Section B (Test 1, Phys 262, Sp. '06) **Name:** Solutions

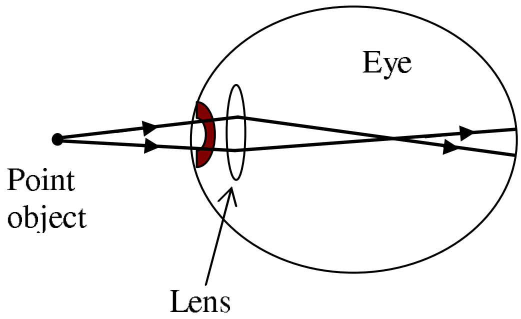
1. A nearsighted woman has an uncorrected far point (farthest point the person can see clearly) of 0.2 m.

(a) When her vision is **uncorrected**, she looks at an point object that is 0.5 m away from her eye. Sketch (at least two) light rays that emanate from the object and enter her eye in this situation. [10 points]

(b) What power lens should she use, so that she can clearly see objects very far away? (Make sure you include the correct sign in your answer.) [10 points]

Answers:

(a)



(b) You need to put the images of objects that are very far away ($d_{\text{object}} = \infty$) at a distance $d_{\text{image}} = -0.2\,\text{m}$ (negative because the image is virtual), because that's the farthest the woman can see. Substituting these into the thin-lens equation,

$$\frac{1}{f} = \frac{1}{d_{\text{object}}} + \frac{1}{d_{\text{image}}}$$

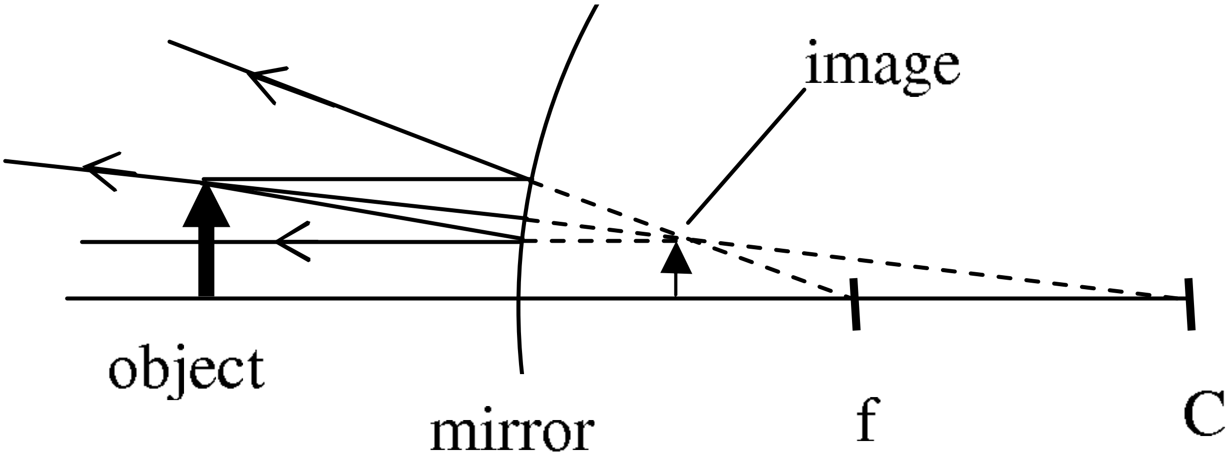
gives a lens power of

$$\frac{1}{f} = \frac{1}{\infty} + \frac{1}{-0.2\,\text{m}} = -5\,\text{D}$$

Answer Key to Section A

1. B	6. B	11. B	16. A	21. A
2. A	7. D	12. C	17. B	
3. D	8. B	13. D	18. A	
4. C	9. B	14. C	19. C	
5. A	10. D	15. C	20. C	

2. The diag
mirror with



(a) Draw the ray diagram (include at least 2 rays) for the above situation. Indicate where the image is. (If you don't have a ruler, you can use the edges of a sheet of paper to draw straight lines.) The focal point and the center of curvature are indicated by f and C, respectively. [10 points]

(b) *Calculate* where the image should be. [8 points]

(c) What is the linear magnification factor of this image? (Include the correct sign.) [2 points]

Answers:

(b) The magnitude of the focal length f is half the radius of curvature, therefore $f = -1.0\,\text{m}$ (negative because it is a diverging mirror). The object distance is $d_{\text{object}} = 1.0\,\text{m}$, and therefore

$$\frac{1}{d_{\text{image}}} = \frac{1}{f} - \frac{1}{d_{\text{object}}} = (-1-1)\frac{1}{\text{m}} = -2\frac{1}{\text{m}}$$

and therefore

$$d_{\text{image}} = -0.5\,\text{m}.$$

(c) Linear magnification $M = -d_{\text{image}}/d_{\text{object}} = 0.5$