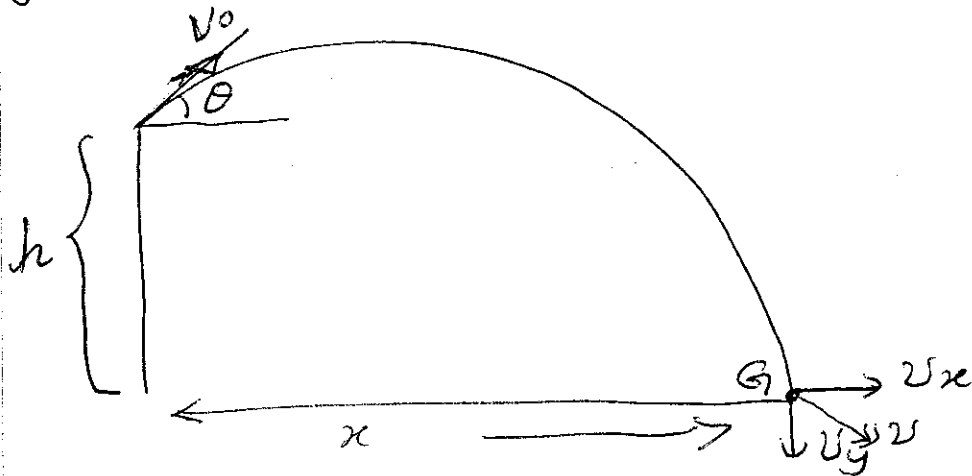


## Quiz 2

A projectile was shot with an initial velocity  $v_0$  and, with an angle  $\theta$  with the horizontal as shown. G is the point where projectile hit the ground



- What is the horizontal velocity  $v_x$  at G
- What is the vertical velocity  $v_y$  at G.
- Prove that the magnitude of velocity at G does not depend on  $\theta$ .

a)  $v_x = v_0 \cos \theta$  (5)

b)  $\downarrow v^2 = v_0^2 + 2a y \Rightarrow v_y^2 = (-v_0 \sin \theta)^2 + 2gh$

$\therefore v_y = \sqrt{v_0^2 \sin^2 \theta + 2gh}$  (3)

c) velocity at G is  $v$

$$v^2 = v_x^2 + v_y^2 = v_0^2 \cos^2 \theta + v_0^2 \sin^2 \theta + 2gh$$

$$= v_0^2 (\underbrace{\cos^2 \theta + \sin^2 \theta}_1) + 2gh \quad (2)$$

$$v^2 = v_0^2 + 2gh, \text{ does not depend on } \theta$$