

semana 22

Problemas de tiro parabólico

1. Lanzamos un objeto con un ángulo hacia arriba de 40° con la horizontal a una velocidad de 9 m/s desde el techo de un edificio de 30 metros de altura. ¿A que distancia de la base del edificio caerá el objeto?

Datos.

Formula.

$$40^\circ$$

$$V_0$$

$$y = 30 \text{ m}$$

$$g = -9.8 \text{ m/s}^2$$

$$V_{0x} = V_0 \cos$$

$$v_{0x} = 9 \text{ m/s} \cos 40^\circ$$

$$v_{0x} = 6.89 \text{ m/s}$$

$$v_{0y} = 9 \text{ m/s} \sin 40^\circ$$

$$v_{0y} = 5.79 \text{ m/s}$$

Formula.

$$T_s = \frac{-v_{0y}}{g}$$

$$T_s = \frac{5.79 \text{ m/s}}{9.8 \text{ m/s}^2}$$

$$T_s = 0.59 \text{ seg}$$

Formula.

$$y = v_{0y} t + \frac{g t^2}{2}$$

$$y = (5.79 \text{ m/s})(0.59 \text{ seg}) + (9.8 \text{ m/s}^2) \frac{(0.59 \text{ seg})^2}{2}$$

$$y = 3.42 \text{ m} - 7.70 \text{ m/s}$$

$$y = 1.72 \text{ m}$$

2. se patea una pelota de fútbol con un ángulo de 37° con una velocidad de 20 m/s Calcula (es)

a la altura máxima

b tiempo que permanezca en el aire

c la distancia a la que llega al suelo

Formula:

$$V_{0x} = V_0 \cos \alpha$$

$$V_{0x} = 20 \text{ m/s}$$

$$\cos = 37^\circ$$

$$V_{0x} = 1.60 \text{ m/s}$$

Formula

$$V_{0y} = V_0 \sin \alpha$$

$$V_{0y} = 20 \text{ m/s}$$

$$V_{0y} = 20 \text{ m/s } 37^\circ$$

$$V_{0y}$$

$$V_{0y} = 1.20 \text{ m/s}$$

Formula

$$T_S = \frac{v_{0y}}{g}$$

$$T_S = \frac{-1.20 \text{ m/s}}{-9.8 \text{ m/s}^2}$$

$$T_S = 1.22 \text{ seg}$$

Formula

$$y = v_{0y} t + \frac{g t^2}{2}$$

$$y = (1.20)(1.22 \text{ seg}) + \frac{(-9.8 \text{ m/s}^2)(1.22^2)}{2}$$

$$y = 1.47 \text{ m} + 7.30 \text{ m}$$

$$y = 8.77 \text{ m}$$

Formula

$$T_V = 2 T_S$$

$$T_V = 2(1.22)$$

$$T_V = 2.44 \text{ seg}$$

Formula

$$x = v_{0x} t$$

$$x = (7.60 \text{ m/s})(7.22)$$

$$x = 1.92 \text{ m}$$

3. Luis lanza una pelota de béisbol con una velocidad de 20 m/s a un ángulo de 50° con la horizontal calcule:
- El tiempo total de vuelo
 - La altura máxima que alcanza la pelota C .
 - El alcance de la pelota

Datos. #3

$$V_0 = 20 \text{ m/s}$$

$$\theta = 50^\circ$$

$$g = 9.8 \text{ m/s}^2$$

$$V_{0x} = V_0 \cos \theta$$

$$V_{0x} = 20 \text{ m/s} \cos 50^\circ$$

$$V_{0x} = 12.9 \text{ m/s}$$

$$V_{0y} = V_0 \sin \theta$$

$$V_{0y} = 20 \text{ m/s} \sin 50^\circ$$

$$V_{0y} = 15.3 \text{ m/s}$$

$$T_s = -\frac{V_{0y}}{g}$$

$$T_s = -\frac{15.3 \text{ m/s}}{-9.8 \text{ m/s}^2}$$

$$T_v = 2t_s$$

$$T_v = 2(1.56 \text{ seg})$$

$$T_v = 3.12 \text{ seg}$$

$$T_s = 1.56 \text{ seg}$$

$$y = V_{0y} \cdot t + \frac{g t^2}{2}$$

$$y = (15.3 \text{ m/s})(1.56 \text{ seg}) + (-9.8 \text{ m/s}^2)(1.56 \text{ seg})^2$$

