

**RAHWAY HIGH SCHOOL
SCIENCE DEPARTMENT**



"Good morning, and welcome to
The Wonders of Physics."

AP PHYSICS 1 SUMMER ASSIGNMENT PACKET

Summer 2021

Due date: September 8th

GUIDELINES FOR COMPLETING THE ASSIGNMENT

Welcome to AP Physics 1. This is, by far, a very challenging course. In order to succeed in this class and on the test, you must continue to put in extra effort and extra time. This is especially true for students coming from Conceptual Physics, or having this as their first Physics course. In order to lead you to success, I am available for extra help and guidance. Please complete this summer assignment throughout the summer instead of the night before your first day of school. The entirety of this assignment is due **the first day of school**. I look forward to teaching you next year.

This assignment is a compilation of necessary math/science skills in order to be successful on the AP Physics 1 test. This packet can and should be completed **without** a calculator. (Mental math is also necessary for success.)

Enjoy your summer!

Supplies needed for your first day of class and every day after:

- **3 Ring Binder/Notebook**
- **Pencils**
- **Scientific Calculator (Graphing Calculator preferable)**

RESOURCE — CONTACT A TEACHER

Michael Keat

Email: mkeat@rahway.net

STUDENT _____ PARTNER: _____

PARENT SIGNATURE _____

Table of Contents

I. Equation Manipulation and Algebra.	3
II. Scientific Notation.	5
III. Metric System / Dimensional Analysis.	6
IV. Proportionality	9
V. Graphing	10

Most of the information in this packet should be a **review** of lessons throughout your education. Each section contains links to background information either video or websites to help you “brush up” on the information. I highly suggest visiting the links and taking the time to watch the videos before completing the worksheets

Internet connectivity is required to access the information. I have provided shortened URLs (**case sensitive**) and QR codes where applicable.

I. Equation Manipulation and Algebra

Algebra Review:

goo.gl/zPLxrb



Flipped Math Algebra Review:

goo.gl/QpDsIU



Solve for each variable (without a calculator):

$$150 = \frac{d}{10}$$

$$2.5 = \frac{(15-10)}{t}$$

$$\Delta x = 3.0(2) + \frac{1}{2}(-0.5)2^2$$

$$\Sigma F = 0.25(10) - 1.5$$

$$1.8 = \mu(6.0)$$

$$20 = \frac{1}{2}(10)t^2$$

Solve each equation for the specified variable:

Solve for a:

$$v^2 = v_0^2 + 2a\Delta x$$

$$v = v_0 + at$$

$$\Delta x = v_0t + \frac{1}{2}at^2$$

Solve for m:

$$\Sigma F = ma$$

$$T_s = 2\pi\sqrt{\frac{m}{k}}$$

$$F_g = G\frac{mM}{R^2}$$

Solve for V:

$$F_B = \rho Vg$$

$$U_C = \frac{1}{2}CV^2$$

$$C = \frac{Q}{V}$$

II. Scientific Notation

Scientific Notation Review:

goo.gl/S64FP0



Write the following in proper scientific notation:

1.) 615,000

2.) 0.00000568

3.) 321

4.) 64,960,000

Express the following in standard form:

5.) 1.09×10^3

6.) 3.078×10^{-4}

7.) 1.337×10^7

8.) 4.1×10^{-7}

III. Metric System / Dimensional Analysis

The Metric system of measurement was created about two hundred years ago by a group of French scientists to simplify measurement.

In the metric system, each of the common kinds of measure (length, mass, volume) has one basic unit of measure. To measure smaller amounts, divide the basic unit into parts of ten, a hundred, or a thousand, and so on. To measure larger amounts, multiply the basic unit by ten, a hundred, or a thousand, and so on.

Length:

1 kilometer (km) = 1000 meters (m)

1 centimeter (cm) = .01 meter (m)

1 millimeter (mm) = .001 meter (m)

Volume:

1 milliliter = .001 liter (l)

Mass:

1 kilogram (kg) = 1000 grams (g)

1 milligram (mg) = .001 gram (g)

Kilo means thousand (1000)

Hecto means hundred (100)

Deca means ten (10)

Deci means one-tenth (1/10)

Centi means one-hundredth (1/100)

Milli means one-thousandth (1/1000)

Prefix	Symbol	Decimal Equivalent	Exponent Equivalent
pico	p	0.000000000001	10^{-12}
nano	n	0.000000001	10^{-9}
micro	μ	0.000001	10^{-6}
milli	m	0.001	10^{-3}
centi	c	0.01	10^{-2}
deci	d	0.1	10^{-1}
		1	10^0
deka	D	10	10^1
hecto	H	100	10^2
kilo	K	1,000	10^3
mega	M	1,000,000	10^6
giga	G	1,000,000,000	10^9

