Conceptual Physics Curriculum (SCI 376/ 377)

Date		Hobbs Science Standards 10th- 12th Grade	NM Standards & Benchmarks	Resources Basic text is Conceptual Physics
		By being embedded throughout the curriculum, these Processing Skills will be addressed throughout the year.		
		Students will be able to:	Strand, Standards, Benchmarks, & Performance Standards	Supplemental books, labs, videos, projects, digital curriculum
_____	**1**	1. Describe the essential components of an investigation, including appropriate methodologies, proper equipment, and safety precautions.	I, I, I, 1	
_____		2. Design and conduct scientific investigations that include: • Testable hypotheses • Controls and variables • Methods to collect, analyze, and interpret data • Results that address hypotheses being investigated • Predictions based on results • Re-evaluation of hypotheses and additional experimentation as necessary • Error analysis.	I, I, I, 2	
_____		3. Use appropriate technologies to collect, analyze, and communicate scientific data (e.g., computers, calculators, balances, microscopes).	I, I, I, 3	
_____		4. Convey results of investigations using scientific concepts, methodologies, and expressions, including: • Scientific language and symbols • Diagrams, charts, and other data displays • Mathematical expressions and processes (e.g., mean, median, slope, proportionality) • Clear, logical, and concise communication	I, I, I, 4	

_____		• Reasoned arguments. 5. Understand how scientific theories are used to explain and predict natural phenomena (e.g., plate tectonics, ocean currents, structure of atom).	I, I, I, 5	
_____	**2**	1. Understand how scientific processes produce valid, reliable results, including: • Consistency of explanations with data and observations • Openness to peer review • Full disclosure and examination of assumptions • Testability of hypotheses • Repeatability of experiments and reproducibility of results.	I, I, II, 1	
_____		2. Use scientific reasoning and valid logic to recognize: • Faulty logic • Cause and effect • The difference between observation and unsubstantiated inferences and conclusion • Potential bias	I, I, II, 2	
_____		3. Understand how new data and observations can result in new scientific knowledge.	I, I, II, 3	
_____		4. Critically analyze an accepted explanation by reviewing current scientific knowledge.	I, I, II, 4	
_____		5. Examine investigations of current interest in science (e.g., superconductivity, molecular machines, age of the universe).	I, I, II, 5	
_____		6. Examine the scientific processes and logic used in investigations of past events (e.g., using data from crime scenes, fossils), investigations that can be planned in advance but are only done once (e.g., expensive or time-consuming experiments such as medical clinical trials), and investigations of phenomena that can be repeated easily and frequently.	I, I, II, 6	
_____	**3**	1. Create multiple displays of data to analyze and explain the relationships in scientific investigations.	I, I, III, 1	
_____		2. Use mathematical models to describe, explain, and predict natural phenomena.	I, I, III, 2	

_____		3. Use technologies to quantify relationships in scientific hypotheses (e.g., calculators, computer spreadsheets and databases, graphing software, simulations, modeling).	I, I, III, 3	
_____		4. *Identify and apply measurement techniques and consider possible effects of measurement errors.*	I, I, III, 4	
_____		5. *Use mathematics to express and establish scientific relationships (e.g., scientific notation, vectors, dimensional analysis*).	I, I, III, 5	
		Science and Technology		
_____	**4**	1. Know how science enables technology but also constrains it, and recognize the difference between real technology and science fiction (e.g., rockets vs. antigravity machines; nuclear reactors vs. perpetual-motion machines; medical X-rays vs. Star-Trek tricorders).	III, I, I, 1	
_____		2. Understand how advances in technology enable further advances in science (e.g., microscopes and cellular structure; telescopes and understanding of the universe).	III, I, I, 2	
_____		3. Evaluate the influences of technology on society (e.g., communications petroleum, transportation, nuclear energy, computers, medicine, genetic engineering) including both desired and undesired effects, and including some historical examples (e.g., the wheel, the plow, the printing press, the lightning rod).	III, I, I, 3	
_____		4. Understand the scientific foundations of common technologies (e.g., kitchen appliances, radio, television, aircraft, rockets, computers, medical X-rays, selective breeding, fertilizers and pesticides, agricultural equipment).	III, I, I, 4	
_____		5. Analyze the impact of digital technologies on the availability, creation, and dissemination of information.	III, I, I, 6	
_____		6. *Examine the role that New Mexico research facilities play in current space exploration (e.g., Very Large Array, Goddard Space Center*).	III, I, I, 7	

