2021-2022 Scope and Sequence
Science – Physics

Cycle 1	27 Days Aug. 23 - Oct. 1, 2021	*The recommended number of class periods is less than the number of days in the grading cycle to accommodate differentiated instruction, extended learning time, and assessment days. Complete instructional planning information and support are in the HISD Curriculum documents.*

Unit	# Class Periods	Texas Essential Knowledge and Skills/Student Expectations (TEKS/SEs) The student will:
Unit 1 Measuring and Describing Motion The focus of this unit is on measurement and quantitative observations, including tables, charts, graphs, and equations, used describing the motion of objects.	**3** class periods (90-min. each) or **6** class periods (45-min. each) *Enrichment Opportunities Aug. 2-13* *Teachers Report to Work Aug. 16* *Teacher Service Days Aug. 16-17, Aug. 19-20* *Teacher Prep Day (no students) Aug. 18* *Labor Day Sept. 6* *Fall Holiday Sept. 16* *Teacher Service Day (no students) Sept. 17*	**Science Content Standards:** Ⓡ **PHYS.4A** Generate and interpret graphs and charts describing different typesof motion including investigations using real-time technology such as motion detectors or photogates. **Science Process Standards:** **PHYS.1A** Demonstrate safe practices during laboratory and field investigations **PHYS.1B** Demonstrate an understanding of the use and conservation ofresources and the proper disposal or recycling of materials. Ⓟⓢ **PHYS.2D** Design and implement investigative procedures including makingobservations, asking well-defined questions, formulating testable hypotheses,identifying variables, selecting appropriate equipment and technology, and evaluating numerical answers for reasonableness, and identifying causes andeffects of uncertainties in measured data. Ⓟⓢ **PHYS.2E** Demonstrate the use of course apparatus, equipment, techniques, and procedures, including multimeters (current, voltage, resistance), balance, batteries, dynamic demonstration equipment, collision, apparatus, lab masses, magnets, plane mirrors, convex lenses, stopwatches, trajectory apparatus, graphpapers, magnetic compasses, protractors, metric rulers, spring scales, thermometer, slinky springs, and/or other equipment and materials that will produce the same results. Ⓟⓢ **PHYS.2F** Use a wide variety of additional course apparatuses, equipment, techniques, materials, and procedures as appropriate such as ripple tank with wave generator, wave motion rope, tuning forks, hand-held spectroscopes, discharge tubes with power supply (H, He, Ne, Ar), electromagnetic spectrum charts, laser pointers, micrometers, caliper, computer, data acquisition probes, scientific calculators, graphing technology, electrostatic kit, electroscope, inclinedplane, optics bench, optics kit, polarized fil, prisms, pulley with table clamp, motion detectors, photogates, friction blocks, ballistic carts, or equivalent, resonance tube, stroboscope, resistors, copper wire, switches, iron filings, and/orother equipment and materials that will produce the same results. Ⓟⓢ **PHYS.2G** Make measurements with accuracy and precision and record datausing scientific notation and International System (SI) units. Ⓟⓢ **PHYS.2H** Organize, evaluate, and make inferences from data including theuse of tables, charts, and graphs. Ⓟⓢ **PHYS.2I** Communicate valid conclusions supported by the data through various methods such as lab reports, labeled drawings, graphic organizers,journals, summaries, oral reports, and technology-based reports. Ⓟⓢ **PHYS.2J** Express relationships among physical variables quantitativelyincluding the use of graphs, charts, and equations.

Cycle 1	27 Days Aug. 23 - Oct. 1, 2021	*The recommended number of class periods is less than the number of days in the grading cycle to accommodate differentiated instruction, extended learning time, and assessment days. Complete instructional planning information and support are in the HISD Curriculum documents.*
Unit	**# Class Periods**	**Texas Essential Knowledge and Skills/Student Expectations (TEKS/SEs)** **The student will:**
		Ⓟⓢ **PHYS.3A** Analyze, evaluate, and critique scientific explanations by using empirical evidence, logical reasoning, and experimental and observational testing Ⓟⓢ **PHYS.3B** Communicate and apply scientific information extracted from varioussources such as current events, news reports, published journal articles and marketing materials. Ⓟⓢ **PHYS.3E** Express, manipulate, and interpret relationships symbolically in accordance with accepted theories to make predictions and solve problems mathematically.
Unit 2 **Motion in One Dimension** Students use kinematic equations and graphical vector addition to describe motion in one dimension including speed, velocity, distance, displacement, frame of reference and acceleration.	4 class periods (90-min. each) or **8** class periods (45-min. each)	**Science Content Standards:** Ⓡ **PHYS.4B** Describe and analyze motion in one dimension using equationsand graphical vector addition with the concepts of distance, displacement, speed, average velocity, instantaneous velocity, frame of reference, and acceleration. **Science Process Standards:** Ⓟⓢ **PHYS.2G** Make measurements with accuracy and precision and record datausing scientific notation and International System (SI) units. Ⓟⓢ **PHYS.2H** Organize and evaluate data and make inferences from dataincluding the use of tables, charts, and graphs. Ⓟⓢ **PHYS.2J** Express and manipulate relationships among physical variables quantitatively including the use of graphs, charts, and equations. Ⓟⓢ **PHYS.3A** Analyze, evaluate, and critique scientific explanations by usingempirical evidence, logical reasoning, and experimental and observational testing Ⓟⓢ **PHYS.3B** Communicate and apply scientific information extracted from various sources such as current events, news reports, published journal articlesand marketing materials. Ⓟⓢ **PHYS.3E** Express, manipulate, and interpret relationships symbolically in accordance with accepted theories to make predictions and solve problems mathematically.
Unit 3 **Gravitational Force** Students are introduced to the four fundamental forces in physics. The rest of this unit focuses on the principles and calculations of gravitational force.		**Science Content Standards:** Ⓢ **PHYS.5A** Describe the concepts of gravitational, electromagnetic, weaknuclear, and strong nuclear forces. Ⓡ **PHYS.5B** Describe and calculate how the magnitude of the gravitational force between two objects depends on their masses and the distance between their centers. **Science Process Standards:** Ⓟⓢ **PHY.2A** Know the definition of science. Ⓟⓢ **PHYS.2B** Know that scientific hypotheses are tentative and testable statements that must be capable of being supported or not supported by observational evidence.

