Phy WS Kinematics

1) $v_0 = 0\ m/s$, $d_0 = 0\ m$, $d = 17.0\ m$, $a = 9.80\ m/s^2$

A) $v = \sqrt{v_0^2 + 2a\Delta d} = \sqrt{(0\ m/s)^2 + 2(-9.80\ m/s^2)(-17.0\ m)}$

$v = -18.3\ m/s$

B) $d = d_0 + v_0 t + \frac{1}{2}at^2$

$t = \sqrt{\frac{2d}{a}} = \sqrt{\frac{2(17.0\ m)}{-9.80\ m/s^2}} = 1.86\ s$

2) $\Delta t = 1.3\ s$, $d_0 = 0\ m$, $v_0 = 0\ m/s$

$v = ?$, $t = ?$, $\bar{v} = ?$

A) $d = d_0 + v_0 t + \frac{1}{2}at^2$

$d = 0\ m + (0\ m/s)(1.3\ s) + \frac{1}{2}(-9.80\ m/s^2)(1.3\ s)^2$

$d = -8.28\ m$

B) $v^2 = v_0^2 + 2a\Delta d$

$v^2 = (0\ m/s)^2 + 2(-9.80\ m/s^2)(-8.3\ m)$

$v = 12.75\ m/s = -12.8\ m/s$

C) $\bar{v} = \frac{1}{2}(v + v_0) = .5(12.75\ m/s + 0\ m/s)$

$\bar{v} = 6.375\ m/s = 6.38\ m/s$

3) $\Delta d = 65\ m$, $a = 9.80\ m/s^2$, $v_0 = 0\ m/s$, $d_0 = 0\ m/s$

$v = ?$

$v^2 = v_0^2 + 2ad$

A) $= (0\ m/s)^2 + 2(-9.80\ m/s^2)(-65\ m)$

$v = -35.7\ m/s$

B) $v = v_0 + at$

$t = \frac{v - v_0}{a} = \frac{-35.7\ m/s - 0\ m/s}{-9.80\ m/s^2} = 3.64\ s$

4.) $\Delta d = -3.0\ m$, $a = -9.80\ m/s^2$, $v_0 = 0\ m/s$, $d_0 = 0\ m$

$\Delta t = ?$

A) $d = d_0 + v_0 t + \frac{1}{2}at^2$

$t = \sqrt{\frac{2d}{a}} = \sqrt{\frac{2(-3.0\ m)}{-9.80\ m/s^2}}$

$t = .782\ s$

B) $v = v_0 + at$

$= 0\ m/s + (-9.80\ m/s^2)(.78\ s)$

$v = -7.64\ m/s$

C) $v^2 = v_0^2 + 2a\Delta d$

$a = \frac{v^2 - v_0^2}{2\Delta d}$

$a = \frac{0\ m/s - 7.64\ m/s}{2(-1.5\ m)} = 19.5\ m/s^2$

5) $v_0 = 182\ m/s$, $a = -9.80\ m/s^2$

A) $\Delta d = ?$ $v^2 = v_0^2 + 2a\Delta d$

$\Delta d = \frac{v^2 - v_0^2}{2a} = \frac{(0\ m/s)^2 - (182\ m/s)^2}{2(-9.80\ m/s^2)}$

$\Delta d = 1690\ m$

B) $v = v_0 + at$

$t = \frac{v - v_0}{a} = \frac{0\ m/s - 182\ m/s}{-9.80\ m/s^2}$

$t = 18.6\ s$

C) Never, it's always $-9.80\ m/s^2$

D) $d = d_0 + v_0 t + \frac{1}{2}at^2$

$0\ m = 0\ m + (182\ m/s)t + \frac{1}{2}(-9.80\ m/s^2)t^2$

$t = 37.1\ s$

6.) $V = 30\ m/s$

$a = -9.80\ m/s^2$

$V_0 = 0$

$V = 30\ m/s$

$V^2 = V_0^2 + 2a\Delta d$

$\Delta d = \frac{V^2 - V_0^2}{2a} = \frac{(30\ m/s)^2 - (0\ m/s)^2}{2(-9.80\ m/s^2)} = 45.9\ m$

7.)

