#AKPHYSICS

Name: _____

First off, welcome to AKPhysics! This course is about the principles of AP Physics & exists to inform how things around you work and how Physics influences our everyday lives.

Your job as a student in the classroom is to keep an open mind, be aware and observant, and learn to develop critical thinking and analytical skills to solve problems, textbook and real-life. This course is also how to work as a team, how to discuss and find solutions and present them in words rather than just equations.

The course uses and develops the basic concepts of mechanics, wave phenomena with current electricity. You have already learnt some trigonometry, vector resolution and atomic theory in chemistry. These concepts and skills are essential to the experience of learning, working and applying physics. They represent higher order thinking skills, behaviors, and training to be revisited and sharpened over time. This course does not resemble subject SAT tests nor is it a Math course and it is not a course where you memorize stuff either.

LINK:

- <u>https://apcentral.collegeboard.org/pdf/ap-physics-1-course-and-exam-description.pdf?course=ap-physics-1</u>
- <u>https://cnx.org/contents/Ax2007UI@16.4:HR_VN3f7@6/Introduction-to-Science-and-the-Realm-of-Physics-Physical-Quantities-and-Units</u>

We need to use our class time effectively so the goal of this summer packet is that you will have reviewed much of the material from previous math and science classes. Think about these problems, they are each designed to make you think about mathematics. If you find yourself looking up solutions on the internet, you have missed the point, which is to learn through struggling. You only need training in algebra and geometry for the course. This assignment should be completed and ready to turn in by 26 August, 2019. If you need anything or have a concern, please email me at vidya1.rao@cms.k12.nc.us and I will respond as soon as I am able.

2019-2020 Summer Assignment

- 1. Review principles of solving equations how to manipulate equations to solve for the right unknowns.
- 2. Dimensional analysis convert units.
- 3. Concepts of Honors Chemistry Atomic theory & waves etc
- 4. Read the book Martian &/ Watch the movie Interstellar.
- 5. A 400 word essay on one physical phenomena described in the movie or the book that struck you as significant and why.
- 6. The following exercises should be solved on a <u>separate</u> sheet of paper. NO CREDIT will be given for solving them on this paper itself. <u>Please show all your work.</u>

Unit Conversion

1 hour = 3600 seconds	1 mile = 5280 feet	1 meter = 3.28 feet
1 km = 0.62 miles	1 light second = $300,000,000$ meters	
1 kg = 2.2 lbs	1 m/s = 2.2 miles/hour	1 inch = 2.54 cm = 25.4 mm

I. Convert the following quantities.

- 1. 565,900 seconds into days
- 2. 165 micrograms into kilograms
- 3. 100 mm into meters

- 4. 60 miles per hour into meters per second
- 5. 130 meters per second into miles per hour

II. Manipulate the following equations to solve for the required unknown:

a.	$v^2 = {v_0}^2 + 2a(x - x_0)$, a =	g. $B = \frac{\mu_o}{2\pi} \frac{I}{r}$, <i>r</i> =
b.	$K = \frac{1}{2}kx^2$, x =	h. $x_m = \frac{m\lambda L}{L}$, <i>d</i> =
C.	$T_p = 2\pi \sqrt{\frac{\ell}{g}}$,g =	i. $pV = nRT$, <i>T</i> =
d.	$F_g = G \frac{m_1 m_2}{r^2}$, <i>r</i> =	j. $\sin \theta_c = \frac{n_1}{n_2}$,θ _c =
e.	$mgh = \frac{1}{2}mv^2$,v =	k. $qV = \frac{1}{2}mv^2$,v =
f.	$x = x_o + v_o t + \frac{1}{2}at^2$, <i>t</i> =	$I. \frac{1}{f} = \frac{1}{s_o} + \frac{1}{s_i}$, s _i =

- III.
- 1. What is the cosine of 45° ?
- 2. What is the arctangent (\tan^{-1}) of 0.9?
- 3. What is the sine of 35° ?
- 4. What is the inverse cosine (\cos^{-1}) of 0.866?



Use the above diagram for all of the following problems. The triangle will not be proportional for all problems, but representative.

- 5. If $\angle A = 48^\circ$, what is $\angle B$?
- 6. If $\angle A = \angle B$, what can you say about sides a and b and the sum of the angles A and B?
- 7. If side a is 6 cm and side b is 8 cm, how long is side c?

IV. GRAPHING:

- 1. If I ask you to graph Velocity vs. time, which one would go on the y-axis?
- 2. What are the characteristics of a good and bad graph? Explain with examples.
- 3. Shapes of graphs:
 a. For graph F vs. a and the equation given is F=ma, what will be the shape?
 b. For graph K vs. v and the equation given is K= ¹/₂ mv², what will be the shape?
- 4. What do the slope and intercept of a graph represent? How do you determine them?