

Quiz.

1. What is the requirement for an image to be "real"?
 - a. the image must be right-side up
 - b. the light must actually converge at the location of the image
 - c. the image must be in front of the mirror
2. Diffuse reflection
 - a. is relative to the wavelength of light
 - b. is the same for all wavelengths of light
 - c. occurs when light strikes a smooth surface
3. When light is reflected, it always does so
 - a. at a right angle to the incident angle
 - b. depending on the type of material the surface is made of
 - c. at the same angle with which it struck the surface
4. When white light is transmitted through a non-vacuum medium, (Circle all that apply.)
 - a. the light cannot be reflected
 - b. the light cannot be absorbed
 - c. the light is refracted
 - d. the light is dispersed
5. Converging lenses
 - a. can only produce virtual images
 - b. can produce real images
6. Diverging lenses
 - a. can only produce virtual images
 - b. can produce real images
7. Chromatic aberration effects _____ and can be partially corrected by achromatic _____.
 - a. concave mirrors, mirrors
 - b. diverging lenses, mirrors
 - c. convex mirrors, lenses
 - d. converging lenses, lenses
8. Total internal reflection can exist for light passing from a "faster" to a "slower" medium.
 - a. True
 - b. False

9. Light travels faster in
 - a. warmer air
 - b. colder air
 - c. the speed of light does not depend on temperature

Answer Key.

1. b)

A virtual image is defined to be one in which the light does not actually converge at the location of the image, and a real image is defined as one in which the light does converge at the location of the image. Real images are usually erect and on the other side of the mirror or lens.

2. a)

Diffuse reflection occurs when light is incident upon a rough surface where the “bumps” of the surface are at least $1/8$ the size of the wavelength of incoming light.

3. c)

The primary additive colors of light are different from the primary colors of paint. We only see red, green, and blue light, and all other colors we see are just linear combinations of these in different proportions. All three added in equal amounts produce white light, and an absence of light produces black.

4. c) & d)

When light strikes a surface it may be reflected, absorbed, or transmitted, and usually a combination of these occurs. Light is refracted or bent as it passes from one transparent medium into another, and the individual colors are dispersed according to frequency, spreading the light into a rainbow.

5. b)

Converging lenses are capable of converging light to a focus and therefore able to produce real images.

6. a)

Diverging lenses cannot converge light, and, therefore, cannot produce real images.

7. d)

Chromatic aberration affects lenses and can be slightly corrected by achromatic lenses. This is one reason why Newton designed a telescope using mirrors instead of lenses – to avoid chromatic aberration altogether.

8. b)

Since light passing from a faster medium to a slower medium will be bent towards the normal, the angle of refraction will always be less than the angle of incidence.

9. a)

Similar to sound, light travels faster through a warmer medium than a cooler medium because the molecules are already moving faster and can transfer the energy more quickly than slower moving molecules.