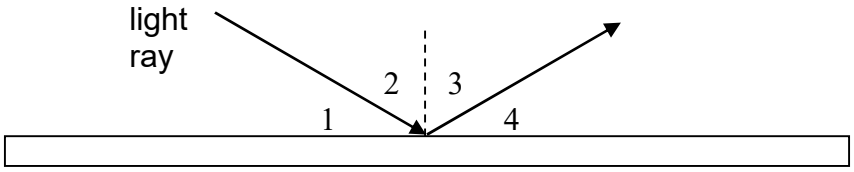
Assignment #1 Read pages 385 - 399.

1. What is the Law of Reflection?

2. Which angle is the angle of incidence and which is the angle of reflection on the diagram below?



3. What is the difference between a virtual image and a real image?

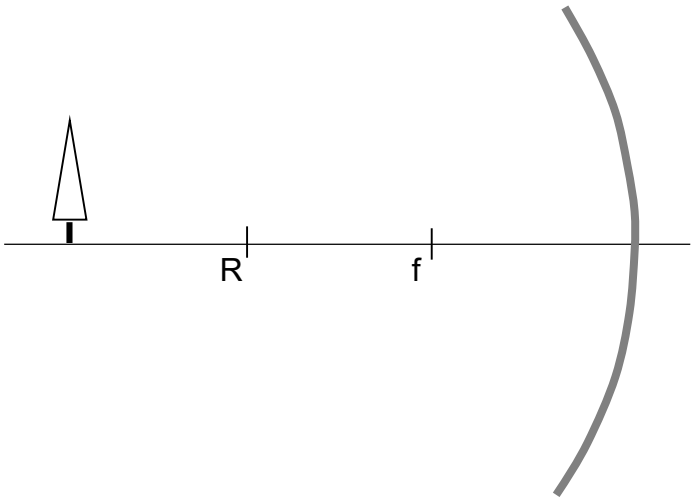
4. What is a focal point?

5. If the radius of a spherical mirror is 24 cm, what is the distance to its focal point?

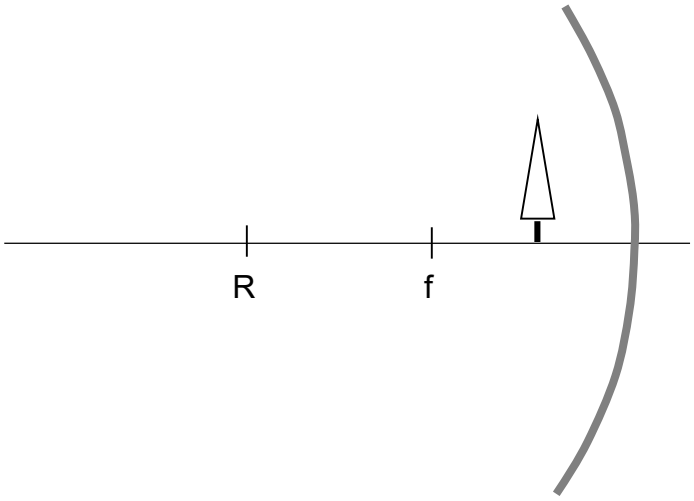
Use a ruler to neatly draw these diagrams on the following sheet.

6. Draw a ray tracing for a concave mirror with an object in front of the focal point.
   a. Is the image real or virtual?
   b. Is it magnified or reduced?
   c. Is it upright or inverted?
7. Draw a ray tracing for a concave mirror with an object behind the focal point.
   a. Is the image real or virtual?
   b. Is it magnified or reduced?
   c. Is it upright or inverted?
8. Draw a ray tracing for a convex mirror.
   a. Is the image real or virtual?
   b. Is it magnified or reduced?
   c. Is it upright or inverted?

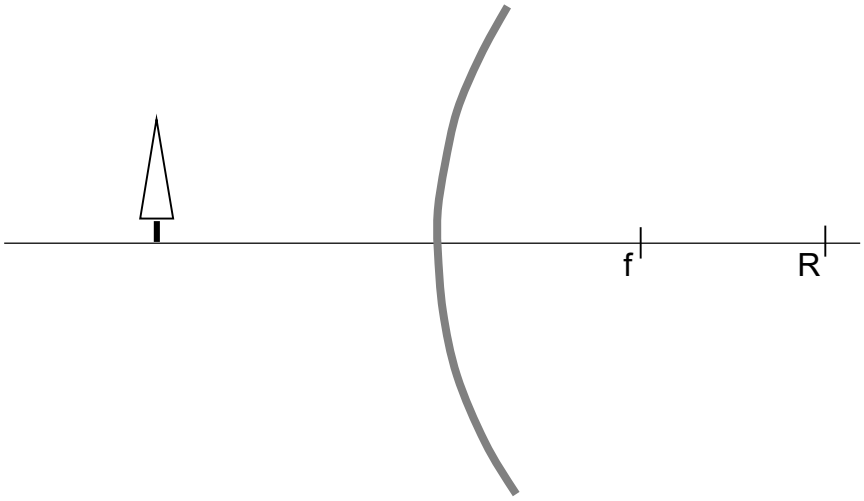
For Problem 6: PRINT OUT THIS SHEET AND DO THE RAY TRACING ON IT. USE A RULER.