_____		7. Describe uses of radioactivity (e.g. nuclear power, nuclear medicine, radiometric dating).	III, I, I, 8	
_____		8. Understand how knowledge about the universe comes from evidence collected from advanced technology (e.g., telescopes, satellites, images, computer models).	II, III, I, 3	
_____		9. *Describe the key observations that led to the acceptance of the Big Bang theory and that the age of the universe is over 10 billion years*.	II, III, I, 4	
		Science and Society		
_____	**5**	1. Describe how human activities have affected ozone in the upper atmosphere and how it affects health and the environment.	III, I, I, 7	
_____		2. Describe how scientific knowledge helps decision makers with local, national, and global challenges (e.g., Waste Isolation Pilot Project [WIPP], mining, drought, population growth, alternative energy, climate change).	III, I, I, 9	
_____		3. Describe major historical changes in scientific perspectives (e.g., atomic theory, germs, cosmology, relativity, plate tectonics, evolution) and the experimental observations that triggered them.	III, I, I, 10	
_____		4. Know that societal factors can promote or constrain scientific discovery (e.g., government funding, laws and regulations about human cloning and genetically modified organisms, gender and ethnic bias, AIDS research, alternative-energy research).	III, I, I, 11	
_____		5. Describe how environmental, economic, and political interests impact resource management and use in New Mexico.	III, I, I, 13	
		Science and Individuals		
_____	**6**	1. *Describe New Mexico's role in nuclear science (e.g., Manhattan Project, WIPP, national laboratories*).	III, I, I, 14	
_____		2. Identify how science has produced knowledge that is relevant to individual health and material prosperity.	III, I, I, 15	

_____		3. Understand that reasonable people may disagree about some issues that are of interest to both science and religion (e.g., the origin of life on Earth, the cause of the Big Bang, the future of Earth).	III, I, I, 16	
_____		4. Identify important questions that science cannot answer (e.g., questions that are beyond today's science, decisions that science can only help to make, questions that are inherently outside the realm of science).	III, I, I, 17	
_____		5. Understand that scientists have characteristics in common with other individuals (e.g., employment and career needs, curiosity, desire to perform public service, greed, preconceptions and biases, temptation to be unethical, core values, including honesty and openness).	III, I, I, 18	
_____		6. Know that science plays a role in many different kinds of careers and activities (e.g., public service, volunteers, public office holders, researchers, teachers, doctors, nurses, technicians, farmers, ranchers).	III, I, I, 19	

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(1st 9 weeks- 1st 4 ½ weeks)

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		Students will be able to:	Strand, Standards, Benchmarks, & Performance Standards	Supplemental books, labs, videos, projects, digital curriculum
	7	**Mechanics** **Mechanical Equilibrium**		**APEX** LA Physical Science Sem. 1- Unit 3 Core Physical Science Sem. 1- Unit 3
_____		1. Distinguish between force and net force.	II, I, III, 8	
_____		2. Describe the equilibrium rule and give examples.	II, I, II, 11	Chapter 2
_____		3. Distinguish between support force and weight.	II, I, III, 2	
_____		4. Give examples of moving objects that are in equilibrium	II, I, II, 11	
_____		5. Determine the resultant of a pair of parallel or non-parallel vectors.	II, I, III, 6	
	8	**Newton's First Law of Motion- Inertia**		**APEX** LA Physical Science Sem. 1- Unit 4 Core Physical Science Sem. 1- Unit 3
_____		1. Describe Aristotle's concept of motion.	II, I, III, 8	
_____		2. Describe Copernicus' idea about Earth's motion.	II, I, III, 8	
_____		3. Describe Galileo's idea about when a force is needed to keep an object moving.	II, I, III, 8	Chapter 3
_____		4. State Newton's First Law of Motion.	II, I, III, 8	

_____		5. Describe the relationship between mass and inertia.	II, I, III, 8	
_____		6. Explain how the law of inertia applies to objects in motion.	II, I, III, 8	
	9	**Linear Motion**		**APEX** LA Physical Science Sem. 1- Unit 3 Core Physical Science Sem. 1- Unit 2 Chapter 4 Tin Pan Alley Activity Reaction Time Lab Blind as a Bat Lab Bull's Eye Lab
_____		1. Explain how you can tell an object is moving.	II, I, III, 9	
_____		2. Describe how you can calculate speed.	II, I, III, 9	
_____		3. Distinguish between speed and velocity.	II, I, III, 8-9	
_____		4. Describe how you can calculate acceleration.	II, I, III, 8	
_____		5. Describe the acceleration of an object in free fall.	II, I, III, 8	
_____		6. Describe how the distance fallen per second changes for an object in free fall.	II, I, III, 8	
_____		7. Describe what the slope of a speed-versus-time graph represents.	II, I, III, 8	
_____		8. Describe how air resistance affects the motion of falling objects.	II, I, III, 8	
_____		9. Explain the relationship between velocity and acceleration.	II, I, III, 8	
	10	**Projectile Motion**		**APEX** LA Physical Science Sem. 1- Unit 3 Core Physical Science Sem. 1- Unit 2 Chapter 5
_____		1. Distinguish between a vector quantity and a scalar quantity.	II, I, III, 6	
_____		2. Explain how to find the resultant of two perpendicular vectors.	II, I, III, 6	
_____		3. Describe how the components of a vector affect each other.	II, I, III, 6	
_____		4. Describe the components of projectile motion.	II, I, III, 8	
_____		5. Describe the downward motion of a horizontally launched projectile.	II, I, III, 8	
_____		6. Describe how far below an imaginary straight-line path a projectile falls.	II, I, III, 8	

