Multiple Category Scope and Sequence: Scope and Sequence Report For Course Standards and Objectives, Content, Skills, Vocabulary

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	Unit	Course Standards and Objectives	Content	Skills	Vocabulary
District Basic **Physics with Technology (21.0105) (District)** 2014-2015 **Collaboration**	**Science Basics** (Week 1, 3 Weeks)		Scientific Method Process Metric vs English Standard Units of Measurement Fundamental and Derived Properties of Matter Tools and Methods of Measurement Use significant digits to reflect accuracy of measurement. Unit Conversions Graphing Skills Math ▪ significant digits ▪ Percentages ▪ Add, Subtract, Multiply, Divide ▪ scientific notation	Write a lab report that follows science standards. Collect and record accurate measurements using: ▪ Ruler/Meter Stick ▪ Scale ▪ Stop Watch Perform calculations using unit analysis Record measurements using significant digits. Report derived values using appropriately rounded numbers.	▪ hypothesis ▪ fact ▪ law ▪ principle ▪ scientific method ▪ theory ▪ Metric System ▪ Distance, d ▪ Time, t ▪ Area, A ▪ Volume, V ▪ Mass, m ▪ Weight, W or F_w ▪ Millimeter, mm ▪ Centimeter, cm, ▪ Meter, m ▪ Kilometer, km ▪ Milligram, mg ▪ Gram, g ▪ Kilogram, kg ▪ Milliliter, ml ▪ Liter, L ▪ Second, sec or s ▪ Cubic Centimeter, cc=ml=cm^3 ▪ Square Centimeter, cm^2 ▪ significant digits ▪ symbol ▪ unit of measurement ▪ empirical evidence ▪ replicable observations ▪ scientific law
	Position, Velocity and Acceleration (Week 4, 3 Weeks)	UT: CTE: Technical and Engineering, UT: Grades 9-12, Principles of Technology Standard 1 Students will understand how to measure, calculate, and describe the motion of an object in terms of position, time, velocity, and	▪ The motion of an object can be described by measurements of its position at different times. ▪ Velocity is a measure of the rate of change of position of an object. ▪ Acceleration is a measure	▪ Measure linear or angular distance and time. ▪ Record data using significant digits, symbols and units. ▪ Create and label a graph of data using best fit lines. ▪ Interpret graphical representation of data (velocity	position time time interval

acceleration.

- Objective 1
  Describe the motion of an object in terms of position, time, and velocity.
  a. Calculate the average velocity of a moving object using data obtained from measurements of position of the object at two or more times.
  b. Distinguish between distance and displacement.
  c. Distinguish between speed and velocity.
  d. Determine and compare the average and instantaneous velocity of an object from data showing its position at given times.
  e. Collect, graph, and interpret data for position vs. time to describe the motion of an object and compare this motion to the motion of another object.
- Objective 2
  Analyze the motion of an object in terms of velocity, time, and acceleration.
  a. Determine the average acceleration of an object from data showing velocity at given times.
  b. Describe the velocity of an object when its acceleration is zero.
  c. Collect, graph, and interpret data for velocity vs. time to describe the motion of an object.
  d. Describe the acceleration of an object

of the rate of change of velocity of an object. This change in velocity may be a change in speed and/or direction.

- Vectors have magnitude and direction, while scalars have only magnitude.
- speed and velocity are the slope of a position (distance or displacement) vs. time graph, while acceleration is the slope of a velocity or speed vs. time graph.
- The area under the curve of a velocity-time graph is displacement, and the area under the curve of an acceleration-time graph is the velocity.

as the slope of a position vs. time graph, acceleration as the slope of a velocity vs. time graph, differentiate zero, constant and changing velocities and accelerations).

- Use the appropriate math formula to calculate a speed or rate by solving for one unknown.
- Find the slope of a line.
- Add vectors graphically
- Differentiate distance and displacement; speed and velocity; scalar and vector.
- Understand that acceleration is the rate of change of either speed or direction.

