Questions 6.-10. refer to the five choices below. Answer with **each and every correct answer.**

A. PLANE MIRROR **B. CONCAVE MIRROR** **C. CONVEX MIRROR**

B 6. Which of the above is capable of producing real images?

A,B,C 7. Which of the above is capable of producing virtual images?

C 8. Which type could never give an image that is the same size as the object?

A,B,C 9. Which of the following produces images by reflection?

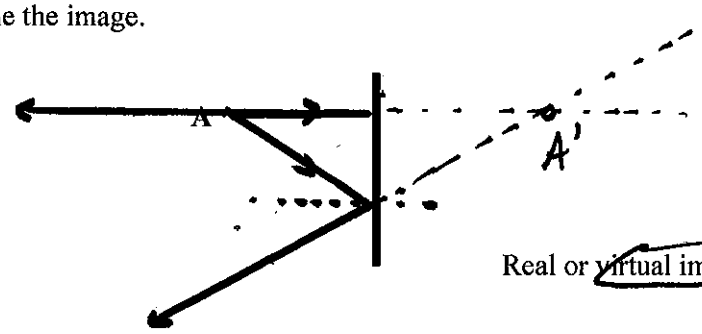
B 10. Which mirror takes rays parallel to the p.a. and converges them to a point?

A 11. Where must you place an object in front of a concave mirror to get an image of the same size? a) anywhere b) between f & c c) at f d) at 2f

C 12. Where must you place an object in front of a concave mirror to get no image?
a) anywhere b) between f & c c) at f d) at 2f

B 13. The focal length (f) of a mirror is 10 cm. What is its center of curvature?
a) 5 cm b) 20 cm c) 10 cm d) infinitely long $c = 2f$

14. Reflect any two rays you like that leave point A off the mirror obeying the law of reflection. Next, determine the image.



Real or virtual image? Why? because reflections had to be extended back to cross.

B 15. In order that you are able to see a full-length view of yourself, the minimum size for a plane mirror must be
a) ¼ your height b) ½ your height c) ¾ your height
d) your full height e) depends on your distance

REFRACTION & LENSES REVIEW

16. Do you know WHY light refracts when it strikes a new medium at angle?

Light refracts b/c its speed changes.

17. What else changes when the light enters the new medium? What remains the same? The wavelength also changes (f constant).

18. What is the *index of refraction (n)* and what does it tell you?

n tells me how much the speed of light changes by.

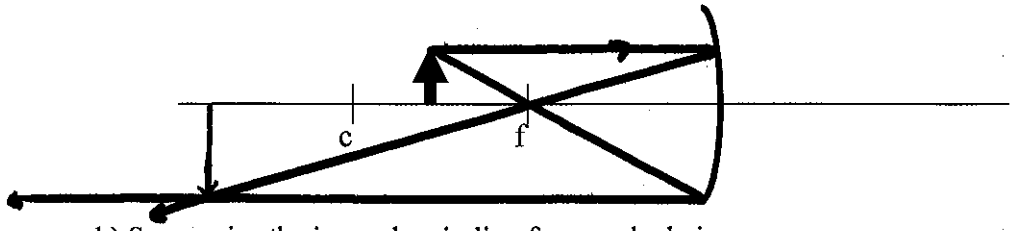
$n = \frac{c}{v}$

Mirror & Lens TEST review

NAMES KEY

REFLECTION & MIRRORS REVIEW

1. a) Locate the image by reflecting light rays from the **concave mirror**.



b) Summarize the image by circling from each choice:

(Real or Virtual?), (Smaller, Same Size or Larger?), (Upright or Inverted?)