2021-2022 Scope and Sequence
Science – Physics

Cycle 1	27 Days Aug. 23 - Oct. 1, 2021	*The recommended number of class periods is less than the number of days in the grading cycle to accommodate differentiated instruction, extended learning time, and assessment days. Complete instructional planning information and support are in the HISD Curriculum documents.*

Unit	# Class Periods	Texas Essential Knowledge and Skills/Student Expectations (TEKS/SEs) The student will:
		Ⓟⓢ **PHYS.2C** Know that scientific theories are based on natural and physicalphenomena and are capable of being tested by multiple independent researchers. Unlike hypotheses, scientific theories are well-established andhighly-reliable explanations, but may be subject to change. Ⓟⓢ **PHYS.2H** Organize and evaluate data and make inferences from dataincluding the use of tables, charts, and graphs. Ⓟⓢ **PHYS.2J** Express relationships among physical variables quantitativelyincluding the use of graphs, charts, and equations. Ⓟⓢ **PHYS.3C** Explain the impacts of the scientific contributions of a variety of historical and contemporary scientists on scientific thought and society. Ⓟⓢ **PHYS.3E** Express, manipulate, and interpret relationships symbolically in accordance with accepted theories to make predictions and solve problems mathematically.

2021-2022 Scope and Sequence
Science – Physics

Cycle 2	29 Days Oct. 5 - Nov. 12, 2021	*The recommended number of class periods is less than the number of days in the grading cycle to accommodate differentiated instruction, extended learning time, and assessment days. Complete instructional planning information and support are in the HISD Curriculum documents.*

Unit	# Class Periods	Texas Essential Knowledge and Skills/Student Expectations (TEKS/SEs) The student will:
Unit 4 **Forces and Laws of Motion** The focus of this unit is describing the effect of forces on the motion of objects. Students calculate the effect of forces including the law of inertia, the relationship between force, and acceleration, and the nature of force pairs between objects using methods including free-body force diagrams.	**7** class periods (90-min. each) or **14** class periods (45-min. each) *Teacher Service Day (no students) Oct. 4*	**Science Content Standards:** Ⓡ **PHYS.4D** Calculate the effect of forces on objects, including the law of inertia,the relationship between force and acceleration, and the nature of force pairs between objects using methods including free-body force diagrams. **Science Process Standards:** Ⓟⓢ **PHYS.2D** Design and implement investigative procedures including makingobservations, asking well-defined questions, formulating testable hypotheses,identifying variables, selecting appropriate equipment and technology, and evaluating numerical answers for reasonableness, and identifying causes andeffects of uncertainties in measured data. Ⓟⓢ **PHYS.2E** Demonstrate the use of course apparatus, equipment, techniques, and procedures, including multimeters (current, voltage, resistance), balance, batteries, dynamic demonstration equipment, collision, apparatus, lab masses, magnets, plane mirrors, convex lenses, stopwatches, trajectory apparatus, graphpapers, magnetic compasses, protractors, metric rulers, spring scales, thermometer, slinky springs, and/or other equipment and materials that will produce the same results. Ⓟⓢ **PHYS.2F** Use a wide variety of additional course apparatuses, equipment, techniques, materials, and procedures as appropriate such as ripple tank with wave generator, wave motion rope, tuning forks, hand-held spectroscopes, discharge tubes with power supply (H, He, Ne, Ar), electromagnetic spectrum charts, laser pointers, micrometers, caliper, computer, data acquisition probes, scientific calculators, graphing technology, electrostatic kit, electroscope, inclined plane, optics bench, optics kit, polarized fil, prisms, pulley with table clamp, motion detectors, photogates, friction blocks, ballistic carts, or equivalent,resonance tube, stroboscope, resistors, copper wire, switches, iron filings, and/or other equipment and materials that will produce the same results. Ⓟⓢ **PHYS.2G** Make measurements with accuracy and precision and record datausing scientific notation and International System (SI) units. Ⓟⓢ **PHYS.2H** Organize and evaluate data and make inferences from dataincluding the use of tables, charts, and graphs. Ⓟⓢ **PHYS.2I** Communicate valid conclusions supported by the data through various methods such as lab reports, labeled drawings, graphic organizers,journals, summaries, oral reports, and technology-based reports. **PHYS.2J** Express relationships among physical variables quantitatively including the use of graphs, charts, and equations. **PHYS.3C** Explain the impacts of the scientific contributions of a variety ofhistorical and contemporary scientists on scientific thought and society. Ⓟⓢ **PHYS.3E** Express, manipulate, and interpret relationships symbolically in accordance with accepted theories to make predictions and solve problems mathematically.

