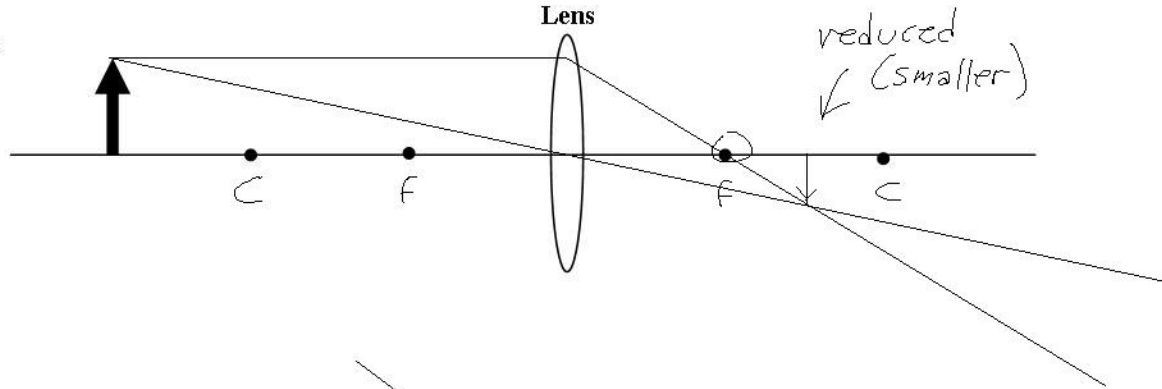
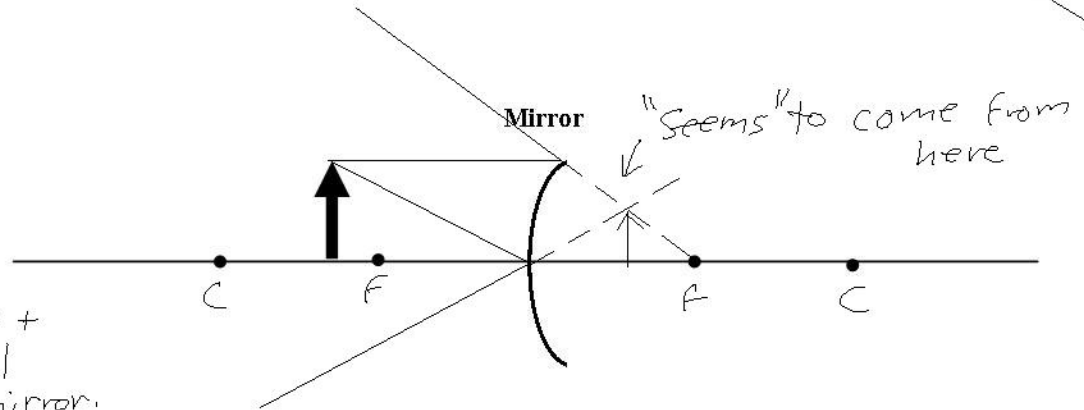


In Class Light Review 1

- Concave or convex?
 - Convergent or divergent?
 - Is f + or -?
 - Draw the ray diagram.
 - Is the image magnified or reduced?
 - Is the image real or virtual?



- Concave or convex?
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- Is light a wave or a particle? Prove your answer.

Both - wave because light can interfere (like with colors); particle because it can go thru the vacuum of space.

- Where does light come from?

Electrons falling from high to low orbits.

- Why did the phosphorous pad (glow-in-the-dark) glow lime green regardless of the light that we shined on it?

Phosphorus can only give off green light.

- Make the following additive colors using RGB.

Cyan GB White RGB Yellow RG
 Red R Magenta RB Black none

- Make the following subtractive colors using CMYK.

Blue MC White none Green CY
 Red MY Magenta M Black K

- What colors does Magenta reflect? RB
 - What color does magenta absorb? G

- What color does Cyan absorb? R

- More energy: Microwaves or X-rays?
 - Shorter wavelength: gamma rays or radio waves?
 - Faster speed: green light or radio waves? *same*
 - Higher frequency: gamma rays or visible light?
 - Less energy: red light or blue light?

- Light is a transverse wave. Does light vibrate parallel or perpendicular to the motion of the wave?

- As a wave, what moves thru the air as light travels: the air particles or the light energy?

- If a light wave has a frequency of 1500 Hz, what is its period?

$$T = \frac{1}{f} = \frac{1}{1500} = 6.7 \times 10^{-4} \text{ sec}$$

- Find the wavelength of radio waves of 6.2 MHz.

$$v = f\lambda \quad \lambda = 48 \text{ m}$$

$$3 \times 10^8 = (6.2 \times 10^6) \lambda$$

- Calculate the speed of 1,200 m microwaves.

$$3 \times 10^8 \text{ m/s} \quad \text{Same for all kinds of light (both visible and invisible)}$$

- If it takes the sun's light 8 minutes to reach the earth, calculate the time it would take a satellite to send its radio signals back to NASA if it is the same distance from the earth as the sun.

