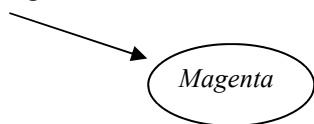


## PreAP Light and Optics 2

1. On July 20, 1969 Neil Armstrong and Buzz Aldrin landed at the Sea of Tranquility on the Earth's moon, approximately 384,000,000 meters away. How long did it take the radio signals from the moon to reach the earth?

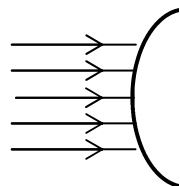
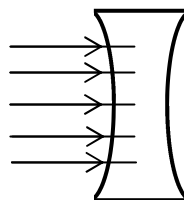
Yellow light



2. Yellow light is incident on a patch of magenta paint.
- \* Break up the yellow light into its constituent colors (next to the incoming arrow write the letters of the two colors that make up yellow).
  - \* If you had white light, what colors would be reflected off of magenta?
  - \* What color is absorbed by magenta?
  - \* What color the magenta patch looks like?

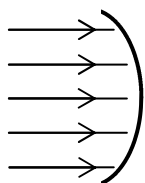
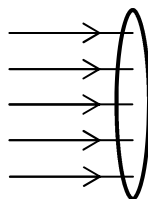
From the lab OR double check your "Optics Basics" notes.

3. Use the **lens** at the right to answer the following.
- Is it concave or convex?
  - Draw what will happen to the parallel light rays.
  - Is it convergent or divergent?
  - Does it have a real or virtual focal point?



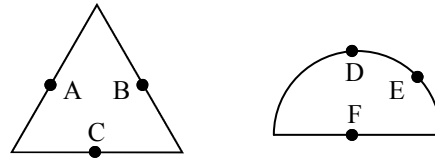
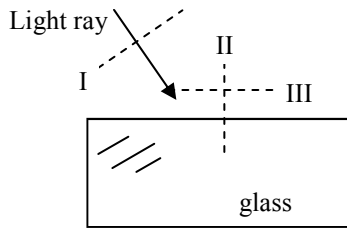
4. Use the **mirror** at the left to answer the following.
- Is it concave or convex?
  - Draw what will happen to the parallel light rays.
  - Is it convergent or divergent?
  - Does it have a real or virtual focal point?

5. Use the **lens** at the right to answer the following.
- Is it concave or convex?
  - Draw what will happen to the parallel light rays.
  - Is it convergent or divergent?
  - Does it have a real or virtual focal point?



6. Use the **mirror** at the left to answer the following.
- Is it concave or convex?
  - Draw what will happen to the parallel light rays.
  - Is it convergent or divergent?
  - Does it have a real or virtual focal point?

7. A. Does light reflect from or go thru a mirror?      B. Does light reflect from or go thru a lens?
8. The light rays shine from a light on the left side of a mirror or lens.
- The light rays will end up on which side of a mirror: left or right?
  - The light rays will end up on which side of a lens: left or right?
  - \* So, which side of a mirror is real?
  - \* Which side of a lens is real?
9. Concave mirror (CCM), convex mirror (CVM), concave lens (CCL), or convex lens (CVL)?
- |  |   |
|--|---|
| A. ____ * Is divergent and reflects.                         | D. ____ Is convergent and the right side is real. |
| B. ____ * The middle is thicker than the ends and refracts.  | E. ____ Has a real focal point and reflects.      |
| C. ____ Has a virtual focal point and the left side is real. | F. ____ Is divergent and the right side is real.  |

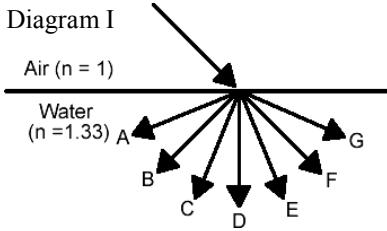
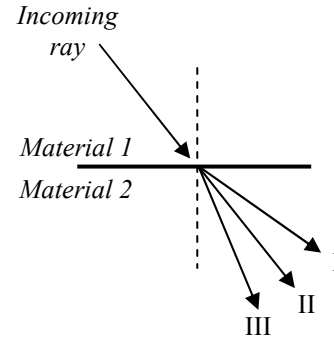


10. \* Just as with the “Normal Force”, “normal” means “perpendicular to a surface”. The diagram shows a light ray is traveling from air into glass. Which ray represents the normal?

11. \* Two different shapes are given at the left. At all of the points (A, B, C, etc) draw the normal to the surface.

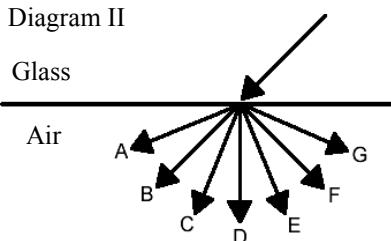
12. At the right, a light ray passes from material 1 to material 2 (what the materials actually are, is not important).

- A. \* On the diagram, label the normal with an “N”.
- B. \* Which line represents the straight path, which is where the light would end up if it does not change directions?
- C. \* Which line shows the light bent away from the normal (farther from the normal)?
- D. Which line has bent toward the normal?



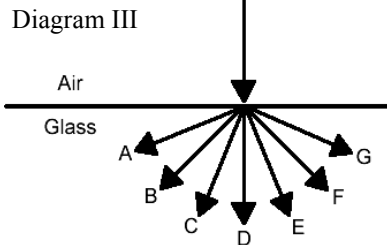
*Turns out that light travels fastest in a vacuum (light space), but air is almost as fast. Light travels slower in glass and water (bumps into more “stuff”).*

13. \* In the first diagram, light travels from air to water.
- A. In which substance does light travel faster?
  - B. Label the “straight path” as “SP”.
  - C. Label the normal with “N”.
  - D. What path with the light ray follow in the water?



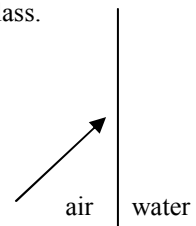
14. In Diagram II, light travels from glass to air.
- A. In which substance does light travel faster?
  - B. Label the “straight path” as “SP”.
  - D. Label the normal with “N”.
  - E. \* What path with the light ray follow in the air?

*From now on, always draw “N” and “SP” before deciding the direction light bends.*



15. In Diagram III, circle the path the light ray takes in the glass.

16. In the diagram at the right, draw and label dotted lines to show the normal (N) and straight path (SP). Then draw the light ray after it passes into the new substance.



2A) R and G light is coming in; 2B) Magenta light is made up of R and B, so Magenta paint reflects R and B light.  
 2C) G is absorbed. 2D) The green gets absorbed and the leaving only R. The patch looks red.  
 9C) left side; 9D) right side 9) A. CVM. B. Thicker in middle is convex, CVL;  
 10) line II 11) See below. 12A) the dashed line is the normal; B. II is the SP; C. I is away. 13) A. Air;  
 B. Right side; C. path F is the SP; D. path D is the normal; E. Path E (toward the normal); 14D) path A, away from normal.

