SCANTRON®

AHSAA Homeschool Student Eligibility Exams Physics		
Standard Reference	**Standard Text**	**Percentage of Test Items**
Motion and Stability: Forces and Interactions		40%
1	Investigate and analyze, based on evidence obtained through observation or experimental design, the motion of an object using both graphical and mathematical models (e.g., creating or interpreting graphs of position, velocity, and acceleration versus time graphs for one- and two-dimensional motion; solving problems using kinematic equations for the case of constant acceleration) that may include descriptors such as position, distance traveled, displacement, speed, velocity, and acceleration.	
2	Identify external forces acting on a system and apply Newton's laws graphically by using models such as free-body diagrams to explain how the motion of an object is affected, ranging from simple to complex, and including circular motion.	
2.a	Use mathematical computations to derive simple equations of motion for various systems using Newton's second law.	
2.b	Use mathematical computations to explain the nature of forces (e.g., tension, friction, normal) related to Newton's second and third laws.	
3	Evaluate qualitatively and quantitatively the relationship between the force acting on an object, the time of interaction, and the change in momentum using the impulse-momentum theorem.	
4	Identify and analyze forces responsible for changes in rotational motion and develop an understanding of the effect of rotational inertia on the motion of a rotating object (e.g., merry-go-round, spinning toy, spinning figure skater, stellar collapse [supernova], rapidly spinning pulsar)	
Energy		25%
5	Construct models that illustrate how energy is related to work performed on or by an object and explain how different forms of energy are transformed from one form to another (e.g., distinguishing between kinetic, potential, and other forms of energy such as thermal and sound; applying both the work-energy theorem and the law of conservation of energy to systems such as roller coasters, falling objects, and spring-mass systems; discussing the effect of frictional forces on energy conservation and how it affects the motion of an object).	
6	Investigate collisions, both elastic and inelastic, to evaluate the effects on momentum and energy conservation.	
7.a	Develop models to illustrate methods of heat transfer by conduction (e.g., an ice cube in water), convection (e.g., currents that transfer heat from the interior up to the surface), and radiation (e.g., an object in sunlight).	
7.b	Engage in argument from evidence regarding how the second law of thermodynamics applies to the entropy of open and closed systems.	

Standard Reference	Standard Text	Percentage of Test Items
Waves and Their Applications in Technologies for Information Transfer		35%
8	Investigate the nature of wave behavior to illustrate the concept of the superposition principle responsible for wave patterns, constructive and destructive interference, and standing waves (e.g., organ pipes, tuned exhaust systems).	
8.a	Predict and explore how wave behavior is applied to scientific phenomena such as the Doppler effect and Sound Navigation and Ranging (SONAR).	
9	Engage in argument to defend the effectiveness of a design solution that maintains biodiversity and ecosystem services (e.g., using scientific, economic, and social considerations regarding purifying water, recycling nutrients, preventing soil erosion).	
10	Use evidence and scientific reasoning to explain how characteristic animal behaviors (e.g., building nests to protect young from cold, herding to protect young from predators, attracting mates for breeding by producing special sounds and displaying colorful plumage, transferring pollen or seeds, creating conditions for seed germination and growth) and specialized plant structures (e.g., flower brightness, nectar, and odor attracting birds that transfer pollen; hard outer shells on seeds providing protection prior to germination) affect the probability of successful reproduction of both animals and plants.	
11	Develop and use models to illustrate electric and magnetic fields, including how each is created (e.g., charging by either conduction or induction and polarizing; sketching field lines for situations such as point charges, a charged straight wire, or a current carrying wires such as solenoids; calculating the forces due to Coulomb's laws), and predict the motion of charged particles in each field and the energy required to move a charge between two points in each field.	
12	Use the principles of Ohm's and Kirchhoff's laws to design, construct, and analyze combination circuits using typical components (e.g., resistors, capacitors, diodes, sources of power).	