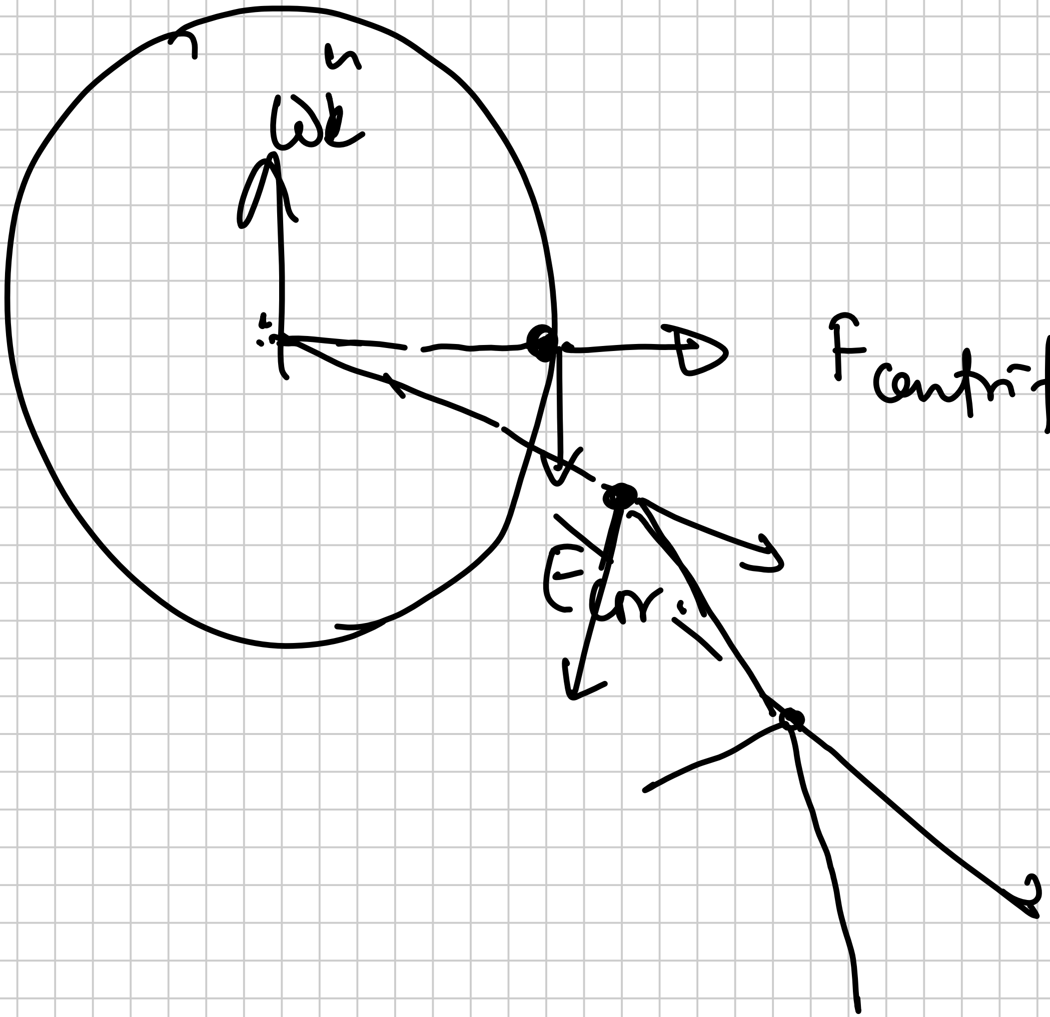
$$\underline{\vec{V}_{in}} = \vec{V}_{rot} + \vec{\Omega}\times\vec{r}$$

$$\left(\frac{d\vec{B}}{dt}\right)_{in} = \left(\frac{dB}{dt}\right)_{rot} + \vec{\Omega}\times\vec{r}$$

$$\vec{a}_{in} = \vec{a}_{rot} + 2\dot{\vec{\Omega}}\times\vec{v}_{rot} + \vec{\Omega}\times(\vec{\Omega}+\vec{r})$$

