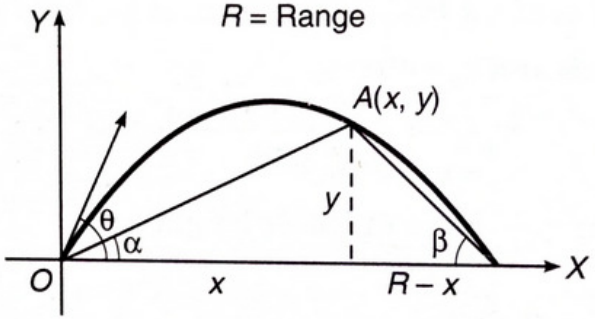
QUES 06:-

A particle is thrown over a triangle from one end of a horizontal base and after grazing the vertex falls on the other end of the base. If α *and* β *be the base angles and* θ *the angle of projection, prove that* $\tan\theta = \tan\alpha + \tan\beta$.

Solution The situation is shown in figure.



From figure, we have

$$\tan\alpha + \tan\beta = \frac{y}{x} + \frac{y}{R-x}$$

$$\tan\alpha + \tan\beta = \frac{yR}{x(R-x)} \quad \ldots(i)$$

Equation of trajectory is

$$y = x\tan\theta\left[1 - \frac{x}{R}\right]$$

or,
$$\tan\theta = \frac{yR}{x(R-x)} \quad \ldots(ii)$$

From Eqs. (i) and (ii), we have

$$\tan\theta = \tan\alpha + \tan\beta$$

Hence Proved.