elapsed time

speed

velocity

acceleration

distance

displacement

rate

magnitude and direction

constant speed, velocity, and acceleration

instantaneous speed and velocity

average speed and velocity

scalar

vector

inversely proportional

directly proportional

Cap Greek letter "delta" for "change"

slope

resultant vector

	moving in a circular path at constant speed (i.e., constant speed, but changing direction). e. Analyze the velocity and acceleration of an object over time.			
Frame of Reference (Week 7, 1 Week) **Standard 1** **Standard 1 Objective 1** **Standard 1 Objective 2**	UT: CTE: Technical and Engineering, UT: Grades 9-12, Principles of Technology Standard 1 Students will understand how to measure, calculate, and describe the motion of an object in terms of position, time, velocity, and acceleration. ▪ Objective 3 Relate the motion of objects to a frame of reference. a. Compare the motion of an object relative to two frames of reference. b. Predict the motion of an object relative to a different frame of reference (e.g., an object dropped from a moving vehicle observed from the vehicle and by a person standing on the sidewalk). c. Describe how selecting a specific frame of reference can simplify the description of the motion of an object.	Motion is defined relative to the frame of reference from which it is observed. We define most motion in Earth's frame of reference. Reference points can be stationary or moving.	▪ Calculate speed or velocity using multiple frames of reference. ▪ Use an alternate frame of reference to calculate one's own speed. ▪ Interpret vector diagrams to determine the motion of one object relative to another. ▪ Use the coordinate axis system as a frame of reference for graphing motion.	frame of reference relative to reference point Earth's frame of reference
Force (Week 8, 1 Week) **Standard 1 Objective 3**	UT: CTE: Technical and Engineering, UT: Grades 9-12, Principles of Technology Standard 2	All objects have forces acting on them (gravity, friction, etc).	Identify common forces. Graph Force vs. acceleration to	Force

	Students will understand the relation between force, mass, and acceleration. ▪ Objective 1 Analyze forces acting on an object. a. Observe and describe forces encountered in everyday life (e.g., braking of an automobile - friction, falling rain drops - gravity, directional compass - magnetic, bathroom scale - elastic or spring). b. Use vector diagrams to represent the forces acting on an object. c. Measure the forces on an object using appropriate tools. d. Calculate the net force acting on an object.	Forces combine to result in a net force that predicts the motion of an object. Balanced forces do not change the motion or shape of an object but unbalanced for do cause a change. Friction is a force that opposes the motion of an object. Rolling, sliding and static are the three types of friction. The coefficient of friction depends on the material the two surfaces are made of. Weight that is the force that results from gravity accelerating an object.	determine mass (the slope) Measure and calculate the force of friction Determine the coefficient of friction Create free body diagrams to show forces acting on an object. Use vectors to determine Net force. Measure force with spring scales, force sensors. Measure mass to determine weight (force). Calculate a Newton.	Newton (N) Pound (lb) acceleration mass weight friction Normal force magnetic force electrical force gravitational force free body diagram Net force
Newton's First Law (Week 9, 1 Week)	UT: CTE: Technical and Engineering, UT: Grades 9-12, Principles of Technology Standard 1 Students will understand how to measure, calculate, and describe the motion of an object in terms of position, time, velocity, and acceleration. ▪ Objective 4 Use Newton's first law to explain the motion of an object. a. Describe the motion of a moving object on which balanced forces are acting. b. Describe the motion of a stationary object on which balanced forces are acting. c. Describe the balanced forces acting	An object's state of motion will remain constant unless unbalanced forces act upon the object. This is Newton's First Law of Motion. Friction, tension, compression, spring, gravitational, and normal forces are all common observable forces.	Students will draw a free body diagram to show balanced and unbalanced forces. Students will explain, demonstrate and write about Newton's 1st Law. Use Vector resolution to find net force.	inertia Newton's 1st Law force balanced forces unbalanced forces Newton pound free body diagram Friction tension

on a moving object commonly encountered (e.g., forces acting on an automobile moving at constant velocity, forces that maintain a body in an upright position while walking). Science language students should use: position, time, speed, velocity, acceleration, distance, displacement, rate, instantaneous velocity, average velocity, frame of reference, balanced forces

Standard 2
Students will understand the relation between force, mass, and acceleration.

- Objective 1
  Analyze forces acting on an object.
  a. Observe and describe forces encountered in everyday life (e.g., braking of an automobile - friction, falling rain drops - gravity, directional compass - magnetic, bathroom scale - elastic or spring).
  b. Use vector diagrams to represent the forces acting on an object.
  c. Measure the forces on an object using appropriate tools.
  d. Calculate the net force acting on an object.