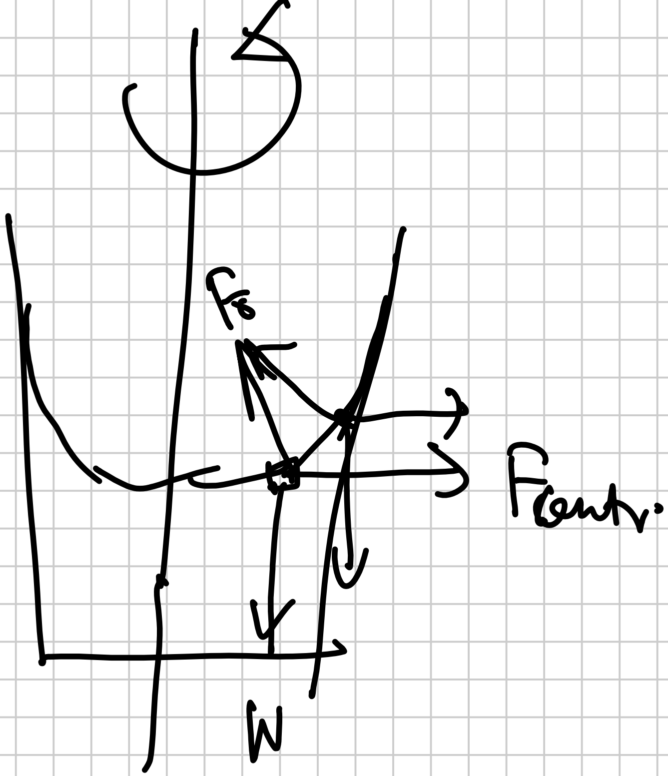
$$\vec{F}_{in} = m\vec{a}_{rot} = m[\vec{a}_{in}] - m2\vec{\Omega}\times\vec{v}_{rot} - m\vec{\Omega}\times(\vec{\Omega}\times\vec{r})$$



