AP Physics 1 2019 Summer Assignment

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Your summer assignment consists of two parts:

1. **Webassign.** Your assignment will be to complete an assignment on a web-based program called Webassign. The assignment consists of introductory physics topics and is titled "Summer Assignment." To access the assignment, do the following:
    - Go to www.webassign.net and click "Enter Class Key" on the top-right of the page
    - Type in the class key: **johnjay.ny 3032 5980** and verify "yes this is my class"
    - Create an account.
    - You have up to 5 submissions for numerical questions, and just 2 submissions for multiple choice
    - The assignment will go live on June 26th, and is due on Thursday September 5th at 11:59pm.
    - There will be a quiz in class on this material on *Friday September 6th.*

    For a reference, go to www.physicsclassroom.com/physics-tutorial and the first two topics listed, "1D Kinematics," and "Newton's Laws" should be of assistance for answering these questions. We encourage you to work with other students on this assignment. The second page of this document has a "fact sheet" with information and equations that could be of use to you

2. **Experimental Design.** One expectation that you will have in class is to design experiments to find a pattern between two variables. This is done in labs, asked in questions on exams, and will be asked on the AP exam.

    

    Your task: Design an experiment to determine the speed of a battery-power constant-speed buggy (as seen in the picture) and use this information to make an equation that allows you to determine the buggy's location after traveling a certain amount of time.

    1) Outline a procedure for exactly how you will *collect* data to accomplish the task listed above.
        - Include a list of equipment you will need
        - Indicate how you will use each piece of equipment
        - Include a well-labelled diagram
        - Be concise
    2) Describe how you will *use your data* to find the buggy's speed.
        - Describe how certain you are of your answer
        - Indicate potential sources of error in the data collection
    3) Lastly, make an equation describing how you will predict the buggy's location after traveling a certain amount of time
        - This equation can be made using symbols or words.

    Note: This entire write-up should be no more than the front of one page. Being concise is important.

Motion Fact Sheet

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Memorize these facts. Refer to them as you provide explanations to your problems.

Table of Quantities

Quantity	Symbol(s)	Definition	Unit	Type
Position	x	Your location and its direction relative to some "0" point	meters (m)	vector
Displacement	d, Δx	The length and direction of a straight line connecting two positions	meters (m)	vector
Distance	d, Δx	The length of the path taken between two positions	meters (m)	scalar
Velocity	v	● The rate at which your *displacement* changes ● How fast you're going AND in what direction you're going	meters/second (m/s)	vector
Speed	v	● The rate at which your *distance* changes ● How fast you're going, regardless of direction	meters/second (m/s)	scalar
Acceleration	a	The rate at which your velocity changes	meters/second^2 (m/s^2)	vector

Facts

- The words, "magnitude," "size," and "value" all have the same meaning
- Scalars are quantities which only have a magnitude
- Vectors are quantities which have a magnitude *and* a direction
- The slope of a line* on a position vs. time graph represents the object's velocity
  **or a tangent line to a curve, if the graph is not linear*
- The slope of a line on a velocity vs. time graph represents the object's acceleration
- The area between the line on a velocity vs. time graph and the time-axis represents the object's displacement
- Objects freely rising or falling have an acceleration of 10 m/s^2 which is always pointed downward (or, you could say -10 m/s^2). This particular acceleration is called "g" and is described as, "acceleration due to gravity"

General Equations

$Speed = \frac{Distance}{\Delta Time}$ $\quad$ $Average\ Speed = \frac{Total\ Distance}{Total\ \Delta Time}$

$Velocity = \frac{Displacement}{\Delta Time}$ $\quad$ $Average\ Velocity = \frac{Total\ Displacement}{Total\ \Delta Time}$

$Acceleration = \frac{\Delta Velocity}{\Delta Time}$

The Kinematics Equations

1) $v_f = v_i + at$ a.k.a. "The acceleration definition formula"
2) $\Delta x = v_i t + \frac{1}{2}at^2$ a.k.a. "El Grande"
3) $v_f^2 = v_i^2 + 2a\Delta x$ a.k.a. "The no-time formula"

Note: In these equations, any "v" is velocity