

STUDY GUIDE CORRECTIONS

Saturday, December 12, 1998

- 1) Page 1: The last line of the Contents of Chapter 2 should not be “practical and fundamental forces,” but instead should read “macroscopic and fundamental forces.”
- 2) Page 9: The boxed formulas at the top of the page should read:

$$\begin{aligned}\vec{v}(t) &= \vec{v}_0 + \vec{a} t \\ \vec{r}(t) &= \vec{r}_0 + \vec{v}_0 t + \frac{1}{2} \vec{a} t^2 ,\end{aligned}$$

The equations in the middle of the page should read:

$$\begin{aligned}v(t) &= v_0 + a t \\ x(t) &= x_0 + v_0 t + \frac{1}{2} a t^2 .\end{aligned}$$

In both cases, the error was the missing subscript 0 on the velocity (\vec{v} or v).

- 3) Page 41: The first part of the answer to Problem 1A.5, the calculus derivation, is sketchy and contains several errors. In particular, v_0 is treated incorrectly on the first line, and x_0 does not appear at all in the second line. A valid derivation is as follows:

$$a = \frac{dv}{dt} \implies v(t) - v_0 = \int_0^t a dt' = at , \text{ so } v(t) = v_0 + at .$$

$$v = \frac{dx}{dt} \implies x(t) - x_0 = \int_0^t (v_0 + at') dt' = v_0 t + \frac{1}{2} at^2 , \text{ so } x(t) = x_0 + v_0 t + \frac{1}{2} at^2 .$$

- 4) Page 42: The second answer to Problem 1B.2(c) should not be [21, 17, 0] m, but should instead be [21, 16, 0] m.
- 5) Page 59: At the end of the 4th starred paragraph, about the Coulomb force, it should read: “The force is repulsive if the two charges have the same sign, and otherwise it is attractive.”
- 6) Page 61: The title for problems 2A should read: FUNDAMENTAL CONCEPTS (FORCE, MASS, AND NEWTON’S SECOND LAW).

- 7) Page 71: The *Conceptualize* section of Problem 2D.2(a) should read: “One force acting on the bob is obviously gravity.”
- 8) Page 72: The derivation of the equation of motion of the pendulum is flawed, since the equation for F_x is written down without a hint of an explanation. Note that the coordinate system used in part (b) is different from that used in part (a), so the answers from the previous part are not directly applicable. For a clearer discussion of the pendulum, see the summary of Lecture 6 on the web page.
- 9) Page 170: The indented equation currently written as

$$v^2 \sin \alpha = v_2^2 \sin 2\theta$$

should be written as

$$v^2 \sin^2 \alpha = v_2^2 \sin^2 \theta .$$

The indented equation immediately below, currently written as

$$v^2 = v_1^2 v_2^2 + 2v_1 v_2 \cos \theta ,$$

should be written as

$$v^2 = v_1^2 + v_2^2 + 2v_1 v_2 \cos \theta .$$

- 10) Page 177: The last indented equation on the page should read:

$$\phi = \tan^{-1} \left(\frac{0.72}{-3.77} \right) = 169^\circ .$$

In the *Study Guide*, the left-hand side of this equation is mistakenly printed as a θ .

- 11) Page 181: The answer to Problem 5C.4(b) should be:
 (b) at point $(\frac{1}{4}\ell, -\frac{1}{4}\ell)$ in a coordinate system where one rod is the x axis and the other the y axis.
- 12) Page 200: The indented equation in the middle of the page should read:

$$U_{\text{initial}} = mgh = K_{\text{final}} - W_{\mathcal{F}}$$

In the *Study Guide*, the right-hand expression is mistakenly printed as $K_{\text{final}} + W_{\mathcal{F}}$.

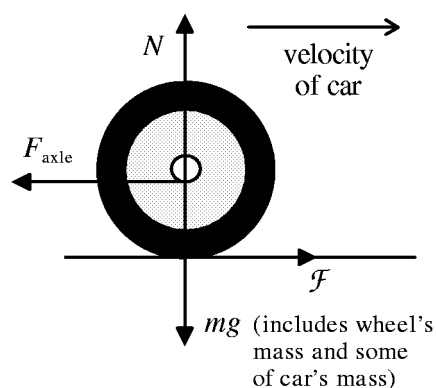
- 13) Page 206: Starting with the second sentence of the *Solve* paragraph, the text should read: “Numerically this comes to 79 kJ, taking $g = 9.8 \text{ m/s}^2$. This must be equal to the kinetic energy lost by the wreck, so (as its final kinetic energy is zero) its initial kinetic energy was

$$\frac{1}{2}mv_0^2 = 79 \text{ kJ} ,$$

giving

$$v_0 = \sqrt{\frac{2 \times 79 \times 10^3 \text{ J}}{2300 \text{ kg}}} = 8.3 \text{ m/s, or } 30 \text{ km/h .}''$$

