AP PHYSICS 1
SUMMER ASSIGNMENT
THE BOLLES SCHOOL

Congratulations on accepting the challenge of AP Physics 1 for next school year! To maximize our class time, students enrolled in AP Physics 1 must complete the following tasks prior to the first day of class.

1. <u>MATH REVIEW</u>

AP Physics 1 is more an Applied Mathematics course than a Science course. It is because of this that the Bolles Curriculum Guide states that all students in AP Physics 1 must be concurrently enrolled in AP Precalculus or AP Calculus (AB or BC). Algebra 2 and Geometry skills will not be reviewed at the start of the year, so it is essential that you complete a short review of these skills. These skills include metric conversion, quadratic equations, systems of simultaneous linear equations, basic right triangle geometry and trigonometry, and algebraic equation rearrangement.

- The "AP Physics 1 Summer Math Review" worksheet is found at the end of this document.

- Complete all problems and bring your completed assignment to the first day of class. **Your solutions must show ALL work to be scored as complete**.

2. <u>TEXTBOOK</u>

The College Board designed AP Physics 1 as a course that does not require a first year of Physics. Though students who have completed a full year of Physics or Physics Honors may have a slight advantage, many students who have never had any Physics preparation have been highly successful in AP Physics 1. Although a year of Physics is not required, the Bolles Curriculum Guide states that all students must have completed a year of Biology along with a final grade of B+ or better in either Chemistry AB or Chemistry Honors.

- We will be using the following FREE downloadable textbook in class both for selected homework problems and as a resource.

- Download a pdf of **OPENSTAX COLLEGE PHYSICS** (NOT *College Physics for AP Courses*)
  https://openstax.org/details/books/college-physics

- Students should also purchase the latest edition of the McGraw-Hill exam prep publication **5 STEPS TO A 5: AP PHYSICS 1: ALGEBRA-BASED** by Greg Jacobs. This may be done later in the year when the 2024 edition is published.

3. <u>REQUIRED SOFTWARE</u>

Vernier's LoggerPro will be used for graphical and video analysis in class and, more importantly, in laboratory investigations.

- Download and install on your laptop or tablet the LoggerPro software at the following links according to your operating system:

  Windows 11, 10, 8.1, 7
  http://www.vernier.com/d/qfijq

  MacOS 10.12, 10.11, 10.10
  http://www.vernier.com/d/p0pgf

- The Chromebook version of LoggerPro is not recommended as it does not allow video analysis, which will be performed in several laboratory exercises.

AP PHYSICS 1 SUMMER MATH REVIEW

I. UNIT CONVERSIONS

Complete the following unit conversions.

(1) 4.3 kg = _____ g

(2) 7.52 cm = _____ m

(3) 23 mm = _____ cm

(4) 1 day = _____ seconds

II. LINEAR GRAPHS

Find (a) the slope of the line segment and (b) the equation of the line containing the segment (in slope-intercept form) between the given pair of points.
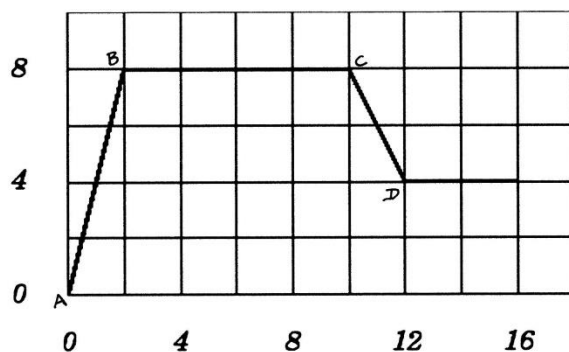
(5) Between points A and B   (6) Between points B and C   (7) Between points C and D

III. SIMULTANEOUS EQUATIONS

Solve the following linear systems by both substitution and elimination.

(8) $\begin{aligned} -4x - 3y &= -26 \\ 5x + y &= 27 \end{aligned}$

(9) $\begin{aligned} 6x + 8y &= 16 \\ -4x - 7y &= -19 \end{aligned}$

IV. QUADRATIC EQUATIONS

Solve the following quadratic equations for x.

