

## MECHANICS EXAM, IPSH 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 will be provided.

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- 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.
- Understand and be able to apply Newton's 1<sup>st</sup> Law of Motion.
- What is inertia?
- Be able to apply the Equilibrium Rule to different situations, including free body diagrams (vector diagrams). Be able to determine the net forces of a system using a free body diagram.
- Know the difference and be able to give examples of something in static vs. dynamic 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** acceleration without given force or mass.
- 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 2<sup>nd</sup> Law.
- Be able to explain and apply free fall and terminal velocity.
- Be able to **calculate** instantaneous speed of an accelerating object and distance that object has traveled.
- Understand and be able to explain the difference between mass and weight.
- Be able to **calculate** weight. Be able to **convert** between kg, N, and pounds.
- Be able to explain and apply Newton's 3<sup>rd</sup> Law of Motion.
- Know that energy of a system = PE + KE
- 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.
- Be able to identify input & output forces, input & output distances when using simple machines. Use that information to **quantify** mechanical advantage.
- Understand that work input equals work output for ideal simple machines. Apply that knowledge when quantifying mechanical advantage.