SCI 101 Scientific Method
Summer 2006
Final exam review sheet — Answers

Here some numerical answers to selected problems. We will discuss the details in class.

1. A metric ton is the mass of one cubic meter of water, about 2200 lb. It takes about 1.3 seconds for light to go from the Earth to the Moon.

3. \( \frac{3.0 \times 10^8 \text{ m/s}}{2.42} = 1.24 \times 10^8 \text{ m/s} \).

4. No, it cannot exit. Using, Snell’s law,

\[
\frac{n_{\text{water}} \sin \theta_1}{n_{\text{air}} \sin \theta_2} = 1
\]

The value of the left side of the equation above is 1.28, since \( n_{\text{water}} = 1.33 \) for water. For air, \( n_{\text{air}} = 1 \), so we obtain

\[
\sin \theta_2 = 1.28
\]

There is no solution to the equation since there is no angle for which the sine function is more than 1.00. Therefore the light cannot get out, and 100% of it is reflected internally.

5. \( f = 8.4 \text{ cm} \), and the image is 11.7 cm tall.

6. The image is virtual. A real image is upside-down.

9. (A) \( a = -0.20 \text{ m/s}^2 \). (B) 35 seconds. (C) 123 m (that’s a big ice rink!)

10. 25 times as far, or 75 cubits. Now, try this: what if the 3.0 cubits of travel happened during the first 2.0 seconds of time? Answer: the hammer drops 18.8 cubits.

14. (A) Bottom left graph, middle right graph. (B) Both top graphs. (C) Middle right and bottom left graphs.

15. (C) 0.20 m/s\(^2\) in a direction opposite the velocity.

16. (A) 4800 kg m/s. (B) 10,800 kg m/s (C) 2.57 m/s, or about 2.6 m/s.