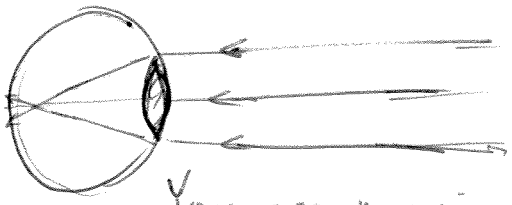
General Problem Solving Guide

Name:	KEY
Lab Time:	
Date:	
Test Code:	
Problem #:	22

List given information, define variables, sketch picture:

[2] 

You are myopic – your eye has a lens system that is too powerful and bends light to hit before retina. You need diverging lens for glasses

[1] 

Simplify question, list target quantity:

[1/2] Power (focal length) of present glasses and for new glasses

List all related quantitative relationships:

[1] $\frac{1}{f} = \frac{1}{i} + \frac{1}{o}$ $\quad D = \frac{1}{f}$

Outline approach, sketch diagrams if needed (or sketch next to pictures above):

[1] A] CURRENT PRESCIPTION NEEDED (NEW)

$o = (20 - .02)\,m$
$i = (1 - .02)\,m$
$D_{glasses} = \frac{1}{(20-.02)} - \frac{1}{(1-.02)} = -0.97\,m^{-1}$

B] PRESENT PRESCRIPTION

$o = (10 - .02)\,m$
$i = (1 - .02)\,m$
$D_{glasses} = \frac{1}{(10-.02)} - \frac{1}{(1-.02)} = -0.92\,m^{-1}$

[1/2] NOTE: IMAGE DISTANCES are negative since image is on same side of lens as object

Obtain a general solution:

Optional

New prescription would require adding power to present prescription

$o = (20 - .02)\,m$

$i = (10 - .02)\,m$

$D_+ = \frac{1}{(20-.02)} - \frac{1}{(10-.02)} = -0.05$

So

$D_{new} = D_g + D_+$

↑ present prescription

$= -.92 - .05 = -.97$

Check Units: _____.

$m^{-1} = \frac{1}{m} + \frac{1}{m}$ ✓

[1]

Check Limiting Cases: _____.

$i \downarrow \quad D \uparrow$ (becomes more negative

$o \uparrow \quad D \uparrow$

and vice versa

[1]

Obtain a numeric solution: _____.
(i.e. plug in the numbers)

$D_{present} = -0.92\ m^{-1}$

$D_{New} = -0.97\ m^{-1}$

[1]

Why is solution reasonable? Explain.

- Units check
- Limiting cases make sense
- D is negative [1]
- PRESCRIPTION IS A REASONABLE number (NOT CRAZY huge like -10 D)