Cycle 2	29 Days Oct. 5 - Nov. 12, 2021	*The recommended number of class periods is less than the number of days in the grading cycle to accommodate differentiated instruction, extended learning time, and assessment days. Complete instructional planning information and support are in the HISD Curriculum documents.*
Unit	**# Class Periods**	**Texas Essential Knowledge and Skills/Student Expectations (TEKS/SEs)** **The student will:**
Unit 5 **Motion in Two Dimensions** Students continue analyzing motion using vectors and kinematic equations for projectile and circular motion.	**5** class periods (90-min. each) or **10** class periods (45-min. each)	**Science Content Standards:** Ⓢ **PHYS.4C** Analyze and describe accelerated motion in two dimensions, including using equations, graphical vector addition, and projectile and circularexamples. **Science Process Standards:** Ⓟⓢ **PHYS.2E** Demonstrate the use of course apparatus, equipment, techniques, and procedures, including multimeters (current, voltage, resistance), balance, batteries, dynamic demonstration equipment, collision, apparatus, lab masses, magnets, plane mirrors, convex lenses, stopwatches, trajectory apparatus, graphpapers, magnetic compasses, protractors, metric rulers, spring scales, thermometer, slinky springs, and/or other equipment and materials that will produce the same results. Ⓟⓢ **PHYS.2F** Use a wide variety of additional course apparatuses, equipment, techniques, materials, and procedures as appropriate such as ripple tank with wave generator, wave motion rope, tuning forks, hand-held spectroscopes, discharge tubes with power supply (H, He, Ne, Ar), electromagnetic spectrum charts, laser pointers, micrometers, caliper, computer, data acquisition probes, scientific calculators, graphing technology, electrostatic kit, electroscope, inclined plane, optics bench, optics kit, polarized fil, prisms, pulley with table clamp, motion detectors, photogates, friction blocks, ballistic carts, or equivalent,resonance tube, stroboscope, resistors, copper wire, switches, iron filings, and/or other equipment and materials that will produce the same results. Ⓟⓢ **PHYS.2G** Make measurements with accuracy and precision and record datausing scientific notation and International System (SI) units. Ⓟⓢ **PHYS.2H** Organize and evaluate data and make inferences from dataincluding the use of tables, charts, and graphs. Ⓟⓢ **PHYS.2J** Express relationships among physical variables quantitativelyincluding the use of graphs, charts, and equations. Ⓟⓢ **PHYS.3C** Explain the impacts of the scientific contributions of a variety ofhistorical and contemporary scientists on scientific thought and society. Ⓟⓢ **PHYS.3E** Express, manipulate, and interpret relationships symbolically in accordance with accepted theories to make predictions and solve problems mathematically.

2021-2022 Scope and Sequence
Science – Physics

Cycle 3	30 Days Nov. 15, 2021 - Jan. 14, 2022	*The recommended number of class periods is less than the number of days in the grading cycle to accommodate differentiated instruction, extended learning time, and assessment days. Complete instructional planning information and support are in the HISD Curriculum documents.*

Unit	# Class Periods	Texas Essential Knowledge and Skills/Student Expectations (TEKS/SEs) The student will:
Unit 6 **Mechanical Energy, Momentum, andImpulse** The focus for this unit is for students to calculate momentum, power, mechanical energy, and apply the impulse-theorem in physical systems.	**3** class periods (90-min. each) or **6** class periods (45-min. each) *Thanksgiving Break* *Nov. 22-26* *Enrichment Opportunities* *Dec. 20-21* *Winter Break* *Dec. 20-31* *MLK Jr. Day* *Jan. 17* *Teacher Prep Day* *(no students)* *Jan. 18*	**Science Content Standards:** Ⓡ **PHYS.6C** Calculate the mechanical energy of power generated within,impulse applied to, and momentum of a physical system. **Science Process Standards:** Ⓟⓢ **PHYS.2D** Design and implement investigative procedures including makingobservations, asking well-defined questions, formulating testable hypotheses,identifying variables, selecting appropriate equipment and technology, and evaluating numerical answers for reasonableness, and identifying causes andeffects of uncertainties in measured data. Ⓟⓢ **PHYS.2G** Make measurements with accuracy and precision and record datausing scientific notation and International System (SI) units. Ⓟⓢ **PHYS.2I** Communicate valid conclusions supported by the data through various methods such as lab reports, labeled drawings, graphic organizers,journals, summaries, oral reports, and technology-based reports. Ⓟⓢ **PHYS.2J** Express relationships among physical variables quantitativelyincluding the use of graphs, charts, and equations. Ⓟⓢ **PHYS.3D** Research and describe the connections between physics and futurecareers.
Unit 7 **Work-Energy Theorem and Energy Transformati-ons** Students investigate and calculate examples of the work-energy theorem and investigate examples of energy transformations.	**6** class periods (90-min. each) or **12** class periods (45-min. each)	**Science Content Standards:** Ⓡ **PHYS.6A** Investigate and calculate quantities using the work-energy theoremin various situations. Ⓡ **PHYS.6B** Investigate examples of kinetic and potential energy and their transformations. **Science Process Standards:** Ⓟⓢ **PHYS.1A** Demonstrate safe practices during laboratory and fieldinvestigations. Ⓟⓢ **PHYS.2D** Design and implement investigative procedures including makingobservations, asking well-defined questions, formulating testable hypotheses,identifying variables, selecting appropriate equipment and technology, and evaluating numerical answers for reasonableness, and identifying causes andeffects of uncertainties in measured data. Ⓟⓢ **PHYS.2E** Demonstrate the use of course apparatus, equipment, techniques, and procedures, including multimeters (current, voltage, resistance), balance, batteries, dynamic demonstration equipment, collision, apparatus, lab masses, magnets, plane mirrors, convex lenses, stopwatches, trajectory apparatus, graphpapers, magnetic compasses, protractors, metric

