Sec 2.4

Answer Key

(16) $a = \frac{\Delta \text{speed}}{\Delta \text{time}}$ where Δ speed = final − initial. We will use $\Delta V = V_f - V_o$

$a = \frac{V_f - V_o}{\Delta t}$

$= \frac{30.0 m/s - 0.00 m/s}{7.00 s} = \boxed{4.29 m/s^2}$

(17) a) $a = \frac{V_f - V_o}{\Delta t} = \frac{282 \frac{m}{s} - 0 \frac{m}{s}}{5.000 s} = \boxed{56.4 m/s^2}$

b) $a = \frac{V_f - V_o}{\Delta t} = \frac{0 \frac{m}{s} - 282 \frac{m}{s}}{1.40 s} = \boxed{-201 m/s^2}$ (Watch the wording in the problem.)

$\left|\frac{a}{g}\right| = \left|\frac{a}{9.8 m/s^2}\right|$ for both parts a, b

a) $\frac{56.4}{9.8} = \boxed{5.76 g}$

b) $\frac{201}{9.8} = 20.55 \Rightarrow \boxed{20.6 g}$

(18) given

a) $a = 1.40 m/s^2$

$V_o = 0 m/s$

$V_f = 2.00 m/s$

Solve for t

$t = \frac{\Delta V}{a} = \frac{2-0}{1.4} = \boxed{1.43 sec}$

b) $V_o = 2.00 m/s$

$V_f = 0 m/s$

$t = 0.800 s$

Solve for a

$a = \frac{0-2}{0.8} = \boxed{-2.50 m/s^2}$

(19) given

$V_o = 0 m/s$

$V_f = 6500 m/s$ ⟸ watch the unit of measure

6.50 km/s = 6500 m/s

$t = 60.0 s$

$a = \frac{6500 - 0}{60} = \boxed{108 m/s^2}$

$\left|\frac{a}{9.8 m/s^2}\right| = \frac{108}{9.8} = \boxed{11.0 g}$

Sec 2.5

(20) given

$V_o = 0 m/s$

$a = 4.50 m/s^2$

$t = 2.40 s$

a) $V_f = V_o + at$

$= 0 m/s + (4.50 m/s^2)(2.40 s)$

$= \boxed{10.8 m/s}$

b) $x = \frac{1}{2}(4.5)t^2$

time (s)	position (m)
0	0
1	2.25
2	9
2.4	12.96

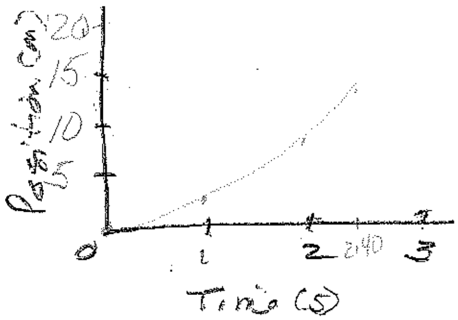
Our book uses x for position. Some books use d or s. Using x,

$x = \frac{1}{2}at^2 + V_o t + x_o$

V_o: initial speed (0 m/s); x_o: initial position (0 m)

(Over)

Position - Time Graph



$V_f - V_0 = at$

$V_f - at = V_0$

(21) given

$a = -2.10 \times 10^4\ m/s^2$

$t = 1.85 \times 10^{-3}\ s$

$V_f = 0\ m/s$

Solve for V_0 — Show equation

$a = \frac{V_f - V_0}{t} \implies V_0 = V_f - at$

$V_0 = 0 - (-2.1 \times 10^4\ m/s^2)(1.85 \times 10^{-3}\ s)$

$= 38.85\ m/s$

$= 38.8\ m/s$

(22) given

$a = 6.20 \times 10^5\ m/s^2$

$t = 8.10 \times 10^{-4}\ s$

$V_0 =$ (from rest) $= 0\ m/s$

Find V_f

$V_f = V_0 + at$

$= 0\ m/s + (6.20 \times 10^5)(8.10 \times 10^{-4}\ s)$

$= 502\ m/s$

Watch units of measure

(23) a) given

$a = 1.35\ m/s^2$

$V_f = 80.0\ km/h$ ~~m/s~~ ★

$V_0 = 0\ km/h$

Solve for t

$t = \frac{V_f - V_0}{a}$

$= \frac{\left(80\ \frac{km}{h} - 0\ \frac{km}{h}\right)}{1.35\ m/s^2} \times \frac{1\ h}{3600\ s} \times \frac{1000\ m}{1\ km} = 16.5\ sec$

b) $a = -1.65\ m/s^2$

$V_0 = 80.0\ km/h$

$V_f = 0\ km/h$

Solve for t

$t = \frac{V_f - V_0}{a} = 13.5\ s$

c) $V_f = 0\ km/h$

$V_0 = 80.0\ km/h$

$t = 8.30\ sec$

Solve for a

$a = -2.68\ m/s^2$

(24) ~~given~~ (knowns)

$V_0 = 0\, m/s$

$a = 2.40\, m/s^2$

$t = 0\, s$

$X_0 = 0\, m$

Solve for V_f

Solve for

$V_f = ?$

$t_0 = 12.0\, s$

$X_0 = ?$

$a = 2.40\, m/s^2$

* Using this info, answer the multiple parts of the problem. This is an AP-type question.

(c) $X = \frac{1}{2}at^2 + V_0 t + X_0$

$= \frac{1}{2}(2.40\, m/s^2)(12.0\, s)^2 + (0\, m/s)(12.0\, s) + 0\, m$

$= 173\, m$

(d)

(25) given

$V_0 =$

watch! $a =$

$t = 5.00\, sec$

a) Solve for X (distance traveled) $X = \frac{1}{2}(-200$

b) Solve for V_f

c) Evaluate ... What do your answers to a) and b) mean? Do they make sense?