Standard 1 Objective 4
Standard 2 Objective 1

spring compression

net force

Newton's Second Law (Week 10, 2 Weeks)	UT: CTE: Technical and Engineering, UT: Grades 9-12, Principles of Technology Standard 2 Students will understand the relation between force, mass, and acceleration. ▪ Objective 2 Using Newton's second law, relate the force, mass, and acceleration of an object. a. Determine the relationship between the net force on an object and the object's acceleration. b. Relate the effect of an object's mass to its acceleration when an unbalanced force is applied. c. Determine the relationship between force, mass, and acceleration from experimental data and compare the results to Newton's second law. d. Predict the combined effect of multiple forces (e.g., friction, gravity, and normal forces) on an object's motion.	▪ Objects in the universe interact with one another by way of forces (Newton's Law of Universal Gravitation). ▪ Changes in the motion of an object are proportional to the sum of the forces, and inversely proportional to the mass ▪ All objects on Earth fall at the same rate, regardless of their mass.	▪ Perform calculations using Newton's 2nd Law (F=ma). ▪ Identify the acceleration due to gravity on Earth. ▪ Explain terminal velocity.	friction gravity normal force gravitational force normal force proportional inversely weight net force acceleration of gravity "g" for gravity free fall terminal velocity
	Standard 2			
Newton's Third Law (Week 12, 1 Week)	UT: CTE: Technical and Engineering, UT: Grades 9-12, Principles of Technology Standard 2 Students will understand the relation between force, mass, and acceleration. ▪ Objective 3 Explain that forces act in pairs as described by Newton's third law. a. Identify pairs of forces (e.g., action-reaction, equal and	▪ If one object exerts a force on a second object, the second object always exerts an equal and opposite force on the first object. ▪ Whenever a force is applied to an object there is an equal and opposite reaction force. ▪ How much force is exerted on a hockey stick by the puck.	▪ Explain action/reaction pairs. ▪ Calculate the forces in action/reaction pairs. ▪ Identify which object (in a pair of objects) is action and which is reaction.	Newton's 3rd Law Action/reaction Acceleration Action force Closed System Directly proportional

	opposite) acting between two objects (e.g., two electric charges, a book and the table it rests upon, a person and a rope being pulled). b. Determine the magnitude and direction of the acting force when magnitude and direction of the reacting force is known. c. Provide examples of practical applications of Newton's third law (e.g., forces on a retaining wall, rockets, walking). d. Relate the historical development of Newton's laws of motion to our current understanding of the nature of science (e.g., based upon previous knowledge, empirical evidence, replicable observations, development of scientific law).			Interaction Inversely proportional Isolated System Reaction force Slug
Gravity (Week 13, 3 Weeks)	**Standard 2 Objective 3** UT: CTE: Technical and Engineering, UT: Grades 9-12, Principles of Technology Standard 3 Students will understand the factors determining the strength of gravitational and electric forces. ▪ Objective 1 Relate the strength of the gravitational force to the distance between two objects and the mass of the objects (i.e., Newton's law of universal gravitation). a. Investigate how mass affects the gravitational force (e.g., spring scale,	Newton's Law of Universal Gravitation Any two objects in the universe with mass exert equal and opposite (attractive) gravitational forces on one another. 1. How does mass affect the force of gravitational attraction between two objects? 2. How are mass and weight different? 3. How does distance affect the the strength of the force of gravitational attraction between two objects?	▪ Calculate the force of gravitational attraction between two objects. ▪ Predict how changing the mass will change the force of gravitational attraction between two objects. ▪ Predict how changing the distance between to objects will change the force of gravitational attraction between them. ▪ Explain how weight and mass are different.	mass weight Newton's Law of Universal Gravitation Gravitational Constant "G"

	balance, or other method of finding a relationship between mass and the gravitational force). b. Distinguish between mass and weight. c. Describe how distance between objects affects the gravitational force (e.g., effect of gravitational forces of the moon and sun on objects on Earth). d. Explain how evidence and inference are used to describe fundamental forces in nature, such as the gravitational force. e. Research the importance of gravitational forces in the space program.	.		
	Standard 3 **Standard 3 Objective 1**			
Energy and Work (Week 16, 5 Weeks)	UT: CTE: Technical and Engineering, UT: Grades 9-12, Principles of Technology Standard 4 Students will understand transfer and conservation of energy. ▪ Objective 1 Determine kinetic and potential energy in a system. a. Identify various types of potential energy (i.e., gravitational, elastic, chemical, electrostatic, nuclear). b. Calculate the kinetic energy of an object given the velocity and mass of the object. c. Describe the types of energy contributing to the total energy of a given system.	The total energy of the universe is constant; however, the total amount of energy available for useful transformation is almost always decreasing. Energy can be converted from one form to another and move from one system to another. Energy can be classified as potential or kinetic energy. Potential energy is stored energy and includes chemical, gravitational, electrostatic, elastic, and nuclear. Kinetic energy is the energy of motion. The interplay of electric and magnetic forces is the basis for electric motors, generators, and many other modern technologies, including the production of electromagnetic waves. Modern electric generators produce electricity by converting mechanical energy into electrical energy.	List types of energy Compare and contrast kinetic and potential energy Deduce changes in stopping distance with changes in speed Calculate KE, PE, work, power, efficiency Combine equations of motion and energy to solve problems	energy potential energy (gravitational, elastic, chemical, electrostatic, and nuclear) kinetic energy law of conservation of energy work power joules (J) watts (W) systems (closed, open)

