$$\frac{10\,mi}{h} \cdot \frac{1}{8} \cdot \frac{60\,s}{h} = \frac{600\,mi}{h^2}$$

PHYSICS I HONORS $\quad .447 \frac{m}{s} / \frac{mi}{h}$ $\quad$ Name KEY

Motion in 1 Dimension Review $\quad$ Per ________

1. A typical jetliner lands at a speed of 160 mi/h and decelerates at the rate of (10mi/h)/s. If the plane travels at a speed of 160 mi/h for 1.0 s after landing before applying the brakes, what is the total displacement of the aircraft between touchdown on the runway and coming to rest?

$a = -10$ mi/h/s

$V_i = 160$ mi/h

$t = 1s = .0003h$

$x = ?$

$V_f = 0$

Constant vel.

$V = \frac{x}{t}$ $\quad x = Vt = (160 mi/h)(.0003h) = .048$ mi

$2ax = V_f^2 - V_i^2 \quad x = \frac{V_f^2 - V_i^2}{2a} = \frac{0-(160 mi/h)^2}{2(-600 mi/h^2)} = 21.3$ mi

$X_{total} = .048 + 21.3 = 21.348$ mi

2. A car traveling at a constant speed of 24.0m/s passes a trooper hidden behind a billboard. One second after the speeding car passes the billboard, the trooper sets off in chase with a constant acceleration of 3.00 m/s^2.

a. How long does it take the trooper to overtake the speeding car?

b. How fast is the trooper going at that time?

3. A rocket moves straight upward, starting from rest with an acceleration of 29.4 m/s^2. It runs out of fuel at the end of 4.00s and continues to coast upward, reaching a maximum height before falling back to Earth.

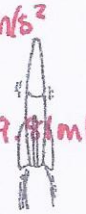
$V_i = 0$

$a = 29.4 m/s^2$

$t_i = 4s$

$a_2 = g = -9.81 m/s^2$

V_f



a. Find the rocket's velocity and position at the end of 4.00s.

$V_f = at + V_i = (29.4 m/s^2)(4s) + 0 = 117.6$ m/s

$y = \frac{1}{2}at^2 + V_i t = \frac{1}{2}(29.4 m/s^2)(4s)^2 + 0(4) = 235$ m

b. Find the maximum height the rocket reaches. $\quad 2gy = V_{yf}^2 - V_{yi}^2$

$y = ?$

$V_f = 0$

$V_i = 117.6$ m/s

$g = -9.81 m/s^2$

$y = \frac{V_{yf}^2 - V_{yi}^2}{2g} = \frac{0-(117.6)^2}{2(-9.81)} = 704.9$ m

+ 235.2 m

940.1m

c. Find the velocity the instant before the rocket crashes on the ground.

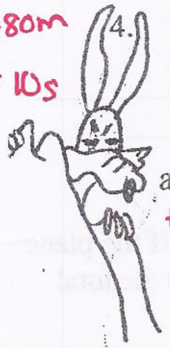
$V_{yi} = 0$

$V_{yf} = ?$

$2gy = V_{yf}^2 - V_{yi}^2$ $\quad 2(-940.1m)(-9.81) = V_{yf}^2 - 0$

$V_{yf} = \sqrt{18444.8} = 135$ m/s

$a = 4 m/s^2$
$v_i = 0$
$x = 80 m$
$t_c = 10 s$



4. The Road Runner stops briefly when he spots Wile E. Coyote hifing behind a rock. He accelerates at 0.4 m/s^2 in attempt to escape Wile E. Coyote by disappearing behind a rock 80 m ahead. It takes Wile E. Coyote 10s to get his ACME Rocket booster started.

a. How long would it take for the Road Runner to reach the rocks and disappear?

$t_R = ?$ $\quad x = \frac{1}{2}at^2 + v_i t \quad 80 = \frac{1}{2}(4 m/s^2)(t^2) + 0$

$t = \sqrt{\frac{2(80)}{4}} = 6.32 s$

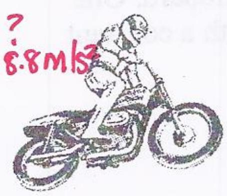
b. How fast would Wile E. Coyote have to accelerate to catch the Road Runner?

$t =$

$v_i = 0$
$v_f = 35.2 m/s$
$t = ?$
$a = 8.8 m/s^2$

5. Evil Kneivel accelerates from rest to a maximum velocity of 35.2 m/s at the top of a take-off ramp, then swoops up and over 20 cars. How long does it take him to reach the maximum velocity at an acceleration of 8.8m/s^2?

$a = \frac{v_f - v_i}{t} \quad t = \frac{v_f - v_i}{a} = \frac{35.2 - 0}{8.8} = 4 s$



$g = -9.81 m/s^2$
$t = 1.5 s$
$v_{yi} = 0$

6. The Physics students from West Broward High School went for a ride on the SheiKra at Busch Gardens. The ride falls freely for 1.5s.

a. How fast will the students be going at the end of the free fall?

$g = \frac{v_{yf} - v_{yi}}{t} \quad v_{yf} = gt + v_{yi} = (-9.81)(1.5 s) - 0 = \boxed{14.7 m/s}$

b. How far have they fallen?

$y = \frac{1}{2}gt^2 + v_{yi}t = \frac{1}{2}(-9.81)(1.5)^2 + 0(1.5)$

$\boxed{= 11.0 m}$