$V_0 = 25.3\ m/s$

$\Delta d = 17.4\ m$

$a = -9.80\ m/s^2$

$t = ?$

$d = d_0 + V_0 t + \frac{1}{2} a t^2$

$17.4\ m = 0\ m + (25.3\ m/s)t + \frac{1}{2}(-9.80\ m/s^2)t^2$

$0\ m = -17.4\ m + (25.3\ m/s)t + \frac{1}{2}(9.80\ m/s^2)t^2$

$t = .817\ s$ or $t = 4.35\ s$

$t = .817\ s$: Before MAX height

$t = 4.35\ s$: After MAX height

WS #2 Physics Kinematics

1) 

$V_0 = 22.0\ m/s$

$a = 1.20\ m/s^2$

$\Delta t = 5.00\ s$

$V = ?$

$V = V_0 + at$

$V = 22.0\ m/s + (1.20\ m/s^2)(5.00\ s)$

$V = 28.0\ m/s$

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2) 

$a = 6.00\ m/s^2$

$V_0 = 30.0\ m/s$

$V = 120.0\ m/s$

$\Delta d = ?$

$V^2 = V_0^2 + 2a\Delta d$

$\Delta d = \frac{V^2 - V_0^2}{2a}$

$\Delta d = \frac{(120\ m/s)^2 - (30.0\ m/s)^2}{2(6.00\ m/s^2)} = 1125\ m = 1130\ m$

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3) 

$V_0 = 22.0\ m/s$

$V = 3.00\ m/s$

$a = -2.10\ m/s^2$

$\Delta t = ?$

$V = V_0 + at$

$t = \frac{V - V_0}{a} = \frac{3.00\ m/s - 22.0\ m/s}{-2.10\ m/s^2}$

$t = 9.05\ s$

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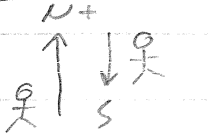
4) 

$V_0 = 6.00\ m/s$

$\Delta t = 5.00\ s$

$V = -4.00\ m/s$

$\bar{a} = \frac{\Delta V}{\Delta t} = \frac{V - V_0}{\Delta t} = \frac{-4.00\ m/s - 6.00\ m/s}{5.00\ s} =$

$\bar{a} = -2.00\ m/s^2$

5.) → (a) $V = V_0 + at$

$a = 20.0\ m/s^2$

$\Delta t = ?$

$V_0 = 7.00 \times 10^3\ m/s$

$V = 8.00 \times 10^3\ m/s$

$\Delta d = ?$

$t = \frac{V - V_0}{a} = \frac{8.00 \times 10^3\ m/s - 7.00 \times 10^3\ m/s}{20.0\ m/s^2}$

$t = 50.0\ s$

(B) $V^2 = V_0^2 + 2a\Delta d$

$\Delta d = \frac{V^2 - V_0^2}{2a} = \frac{(8.00 \times 10^3\ m/s)^2 - (7.00 \times 10^3\ m/s)^2}{2(20\ m/s^2)} =$

$\Delta d = 375000\ m$

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6) $V_0 = 5.00\ m/s$

$V = 11.4\ m/s$

$\Delta t = 8.30\ s$

$a = ?$

$\Delta d = ?$

$\bar{a} = \frac{\Delta V}{\Delta t} = \frac{11.4\ m/s - 5.00\ m/s}{8.30\ s} = .7711\ m/s^2$

$V^2 = V_0^2 + 2a\Delta d$

$\Delta d = \frac{V^2 - V_0^2}{2a} = \frac{(11.4\ m/s)^2 - (5.00\ m/s)^2}{2(.7711\ m/s^2)} =$

$\Delta d = 68.1\ m$

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7) e → $\Delta d = .450\ m$

$\Delta t = 6.00 \times 10^{-9}\ s$

$V_0 = 0\ m/s$

$\bar{V} = ?$

$d = \bar{V}t$

$\bar{V} = \frac{d}{t} = \frac{.450\ m}{6.00 \times 10^{-9}\ s} = 7.50 \times 10^7\ m/s$

$\bar{V} = \frac{V_0 + V}{2}$

$V = 2\bar{V} - V_0$

$V = 2(7.50 \times 10^7\ m/s) - 0\ m/s$

$V = 1.50 \times 10^8\ m/s$

OR

$d = t_0 + V_0 t + \frac{1}{2}at^2$

$a = \frac{2d}{t^2} = \frac{2(.450\ m/s)}{(6.00 \times 10^{-9}\ s)^2} = 2.50 \times 10^{16}\ m/s^2$

$V = V_0 + at = 0\ m/s + (2.50 \times 10^{16}\ m/s^2)(6.00 \times 10^{-9}\ s)$

$V = 1.50 \times 10^8\ m/s$