

# PROJECTILE MOTION

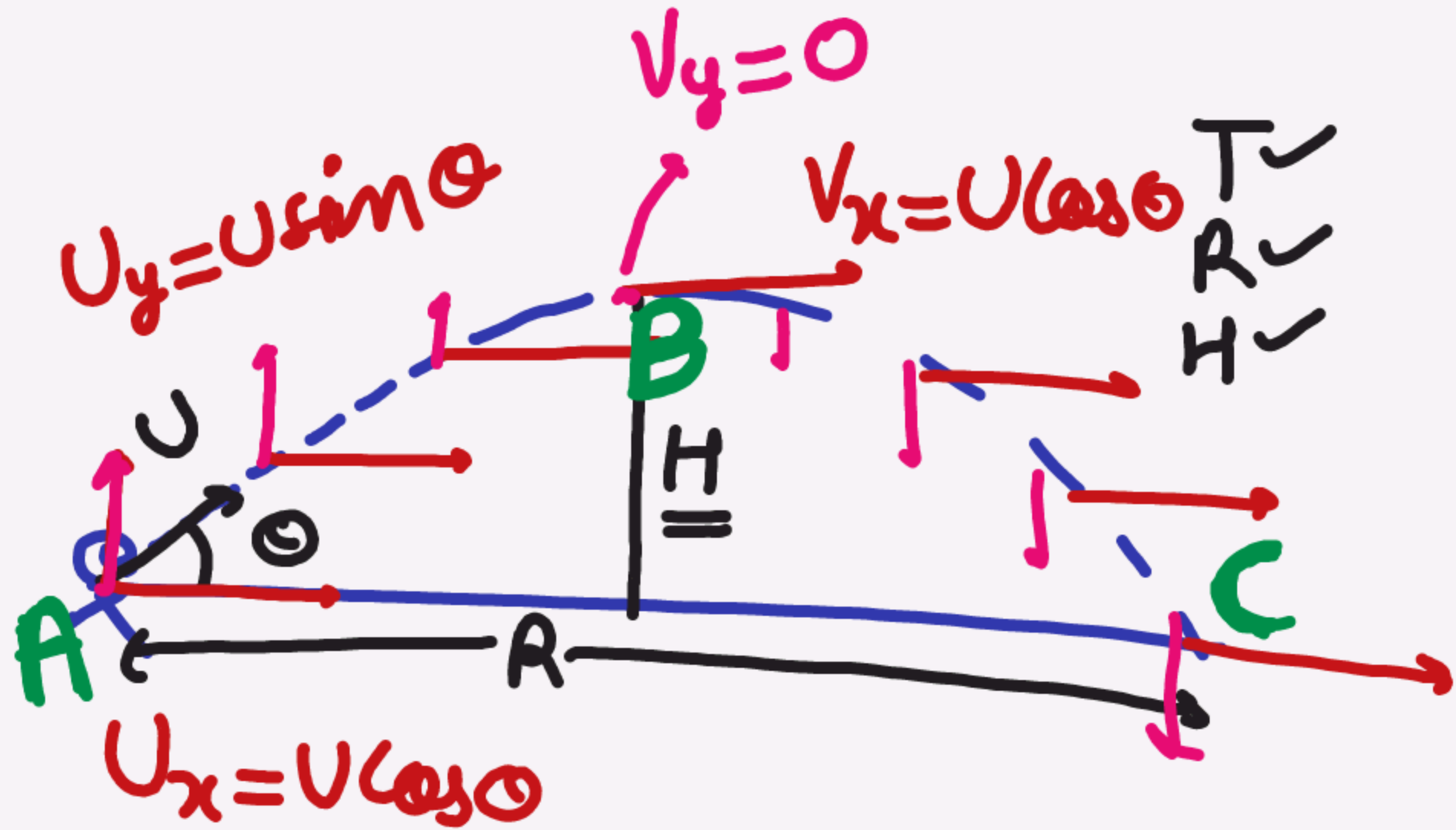
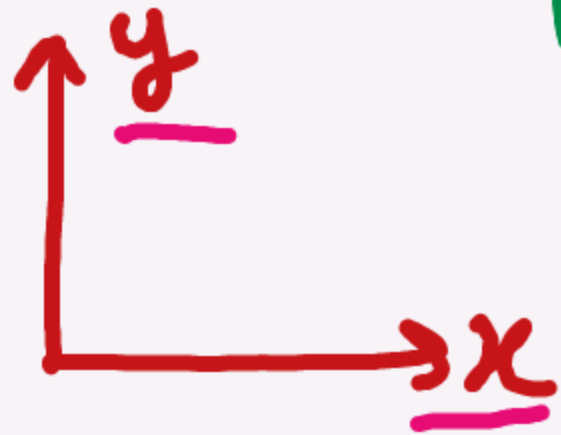
\* 2-D MOTION

\* MOTION  $\rightarrow$  PLANE

\* MOTION UNDER GRAVITY.