	▪ Objective 2 Describe conservation of energy in terms of systems. a. Describe a closed system in terms of its total energy. b. Relate the transformations between kinetic and potential energy in a system (e.g., moving magnet induces electricity in a coil of wire, roller coaster, internal combustion engine). c. Gather data and calculate the gravitational potential energy and the kinetic energy of an object (e.g., pendulum, water flowing downhill, ball dropped from a height) and relate this to the conservation of energy of a system. d. Evaluate social, economic, and environmental issues related to the production and transmission of electrical energy.			work input work output efficiency
	Standard 4 **Standard 4 Objective 1** **Standard 4 Objective 2** **Standard 4 Objective 3**			
Static Electricity (Week 21, 2 Weeks)	UT: CTE: Technical and Engineering, UT: Grades 9-12, Principles of Technology Standard 3 Students will understand the factors determining the strength of gravitational and electric forces. ▪ Objective 2 Describe the factors that	The electromagnetic force is manifested as an electric force, a magnetic force, or a combination. Any two objects in the universe with a net electric charge exert equal and opposite electric forces on one another. While gravitational forces are always attractive, electromagnetic forces can be either attractive or repulsive. Both gravitational and electrical work through space and the both involve	▪ Calculate the force of electrical attraction or repulsion between two objects. ▪ Predict how changing the mass will change the force of electrical attraction or replusion between two charges. ▪ Predict how changing the distance between to charges will change the force of electrical attraction or replusion between them.	attractive repel repulsive force Charge Discharge

	affect the electric force (i.e., Coulomb's law). a. Relate the types of charge to their effect on electric force (i.e., like charges repel, unlike charges attract). b. Describe how the amount of charge affects the electric force. c. Investigate the relationship of distance between charged objects and the strength of the electric force. d. Research and report on electric forces in everyday applications found in both nature and technology (e.g., lightning, living organisms, batteries, copy machine, electrostatic precipitators).	a constant, but the constants are different gravitional constant is (G) and Coulomb's constant is (K). **Coulomb's Law** **Like charges repel (two charges of the same type result in a repulsive force between the objects), unlike charges attract two opposite charges result in an attractive force between the objects).** ▪ The strength of the electrical force is inversely proportional to the square of the distance between two charges. ▪ The strength of the electrical force is directly proportional to the magnitude of the two charges.	▪ Predict if an electrical force between two charges will be attractive or repulsive. ▪ Differentiate and use the gravitational constant (G) and Coulomb's constant (K), and use both correctly in calculations.	Electrical force Coulomb's Law Coulomb's Constant (k) Inverse square law Electric field Electric potential difference Polarization Volts Voltage

Circuits (Week 23, 2 Weeks)	**Standard 3 Objective 2**
	UT: CTE: Technical and Engineering, UT: Grades 9-12, Principles of Technology
	Standard 3
	Students will understand the factors determining the strength of gravitational and electric forces.
	
	▪ Objective 2
	Describe the factors that affect the electric force (i.e., Coulomb's law).
	a. Relate the types of charge to their effect on electric force (i.e., like charges repel, unlike charges attract).
	b. Describe how the amount of charge affects the electric force.
	c. Investigate the relationship of distance between charged objects and the strength
		students should understand
		
		▪ Moving electric charges produce magnetic forces and moving magnets produce electric forces.
		▪ which direction electric charge moves in both direct and alternating current.
		▪ Voltage is a potential energy created when work is done on electrons.
		▪ Current is a measure of the amount of charge that passes one point in a certain amount of time.
		▪ Resistance is a barrier that limits the electrical current.
		▪ the difference between series and parallel circuits.
		▪ In a series circuit, if the resistors are not all the same, there will be a
			Should should be able to
			
