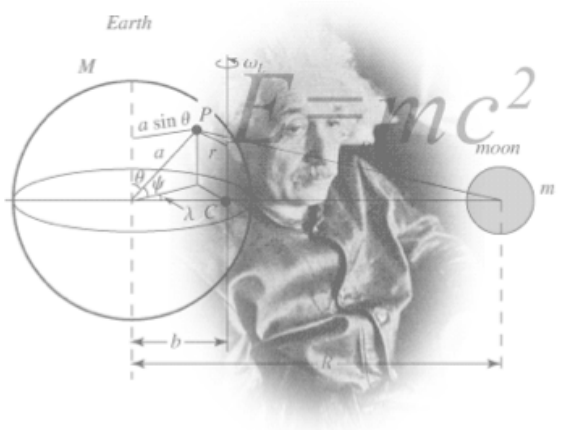
Stone Ridge
School of the Sacred Heart

9101 Rockville Pike · Bethesda, Maryland 20814
301.657.4322 · www.stoneridgeschool.org

Empowering leaders to serve with faith, intellect, and confidence.

Course Number (when applicable)
SC570
Course Title
AP Physics
Name of Assignment (title of book(s), Author, Edition, and ISBN (when applicable)
AP Physics Summer Assignment
Expectations/Instructions for Student When Completing Assignment
Please see page 2 for an introduction to the assignment and instructions. It is expected that students will complete their own summer assignment independently but are encouraged to confer or collaborate. More specifically, students may work together when solving problems, but each student should complete their own work and students should not copy any other student's solution.
One Essential Question for Assignment
How is velocity fundamentally different from speed, and why is this difference important when solving kinematics problems?
One Enduring Understanding for Assignment
The motion of an object in one dimension can be described using such quantities as position, displacement, distance, velocity, speed and acceleration.
Parent Role and Expectations
Cheerleader and content guide when possible
Estimated Time Requirement
2.5 – 3 hrs

AP Physics Summer Assignment



Welcome to AP Physics! I am so excited for our year ahead as we delve more deeply into the physics principles you studied in Physics 1 and explore new areas as well.

You will find that the class involves a lot of hands-on exploration, experimenting and engineering design, so I would like you to feel comfortable collecting and analyzing data – this includes plotting data on a graph and with your calculator – and manipulating variables in an equation to discern a relationship between physical quantities.

We will also be connecting the physics we study to the world around us. Our understanding of the universe continues to grow, but there is still much we don't know. Perhaps you've heard of dark matter and dark energy, for example, which scientists think is more prevalent that any normal matter or energy observed in the universe. I find this area of physics research fascinating. I'd like to know what areas of physics you find interesting and intriguing. Please take a look through the chapters in your textbook, or use another resource such as the newspaper, online website, movie, TV program, museum, etc, and write me a note (no more than a page, hand written or typed double-spaced) about what topic(s) you'd especially like to investigate in class this year as a way to get to know you and your scientific interests better. Please be sure to cite the resource(s) you refer to.

The summer assignment will be due on Friday, September 1st. There are three parts:

1. Mathematics and Data Analysis Review (15 pts)
2. Review of kinematics, describing motion – Chap. 2 and the first two sections of Chap. 3 (20 pts)
   Note: There will be a quiz within the first two weeks of school on part 2 of the assignment.
3. Note about your topic(s) of interest (15 pts)

A rare opportunity to explore a physical phenomenon happens just before school starts – a nearly full solar eclipse! On August 21st from about 1-3 pm, weather permitting, we should be able to view the eclipse here in Bethesda. I'm planning to have an Eclipse Viewing Party here at school on our faculty work day! If you will be in the area, please consider stopping by. If you will be further south, say in South Carolina, then you may be able to see a total eclipse! Mark your calendars!

I hope you have a wonderful summer. Relax, have fun and get ready for a great 2017-2018!!!!

Best wishes,

Mrs. Caudle
jcaudle@stoneridgeschool.org

Many thanks to the teachers at the following schools for inspiration and resources used in the preparation of this packet:
Ann Sobrato High School, California
East Bakersfield High School, California
Jonathon Kinney, Colliersville High School

PART I: Mathematics & Data Analysis Review
Please review Ch. 1 of your textbook and answer the following questions:

Significant Figures and Scientific Notation Review

1.) How many significant figures do the following numbers have?

a.) 6.001 Answer: _____

b.) 0.0080 Answer: _____

c.) 206,000 Answer: _____

d.) 27.00 Answer: _____

e.) π Answer: _____

Directions: Find the following. Final answers should be in scientific notation with the correct number of significant figures.

2.) $(5.0\times10^{-8})(2.9\times10^{2})$

3.) $\left(3.25\times10^{4}+7.4\times10^{3}\right)$

4.) $6.000\times10^{-11}\dfrac{1.00\times10^{26}}{2.00\times10^{7}}$

5.) $\dfrac{8400}{1.2\times10^{7}}$

Unit Conversions Review

6.) Finish the SI prefix table below. Follow the example of the centi- prefix. You will need to be very comfortable using these.

Symbol	Name	Numerical Equivalent
n		
μ		
m		
c	centi	10^{-2}
k		
M		
G		

7.) 16.7 kilograms is how many grams?

8.) 560 nm is how many meters?

9.) 15 years is how many seconds?

10.) 8.99×10^9 seconds is how many years?

11.) 2.998×10^8 m/s is how many kilometers per hour?

