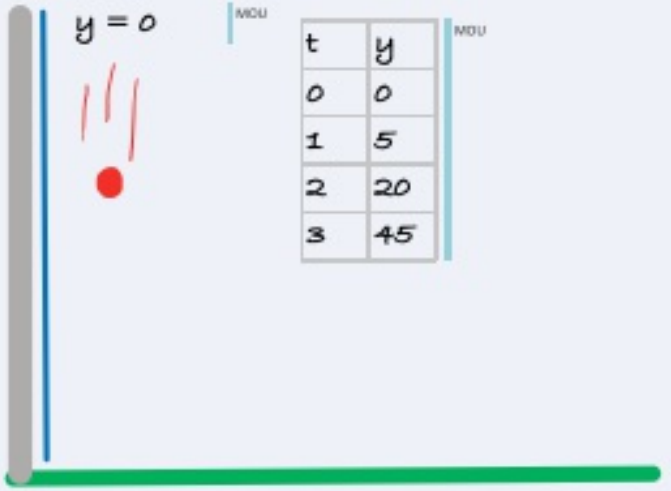
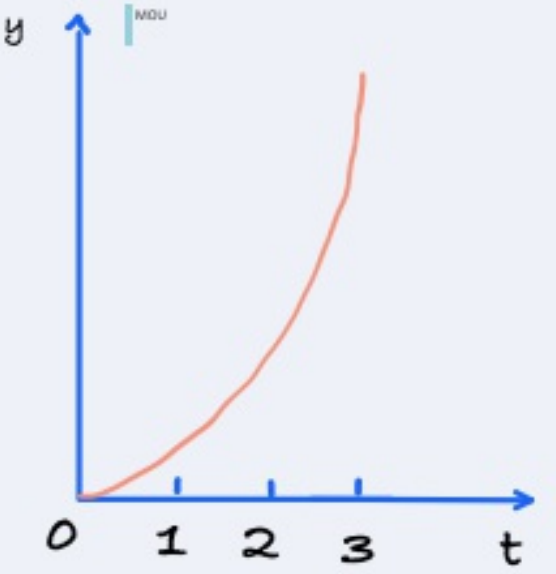
¿CUÁNTO CAE UNA MASA EN 1 SEGUNDO?

