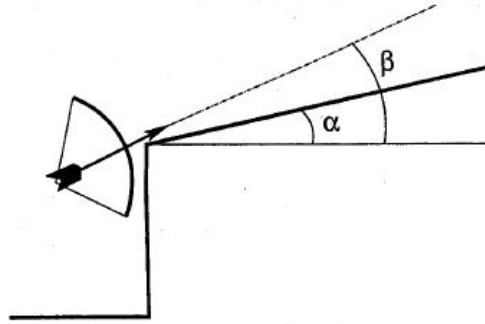**QP19**

Robin Hood is standing at the foot of a hill which makes an angle α with the horizontal. For practicing his recently learnt Phys 1a formulae, he shoots an arrow from a point on the hill, with initial velocity v_0 and under an angle $\beta > \alpha$ with the horizontal. Neglect both the size of the arrow and air friction.

a) (2 points) Express the time needed for the arrow to land in terms of α, β, v_0 and the gravitational acceleration g.

b) (1 point) Show that the distance between the origin and the place of landing is given by

$$l = \frac{2v_0^2}{g\cos^2(\alpha)} \sin(\beta - \alpha) \cos(\beta)$$