$$y = 2.39 \text{ m} - 1.19 \text{ m}$$

$$y = 1.2 \text{ m}$$

$$x_{\text{max}} = V_{0x} \cdot T_v$$

$$x_{\text{max}} = (12.9 \text{ m/s})(3.12 \text{ seg})$$

$$x_{\text{max}} = 40.2 \text{ m}$$

Qatar #1

$$V_0 = 20 \text{ m/s}$$

$$\theta = 50^\circ$$

$$g = 9.8 \text{ m/s}^2$$

$$V_{0x} = V_0 \cos \theta$$

$$V_{0x} = 20 \text{ m/s} \cos 50^\circ$$

$$V_{0x} = 12.9 \text{ m/s}$$

$$V_{0y} = V_0 \sin \theta$$

$$V_{0y} = 20 \text{ m/s} \sin 50^\circ$$

$$V_{0y} = 15.3 \text{ m/s}$$

$$T_s = -\frac{V_{0y}}{g}$$

$$T_s = -\frac{15.3 \text{ m/s}}{-9.8 \text{ m/s}^2}$$

$$T_s = 1.56 \text{ sec}$$

$$T_v = 2 T_s$$

$$T_v = 2(1.56 \text{ sec})$$

$$T_v = 3.12 \text{ sec}$$

$$T_s = 1.56 \text{ sec}$$

$$y = V_{0y} \cdot t + \frac{g t^2}{2}$$

$$y = (15.3 \text{ m/s})(1.56 \text{ sec}) + \frac{(-9.8 \text{ m/s}^2)(1.56 \text{ sec})^2}{2}$$

$$y = 2.39 \text{ m} - 1.19 \text{ m}$$

$$y = 1.2 \text{ m}$$

$$x_{\text{max}} = V_{0x} \cdot T_v$$

$$x_{\text{max}} = (12.9 \text{ m/s})(3.12 \text{ sec})$$

$$x_{\text{max}} = 40.2 \text{ m}$$

$$x_{\text{max}} = V_{0x} \cdot T_v$$

$$x_{\text{max}} = (2.58 \text{ m/s})(3.12 \text{ sec})$$

$$x_{\text{max}} = 8.04 \text{ m}$$

Datos # 5

$$V_0 = 30 \text{ m/s}$$

$$\theta = 40^\circ$$

$$V_{0x} = V_0 \cos \theta$$

$$V_{0x} = 30 \text{ m/s} \cos 40^\circ$$

$$V_{0x} = 23.0 \text{ m/s}$$

$$V_{0y} = V_0 \sin \theta$$

$$V_{0y} = 30 \text{ m/s} \sin 40^\circ$$

$$V_{0y} = 19.28 \text{ m/s}$$

$$T_s = \frac{-V_{0y}}{-g}$$

$$T_s = \frac{-19.28 \text{ m/s}}{-9.8 \text{ m/s}^2}$$

$$T_v = 2T_s$$

$$T_v = 2(1.97 \text{ seg})$$

$$T_v = 3.94 \text{ seg}$$

$$T_s = 1.97 \text{ seg}$$

$$y = V_{0y} \cdot t + \frac{g t^2}{2}$$

$$y = (19.28 \text{ m/s})(3.94 \text{ seg}) + (-9.8 \text{ m/s}^2)(3.94 \text{ seg})^2$$

$$y = 76.0 \text{ m} - 76.67 \text{ m}$$

$$y = -0.67 \text{ m}$$

$$y = V_{0y} \cdot t + \frac{g t^2}{2}$$

$$y = (19.28 \text{ m/s})(1.97 \text{ seg}) + (-9.8 \text{ m/s}^2)(1.97 \text{ seg})^2$$

$$y = 38.0 \text{ m} - 38.4 \text{ m}$$

$$y = -0.4 \text{ m}$$

$$x_{\text{max}} = V_{0x} \cdot T_v$$

$$x_{\text{max}} = (23.0 \text{ m/s})(3.94 \text{ seg})$$

$$x_{\text{max}} = 91.6 \text{ m}$$

Dates. #6

$$V_0 = 40 \text{ m/s}$$

$$\theta = 45^\circ$$

$$g = 9.8 \text{ m/s}^2$$

$$V_{0x} = V_0 \cos \theta$$

$$V_{0x} = 40 \text{ m/s} \cos 45^\circ$$

$$V_{0x} = 28.3 \text{ m/s}$$

$$V_{0y} = V_0 \sin \theta$$

$$V_{0y} = 40 \text{ m/s} \sin 45^\circ$$

$$V_{0y} = 28.3$$

$$T_s = -\frac{V_{0y}}{g}$$

$$T_s = -\frac{28.3 \text{ m/s}}{-9.8 \text{ m/s}^2}$$

$$T_v = 2 t_s$$

$$T_v = 2 / (2.89 \text{ sec})$$

$$T_v = 5.78 \text{ sec}$$

$$T_s = 2.89 \text{ sec}$$

$$y = V_{0y} \cdot t + \frac{g t^2}{2}$$

$$y = (28.3 \text{ m/s}) / (2.89 \text{ sec}) + (-9.8 \text{ m/s}^2) / (2.89 \text{ sec})^2$$

$$y = 8.78 \text{ m} - 4.93 \text{ m}$$

$$y = 3.25 \text{ m}$$

$$x_{\text{max}} = V_{0x} \cdot t_v$$

$$x_{\text{max}} = (28.3 \text{ m/s}) / (5.78 \text{ sec})$$

$$x_{\text{max}} = 7.64 \text{ m}$$