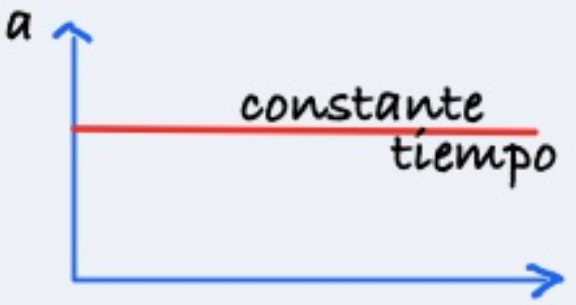


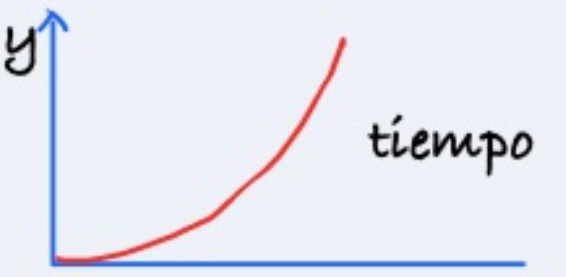
t	y
0	0
1	5
2	20
3	45

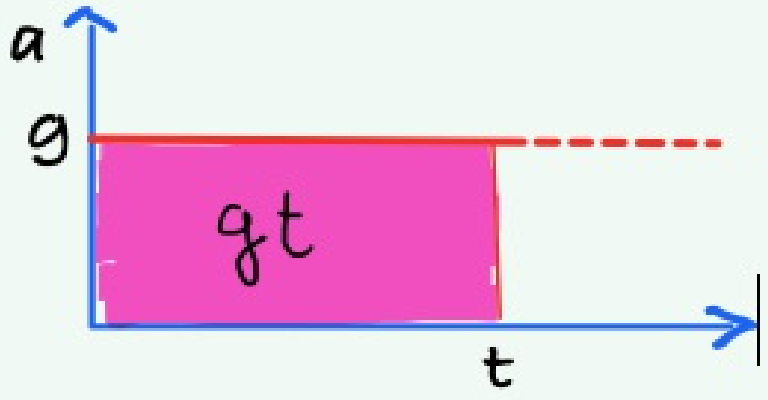


$$y = 5t^2$$

$$a = \frac{\Delta v}{\Delta t} \longleftrightarrow v = \frac{\Delta y}{\Delta t} \longleftrightarrow y(t)$$