(10) $x^2 - 5x - 24 = 0$

(11) $16x^2 = -48x - 36$

(12) $-8x^2 + 46x - 30 = 0$

(13) $2x^2 + 6x - 7 = 0$

(14) The height of a ball thrown upwards, h, in meters, after time, t, in seconds, is given by the function:

$$h(t) = 14t - 5t^2$$

(a) How many seconds does it take for the ball to reach its maximum height?
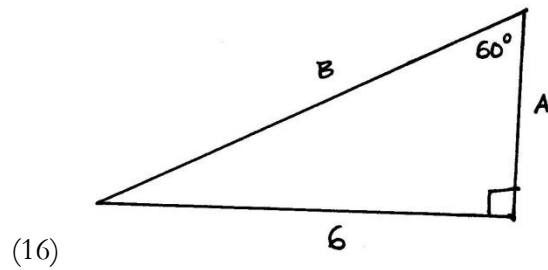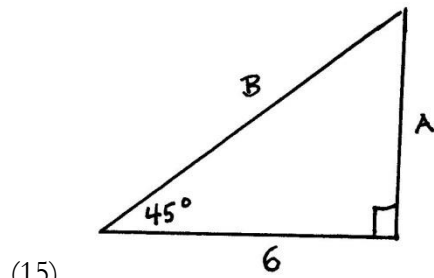(b) What is its maximum height in meters?
(c) At what TWO times is the ball at a height of 6.6 meters?
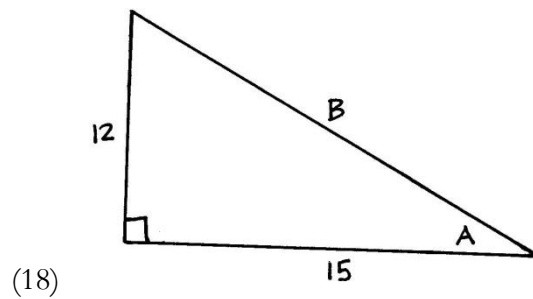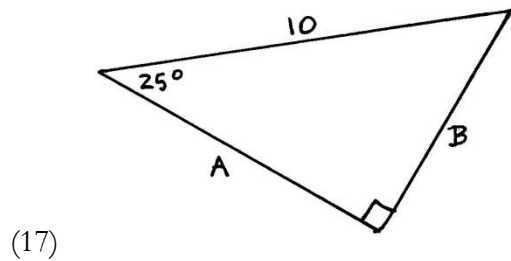(d) Sketch a graph that shows the height of the ball as a function of time.

V. <u>RIGHT TRIANGLES AND TRIGONOMETRY</u>
(NOTE: Triangles are NOT drawn to scale!)

Find the EXACT values of sides A and B in the triangles below.

(15)

(16)

Find side or angle A and B to two decimal places in the triangles below.

(17)

(18)

VI. <u>LITERAL EQUATIONS</u>

Solve the algebraic equations for the given variable, stating your answer in simplest form.

(19) $v = \dfrac{d}{t}$ for t

(20) $T = 2\pi\sqrt{\dfrac{L}{g}}$ for g

(21) $x = sv + \dfrac{1}{2}gs^2$ for s

<u>**KEY**</u>

(1) 4300

(2) 0.0752

(3) 2.3

(4) 86400

(5) m = 4   y = 4x

(6) m = 0   y = 8

(7) m = – 2   y = – 2x +28

(8) (5, 2)

(9) (– 4, 5)

(10) – 3 or 8

(11) $-\dfrac{3}{2}$
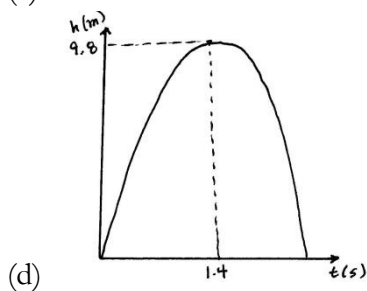
(12) 5 or $\dfrac{3}{4}$

(13) $\dfrac{-3\pm\sqrt{23}}{2}$

(14)   (a) 1.4 seconds
           (b) 9.8 meters
           (c) 0.6 seconds and 2.2 seconds

           (d)

(15) A = 6   B = $6\sqrt{2}$

(16) A = $2\sqrt{3}$ B = $4\sqrt{3}$

(17) A = 9.06   B = 4.23

(18) A = 38.66°   B = 19.21

(19) $t = \dfrac{d}{v}$

(20) $g = \dfrac{4\pi^2 L}{T^2}$ or $g = L\left(\dfrac{2\pi}{T}\right)^2$

(21) $s = \dfrac{-v\pm\sqrt{v^2+2gx}}{g}$