

# KEY TO PRE TEST

1. BOTH TRAVEL THE SAME VERTICAL DISTANCE AND HIT THE GROUND AT THE SAME TIME
2. SAME (MASS IS NOT PART OF THE KINEMATICS EQUATIONS)

## 3. PARABOLA

$$4. d = \frac{1}{2}at^2 \quad (v_i t = 0)$$
$$= \frac{1}{2}(9.8 \frac{m}{s^2} \text{ OR } 32 \frac{ft}{s^2})(5s)^2 = \boxed{122.5 \text{ m OR } 400 \text{ ft}}$$

$$5. t = \sqrt{\frac{2d}{a}} = \sqrt{\frac{2(-100 \text{ ft})}{-32 \text{ ft/s}^2}} = \boxed{2.5 \text{ s}}$$

$$v_f^2 = v_i^2 + 2ad$$

$$v_f^2 = 0 + 2(32 \frac{ft}{s^2})(100 \text{ ft})$$

$$v_f^2 = \sqrt{6400} = \boxed{80 \text{ ft/s}}$$

## 6. (NO ACCELERATION)

$$v_i = 100 \frac{ft}{s}$$

$$v_f = 0$$

$$d = ?$$

$$t = 10 \text{ s}$$

$$d = \frac{1}{2}(v_i + v_f)t = \frac{1}{2}\left(\frac{100 \text{ ft}}{s} + \frac{0 \text{ ft}}{s}\right)10 \text{ s}$$
$$= \boxed{500 \text{ ft}}$$

#7

Vert.

$$V_i = 0 \text{ m/s}$$

$$V_f =$$

$$d = -120 \text{ m}$$

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

$$t = ?$$

→

Horiz.

$$V_i = 200 \text{ m/s}$$

$$V_f =$$

$$d = ?$$

$$a = 0$$

$$t = 5 \text{ sec.}$$

$$d = \cancel{V_i t} + \frac{1}{2} a t^2$$

$$t = \sqrt{\frac{2d}{a}} = \sqrt{\frac{2(-120\text{m})}{-9.8 \text{ m/s}^2}}$$

$$\boxed{t = 5 \text{ s}}$$

$$d = V_i t + \frac{1}{2} \cancel{a} t^2$$

$$= (200 \text{ m/s})(5 \text{ s})$$

$$= \boxed{1000 \text{ m}}$$

50: 1010 m From Hikers

#8

Vert

$$V_i = 0$$

$$\cancel{V_f} =$$

$$d = -75 \text{ cm}$$

$$a = -980 \text{ cm/s}^2$$

$$t = ?$$

Horiz.

$$V_i = 55 \text{ cm/s}$$

$$\cancel{V_f} =$$

$$d = ?$$

$$a = 0$$

$$t = 0.4 \text{ s}$$

$$t = \sqrt{\frac{2d}{a}} = \sqrt{\frac{2(-75\text{cm})}{-980 \text{ cm/s}^2}}$$

$$= \boxed{0.4 \text{ s}}$$

$$d = V_i t + \frac{1}{2} \cancel{a} t^2$$

$$= (55 \text{ cm/s})(0.4 \text{ s})$$

$$= \boxed{22 \text{ cm}}$$

9. <sup>MOZZLE</sup> <sup>velocity</sup> <sup>UP</sup>  
 Vert.

(DART GUN LAB)

$$v_i = ?$$

$$v_f = 0$$

$$d = +1.9 \text{ m}$$

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

$$x =$$

$$v_f^2 = v_i^2 + 2ad$$

$$v_i = \sqrt{-2ad}$$

$$= \sqrt{-2(-9.8 \text{ m/s}^2)(1.9 \text{ m})}$$

$$= \boxed{6.1 \text{ m/s}}$$

50°

Angle Vert.

$$v_i = v \sin \theta = 6.1 (\sin 50) = 4.5 \text{ m/s}$$

$$v_f = (-v_i) = -4.5 \text{ m/s}$$

$$d = 0$$

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

$$t = ?$$

$$d = v_i t + \frac{1}{2} a t^2$$

$$t = \frac{\sqrt{-2v_i}}{a}$$

$$= \frac{\sqrt{-2(4.5 \text{ m/s})}}{-9.8 \text{ m/s}^2}$$

$$= \boxed{0.96 \text{ sec}}$$

Angle Horiz.

$$v_i = v \cos \theta = 6.1 (\cos 50) = 3.9 \text{ m/s}$$

$$v_f = v_i$$

$$d = ?$$

$$a = 0$$

$$t = 0.96 \text{ sec}$$

$$d = v_i t + \frac{1}{2} a t^2$$

$$(3.9 \text{ m/s})(0.96 \text{ sec})$$

$$= \boxed{3.8 \text{ m}}$$

OR:  $v_f = v_i + at$

$$t = \frac{v_f - v_i}{a}$$

$$= \frac{-4.5 \text{ m/s} - 4.5 \text{ m/s}}{-9.8 \text{ m/s}^2} \approx 0.96$$