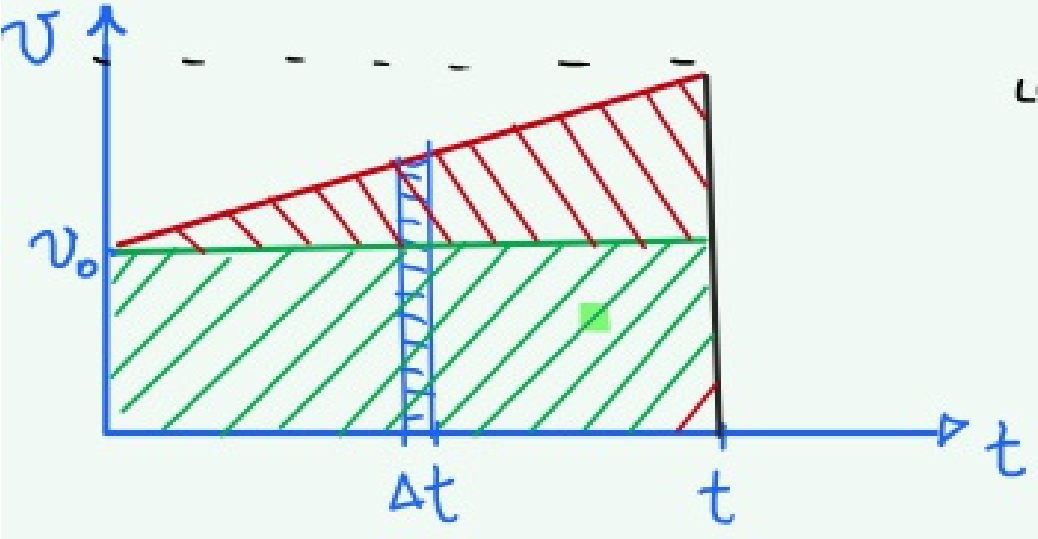






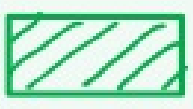
$$a = \frac{\Delta v}{\Delta t} \qquad v_{(t)} - v_{(0)} = gt$$

$$v_{(t)} = v_0 + gt$$



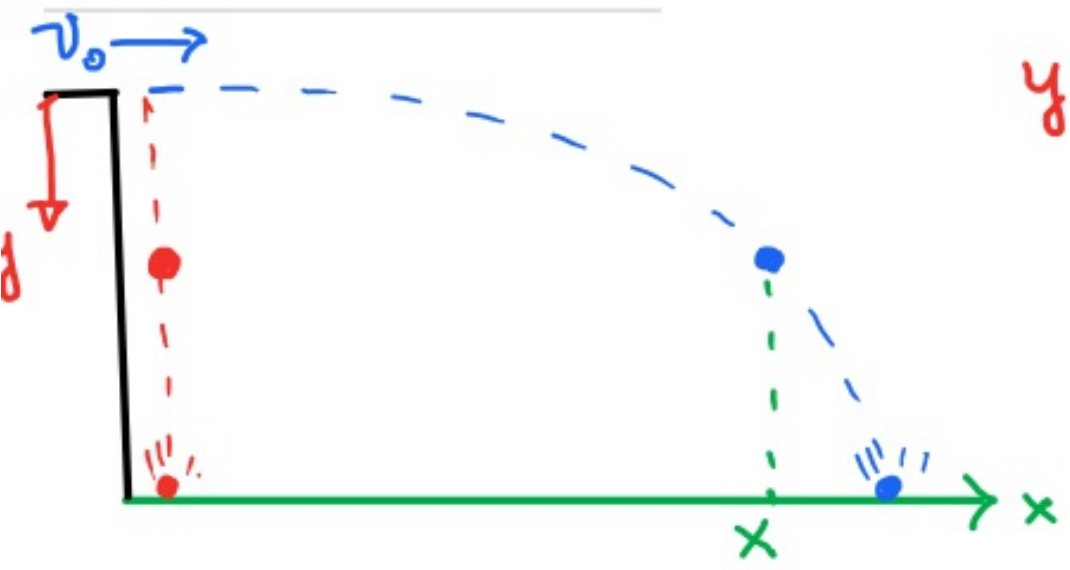
$v\,\Delta t$ = distancia recorrida entre t y $t+\Delta t$

