4) a) $24h \cdot \left(\frac{3600s}{1h}\right) = 86400s$

$a_{rad} = \frac{4\pi^2 R}{T^2} = \frac{4\pi^2(6{,}38 \times 10^6 m)}{(86400s)^2} = 0{,}034 \frac{m}{s^2} = 3{,}4 \times 10^{-3} g$

b) $T = \sqrt{\frac{4\pi^2 R}{g}} = 5070s$

---

8) En general se tiene que

$y = V_0 \operatorname{Sen}(\alpha) t - \frac{1}{2} g t^2 \quad x = V_0 \operatorname{Cos}(\alpha) t \quad ; \quad \operatorname{Sen}\alpha = \operatorname{Cos}\alpha = \frac{\sqrt{2}}{2}$

Caso velocidad mínima:

$y = 2D = \frac{\sqrt{2}}{2} V_0 t - \frac{1}{2} g t^2 \quad x = 6D = \frac{\sqrt{2}}{2} V_0 t \Rightarrow 2D = 6D - \frac{1}{2} g t^2 \Rightarrow t = \sqrt{\frac{8D}{g}}$

$\Rightarrow 6D = \frac{\sqrt{2}}{2} V_0 \sqrt{\frac{8D}{g}} \Rightarrow V_0 = 3\sqrt{D \cdot g}$

Caso velocidad máxima

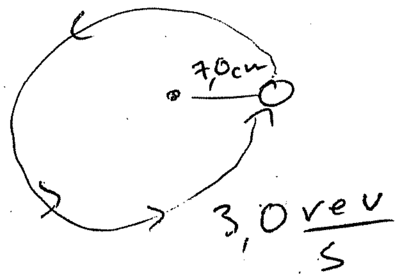
$y = 2D = \frac{\sqrt{2}}{2} V_0 t - \frac{1}{2} g t^2 \quad x = 7D = \frac{\sqrt{2}}{2} V_0 t \Rightarrow 2D = 7D - \frac{1}{2} g t^2 \Rightarrow t = \sqrt{\frac{10D}{g}}$

$\Rightarrow 7D = \frac{\sqrt{2}}{2} V_0 \sqrt{\frac{10D}{g}} \Rightarrow V_0 = \sqrt{\frac{49}{5} Dg}$

Solución Taller 3

FISI 1

Ejercicio 4 (3,24)



Radio

$$7{,}0\,cm \times \frac{1\,m}{100\,cm} = 0{,}070\,m$$

Periodo

$$T = \frac{1\,s}{3{,}0\,\frac{rev}{s}} = 0{,}33\,s$$

la aceleración está dada por

$$a_{rad} = \frac{v^2}{R}$$

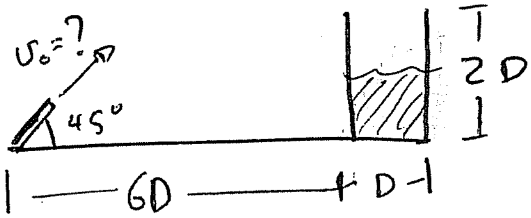
Para $v = \dfrac{2\pi R}{T}$ ← Perímetro ← Tiempo

$$a_{rad} = \left(\frac{2\pi R}{T}\right)^2 / R = \frac{4\pi^2\, 0{,}070\,m}{0{,}33^2\, s^2}$$

$$a_{rad} = 25\,m/s^2$$

Solución Taller 3 FISI 1

Ejercicio 8 (3,60)



Distancia mínima

El agua debe pasar por

$$y = 2D, \quad x = 6D$$

Utilizando: $y = v_{oy} t + \frac{1}{2} a t^2$ $\qquad a = -g$

$$v_{ox} = v_0 \cos\theta$$

$$x = v_{ox} t \qquad v_{oy} = v_0 \operatorname{sen}\theta$$

$$\Rightarrow \quad 2D = \frac{\sqrt{2}}{2} v_0 t - \frac{1}{2} g t^2 \quad (1)$$

$$\text{y} \quad 6D = \frac{\sqrt{2}}{2} v_0 t \quad (2)$$

de (2) $\quad t = \frac{6D}{v_0} \frac{2}{\sqrt{2}} = \frac{6D}{v_0}\sqrt{2}$

Metiendo en (1)

$$2D = 6D - \frac{1}{2} g \left(\frac{6D\sqrt{2}}{v_0}\right)^2 \Rightarrow$$

$$\Rightarrow \sqrt{-\frac{2}{g}(2D - 6D)} = \frac{6D\sqrt{2}}{v_0} \Rightarrow v_0 = \frac{6D\sqrt{2}}{\sqrt{\frac{2}{g}}\sqrt{4D}} = \boxed{3\sqrt{gD}}$$

