Physics 7C, Fall 2000, Section 1
Instructor: Adrian Lee

First Midterm Examination, Monday October 2

Name:_____

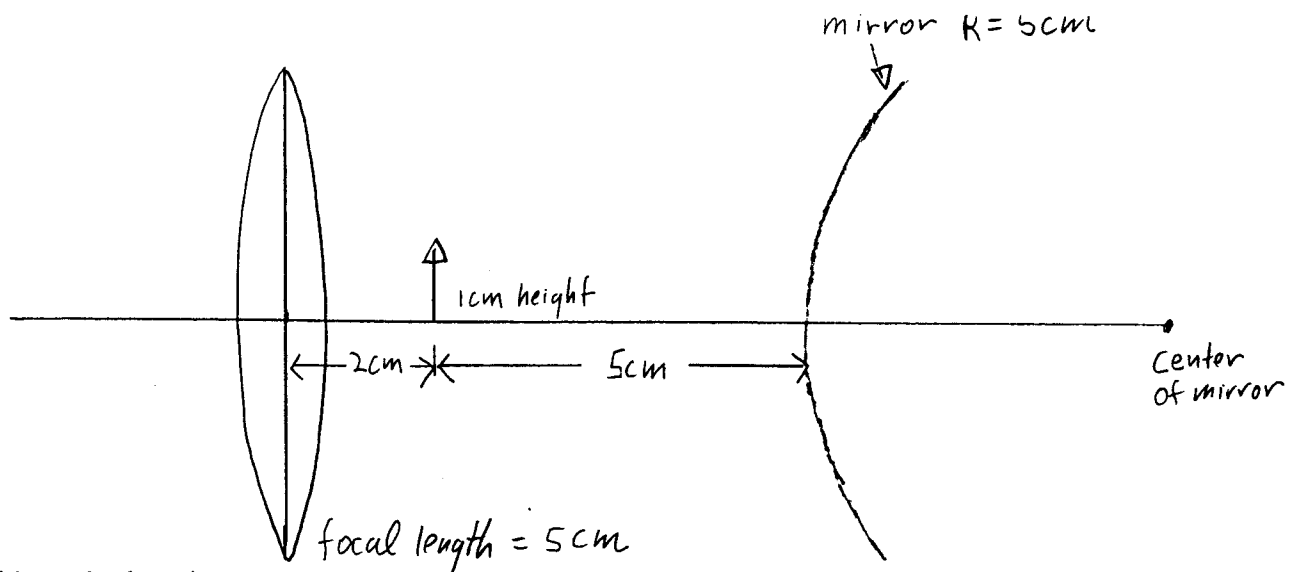Student ID:_____

Discussion Section Number/Time/TA:_____

Please write on the paper provided. You can write on both sides of the page. You may use one 8.5" x 11" sheet of double-sided notes.

	Score
Problem 1 (40 pts)	
Problem 2 (40 pts)	
Problem 3 (40 pts)	
Total	

mirror R = 5cm

1)

1cm height

←—2cm—→|←———— 5cm ————→|

Center
of mirror

focal length = 5cm

Consider only the mirror

a) Do a ray tracing. Is the image real or virtual? (10 pts)
b) What is the image distance i? (5 pts)
c) What is the image height? (5 pts)

Consider the lens and the mirror. All questions refer to light that reflects from the mirror once and is refracted by the lens once.

d) Do a ray tracing. Is the image real or virtual? (10 pts)
e) What is the image distance i? (referred to lens) (5 pts)
f) What are r1 and r2 for the lens? (|r1| = |r2|) (5 pts)

2)

focal length = 50 cm   focal length = 10 cm
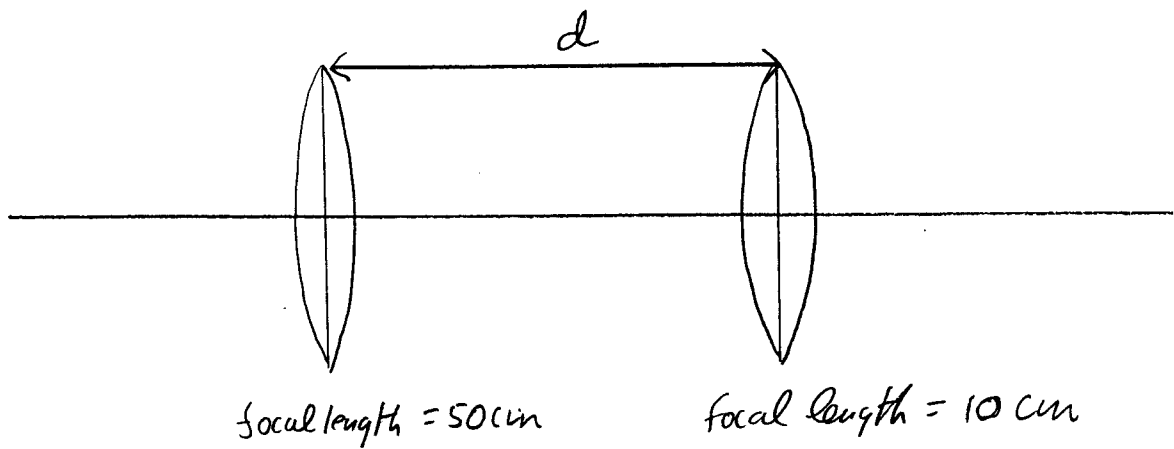
a)   Draw a ray diagram for an object at infinity to the left and the final image at infinity
     to the right (suitable for the eye) (10 pts)

b)   What is d? (10 pts)

c)   Derive the angular magnification of the system. (10 pts)

d)   If the eyepiece was replaced with a concave lens with focal length = -10 cm, what does
     d have to be to have the resulting final image at infinity? (a ray diagram may help) (10 pts)

$\downarrow \downarrow \downarrow$ light

Glass $n = 1.5$

Plastic $n = 1.2$

t t d
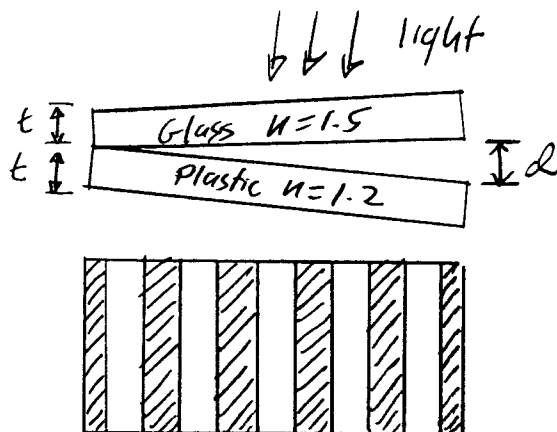
$(t \gg d)$

ignore thickness of Glass and Plastic

3)

a)   A flat piece of glass with n = 1.5 is placed over a flat piece of plastic with n = 1.2. They touch at the left edge and are separated by d on the right edge. Light with wavelength 600 nm is incident normally from above. Given the drawing of the dark fringes above, what is the value for d? (25 pts)

b)   If the gap is filled with water with n = 1.33, how many dark fringes appear? (15 pts)