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(1st 9 weeks- 2nd 4 ½ weeks)

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		Students will be able to:	Strand, Standards, Benchmarks, & Performance Standards	Supplemental books, labs, videos, projects, digital curriculum
	11	**Newton's Second Law of Motion- Force and Acceleration**		**APEX** LA Physical Science Sem. 1- Unit 4 Core Physical Science Sem. 1- Unit 3 Chapter 6 Styrofoam Astronauts Activity What a Drag! Activity
_____		1. State the relationship between acceleration and net force.	II, I, III, 8	
_____		2. State the relationship between acceleration and mass.	II, I, III, 8	
_____		3. State and explain Newton's Second Law of Motion.	II, I, III, 8	
_____		4. List the factors that affect the force of friction between surfaces.	II, I, III, 8	
_____		5. Distinguish between force and pressure.	II, I, III, 4	
_____		6. Explain why the acceleration of an object in free fall does not depend upon the mass of the objet.	II, I, III, 8	
_____		7. List the factors that affect the air resistance force on an object.	II, I, III, 8	
	12	**Newton's Third Law of Motion- Action and Reaction**		**APEX** LA Physical Science Sem. 1- Unit 4 Core Physical Science Sem. 1- Unit 3 Chapter 7
_____		1. Define force as part of an interaction.	II, I, III, 7	
_____		2. State Newton's Third Law of Motion	II, I, III, 7	
_____		3. Describe how to identify a pair of action-reaction forces.	II, I, III, 7	

_____		4. Explain why the acceleration caused by an action force and by a reaction force do not have to be equal.	II, I, III, 7	Go Cart Activity Trial and Error Lab
_____		5. Explain why an action force is not cancelled by the reaction force.	II, I, III, 7	
_____		6. Explain how a horse-cart system accelerates.	II, I, III, 7	
_____		7. Explain what must occur in every interaction between things.	II, I, III, 7	
	13	**Momentum**		**APEX** LA Physical Science Sem. 1- Unit 5 Core Physical Science Sem. 1- Unit 4 Chapter 8 Impact Speed Lab
_____		1. Define momentum.	II, I, III, 8	
_____		2. Define impulse and describe how it affects changes in momentum.	II, I, III, 8	
_____		3. Explain why an impulse is greater when an object bounces than when the same object comes to a sudden stop.	II, I, III, 8	
_____		4. State the Law of Conservation of Momentum.	II, I, III, 8	
_____		5. Describe how the Conservation of Momentum applies to collisions.	II, I, III, 8	
_____		6. Describe how the vector nature of momentum affects the Law of Conservation of Momentum.	II, I, III, 8	
	14	**Energy**		**APEX** LA Physical Science Sem. 1- Unit 5 Core Physical Science Sem. 1- Unit 4 Chapter 9 Powerhouse Activity On or Off the Mark? Lab
_____		1. Define and describe work.	II, I, II, 6	
_____		2. Define and describe power.	II, I, II, 6	
_____		3. State the two forms mechanical energy.	II, I, II, 1	
_____		4. State three forms of potential energy.	II, I, II, 1	
_____		5. Describe how work and kinetic energy are related.	II, I, II, 6	

_____		6. State the work-energy theorem.	II, I, II, 6	Gearing Up Lab
_____		7. State the Law of Conservation of Energy.	II, I, II, 3	
_____		8. Describe how a machine uses energy.	II, I, II, 6	
_____		9. Explain why no machine can be 100% efficient.	II, I, II, 6	
_____		10. Describe the role of energy in living organisms.	II, II, I, 5	