$F_{\text{centrifuga}}$

$$\vec{v}_{rot} = v_r \hat{r} + v_\theta \hat{\theta}$$

$$\vec{F}_{cor} = (\hat{r} v_\theta - v_r \hat{\theta}) \cdot 2m\Omega$$



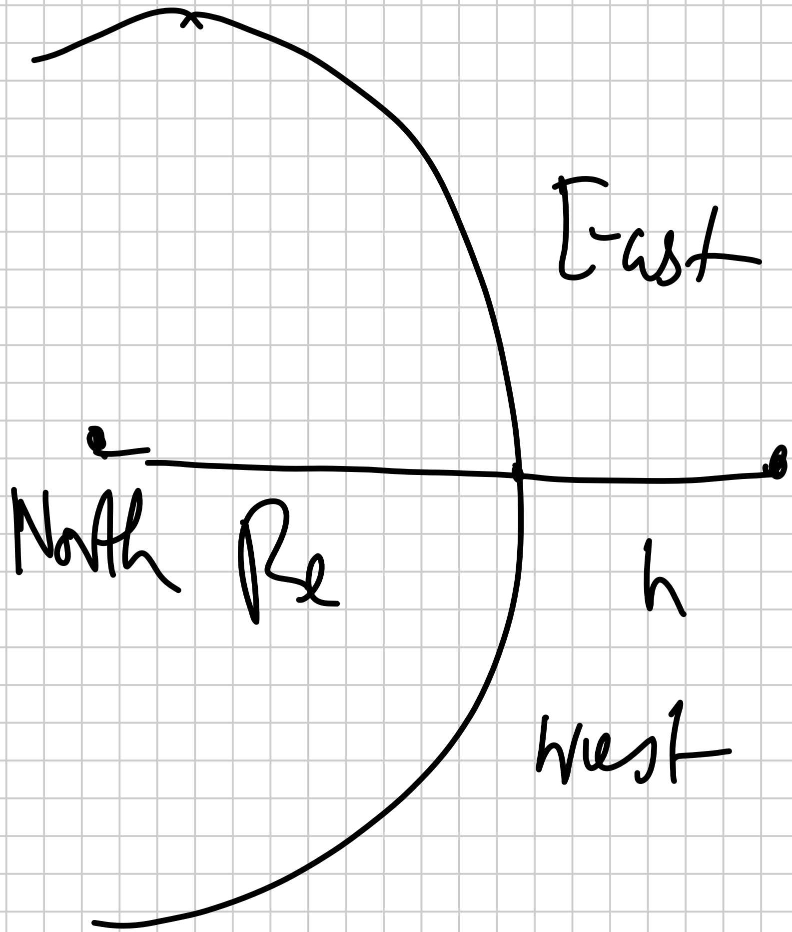
$$F\cos\phi - W = 0$$

$$-F\sin\phi + F_{\underline{fict}} = 0$$

$$\frac{dz}{dr} = \tan\phi = \frac{\omega^2 r}{g}$$

$$\int_0^z dz = \int_0^r \frac{\omega^2 r}{g}\, dr$$

$$z = \frac{1}{2}\frac{\omega^2}{g} r^2$$

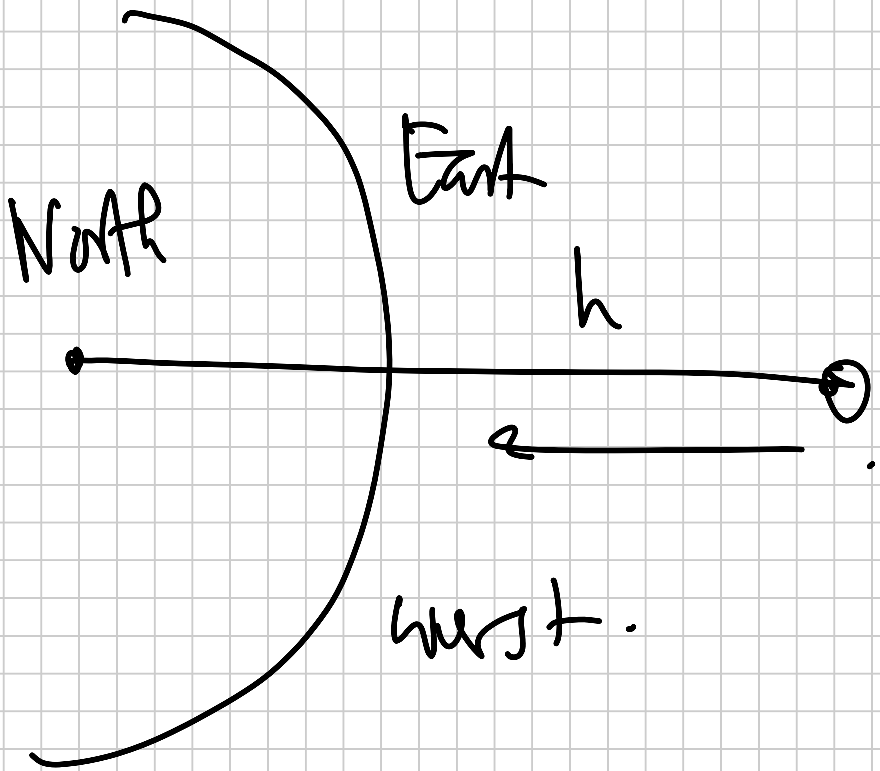


$$\vec{F} = -mg\,\hat{r} - 2m\,\vec{\Omega}\times\vec{V}_{rot} - m\,\vec{\Omega}\times(\vec{\Omega}\times\vec{r})$$

$$\vec{V}_{rot} = \dot{r}\,\hat{r} + r\dot{\theta}\,\hat{\theta}$$

$$m\left(\ddot{r} - r\dot{\theta}^2\right)\hat{r} + \left(r\ddot{\theta} + 2\dot{r}\dot{\theta}\right)\hat{\theta} = \vec{F} = F_\theta\,\hat{\theta} + F_r\,\hat{r}$$

Coriolis Force:



$$\vec{F} = -mg\hat{r} - 2m\,\vec{\Omega}\times\underline{\vec{v}_{rot}} - m\,\vec{\Omega}\times(\vec{\Omega}\times\vec{r})$$

$$\vec{v}_{rot} = \dot{r}\hat{r} + r\dot{\theta}\hat{\theta}$$

$$m(\ddot{r} - \underline{r\dot{\theta}^2}) = F_r = -mg + 2m\Omega\dot{\theta}r + m\underline{\Omega^2 r} \quad (1)$$

$$m(r\ddot{\theta} + 2\dot{r}\dot{\theta}) = F_\theta = \underline{-2m\dot{r}\Omega} \quad (2)$$

