Physics 12: Review of Physics 11 Quiz: Significant Digits and Kinematics in 1-D

Name: KEY **Block: 2**

PART A: Significant Digits

1. State the ***number of significant digits*** in each of the following measured values:

i.	4.03 kg	3
j.	8200 mm	2 (ambiguous)
k.	6.02×10^{5} m	3
l.	120.04 s	5
m.	0.004600 mg	4

2. Complete the following calculations. Give your answers to the appropriate number of *significant digits*, correct *units*, and in *scientific notation*.

a.	0.0465g + 0.105g	$0.152\ g = 1.52\times10^{-1}\ g$ (0.1515)
b.	2.87×10^{2}cm + 5.38×10^{3}cm	5.67×10^{3} cm
c.	5.605×10^{-3}kg + 2.35×10^{-2}kg = 0.029105	2.91×10^{-2} kg
d.	4.1865 L – 1.02 L	3.17 L
e.	895.0 kg + 0.0068 kg	$895.0\ kg = 8.950\times10^{2}$ kg
f.	1.1m × 7.658m × 205.6m	$1.7\times10^{3}\ m^{3}$
g.	$(9.8\times10^{-3}m^{3}) \div (4\times10^{2}m)$	$2\times10^{-5}\ m^{2}$ (2.45×10^{-5})
h.	$\frac{(5.2\ mL)\times(6.250g/mL)}{35.0mL}$	9.3×10^{-1} g/mL

2.87
380
3.0235
3.005605

8.5

PART B: Kinematics Problems in 1-D

Answer all questions in the space provided using proper format. ***Show all work*** including appropriate units and significant digits.

- Draw a sketch of the situation
- List the given and unknown variables (v_i, v_f, a, Δd, Δt)
- Show the equation in symbols
- Show algebra steps that you used to solve the problem
- State your final answer with ***appropriate units*** and ***significant digits***
- Draw a box around your final answer so that the reader (your teacher ☺) can easily see which of the values you have written on the page is meant to be the final answer

11

EQUATIONS

Average velocity: $v = \Delta d/\Delta t$

$g = 9.80\ m/s^2$

$v_f = a\Delta t + v_i$

$\Delta d = 1/2(v_i + v_f)\Delta t$

$\Delta d = 1/2\ a\Delta t^2 + v_i \Delta t$

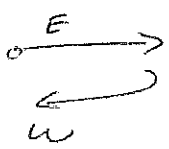
$v_f^2 = 2a\Delta d + v_i^2$

$ax^2 + bx + c = 0$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

1. A bird flies East for 3.50 hours at a speed of 11.0 m/s, and then turns around and flies towards the West at 8.00 m/s for 85.0 minutes.

   a. How far (distance) has it flown?



$d = v_E t_E + v_W t_W = (11)(3.5 \times 3600) + (8)(85 \times 60)$

$= 179400$

$d = 1.79 \times 10^5\ m$

   b. What was its final displacement from its original position?

$\Delta\vec{d} = \vec{v}_E t_E + \vec{v}_W t_W = (11)(3.5 \times 3600) + (-8)(85 \times 60)$

$= 97800$

$\Delta\vec{d} = 9.78 \times 10^4\ m$ [East]

   c. What was its average velocity?

$$\vec{v} = \frac{\Delta\vec{d}}{t_E + t_W} = \frac{97800}{(3.5 \times 3600) + (85 \times 60)}$$

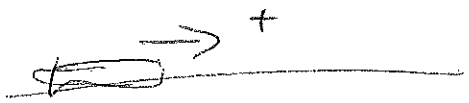
$\vec{v} = 5.53\ m/s$ [East]

   d. What was its average speed?

$$v = \frac{d}{t_E + t_W} = \frac{179400}{(3.5 \times 3600) + (85 \times 60)}$$

$v = 10.1\ m/s$

8



2. An airplane flying horizontally with a velocity of 75.0 m/s [West] is accelerated uniformly at a rate of 4.00 m/s² for 10.50 s.
   a. What is the planes final velocity?

$V_i = 75.0 m/s$

$a = 4.00 m/s^2$

$t = 10.50 s$

$V_f = ?$

$\Delta d = ?$

$V_f = at + V_i$

$= (4)(10.5) + (75)$

$V_f = 117 m/s [West]$

   b. How far does the airplane travel while accelerating?

$\Delta d = \frac{1}{2}at^2 + V_i t$

$= \frac{1}{2}(4)(10.5)^2 + (75)(10.5)$

$\Delta d = 1.01 \times 10^3 m$

   c. If instead the airplane needs to reach a speed of 550.0 km/h, for how much time should it accelerate? (assume the same initial velocity and acceleration rate as stated above)

$V_f = \left(\frac{550}{3.6}\right) m/s$

$a = 4 m/s^2$

$t = ?$

$t = \frac{V_f - V_i}{a}$

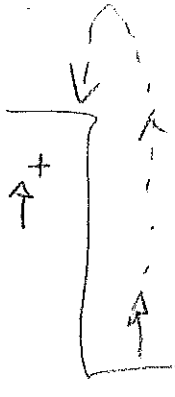
$t = \frac{\left(\frac{550}{3.6}\right) - 75}{4}$

$t = 19.4 s$

/6

3. An arrow is shot upward from the ground at the base of a 15.0m high cliff. The velocity of the arrow the instant after it leaves the bow at ground level is 50.0 m/s [upward]. (assume that air resistance is negligible)

   a. To what maximum height above the ground does the arrow fly?



$v_i = 50.0\,m/s$

$v_f = 0\,m/s$

$a = -9.80\,m/s^2$

$\Delta d = ?$

$t = ?$

$\Delta d = \frac{v_f^2 - v_i^2}{2a}$

$\Delta d = \frac{0 - (50)^2}{2(-9.8)}$

$\Delta d = 128\,m$

(3)

   b. When it falls down, the arrow lands on top of the cliff (instead of falling all the way back to the ground). How long (time) after it was fired did the arrow land on the cliff?

$v_f = ?$

$\Delta d = 15.0\,m$

$t = ?$

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

$0 = \frac{1}{2}(-9.8)t^2 + 50t - 15$

$0 = -4.9t^2 + 50t - 15$

$t = \frac{-50 \pm \sqrt{50^2 - 4(-4.9)(-15)}}{2(-4.9)} = \frac{-50 \pm 46.968}{-9.8}$

(3) $t = 9.89\,s$ or $0.309\,s$

   c. Instead, the arrow is fired downward from the top of the cliff toward the ground below. The velocity when fired is 50.0 m/s [downward]. In this case, determine the velocity of the arrow the instant before it hits the ground.

$v_i = 50$

$\Delta d = 15$

$a = 9.8$

$v_f = ?$

$v_f = \sqrt{2a\Delta d + v_i^2}$

$= \sqrt{2(9.8)(15) + (50)^2}$

(2) $v_f = 52.9\,m/s\,[down]$

8