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		Students will be able to:	Strand, Standards, Benchmarks, & Performance Standards	Supplemental books, labs, videos, projects, digital curriculum
	15	**Mechanics** **Circular Motion**		**APEX** LA Physical Science Sem. 1- Unit 4 Core Physical Science Sem. 1- Unit 3 Chapter 10
_____		1. Describe the two types of circular motion.	II, I, III, 8	
_____		2. Describe the relationship among tangential speed, rotational speed, and radial distance.	II, I, III, 8	
_____		3. Describe the factors that affect the centripetal force acting on an object.	II, I, III, 8	
_____		4. Explain the "centrifugal-force effect".	II, I, III, 8	
_____		5. Explain why centrifugal force is not considered a true force.	II, I, III, 8	
	16	**Rotational Equilibrium**		**APEX** LA Physical Science Sem. 1- Unit 4 Core Physical Science Sem. 1- Unit 3 Chapter 11
_____		1. Describe how to make an object turn or rotate.	II, I, III, 8	
_____		2. Explain what happens when balanced torques act on an object.	II, I, III, 8	
_____		3. Describe how to find an object's center of mass.	II, I, III, 8	
_____		4. Describe how the center of gravity of an everyday object is related to its center of mass.	II, I, III, 8	

_____		5. Describe how to predict whether an object will topple.	II, I, III, 8	
_____		6. Explain why the center of gravity of a person is not located in a fixed place.	II, I, III, 8	
_____		7. Describe what happens to the center of gravity of an object when the object is toppled.	II, I, III, 8	
	17	**Rotational Motion**		**APEX** LA Physical Science Sem. 1- Unit 4 Core Physical Science Sem. 1- Unit 3
_____		1. Describe how the rotational inertia of an object affects how easily the rotational speed of the object changes.	II, I, III, 8	
_____		2. List the three principal axes of rotation in the human body.	II, I, III, 8	Chapter 12
_____		3. Describe what happens when objects of the same shape but different sizes are rolled down an incline.	II, I, III, 1	Point of No Return Activity
_____		4. Explain how Newton's First Law applies to rotating systems.	II, I, III, 1	Torque Feeler Activity
_____		5. Describe what happens to angular momentum when no net external torque acts on an object.	II, I, III, 8	Hanging Out Activity Rotational Derby Activity
_____		6. Explain how gravity can be simulated.	II, I, III, 8	Name that Lever Activity Weight a Moment Lab Solitary See-Saw Lab The Flying Pig Lab
	18	**Universal Gravitation**		**APEX** LA Physical Science Sem. 1- Unit 4 Core Physical Science Sem. 1- Unit 2
_____		1. Explain Newton's reasoning about the apple falling from the tree.	II, I, III, 2	
_____		2. Explain why the moon doesn't hit Earth.	II, I, III, 2	

				Chapter 13
_____		3. Explain how Newton's Theory of Gravity confirmed the Copernican Theory of the Solar System.	II, I, III, 1-2	
_____		4. Describe what Newton discovered about gravity.	II, I, III, 1-2	
_____		5. Describe how the force of gravity changes with distance.	II, I, III, 1-2	
_____		6. Describe the gravitational field that surrounds Earth.	II, I, III, 2	
_____		7. Describe the gravitational field at Earth's center.	II, I, III, 2	
_____		8. Describe the sensation we interpret as weight.	II, I, III, 2	
_____		9. Explain ocean tides.	II, I, III, 2	
_____		10. Describe the gravitational field around a black hole.	II, I, III, 2	
_____		11. Explain the importance of the formulation of the Law of Universal Gravitation.	II, I, III, 2	
	19	**Satellite Motion**		**APEX** LA Physical Science Sem. 1- Unit 4 Core Physical Science Sem. 1- Unit 3
_____		1. Explain how the speed of a satellite in circular orbit around Earth is related to the distance an object falls in the first second due to gravity.	II, I, III, 2 & 8	
_____		2. Describe the motion of a satellite in a circular orbit.	II, I, III, 2 & 8	Chapter 14
_____		3. Describe the shape of the path of a satellite in an orbit around Earth.	II, I, III, 2 & 8	Getting Eccentric Activity
_____		4. Apply the Energy Conservation Law to describe changes in the PE and KE of a satellite in different portions of an elliptical orbit.	II, I, III, 2 & 8 II, I, II, 1	
_____		5. State Kepler's three Laws of Planetary motion.	II, I, III, 2	
_____		6. Determine the vertical speed required to ensure a projectile can "escape" Earth.	II, I, III, 2 & 7	

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		Students will be able to:	Strand, Standards, Benchmarks, & Performance Standards	Supplemental books, labs, videos, projects, digital curriculum
	20	**Properties of Matter** **The Atomic Nature of Matter**		**APEX** LA Physical Science Sem. 2- Unit 1 Core Physical Science Sem. 2- Unit 1
_____		1. Describe the connection between substances and elements.	II, I, I, 3	
_____		2. Give examples that illustrate the small size of atoms.	II, I, I, 6	Chapter 17
_____		3. Compare the ages of atoms to the ages of the materials they compose.	II, I, I, 12	Polarity of Molecules Activity
_____		4. State evidence for the existence of atoms.	II, I, I, 5	Oleic Acid Pancake Lab
_____		5. Describe molecules.	II, I, I, 8	
_____		6. Describe how compounds are different from their component elements.	II, I, I, 8	
_____		7. Describe the distribution of mass in an atom.	II, I, I, 5-6	
_____		8. Explain the cause of an atom's chemical properties.	II, I, I, 2	
_____		9. Identify the four phases of matter.	II, I, I, 1	
	21	**Solids**		Chapter 18
_____		1. Describe the structure of crystals.	II, I, I, 10	

