# Beverly Hills High School -- AP Physics C -- F'16 -- Test #1 -- Chaps. 1-2 -- 90 points

As usual, show all of your work. Be neat and complete. Answer what is being asked and write out conclusions in full sentences. The AP examiners are watching! We're all gonna get FIVEs. All decimals given to three decimal places. Neglect frictional effects and air resistance. Each problem is 15 pts.
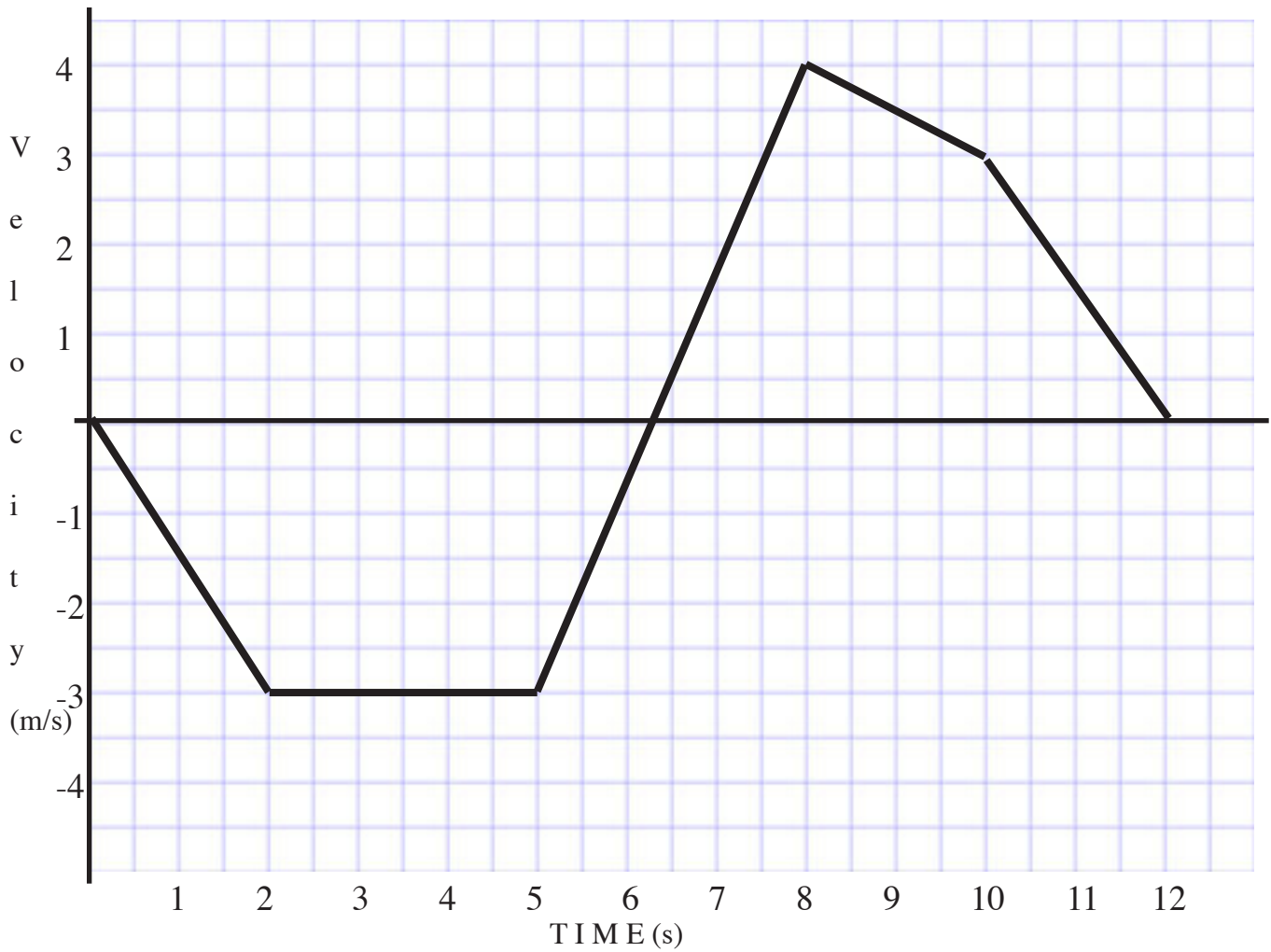
1) Let us say that BBs used in Daisy-brand BB guns have a diameter of 0.175 inches. They are made of steel, coated in copper, and have a density of 6916 $kg/m^3$. What would the mass of BBs that would have the same surface area of a cube 1.000 m on a side? Here, use 25.4 mm = 1 inch. Also, to remind you, the volume of a sphere is $V = 4/3(\pi r^3)$ and surface area is $A = 4\pi r^2$.

2) The position of an object moving along the x-axis is given by $x(t) = 18t - 24t^2 + 5t^3$, where x is in meters and t is in seconds.
   Find the position of the object at  a)  t = 1 s   and b)  t = 3 s.
   c)  What is the object's displacement between t = 1 and t = 4 s?
   d)  What is its average velocity for the time interval t = 2 s to t = 4 s?
   e)  Does the speed of the particle ever equal zero? If so, when?

3) Consider the following object's velocity vs. time graph and answer the questions below.



a) What was the object's position at t = 3 s?

b) What was the object's displacement at t = 10 s?

b) Through what interval was the object's average acceleration the greatest?

d) At what time did the object change directions?

4) Water drips from the nozzle of a shower onto the floor 240 cm below. The drops fall at regular (equal) intervals of time, the first drop striking the floor at the instant that the sixth drop begins to fall. When the first drop strikes the floor, how far below the nozzle are the THIRD and FIFTH drops?

5) You are standing on a cliff some 300 m above the desert below. You throw a stone straight down with an initial velocity of -18.0 m/s.

   a) How long will it take to hit bottom?

   b) A friend is at the bottom. They pick up the stone and want to throw it back up to you, directly vertically. Is it humanly possible? If so, at what velocity must it be thrown?

6) A car traveling 56.0 km/hr is 24.0 m from a wall when the driver slams on the brakes. The car hits the wall exactly 2.00 seconds later.

   a) What is the magnitude of the car's constant acceleration before impact?
   b) How fast is the car traveling at impact?

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SCRATCH AREA - Nothing will be considered that is written here.