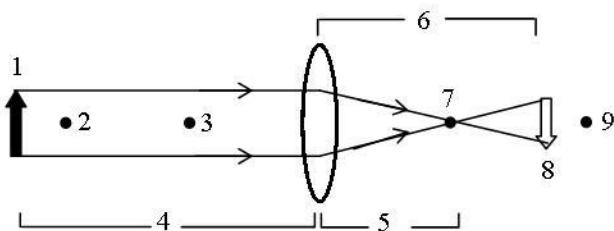
radio waves are light, so same speed - 8 min

In Class Review 1 - p.2

17. Fill in this table.	Convergent or Divergent?	Magnifies or Reduces?	+ or - f?	Which side is real?
Concave Lens	D	R	-	R
Convex Lens	C	both	+	R
Concave Mirror	C	both	+	L
Convex Mirror	D	R	-	L

18. Are the following + or -?

+ q if image is inverted.	- q if the image is on the left side of a lens
+ h always	- h' if the image is on the right side of a lens. <i>real</i>
+ h' if the image is upright	+ q if the image is on the left side of a mirror.
+ M if the image is upright	- M if the image is real.
+ h' if the image is on the right side of a mirror	
+ M if the image is virtual	



19. Identify the parts of the diagram above.

- A. The object: 1. E. p: 4.
 B. Radius of curvature: 2, 9. F. f: 5.
 C. The focal point: 7. G. The image: 8.
 D. q: 6.

20. A 4 cm object is in front of a convex mirror with a 3 cm focal length. The image is 2 cm to the right of the mirror.

- A) Is this mirror convergent or divergent?
 B) Is f + or - for this mirror?
 C) Find where the object is.
- $p = ?$
 $q = -2\text{cm}$
 $f = -3\text{cm}$
- $\frac{1}{p} + \frac{1}{q} = \frac{1}{f}$
 $\frac{1}{p} + \frac{1}{-2} = \frac{1}{-3}$
 $\frac{1}{p} = \frac{1}{-3} + \frac{1}{2} = \frac{-2 + 3}{-6} = \frac{1}{-6}$
 $p = -6\text{cm}$

D) Find the height of the image.

$M = \frac{h'}{h} = \frac{q}{p} = \frac{-2}{-6} = \frac{1}{3}$
 $\frac{1}{3} = \frac{h'}{4}$
 $h' = \frac{4}{3} = 1.33\text{cm}$

E) Find the magnification of the mirror.

$M = \frac{-q}{p} = \frac{-(-2)}{-6} = \frac{2}{-6} = -\frac{1}{3} = -.333$

F) Is the image real or virtual? *Div. devices on make virt. images*

21. The object is placed between the focal length and center of curvature of a convex lens.

- A) Where will the image be?
outside C
 B) Will the image be real or virtual?
 C) Will the image be magnified or reduced?

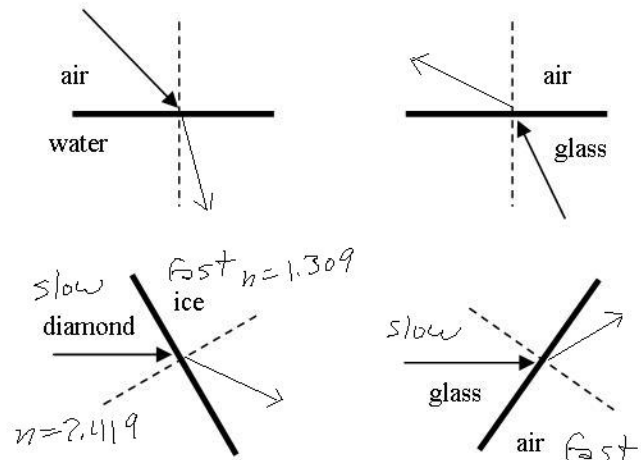
22. Why does light refract?

Light hits at an angle and changes speed.

23. How can you decide which way light will refract?

The side that hits first slows down and bends that way OR speeds up and bends away.

24. Draw what will happen for the following situations.



25. Find the speed of light in a diamond.

$n = \frac{c}{v} \Rightarrow v = \frac{c}{n} = \frac{3 \times 10^8}{2.419} = 1.24 \times 10^8 \text{ m/s}$

26. Light travels thru a substance at 1.6×10^8 m/s.

What is the index of refraction for this substance?

$n = \frac{c}{v} = \frac{3 \times 10^8}{1.6 \times 10^8} = 1.875$

27. Two substances: A ($n = 1.65$); B ($n = 2.44$).

- A. In which substance will light travel slower? B
 B. In which substance will light refract more from air? B

28. A ray of light is going 15° in water. At what angle will it be going when it passes into air?

$n_1 \sin \theta_1 = n_2 \sin \theta_2$
 $1.33 \sin 15^\circ = 1 \sin \theta_2$
 $1.33 (.259) = \sin \theta_2$
 $.344 = \sin \theta_2$
 $\theta_2 = \sin^{-1}(.344)$
 $\theta_2 = 20^\circ$

29. Find the critical angle from a diamond to air.

$\sin \theta_c = \frac{n_2}{n_1} \Rightarrow \theta_c = \sin^{-1}\left(\frac{1}{2.419}\right) = 24.4^\circ$

30. The critical angle for a substance is 35° .

- A. What happens at 32° ? refracts thru
 B. What happens at 37° ? reflects back