_____ _____ _____ _____		2. Describe the factors that determine the density of a material. 3. Explain the property of elasticity. 4. Explain how a load-carrying beam undergoes compression and tension. 5. Describe the relationship among linear growth, surface area growth, and volumetric growth.	II, I, I, 2 II, I, I, 2 II, I, I, 2 II, I, III, 7 II, I, I, 4	Getting the Lead Out Activity Elephant Ears Activity By Hooke or By Crook Lab
_____ _____ _____ _____ _____	**22**	**Liquids** 1. Describe what determines the pressure of a liquid at any point. 2. Explain what causes a buoyant force on an immersed or submerged object. 3. Relate the buoyant force on an immersed or submerged object to the weight of the fluid it displaces. 4. Describe what determines whether an object will sink or float in a fluid. 5. Given the weight of a floating object, determine the weight of fluid it displaces. 6. Describe how Pascal's principle can be applied to increase the force of a fluid on a surface.	II, I, III, 4 II, I, III, 7 II, I, III, 7 II, I, III, 4 & 7 II, I, III, 4 & 7 II, I, III, 4 & 7	**APEX** LA Physical Science Sem. 1- Unit 4 Core Physical Science Sem. 1- Unit 3 Chapter 19 Strong as an Ox Activity Getting Displaced Activity Cartesian Diver Activity Diameter of a BB Lab Float a Boat Lab
_____ _____ _____ _____	**23**	**Gases** 1. Describe Earth's atmosphere. 2. Explain what causes atmospheric pressure. 3. Describe how a single mercury barometer shows pressure. 4. Explain how an aneroid barometer works.	II, I, III, 4 II, I, III, 4 II, I, III, 4 II, I, III, 4	Chapter 20 Screwball Bernoulli Activity

_____		5. Describe the relationship between the pressure and volume for a given mass of gas at a constant temperature.	II, I, III, 4	
_____		6. Explain what causes an object to rise in the air around it.	II, I, III, 4	
_____		7. Describe the relationship between the speed of a fluid at any point and the pressure at that point, for steady glow.	II, I, III, 4	
_____		8. Explain how horizontal flight is possible.	II, I, III, 4	
	24	**Heat** **Temperature, Heat, and Expansion**		**APEX** LA Physical Science Sem. 2- Unit 4
_____		1. Define temperature in terms of molecular motion.	II, I, II, 2	Chapter 21
_____		2. Describe how heat flows.	II, I, II, 5	Hot Strip Activity Niagara Falls Activity
_____		3. Describe how a thermometer works.	II, I, II, 2	Specifically Water Activity
_____		4. Explain the connection between internal energy and heat.	II, I, II, 2	Spiked Water Activity
_____		5. Describe how the quantity of heat that enters or leaves a substance is determined.	II, I, II, 5	Specific Heats Lab
_____		6. Explain why the specific heat capacities of different substances are different.	II, I, II, 2	
_____		7. Describe how water's high specific heat capacity affects climate.	II, I, II, 5	
_____		8. Explain how matter changes when heated or cooled.	II, I, II, 5	
_____		9. Explain why ice floats on water.	II, I, II, 5	
	25	**Heat Transfer**		**APEX** LA Physical Science Sem. 2- Unit 4
_____		1. Explain how conduction works.	II, I, II, 4	

_____		2. Explain how convection works.	II, I, II, 4	Chapter 22
_____		3. Explain how heat can be transmitted through empty space.	II, I, II, 4-5 & 7	
_____		4. Identify which substances emit radiant energy.	II, I, II, 9	
_____		5. Compare the ability of an object to emit radiant energy with its ability to absorb radiant energy.	II, I, II, 9	
_____		6. Relate the temperature difference between an object and its surroundings to the rate at which it cools.	II, I, II, 5	
_____		7. Identify the main driver of global warming and climate change.	II, I, II, 9 & 11	
	26	**Change of Phase**		**APEX** LA Physical Science Sem. 2- Unit 4
_____		1. Describe how evaporation affects a liquid's temperature.	II, I, II, 2	
_____		2. Describe how condensation affects temperature.	II, I, II, 2	Chapter 23
_____		3. Explain how evaporation and condensation can take place at the same time.	II, I, II, 2	Old Faithful Activity
_____		4. Describe how pressure affects boiling point.	II, I, III, 4	Boiling- A Cooling Process? Activity
_____		5. Describe the effect of dissolving anything in a liquid on the liquid's freezing temperature.	II, I, II, 2	Freezing- A Warming Process? Activity
_____		6. Describe how something can boil and freeze at the same time.	II, I, II, 2	Solar Power Lab
_____		7. Explain why so few substances undergo regelation.	II, I, II, 3	
_____		8. Explain the relationship between energy and phase change.	II, I, II, 5	
	27	**Thermodynamics**		**APEX** LA Physical Science Sem. 2- Unit 4
_____		1. Describe what happens to the temperature of a substance when the thermal	II, I, II, 2	

