**Physical Science Exam Study Guide – First Semester Physics**

Name:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Hour:\_\_\_

\*For the exam, you may create a “cheat sheet” on a 3x5 card, it may be both sides but it MUST be hand written, or will be thrown away when I check them **before the exam**

**Unit 1 – Scientific Method, Measurement and Density**

**Terms to know for scientific method:**

Variable -

Independent Variable –

Dependent Variable –

Control Group –

Experimental Group –

Hypothesis –

Data –

Conclusion –

**Concepts to know for scientific method:**

* Using the scientific method to solve problems, evaluate a scientific experiment and identify the parts (vocabulary words) of it
* Reading/interpreting information from a graph

*Practice…*

Hypothesis: When a person is placed in front of a speaker, the higher the frequency of a sound wave the greater the impact it will be on someone’s hair.  
Materials: Stereo system, person with long hair, audio with different pitches, video recorder to capture observations

Procedure:

1. Student 1 is sat in front of a stereo system speaker, another student, student 2, places a CD of pre-recorded frequencies into the stereo system
2. A video recorder is set up in front of student 1 so that observations can be recorded as the pitch changes
3. Student 2 plays each sound for 30 seconds, pausing 30 seconds in-between to allow hair to settle back to rest position. During each sound volume should be left at the same place
4. After all the frequencies have been played students analyze the tape data and make observations about the height hair was blown

Data:

|  |  |
| --- | --- |
| Frequency | Height of Hair Blown |
| 10 Hz | No effect |
| 50 Hz | No effect |
| 100 Hz | 10 cm |
| 150 Hz | Straight up, 50 cm |

Answer the following questions based on the above experiment….

1. What is the problem they are experimenting with?
2. What is their hypothesis?
3. What is the independent variable? What about the dependent variable?
4. What would be their control group?
5. What would their conclusion be?

**Terms to know for measurement and density.**

Mass –

Volume –

Density -

**Equations to know for measurement and density.**

Density   
Area  
Volume

**Units to know for measurement and density.**

Length –

Volume –

Mass –

Area –

**Concepts to know for measurement and density.**

* How does density relate to objects sinking/floating
* How to solve for area, volume and density

*Practice…*

1. Calculate the area of one side of a box that is 10 cm long, 2 cm high and 2 cm wide with a mass of 20 grams.
2. Calculate the volume of the box is #1.
3. Calculate the density of the block in #1.

**Unit 2 – Forces and Motion**

**Terms to know for forces and motion:**

Speed –

Velocity –

Vector –

Weight –

Mass –

Acceleration –

Force –

Friction –

Gravity –

**Equations to know for forces and motion:**

Speed

Velocity

Acceleration

Momentum

Force

**Units to know for forces and motion:**

Force –

Speed –

Velocity –

Acceleration –

**Concepts to know for forces and motion**

* Newton’s three laws, both the definitions and examples
* Graphing motion – constant speed, acceleration, stopped
* Calculating vectors from two forces P

*Practice…*

1. What is the difference between mass and weight AND which one changes when you are on another planet?
2. What is the speed of a runner who covers 15 meters in 3 seconds?
3. What is the speed of a dog chasing a cat 2 meters north and 4 meters west for 3 minutes around the neighborhood?
4. What is the average velocity of the dog in #3 going north?
5. If Cooper and I are playing tug on a rope and he pulls with 100 N to the right and I pull 500 N to the left, what is the resultant vector? Draw it out.
6. If 2 Chainz and I are sitting at the stop sign and accelerate from 0 m/s to 100 m/s in 5 seconds, what is the rate of acceleration?
7. Draw a graph below of a runner who is going a constant speed, stops then accelerates away. Label each part.
8. Below list Newton’s 3 laws AND an example of each.

**Unit 3 – Work, Power, Energy**

**Terms to know for work, power and energy:**

Work –

Power –

Kinetic energy –

Potential energy –

Gravitational potential energy –

Elastic potential energy –

Mechanical advantage –

Conduction –

Convection –

Radiation –

Thermal expansion –

**Equations to know for work, power and energy**

Work

Power

Potential energy

Kinetic energy

MA for a pulley

MA for a lever

MA for a wheel and axle

MA for an incline plane

**Units to know for work, power and energy**

Work -

Power -

Energy –

**Concepts to know for work, power and energy**

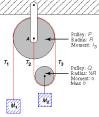
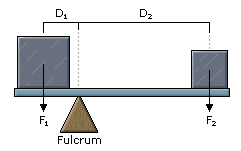
* Examples and definitions of each type of simple machine
* How friction plays a role in work
* Examples and definitions of different types of energy
* Apply the equations to solve problems