c) **Measure** d_i and s_i and f. d_i= 6.7 cm s_i= 1.2 cm f = 2.5 cm

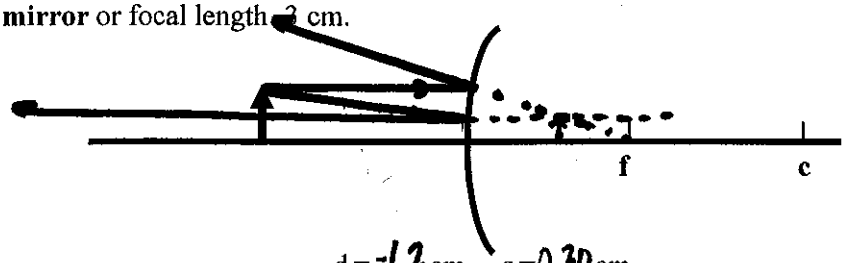
d) **Calculate** d_i and s_i using the mirror equations. NOTE: You will need to use your measured object distance, focal length, and size of the object to begin with.

d_o = 3.8cm
s_o = 0.80cm
d_i = ?
s_i = ?

$\frac{1}{d_o} + \frac{1}{d_i} = \frac{1}{f}$ $\frac{1}{3.8} + \frac{1}{d_i} = \frac{1}{2.5}$ $\frac{1}{d_i} = 0.40 - 0.26 = 0.14$ $d_i = 7.1$cm

d_i= 7.1 cm s_i= 1.5 cm

2. Determine the image location and size of a 1-cm tall object placed 4 cm in front of a **convex mirror** or focal length 3 cm.



d_i= -1.2 cm s_i= 0.30 cm

$\frac{s_i}{s_o} = \frac{-d_i}{d_o}$

$\frac{s_i}{0.80\text{cm}} = \frac{-7.1\text{cm}}{3.8\text{cm}}$

$s_i = 1.50$cm

3a. Explain the ideal location of a light bulb in a flashlight if a parallel beam of light is desired.

The bulb should be @ f so reflections come out parallel as a "beam".

3b. Where should a microphone be placed in a parabolic microphone (for sporting events) in order to pick up the most sound? Explain.

The microphone should be @ f b/c reflections from distant sources (~parallel to p.a.) will reflect there.

D 4. Where must you place an object in front of a concave mirror to get a virtual image?

a) anywhere b) between f & c c) at f d) between f & mirror

A 5. Where must you place an object in front of a convex mirror to get a virtual image?

a) anywhere b) between f & c c) at f d) between f & mirror

$n = \frac{c}{f} = \frac{3.0\times10^{8}\ m/s}{5.09\times10^{14}\ Hz} = 5.9\times10^{-7}\ m$ in air

A ray of light (f = 5.09 x 10^{14} Hz) is incident upon a surface of diamond.

19a. Can you determine the speed of light in diamond?

$n = \frac{c}{v}$ $\quad v = \frac{c}{n} = \frac{3.0\times10^{8}\ m/s}{2.42} = 1.2\times10^{8}\ m/s$

19b. Can you determine the wavelength of this light in diamond?

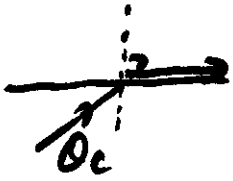
$\lambda_n = \frac{\lambda}{n} = \frac{5.9\times10^{-7}\ m}{2.42} = 2.4\times10^{-7}\ m$

19c. What is its frequency in diamond?

Still $f = 5.09\times10^{14}$ Hz

20. What exactly is the *critical angle*?

The $\angle$ of incidence whose $\angle$ of refraction = 90°



21. What happens if a ray of light reaches a boundary at an angle less than this angle?...greater than this angle?....at this angle?

When $\angle_{inc} < \theta_c$, the ray refracts.

" $\angle_{inc} = \theta_c$, " " " = 90°

" $\angle_{inc} > \theta_c$, " " reflects!

22. What is meant by the term *total internal reflection* and how does it relate to the technology of *fiber optics*?

The ray continues to reflect down the glass fiber since it's at an $\angle_{inc} > \theta_c$.

23. What is *Snell's Law* and where would you use it?

$n_1 \sin\theta_1 = n_2 \sin\theta_2$

Used for all refraction problems.

24. What are all angles measured *from*?

Always measure $\angle$'s from the normal, not the surface!