		motion of the atoms approaches zero.		Chapter 24
_____		2. State the First Law of Thermodynamics.	II, I, III, 4	Temperature of a Flame Lab
_____		3. Describe the effect of adiabatic compression on a gas.	II, I, III, 4	Cool Stuff Lab
_____		4. State the Second Law of Thermodynamics.	II, I, II, 6	
_____		5. Explain how the Second Law of Thermodynamics applies to heat engines.	II, I, II, 6	
_____		6. Describe what happens to the orderly state of any natural system	II, I, II, 2 & 5	
_____		7. Describe what happens to the entropy of any system.	II, I, II, 2 & 5	

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(3rd 9 weeks- 5th 4 ½ weeks)

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	28	**Sound and Light** **Vibrations and Waves**		**APEX** LA Physical Science Sem. 1- Unit 6 Core Physical Science Sem. 1- Unit 5
_____		1. Describe the period of a pendulum.	II, I, III, 10	Chapter 25
_____		2. Describe the characteristics and properties of waves.	II, I, III, 10	Tuning Forks Revealed Activity
_____		3. Describe wave motion.	II, I, III, 10	Give Sounds a Whirl Activity
_____		4. Describe how to calculate the speed of a wave.	II, I, III, 10	Oh Say Can You Sing? Activity
_____		5. Give examples of transverse waves.	II, I, III, 10	
_____		6. Give an example of a longitudinal wave.	II, I, III, 10	
_____		7. Explain what causes interference patterns.	II, I, III, 10-11	
_____		8. Describe how a standing wave occurs.	II, I, III, 10-11	
_____		9. Describe how the apparent frequency of waves change as a wave source moves.	II, I, III, 10	
_____		10. Describe bow waves.	II, I, III, 10	
_____		11. Describe sonic booms.	II, I, III, 10-11	

	29	**Sound**		**APEX** LA Physical Science Sem. 1- Unit 6 Core Physical Science Sem. 1- Unit 5 Chapter 26 Sound Off Activity Sir Speedy Activity Sound Barrier Lab Screech! Lab
_____		1. State what the source of sound is.	II, I, III, 10	
_____		2. Describe the movement of sound through air.	II, I, III, 10	
_____		3. Compare the transmission of sound through air with that through solids, liquids, and a vacuum.	II, I, III, 10	
_____		4. Describe factors that affect the speed of sound.	II, I, III, 10-11	
_____		5. Describe loudness and sound intensity.	II, I, III, 10	
_____		6. Describe natural frequency.	II, I, III, 10	
_____		7. Describe the purpose of a sounding board in a stringed musical instrument.	II, I, III, 10	
_____		8. Describe resonance.	II, I, III, 10	
_____		9. Describe how sound waves interfere with one another.	II, I, III, 11	
_____		10. Describe beats.	II, I, III, 11	
	30	**Light**		**APEX** LA Physical Science Sem. 1- Unit 6 Core Physical Science Sem. 1- Unit 5 Chapter 27
_____		1. Describe the dual nature of light.	II, I, II, 8	
_____		2. State what Albert Michelson's experimental value for the speed of light was.	II, I, II, 8	
_____		3. State the waves in the electromagnetic spectrum	II, I, II, 8	
_____		4. Describe why certain materials are transparent to light.	II, I, II, 10	
_____		5. Describe opaque materials.	II, I, II, 10	
_____		6. Describe why shadows form.	II, I, II, 8	