For Problem 7:

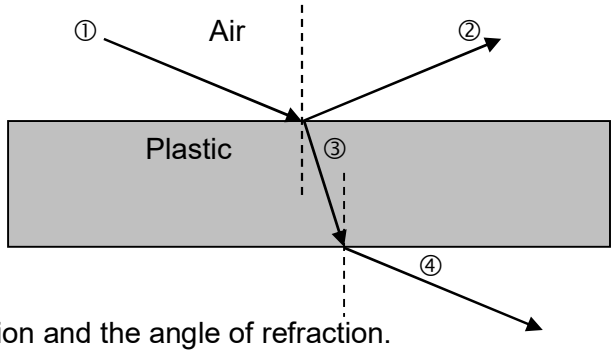


For Problem 8:



9. What is refraction?

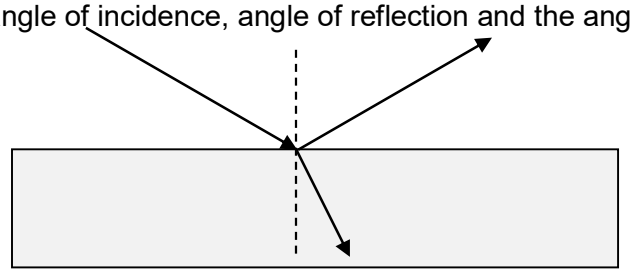
10. Ray 1 is the incident ray.



   a. Which ray or rays are reflected?

   b. Which ray or rays are refracted?

11. Label the angle of incidence, angle of reflection and the angle of refraction.



12. What happens to the frequency of light when it refracts?

13. What happens to the wavelength of light when it refracts?

14. Write Snell's Law.

15. The index of refraction of diamond is 2.4 and the index of refraction of ice is 1.3. A light ray is shined through both substances.

   a. In which substance, would the speed of light be slower?

   b. Which substance has the larger angle of refraction?

16. A jeweler shined a light through a stone that was supposed to be a diamond. The angle of incidence was 15° and the angle of refraction was 6.7°. What kind of material was it?

Indices of Refraction	
Cubic zirconia	2.20
Diamond	2.42
Quartz	1.46
Glass	1.66

17. Use the index of refraction to calculate the speed of light through glass.

18. Draw a ray tracing for a double convex lens.

   a. Is the image real or virtual?

   b. Is it magnified or reduced?

   c. Is it upright or inverted?

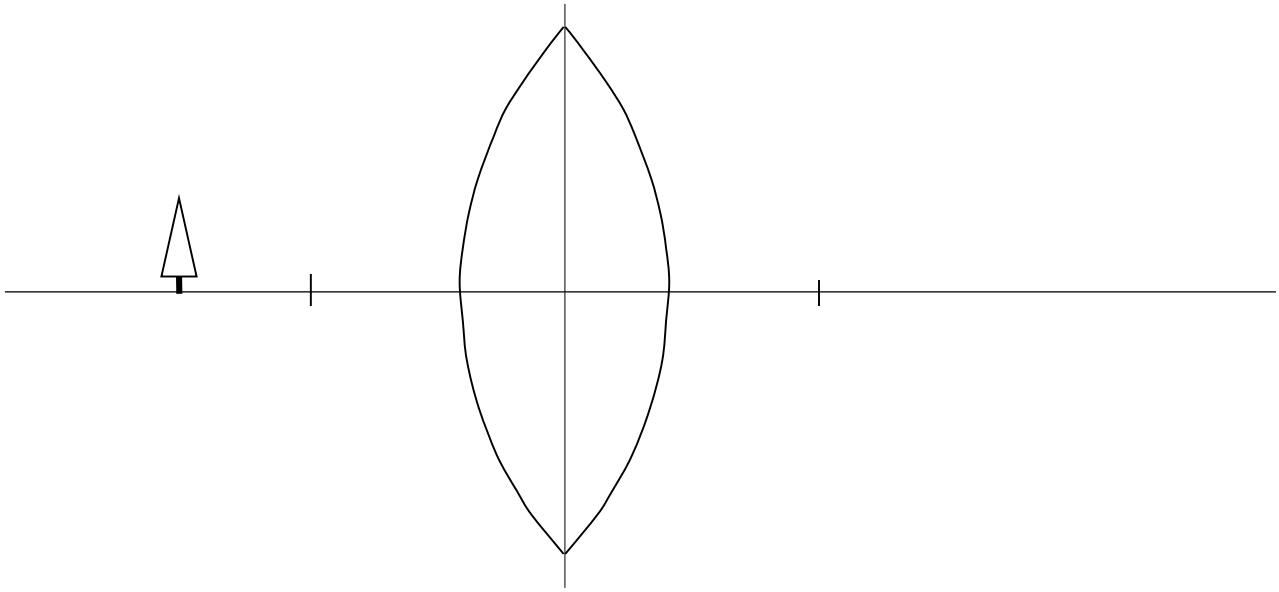
19. Draw a ray tracing for a double concave lens.

   a. Is the image real or virtual?

   b. Is it magnified or reduced?

   c. Is it upright or inverted?

For Problem 18: PRINT OUT THIS SHEET AND DO THE RAY TRACING ON IT.
USE A RULER.



For Problem 19: