

## SPH4UA Exam Outline and Review

Unit 1	<ul style="list-style-type: none"> <li>• Displacement</li> <li>• 5 Kinematic Equations</li> <li>• Acceleration</li> <li>• Projectile Motion*</li> <li>• Forces</li> <li>• Pulley System*</li> <li>• Friction and coefficient of friction*</li> <li>• Drawing FBDs</li> <li>• Uniform Circular Motion*</li> <li>• Centripetal force, acceleration</li> <li>• Power</li> <li>• Gravitational Field Strength</li> <li>• Mass vs. Weight</li> <li>• Acceleration of systems</li> </ul>	<p><b><u>Review - Nelson</u></b> Pg. 148 #1, 8 Pg. 154 #71, 77, 84, 90</p> <p><b><u>Review – AP College Board</u></b> Pg. 136 # 18 Pg. 229 # 20 Pg. 254 # 8 Pg. 371 #21</p>
Unit 2	<ul style="list-style-type: none"> <li>• Collisions (1D, 2D, conservation of momentum, elastic vs inelastic)*</li> <li>• Energy – spring, kinetic, gravitational potential*</li> <li>• Work-Energy Theorem*</li> <li>• Conservation of energy*</li> <li>• Moment of Inertia – which ones have higher/lower moment of inertia (of the ones we did in class – thin hoop, cylinder, ball)</li> <li>• Total kinetic energy (translational +rotational)</li> <li>• Moment of inertia and angular velocity</li> <li>• Torque and torque direction</li> <li>• Fluids – pressure (Multiple Choice)</li> </ul>	<p><b><u>Review - Nelson</u></b> Pg. 268 #51 Pg. 274 #10, 52, 60, 63</p> <p><b><u>Review – AP College Board</u></b> Pg. 371 #21 Pg. 430 #16</p>
Unit 3	<ul style="list-style-type: none"> <li>• Coulomb's Law*</li> <li>• Gravitational Force/field</li> <li>• Drawing electric Fields*</li> <li>• Electric and Magnetic Force*</li> <li>• RHRs – directions of force, velocity, etc.</li> <li>• Law of conservation of charge</li> <li>• Electric/magnetic field lines</li> <li>• Speed of particles inside magnetic/electric fields*</li> <li>• Circular motion in magnetic field*</li> <li>• Electric and Magnetic Field*</li> </ul>	<p><b><u>Review - Nelson</u></b> Pg. 426 #2, 74, 83, 92, 97</p> <p><b><u>Review – AP College Board</u></b> Pg. 811 #14 Pg. 972 #8, 19</p>
Unit 4	<ul style="list-style-type: none"> <li>• Reflection</li> <li>• Refraction</li> <li>• Interference</li> <li>• Thin Film Interference*</li> <li>• Index of Refraction</li> <li>• Speed of light in mediums</li> <li>• Diffraction</li> <li>• Single slit vs. double slit interference</li> <li>• Oscillating electric and magnetic fields</li> </ul>	<p><b><u>Review - Nelson</u></b> Pg. 560 #13, 32, 36, 48, 49, 94, 96</p> <p><b><u>Review – AP College Board</u></b> Pg. 1123 #28a</p>
Unit 5	<ul style="list-style-type: none"> <li>• Time Dilation – proper time</li> <li>• Speed of Light in different frames</li> </ul>	<p>PowerPoint: 11 Relativity. Slides 8 and 13</p>

\*Areas of focus - concepts included in Communication/Application/Thinking (Part B)

## EXAM STRUCTURE

Date: Wednesday, January 21 (Period 1)

Time: 8:30 am to 10:30 am (2 hours)

Weight: 20%

**PART A – KNOWLEDGE**

**35 MARKS TOTAL**

- Multiple Choice
- True and False

25 questions

10 questions

\*You will be answering these on a scantron

**PART B – COMMUNICATION/APPLICATION/THINKING**

**35 MARKS TOTAL**

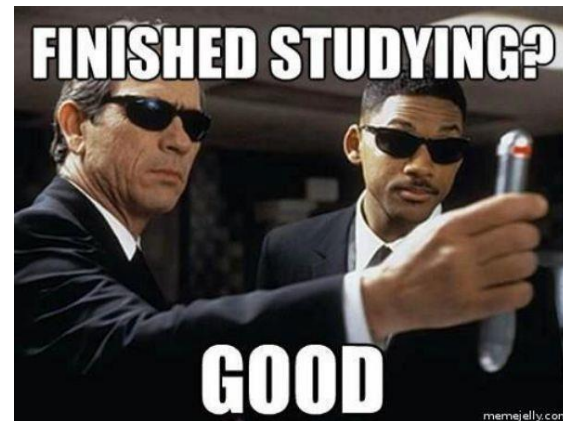
Short Answer (Calculations and Derivation)

8 questions

**\*All formula and constants will be provided on the exam**

Other Skills:

- Sketch a graph \*
- Derive formulas (no numbers just variables)\*
- How are formulas affected when one variable increases/decreases



1. A ballistic pendulum is used to measure the speed of a bullet. It consists of a wooden block of mass  $M = 10\text{kg}$  suspended from a vertical string. A bullet of mass  $m = 100\text{g}$  strikes and embeds itself in the block and the block swings upward through a vertical distance of  $0.10\text{m}$ . What is the bullet's speed?
2. Suppose that Ben elevates his  $80\text{-kg}$  body up the  $2.0\text{-meter}$  stairwell in  $1.8$  seconds. What is Ben's *power rating*?
3. List the objects based on their moments of inertia from highest to lowest: thin hoop, solid cylinder, uniform sphere.
4. For the solid sphere in the figure, what is the linear speed of the center of mass at the bottom of the incline?
5. A charged coin having a mass of  $4.35\text{ g}$  and a charge of  $-2500\text{ }\mu\text{C}$  is placed in an upward uniform electric field of strength  $27.5\text{ N/C}$ . What is magnitude and direction of uniform magnetic field are needed in the region for the coin to travel through the fields at a velocity of  $12.8\text{ m/s [E]}$ . Draw a FBD and field diagram with your answer. Include the gravitational force.
6. What is Newton's Second Law? Describe relationship between variables

