

Astronomy 120: Assignment 2, the history of astronomy, Newton and Light.

1. Suppose that Erastotenes found the sun at Alexandria to be 10 degrees from the zenith when it was overhead at Syene, a distance of 2000 stadia away. What would he calculate of the radius of the earth (in stadia)? Include a diagram with your answer.
2. Give 4 factors you would take into account when considering where to build an optical telescope on the ground. Draw a diagram showing the basic design of a reflecting telescope, showing the paths followed by the light rays and position of the primary and secondary mirrors. Give two advantages of telescopes in space rather than those on the ground.
3. On two consecutive nights at an observatory, the seeing is measured to be 1.5 arcseconds and 2.2 arcseconds. What does the term 'seeing' mean? Which of the 2 nights would have been better for taking astronomical images? What technological advance is used at many observatories to counteract the effect of seeing? Describe briefly how this works. Which will have a better resolution (image sharpness) – a 10m ground based telescope with a mechanism to remove the effects of the atmosphere, or a 2.5-m space telescope like Hubble?
4. if you drop a bowling ball and a feather simultaneously and from the same height, which will hit the ground first (a) on earth and (b) on the moon. Explain the difference. Gravity is an inverse square law, what does that mean? If the moon had the same mass as Earth would its escape velocity be larger, smaller or the same as the Earth's? Why?
5. Explain how the discoveries made by Galileo concerning a) sunspots, b) craters on the moon, c) phases of Venus contradicted the models favoured by Ptolemy and Aristotle.