Alignment Document

State of Connecticut
And
Aventa Learning Physics

Physics
2005-2007 Benchmark Blueprint

State Standard Number	State Standard Area / Description	Unit Name	Course Topic Description
P	Physics		
P.1	Motion and Forces		
P.1.1	Newton's laws predict the motion of most objects.	Physics and the Laws of Motion	Forces and the Laws of Motion
P.1.1.1	When forces are balanced, no acceleration occurs; thus an object continues to move at a constant speed or stays at rest.	Physics and the Laws of Motion	Forces and the Laws of Motion
P.1.1.2	The law F = ma is used to solve motion problems that involve constant forces.	Physics and the Laws of Motion	Forces and the Laws of Motion
P.1.1.3	When one object exerts a force on a second object, the second object always exerts a force of equal magnitude and in the opposite direction.	Physics and the Laws of Motion	Forces and the Laws of Motion
P.1.1.4	Applying a force to an object perpendicular to the direction of its motion causes the object to change direction.	Physics and the Laws of Motion	Forces and the Laws of Motion
P.1.1.5	Circular motion requires the application of a constant force directed toward the center of the circle.	Energy and Motion	Circular Motion and Gravitation
P.1.1.6	Newton's laws are not exact, but provide very good approximations unless an object is small enough that quantum effects become important.	Magnetism and Atomic Physics	Atomic Physics
P.2	Conservation of Energy and Momentum		
P.2.1	The laws of conservation of energy and momentum provide a way to predict and describe the movement of objects.	Energy and Motion	Work and Energy

P.2.1.1	Kinetic energy can be calculated by using the formula $E = (1/2)mv^2$.	Energy and Motion	Work and Energy
P.2.1.2	Changes in gravitational potential energy near Earth can be calculated by using the formula (change in potential energy) = mgh.	Energy and Motion	Work and Energy
P.2.1.3	Momentum is calculated as the product mv.	Energy and Motion	Momentum and Collisions
P.2.1.4	Momentum is a separately conserved quantity different from energy.	Energy and Motion	Momentum and Collisions
P.2.1.5	An unbalanced force on an object produces a change in its momentum.	Energy and Motion	Momentum and Collisions
P.2.1.6	The principles of conservation of momentum and energy can be used to solve problems involving elastic and inelastic collisions.	Energy and Motion	Momentum and Collisions
P.3	Heat and Thermodynamics		
P.3.1	Energy cannot be created or destroyed although, in many processes, energy is transferred to the environment as heat.	Heat and Thermodynamics	Heat
P.3.1.1	Heat flow and work are two forms of energy transfer between systems.	Heat and Thermodynamics	Heat
P.3.1.2	The work done by a heat engine that is working in a cycle is the difference between the heat flow into the engine at high temperature and the heat flow out at a lower temperature.	Heat and Thermodynamics	Thermodynamics
P.3.1.3	The internal energy of an object includes the energy of random motion of the object's atoms and molecules. The greater the temperature of the object, the greater the energy of motion of the atoms and molecules that make up the object.	Heat and Thermodynamics	Heat
P.3.1.4	Most processes tend to decrease the order of a system over time, so that energy levels eventually are distributed more uniformly.	Heat and Thermodynamics	Thermodynamics
P.4	Waves		
P.4.1	Waves have characteristic properties that do not depend on the type of wave	Waves	Vibrations and Waves
		Waves	Sound
		Waves	Light
P.4.1.1	Waves carry energy from one place to another.	Waves	Vibrations and Waves

P.4.1.2	Transverse and longitudinal waves exist in mechanical media, such as springs and ropes, and in the Earth as seismic waves.	Waves	Vibrations and Waves
P.4.1.3	Wavelength, frequency and wave speed are related.	Waves	Vibrations and Waves
P.4.1.4	Sound is a longitudinal wave whose speed depends on the properties of the medium in which it propagates.	Waves	Sound
P.4.1.5	Radio waves, light and X-rays are different wavelength bands in the spectrum of electromagnetic waves, the speed of which in a vacuum is approximately 3 x 108m/s, and less when passing through other media.	Waves	Light
P.4.1.6	Waves have characteristic behaviors, such as interference, diffraction, refraction and polarization.	Waves	Vibrations and Waves
		Waves	Light
P.4.1.7	Beats and the Doppler Effect result from the characteristic behavior of waves.	Waves	Sound
P.5	Electric and Magnetic Phenomena		
P.5.1	Electric and magnetic phenomena are related and have many practical applications.	Magnetism and Atomic Physics	Electromagnetic Induction
P.5.1.1	The voltage or current in simple direct current (DC) electric circuits constructed from batteries, wires, resistors and capacitors can be predicted using Ohm's law.	Electricity	Electrical Energy and Current
P.5.1.2	Any resistive element in a DC circuit dissipates energy, which heats the resistor.	Electricity	Electrical Energy and Current
P.5.1.3	The power in any resistive circuit element can be calculated by using the formula Power = I^2R.	Electricity	Electrical Energy and Current
P.5.1.4	Charged particles are sources of electric fields and are subject to the forces of the electric fields from other charges.	Electricity	Electric Forces and Fields
P.5.1.5	Magnetic materials and electric currents (moving electric charges) are sources of magnetic fields and are subject to forces arising from the magnetic fields of other sources.	Magnetism and Atomic Physics	Magnetism

P.5.1.6	Changing magnetic fields produce electric fields, thereby inducing currents in nearby conductors.	Magnetism and Atomic Physics	Electromagnetic Induction
P.5.1.7	Plasmas, the fourth state of matter, contain ions, or free electrons or both and conduct electricity.	Electricity	Electrical Energy and Current