			▪ calculate total electrical resistance.
			▪ identify the four main parts of an electrical circuit (source, conductor, load, switch)
			▪ read and draw schematic diagrams
			▪ build series, parallel and series/parallel electrical circuits.
			▪ connect resistors in series to produce a desired resistance.
			▪ connect resistors in parallel to produce a desired resistance.
			▪ Determine the electrical properties of matter by observing and measuring voltage and current, in series and parallel circuits.
			  ▪ Connect voltmeter correctly into a circuit (parallel or series).
			  ▪ Connect amp meter
				alternating current (AC)
				
				ampere
				
				direct current (DC)
				
				conductor
				
				current
				
				electrical resistance
				
				electric current
				
				electrical circuit
				
				electric power
				
				insulator

	of the electric force. d. Research and report on electric forces in everyday applications found in both nature and technology (e.g., lightning, living organisms, batteries, copy machine, electrostatic precipitators).	voltage drop across the resistors for resistors of different value. ▪ In parallel circuits, there will be a different current across each resistor for resistors of different value. ▪ Ohm's Law ▪ the units of measurement for voltage, current and resistance. ▪ that power is the rate of using electricity and is measured Watts. ▪ know the difference between resistance and conductance.	correctly into a circuit (parallel or series). ▪ Properly set range and function switches on the meter. ▪ Correctly read the meter.	load Ohm Ohm's Law Potential difference Voltage source voltage parallel circuit schematic diagram series circuit Watts
Thermodynamics and Energy Loss (Week 25, 3 Weeks)	UT: CTE: Technical and Engineering, UT: Grades 9-12, Principles of Technology Standard 4 Students will understand transfer and conservation of energy. ▪ Objective 3 Describe common energy transformations and the effect on availability of energy. a. Describe the loss of useful energy in energy transformations. b. Investigate the transfer of heat energy by conduction, convection, and radiation. c. Describe the transformation of mechanical energy into electrical energy and the transmission of electrical energy. d. Research and report on the transformation of energy in electrical generation plants (e.g.,	Transformation of energy usually produces heat that spreads to cooler places by radiation, convection, or conduction. First Law of Thermodynamics- Heat is a form of energy. In a closed system, energy is conserved. Some energy is lost as heat due to friction, but this energy can be measured and accounted for. The comparison of the input to output energy in a system is called 'efficiency'. No machine can be 100% efficient. Second Law of Thermodynamics- "All things strive toward chaos" (i.e, All things move from higher to lower energy).	▪ Compare difference between insulation and conduction of heat ▪ Determine thermal properties of matter by measuring heating or cooling of matter over time. ▪ Correctly use temperature measuring devices. ▪ Convert different heat units (BTU, Joules, Calories) ▪ Accurately record temperature data over time in a graph, table or chart. ▪ Measure, calculate, and report the energy and efficiency of an energy conversion device or system. ▪ Explain energy loss.	Heat energy conduction convection radiation friction First Law of Thermodynamics Second Law of Thermodynamics insulation transformation resistance efficiency

	chemical to heat to electricity, nuclear to heat to mechanical to electrical, gravitational to kinetic to mechanical to electrical), and include energy losses during each transformation.			entropy Kelvin (K) Celsius (Centigrade) Fahrenheit Joule (J) heat engine
	Standard 4 Objective 3			
Waves (Week 28, 3 Weeks)	UT: CTE: Technical and Engineering, UT: Grades 9-12, Principles of Technology Standard 5 Students will understand the properties and applications of waves. ▪ Objective 1 Demonstrate an understanding of mechanical waves in terms of general wave properties. a. Differentiate between period, frequency, wavelength, and amplitude of waves. b. Investigate and compare reflection, refraction, and diffraction of waves. c. Provide examples of waves commonly observed in nature and/or used in technological applications. d. Identify the relationship between the speed, wavelength, and frequency of a wave. e. Explain the observed change in frequency of a mechanical wave coming from a moving object as it approaches and moves away (i.e., Doppler effect). f. Explain the transfer of	Sound and light transfer energy from one location to another as waves. Characteristics of waves include wavelength, amplitude, and frequency. Waves can combine with one another, bend around corners, reflect off surfaces, be absorbed by materials they enter, and change direction when entering a new material. All these effects vary with wavelength. Observable waves include mechanical and electromagnetic waves. Mechanical waves transport energy through a medium. Electromagnetic radiation is differentiated by wavelength or frequency, and includes radio waves, microwaves, infrared, visible light, ultraviolet radiation, x-rays, and gamma rays. These wavelengths vary from radio waves (the longest) to gamma rays (the shortest). In empty space all electromagnetic waves move at the same speed, the “speed of light.”	▪ Differentiate between period, frequency, wavelength, and amplitude of waves. ▪ Sketch the electromagnetic spectrum to show the general frequency (or wavelengths) of the types of waves. ▪ identify the high and low energy areas of the electromagnetic spectrum ▪ Explain how frequency, wavelength and wave speed and energy are related. ▪ Calculate frequency, wavelength and wave speed including light and sound. ▪ Explain the observed change in frequency of mechanical and electromagnetic waves coming from a moving object as it approaches and moves away (i.e., Doppler effect, red/blue shift). ▪ Investigate and compare reflection, refraction, and diffraction of waves. ▪ Give examples of mechanical and EM waves found in nature. ▪ Explain that transfer of energy by mechanical waves waves requires a medium, while energy transfer by EM waves does not require a medium. ▪ Sketch and identify the parts of a transverse wave. ▪ Explain the importance of nodes and anti-nodes in a standing wave.	wave mechanical wave electromagnetic wave electromagnetic spectrum wavelength frequency amplitude period reflection refraction diffraction Doppler effect elastic potential energy constructive and destructive interference medium radio wave