Understanding mathematical relationships:

12.) Consider $z = \frac{x}{y}$, $c = ab$, $l = m - n$, or $r = \frac{s^2}{t^2}$.

a.) As *x* increases and *y* stays constant, *z* _____.

b.) As *y* increases and *x* stays constant, *z* _____.

c.) As *x* increases and *z* stays constant, *y* _____.

d.) As *a* increases and *c* stays constant, *b* _____.

e.) As *c* increases and *b* stays constant, *a* _____.

f.) As *b* increases and *a* stays constant, *c* _____.

g.) As *n* increases and *m* stays constant, *l* _____.

h.) As *l* increases and *n* stays constant, *m* _____.

i.) If *s* is tripled and *t* stays constant, *r* is multiplied by _____.

j.) If *t* is doubled and *s* stays constant, *r* is multiplied by _____.

Graphical Analysis:

13.)

Read all information carefully and complete all problems. You must show your work for the problems to receive credit. Work may be shown on a separate sheet of paper if necessary.

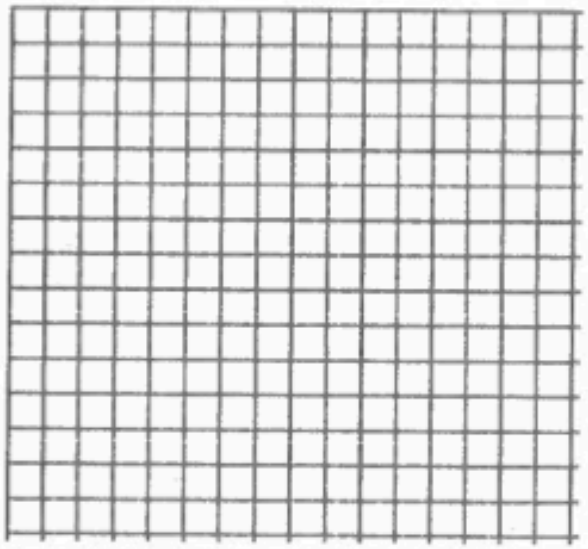
Graphing and Graph Interpretation

You should be familiar with graph construction (by hand and on a calculator). This is a topic that often appears on AP exams and is an easy way to score points on any assignment.

Note: When you are told to graph Apples vs. Oranges, the first thing goes on the y-axis. The second thing is on the x-axis.

Fill in the following table and plot the points on the grid below as distance versus time. Be sure to correctly label the graph (axes labels, including units, and title)

Time, *t* (s)	Distance, *d* (m)
0.0	0 m
1.0	5.1 m
2.0	9.9 m
3.0	15.2 m



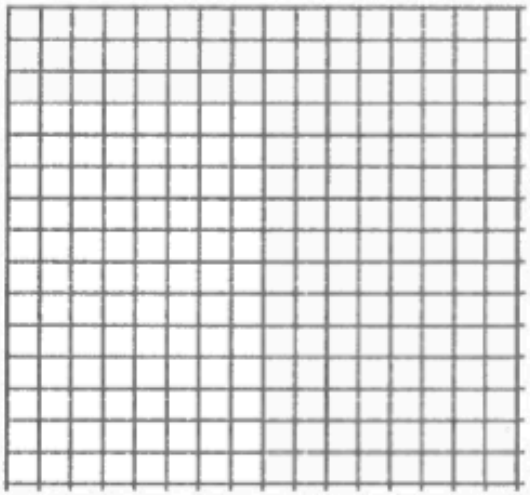
Draw the best fit line through your data points. Use a graphing calculator to plot the graph. Record the equation of the best-fit line. What is the slope of the line that you plotted (with correct units)?

14.)

Read all information carefully and complete all problems. You must show your work for the problems to receive credit. Work may be shown on a separate sheet of paper if necessary.

Plot position vs. time on the axes below.

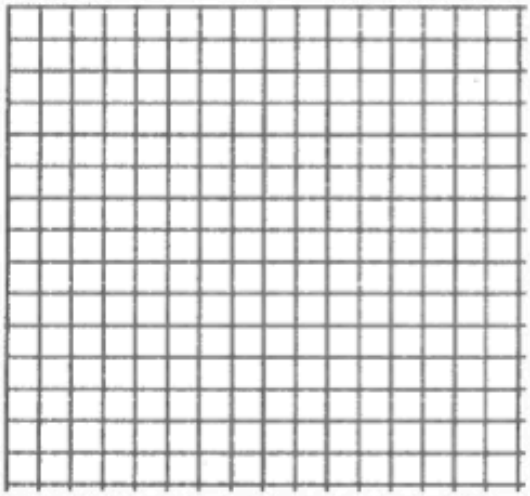
Time	Position
0.0 s	0.0 m
1.0 s	4.1 m
2.0 s	15.8 m
3.0 s	36.2 m



On your graphing calculator, create this plot and find the equation of the best fit curve. Record this best-fit equation below.

This graph has a changing slope. What does its slope represent?

This quadratic function can be "linearized" by squaring the time values, and plotting position vs. time squared. Try this with this data.



Find the equation of this best fit line on your graphing calculator. Record the equation of this best fit curve below.

Find the slope of this graph (use correct units). What does it represent?

PART II: Kinematics Review – Describing Motion

Review Chapter 2 and Chapter 3, Sections 1 and 2 of Walker Text

(Online resource: www.physicsclassroom.com - Kinematics Lessons 3 and 4)

Complete Ch. 2 Conceptual Questions (pg. 47) 3-15 odd and Problems (pg. 48) 2, 5, 7, 8, 13-15, 23, 31-39 odd, 65, and 69-72 all

Complete Ch. 3, Section 1 and 2 Problems (pg. 76) 1-4 all, 10, 14 and 17