Metric System - Khan Academy: goo.gl/4tsf7b



Dimensional Analysis Review: goo.gl/4eRuDv



Drug Dosing example: goo.gl/nJoqPB



Perform the following conversions (without a calculator):

Show work (dimensional analysis) here:

$$40 \text{ mL} = \underline{\hspace{2cm}} \text{ L}$$

$$5000 \text{ m} = \underline{\hspace{2cm}} \text{ km}$$

$$8.0\text{g} = \underline{\hspace{2cm}} \text{ cg}$$

$$6000\text{g} = \underline{\hspace{2cm}} \text{ Gg}$$

$$20\text{KL} = \underline{\hspace{2cm}} \text{ mL}$$

$$85\text{mm} = \underline{\hspace{2cm}} \text{ km}$$

Answer the following questions using dimensional analysis. You may use a calculator, but be sure to show all supporting work.

1. How many seconds are in 2 hours, 56 minutes, and 21 seconds?
2. Jupiter's moon Io has an orbital period of 152,854 seconds while Ganymede has an orbital period of 7.1546 days. Which moon takes longer to travel around Jupiter?
3. What is the volume of a steel marble that has a mass of 50. Grams? (Density of steel is $7,800 \text{ kg/m}^3$.)
4. What is the angular speed (in radians per second) of Earth traveling around the Sun? There are 2π radians in one revolution. Use $1 \text{ year} = 365.25 \text{ days}$.
5. What is the weight in N of the water inside a circular pool with a diameter of 6.1 m and height of 1.5 m? Water has a density of 1000 kg/m^3 and $1\text{kg} = 9.8\text{N}$

IV. Proportionality

Direct and Inverse Proportions:

goo.gl/KOyiIc



Solving for the proportionality constant:

goo.gl/5iq2DO



Answer the following questions:

1. Noting that acceleration is directly proportional to net force and inversely proportional to the mass of an object:

- a. What happens to the acceleration if you double the net force?
- b. What happens to the acceleration if you triple the mass?
- c. What two things could have happened if the acceleration of an object has increased by a factor of 3.5?

2. Use the following data to determine how pressure is proportional to the other variables.

Pressure (P)	Force (F)
5.0 Pa	3.75 N
6.0 Pa	4.5 N
320 Pa	240 N
1.0 Pa	0.75 N

Pressure (P)	Area (A)
4.0 Pa	0.5 m ²
3.0 Pa	1.5 m ²
232 Pa	0.0086 m ²
1.0 Pa	2.0 m ²

Write an equation that relates P, F, and A:

V. Graphing

Flipped Math – Slope as Rate of Change: goo.gl/53imva



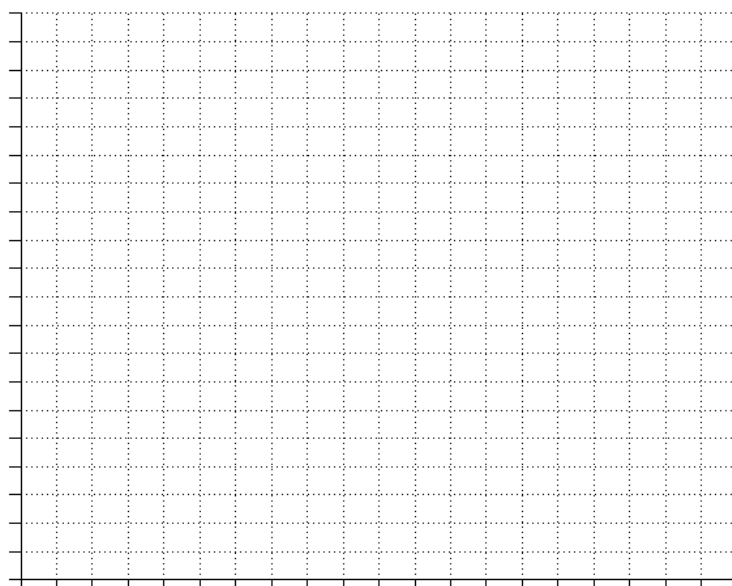
How to Make a Graph:

goo.gl/EDDm8R



Create a graph of Position (y-axis) vs. Time (x-axis)

Position (m)	Time (s)
8.0	0.5
8.6	1.0
9.5	1.5
10.1	2.0



What is the slope of this graph? (Show work and include units)

What is the physical meaning of this slope? What is the physical meaning of this y-intercept?

Estimate whether this would be a person, walking, jogging, or running.