Cycle 3	30 Days Nov. 15, 2021 - Jan. 14, 2022	*The recommended number of class periods is less than the number of days in the grading cycle to accommodate differentiated instruction, extended learning time, and assessment days. Complete instructional planning information and support are in the HISD Curriculum documents.*
Unit	**# Class Periods**	**Texas Essential Knowledge and Skills/Student Expectations (TEKS/SEs)** **The student will:**
		rulers, spring scales, thermometer, slinky springs, and/or other equipment and materials that will produce the same results. Ⓟ **PHYS.2G** Make measurements with accuracy and precision and record datausing scientific notation and International System (SI) units. Ⓟ **PHYS.2H** Organize and evaluate data and make inferences from data includingthe use of tables, charts, and graphs. Ⓟ **PHYS.2I** Communicate valid conclusions supported by the data through various methods such as lab reports, labeled drawings, graphic organizers,journals, summaries, oral reports, and technology-based reports. Ⓟ **PHYS.2J** Express relationships among physical variables quantitatively including the use of graphs, charts, and equations.
Unit 8 Conservation of Energy and Momentum After calculating momentum and energy in various situation students demonstrate and apply the laws of conservation of energy and momentum in one dimension.	**3** class periods (90-min. each) or **6** class periods (45-min. each)	**Science Content Standards:** Ⓡ **PHYS.6D** Demonstrate and apply the laws of conservation of energy andconservation of momentum in one dimension. **Science Process Standards:** Ⓟ **PHYS.2D** Design and implement investigative procedures including makingobservations, asking well-defined questions, formulating testable hypotheses,identifying variables, selecting appropriate equipment and technology, and evaluating numerical answers for reasonableness, and identifying causes andeffects of uncertainties in measured data. Ⓟ **PHYS.2G** Make measurements with accuracy and precision and record datausing scientific notation and International System (SI) units. Ⓟ **PHYS.2H** Organize and evaluate data and make inferences from data includingthe use of tables, charts, and graphs. Ⓟ **PHYS.2I** Communicate valid conclusions supported by the data throughvarious methods such as lab reports, labeled drawings, graphic organizers, journals, summaries, oral reports, and technology-based reports. Ⓟ **PHYS.2J** Express relationships among physical variables quantitativelyincluding the use of graphs, charts, and equations. Ⓟ **PHYS.3B** Communicate and apply scientific information extracted from varioussources such as current events, news reports, published journal articles and marketing materials. Ⓟ **PHYS.3E** Express, manipulate, and interpret relationships symbolically in accordance with accepted theories to make predictions and solve problems mathematically.

Cycle 4	27 Days Jan. 19 - Feb. 25, 2022	*The recommended number of class periods is less than the number of days in the grading cycle to accommodate differentiated instruction, extended learning time, and assessment days. Complete instructional planning information and support are in the HISD Curriculum documents.*

Unit	# Class Periods	Texas Essential Knowledge and Skills/Student Expectations (TEKS/SEs) The student will:
Unit 9 **Thermodynamic s and Thermal Energy Transfer** In this unit, students explain Four Laws of Thermodynamics with examples and also give examples of the processes of thermal energy transfer.	**2** class periods (90-min. each) or **4** class periods (45-min. each) *Teacher Service Day/Presidents' Day (no students) Feb. 21*	**Science Content Standards:** Ⓢ **PHYS.6E** Explain everyday examples that illustrate the four laws ofthermodynamics and the processes of thermal energy transfer. **Science Process Standards:** Ⓟⓢ **PHYS.2D** Design and implement investigative procedures including makingobservations, asking well-defined questions, formulating testable hypotheses,identifying variables, selecting appropriate equipment and technology, and evaluating numerical answers for reasonableness, and identifying causes andeffects of uncertainties in measured data. Ⓟⓢ **PHYS.2E** Demonstrate the use of course apparatus, equipment, techniques, and procedures, including multimeters (current, voltage, resistance), balance, batteries, dynamic demonstration equipment, collision, apparatus, lab masses, magnets, plane mirrors, convex lenses, stopwatches, trajectory apparatus, graphpapers, magnetic compasses, protractors, metric rulers, spring scales, thermometer, slinky springs, and/or other equipment and materials that will produce the same results. Ⓟⓢ **PHYS.2G** Make measurements with accuracy and precision and record datausing scientific notation and International System (SI) units. Ⓟⓢ **PHYS.2H** Organize and evaluate data and make inferences from dataincluding the use of tables, charts, and graphs. Ⓟⓢ **PHYS.2I** Communicate valid conclusions supported by the data through various methods such as lab reports, labeled drawings, graphic organizers,journals, summaries, oral reports, and technology-based reports. **PHYS.2J** Express relationships among physical variables quantitatively including the use of graphs, charts, and equations. Ⓟⓢ **PHYS.3B** Communicate and apply scientific information extracted from various sources such as current events, news reports, published journal articlesand marketing materials. Ⓟⓢ **PHYS.3C** Explain the impacts of the scientific contributions of a variety ofhistorical and contemporary scientists on scientific thought and society Ⓟⓢ **PHYS.3D** Research and describe the connections between physics and futurecareers. Ⓟⓢ **PHYS.3E** Express, manipulate, and interpret relationships symbolically in accordance with accepted theories to make predictions and solve problems mathematically.

