By	[signature]
On	8 / 25 / 04

CH 2: Q 31, 38, 48; Ex 5, 9, 21
CH 3: Q 4, 7; Ex 1, 8

2Q31 $\bar{a} = \dfrac{v_f - v_i}{t_f - t_i} = \begin{cases} (555-550)/\Delta t = 5/\Delta t & \text{(AIRPLANE)} \\ (67-60)/\Delta t = 7/\Delta t & \text{(Car)} \\ (10-0)/\Delta t = 10/\Delta t & \text{(Bike)} \end{cases}$

A: BIKE has largest acceleration

2Q38 $v_f = v(t_f) = v_0 + at = v_0 - gt$, where accln $a = -g = -10\ m/sec^2$ is accln. due to gravity (downward!)

A: $v_f = 30 - 2\cdot 10 = 10\ m/sec$

{Check dimensional units: $[v] = (m/sec)$; $[g] = (m/sec^2)$; $t = sec$, so that $[gt] = (m/sec^2)\cdot sec = m/sec = [v]$ (ok!).

2Q48 Each ball is subject to force of gravity (downward) & drag force due to Air Resistance, directed opposite to velocity. Gravity accelerates both balls at same rate, but drag Force, not acceleration, is same for two balls of same size & shape (as long as they have the same speed). (Drag forces increase with speed.) By Newton's second law, $\vec{F} = m\vec{a} \Leftrightarrow \vec{a} = \vec{F}/m$, so that the same drag force decelerates the lighter ball MORE than a heavier ball moving at the same speed. Thus, WHEN air drag is considered, the lighter ball slows down MORE than the heavier, so that the heavier ball hits first (as Aristotle would have expected) but because of air resistance NOT because of gravity. {Note this problem anticipates Newton's II law .... it pays to read ahead!}.

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2: Ex 5: $|\vec{v}|_{AVG} = d/t = 143\ mi/24\ hr = \boxed{5.96\ mi/hr}$ = Avg. Speed

$d = \vec{v} \cdot \Delta t$

2: Ex 9: $d = 3 \times 4 = 12\ mi$, $\vec{v} = \frac{12\ mi}{5\ hr} = \boxed{2.4\ mi/hr}$

2: Ex 21: $d = \frac{1}{2} g t^2 = \frac{1}{2} \cdot 10 (2)^2 \frac{m}{sec^2} \cdot sec^2 = \boxed{20\ m}$

3 Q 4: NI says that object continues in uniform motion unless acted upon by a force. Therefore, we conclude that book on table is acted upon by a force which slows it down. In fact this force is the force of friction, which the (microscopically) rough surface of the table exerts upon the (microscopically) rough surface of the book.

3 Q 7: Because (NI) it tends to remain in a state of uniform (i.e CONSTANT VELOCITY!) motion, unless acted upon by a force.
As car accelerates horizontally the tassel rope exerts no horizontal force, so the tassel does not accelerate with the car. Instead it swings back until its string does exert a horizontal force, $F_H = T \cdot \sin \vartheta$, (where T is the tension in the string & ϑ is the angle of the string off the vertical) sufficient to accelerate the tassel horizontally with the car.

$T \sin \vartheta$ = Horizontal Force.

Homework Solutions, Physics 117, Spring 2005.
Home Work Problem Set #1, (due 2/2/05).

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Solutions by JJG

3 Ex 1

$$\vec{F}^{NET} = \vec{F}_1 + \vec{F}_2 \Leftrightarrow \begin{cases} F_x^{NET} = F_{1x} + F_{2x} \\ F_y^{NET} = F_{1y} + F_{2y} \end{cases} \;\&\; |F^{NET}| = \sqrt{(F_x^{NET})^2 + (F_y^{NET})^2}$$

(a) $|\vec{F}^{NET}| = F_x = 6 + 8 = 14N$ $\xrightarrow{+6}\xrightarrow{+8}$; Since $F_y^{NET} = 0$

(b) $|\vec{F}^{NET}| = F_x = -6 + 8 = 2N$ $\xleftarrow{-6}\xrightarrow{+8}$; " " $= 0$, again.

(c) $|\vec{F}^{NET}| = \sqrt{(6)^2 + (8)^2} = 10N$

; Since $F_x^{NET} = 6$, $F_y^{NET} = 8$.

3 Ex 8 $a = F/m = \dfrac{6{,}000\ N}{60{,}000\ kg} = 0.1\ m/sec^2$

[Check Dimensional Units: $1N = 1kg \cdot \dfrac{1m}{sec^2} \Rightarrow \dfrac{1N}{1kg} = 1\ m/sec^2$ (ok!)]