Siguiendo el mismo procedimiento para v_{omax} tenemos $y = 2D$ y $x = 7D$ y como resultado encontramos

$$v_0 = \sqrt{\frac{49}{5} g D} = 3{,}13\sqrt{gD}$$

3.3 Diseñador Web

El punto sigue la trayectoria

$$\vec{r}(t) = [4\ cm + (2{,}5\ cm/s^2)t^2]\ \hat{\imath} + (5\ cm/s)t\ \hat{\jmath}$$

ⓐ Hallar magnitud y dirección de $\vec{V}_{prom}$ en $t=0$ y $t=2$

$$V_{prom} = \frac{\Delta \vec{r}(t)}{\Delta t} , = \frac{\vec{r}(2) - \vec{r}(0)}{2 - 0}$$

~~Separando x & y~~:

$$\vec{r}(2) = [4\ cm + 2{,}5\ cm/\cancel{s^2} \cdot 4\cancel{s^2}]\ \hat{\imath} + 5\ cm/\cancel{s} \cdot 2\cancel{s}\ \hat{\jmath}$$

$$= (4\ cm + 10\ cm)\ \hat{\imath} + 10\ cm\ \hat{\jmath}$$

$$\vec{r}(0) = 4cm\ \hat{\imath}$$

$$\frac{\vec{r}(2) - \vec{r}(0)}{2} = \frac{10\ cm\ \hat{\imath} + 10\ cm\ \hat{\jmath}}{2}$$

$$\vec{V}_{prom} = 5\ \frac{cm}{s}\ \hat{\imath} + 5\ \frac{cm}{s}\ \hat{\jmath}$$

$$\vec{V}_{prom} = V_{x_{prom}}\ \hat{\imath} + V_{y_{prom}}\ \hat{\jmath}$$

$$|\vec{V}_{prom}| = \sqrt{5^2 + 5^2} = \sqrt{50}$$

$$= 5\sqrt{2} = 7{,}07\ m/s$$

$$\tan\alpha = \frac{V_{prom\,y}}{V_{prom\,x}} = \frac{5}{5} = 1.$$

$$\alpha = \tan^{-1} 1 \Rightarrow 45°$$

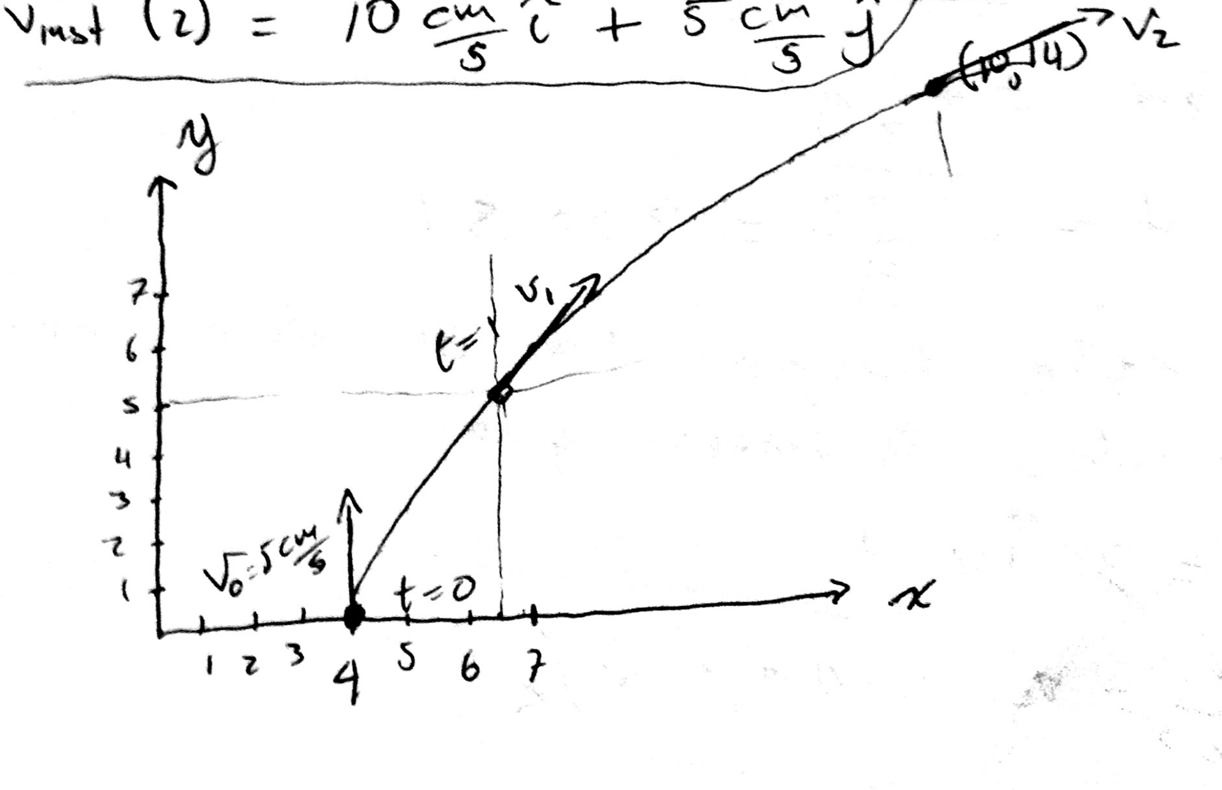
(b) $V_{inst} = \frac{d\vec{r}(t)}{dt}$, $t = 0, 1, 2.$

