

Physics 25 Problem Set 7

Harry Nelson

due Monday, May 19

Please make your work neat, clear, and easy to follow. It is hard to grade sloppy work accurately. Generally, make a clear diagram, and label quantities. Derive symbolic answers, and then plug in numbers after a symbolic answer is available.

1. Consider a concave mirror where x is the horizontal, y is vertical, and the formula for the surface of the mirror is $y^2/(2R)$, where R is the radius of the mirror; this is as done in class. Assume y is small and $y^2/(2R)$ is tiny. Consider an object at distance p from the mirror, and use geometry and algebra to show that the three principal rays all converge at a distance q from the mirror, where $1/p + 1/q = 2/R$.
 2. Consider a telescope with an objective of diameter 5.0 cm and focal length 50 cm. Consider diffraction, and estimate the width of a distant star in the focal plane of the objective. What focal length should you choose for the **eyepiece** to get an angular magnification of 10?
 3. Crawford 9.32
 4. Crawford 9.60. Hint: use the formula(s) for angular deflection discussed in class. Add the following questions: evaluate f (defined in the problem) for a pair consisting of a converging lens of focal length f_1 and a *diverging* lens of focal length $-f_1$, for two cases: (a) rays incident from the left; (b) rays incident from the right.
 5. Anderson, 3-5
 6. Anderson, 3-6
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