25. What is *dispersion* and WHY does it occur? What color bends the most?...

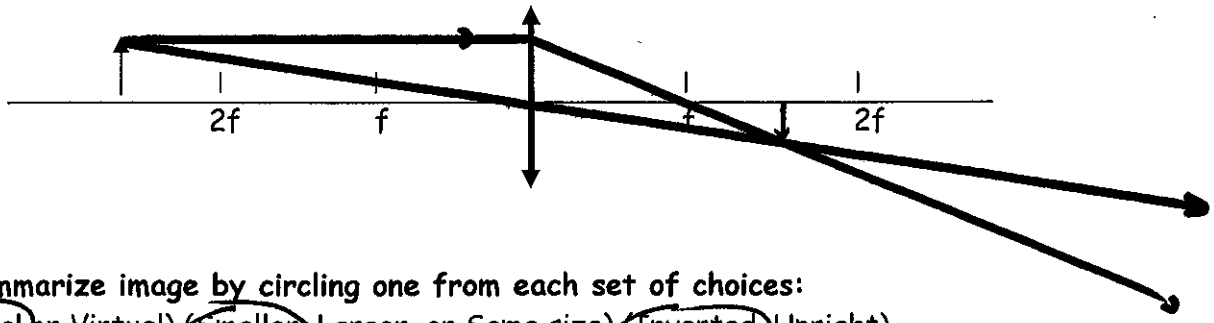
All light refracts BUT not the same amt!

26. Why can't a *monochromatic* laser be dispersed?

↓

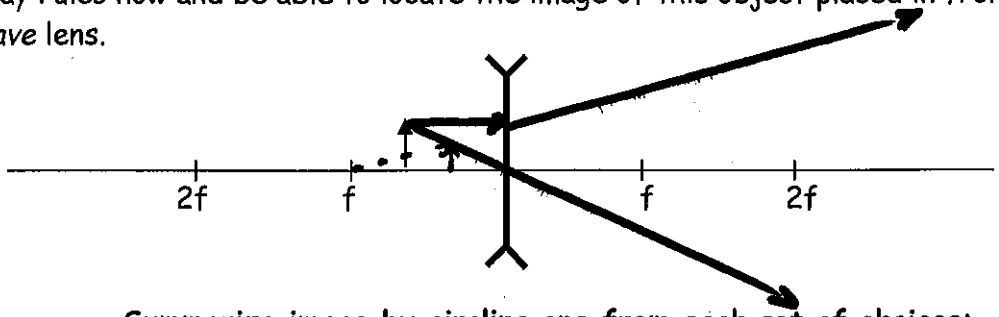
You can't separate something that only has one component.

27. Do you know what a ray of light will do upon entering a *converging lens*? Review the ray rules now and be able to locate the image of this object placed in front of a *convex* lens.



Summarize image by circling one from each set of choices:
(Real or Virtual) (Smaller, Larger, or Same size) (Inverted, Upright)

28. Do you know what a ray of light will do upon entering a *diverging lens*? Review the ray rules now and be able to locate the image of this object placed in front of a *concave* lens.



Summarize image by circling one from each set of choices:
(Real or Virtual) (Smaller, Larger, or Same size) (Inverted, Upright)

Did you write the *mirror/lens equations* into your reference tables? Practice doing this problem.

29. A 2.0-cm tall object is placed 3.0 cm from a diverging lens of focal length = -6.0 cm. Calculate the image location **and** size.

f $\quad \frac{1}{d_o} + \frac{1}{d_i} = \frac{1}{f}$

$\frac{1}{3.0\text{cm}} + \frac{1}{d_i} = \frac{1}{6.0\text{cm}}$

$\frac{1}{d_i} = .166 - .333$

$d_i = -6.1\text{cm}$

$\frac{S_i}{S_o} = -\frac{d_i}{d_o}$

$\frac{S_i}{2.0\text{cm}} = -\frac{(-6.1\text{cm})}{3.0\text{cm}}$

$S_i = 4.1\text{cm}$