Answer on Question #91150 - PHYSICS/MECHANICS - RELATIVITY

1.

Let block have travelled h depth in vertical direction,final velocity of the block ,by applying newton law of motion

$V^2 = u^2 + 2*g*h$

$V = \sqrt{u^2 + 2gh}$ ----------(1)

And, $h = r(1 - \cos\theta)$ ----------(2)

At the moment of separation of block from hemisphere,

''Centrifugal force = Component of gravity force in the direction of centre,

$(m*v^2)/r = m*g * \cos\theta$

$(u^2+2*g*h)/r = g * \cos\theta$

$\cos\theta = (u^2+2*g*r)/(3*g*r)$

Angle made from the vertical, $\theta = \cos^{-1}$ **$((u^2+2*g*r)/(3*g*r))$**