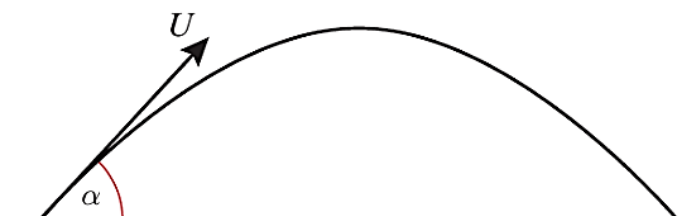


## 1. Horizontal and Vertical Components of Velocity

When a particle is projected with initial velocity  $U$  at an angle  $\alpha$  above the horizontal:

- The horizontal component of the initial velocity is  $U\cos\alpha$
- The vertical component of the initial velocity is  $U\sin\alpha$
- When the particle is at its highest point, the vertical velocity = 0.
- The speed of the object is the magnitude of the velocity vector.



### **Example** (Textbook Exercise 6B Q4)

A particle is projected from the top of a building with initial velocity of  $28\text{ms}^{-1}$  at an angle  $\theta$  below the horizontal, where  $\tan\theta = \frac{7}{24}$ .

- Find the horizontal and vertical components of the initial velocity
- Express the initial velocity as a vector in terms of  $\mathbf{i}$  and  $\mathbf{j}$ .