_____		7. Describe the evidence that suggest light waves are transverse.	II, I, II, 8	
_____		8. Describe 3-D vision.	II, I, II, 8	
	31	**Color**		**APEX** LA Physical Science Sem. 1- Unit 6 Core Physical Science Sem. 1- Unit 5 Chapter 28 Why the Sky is Blue Activity
_____		1. Describe what happens when sunlight is passed through a triangular-shaped prism	II, I, III, 10	
_____		2. Describe how the reflection of light affects an object's color.	II, I, III, 11	
_____		3. Describe what determines whether a material reflects, transmits, or absorbs light of a particular color.	II, I, III, 12	
_____		4. Describe white light.	II, I, III, 12	
_____		5. State the three colors that can be combined to form almost any color.	II, I, III, 12	
_____		6. Define complementary colors.	II, I, III, 12	
_____		7. Describe color mixing by subtraction.	II, I, III, 10 & 12	
_____		8. Explain why the sky is blue, why sunsets are red, and why water is greenish-blue.	II, I, III, 10	
_____		9. Explain how atoms emit light.	II, I, II, 10	

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(3rd 9 weeks- 6th 4 ½ weeks)

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		Students will be able to:	Strand, Standards, Benchmarks, & Performance Standards	Supplemental books, labs, videos, projects, digital curriculum
	32	**Reflection and Refraction**		**APEX** LA Physical Science Sem. 1- Unit 6 Core Physical Science Sem. 1- Unit 5 Chapter 29 Lensless Lens Activity Camera Obscura Activity Disappearing Act Activity Sunballs Lab Kaleidoscope Lab
_____		1. Describe what happens when a wave reaches a boundary between two media.	II, I, II, 8	
_____		2. Describe the Law of Refraction.	II, I, II, 11	
_____		3. Describe the type of images that are produced by plane mirrors.	II, I, II, 11	
_____		4. Describe that happens when light is incident on a rough surface.	II, I, II, 11	
_____		5. Describe what happens to sound energy that is not reflected.	II, I, II, 11	
_____		6. Describe what happens when a wave that is traveling at an angle changes its speed upon crossing a boundary between two media.	II, I, II, 11	
_____		7. Describe what causes sound waves to refract.	II, I, II, 11	
_____		8. Describe what causes the refraction of light.	II, I, II, 11	
_____		9. Describe what causes the appearance of a mirage.	II, I, II, 11	
_____		10. Describe what causes the dispersion of light.	II, I, II, 11	
_____		11. Describe the condition necessary for seeing a rainbow.	II, I, II, 11	

_____		12. Describe what causes total internal reflection to occur.	II, I, II, 8	
	33	**Lenses**		**APEX** LA Physical Science Sem. 1- Unit 6 Core Physical Science Sem. 1- Unit 5 Chapter 30
_____		1. Describe how a lens forms an image.	II, I, III, 12	
_____		2. Explain what determines the type of image formed by a lens.	II, I, III, 12	
_____		3. Construct ray diagrams.	II, I, III, 12	
_____		4. Distinguish between the types of images formed by lenses.	II, I, III, 12	
_____		5. Describe some optical instruments that use lenses.	II, I, III, 12	
_____		6. Describe the main parts of the human eye.	II, I, III, 12	
_____		7. Describe the three common vision problems.	II, I, III, 12	
_____		8. Describe the types of aberrations that can occur in images.	II, I, III, 12	
	34	**Diffraction and Interference**		**APEX** LA Physical Science Sem. 1- Unit 6 Core Physical Science Sem. 1- Unit 5 Chapter 31 Mirror, Mirror, on the Wall Activity Pepper's Ghost Lab What's My Lambda? Lab
_____		1. Describe what Huygens stated about light waves.	II, I, II, 8	
_____		2. Describe what affects the extent of diffraction.	II, I, III, 11	
_____		3. Explain how interference affects wave amplitudes.	II, I, III, 11	
_____		4. Describe what Young's interference experiment demonstrated.	II, I, III, 11	
_____		5. Explain how the colors seen in thin films are produced.	II, I, III, 10-12	
_____		6. Describe how laser light is emitted.	II, I, III, 12	
_____		7. Explain how a hologram is produced.	II, I, III, 12	

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(4th 9 weeks- 7th 4 ½ weeks)

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		Students will be able to:	Strand, Standards, Benchmarks, & Performance Standards	Supplemental books, labs, videos, projects, digital curriculum
	35	**Electricity and Magnetism** **Electrostatics**		**APEX** LA Physical Science Sem. 1- Unit 7 Core Physical Science Sem. 1- Unit 6
_____		1. Describe the fundamental rule of the base of all electrical phenomena.	II, I, III, 1 & 3	Chapter 32
_____		2. Explain how an object becomes electrically charged.	II, I, III, 3	Give Me a Charge Activity Sticky Electrostatics Activity The Electric Ferry Activity Ohm Sweet Ohm Lab Voltage Divider Lab
_____		3. Describe Coulomb's Law.	II, I, III, 3	
_____		4. Distinguish between a good conductor and a good insulator.	II, I, II, 4	
_____		5. Describe two ways electric charges can be transferred.	II, I, III, 3	
_____		6. Describe what happens when a charged object is placed near a conducting surface.	II, I, III, 5	
_____		7. Describe what happens when an insulator is in the presence of a charged object.	II, I, II, 4	
	36	**Electric Fields and Potential**		**APEX** LA Physical Science Sem. 1- Unit 7 Core Physical Science Sem. 1- Unit 6
_____		1. Describe how to measure the strength of an electric field at different points.	II, I, III, 3	
_____		2. Describe how electric fields are represented by vectors and by electric field	II, I, III, 5-6	

