Physics 200 (Stapleton)   Name: _____
Lens Equation (and magnification)

The Lens Equation: $\frac{1}{f} = \frac{1}{d_o} + \frac{1}{d_i}$ Magnification Equation: $M = \frac{H_i}{H_o} = \frac{-d_i}{d_o}$

** After the first problem or two, feel free to create a spreadsheet to speed up this task.

1.   An object with a **height of 1.2cm** is placed on top of the principal axis of a convex lens, **7.8cm from the center of the lens**. The **focal length of the lens is 3cm**.

   a. Where is the image located? **4.875cm from the lens center, on the opposite side from the object**

   b. What is the image height? **– 0.75cm**

   c. Is the image upright or inverted? **inverted**

   d. What is the magnification of the object in this position? **-0.625**

   e. Is the image real or virtual? **real**

2.   An object with a **height of 2cm** is placed on top of the principal axis of a convex lens, **6cm from the center of the lens**. The **focal length of the lens is 3cm**.

   a. Where is the image located? **6 cm from the lens center, on the opposite side from the object**

   b. What is the image height? **-2cm**

   c. Is the image upright or inverted? **Inverted**

   d. What is the magnification of the object in this position? **-1**

   e. Is the image real or virtual? **real**

3.   An object with a **height of 1.5cm** is placed on top of the principal axis of a convex lens, **5cm from the center of the lens**. The **focal length of the lens is 3cm**.

   a. Where is the image located? **7.5cm from the lens center, on the opposite side from the object**

   b. What is the image height? **-2.25cm**

   c. Is the image upright or inverted? **inverted**

   d. What is the magnification of the object in this position? **-1.5**

   e. Is the image real or virtual? **real**

4.   An object with a **height of 3cm** is placed on top of the principal axis of a convex lens, **3cm from the center of the lens**. The **focal length of the lens is 3cm**.

      a.   Where is the image located? **NA – no image when the object is placed at the focal point**

      b.   What is the image height? **NA – no image when the object is placed at the focal point**

      c.   Is the image upright or inverted? **NA – no image when the object is placed at the focal point**

      d.   What is the magnification of the object in this position? **NA – no image**

      e.   Is the image real or virtual? **NA – no image when the object is placed at the focal point**

5.   An object with a **height of 1.7cm** is placed on top of the principal axis of a convex lens, **1cm from the center of the lens**. The **focal length of the lens is 3cm**.

      a.   Where is the image located? **1.5 cm from the center of the lens, on the <u>same</u> side as the object**

      b.   What is the image height? **2.55cm**

      c.   Is the image upright or inverted? **upright**

      d.   What is the magnification of the object in this position? **1.5**

      e.   Is the image real or virtual? **virtual**