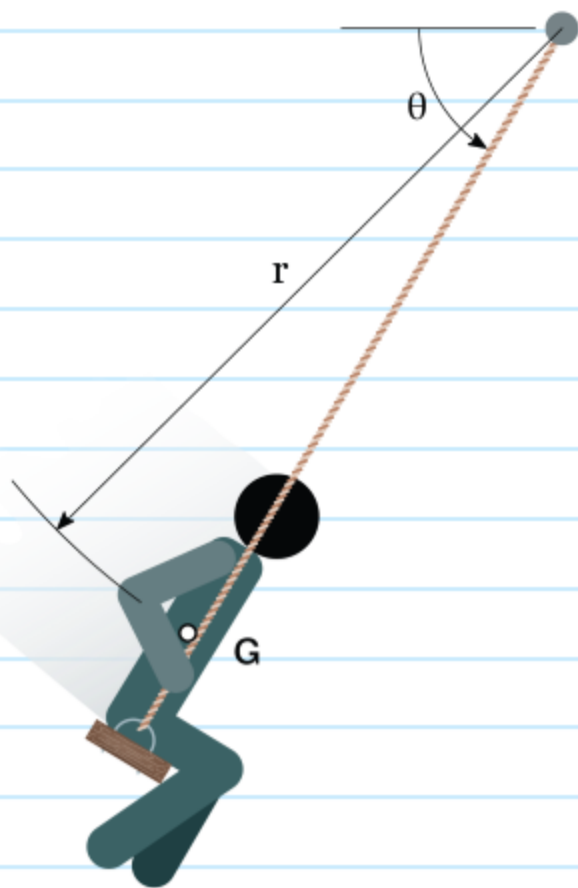


21-P-WE-GD-015



A  $m$  kg child is playing on a swingset. The child starts at  $v_1$  m/s, at an angle of  $\theta = \theta_1^\circ$ . If  $r = r$  m, how fast is the child moving when  $\theta = \theta_2$  degrees?

(Assume  $g = 9.81 \text{ m/s}^2$ )

given

$m, r, \theta_1, \theta_2, g, v_1$

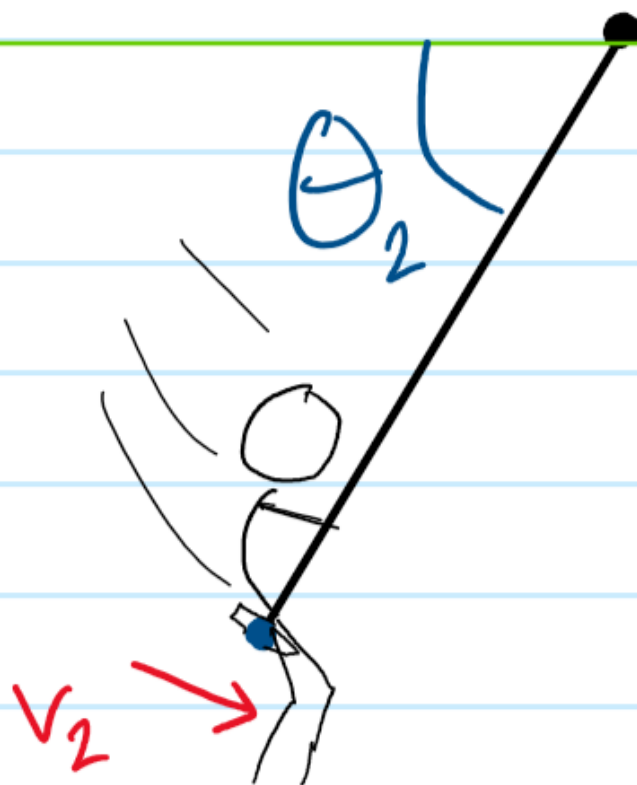
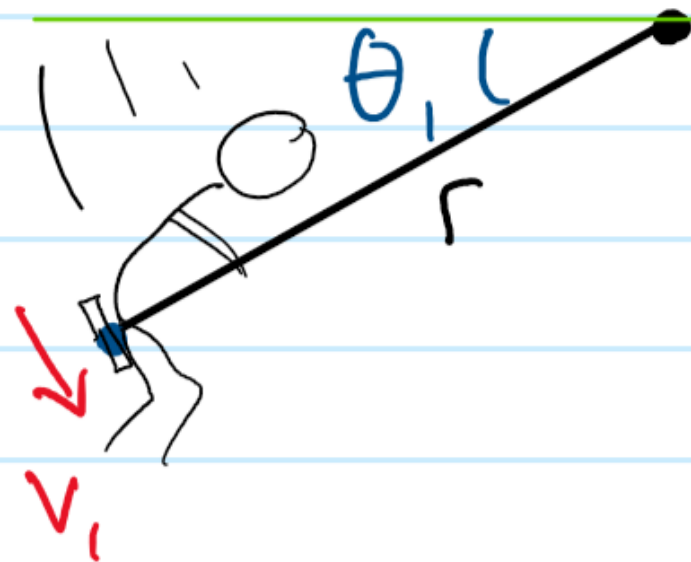
find

$v_2$

1

2

datum



# Conservation of Energy

$$T_1 + V_1 + \cancel{\Sigma U_{1 \rightarrow 2}}^0 = T_2 + V_2$$

$$\frac{1}{2}mv_1^2 - mg(r \sin \theta_1) = \frac{1}{2}mv_2^2 - mg(r \sin \theta_2)$$

$$v_2 = \sqrt{\frac{\cancel{mv_1^2} + 2\cancel{mgr}(\sin \theta_2 - \sin \theta_1)}{\cancel{m}}}$$
