Physics 1005 (F18) Exam1a, Name_____ANSWERS_____, ID#_____, Score_____

1. (**Lab-related kinematics, 20%**) As shown in Fig. 1, a ball initially at rest in position A, takes **0.05** s passing from G1 (start) to G2 (stop) after being released. The distance from G1 to G2 is 0.1 m.
   Find: (a) Velocity at point C, **Ans. ____2 m/s____**; (b) The time it takes for ball to hit the ground after launching at the position C, **Ans. ____0.44 s____; (**c) Range, **Ans. ___0.88 m_____**

2. (**1D Kinematics with two objects, a = 0, 20%**) Two persons (A and B) run on a 100-meter track. Person A runs with a speed 10 m/s. Person B runs with 12 m/s, but with a **0.5** s late-starting. (a) How long does it take for the B-person to catch up with the A-person? **Ans.** _2.5 s_ (b) How far away from the starting point when they meet? **Ans.**_30 m___

3. **(1D Vertical motion with a = ± g, g = 10 m/s^2, 20%)** A 2-m person throws a stone vertically to the sky with an initial speed of **20 m/s**. (a) how long it takes to reach the maximum height? **Ans. __2 s_;** (b) find the maximum height it can reach **from ground**? **Ans. _22 m__;** (c) How long does it take for the stone to return to the ground from the top? **Ans. __2.1 s__;** (d) the stone speed just before reaching to the ground? **Ans.** ___21 m/s____

4. (**2D kinematics, 40%**) As shown in Fig. 2, an object is launched from the ground with a speed of 20 m/s in an angle of 60 degree from horizontal and lands on a building top. **Use g = 10 m/s^2 for this problem**.
   (a) What is horizontal initial-launching speed? **Ans. _____10 m/s____**
   (b) What is the vertical initial-launching speed? **Ans. _____17.3 m/s___**
   (c) How long does the object take to reach to the maximum height? **Ans._____1.73 s___**
   (d) What is the maximum height the object can reach **above the ground**? **Ans. ____15 m___**
   (e) How long does it take for the object to reach the building top **after reaching the maximum height**? **Ans._1.4 s__**
   (f) What is the horizontal speed of the object just before it reaches the building top? **Ans. __10 m/s__**
   (g) How far does the object fly horizontally? **Ans.___31 m__**
   (h) What is the final speed of the object just before reaching the building top? **Ans. ____17.2 m/s__**

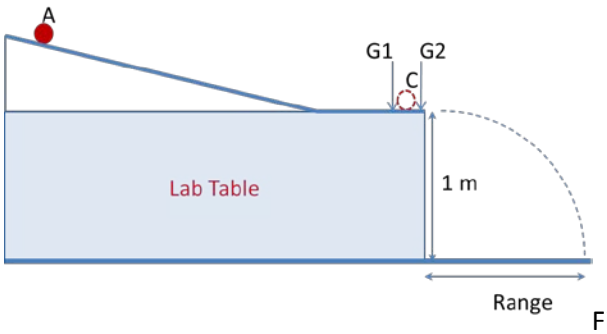

Fig. 1

Fig.2

Reference equations:

Kinematics (a = 0)	$x = x_0 + v_0 t$		
Kinematics (a ≠ 0)	$v = v_0 + at$	$x = x_0 + v_0 t + (1/2)at^2$	$v^2 = v_0^2 + 2a(x - x_0)$
Note:	$\sin(60^o)$ = sqrt(3)/2	$\cos(60^o)$ = 1/2	