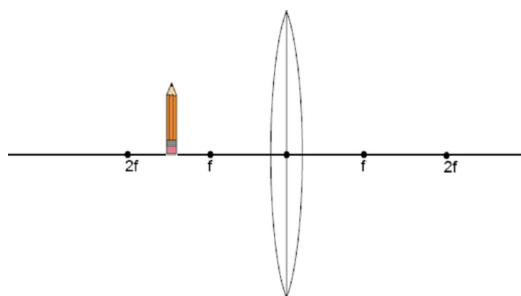
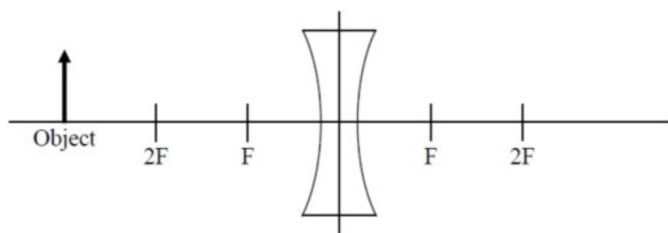
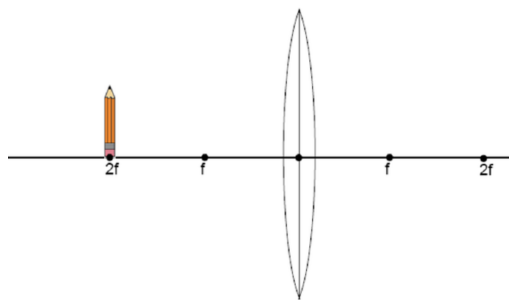
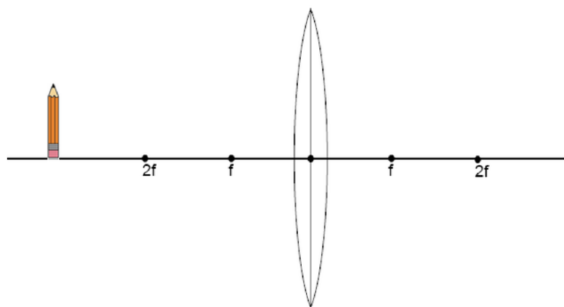


Optics Review

Name: _____

Answer the following questions and show all work where needed.

1. A light ray travels from one medium into another. What would the conditions of the mediums need to be for the ray to bend toward the normal?
2. A light ray passes from air into glass. Describe what happens to the speed of the light ray during this change.
3. What is the relationship between the speed of light and the index of refraction of a transparent material?
4. Does refraction *always* occur when light passes from air into a glass object? Explain.
5. A ray of light enters the top of a glass of water at an angle of 36° with the vertical/normal. What is the angle between the refracted ray and the vertical/normal?
6. Nephrite jade was once used virtually everywhere by Neolithic man for polished stone weapons. Nephrite jade was also important in ancient oriental art. Suppose light passes from air at an angle of incidence of 59.2° into a thin ornate handle of a nephrite jade vase on display at a museum refracting the light at an angle of 32.2° . What is the index of refraction for nephrite jade?
7. Which type of lens could you use to start a fire by focusing the sun's image? Describe how you would position the lens.
8. Complete the ray diagrams below. Identify the lens type, image orientation, image size, and if the image is real or virtual.



9. There are two converging lenses in a compound microscope. Why is the image still inverted?

10. Light moves from glass into a substance of unknown refraction index. If the critical angle for the glass is 46° and the index of refraction for the glass is 1.5, what is the index of refraction of the other substance?
11. The largest uncut diamond had a mass of more than 600 g. Eventually, the diamond was cut into several pieces. Suppose one of those pieces is a cube with sides 1.00 cm wide. If a beam of light were to pass from air into the diamond with an angle of incidence equal to 75.0° , the angle of refraction would be 23.3° . From this information, calculate the index of refraction and the critical angle for diamond in air.
12. A microscope slide is placed in front of a converging lens with a focal length of 3.6 cm. The lens forms a real image of the slide 15.2 cm behind the lens. How far is the lens from the slide? What is the magnification?
13. Where must an object be placed to form an image 12 cm in front of a diverging lens with a focal length of 44 cm? What is the magnification?
14. What are the conditions necessary for a mirage? How do these conditions differ to make an inferior mirage vs. a superior mirage? Describe how these two types of mirages differ.
15. A diamond shows flashes of color when it is moved around under a bright white light. How do you explain the appearance of colors?
16. Cal is having a hard time seeing things far away. Identify the name of his vision problem, explain what is happening inside the eyeball that creates this problem and identify what kind of lens would fix this vision problem and why.
17. Which of the following colors of light would be most refracted by a prism: red, green, yellow, blue? Explain your choice.