~~#~~  $V = U + at$   
~~#~~  $S = Ut + \frac{1}{2}at^2$   
~~#~~  $V^2 = U^2 + 2as$



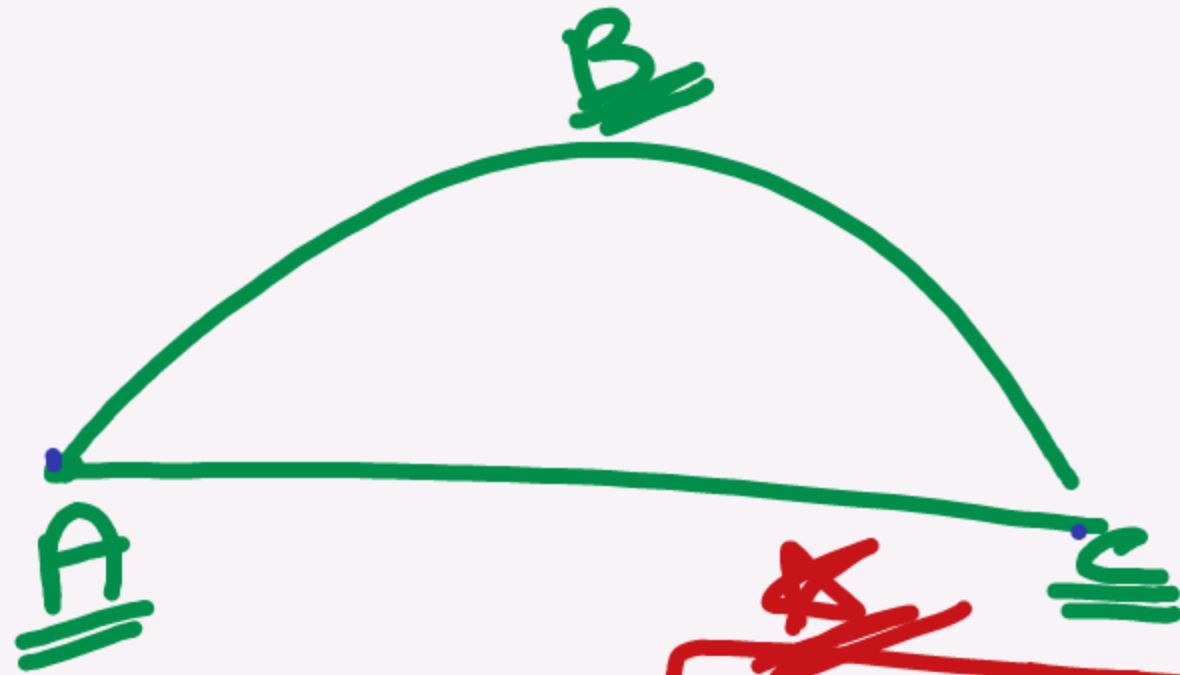
A → C

$$s_y = 0$$
$$a_y = -g$$

$$s_y = u_y t + \frac{1}{2} a_y t^2$$

$$0 = u \sin \theta (T) + \frac{1}{2} (-g)(T^2)$$

$$0 = T \left[ u \sin \theta - \frac{gT}{2} \right]$$



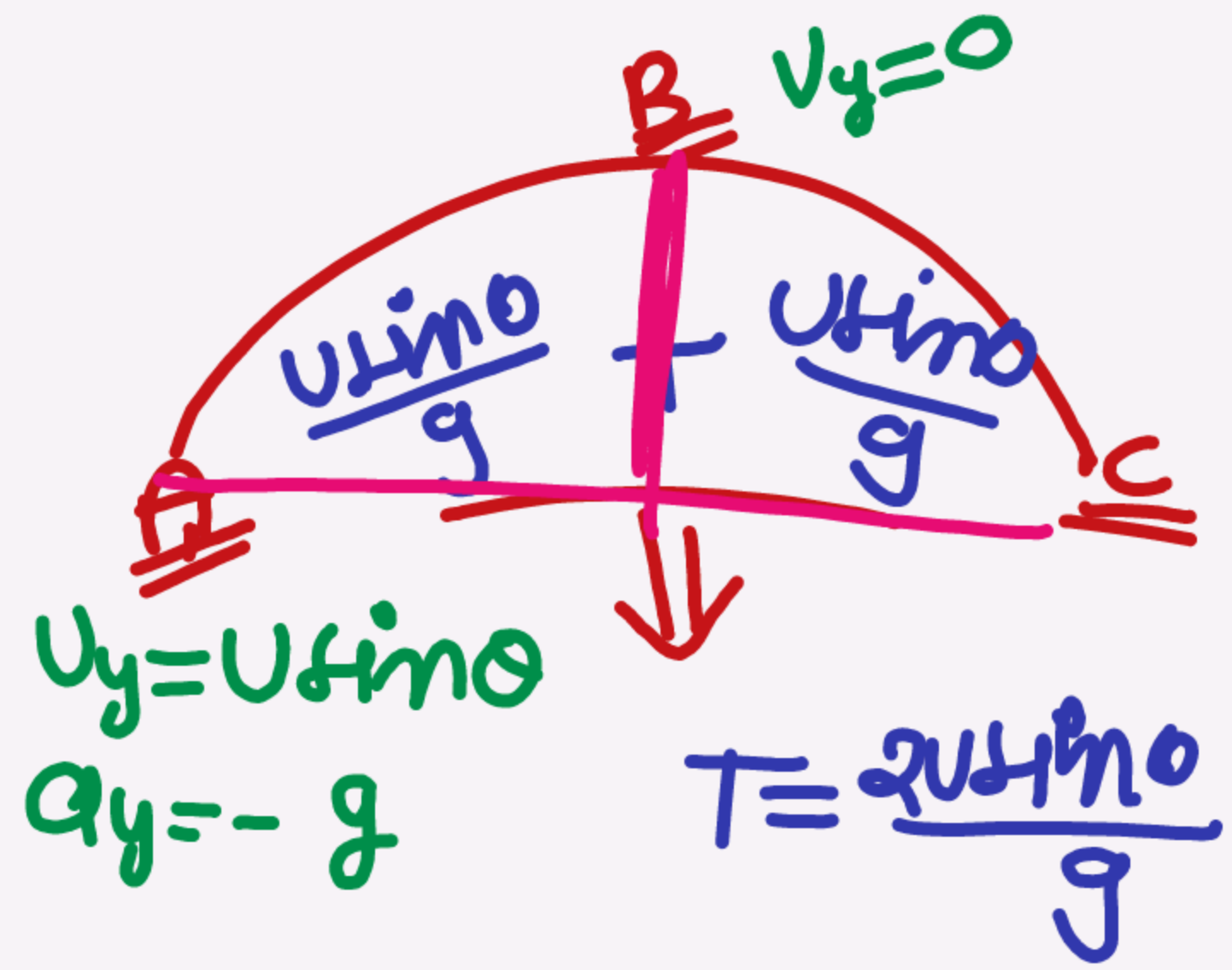
$$T = \frac{2u \sin \theta}{g}$$

A → B

$$v_y = u_y + a_y t$$

