

Chapter 34 End-of-Chapter Problems

Halliday & Resnick, 10th Edition

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Hit me where it Matters

1 Problem 1

You look through a camera toward an image of a hummingbird in a plane mirror. The camera is 4.30 m in front of the mirror. The bird is at camera level, 5.00 m to your right and 3.30 m from the mirror. What is the distance between the camera and the apparent position of the bird's image in the mirror?

1.1 Solution

2 Problem 3

In Fig. 34-32, an isotropic point source of light S is positioned at distance d from a viewing screen A and the light intensity I_P at point P (level with S) is measured. Then a plane mirror M is placed behind S at distance d . By how much is I_P multiplied by the presence of the mirror?



Figure 34-32

2.1 Solution

3 Problem 7

A concave shaving mirror has a radius of curvature of 35.0 cm. It is positioned so that the (upright) image of a man's face is 2.50 times the size of the face. How far is the mirror from the face?

3.1 Solution

4 Problem 9-16

Object O stands on the central axis of a spherical mirror. For this situation, each problem in Table 34-3 gives object distance p s (centimeters), the type of mirror, and then the distance (centimeters, without proper sign) between the focal point and the mirror. Find (a) the radius of curvature r (including sign), (b) the image distance i , and (c) the lateral magnification m . Also, determine whether the image is (d) real (R) or virtual (V), (e) inverted (I) from object O or non- inverted (NI), and (f) on the same side of the mirror as O or on the opposite side.

	p	Mirror
9	+18	Concave, 12
10	+15	Concave, 10
11	+8	Convex, 10
12	+24	Concave, 36
13	+12	Concave, 18
14	+22	Convex, 35
15	+10	Convex, 8
16	+17	Convex, 14

4.1 Solution

5 Problem 17-29

Object O stands on the central axis of a spherical or plane mirror. For this situation, each problem in Table 34-4 refers to (a) the type of mirror, (b) the focal distance f , (c) the radius of curvature r , (d) the object distance p , (e) the image distance i , and (f) the lateral magnification m . (All distances are in centimeters.) It also refers to whether (g) the image is real (R) or virtual (V), (h) inverted (I) or non-inverted (NI) from O, and (i) on the same side of the mirror as object O or on the opposite side. Fill in the missing information. Where only a sign is missing, answer with the sign.

Table 34-4 Problems 17 through 29: More Mirrors. See the setup for these problems.

	(a) Type	(b) f	(c) r	(d) p	(e) i	(f) m	(g) R/V	(h) I/NI	(i) Side
17	Concave	20	-40	+10				I	
18				+24		0.50			
19					-10				
20				+40		-0.70			
21				+30					
22						+0.10			
23						+0.20			
24				+60		-0.50			
25				+30		0.40			
26				+60					Same
27					-15				
28				+10		+1.0			
29					4.0				
	Convex		40						

5.1 Solution

6 Problem 32-38

An object O stands on the central axis of a spherical refracting surface. For this situation, each problem in Table 34-5 refers to the index of refraction n_1 where the object is located, (a) the index of refraction n_2 on the other side of the refracting surface, (b) the object distance p , (c) the radius of curvature r of the surface, and (d) the image distance i . (All distances are in centimeters.) Fill in the missing information, including whether the image is (e) real (R) or virtual (V) and (f) on the same side of the surface as object O or on the opposite side.

Table 34-5 Problems 32 through 38: Spherical Refracting Surfaces. See the setup for these problems.

	n_1	(a) n_2	(b) p	(c) r	(d) i	(e) R/V	(f) Side
32	1.0	1.5	+10	+30			
33	1.0	1.5	+10		-13		
34	1.5		+100	-30	+600		
35	1.5	1.0	+70	+30			
36	1.5	1.0		-30	-7.5		
37	1.5	1.0	+10		-6.0		
38	1.0	1.5		+30	+600		

6.1 Solution

7 Problem 39

In Fig. 34-38, a beam of parallel light rays from a laser is incident on a solid transparent sphere of index of refraction n . (a) If a point image is produced at the back of the sphere, what is the index of refraction of the sphere? (b) What index of refraction, if any, will produce a point image at the center of the sphere?

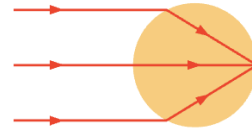


Figure 34-38 Problem 39.

7.1 Solution

8 Problem 41

A lens is made of glass having an index of refraction of 1.5. One side of the lens is flat, and the other is convex with a radius of curvature of 20 cm. (a) Find the focal length of the lens. (b) If an object is placed 40 cm in front of the lens, where is the image?

8.1 Solution

9 Problem 45

You produce an image of the Sun on a screen, using a thin lens whose focal length is 20.0 cm. What is the diameter of the image? (See Appendix C for needed data on the Sun.)

9.1 Solution

10 Problem 49

An illuminated slide is held 44 cm from a screen. How far from the slide must a lens of focal length 11 cm be placed (between the slide and the screen) to form an image of the slide's picture on the screen?

10.1 Solution

11 Problem 53

11.1 Solution

12 Problem 57

12.1 Solution

13 Problem 63

13.1 Solution

14 Problem 69

14.1 Solution

15 Problem 73

15.1 Solution

16 Problem 75

16.1 Solution

17 Problem 81

17.1 Solution

18 Problem 83

18.1 Solution

19 Problem 85

19.1 Solution

20 Problem 87

20.1 Solution

21 Problem 99

21.1 Solution

22 Problem 105

22.1 Solution

23 Problem 109

23.1 Solution

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