*Practice…*

1. What impact does friction have on work?
2. What is the law of conservation of energy?
3. List an example of the following types of energy…
   1. Kinetic energy -
   2. Gravitational potential energy -
   3. Elastic potential energy –
4. Describe an example of…
   1. Kinetic energy turning into potential energy –
   2. Potential energy turning into kinetic energy –
5. Describe the following simple machines AND give an example of each
   1. Lever –   
      1. Example:
   2. Wheel and Axle –   
      1. Example :
   3. Incline Plant –   
      1. Example:
   4. Wedge –   
      1. Example:
   5. Screw –   
      1. Example:
   6. Pulley  
      1. Example:
6. Nelly picks up his chains from the table and places them around his neck 1.5 meters up. He uses 200 J of work to do this in 2 seconds, how much power did he use?
7. Cooper wanted to bring his stuffed animal to bed; he exerted a force of 50 N and pushed it 200 meters to his bed. How much work did he apply to the stuffed animal?
8. 2 Chainz is running across the stage at a rate of 2 m/s, he has a mass of 75 kg, what is his kinetic energy?
9. Bill Nye is working on his dance moves and glides across the stage at a rate of 10 m/s and has a mass of 60 kg, what is his kinetic energy?
10. Two dogs sit on the edge of a diving board, one has a mass of 50 kg and the other 500 kg, who has more potential energy?
11. Determine the mechanical advantage of the following objects:

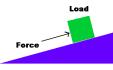
MA= MA=

M1= input(hand) M2= load Output D1= 4 Input D2= 20

[](http://images.google.com/imgres?imgurl=http://www.physics.csbsju.edu/twk/examples/pulley.gif&imgrefurl=http://www.physics.csbsju.edu/cgi-bin/twk/examples/G2.html&h=356&w=302&sz=5&tbnid=bbwH_ZXCpo1aDM:&tbnh=117&tbnw=99&hl=en&start=5&prev=/images?q=pulley&svnum=10&hl=en&lr=&sa=G) [](http://en.wikipedia.org/wiki/Image:LeverPrinciple.png)

MA= MA =

R= 16 r2= 2

[](http://images.google.com/imgres?imgurl=http://kosmoi.com/Science/Physics/Machines/incline.gif&imgrefurl=http://kosmoi.com/Science/Physics/Machines/&h=197&w=316&sz=3&tbnid=qugitR0fPLeq9M:&tbnh=70&tbnw=113&hl=en&start=2&prev=/images?q=inclined+plane&svnum=10&hl=en&lr=&sa=G) 5 ft high [](http://images.google.com/imgres?imgurl=http://www.worsleyschool.net/science/files/wheel/diagram1.gif&imgrefurl=http://www.worsleyschool.net/science/files/wheel/andaxle.html&h=180&w=165&sz=6&tbnid=z5ZK0_qwZyob3M:&tbnh=96&tbnw=88&hl=en&start=78&prev=/images?q=wheel+and+axle&start=60&svnum=10&hl=en&lr=&sa=N)

20 feet long r2^

**Unit 4 – Waves and Sound**

**Terms to know for waves and sound:**

Reflection –

Refraction –

Interference –

**Equations to know for waves and sound:**

Wave Frequency

**Units to know for waves and sound:**

Frequency –

Velocity –

Wavelength -

**Concepts to know for waves and sound:**

* How and where does sound travel.
* How do sound waves compare to light waves

*Practice…*

1. What type of wave is sound? What can sound not travel through?

1. Draw below a transverse wave, label the amplitude, crest and wavelength.
2. Draw below a longitudinal wave, label a wavelength, rarefaction and compression.
3. Draw and explain using a picture below the Doppler Effect.
4. A tuning fork has a frequency of 280 Hz, and the wavelength of the sound produced is 1.5 meters. Calculate the velocity of the wave.
5. A wave is moving toward shore with a velocity of 5 m/s. If its frequency is 2.5 HZ, what is its wavelength?

**Unit 5 – Light and Spectrum**

**Terms to know for light and spectrum:**

Photons –

Reflection –

Law of Reflection –

Refraction –

Prism –

**Concepts to know for light and spectrum:**

* How does light interact with the eye, including colors
* How do different mirrors and lens interact with light

*Practice…*

1. What is the path that light takes into the eye (think the parts of the eye as it travels in)?

1. What is the difference between the rods and the cones in our eyes?
2. What are the primary colors of light?
3. Why do things appear the color they do?
4. Draw pictures below showing how light travels through concave AND convex lens.
5. Draw pictures below showing how light reflects off of concave and convex mirrors.
6. What is the difference between a virtual image and a real image?

What we never talked about this in class… so here is the answer… A virtual image is the image your brain creates that makes objects appear right side up, the real image that your eyes collect are upside down due to the focal point of the eye… so what do I need to know Ms. P?... “virtual images are right side up, real images are upside down” if you write that on your note card you will get the question right ☺

**Unit 6 – Magnetism and Electricity**

**Terms to know for magnetism and electricity:**

AC Electricity –

DC Electricity –

Static Electricity -

Current –

Resistance –

Temporary Magnet –

Permanent Magnet –

Magnetic Field –

Electromagnetic induction -

**Equations to know for magnetism and electricity:**

Power

Kilowatt Hours

**Units to know for magnetism and electricity:**

Power -

Voltage -

Current -

Resistance -

Kilowatt Hours -

**Concepts to know for magnetism and electricity:**

* Tell the difference between different types of circuits
* Definitions and examples of AC and DC current
* Calculate power and kWh of appliances

*Practice…*

1. What is the difference between a series and a parallel circuit? Show the difference using pictures and words.
2. What is the difference between an open and a closed circuit? Show the difference using pictures and words.
3. Describe how the poles of magnets interact.
4. A washing machine operates on 6 amps of current plugged into a 120 volt circuit for 2 hours a day. The electric company charges 10 cents per kilowatt hour.
   1. How much power does the washing machine use?
   2. How many kilowatt hours does it use per day?