Appendices

Formulas

Summary of the kinematic equations for constant acceleration. The bar over the v means average. The initial values of time, position, and velocity to be 0, 0, and v_0, respectively.

$$d = \bar{v}t \qquad\qquad d = \tfrac{1}{2}(v_0 + v)t \qquad\qquad d = v_0 t + \tfrac{1}{2}at^2$$

$$v = v_0 + at \qquad\qquad v^2 = v_0^2 + 2ad \qquad\qquad a_c = \frac{v^2}{r} = \frac{\left(\frac{2\pi r}{T}\right)^2}{r} = \frac{4\pi^2 r}{T^2}$$

$$f = \frac{1}{T}.$$

Formulas from dynamics and energy. (Use 9.81 m/s^2 for g.)

$$F = ma \qquad\qquad F = \frac{mv^2}{r} = \frac{m\left(\frac{2\pi r}{T}\right)^2}{r} = \frac{4\pi^2 mr}{T^2}$$

$$PE = mgh \qquad\qquad KE = \frac{1}{2}mv^2 \qquad\qquad W = Fd$$

Conversion Factors

1 inch = 2.54 cm (exact)	1 h = 3600 s
1 ft = 30.48 cm (exact)	1 d = 86,400 s
1 m = 39.37 in.	1 kg = 1000 g
1 lb = 4.45 N	
1 kg has a weight of 2.21 lbs	

Books

Amusement Park Physics, A Teachers Guide, Nathan A. Uterman, (J. Weston Walch, Portland, 1990) pages 19-47. Making horizontal and vertical accelerometers, practice problems; using accelerometers in cars, elevators, swings, etc. The author has a web page at http://newton.dep.anl.gov/hwp/unterman_n.html

Amusement Park Physics, Carole Escobar, Editor, (American Association of Physics Teachers, College Park, 1994) Thorough discussion of the physics and the measurements. Contains reprints of papers on amusement park rides. This can be ordered from Pasco and from AAPT (www.aapt.org)).

Carole Escobar, "Amusement Park Physics," *The Physics Teacher,* Vol. 28, # 7, pp. 446-453, (October 1990).

Roller Coaster Science, Jim Wiese (Wiley, New York, 1994) pages 25-26. Making a simple *g* meter, testing on a merry-go-round and in a car, pages 25- 26.

Requests for suggestions

We will continue Midway Physics Day at the South Carolina State Fair. Help us preparefor the next one by sending suggestions and comments for improving the guide to:

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