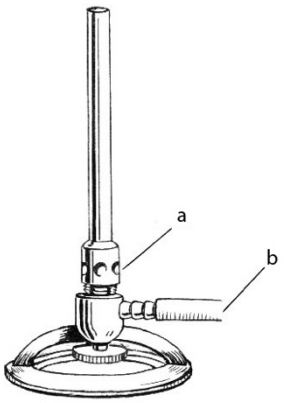
REVIEW

Name: **Date:** **Period:** **Seat #:**

Station 1 – BURNERS AND FLAME TESTS

Metal Ion	Flame Test Color
sodium, Na	
strontium, Sr	
copper, Cu	
barium, Ba	



During a flame test, light is _____ (absorbed/emitted) as an electron moves to a _____ (higher/lower) energy level.

For the Bunsen burner:
a) _____ is added to the flame.
b) _____ is added to the flame.

Draw a well adjusted flame above the burner.
Indicate the hottest part of the flame.

Atomic Structure

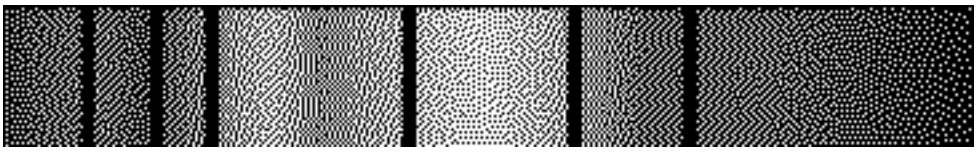
Station 2 – VIEWING SPECTRA

Using the triangular spectrometers, look at the provided light source.
The wavelength of light viewed ranges from 400 nm to 700 nm.

What is the wavelength of the GREEN light? _____

Calculate the frequency of the green light.

Consider the spectrum below. It is an _____ (emission/absorption) spectrum.



Explain what the electrons are doing to produce the black lines:

Atomic Structure

Station 3 – ENERGY CALCULATIONS

H-O-O-H

The energy required to break the O - O bond in hydrogen peroxide, $H_2O_{2(g)}$, is 139 kJ mol^{-1}.
How much energy is needed to break one peroxide bond (in Joules)? (Show work)

Blue light has a wavelength of about 475 nm. Does this light have enough energy to break the bond? _____
Justify your answer with calculations.

Atomic Structure

Station 4 – SHELLS, SUBSHELLS & ORBITALS

Circle the subshells that do NOT exist: ***4p*** ***1p*** ***2f*** ***5s*** ***3d*** ***7p*** ***2d*** ***3s***

_____ The number of **orbitals** in a ***4d*** **subshell**.

_____ The number of **orbitals** in the n=2 **shell**.

_____ The number of **subshells** in the n=5 **shell**.

_____ The number of **orbitals** in a ***4f*** **subshell**.

_____ The number of **subshells** in the n=3 **shell**.

Atomic Structure

Station 5 – WAVE CALCULATIONS

$c = 2.998 \times 10^{8}$ m/s $h = 6.626 \times 10^{-34}$ J·s

The color orange (school colors) has a wavelength of 615 nm.
Calculate the frequency of this light.
Calculate the energy of a photon this light.

A radio station broadcasts at a frequency of 590 KHz (590×10^{3} Hz).
What is the wavelength of the radio waves?

Atomic Structure – not assessed

Station 6 – THE BOHR ATOM

$c = 2.998 \times 10^{8}$ m/s $h = 6.626 \times 10^{-34}$ J·s $Rhc = 2.18 \times 10^{-18}$ J $R = 1.0974 \times 10^{7}$ m^{-1}

Sketch the Bohr atom from levels n=1 to n=5.

Show the transition that would give off **blue-green** light.

Calculate the energy of level n=4.

Calculate the energy change of an electron that drops from level 4 to level 2.

An electron that moves from n=1 to n=5 would _____ (gain / lose) energy and produce an _____ (absorption / emission) spectrum.

Atomic Structure – not assessed

Station 7 – DE BROGLIE WAVELENGTH

$c = 2.998 \times 10^{8}$ m/s	$h = 6.626 \times 10^{-34}$ J·s	$Rhc = 2.18 \times 10^{-18}$ J	$R = 1.0974 \times 10^{7}$ m^{-1}

Write the equation for the De Broglie wavelength of a particle:

Joule is the same as a unit containing "kg". What is it?

An electron has a mass of 9.10956×10^{-31} kg. What is the wavelength of an electron traveling at 75.0% the speed of light?

Atomic Structure – not assessed

Station 8 – QUANTUM NUMBERS

When n = 3, the possible values of l are: 0 1 2 3 4 5 (Circle your answers.)

For a ***3d*** orbital, the value of l is ___.

When n = 5, the possible values of l are: 0 1 2 3 4 5 (Circle your answers.)

For a ***5p*** orbital, the value of l is ___.

There are three different ***4p*** orbitals.
Write the three quantum numbers that describe these orbitals:

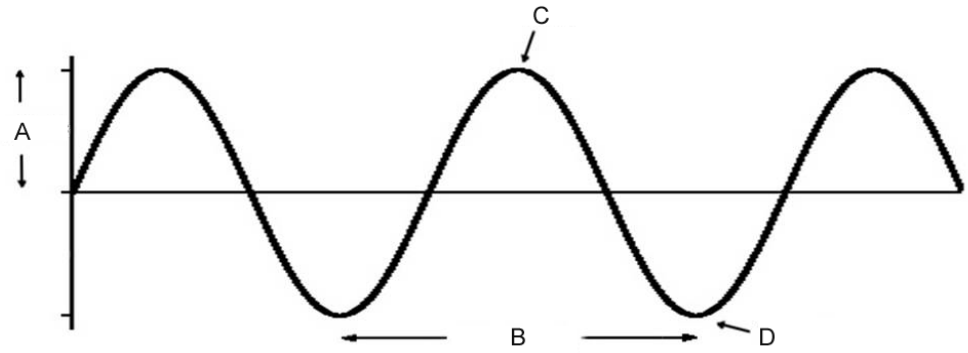
n	l	m_l

Is this set of quantum numbers possible? _____

3	**2**	**-2**

Atomic Structure

Station 9 – WAVE FACTS



A = _____ B = _____ C = _____ D = _____

If this is a wave of YELLOW light, **sketch** what a wave of RED light would look like.

The red light would have a _____ (higher/lower) frequency, a _____ (longer/shorter) wavelength, and _____ (more/less) energy.

If this were a picture of a **standing wave**, how many antinodes are shown? ___