

IPSH FINAL EXAM REVIEW, SEMESTER 1, 2011-12

The following items are listed as a guide for what to focus on during your studies. You must bring a calculator and no.2 pencil to the exam. An equations sheet and a periodic table will be provided.

SCIENCE SKILLS

- Be able to interpret a scientific investigation for purpose, hypothesis, and variables (manipulated, responding, control).
- Be able to setup a graph based on experimental data.
- Be able to **convert** between metric units. Be able to **convert** between imperial (English) and metric units.
- Be able to express numbers in scientific notation.

MECHANICS

- Understand and be able to apply Newton's 1st Law of Motion.
- What is inertia?
- Be able to determine the net force of a system using a free body diagram and be able to determine how motion is effected by that net force.
- Be able to explain how an object at rest and an object traveling a constant can both be in equilibrium.
- Be able to interpret graphs of velocity, acceleration, and distance.
- Be able to interpret distance-time graphs and velocity-time graphs.
- Be able to **calculate** the average acceleration of an object when given changes in speed and time.
- How are speed and velocity different from each other? Be able to apply and give examples.
- Be able to **calculate** velocity and average speed.
- Be able to apply and **calculate** using Newton's 2nd Law.
- Be able to explain how the instantaneous speed of an object changes while it is accelerating.
- Be able to explain the difference between mass and weight.
- Be able to explain and apply Newton's 3rd Law of Motion.
- Know how potential energy and kinetic energy are related and how to **calculate** each.
- Understand and be able to explain how energy is transferred using the conservation of energy.
- What is work? What is power? How are they related?
- Be able to **calculate** work and power.
- Be able to explain and identify the six different types of simple machines.
- Understand that work input equals work output for ideal simple machines. Apply that knowledge when quantifying mechanical advantage.

CHEMISTRY

- Be able to describe an atom and its components (protons, neutrons, electrons).
- Know the relative size and charges of protons, neutrons, electrons.

- Be able to interpret an element key (atomic #, symbol, atomic mass, # protons, #electrons in an atom, # neutrons).
- How is atomic mass different from mass number?
- What is an isotope?
- Be able to explain why elements in a period are very different from each other, while elements in a group/family are so similar.
- Know the different characteristics of metals, nonmetals, metalloids. Be able to identify them on the periodic table.
- Understand physical vs. chemical properties, physical vs. chemical changes.
- Be able to identify and draw Bohr models of atoms for elements 1-18.
- Understand periodic patterns of valence shells, valence electrons, periods, groups, atomic radius, ionic charge.
- How are atoms, elements, and compounds different from each other?
- How are alpha, beta, and gamma particles/rays different (sizes, charges, harm).
- Be able to explain why some elements are radioactive and why some aren't.
- How fusion & fission are different?
- What is a chemical bond? What are the three types of chemical bonds and how are they formed?
- Be able to combine ions and/or polyatomic ions to create compounds and write their chemical formulas.
- Be able to calculate the molecular mass of compounds.
- Be able to identify number of atoms of elements in a chemical formula.
- How do you write a chemical equation? Reactants vs. products.
- Be able to balance chemical equations using coefficients. How does this relate to the Law of Conservation of Matter?
- Be able to identify synthesis, decomposition, single-replacement, and double-replacement reactions when given a chemical equation.
- Be able to identify an element's ionic charge and understand why that is.
- Be able to draw, interpret, and identify Lewis structures for elements.
- Ionic compounds vs. molecules vs. metals.

HEAT

- How are thermal energy, temperature, and heat different?
- Be able to convert between Kelvin, Celsius, and Fahrenheit.
- Understand the molecular differences between solids, liquids, and gases. How does heat affect molecular speed, spacing, and density?
- Understand and apply the Laws of Thermodynamics.
- Be able to interpret a phase change diagram for an unknown substance.
- Understand the 6 different phase changes.
- How is boiling different from evaporation?
- Why doesn't temperature change during a phase change?
- Which phase changes are cooling vs. warming processes and why?
- How does pressure effect phase change?