"Área" = distancia total

$y_{(t)}$ =  + 

$$y_{(t)} = v_0 t + \frac{1}{2} t(gt)$$

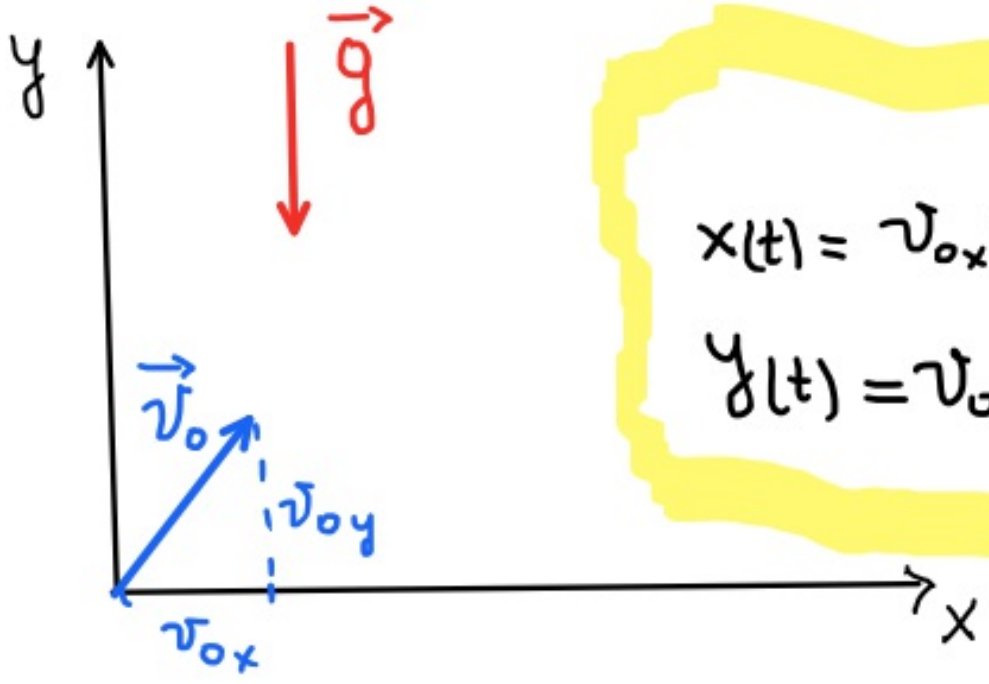
$$y_{(t)} = v_0 t + \frac{1}{2} g t^2$$



$$y = \frac{1}{2}gt^2$$

$$x(t) = v_0 t$$

$$y(t) = \frac{1}{2}gt^2$$

