Indiana Course-Aligned Assessment
Physics – Blueprint

Standard	Description	Percent Range *
1 – Motion and Forces	Students will understand motion of macroscopic objects through analysis of Newton's Laws. Students will use motion, maps, graphs, and equations in one dimension and two dimensions with regards to time, displacement, velocity, and acceleration. Students can describe magnitude and directions of forces, net forces, contact and non-contact forces. Students will use Newton's laws to analyze dynamic and static systems as well as Newton's law of Universal Gravitation to analyze orbiting objects.	35-45%
2 – Energy and Momentum	Students will give qualitative and quantitative descriptions of momentum, work, kinetic energy, potential energy, and power. Students will make quantitative predictions in the change of momentum and kinetic energy. Students will analyze evidence to illustrate the law of conservation of energy and momentum and then apply these laws to analyze elastic and inelastic collisions. Students can describe and quantify energy in different mechanical forms and recognize that energy can be transformed into different forms of energy.	20-30%
3 – Temperature and Thermal Energy Transfer	Students will describe temperature, thermal energy and thermal energy transfer using the kinetic molecular theory as well as expanding on the conservation of thermal energy. Students will describe the kinetic molecular model, derive the ideal gas law, and prove the relationship between temperature and kinetic energy. Students will use the kinetic theory to explain the transfer of heat during a change of state in addition to describing the transfer of thermal energy by conduction, convection, and radiation.	0-10%
4 – Electricity and Magnetism	Students will use Coulomb's Law to describe and determine the force on a stationary charge due to other charges. They will define an electric field and describe motion of charged particles, electric potential energy and electric potential. Students can explain and analyze electrical components in series and parallel circuits in terms of current, resistance, voltage and power while using Ohm's and Kirchoff's laws. Students will describe magnetic forces and fields and how they are produced.	0-10%
5 – Vibrations, Waves	Students will use Newton's laws to identify properties of objects that vibrate and describe vibrational motion resulting from restoring forces. Students will describe how vibrating objects can generate transverse and or longitudinal waves while distinguishing between the two. Students will describe and analyze propagating waves in terms of wave speed, wavelength, frequency or period, and amplitude and describe the behavior of waves through transmission, reflection, interference, and polarizations.	5-15%
6 – Light and Optics	Students will understand the geometric nature of light in reflection, refraction, and in image formation by lenses and mirrors and then graphically predict the formation of images. Students will describe the electromagnetic spectrum in terms of frequency, wavelength and energy, and the speed in a vacuum. Students will understand the electromagnetic waves are produced by charged particles and interact with matter both as packets and waves while qualitatively showing that wave theory helps explain polarization and diffraction.	5-15%
7 – Modern Physics	Students will explain the parts of the atom and nucleus and understand the forces of attraction and repulsions between the particles. Students will distinguish fission from fusion and describe the binding energies of protons and neutrons. They will describe qualitatively how nuclear reactions convert small amounts of matter in large amounts of energy and that fission results from large less stable nuclei decomposing forming smaller more stable nuclei.	0-10%

* This range represents the approximate emphasis for each reporting category on the assessment.