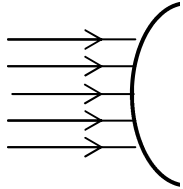
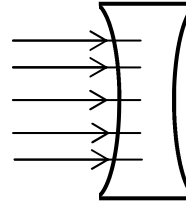
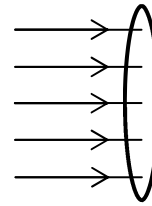


# 2009 Light 3

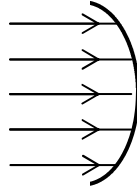
- Use the **lens** at the right to answer the following.
  - Is it concave or convex?
  - Draw what will happen to the parallel light rays.
  - Is it convergent or divergent?
  - Does it have a real or virtual focal point?
  - Which side is real?



- 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?
  - Which side is real?



- Use the **lens** at the right to answer the following.
  - Is it concave or convex?
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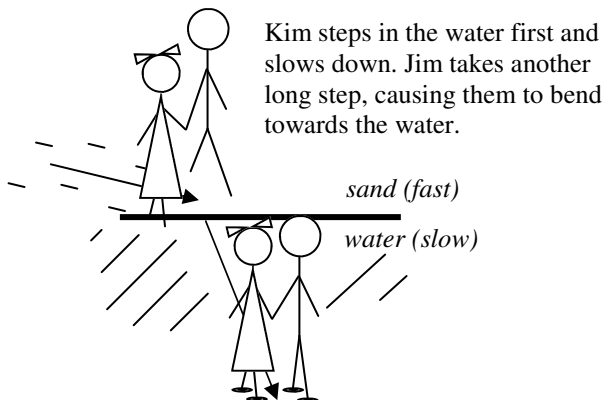


- Use the **mirror** at the left to answer the following.
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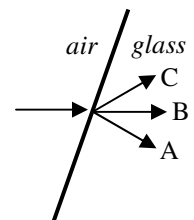
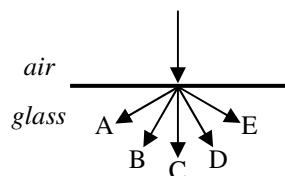
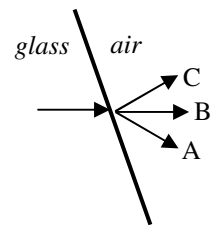
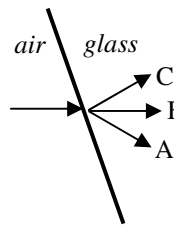
- Does light reflect from or go thru a mirror?
  - Does light reflect from or go thru a lens?
- The light rays shine from a light on the left side of a mirror or lens.
  - The light rays will end up on which side of a mirror: left or right?
  - The light rays will end up on which side of a lens: left or right?
  - So, which side of a mirror is real?
  - Which side of a lens is real?
- Concave mirror (CCM), convex mirror (CVM), concave lens (CCL), or convex lens (CVL)?
 

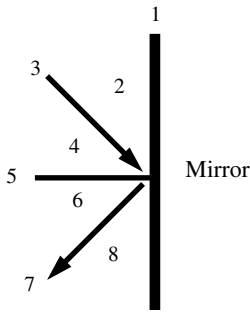
A. ___ Is divergent and reflects.	E. ___ Has a real focal point and reflects.
B. ___ The middle is thicker than the ends and refracts.	F. ___ Is divergent and the right side is real.
C. ___ Has a virtual focal point and the left side is real.	G. ___ Bends toward the light source and reflects.
D. ___ Is convergent and the right side is real.	

The following picture is for those of you that need a reminder of why light refracts.



- For the following situations decide which way the light ray will refract (*study help available*).

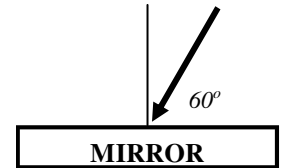




9. From “Optics Basics”. Remember back to forces. The “normal force” is a force perpendicular to any surface. Likewise, in optics, the “normal” is an imaginary line perpendicular to a mirror or lens. In all optics equations, the angles are always measured from the normal.

10. The diagram at the left shows a light ray hitting a flat mirror.

- A. Is it concave or convex?
- B. \_\_\_ Which is the incident ray?
- C. \_\_\_ Which is the angle of reflection?
- D. \_\_\_ Which is the normal?
- E. \_\_\_ Which is the angle of incidence?
- F. \_\_\_ Which is the reflected ray?

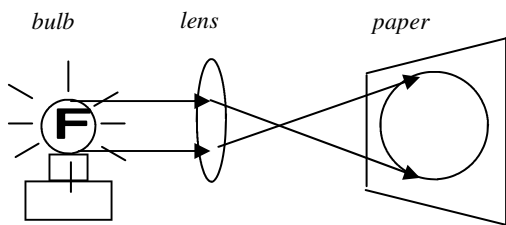


11. For the mirror at the right,

- A. What is the angle of incidence?
- B. What is the angle of reflection?
- C. Draw the reflected ray.

