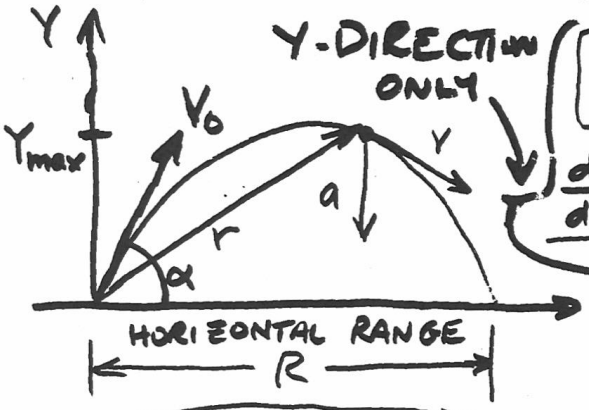
10.4 PROJECTILE MOTION $g = \frac{9.8\,m}{s^2} = \frac{32\,ft}{s^2}$ (460)



Y-DIRECTION ONLY

$$r = -\frac{1}{2}gt^2 j + V_0 t + r_0$$

$$\frac{dr}{dt} = V = -gtj + V_0$$

$$\frac{d^2r}{dt^2} = \frac{dv}{dt} = a = -gj$$

$$Y_{MAX} = \frac{(V_0 \sin\alpha)^2}{2g} \qquad R = \frac{V_0^2}{g}\sin 2\alpha$$

$$\text{FLIGHT TIME} = \frac{2V_0 \sin\alpha}{g}$$

FROM LAUNCH TO CRASH

$$x(t) = X_0 + (V_0 \cos\alpha)t \quad \text{i component}$$

$$Y(t) = Y_0 + (V_0 \sin\alpha)t - \frac{1}{2}gt^2 \quad \text{j component}$$

p.541 EX. 1 $V_0 = 500$ m/sec $\alpha = 60^\circ$ $g = 9.8$

FIND POSITION AT $t = 10$ seconds

$$x = X_0 + V_0 \cos\alpha\, t = 0 + (500 \cos 60^\circ)10 = 2500\ m$$

$$Y = (V_0 \sin\alpha)t - \frac{1}{2}gt^2 = (500 \sin 60^\circ)10 - \frac{1}{2}(9.8)10^2 = 3840\ m$$

$$x = 250t \qquad Y = 250\sqrt{3}\,t - 4.9t^2$$

$$r = 250t\,i + (250\sqrt{3}\,t - 4.9t^2)\,j$$

p. 542 EX. 2 $V_0 = 500\ m/s$ $\alpha = 60°$ $g = 9.8$

$$Y_{max} = \frac{(V_0 \sin\alpha)^2}{2g} = \frac{(500 \sin 60°)^2}{2(9.8)} = \text{[illegible] m}$$

$$\text{FLIGHT TIME} = \frac{2V_0 \sin\alpha}{g} = \frac{2(500 \sin 60°)}{9.8} = 88 \text{ sec}$$

$$\text{RANGE} = \frac{V_0^2}{g} \sin 2\alpha = \frac{500^2}{9.8} \sin 120 = 22{,}000 \text{ m}$$

HOMEWORK p. 549-550 → 1-5, 7, 19