

# PHYSICS 1A

## Quiz #1C

H. E. Smith

9 April 2004

*Closed book and notes; only these sheets, Scantron, pen/pencil and calculator may be used. This is exam version C. Write your name on your Scantron, mark your Scantron Test Form "C" and code your UCSD ID# under ID Number. Write your ID number and name on the last sheet of this Quiz. Answer Questions 1-6 on the Scantron; answer Problem 7 in the space provided. Organize your work if you want to be considered for partial credit. **GOOD LUCK!***

Useful Formulae:

$$\langle \vec{v} \rangle = \frac{\Delta \vec{x}}{\Delta t} \quad \vec{v} = \frac{d\vec{x}}{dt}$$

$$\langle \vec{a} \rangle = \frac{\Delta \vec{v}}{\Delta t} \quad \vec{a} = \frac{d\vec{v}}{dt} = \frac{d^2 \vec{x}}{dt^2}$$

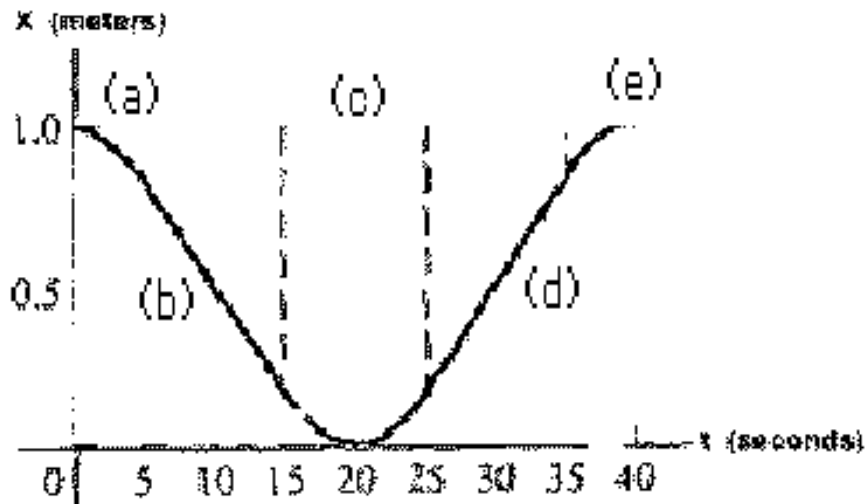
$$x = x_0 + v_0 \cdot t + \frac{1}{2} a \cdot t^2$$

$$v = v_0 + at$$

$$g = -9.80 m s^{-2}$$

Quadratic :  $ax^2 + bx + c = 0 \quad \rightarrow \quad x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

1-3) The graph below is a plot of the displacement of a spider crawling along the floor as a function of time. Section "a"(0-5s), "c"(15-25s) and "e"(35-40s) are parabolic; "b"(5-15s) and "d"(25-35s) are straight lines. Answer the following questions (2 pts each):



1. In section “b” (5–15s) the spider’s velocity is about
  - a) -0.6 m/s
  - b) -0.06 m/s
  - c) 0.06 m/s
  - d) 0.6 m/s
  - e) 6 m/s
2. In section “c” (15–25s) the spider’s acceleration is
  - a) positive, increasing with time.
  - b) constant and negative
  - c) constant and positive
  - d) negative, decreasing (becoming more negative) with time.
  - e) zero
3. Over this interval the spider’s velocity is:
  - a) constant and positive.
  - b) constant and negative
  - c) continuously increasing from negative to positive.
  - d) positive, decreasing with time.
  - e) continuously decreasing from positive to negative.
4. A ball drop experiment measures  $t = 1.5s$  for a drop of 1.88m. You conclude that  $g$  is
  - a)  $10 \text{ m s}^{-2}$
  - b)  $9.800 \text{ m s}^{-2}$
  - c)  $9.798 \text{ m s}^{-2}$
  - d)  $0.60 \text{ m s}^{-2}$
  - e)  $1.67 \text{ m s}^{-2}$

Do you know where you might be?

5. The world record for the 100m dash is just under 10s. How long would it take to run a mile (1610m) with the same average acceleration?
  - a) 40s
  - b) 56s
  - c) 160s
  - d) 4 minutes
  - e) 400s
6. There are about a 500 billion stars in the Milky Way galaxy. The mass of the sun is about  $2 \times 10^{30} \text{ kg}$ . Estimate the mass of the Milky Way.
  - a)  $10^{18} \text{ kg}$
  - b)  $10^{41} \text{ kg}$
  - c)  $10^{42} \text{ kg}$ .
  - d)  $10^{44} \text{ kg}$ .
  - e)  $10^{50} \text{ kg}$ .

Name\_\_\_\_\_

ID # A\_\_\_\_\_

7. Standing at the top of the Campanile in Pisa ( $h = 55m$ ) Galileo throws a 1kg weight upward with a velocity of 10 m/s; at the same time his assistant throws a 2kg weight downward with the same velocity.

- a) What is the time difference between the impact of the first and second weights?

$$t_{1kg} - t_{2kg} = \underline{\hspace{2cm}}$$

- b) What are their velocities just before they strike the ground?

$$v(1kg) = \underline{\hspace{2cm}}$$

$$v(2kg) = \underline{\hspace{2cm}}$$