2021-2022 Scope and Sequence
Science – Physics

Cycle 4	27 Days Jan. 19 - Feb. 25, 2022	*The recommended number of class periods is less than the number of days in the grading cycle to accommodate differentiated instruction, extended learning time, and assessment days. Complete instructional planning information and support are in the HISD Curriculum documents.*

Unit	# Class Periods	Texas Essential Knowledge and Skills/Student Expectations (TEKS/SEs) The student will:
Unit 10 **Wave Propagati-on and Characteristics** Students examine propagation of waves in various types of media and investigate and interpret a variety of waves, their characteristics, and properties and calculate wave speed, frequency, and wavelength of different types of waves.	**5** class periods (90-min. each) or **10** class periods (45-min. each)	**Science Content Standards:** Ⓢ **PHYS.7A** Examine and describe oscillatory motion and wave propagation invarious types of media. Ⓡ **PHYS.7B** Investigate and analyze characteristics of waves including velocity, frequency, amplitude, and wavelength and calculate using the relationshipbetween wave speed, frequency, and wavelength. **Science Process Standards:** Ⓟⓢ **PHYS.2D** Design and implement investigative procedures including makingobservations, asking well-defined questions, formulating testable hypotheses,identifying variables, selecting appropriate equipment and technology, and evaluating numerical answers for reasonableness, and identifying causes andeffects of uncertainties in measured data. Ⓟⓢ **PHYS.2E** Demonstrate the use of course apparatus, equipment, techniques, and procedures, including multimeters (current, voltage, resistance), balance, batteries, dynamic demonstration equipment, collision, apparatus, lab masses, magnets, plane mirrors, convex lenses, stopwatches, trajectory apparatus, graphpapers, magnetic compasses, protractors, metric rulers, spring scales, thermometer, slinky springs, and/or other equipment and materials that will produce the same results. Ⓟⓢ **PHYS.2F** Use a wide variety of additional course apparatuses, equipment, techniques, materials, and procedures as appropriate such as ripple tank with wave generator, wave motion rope, tuning forks, hand-held spectroscopes, discharge tubes with power supply (H, He, Ne, Ar), electromagnetic spectrum charts, laser pointers, micrometers, caliper, computer, data acquisition probes, scientific calculators, graphing technology, electrostatic kit, electroscope, inclined plane, optics bench, optics kit, polarized fil, prisms, pulley with table clamp, motion detectors, photogates, friction blocks, ballistic carts, or equivalent,resonance tube, stroboscope, resistors, copper wire, switches, iron filings, and/or other equipment and materials that will produce the same results. Ⓟⓢ **PHYS.2G** Make measurements with accuracy and precision and record datausing scientific notation and International System (SI) units. Ⓟⓢ **PHYS.2H** Organize and evaluate data and make inferences from dataincluding the use of tables, charts, and graphs. Ⓟⓢ **PHYS.2I** Communicate valid conclusions supported by the data through various methods such as lab reports, labeled drawings, graphic organizers,journals, summaries, oral reports, and technology-based reports. Ⓟⓢ **PHYS.2J** Express relationships among physical variables quantitativelyincluding the use of graphs, charts, and equations. Ⓟⓢ **PHYS.3E** Express, manipulate, and interpret relationships symbolically in accordance with accepted theories to make predictions and solve problems mathematically.

Cycle 4	27 Days Jan. 19 - Feb. 25, 2022	*The recommended number of class periods is less than the number of days in the grading cycle to accommodate differentiated instruction, extended learning time, and assessment days. Complete instructional planning information and support are in the HISD Curriculum documents.*

Unit	# Class Periods	Texas Essential Knowledge and Skills/Student Expectations (TEKS/SEs) The student will:
Unit 11 **Characteristics and Behaviors of Sound Waves** Students investigate characteristics and behaviors of longitudinal waves including sound waves.	**2** class periods (90-min. each) or **4** class periods (45-min. each)	**Science Content Standards:** Ⓢ **PHYS.7C** Compare characteristics and behaviors of transverse waves including electromagnetic waves and the electromagnetic spectrum, and characteristics and behaviors of longitudinal waves including sound waves. Ⓡ **PHYS.7D** Investigate behaviors of waves including reflection, refraction, diffraction, interference, resonance, and the Doppler effect. **Science Process Standards:** Ⓟⓢ **PHYS.2D** Design and implement investigative procedures including makingobservations, asking well-defined questions, formulating testable hypotheses,identifying variables, selecting appropriate equipment and technology, and evaluating numerical answers for reasonableness, and identifying causes andeffects of uncertainties in measured data. Ⓟⓢ **PHYS.2H** Organize and evaluate data and make inferences from dataincluding the use of tables, charts, and graphs. Ⓟⓢ **PHYS.2I** Communicate valid conclusions supported by the data through various methods such as lab reports, labeled drawings, graphic organizers, journals, summaries, oral reports, and technology-based reports.
Unit 12 **Electromagnetic Waves and Image Formation** Students investigate characteristics and behaviors of transverse waves such as electromagnetic waves and investigate, describe, and predict image formation as a consequence of reflection from a plane mirror and refraction through a thin convex lens.	**2** class periods (90-min. each) or **4** class periods (45-min. each)	**Science Content Standards:** Ⓢ **PHYS.7C** Compare characteristics and behaviors of transverse waves including electromagnetic waves and the electromagnetic spectrum and characteristics and behaviors of longitudinal waves including sound waves. Ⓡ **PHYS.7D** Investigate behaviors of waves including reflection, refraction, diffraction, interference, resonance, and the Doppler effect. Ⓢ **PHYS.7E** Describe and predict image formation as a consequence of reflection from a plane mirror and refraction through a thin convex lens. **Science Process Standards:** Ⓟⓢ **PHYS.2D** Design and implement investigative procedures including makingobservations, asking well-defined questions, formulating testable hypotheses,identifying variables, selecting appropriate equipment and technology, and evaluating numerical answers for reasonableness, and identifying causes andeffects of uncertainties in measured data. Ⓟⓢ **PHYS.2H** Organize and evaluate data and make inferences from dataincluding the use of tables, charts, and graphs. Ⓟⓢ **PHYS.2I** Communicate valid conclusions supported by the data through various methods such as lab reports, labeled drawings, graphic organizers,journals, summaries, oral reports, and technology-based reports.