$\dot{\theta} \ll \Omega$

$\underbrace{m\dot{r}\dot{\theta}^2}_{\cdot} \quad \& \quad 2m r\dot{\theta} \longrightarrow m\Omega^2 r$

$\ddot{r} = -g + \Omega^2 r = -g'$

$\boxed{g' = g - \Omega^2 r} \equiv g$

$\ddot{r} = -g$

$r = r_0 - \frac{1}{2}gt^2$

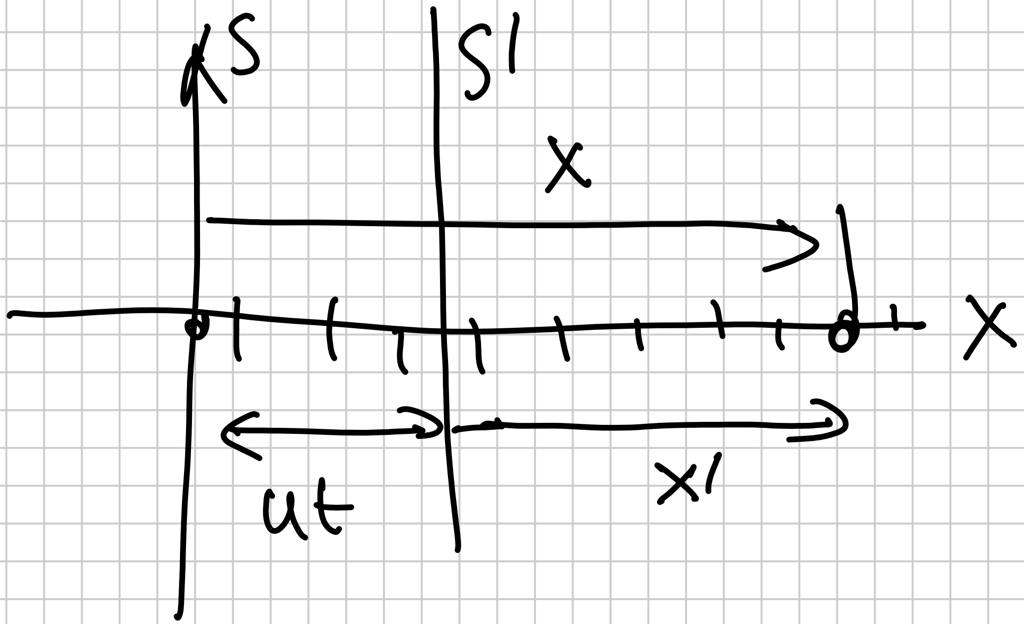
$$r\ddot{\theta} = 2gt\Omega$$

$$\Rightarrow \boxed{\theta = \frac{1}{3}\frac{g\Omega}{R_e}t^3}$$

$$R_e\theta = y = \frac{1}{3}g\Omega t^3$$

$h = 50$ m. $\qquad y = 0.77$ cm.

Special Theory of Relativity!



me — (x, t)

ym — (x', t)

x' & x

$$\underline{x}' = x - ut' \quad \bigg| \quad t' = t$$

$$x = x' + ut'$$

$$w = \frac{dx'}{dt} = \frac{dx}{dt} - u \quad \bigg| \quad \frac{d^2x'}{dt^2} = \frac{d^2x}{dt^2}$$

$$w = V - u$$

$$x' = x - ut$$
$$x = x' + ut'$$

$$x' = ct'$$
$$x = ct$$

$$x' = (x - ut)\gamma$$
$$x = (x' + ut)\gamma$$

$x = ct$

$$\frac{xx'}{c^2 t' t} = \gamma^2 \left(xx' + uxt' - ux't - u^2 tt' \right)$$
$$1 = \gamma^2 \left(1 + \cancel{u \frac{t'}{x'}} - \cancel{u \frac{t}{x}} - u^2 \frac{t}{x} \frac{t'}{x'} \right)$$
$$1 = \gamma^2 \left(1 - \frac{u^2}{c^2} \right)$$
$$\gamma = 1 / \left[1 - u^2/c^2 \right]^{1/2}$$

$$x' = \frac{x - ut}{\sqrt{1 - u^2/c^2}}$$

$$t' = \frac{t - ux/c^2}{\sqrt{1 - u^2/c^2}}$$