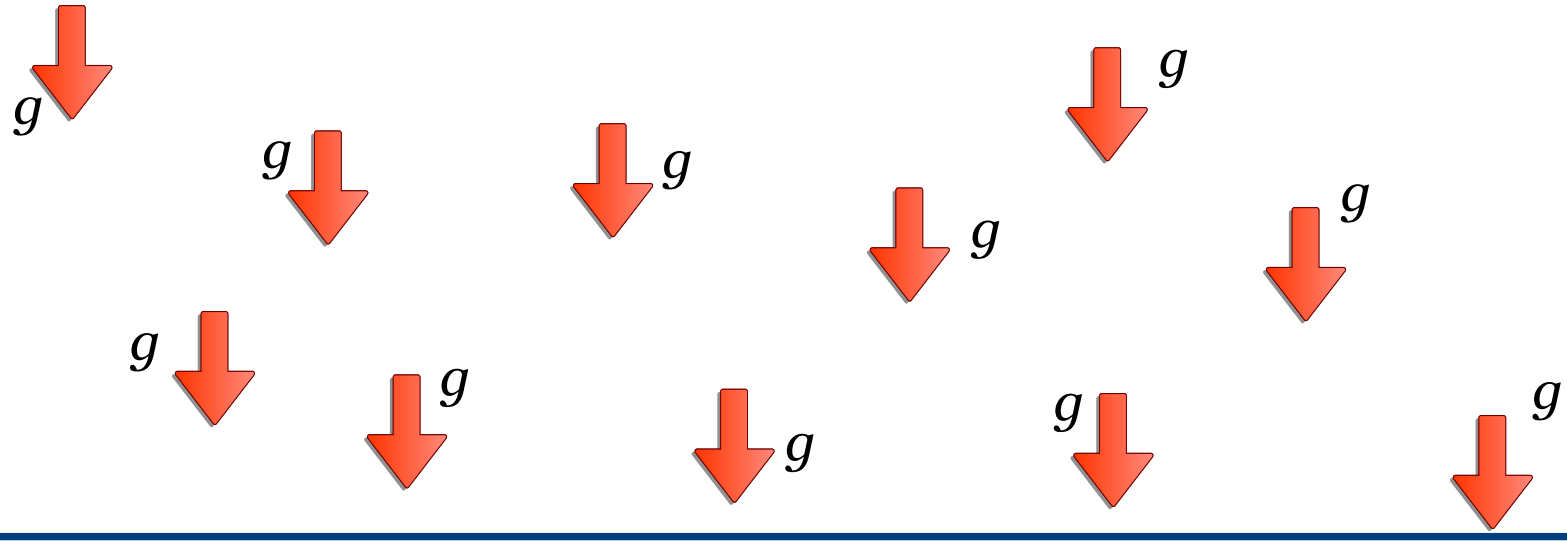


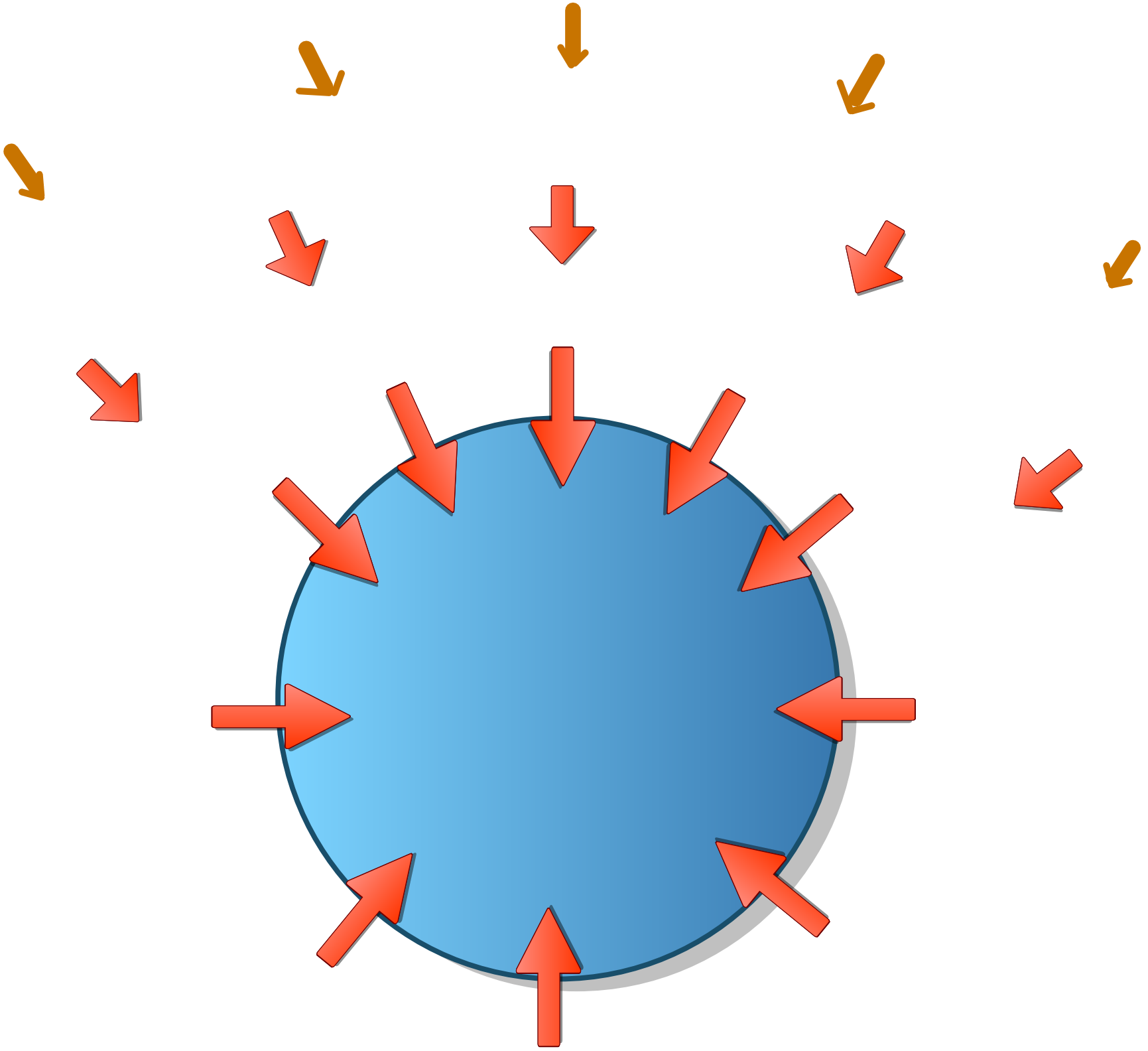
$$x(t) = v_{ox} t \qquad v_x = v_{ox}$$

$$y(t) = v_{oy} t - \frac{1}{2}gt^2 \qquad v_y = v_{oy} - \frac{1}{2}gt$$

¿Quién es g?
¿Es una constante universal?
¿Vale en todas partes lo mismo?