Cycle 4	27 Days Jan. 19 - Feb. 25, 2022	*The recommended number of class periods is less than the number of days in the grading cycle to accommodate differentiated instruction, extended learning time, and assessment days. Complete instructional planning information and support are in the HISD Curriculum documents.*

Unit	# Class Periods	Texas Essential Knowledge and Skills/Student Expectations (TEKS/SEs) The student will:
		Ⓟⓢ **PHYS.2J** Express relationships among physical variables quantitativelyincluding the use of graphs, charts, and equations. Ⓟⓢ **PHYS.3D** Research and describe the connections between physics and futurecareers. Ⓟⓢ**PHYS.3E** Express and interpret relationship symbolically in accordance with accepted theories to make predictions and solve problems mathematically.

2021-2022 Scope and Sequence
Science – Physics

Cycle 5	33 Days Feb. 28 - Apr. 22, 2022	*The recommended number of class periods is less than the number of days in the grading cycle to accommodate differentiated instruction, extended learning time, and assessment days. Complete instructional planning information and support are in the HISD Curriculum documents.*

Unit	# Class Periods	Texas Essential Knowledge and Skills/Student Expectations (TEKS/SEs) The student will:
Unit 13 Electric and Magnetic Forces This unit focuses on electric and magnetic forces and the relationship between the two. Students calculate the electric force between objects and investigate the relationship between electric and magnetic forces in everyday applications such as generators, motors, and transformers.	**6** class periods (90-min. each) or **12** class periods (45-min. each) *Enrichment Opportunities Mar. 14-16* *Spring Break Mar. 14-18* *Chávez-Huerta Day Mar. 28* *Spring Holiday Apr. 15*	**Science Content Standards:** Ⓢ **PHYS.5C** Describe and calculate how the magnitude of the electric force between two objects depends on their charges and the distance between their centers. Ⓢ **PHYS.5D** Identify and describe examples of electric and magnetic forces and fields in everyday life such as generators, motors, and transformers. **Science Process Standards:** Ⓟⓢ **PHYS.2E** Demonstrate the use of course apparatus, equipment, techniques, and procedures, including multimeters (current, voltage, resistance), balance, batteries, dynamic demonstration equipment, collision, apparatus, lab masses, magnets, plane mirrors, convex lenses, stopwatches, trajectory apparatus, graphpapers, magnetic compasses, protractors, metric rulers, spring scales, thermometer, slinky springs, and/or other equipment and materials that will produce the same results. Ⓟⓢ **PHYS.2F** Use a wide variety of additional course apparatuses, equipment, techniques, materials, and procedures as appropriate such as ripple tank with wave generator, wave motion rope, tuning forks, hand-held spectroscopes, discharge tubes with power supply (H, He, Ne, Ar), electromagnetic spectrum charts, laser pointers, micrometers, caliper, computer, data acquisition probes, scientific calculators, graphing technology, electrostatic kit, electroscope, inclined plane, optics bench, optics kit, polarized fil, prisms, pulley with table clamp, motion detectors, photogates, friction blocks, ballistic carts, or equivalent,resonance tube, stroboscope, resistors, copper wire, switches, iron filings, and/or other equipment and materials that will produce the same results. Ⓟⓢ **PHYS.2G** Make measurements with accuracy and precision and record datausing scientific notation and International System (SI) units. Ⓟⓢ**PHYS.2J** Express relationships among physical variables quantitativelyincluding the use of graphs, charts, and equations. Ⓟⓢ **PHYS.3B** Communicate and apply scientific information extracted from various sources such as current events, news reports, published journal articlesand marketing materials. Ⓟⓢ **PHYS.3C** Explain the impacts of the scientific contributions of a variety ofhistorical and contemporary scientists on scientific thought and society. Ⓟⓢ **PHYS.3E** Express and interpret relationships symbolically in accordance withaccepted theories to make predictions and solve problems mathematically.

