**Physics Review Guide – Spring 2019**

**Electrostatics**

Attraction

Charge

Conduction

Conductor

Conservation of Charge

Coulomb

Coulomb’s Law

Electric Field

Electric Field Lines

Electric Force

Electric Potential Difference

Electric Potential Energy

Electron

Electroscope

Electrostatics

Friction

Grounding

Induction

Insulator

Lightning

Negatively Charged

Neutral

Ohm

Ohm’s Law

Polarization

Positively Charged

Proton

Repulsion

Static Electricity

1. What is the magnitude of the electrostatic force between a 6.2 C charge and 3.4 C charge that are separated by a distance of 4.3 x 10-3 m?
2. If a distance of 1 km separates two electrons, what would be the electrostatic force between them? (Hint: charge on an electron is -1.6 x 10-19 C)
3. The electric field strength in a given area is 2200 N/C. What is the force exerted on an object with the charge of 0.004 C?
4. The electric field in a particle accelerator machine is 4.5 x 105 N/C. How much work is done to move a proton (1.6 x 10-19 C) 15 cm through that field?
5. In the diagram below, rank the field strength of each letter from least to greatest. Justify your answer.



1. In the diagram below, determine the charge of each particle. Justify your answer.



1. Label the method used for charging the object and explain the process.



**Electricity**

Alternating Current

Ammeter

Ampere

Battery

Circuit

Circuit Breaker

Current

Direct Current

Electric Potential Difference

Equivalent Resistance

Fuse

Generator

Kilo-watt hour

Load

Motor

Parallel Circuit

Power

Resistance

Resistor

Series Circuit

Short Circuit

Volt

Voltage

Voltmeter

Watt

1. A portable compact disc player is designed to play for 2 hours on a fully charged battery pack. If the battery pack provides a total of 180 C of charge, how much current does the player use while operating?
2. You light a light bulb with 1.5 V battery. If the resistance of the light bulb is 10 Ω, how much current is flowing through the bulb?
3. Calculate the power usage of a light bulb that is connected to a 1.5 V battery. The resistance of the bulb is 3.0 Ω.
4. Three resistors, 4.0 Ω, 5.0 Ω and 7.0 Ω, are connected in a series circuit.

a. What is the total resistance of the circuit?

b. If the circuit is connected to a 9.0 V battery, what is the total current in the circuit?

c. What is the voltage drop across the 7.0 Ω resistor?

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1. Label the type of circuit below and the component represented by each symbol.





1. Which wire has the least resistance? Justify your answer.



**Magnetism**

Attraction

Compass

Electromagnet

Ferromagnetic

Lodestone

Magnetic Domain

Magnetic Field Lines

North Pole

Permanent magnet

Repulsion

South Pole

Temporary Magnet

Tesla

1. Label the North Pole and the South Pole on the diagram below. Justify your answer.



1. A bar magnet is cut in half. Identify and draw the new poles on the magnet pieces.



1. Identify the item in the diagram below and explain how it works.



**Waves**

Amplitude

Compression

Constructive Interference

Crest

Destructive Interference

Diffraction

Electromagnetic Wave

Energy

Equilibrium

Frequency

Hertz

Incident Wave

Interference

Longitudinal Wave

Mechanical Wave

Medium

Oscillation

Period

Periodic Motion

Rarefaction

Reflected Wave

Reflection

Refraction

Simple Harmonic Motion

Sine Curve

Standing Wave

Transverse Wave

Trough

Vibration

Wave

Wavelength

Wave Pulse

1. A guitar string makes 80 vibrations in 8 seconds. Calculate the frequency and the period.
2. If the time it takes for a wave to complete one cycle doubles, what happens to the frequency of the wave?
3. A typical light wave has a wavelength of 580 nm. What is the frequency of this wave?
4. A transverse wave has a frequency of 125 Hz. If the velocity of the wave is 220 m/s what is the wavelength?
5. A wave travels 1.23 km. If the speed of the wave is 375 m/s how long did it take for the wave to travel this distance?
6. Label the type of wave and all components. Measure the wavelength and the amplitude of the wave.



