Lens Problems

1. An object (1 cm tall) is 8 cm from a **<u>converging lens</u>** that has a focal length of 3 cm. Find the location and the size of the image using: (q= 4.8 cm, hi= -0.6 cm)
   scaled ray diagram:

   q =

   hi =

   equations:

   q =

   hi =

2. An object (1 cm tall) is 5 cm in front of a **<u>diverging lens</u>** that has a focal length of 2 cm. Find the location and the size of the image using: *(q= -1.43 cm, hi = 0.29 cm)*
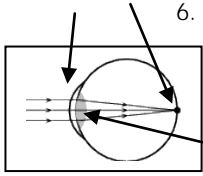   **scaled ray diagram**:

   q =

   hi =

   equations: *(Hint: Remember you will need to make f negative for diverging lenses.)*

   q =

   hi =

3. Your physics teacher's eyes are -7.00 on her prescription for contacts. What do those numbers mean?

4. Why is f (focal length) on both sides of the lens? _____

5. Explain how lenses are used to correct vision for people that are
   a. Farsighted:

   b. Nearsighted:

6. Label the parts of the eye.
    a. Where are the rods and cones located? _____
    b. What part of sight do the rods work for? _____
    c. What part of sight do the cones work for? _____
    d. If you are colorblind, which cells in your eye are missing/don't work well?

7. A microscope has a converging lens with a focal length of 2.0 cm. A fly that is 0.7 cm tall is placed 1.2 cm from the lens.   Find the **image distance** and **image height** using a scaled ray diagram <u>and</u> equations. *(ans -3 cm and 1.75 cm)*

<u>scaled ray diagram</u>:

q =

hi =

q =

hi =

<u>equations</u>:

8. Sherlock Holmes examines a shoe print by holding his magnifying glass (with a focal length of 15 cm) at a distance of 10 cm away from the shoe print. Find the **image distance** and the **magnification** of his magnifying glass using **equations**. *(ans. -30 cm, 3)*

9. You want to use a **converging** lens as a projector to make a real image 100 cm tall of an object that is 10 cm tall.
    a. What is the magnification? _____
    b. If the object is to be put 8.8 cm from the lens, what is the **focal length** of the lens if the image is **inverted**? Solve using **equations**. *(ans. 8 cm)*

10. A 1-cm tall object is 4 cm from a **diverging** lens with a focal length of 2 cm. Calculate the image distance and the image size using **equations**. *(ans. -1.33 cm and 0.33 cm)*

q =

hi =

b) Why is q negative? _____