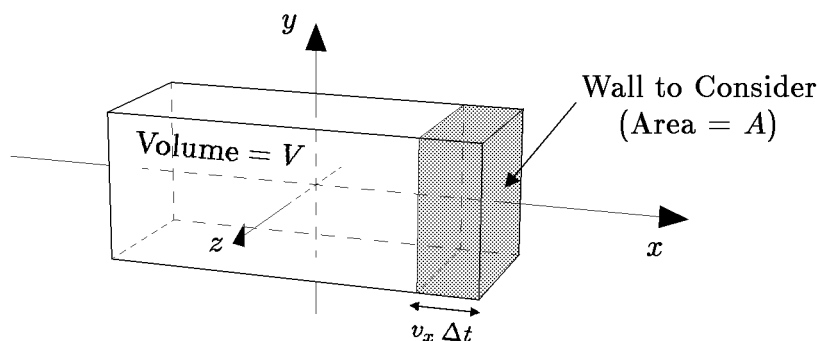
- 14) Page 228: The second line of the **Scrutinize** section should read: "If $m = 0$, then $a = -g$, which is obviously right"
- 15) Page 338: The diagram in the answer to the hint for Problem 10.7(b) has both the force of friction and the force of the axle on the wheel pointing in the wrong direction. The diagram should be:



- 16) Page 339: In the answer to Problem 10.4, the units in the expression for the torque at later times were not handled correctly. The expression should be written as

$$\left[\left(-21 + \frac{6t}{1 \text{ s}} \right), 0, \left(9 + \frac{3t}{1 \text{ s}} \right) \right] \text{ N}\cdot\text{m} .$$

- 17) Page 355: Problem 11D.1 should be marked as "11D.1 (H)".
- 18) Page 358: The solution to Problem 11B.5 is missing a diagram, but it is identical to a diagram that appears in the Summary of Chapter 11:



- 19) Page 367: The answer to Problem 11C.5 was misprinted. It should read:

$$M/m; 2.47 \times 10^{25} \text{ m}^{-3}$$

- 20) Page 368: The answer to Problem 11C.5 is incomplete, lacking an answer to the first question. The ratio of the number of nitrogen molecules to the number of oxygen molecules is 4.57:1.
- 21) Page 378: The equation at the top of the page should be

$$\Delta K = \frac{1}{2} \rho \Delta V (v_2^2 - v_1^2) .$$

- 22) Page 389: The reference to Problem 6.7 in the **Scrutinize** section should refer to Problem 7.7.
- 23) Page 390: The first sentence of the statement of Problem 12B.2 was printed with short dashes where there should have been long dashes, making the sentence very hard to understand. It should have been printed: “*Water is unusual in that its solid phase—ice—is less dense than its liquid phase.*”
- 24) Page 392: An important symbol was omitted from a sentence in the **Formulate** section. The sentence should read: “The cube’s mass is $m = \rho' V_{\text{tot}}$, where ρ' is 700 kg/m³ and V_{tot} is the total volume of the cube.”
- 25) Page 397: Two equations in the answer to Problem 12D.3 were misprinted. The first equation should have been written as

$$P = \frac{3P_0V_0}{4\pi r^3} - \frac{4\gamma}{r} ,$$

and the equation in the last line of text should have been written as

$$V_0 = \frac{4}{3}\pi r^3 .$$

- 26) Chapter 13 contains three worked examples, but all three printed solutions contain errors. (Somehow every time we have revised the *Study Guide*, we have fallen short of reaching Chapter 13.) Corrected solutions might be written soon, but in any case you should not trust the solutions in the *Guide*.
- 27) Page 417: The third numerical answer to Problem 13.1 was misprinted as 2.4×10^{24} . It should be 2.4×10^{22} .

Thanks to Kristin Burgess, Young Lee, Christopher Lyon, Michael Rasmussen, Warren Ruder, Shufang Su, Tan-Quy Tran, Uwe-Jens Wiese, and Wei-An Yu for pointing out

8.01 Study Guide Corrections, Fall 1998, p. 5

some of these errors. Apologies to anyone whose name I may have forgotten to include here.

If you find any other errors in the Study Guide, please email them to guth@ctp.mit.edu so that this correction listing can be updated. Thanks a lot.

— Alan Guth