1. Label the wave type and all components. Measure the wavelength.



1. In the diagram below determine which
2. wave has the greatest amplitude
3. wave has the shortest wavelength
4. wave has the lowest frequency
5. which two waves are in phase and the amplitude of the resultant wave

A B C



**Sound**

Antinode

Beat

Closed-End Air Column

Compression

Decibel (dB)

Decibel Scale

Doppler Effect

Echo

Fundamental Frequency

Infrasonic

Intensity

Longitudinal Wave

Loudness

Node

Noise

Octave

Open-End Air Column

Oscillation

Pitch

Rarefaction

Resonance

Sound

Standing Wave

Ultrasonic

1. An A note is played a 440 Hz. If the temperature in the room is 18ºC what is the wavelength?
2. You stand on the edge of a canyon and shout, 3.2 seconds later you hear your echo. If the temperature of the air is 22 ºC how wide is the canyon?
3. You have 3 tuning forks available; 441 Hz, 443 Hz, and 437 Hz. Identify all the beat frequencies can you produce by playing any two of them at the same time.
4. A police siren has a frequency of 500 Hz. The police car is involved in a high speed chase and is moving east with a speed of 50 m/s. The temperature is 22° C.
	1. What frequency does someone at rest hear as the police car is approaching them?
	2. What frequency do they hear as they the police car moves away from them?
5. The speed of sound waves in air is found to be 340 m/s. Determine the fundamental frequency of an open-end air column that has a length of 67.5 cm.
6. A closed-end pipe is capable of sounding out a first harmonic of 349.2 Hz. The speed of sound in the pipe is 350 m/sec. Find the length of the air column inside the pipe.
7. Identify the type of wave below. Label the nodes and antinodes.

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1. If the length of the string in the diagram above is 15 m, what is the wavelength measurement?
2. Label the parts of the ear and explain how someone hears a sound.



**Light and Color**

Absorption

Angle of Incidence

Angle of Reflection

Angle of Refraction

Color Addition

Color Subtraction

Complementary Colors

Cones

Dye

EM Spectrum

Electromagnetic Wave

Illuminated

Incident Ray

Index of Refraction

Intensity

Law of Reflection

Luminous

Normal

Opaque

Penumbra

Pigment

Polarization

Primary Colors of Light

Primary Colors of Pigment

Prism

Reflected Ray

Reflection

Refracted Ray

Refraction

Retina

Rods

Secondary Colors of Light
Secondary Colors of Pigment

Shadow

Snell’s Law

Speed of Light

Translucent

Transmission

Transparent

Umbra

Visible Light

White Light

1. What is the frequency of an EM wave that has a wavelength of 3.2 x 10-9 m?
2. The distance from the Earth to the sun is 1.496 x 1011 m. A solar flare occurs on the sun’s surface on Wednesday morning at 10:24 AM. At what time will electromagnetic radiation from the flare reach the Earth?
3. Light is incident at 20° to the normal. What is the angle of reflection?
4. A ray of light is traveling from air to water at an angle of 33°. If n = 1.33 for water, what is the angle of refraction?
5. What is the speed of light in a diamond (n = 2.42)?
6. If the speed of light in ethanol is 2.2 x 108 m/s, what is the index of refraction for ethanol?
7. What is the critical angle for light traveling from water to air?
8. Consider the diagram at the right. Which one of the angles (A, B, C, or D) is the angle of incidence? Which one of the angles is the angle of reflection? Complete the chart with each degree value.

|  |  |
| --- | --- |
| Angle | Degree Value |
| A | 32° |
| B |  |
| C |  |
| D |  |

1. Analyze the diagram below to determine the following:
2. medium that is the most dense
3. what component is missing from the diagram



1. Place the EM radiation in order on the spectrum. Label the area of lowest frequency and the area of highest energy.



1. Complete the Venn Diagram to indicate the primary colors of light and the resulting secondary colors when added.



1. Explain what is happening in the diagram below.