2021-2022 Scope and Sequence
Science – Physics

Cycle 5	33 Days Feb. 28 - Apr. 22, 2022	*The recommended number of class periods is less than the number of days in the grading cycle to accommodate differentiated instruction, extended learning time, and assessment days. Complete instructional planning information and support are in the HISD Curriculum documents.*
Unit	**# Class Periods**	**Texas Essential Knowledge and Skills/Student Expectations (TEKS/SEs)** **The student will:**
Unit 14 **Electric Circuits** Students characterize materials as conductors or insulators based on their electric properties. Students also investigate, construct, and analyze series and parallel circuits using calculation for potential difference, resistance, and power used by electric circuit elements in both series and parallel combinations.	**7** class periods (90-min. each) or **14** class periods (45-min. each)	**Science Content Standards:** Ⓢ **PHYS.5E** Characterize materials as conductors or insulators based on theirelectric properties. Ⓡ **PHYS.5F** Investigate and calculate current through, potential difference across, resistance of, and power used by electric circuit elements connected in both series and parallel combinations. **Science Process Standards:** Ⓟⓢ **PHYS.2D** Design and implement investigative procedures including makingobservations, asking well-defined questions, formulating testable hypotheses,identifying variables, selecting appropriate equipment and technology, and evaluating numerical answers for reasonableness, and identifying causes andeffects of uncertainties in measured data. Ⓟⓢ **PHYS.2E** Demonstrate the use of course apparatus, equipment, techniques, and procedures, including multimeters (current, voltage, resistance), balance, batteries, dynamic demonstration equipment, collision, apparatus, lab masses, magnets, plane mirrors, convex lenses, stopwatches, trajectory apparatus, graphpapers, magnetic compasses, protractors, metric rulers, spring scales, thermometer, slinky springs, and/or other equipment and materials that will produce the same results. Ⓟⓢ **PHYS.2F** Use a wide variety of additional course apparatuses, equipment, techniques, materials, and procedures as appropriate such as ripple tank with wave generator, wave motion rope, tuning forks, hand-held spectroscopes, discharge tubes with power supply (H, He, Ne, Ar), electromagnetic spectrum charts, laser pointers, micrometers, caliper, computer, data acquisition probes, scientific calculators, graphing technology, electrostatic kit, electroscope, inclined plane, optics bench, optics kit, polarized fil, prisms, pulley with table clamp, motion detectors, photogates, friction blocks, ballistic carts, or equivalent,resonance tube, stroboscope, resistors, copper wire, switches, iron filings, and/or other equipment and materials that will produce the same results. Ⓟⓢ **PHYS.2G** Make measurements with accuracy and precision and record datausing scientific notation and International System (SI) units. Ⓟⓢ **PHYS.2H** Organize and evaluate data and make inferences from dataincluding the use of tables, charts, and graphs. Ⓟⓢ **PHYS.2I** Communicate valid conclusions supported by the data through various methods such as lab reports, labeled drawings, graphic organizers,journals, summaries, oral reports, and technology-based reports. Ⓟⓢ **PHYS.2J** Express relationships among physical variables quantitativelyincluding the use of graphs, charts, and equations. Ⓟⓢ **PHYS.3E** Express and interpret relationships symbolically in accordance withaccepted theories to make predictions and solve problems mathematically.

Cycle 6	31 Days Apr. 25 - June 7, 2022	*The recommended number of class periods is less than the number of days in the grading cycle to accommodate differentiated instruction, extended learning time, and assessment days. Complete instructional planning information and support are in the HISD Curriculum documents.*
Unit	**# Class Periods**	**Texas Essential Knowledge and Skills/Student Expectations (TEKS/SEs)** **The student will:**
Unit 15 **Photoelectric Effect and Atomic Physics** Students investigate atomic and quantum phenomena including the dualnature of light. Calculate and describe the application of mass-energy equivalence.	**5** class periods (90-min. each) or **10** class periods (45-min. each) *Memorial Day* *May 30* *Teacher Prep Day* *(no students)* *June 8*	**Science Content Standards:** Ⓡ **PHYS.8A** Describe the photoelectric effect and the dual nature of light. Ⓢ **PHYS.8B** Compare and explain the emission spectra produced by various atoms. Ⓢ **PHYS.8C** Calculate and describe the applications of mass-energy equivalence. **Science Process Standards:** Ⓟⓢ **PHYS.2H** Organize and evaluate data and make inferences from dataincluding the use of tables, charts, and graphs. Ⓟⓢ **PHYS.2J** Express relationships among physical variables quantitativelyincluding the use of graphs, charts, and equations. Ⓟⓢ **PHYS.3A** Analyze, evaluate, and critique scientific explanations by usingempirical evidence, logical reasoning, and experimental and observational testing Ⓟⓢ **PHYS.3B** Communicate and apply scientific information extracted from varioussources such as current events, news reports, published journal articles, and marketing materials. Ⓟⓢ **PHYS.3C** Explain the impacts of the scientific contributions of a variety of historical and contemporary scientists on scientific thought and society.
Unit 16 **Applications of Atomic and Nuclear Physics** Students investigate examples of atomic, nuclear, and quantum phenomena in everyday applications.	**2** class periods (90-min. each) or **4** class periods (45-min. each)	**Science Content Standards:** Ⓢ **PHYS.8D** Give examples of applications of atomic and nuclear phenomenausing the standard model such as nuclear stability, fission and fusion, radiation therapy, diagnostic imaging, semiconductors, superconductors, solar cells andnuclear power and examples of applications of quantum phenomena. **Science Process Standards:** Ⓟⓢ **PHYS.2J** Express relationships among physical variables quantitativelyincluding the use of graphs, charts, and equations. Ⓟⓢ **PHYS.3B** Communicate and apply scientific information extracted from varioussources such as current events, news reports, published journal articles, and marketing materials. Ⓟⓢ **PHYS.3C** Explain the impacts of the scientific contributions of a variety ofhistorical and contemporary scientists on scientific thought and society. Ⓟⓢ **PHYS.3D** Research and describe the connections between physics and futurecareers. Ⓟⓢ **PHYS.3E** Express and interpret relationships symbolically in accordance withaccepted theories to make predictions and solve problems mathematically.