$$0 = u \sin \theta + (-g)t$$

$$t = \frac{u \sin \theta}{g}$$



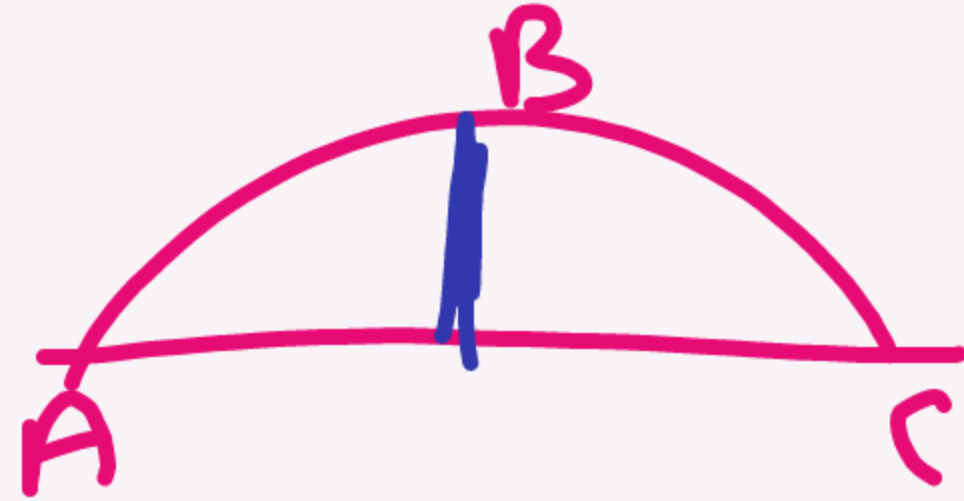
A → B

$$v_y^2 = u_y^2 + 2a_y \Delta y$$

$$0 = u^2 \sin^2 \theta + 2(-g)H$$

$$0 = u^2 \sin^2 \theta + 2(-g)H$$

$$H = \frac{u^2 \sin^2 \theta}{2g}$$

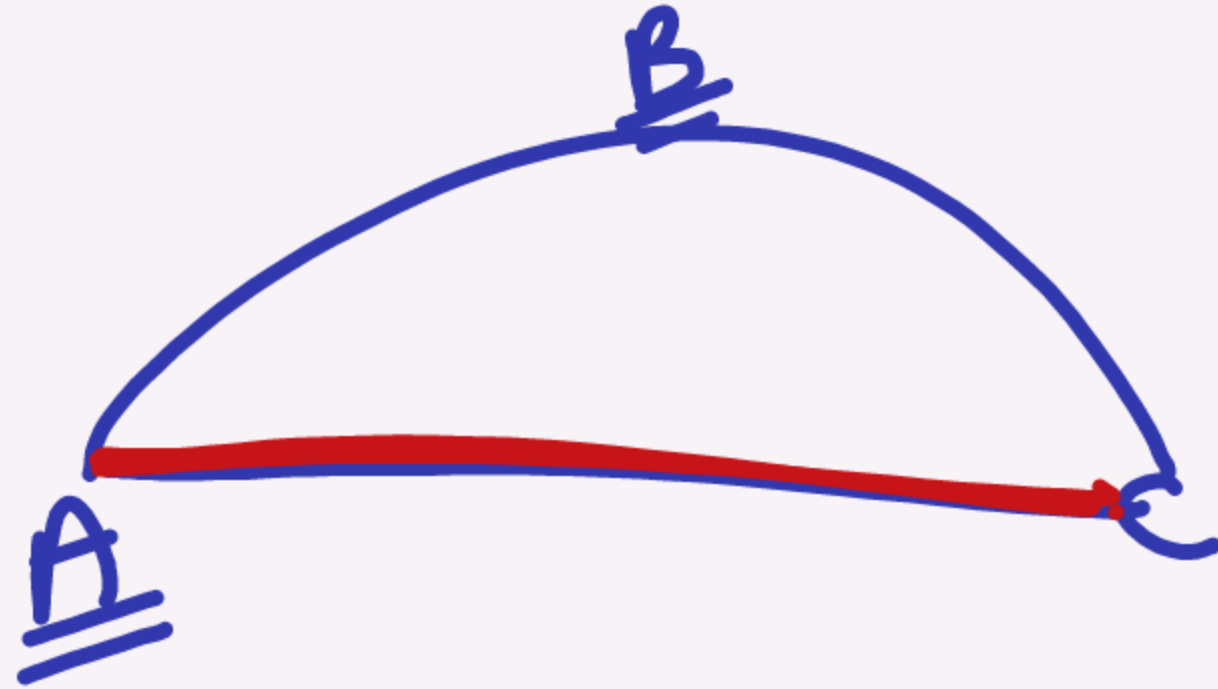


Arc

$$S = ut + \frac{1}{2}at^2$$

$$R = \frac{u^2 \sin 2\theta}{g}$$

$$R = \frac{u^2 \sin 2\theta}{g}$$



$$R = \frac{U^2 \sin^2 \theta}{g}$$



$$2\theta = 90$$

$$\theta = 45^\circ$$

$$\sin 30 \quad \cos 60$$

$$\sin 60 \quad \cos 30$$

$$\sin 45 \quad \cos 45$$

$$\sin 15 \quad \cos 75$$

$$\cdot 2 \sin \theta \cos \theta$$

$$R = \frac{U^2 \sin 2\theta}{g}$$

$$U^2 \times 2 \sin \theta \cos \theta$$

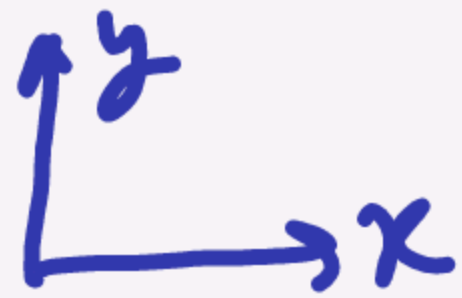
$\frac{1}{2} \times \frac{\sqrt{3}}{2} = \frac{\sqrt{3}}{4}$