		lines.		Chapter 33
_____		3. Describe how objects can be completely shielded from electric fields.	II, I, III, 5-6	
_____		4. Explain why a charged object in an electric field is considered to have electrical potential energy.	II, I, III, 3	
_____		5. Distinguish between electrical potential energy and electric potential.	II, I, III, 3	
_____		6. Describe how electrical energy can be stored.	II, I, III, 3	
_____		7. Describe the operation of a Van de Graaff generator.	II, I, III, 1	
	37	**Electric Current**		**APEX** LA Physical Science Sem. 1- Unit 7 Core Physical Science Sem. 1- Unit 6 Chapter 34 Let There Be Light Activity 3-Way Switch Activity Workaholic Activity Cranking-Up Qualitatively Lab Cranking-Up Quantitatively Lab
_____		1. Describe the flow of electric charge.	II, I, II, 9	
_____		2. Describe what is happening inside a current-carrying wire.	II, I, II, 8-9	
_____		3. Give examples of voltage sources.	II, I, II, 9	
_____		4. Describe the factors that affect the resistance of a wire.	I, I, II, 3	
_____		5. Describe Ohm's Law.	I, I, II, 3	
_____		6. Explain the causes of electric shock.	II, I, II, 1	
_____		7. Distinguish between DC and AC.	II, I, II, 1 & 3	
_____		8. Describe how AC is converted to DC.	II, I, II, 1 & 3	
_____		9. Describe the drift speed of conduction electrons in a current-carrying wire.	II, I, II, 9	
_____		10. Identify the source of conduction electrons in a circuit.	II, I, II, 4	
_____		11. Relate the electric power used by a device to current and voltage.	II, I, II, 3	

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	38	**Electric Circuits**		**APEX** LA Physical Science Sem. 1- Unit 7 Core Physical Science Sem. 1- Unit 6 Chapter 35
_____		1. Describe the configuration of a working circuit.	II, I, II	
_____		2. Explain how current can be turned on or off in a circuit, and how electrical devices can be connected in a circuit.	II, I, II	
_____		3. Describe the characteristics of a series circuit.	II, I, II	
_____		4. Describe the characteristics of a parallel circuit.	II, I, II	
_____		5. Interpret circuit diagrams.	II, I, II	
_____		6. Determine the equivalent resistance of circuits having two or more resistors.	II, I, II	
_____		7. Explain the cause and prevention of overloading household circuits.	II, I, II	
	39	**Magnetism**		**APEX** LA Physical Science Sem. 1- Unit 7 Core Physical Science Sem. 1- Unit 6 Chapter 36
_____		1. Explain how magnetic poles affect each other.	II, I, III, 5	
_____		2. Describe the magnetic field in the space around a magnet.	II, I, III, 5	
_____		3. Describe how magnetic fields are produced.	II, I, III, 5	

_____		4. Describe how to make a permanent magnet.	II, I, III, 5	Your Repulsive! Activity
_____		5. Describe the magnetic field produced by a current-carrying wire.	II, I, III, 5	
_____		6. Describe how a magnetic field exerts a force on a charged particle in the field.	II, I, III, 5	
_____		7. Describe how current is affected by a magnetic field.	II, I, III, 5	
_____		8. Describe how a galvanometer and a motor work.	II, I, III, 5	
_____		9. Suggest a possible cause for Earth's magnetic field.	II, I, III, 5	
	40	**Electromagnetic Induction**		**APEX** LA Physical Science Sem. 1- Unit 7 Core Physical Science Sem. 1- Unit 6
_____		1. Describe how voltage is induced in a coil of wire.	II, I, III, 5	Chapter 37
_____		2. State and explain Faraday's law.	II, I, III, 5	Jump Rope Generator Activity
_____		3. Describe how a generator works.	II, I, III, 5	Motors and Generators Lab
_____		4. Describe how a magnetic field affects a moving charge.	II, I, III, 5	
_____		5. Describe how a transformer works.	II, I, III, 5	
_____		6. Explain why almost all electrical energy is sold in the form of alternative current.	II, I, III, 5	
_____		7. Explain how an electric field creates a magnetic field.	II, I, III, 5	
_____		8. Describe electromagnetic waves.	II, I, II, 8	