

Week 1 Notes

Astro 1 (Discussion Section 105)

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Class Overview

1. Name: Bill Wolf
2. Go over syllabus
3. Attendance Policy
4. Structure of Class

Review

Unit Conversions Perform the example of how many seconds there are in a year:

$$1 \text{ year} \times \frac{365 \text{ days}}{1 \text{ year}} \times \frac{24 \text{ hours}}{1 \text{ day}} \times \frac{60 \text{ minutes}}{1 \text{ hour}} \times \frac{60 \text{ seconds}}{1 \text{ minute}} = 3.15 \times 10^7 \text{ seconds}$$

Have students introduce each other to their neighbors and have them work on converting the speed of light from m/s to mph.

$$1 \text{ mile} = 1600 \text{ m} \quad c = 3 \times 10^8 \text{ m/s}$$
$$c = 3 \times 10^8 \text{ m/s} \times \frac{1 \text{ mile}}{1600 \text{ m}} \times \frac{3600 \text{ seconds}}{1 \text{ hours}} = 6.75 \times 10^8 \text{ mph}$$

Extra Stuff Time permitting, go over angles and relevant conversions between degrees, minutes, and arcseconds, as well as basic geometric formulas for circles and spheres:

$$C = 2\pi r \quad A = \pi r^2 \quad SA = 4\pi r^2 \quad V = \frac{4}{3}\pi r^3$$

Open Forum

Examples

Example 1 (Example from Box 1-1 in textbook) On December 11, 2006, Jupiter was 944 million kilometers from Earth and had an angular diameter of 31.2 arcsec. From this information, calculate the actual diameter of Jupiter in kilometers.

Solution: The small angle formula is

$$D = \frac{\alpha d}{206,265}$$

We know d and α and we wish to find D . Simply plugging in numbers yields

$$D = \frac{\alpha d}{206,265} = \frac{(31.2)(9.44 \times 10^8 \text{ km})}{206265} = 1.42 \times 10^5 \text{ km}$$

Example 2 (Problem 2.42 in textbook) The city of Mumbai (formerly Bombay) in India is 19° north of the equator. On how many days of the year, if any, is the Sun at the zenith at midday as seen from Mumbai? Explain your answer.

Solution There are only two days in which this could happen, and they both happen in the summer. As the solstice approaches, the sun goes higher and higher in the sky at midday until it approaches the zenith. It then continues to move further north until the solstice, when it moves back south, passing again through the zenith.

Example 3 (Problem 3.39 in textbook) The total lunar eclipse of October 28, 2004, was visible from South America. The duration of totality was 1 hour, 21 minutes. Was this total eclipse also visible from Australia, on the opposite side of Earth? Explain your reasoning.

Solution No, since it was currently night in Australia, and presumably an hour and 21 minutes was not a sufficient amount of time to bring Australia into daylight.