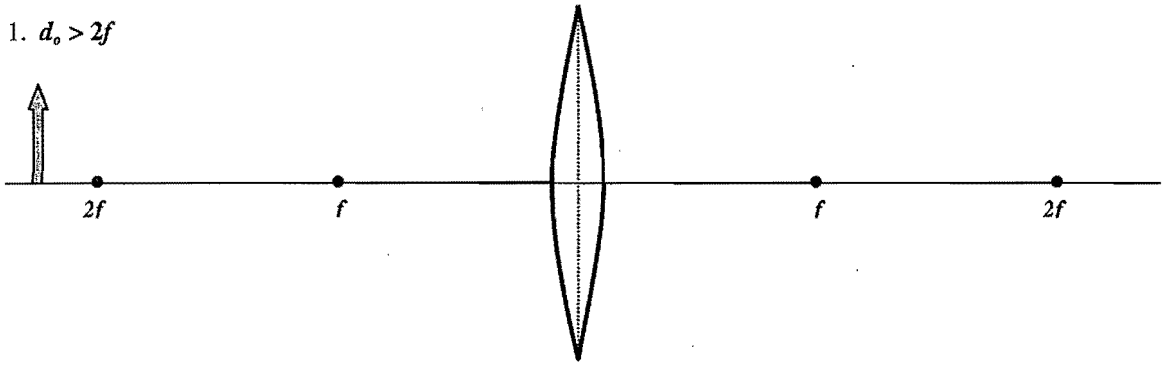
Physical Science
Ray Diagrams – Lenses

Name_____
Date_____

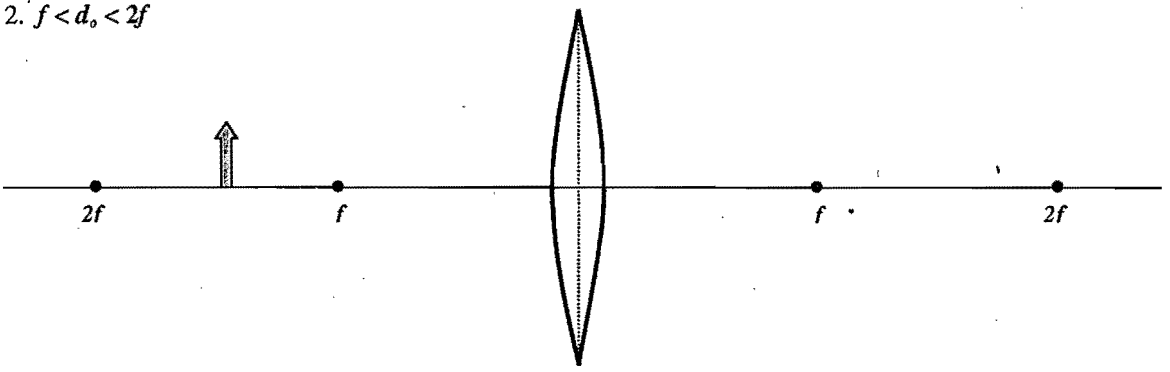
Ray Diagrams - Thin Lenses

Directions: Use ray diagrams to construct images in each of the following examples. The textbook pages **576** and **577** may be helpful. Recall the three rays which are used to create images, and recall that light passes THROUGH lenses.

