A stone thrown from the surface of the earth at a speed of 10m / s at an angle of 600 to the horizontal. The radius of curvature of the upper root point of the trajectory

Solution:

Gravitational acceleration change velocity amount only on the vertical component, the horizontal component then remains constant:

$V_x = const = V\cos\alpha\ (from\ a\ right\ triangle)$

$\alpha = 60^o, \cos 60^o = \frac{1}{2}$

$V_x = V\cos\alpha = \frac{V}{2}$

At the topmost point of the trajectory velocity of the body is equal to the horizontal component of the initial velocity, so that the vertical component of the velocity is zero:

$2: V_2 = V_x = \frac{V}{2}$

Formula for the centripetal acceleration at the topmost point (2):

$a_c = \frac{V_x^2}{R} = g\ (the\ only\ acceleration\ that\ acts\ on\ the\ ball)$

$R = \frac{V_x^2}{a_c} = \frac{\left(\frac{V}{2}\right)^2}{g} = \frac{V^2}{4g} = \frac{\left(10\frac{m}{s}\right)^2}{4 \cdot 9.8\frac{m}{s^2}} = 2.6m$

Answer: the radius of curvature of the upper root point of the trajectory is $2.6m$