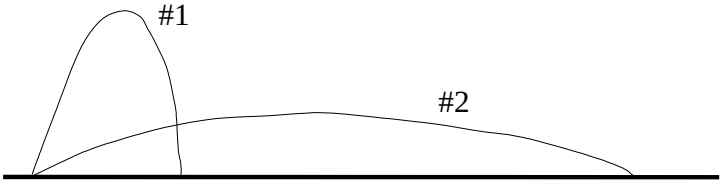
Name: KEY TA: _____

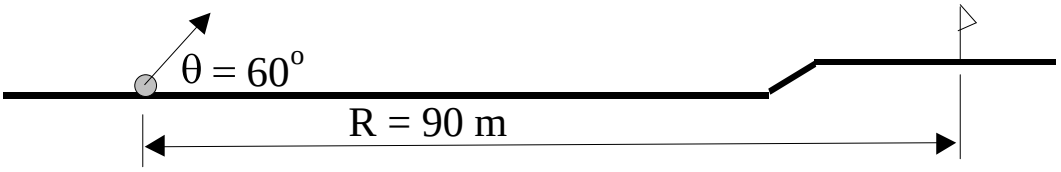
$$x = x_0 + v_{x0}t + \frac{1}{2}a_x t^2 \qquad v_x = v_{x0} + at \qquad v_x^2 = v_{x0}^2 + 2a(x - x_0)$$

Multiple Choice: For the two projectile paths shown below, which of the following statements is true. The effects of air friction are negligible. (circle one) (5pts):

a.) #2 has greater initial *vertical* and *horizontal* velocity components than #
b.) #1 has a great initial *vertical* velocity component than #2, but #2 is in the air for a greater time period than #1.
c.) #1 has a greater initial *vertical* velocity and is in the air for a greater period of time than #2.
d.) The acceleration is largest for projectile #2
e.) The acceleration is largest for projectile #1
f.) Not enough information is given.



Show all work: A golfer is attempting to hit a golf ball toward an elevated golf green which is 3 m above the height of the ball.. The center of the green is 90 m (horizontally) from the ball. The golfer has selected a golf club that will give the ball an angle of 60^o with respect to the ground. What initial speed should the golfer give the ball so that it hits the ground at the center of the green. (15pts).



Define the ball's starting position as the origin ($x_o = 0$ and $y_o=0$), when the ball lands on the green its location will be x=R=90 m and y=3m). Start by determining the amount of time that the ball is in the air.

$x = x_o + v_o \cos\theta\, t \;\rightarrow\; R = 0 + v_o \cos\theta\, t \;\rightarrow\; t = R/(v_o \cos\theta)$

Now substitute this into the equation for the y-direction motion and

$y = y_o + v_o \sin\theta\, t - \frac{1}{2}gt^2$
$y = v_o \sin\theta\, [\, R/(v_o \cos\theta)] - \frac{1}{2}g[R/(v_o \cos\theta)]^2$
$y = R \tan\theta - \frac{1}{2}g[R/(v_o \cos\theta)]^2$ (Now solve for v_o)
$\frac{1}{2}\, gR^2/(\cos\theta)^2\, [\, 1/v_o]^2 = R \tan\theta - y$
$[1/v_o]^2 = 2\,(\cos\theta)^2\, [R \tan\theta - y]/[gR^2]$
$v_o = \{\, [gR^2]/[\, 2\,(\cos\theta)^2\,(R \tan\theta - y)]\, \}^{1/2} = 32$ m/s