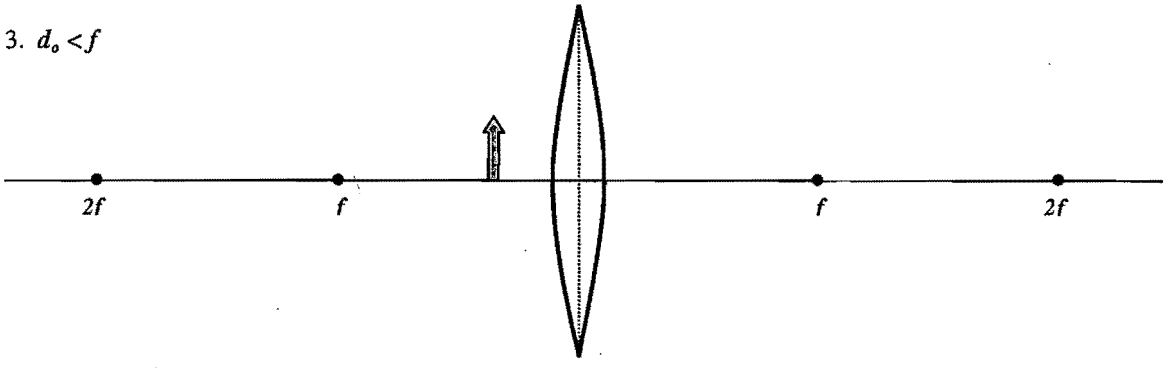
1. $d_o > 2f$



2. $f < d_o < 2f$

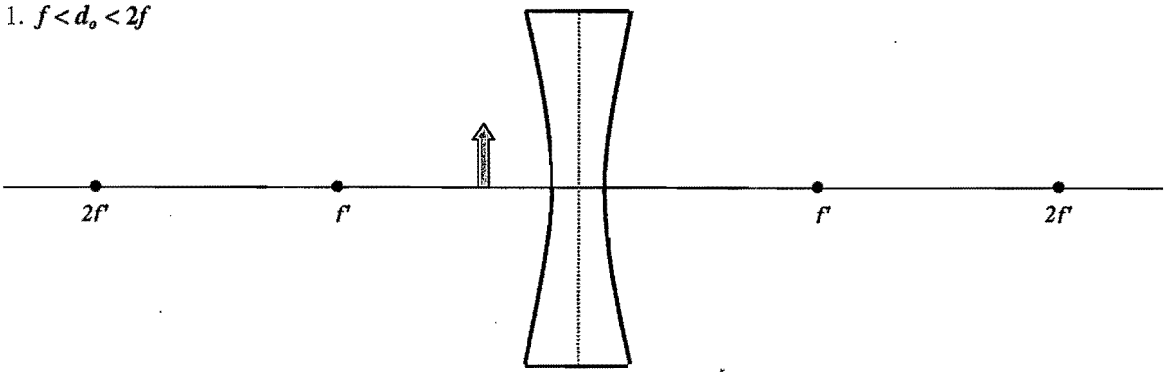


3. $d_o < f$

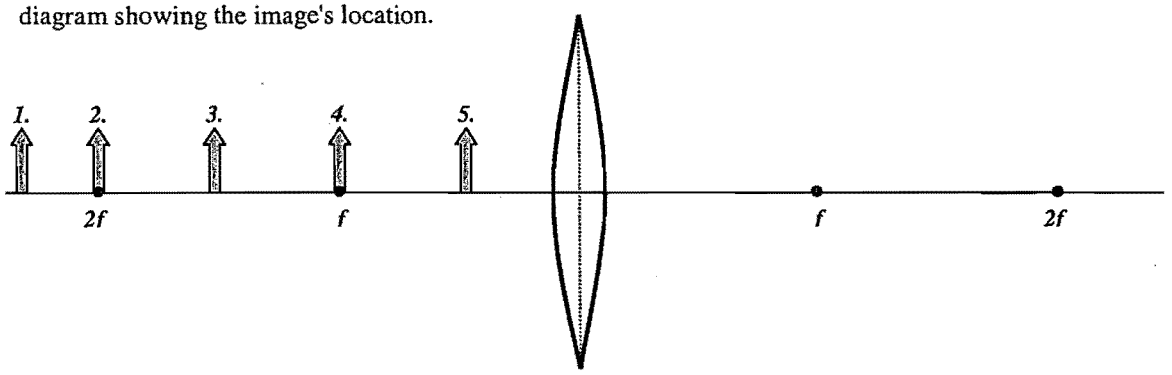


Concave Lens

1. $f < d_o < 2f$



The following diagram shows positions of the object for each trial of an experiment. The point ***2f*** is twice as far from the lens as the focal point ***f*** is from the lens. For each trial write circled numbers ***1-5*** on the diagram showing the image's location.



1. Which trial represents the use of a magnifying glass, where you want a large, right-side-up image?

2. Which trial represents the use of a film projector, where a large image is cast on a screen?

3. If movies are cast off a screen, they are real images. Why aren't movies therefore up-side-down?

4. What trial do you think best represents the use of the eye? The "screen" on the back of the eye is called the retina.

After completing the previous diagrams you should be able to fill in the appropriate charts below. Refer to the lens diagrams above for answers.

Convex Lens

Object Position	Image Position	Inverted or Upright	Magnification (larger, smaller, or same)	Real or Virtual
do > 2f				
do = 2f				
f < do < 2f				
do = f				
do < f				

Concave Lens

Object Position	Image Position	Inverted or Upright	Magnification (larger, smaller, or same)	Real or Virtual
anywhere				

Physics 432
Lens Equation Practice

Name: _____
Date: _____ Hr. _____

Directions: Please show all work including formulas and units.Use the back of this page to show work if you'd like.

1. An object is placed 15 cm in front of a convex lens which has a focal length of 10 cm. The height of the object is 4 cm. Find:
   a) the location of the image.

   b) the height of the image.

   c) is the image real or virtual?

2. An object is placed 15 cm in front of a concave lens which has a focal length of 10 cm. The height of the object is 4 cm. Find:
   d) the location of the image.

   e) the height of the image.

   f) is the image real or virtual?

3. An object is placed 12 cm in front of a lens. An inverted real image appears 18 cm behind the lens.
   a) What type of lens is this?

   b) What is the focal length of the lens?

   c) If the height of the object is 3 cm, what is the height of the image?

4. An object is placed 5 cm in front of a convex lens which has a focal length of 10 cm. The height of the object is 4 cm. Find:
   g) the location of the image.

   h) the height of the image.

   i) is the image real or virtual?

1. a) 30 cm
   b) -8 cm
   c) real

2. d) -6 cm
   e) +1.6 cm
   f) virtual

3. a) convex
   b) 7.2 cm
   c) -4.5 cm

4. g) -10 cm
   h) -8 cm
   i) virtual

Physics 432 Name _____

Eye Optics

Nearly 30% of the US population is considered nearsighted and 5 to 10% of Americans are farsighted. Basically that boils down to a large group of people who are reliant on lenses to be able to see clearly. Myopia (nearsightedness) and hyperopia (farsightedness) are both conditions that can be corrected with information we learn in this unit.

Purpose: Understand the different vision problems and how to fix them.

Go to the following website: http://www.nei.nih.gov/healthyeyes/problems.asp

1. Look at the picture of the normal eye. Does the shape of the lens appear to look like a concave or convex lens?

2. For normal vision, where does the lens focus the light?

3. Define Nearsightedness:

4. Draw a picture of how an eye focuses if it is affected by nearsightedness:

5. What type of lens, concave or convex, might be able to help fix this problem?

6. Define Farsightedness:

7. Draw a picture of how an eye focuses if it is affected by farsightedness:

8. What type of lens, concave or convex, might be able to help fix this problem?

9. What is astigmatism?

10. Go to the following website and check your answers: http://www.mysciencesite.com/optics4.html