First Midterm

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Discussion Instructor (circle one): Hamed  Hari  Molina  Nott  Paul  Reeve  Zhang

Discussion Section #

Report all numbers to three significant figures:
Use the conversion constants and data given on the front page.

(a) Convert 725 m to feet.
\[ \left( \frac{725 \text{ m}}{1 \text{ m}} \right) \left( \frac{3.28 \text{ ft}}{1 \text{ m}} \right) = 2.38 \times 10^3 \text{ ft} \]

(b) Convert 186 mi/hr to ft/s.
\[ \left( \frac{186 \text{ mi}}{1 \text{ hr}} \right) \left( \frac{1 \text{ hr}}{60 \text{ min}} \right) \left( \frac{1 \text{ min}}{1 \text{ sec}} \right) \left( \frac{5280 \text{ ft}}{1 \text{ mi}} \right) = 272.8 \text{ ft/sec} \]

(c) On a small planet a dropped from rest rock falls 18.0 ft in 17.0 s. What is the magnitude of \( g \) on this planet?
Use \( y = y_0 + v_0 t + \frac{1}{2} a t^2 \) \[ g = \frac{y - y_0 - v_0 t}{\frac{1}{2} t^2} = \frac{0 - 18 - 0}{\frac{1}{2} (17)^2} = 124.6 \text{ ft/sec}^2 \]

(d) On the moon an object dropped from rest falls 250 m. What is its velocity after falling 250 m?
\( g_m = 1.67 \text{ m/sec}^2 \) from data sheet.
\[ v^2 = v_0^2 + 2a(y - y_0) \Rightarrow v = -\sqrt{\frac{g_m}{2(1.67)(0-250)}} = -28.9 \text{ m/sec} \]

(e) A ball is thrown straight up on Jupiter (\( g = 26.5 \text{ m/s}^2 \)) at a speed of 50.0 m/s (about 100 mi/hr). How high (in meters) does it go?
Max height \( \Rightarrow v = 0 \)
\[ v^2 = v_0^2 + 2a(y - y_0) \Rightarrow y = \frac{v^2 - v_0^2}{2a} = \frac{0^2 - (26.5)^2}{2(-26.5)} = 47.2 \text{ m} \]

Grading: 5 pts. each.
-1 for missing or incorrect units
-1 for one extra or one too few significant figures (S.F.)

Notes: A number of students (i.e. about half) made serious errors with significant figures. All answers are to be reported to three significant figures unless the most significant digit is a 1, in which case you are allowed (and encouraged) to use four (as in (c)).

Part (d) really should be negative but since no unit was specified as negative in the problem, no points were taken off for positive answers.