Perception: Winter Quarter

Workshop Answers: Week 1

① focal length (f) = 50cm

$d_o = 80cm$

$d_i = ?$

Use equation: $\frac{1}{f} = \frac{1}{d_o} + \frac{1}{d_i}$

$$\frac{1}{50cm} = \frac{1}{80cm} + \frac{1}{d_i}$$

$$0.02cm = 0.0125cm = \frac{1}{d_i}$$

$$\frac{0.0075cm}{1} = \frac{1}{d_i}$$

Cross multiply to solve for d_i

$$0.0075cm(d_i) = 1$$

$$d_i = \frac{1}{0.0075cm}$$

$$d_i = 133.3cm$$

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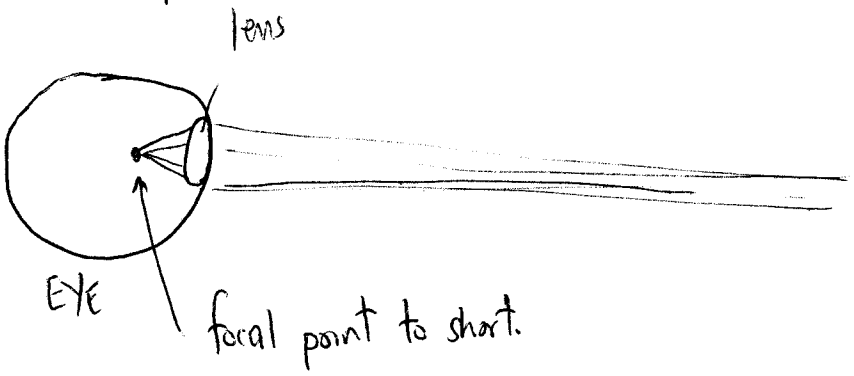
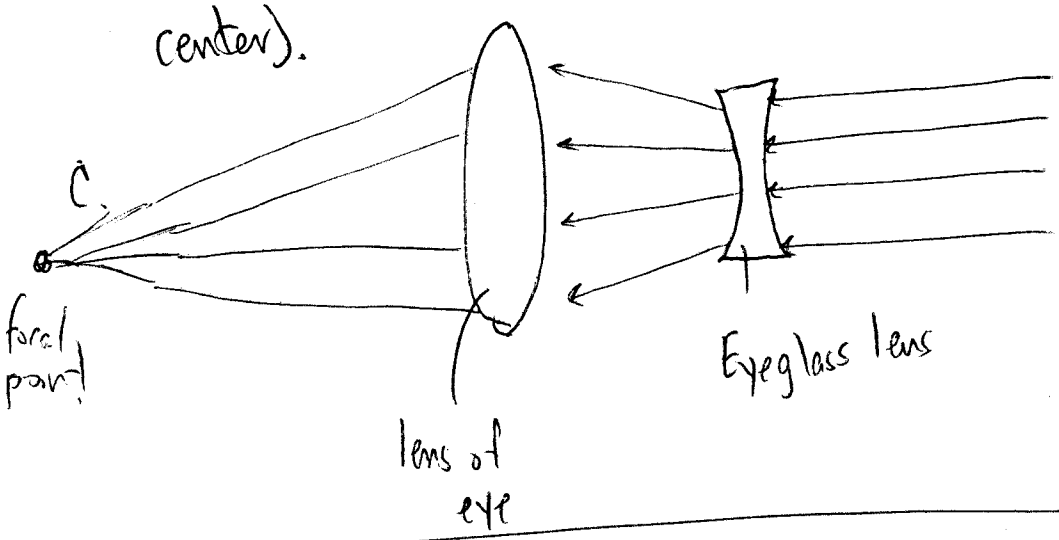
(2)

A. focusing at infinity:



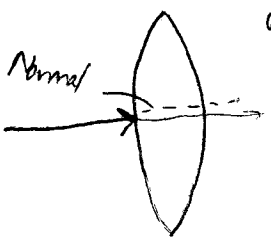
∞ (infinity)

B. This person would need a lens in her glasses that would spread the light rays out (diverge) before hitting the eye. The correct type of lens in a concave (one with edges that are thicker than the center).



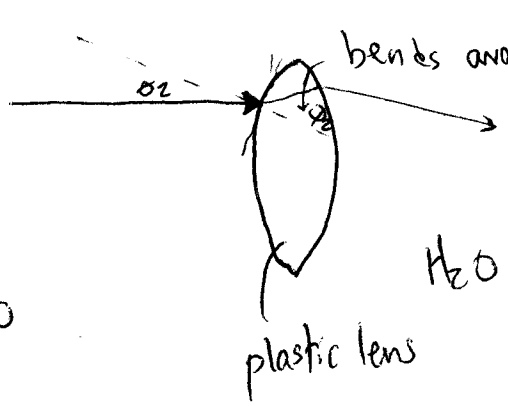
3. Snell's Law: $\frac{\sin \theta_1}{\sin \theta_2} = \frac{n_2}{n_1}$

If a light ray strikes a lens (inbending or ~~concave~~ convex lens) near the center as shown, it is already close to the normal or perpendicular plane of the lens. Looking at Snell's Law, θ_1 and θ_2 would be quite small angles.



If a ray strikes near the edge, it is not forming an angle that is close to the normal and is bent more. ($\theta_1 + \theta_2$ would be large).

4. If an unbending lens (convex) is made of a plastic material with an index of refraction less than H_2O; what would happen if it is placed underwater?



From lecture notes: a light ray passing from a high to low index of refraction, the light bends AWAY from the normal.

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5. n of ethyl alcohol = 1.31 n of air = 1.0

$\sin\theta_2 = 15°$

From Snell's Law:

$$\frac{\sin\theta_1}{\sin\theta_2} = \frac{n_2}{n_1}$$

$$\frac{\sin\theta_1}{\sin 15°} = \frac{1.31}{1}$$

$$\frac{\sin\theta_1}{.26} = \frac{1.31}{1}$$

$$1.31(0.26) = \sin\theta_1$$

$$0.34 = \sin\theta_1$$

to solve for θ_1, take inverse sin of 0.34

$$\boxed{19.9°} = \theta_1$$

or round to $\boxed{20°}$