$$\frac{\sqrt{3}}{2} \times \frac{1}{2}$$

30, 60







$$a_x = 0$$

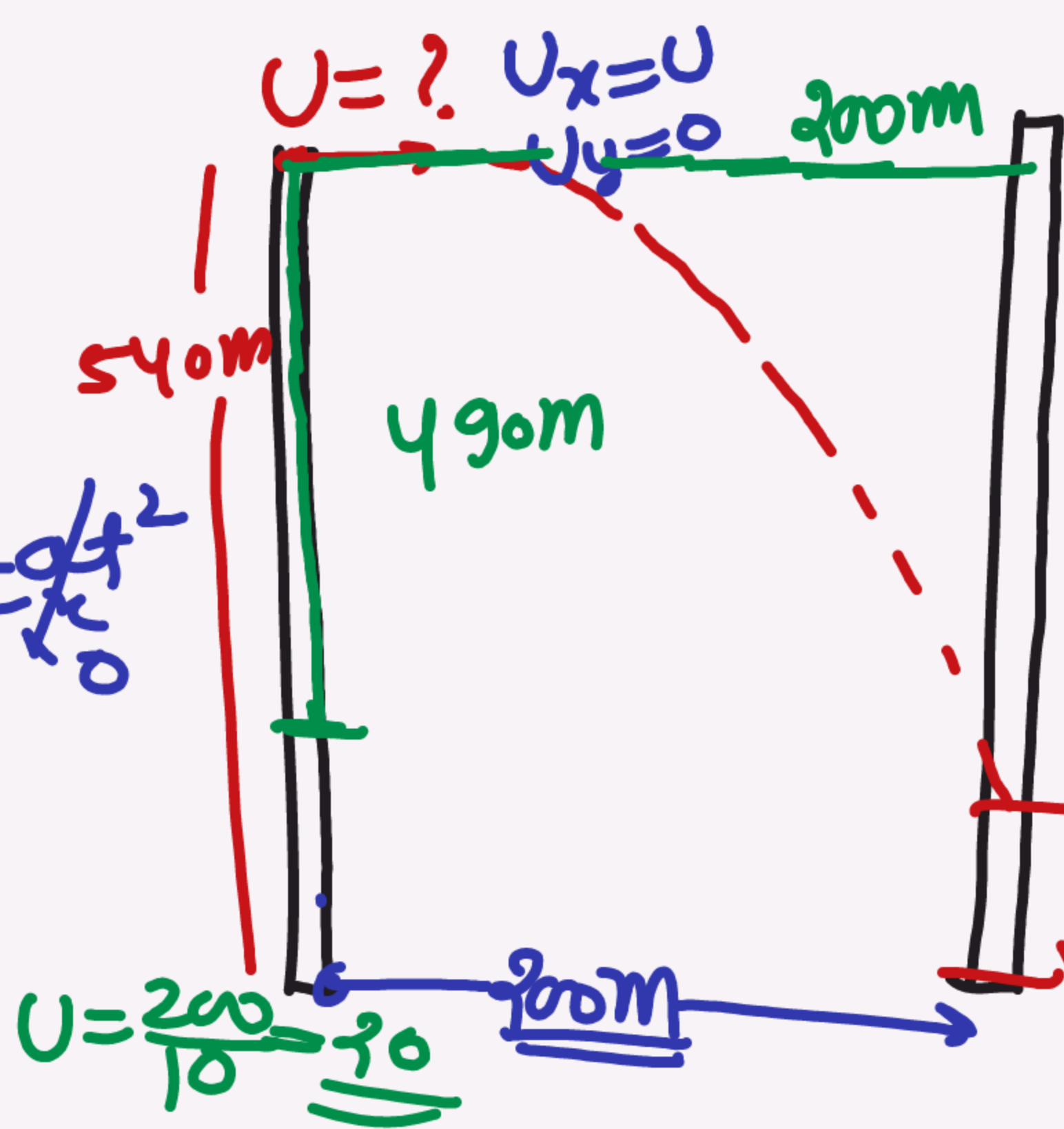
$$a_y = -g$$

$$s_x = u_x t + \frac{1}{2} a_x t^2$$

$$s_y = 0$$

$$200 = u_x(t)$$

$$u = \frac{200}{t}$$



$$s_y = u_y t + \frac{1}{2} a_y t^2$$

$$-490 = 0 + \frac{1}{2} (-9.8) t^2$$

$$t^2 = \frac{-980}{-9.8}$$

$$t^2 = 100$$

$$t = 10s$$



