.

**Independent Work – Posttest (They Do 30 minutes) Lesson 17.3:** The students will work independently on their post that is located at the end of each lesson. Explain to the students that they will be assessed and will work independently. Encourage them to think critically and do their best on the Posttest. The Posttest will count as the grade for the daily lesson.

**Closing/Wrap Up/Notes Review (10 minutes):** Take a moment to reflect on the lesson of the day. Use the lesson review to close out the lesson by using an exit ticket or discussion to test the students' knowledge about the lesson. The lesson Review is located under the content tab of each lesson in grade result. It is also listed above under lesson review.

## Summer School Lesson Plan

Subject/Grade: Science/8<sup>th</sup> Grade

Day: 18

### Topic/Lesson Title & Grade Results #: Plate Tectonics Lesson 18

**Objective(s):** Students will be able to state the plate tectonics theory, list the major and some of the minor tectonic plates of the Earth, describe the relation between the Earth's tectonic plates and the Earth's layers, discuss the different types of plate boundaries and their features, and list the effects of subduction zones.

**Guiding Question(s):** What is the theory of plate tectonics?

#### TN Curriculum Standard(s):

- 8.ESS2.5 Construct a scientific explanation using data that explains the gradual process of plate tectonics accounting for A) the distribution of fossils on different continents, B) the occurrence of earthquakes, and C) continental and ocean floor features (including mountains, volcanoes, faults, and trenches).
- 8.ESS3.2 Collect data, map, and describe patterns in the locations of volcanoes and earthquakes related to tectonic plate boundaries, interactions, and hotspots.

**Materials/Resources Needed:** Grade Results Online Platform, Grade Results video, paper, pencil, or notes in Grade Results

**Technology:** Computer, Whiteboard, TEAMS meeting (if applicable)

#### Key Vocabulary/Terms:

- **asthenosphere:** The highly viscous layer of the Earth, below the lithosphere, forming a part of the upper mantle, between 80 and 200 km below the Earth's surface.
- **Batholith:** A large, intrusive mass of igneous rock with many plutons, covering an area of up to hundreds of square kilometers.
- **Convergent boundary:** The place where two tectonic plates move towards each other.
- **Divergent boundary:** The place where two tectonic plates move away from each other.
- **Island arc:** An arc of volcanic islands rising from a tectonic plate margin.
- **Lithosphere:** The solid outermost layer of the Earth, comprising its crust and upper mantle.
- **Plate boundary:** The place where two tectonic plates meet.
- **Plate tectonics:** A theory stating that the Earth is divided into several crustal plates that move independently over the underlying mantle and interact with each other by colliding or sliding with their adjacent plates.
- **Pluton:** A small intrusive mass of igneous rock, covering an area of tens of square kilometers.
- **Ring of Fire:** An area around the margins of the Pacific Ocean, where many earthquakes and volcanic eruptions occur.
- **Subduction:** The process that takes place at convergent boundaries, where one tectonic plate moves under another tectonic plate and sinks into the mantle.
- **Transform boundary:** The place where tectonic plates slide past each other.

#### Take Attendance (5 mins)

**Lesson Introduction (I Do 10 minutes) Slide 2:** The teacher will go over the objectives for the lesson and introduce the lesson by completing the Himalayas activity. Explain to the students that the Himalayas were formed due to continuous movement of the Earth's Tectonic Plates. After the introduction the following grade result content will be used during the "I Do" part of the lesson.

**Grade Result Content:** Video-Earth's Tectonic Plates, Plate Tectonics Theory, Video-Plate Tectonics Theory, Relation Between the Earth's Tectonic Plates and the Earth's Layers, Types of Plate Boundaries, Divergent Plate Boundary, Video-Divergent Plate Boundary, Transform Boundary, Convergent Plate boundary, Video-Convergent Plate Boundary, Effects of Subduction Zones, and Lesson Review.

**Vocabulary (5 minutes) Slide 12:** Define and discuss the meaning of the vocabulary words from the Lesson 18 activities.

**Lesson Activities (We Do/ They Do 30 minutes) Slide 3-10:**

As a whole group, complete the Practice Activities. Discuss.

**Grade Result Content:** Activity-Relation Between the Earth's Tectonic Plates and The Earth's Layers and Activity-Types of Plate Boundaries.