12. You are standing in front of a full length flat mirror. There are 4 floor tiles between you and the mirror.

- A. How many floor tiles will you see in the mirror in front of your reflection?
- B. If each floor tile is 1 foot wide, how much distance does there seem to be between you and your image?



13. The lens at the right allows the letter to be projected onto the paper.

- A. Is the image real or virtual?
- B. Label the focal point, the image, and the object.
- C. On the paper draw the image (*be accurate—study the notes*).

14. How do we define a real image in optics?

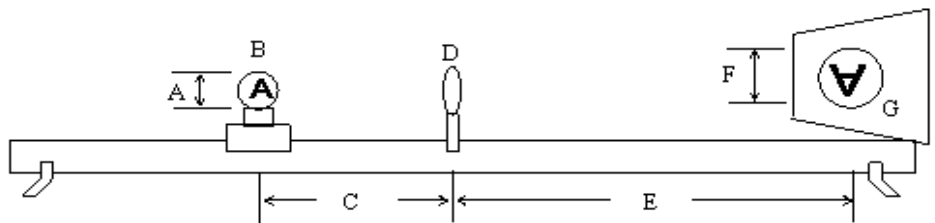
15. By looking at an image, how can you tell if it is real or virtual?

16. Give two ways to prove that your image in a bathroom mirror is virtual.

From the “Lens Equation and Magnification” notes:

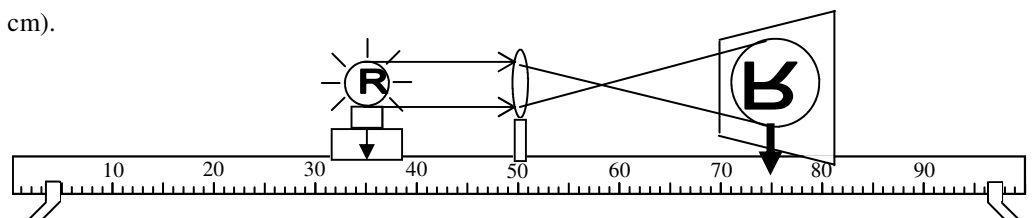
17.  $p$ ,  $q$ ,  $f$ ,  $h$ ,  $h'$ , or  $M$ ?

- A. \_\_\_ Height of the image.
- B. \_\_\_ Distance to the object.
- C. \_\_\_ Magnification
- D. \_\_\_ Focal length
- E. \_\_\_ Distance to the image.
- F. \_\_\_ Is always positive.
- G. \_\_\_ Label these on the diagram at the right.



18. With the diagram below, the lens is put at 50 cm. The light bulb on the left is the object and is at 35 cm. The paper is where the image is in focus and is at 75 cm.

- A.  $p =$
- B.  $q =$
- C. Calculate  $f$  (you can use cm).



TAKS, next page

19. Which kind of symbiosis: mutualism; commensalisms; predation; parasitism?
- A. \_\_\_\_\_ A mushroom latches onto a tree and lives off the energy of the tree.
  - B. \_\_\_\_\_ A shark eats fish.
  - C. \_\_\_\_\_ A cowbird eats the ticks off of a cow. The cow is helped because the ticks are removed.
  - D. \_\_\_\_\_ A species of bird lives in a hole in a cactus. The cactus is neither helped nor harmed.
  - E. \_\_\_\_\_ In Costa Rica the Cycropia tree lives in symbiosis with ants that live in its trunk. The tree secretes a nectar that the ants eat, thus benefiting the ants. When other animals come to eat leaves or the nectar, the ants swarm out of the tree, protecting the tree. What kind of symbiosis does this show?
20. Kingdom, Phylum, Class, Order, Family, Genus, Species
- A. Which of the above classifications is the most specific?
  - B. Which one is the most general?
21. Which Badgers are most closely related?
- A. North American Badgers – *Taxidea taxus*
  - B. Palawan Badger – *Mydaus marchei*
  - C. Eurasian Badgers – *Meles meles*
  - D. Javan Stink Badger – *Mydaus javanensis*
22. Which of the following bears are most closely related? (*Can you guess any of them?*)
- A. *Ursus arctos horribilis*
  - B. *Ailuropoda melanoleuca*
  - C. *Ursus maritimus*
  - D. *Melursus ursinus*
23. With their foot, a person pushes back against the floor. What is the reaction force?
24. How many protons does Chlorine have?
25. Give an element with the same reactivity as that of magnesium.
26. Give the balanced ionic compound formed when magnesium combines with fluorine. (*Draw it, if need be.*)