$$\rightarrow \frac{d}{dt}\left[(4 + 2{,}5t^2)\hat{i} + 5t\,\hat{j}\right]$$

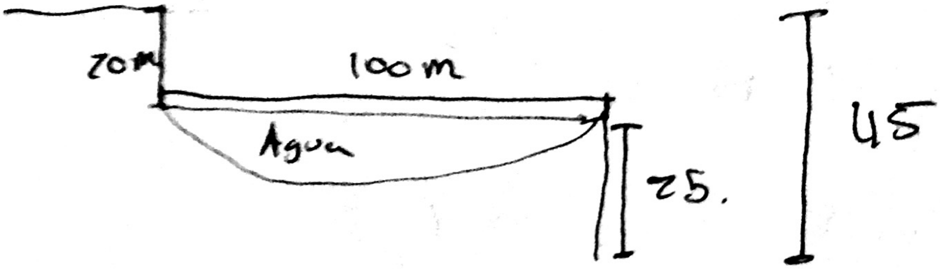
$$V_{inst} = 5t\,\frac{cm}{s^2}\hat{i} + 5\frac{cm}{s}\hat{j}$$

- $V_{inst}(0) = 5\frac{cm}{s}\hat{j}$, $\tan\theta = \frac{V_y}{V_x} \Rightarrow \tan\theta = \infty, \theta = 90°$
- $V_{inst}(1) = 5\frac{cm}{s}\hat{i} + 5\frac{cm}{s}\hat{j} \rightarrow \tan\theta = 1 \rightarrow \theta = 45°$
- $V_{inst}(2) = 10\frac{cm}{s}\hat{i} + 5\frac{cm}{s}\hat{j} \rightarrow \tan\theta = \frac{1}{2} \rightarrow \theta = 26{,}5°$

(c)



3.71



ⓐ V_0 mínima para que sobre pase la represa.

Se espera que en el tiempo que cae los primeros 20 m, la pelota ya haya recorrido los 100 m del lago. Entonces:

$$y_f = y_0 + \cancel{v_{0y} t}^{\,0} - \frac{1}{2} g t^2$$

$$-45 + 25 = -\frac{1}{2} g t^2$$

$$+20 = +\frac{1}{2} g t^2$$

$$\boxed{t = \sqrt{\frac{2 \cdot 20}{g}} = 2{,}02\ s}$$

En este tiempo 100 m deben ser recorridos. De manera que:

$$\rightarrow x_f = \cancel{x_0}^{\,0} + v_{0x} t$$

$$\frac{100}{2{,}02} = v_{0x} = \boxed{49{,}5\ m/s}$$

(b) Si $v_0 = 49{,}5\ m/s$ entonces.
el tiempo total de vuelo. es:

$$\cancel{y_f}^{0} = y_0 + \cancel{v_{0y}} t^{0} - \frac{1}{2} g t^2$$

$$y_0 = \frac{1}{2} g t^2$$

$$t = \sqrt{\frac{2 y_0}{g}} = \sqrt{\frac{2 \cdot 45}{9{,}81}} = 3{,}03.\ s.$$

$$\rightarrow X_F = \cancel{X_0}^{0} + V_0 t$$

$$X_F = 49{,}5 \frac{m}{\cancel{s}} \cdot 3{,}03 \cancel{s} \approx 150\ m.$$