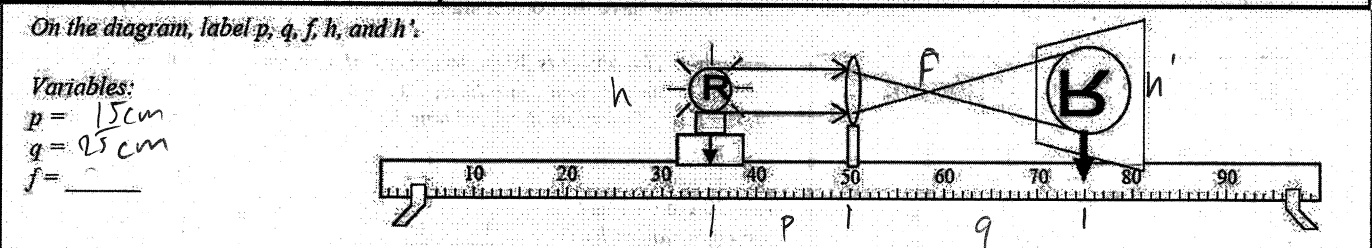
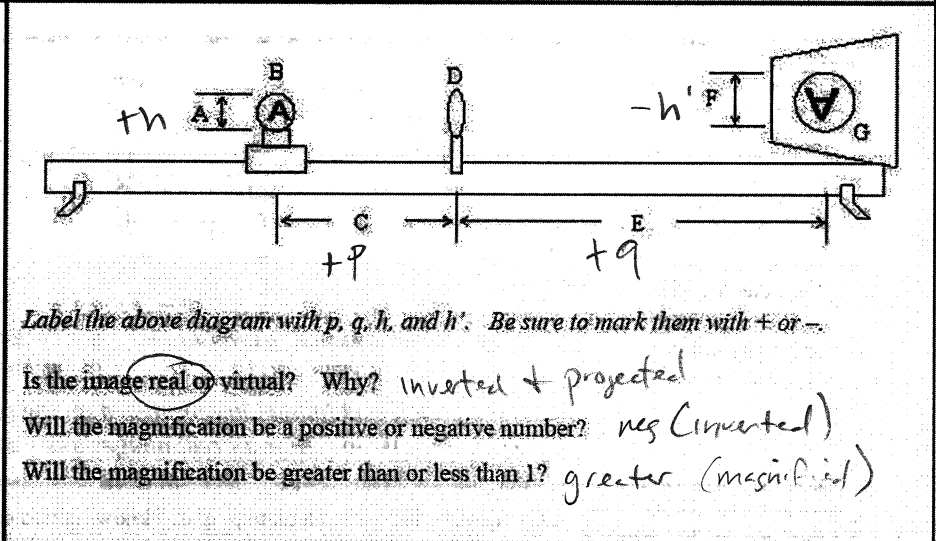


| | | | |
|-------|---|---|---|
| 1. p | D | A. Magnification of the lens. | Which side of a lens is real? R Why? Light <u>really</u> refracts thru a lens to the right |
| 2. q | C | B. Height of the image. | Which side of a mirror is real? L Why? Light <u>really</u> reflects back from a mirror from the right |
| 3. h | E | C. Distance from lens or mirror to the image. | |
| 4. h' | B | D. Distance from lens or mirror to object. | |
| 5. M | A | E. Height of the object. | |

When is f negative? **for divergent devices**
 When is q negative? **when it is on the virtual side**
 Mirrors = **R** Lens = **L**
 When is p negative? **never**
 When is h' negative? **inverted on real side**
 When is h negative? **never**
 When is M negative? **if the image is real, inverted + on real side**

- Positive (+) or negative (-)?
- A. **+** Object distance (p) always
 - B. **-** Right side of a mirror.
 - C. **-** Left side of a lens.
 - D. **-** f for divergent devices.
 - E. **+** q for a real image.
 - F. **+** Left side of a mirror.
 - G. **+** h. *always!*
 - H. **+** Right side of a lens.
 - I. **+** f for convergent devices.
 - J. **-** f for a convex mirror.
 - K. **-** f for a concave lens.
 - L. **-** q for a virtual object.
 - M. **-** h' for a real object.



Calculate the focal length. $\frac{1}{p} + \frac{1}{q} = \frac{1}{f}$
 $\frac{1}{15} + \frac{1}{25} = \frac{1}{f}$ $f = 9.8cm$

Calculate the magnification. $M = \frac{-q}{p} = \frac{-25}{15}$
 $M = -1.7$

If the object is 1.5 cm tall, calculate h'.
 $M = \frac{h'}{h} = \frac{-25}{15}$
 $\frac{1.5cm}{h'} = \frac{-25}{15}$ $h' = -2.5cm$

The object is 12 cm from a convex lens that has a focal length of 5 cm.

Is the lens convergent or divergent?
 Real or virtual focal point? **Positive or negative focal length?**
 Find the distance to the image.
 $\frac{1}{p} + \frac{1}{q} = \frac{1}{f}$
 $\frac{1}{12cm} + \frac{1}{q} = \frac{1}{5cm}$
 $0.083 + \frac{1}{q} = 0.2$
 $\frac{1}{q} = 0.2 - 0.083 = 0.117$
 $q = 8.55cm$

The magnification of a convex mirror is 5. The object is 3 cm tall. How tall is the image?

$M = \frac{h'}{h}$ $h' = M \cdot h = 5 \cdot 3cm = 15cm$

Is the image real or virtual?
 Is the image on the left or right side of the mirror?