Ch. 1 & 2 Homework Solutions

Ch. 1 Homework

Phy 10
C

E 11, 12

11. Orbit of pluto Orbit of Mars

Approximate each orbit with circle.
Circumfirance of a circle = $2\pi r$

$$\frac{Cir|_{pluto}}{Cir|_{Mars}} = \frac{2\pi r_p}{2\pi r_m} = \frac{r_p}{r_m} = \frac{5.9\times10^{9}\ km}{2.3\times10^{8}\ km} \text{ times bigger}$$

25.6 x bigger

12. Childs fingernail compared to a proton

fingernail $\sim$ 1cm $= 10^{-2}$m in diameter

proton $r = 1.2\times10^{-15}$m

$d = 2r = 2.4\times10^{-15}$m

$$\frac{d_{fingernail}}{d_{proton}} = \frac{10^{-2}\ m}{2.4\times10^{-15}\ m} = 4.2\times10^{12} \text{ times bigger}$$

p.04 Ch. 2 Homework Phy 101 (1)

Qs 1, 2, 4, 6, 9, 15, 25
26, 40, 43, 46

Es 3, 5, 7, 12, 14, 21, 23

Questions:

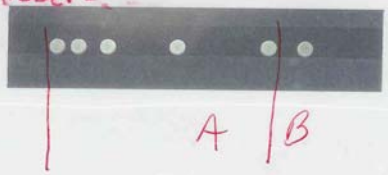
(1)

1. Describe the *motion* depicted in the following strobe drawing.

Motion A: acceleration – speeding up
B: constant motion
C: deceleration – slowing down

2. Describe the motion of the pucks in the strobe photographs. (Assume that the pucks move from left to right and do *not* retrace their paths.)

Strobe 1:



Strobe 1:
Motion A: acceleration – speeding up
B: deceleration – slowing down

Ch. 2 HW

Qs (cont)

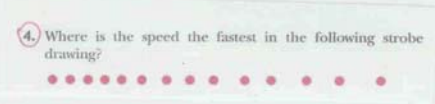
(2) cont.

Strobe 2

Strobe 2:

Motion: All the same distances between exposures — constant motion

(4)



Fastest speed means largest distance between exposures on strobe photo.

Puck speeds up from left to right → Right-most part of photo is highest speed.

(6.) Motion A: Constant speed

B: Slows down

C: Speeds up to higher speed than A

D: Goes at constant faster speed

Strobe:

04 Ch. 2 HW (3)

Qs (cont.)

7.) Truck: $v_T = \frac{\Delta x}{\Delta t} = \frac{100\,mi - 92\,mi}{10\,min} = 0.8\,mi/min$

Car: $v_C = \frac{\Delta x}{\Delta t} = \frac{120\,mi - 113\,mi}{10\,min} = 0.7\,mi/min$

$v_T > v_C$

15.

15. For the following strobe drawing, compare the instantaneous speeds at points C and D to the average speed for the time interval between C and D.

A B C D E

$v_{instant} = \frac{\Delta x}{\Delta t} = \frac{x_D - x_C}{\Delta t_{CD}}$

$v_{inst} = v_{ave}$

$v_{ave} = \frac{\Delta x}{\Delta t} = \frac{x_D - x_C}{\Delta t_{CD}}$

25.

25. In the following strobe drawings, which object (if either) has the greater acceleration?

a.

b.

Motion a: Constant speed - same distance between each exposure

Motion b: Constant speed -

However, $v_b > v_a$ because distances in 'b' are greater than in motion 'a'!

Qs (cont.)

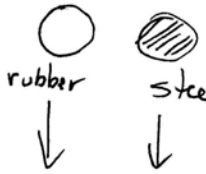
(26.)

26. The following strobe drawings represent the motions o
two cars a and b. During which interval of the motion o
car a is the average speed of car a approximately equal t
the average speed of car b?

	A	B	C	D	E
a.	○	○	○	○	○
b.					

The instantaneous speed of car a from B → C is approximately the same as the constant speed of car

(40.)



Both balls will drop with the same acceleration if you neglect air resistance

$a = 9.8\ m/s^2$

Eventually, with air resistance, the rubber ball will reach terminal velocity first & have no acceleration.

(13.) With no air resistance (air pumped out), both objects will ALWAYS fall with the same speed & hit at the same time.

(6.) Aristotle would say that the book is more like the earth than the paper & thus falls faster, ~~when~~ when the paper is wadded up, it becomes more rocklike & falls faster.

Galileo would use air resistance to explain.

E s (cont)

(3.) 12:00 PM 50 miles
2:30 PM 215 miles

$v = \frac{\Delta d}{\Delta t} = \frac{215 - 50 \text{ mi}}{2.5 \text{ hrs}}$

$v = 66 \text{ mi/hr}$

(5.) 143 miles in 24 hrs

$v = \frac{143 \text{ mi}}{24 \text{ hrs}} = 6 \text{ mi/hr}$

(7.) $v = 60 \text{ mph}$ for $t = 8 \text{ hr}$

$d = vt = 60 \frac{\text{mi}}{\text{hr}} (8 \text{ hr}) = 480 \text{ miles} = d$

(12.) $d = 4400 \text{ km}$ $v = 80 \text{ km/hr}$

$t = \frac{d}{v} = \frac{4400 \text{ km}}{80 \text{ km/hr}} = 55 \text{ hr} = t$

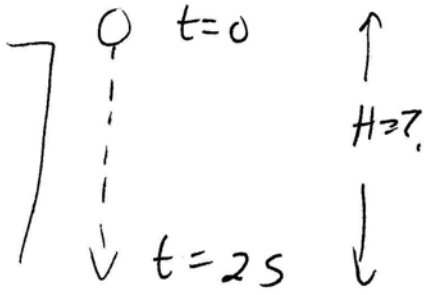
(14.)

$v = 125 \text{ mi/hr}$ $d = 500 \text{ mi}$

$t = \frac{d}{v} = \frac{500 \text{ mi}}{125 \text{ mi/hr}} = 4 \text{ hr} = t$

E's (cont)

(21.)



$d = \frac{1}{2} a t^2$

$H = \frac{1}{2}(9.8\ m/s^2)(2\ sec)^2$

$\boxed{H = 19.6\ m}$

(23.)

t	v=at	$d = \frac{1}{2}at^2$
1	9.8 m/s	4.9 m
2	19.6 m/s	19.6 m
3		
4	29.4 m/s	44.1 m
5	39.2 m/s	78.4 m ← Just before it hits
	49 m/s	122.5 m

$a = 9.8\ m/s^2$

Total d = 80 m