**Supplemental (20 minutes) Lesson 18.2:** Please watch and discuss the additional Supplemental Videos under the Supplemental Tab in the upper left-hand corner of the Lesson for additional support on the topic. To access the videos, click on the page under the supplemental tab and click on the topic next to the page number.

- **Video-Evidence of Plate Movement**
- **Flocabulary/Earth Layers and Plate Tectonics-** Video, Vocabulary Cards, Vocabulary Game, Reading Passage, and Lyric Lab.

**Additional Teacher Resources: None**

**Break:** 10 minutes

**Lesson Review (10 minutes) Slide 11:**

- The theory of plate tectonics states that the surface of the Earth is divided into several major and minor crustal plates, which are in constant motion, relative to each other, over the asthenosphere.
- There are different continental and oceanic plates on the Earth.
- The African plate, North American plate, South American plate, Eurasian plate, Indian Australian plate, Antarctic plate, and the Pacific plate are the major tectonic plates.
- The Juan de Fuca plate, Caribbean plate, Cocos plate, Nazca plate, Scotia plate, Philippine plate, and the Arabian plate are some of the minor tectonic plates of the Earth.
- There are three types of tectonic plate boundaries: divergent boundaries, convergent boundaries, and transform boundaries.
- The movement of the Earth's plates releases tremendous energy that can transform the Earth's surface, forming volcanoes, causing earthquakes, and forming oceanic trenches, mountains, subduction zones, etc.

**Independent Work – Posttest (They Do 30 minutes) Lesson 18.3:** The students will work independently on their post that is located at the end of each lesson. Explain to the students that they will be assessed and will work independently. Encourage them to think critically and do their best on the Posttest. The Posttest will count as the grade for the daily lesson.

**Closing/Wrap Up/Notes Review (10 minutes):** Take a moment to reflect on the lesson of the day. Use the lesson review to close out the lesson by using an exit ticket or discussion to test the students' knowledge about the lesson. The lesson Review is located under the content tab of each lesson in grade result. It is also listed above under lesson review.

## Summer School Lesson Plan

Subject/Grade: Science/8<sup>th</sup> Grade

Day: 19

Topic/Lesson Title & Grade Results #: Final Post-Test Review & Post-Test

### Objective(s):

- Students will review lessons to prepare for their final Post-test.
- Final Post-test will open. All students must complete the final Post-test.

**Materials/Resources Needed:** Grade Results Online Platform, Grade Results video, paper, pencil, or notes in Grade Results

**Technology:** Computer, Whiteboard, TEAMs meeting (if applicable)

### Take Attendance (5 mins)

### Lesson Introduction (I Do):

- Identify the purpose of the course.
- Connect the course to missing or future coursework and Post-test.

Lesson Activities /Supplemental (We Do) – 30-60 minutes.

### Lesson Activities and Review (We Do):

Check Grade Results and have students review activities/lesson that they have not completed or need assistance with. Hold an open Q&A for students to ask questions regarding the activities/lessons they are reviewing.

### Independent Work – Posttest (They Do):

Students will review and complete any incomplete/missed/failed coursework.

### Closing/Wrap Up:

## Summer School Lesson Plan

Subject/Grade: Science/8<sup>th</sup> Grade

Day: 20

Topic/Lesson Title & Grade Results #: Review Lesson & Quizzes

### Objective(s):

- Students will review and complete all incomplete/missed/failed coursework.
- Students can retake daily post-tests up to three (3) times before the test locks. Teachers can unlock the test so students can retake the test.
- Students can retake the final post-test.

**Materials/Resources Needed:** Grade Results Online Platform, Grade Results video, paper, pencil, or notes in Grade Results

**Technology:** Computer, Whiteboard, TEAMS meeting (if applicable)

### Take Attendance (5 mins)

### Lesson Introduction (I Do):

- Identify the purpose of the course.
- Connect the course to missing or future coursework and Post-test.

Lesson Activities /Supplemental (We Do) – 20-60 minutes.

### Lesson Activities and Review (We Do):

Check Grade Results and have students review activities/lesson that they have not completed or need assistance with. Hold an open Q&A for students to ask questions regarding the activities/lessons they are reviewing.

### Independent Work – Posttest (They Do):

Students will review and complete any incomplete/missed/failed coursework.

### Closing/Wrap Up