

Name Key Hour _____

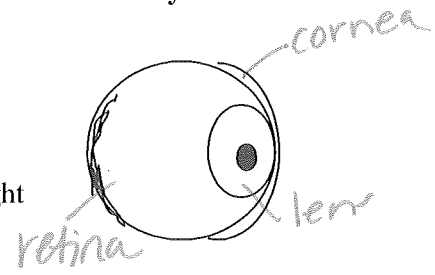
legally blind - 20/200 (can't be corrected w/ lenses)

LENSES AND EYESIGHT:

The eye:

in retina <

- Rods : React to black and white and dim light
- Cones : React to bright light and color vision
- Lens : Transparent with curved sides to bend light



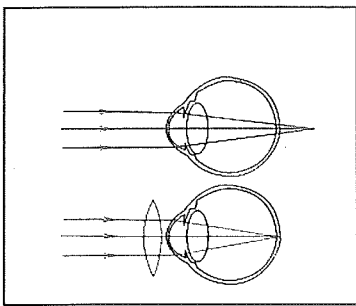
Lenses are used very often to correct your eye sight.

2 common ways to express your eye sight

1) By using an eye chart ex: 20 / 200 means what perfect visioned people see at 200 ft you need to be 20 ft away.

2) From your prescription - 3.25 means you need to be 20 ft to see what perfect visioned people see at 325 ft

Mirrors reflect light
Lenses refract light and have focus on both sides of lens!



Refraction: bending of light

Light converges too late
Need a lens that makes light rays come together sooner

Farsightedness: (+) (hyperopia) *can see far, not near*
Corrected with converging lenses.

Converging Lenses- make the light rays that travel through them **converge**, or **come together**

Converging lenses are thicker in the middle

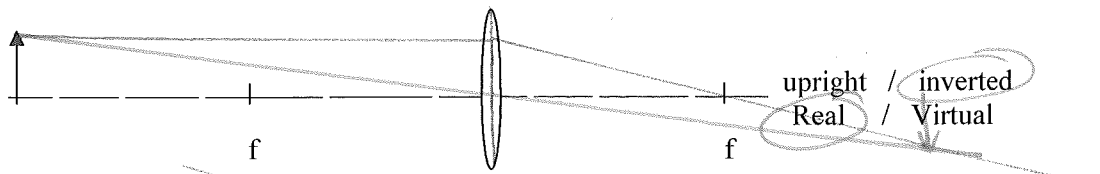
Far away: inverted At focus: blurry Close: larger, upright

Just like for mirrors, we need to draw 2 light rays.

- 1) Draw the first light ray parallel to the axis then converge through focus on other side.
- 2) The second light ray goes from the top of the object through the center of the lens.

f = 3 cm
p = 6 cm
ho = 1 cm

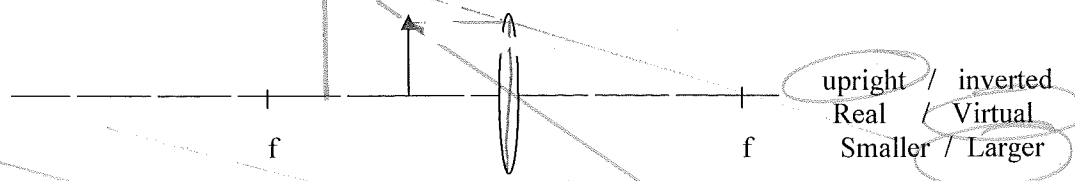
Object beyond the focus:



upright / inverted
Real / Virtual

f = 3 cm
p = 1.5 cm
ho = 1 cm

Object in front of the focus: (*how a microscope and reading glasses work*)



upright / inverted
Real / Virtual
Smaller / Larger

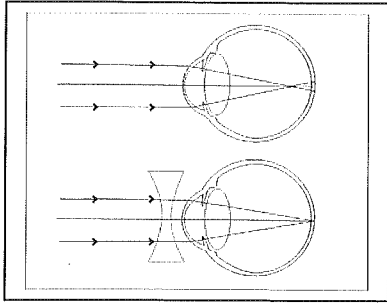
f = 3 cm
p = 3 cm
ho = 1 cm

Object at the focus:



There is no image
blurry

parallel - never intersect



Nearsightedness: (-) (myopia)

Corrected with diverging lenses. *can see near, not far*

Light converges too early
Need a lens that makes the light rays spread out so they converge later

Diverging Lenses- make the light rays that travel through them diverge, or spread out

Diverging lenses are thicker on the edges

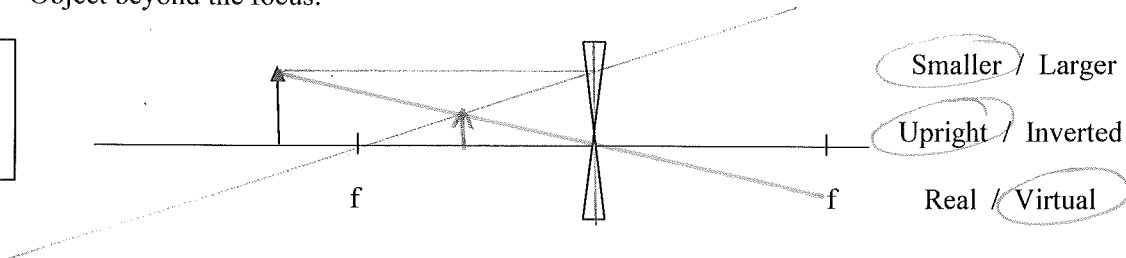
Far away: upright, smaller — Close: → same

Again, we need to draw two light rays so we can find the intersection which is where the image is located.

- 1) The first ray travels parallel then it diverges (or spreads out) so that if you extend it backwards, it goes through the focus on the same side of the lens.
- 2) The second light ray goes from the top of the object through the center of the lens.

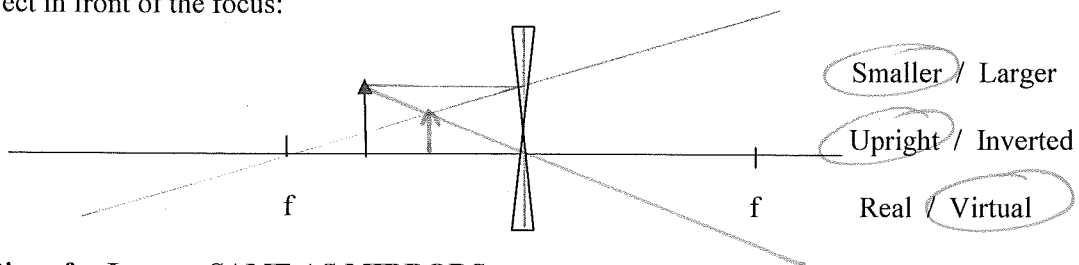
Object beyond the focus:

$f = -3 \text{ cm}$
 $p = 4 \text{ cm}$
 $h_o = 1 \text{ cm}$



Object in front of the focus:

$f = -3 \text{ cm}$
 $p = 2 \text{ cm}$
 $h_o = 1 \text{ cm}$



Equations for Lenses: SAME AS MIRRORS

Sign Conventions for Lenses: (p and h_i will always be positive for us on LEFT side!)

- f is + for converging lens / diverging lens
- f is - for converging lens / diverging lens
- h_i is + when upright / inverted
- h_i is - when upright / inverted
- q is + when image and object on same / opposite side of lens
- q is - when image and object on same / opposite side of lens