Cycle 6	31 Days Apr. 25 - June 7, 2022	*The recommended number of class periods is less than the number of days in the grading cycle to accommodate differentiated instruction, extended learning time, and assessment days. Complete instructional planning information and support are in the HISD Curriculum documents.*
Unit	**# Class Periods**	**Texas Essential Knowledge and Skills/Student Expectations (TEKS/SEs)** **The student will:**
	6 class periods (90-min. each) or **12** class periods (45-min. each)	**Science Content Standards:** **(Suggested Spiraling TEKS for STEM/PBL Projects)** Ⓡ **PHYS.4A** Generate and interpret graphs and charts describing different typesof motion including investigations using real-time technology such as motion detectors or photogates. Ⓡ **PHYS.4B** Describe and analyze motion in one dimension using equationsand graphical vector addition with the concepts of distance, displacement, speed, average velocity, instantaneous velocity, frame of reference, and acceleration. Ⓡ **PHYS.4D** Calculate the effect of forces on objects, including the law of inertia,the relationship between force and acceleration, and the nature of force pairs between objects using methods including free-body force diagrams. Ⓢ **PHYS.4C** Analyze and describe accelerated motion in two dimensions, including using equations, graphical vector addition, and projectile and circularexamples. Ⓢ **PHYS.5D** Identify and describe examples of electric and magnetic forces andfields in everyday life such as generators, motors, and transformers. Ⓡ **PHYS.5F** Investigate and calculate current through, potential difference across, resistance of, and power used by electric circuit elements connected inboth series and parallel combinations. Ⓡ **PHYS.6D** Demonstrate and apply the laws of conservation of energy and conservation of momentum in one dimension. Ⓢ **PHYS.6E** Explain everyday examples that illustrate the four laws of thermodynamics and the processes of thermal energy transfer. Ⓢ **PHYS.7C** Compare characteristics and behaviors of transverse waves including electromagnetic waves and the electromagnetic spectrum and characteristics and behaviors of longitudinal waves including sound waves. Ⓡ **PHYS.7D** Investigate behaviors of waves including reflection, refraction,diffraction, interference, resonance, and the Doppler effect. Ⓢ **PHYS.8D** Give examples of applications of atomic and nuclear phenomena using the standard model such as nuclear stability, fission and fusion, radiation therapy, diagnostic imaging, semiconductors, superconductors, solar cells and nuclear power and examples of applications of quantum phenomena.

Cycle 6	31 Days Apr. 25 - June 7, 2022	*The recommended number of class periods is less than the number of days in the grading cycle to accommodate differentiated instruction, extended learning time, and assessment days. Complete instructional planning information and support are in the HISD Curriculum documents.*
Unit	**# Class Periods**	**Texas Essential Knowledge and Skills/Student Expectations (TEKS/SEs)** **The student will:**
		Science Process Standards: Ⓟⓢ **PHYS.1A** Demonstrate safe practices during laboratory and fieldinvestigations. Ⓟⓢ **PHYS.1B** Demonstrate an understanding of the use and conservation ofresources and the proper disposal or recycling of materials. Ⓟⓢ **PHYS.2A** Know the definition of science. Ⓟⓢ **PHYS.2B** Know that scientific hypotheses are tentative and testable statements that must be capable of being supported or not supported byobservational evidence. Ⓟⓢ **PHYS.2D** Design and implement investigative procedures including making observations, asking well-defined questions, formulating testable hypotheses, identifying variables, selecting appropriate equipment and technology, and evaluating numerical answers for reasonableness and identifying causes and effects of uncertainties in measured data. Ⓟⓢ **PHYS.2E** Demonstrate the use of course apparatus, equipment, techniques, and procedures, including multimeters (current, voltage, resistance), balance, batteries, dynamic demonstration equipment, collision, apparatus, lab masses, magnets, plane mirrors, convex lenses, stopwatches, trajectory apparatus, graphpapers, magnetic compasses, protractors, metric rulers, spring scales, thermometer, slinky springs, and/or other equipment and materials that will produce the same results. Ⓟⓢ **PHYS.2F** Use a wide variety of additional course apparatuses, equipment, techniques, materials, and procedures as appropriate such as ripple tank with wave generator, wave motion rope, tuning forks, hand-held spectroscopes, discharge tubes with power supply (H, He, Ne, Ar), electromagnetic spectrum charts, laser pointers, micrometers, caliper, computer, data acquisition probes, scientific calculators, graphing technology, electrostatic kit, electroscope, inclined plane, optics bench, optics kit, polarized fil, prisms, pulley with table clamp, motion detectors, photogates, friction blocks, ballistic carts, or equivalent,resonance tube, stroboscope, resistors, copper wire, switches, iron filings, and/or other equipment and materials that will produce the same results. Ⓟⓢ **PHYS.2G** Make measurements with accuracy and precision and record datausing scientific notation and International System (SI) units. Ⓟⓢ **PHYS.2H** Organize, evaluate, and make inferences from data including theuse of tables, charts, and graphs. Ⓟⓢ **PHYS.2I** Communicate valid conclusions supported by the data through various methods such as lab reports, labeled drawings, graphic organizers,journals, summaries, oral reports, and technology-based reports. Ⓟⓢ **PHYS.2J** Express relationships among physical variables quantitativelyincluding the use of graphs, charts, and equations.

2021-2022 Scope and Sequence
Science – Physics

Cycle 6	31 Days Apr. 25 - June 7, 2022	*The recommended number of class periods is less than the number of days in the grading cycle to accommodate differentiated instruction, extended learning time, and assessment days. Complete instructional planning information and support are in the HISD Curriculum documents.*

Unit	# Class Periods	Texas Essential Knowledge and Skills/Student Expectations (TEKS/SEs) The student will:
		Ⓟ **PHYS.3A** Analyze, evaluate, and critique scientific explanations by usingempirical evidence, logical reasoning, and experimental and observational testing. Ⓟ **PHYS.3B** Communicate and apply scientific information extracted from various sources such as current events, news reports, published journal articles,and marketing materials. Ⓟ **PHYS.3C** Explain the impacts of the scientific contributions of a variety ofhistorical and contemporary scientists on scientific thought and society Ⓟ **PHYS.3D** Research and describe the connections between physics and future careers.