Immaculate Conception High School

Summer Assignment

Physics CP

* Email Ms. Lusamba if you have any questions: plusamba@ichspride.org

Directions: This assignment consists of two parts. Part 1 will take through the journey of the major concepts in Physics that we will be studying next year. Part 2 is a list of interactive videos investigating topics explored in Part 1. Complete the entire summer assignment by Wednesday September 04, 2019. For each part, create a new Google Doc and answer the questions on the Doc. Share these docs with Ms. Lusamba by the due date when completed.

CP-Physics Summer Assignment

Name : _____ Date: _____

Part one: Learning Concepts in Physics.

Concept 1: Scientific Notation

Refer the following videos about Newton's 3 Laws:

https://www.youtube.com/watch?v=5-ZFOhHQS68

https://www.youtube.com/watch?v=ou9YMWlJgkE

https://www.youtube.com/watch?v=By-ggTfeuJU

Scientist very often deal with very small and very large numbers, which can lead to confusion when counting zeros. We have learned to express these numbers as powers.
Scientific notation takes the form of M x 10n where $1 \leq M < 10$ and n represents the number of decimal places to be moved. Positive n indicates the standard form is a large number. Negative n indicates a number between zero and one.
Example: Convert 1,400,000 to scientific notation. We move the decimal point so that there is only one digit to its left, a total of 6 places. 1.4 x 106
Example: Convert 0.000025 to scientific notation. For this we move the decimal place 5 places to the right. 0.000025 = 2.5 x 10-5.

Concept 2: Significant figures

Significant figures in a measurement expression comprise all digits that are known with certainty, plus one digit that is uncertain. PLACEHOLDERS ARE NOT SIGNIFICANT. Eg 0.0004 has 1 significant figure.
Rules for determining the number of significant figures in a given value:
1. All non-zero digits are significant.
2. All zeros between two nonzero digits are significant. (aka: sandwich rule)

Write the number in proper scientific notation.

(a) 410,000,000

(b) 0.00003650

2. Provide the proper response. (Note: use a calculator if you must, but you should also be able to complete all without using a calculator!) Remember the order of operation **PEMDAS** (**P**arentheses → **E**xponent → **M**ultiplication → **D**ivision → **A**ddition → **S**ubtraction)

(a) (3 x 107) * (6 x 10-12) =

b. (2 x 10-4) * (4 x 10-3) =

c (6 x 107) / (2 x 103) =

d. $\frac{(3 \times 10^{5})(8 \times 10^{-3})}{(2 \times 10^{14})(6 \times 10^{6})} =$

Concept 3: Kinematics

The first topic we cover in Honors Physics is Kinematics, the study of motion. We will spend time learning the graphs and equations that describe the motion of an object.

The most basic of all kinematics problems is when an object is traveling at a constant velocity. Velocity is "distance traveled" divided by "time". The activity below will help you familiarize yourself with the study of motion.

The Moving man Activity

PART A. OBSERVATIONS OF MOTION: In this activity you will be exploring the relationships between distance, time, velocity, and acceleration. Begin by opening "The Moving Man" link by clicking on this link. https://phet.colorado.edu/en/simulation/moving-man and play the simulation. You may get a JAVA update pop up - say "Later" and proceed. From this point, follow the directions on the attachment. Working on the "Intro" tab,

familiarize yourself with the controls. You can manually move the man or type in the boxes. You should click on the boxes showing the velocity and acceleration vectors.

Set the position of the man to 0 m, his velocity to +1.0 m/s, and his acceleration to +1.0 m/s^2. Hit play and observe the motion. We will now use the playback function to analyze the motion. Using the "step" function, advance the man for 1.0 s. Record the man's position, velocity, and acceleration. Continue to 2.0 s and 3.0 s.

TIME	POSITION	VELOCITY	ACCELERATION
0.0 s			
1.0 s			
2.0 s			
3.0 s			

1. Does the man's position increase at a constant rate? _____

2. Does the man's velocity increases at a constant rate? _____

3. Does the man's acceleration change? _____

Hit reset all. Change the man's velocity to +5.0 m/s and his acceleration to -2.0 m/s^2. Hit play and observe the man's motion. Describe his motion below. Be very specific regarding direction and velocity changes.

PART B. GRAPHICAL INTERPRETATION OF MOTION.

In this part of the activity, we will examine how motion is represented on graphs. To do this, open the "Charts" tab. Click the "x" on the brick wall to turn it off. You will see three graphs – a D-T, a V-T and an A-T (acceleration-time). Fill in the table below. Describe the graphs as

flat, straight lined, or curved. Answer the questions on the next page before proceeding to the next graph.

Position	**Velocity**	**Acceleration**	**Graph Description**
-10	**0**	**+1**	**D-T**
			V-T
			A-T
-10	**5**	**0**	**D-T**
			V-T
			A-T
0	**2**	**-5**	**D-T**
			V-T
			A-T
5	**-5**	**+1**	**D-T**
			V-T

			A-T

1. Referring to the first situation, does the man's position change at a constant rate? (In other words, does it increase by the same amount each second?) Does his velocity change at a constant rate?

2. Referring to the second situation, what accounts for the differences in the graphs compared to the first situation?

3. Referring to the third situation, why is the V-T graph's appearance different from the previous two graphs?

4. Referring to the final situation, how does the D-T graph relate to the motion of the man? Be specific.

5. What did all of the A-T graphs have in common? Why is this so?

Part 2: Explore concepts in Physics

I want you to come into the course with tones of positivity, math skills, a little practice with some physics problems, and a strong work ethic. I also want you to look at this new experience as an adventure, full of puzzles to solve, misconceptions to dispel, and moments that make you think, "Wow- how does that happen?" So, I am asking that you take some time this summer to watch the following videos from the list of sites. Write a paragraph (5-7 sentences) about what you learned from each (what surprised you, what new ideas or questions does it make you think of, etc). This work will be collected, along with your work from Part 1, on the first day of school. Please type and print your video response paragraphs. **Watch all videos!!**

Smarter Everyday Videos

"Turning gravity into light" https://www.youtube.com/watch?v=Jsc-pQIMxt8

You won't believe your eyes" https://www.youtube.com/watch?v=_FlV6pgwlrk

"Kinematics of grasshopper hops" https://www.youtube.com/watch?v=O-JVepPdZbY

"The archer's paradox" https://www.youtube.com/watch?v=O7zewtuUM_0

"Mind blowing magnets" https://www.youtube.com/watch?v=IANBoybVApQ

Veritasium Videos

"Can you solve this?" https://youtu.be/vKA4w2O61Xo?list=PL16649CCE7EFA8B2F

"The most amazing thing about trees" https://www.youtube.com/watch?v=BickMFHAZR0

"The truth about toilet swirl" https://youtu.be/ihv4f7VMeJw?list=PL16649CCE7EFA8B2F

"Sparks from falling water": https://www.youtube.com/watch?v=rv4MjaF_wow

"Is there gravity in space?" https://www.youtube.com/watch?v=d57C2drB_wc

"Misconceptions about the universe" https://www.youtube.com/watch?v=XBr4GkRnY04

"Chain drop experiment"
https://www.youtube.com/watch?v=1erU-Cwcl2c

"Shadow illusion" https://www.youtube.com/watch?v=liqF6EamiE4

If you have questions, feel free to send me an email plusamba@ichspride.org

End of Assignment. Well done!