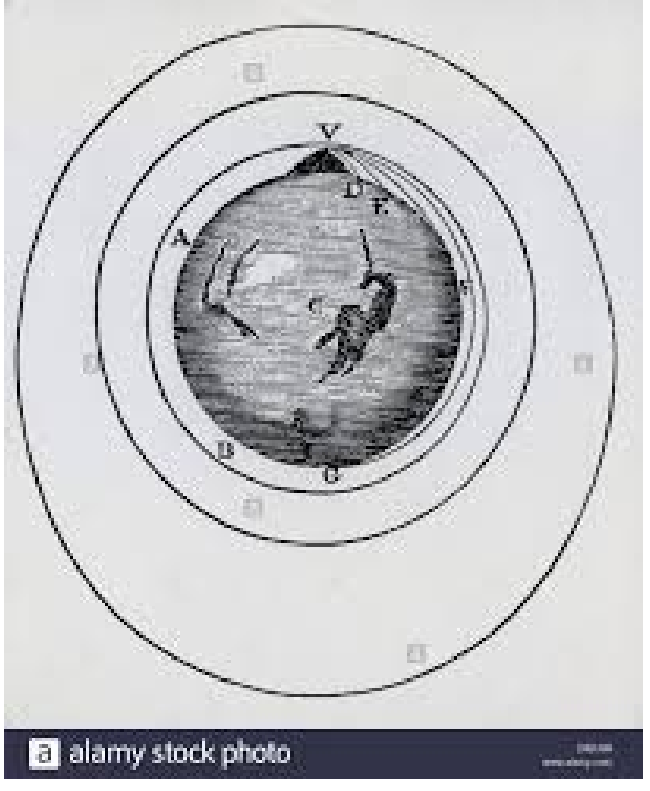
$g = 10 m/s^2$

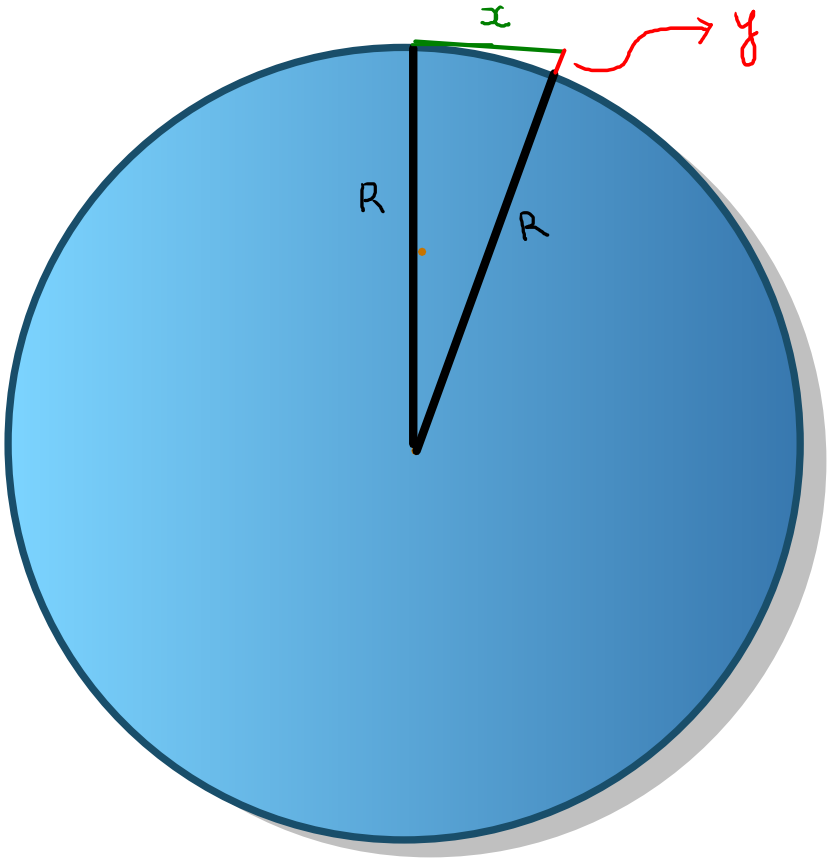




¿Y si lanzamos un objeto horizontalmente de tal forma que cuando caiga, la curvatura de la Tierra compense la caída?

¿A qué velocidad habría que lanzarlo?





$$(R+y)^2 = R^2 + x^2$$

$$R^2 + 2Ry + y^2 = R^2 + x^2 \Rightarrow y = \frac{1}{2R}x^2$$

$y(x) = \frac{1}{2R} x^2$ Pero $y(t) = \frac{1}{2} g t^2$

$$\frac{1}{2R} x^2 = \frac{1}{2} g t^2 \Rightarrow \frac{x^2}{t^2} = gR \qquad \frac{x}{t} = v$$

$$\boxed{v^2 = gR}$$

$$v^2 = 6.400\,km \times 10\,\frac{m}{s^2}$$

$$v^2 = 64.10^8\,\frac{m^2}{seg^2} \Rightarrow \boxed{v = 8000\,\frac{m}{s}}$$

Aceleración centrípeta

$$g = \frac{x^2}{Rt^2} = \frac{v^2}{R}$$

$$\boxed{a_c = \frac{v^2}{r}}$$

De nuevo: ¿g?