energy through a medium by mechanical waves.

- Objective 2
  Describe the nature of electromagnetic radiation and visible light.
  a. Describe the relationship of energy to wavelength or frequency for electromagnetic radiation.
  b. Distinguish between the different parts of the electromagnetic spectrum (e.g., radio waves and x-rays or visible light and microwaves).
  c. Explain that the different parts of the electromagnetic spectrum all travel through empty space and at the same speed.
  d. Explain the observed change in frequency of an electromagnetic wave coming from a moving object as it approaches and moves away (i.e., Doppler effect, red/blue shift).
  e. Provide examples of the use of electromagnetic radiation in everyday life (e.g., communications, lasers, microwaves, cellular phones, satellite dishes, visible light).
  Science language students should use: energy, potential energy, kinetic energy, law of conservation of energy, wave, mechanical wave, electromagnetic wave, electromagnetic spectrum, wavelength, frequency, amplitude,

microwave

infrared

visible light

ultraviolet

x-ray

gamma ray

speed of light and "*c*"

crest

trough

median (equilibrium line or rest position)

node

anti-node

standing wave

transverse wave

longitudinal wave

compressional wave

vibrations

compression

rarefaction

angle of incidence and angle of reflection

angle of refraction

	period, reflection, refraction, diffraction, Doppler effect, elastic potential energy, medium, radio wave, microwave, infrared, visible light, ultraviolet, x-ray, gamma ray, conduction, convection, radiation			
Review (Week 31, 3 Weeks)	**Standard 5** **Standard 5 Objective 1** **Standard 5 Objective 2** **USOE Physics Core**	Review all standards and objectives which are found in the following units: Science Basics Position, Velocity and Acceleration Frame of Reference Force Newton's Law of Motion Gravity Energy (KE and PE) and Work Static Electricity Circuits Thermodynamics and Energy Loss Waves	▪ Use science language to accurately describe an event. ▪ Use formulas to calculate various quantities. ▪ Identify appropriate units of measurement for various quantities. ▪ Apply physics concepts to new situations. ▪ Combine physics concepts to solve a problem. ▪ Describe the historical and societal impacts of science, physics and technology.	see Vocabulary for each unit, including at a minimum: position, time, speed, velocity, acceleration, distance, displacement, rate, instantaneous velocity, average velocity, frame of reference, balanced forces, Friction, tension, compression, spring, normal forces, force, electric force, electric charge, friction, gravitational force, mass, net force, normal force, weight, vector, vector diagram, energy, potential energy, kinetic energy, law of conservation of energy, wave, mechanical wave, electromagnetic wave, electromagnetic spectrum, wavelength, frequency, amplitude, period, reflection, refraction, diffraction, Doppler effect, elastic potential energy, medium, radio wave, microwave, infrared, visible light, ultraviolet, x-ray, gamma ray, conduction, convection, radiation
Applications in Motion (Week 34, 4 Weeks)		Science is fun, we can design and conduct experiments to answer questions, and can use scientific language to communicate outcomes. Graphs, charts and tables are used to help communicate information.	identify a problem, design and conduct an experiment and analyze the data to come up with a solution. Formative Assessment: Identify a problem, hypothesis, experiment,	Suggested vocabulary: velocity

	variable, control.	hang time amps volts hypothesis problem experiment analyze conclusion independent variable dependent variable control