1. If light is traveling at a velocity of $2.75 \times 10^8$ m/s, what is the index of refraction of the material light is traveling through?

2. When considering measuring the incident or refracted angle, what do you call the dotted, perpendicular line you will draw to reference your angles?

3. Write an equation for the law of reflection?

4. If the wave speeds in two media are different as light passes from one media to another, the light speeds up or slows down; consequently, bending. This is called....

5. Write Snell’s Law:

6. A monochromatic beam of light moves from air to glass, where the index of refraction is 1.5. If the incident angle is $30^\circ$ measured with respect to the normal, what angle will the refracted beam make with the reflected beam?

7. A laser of wavelength 640 nm in a vacuum is placed at the bottom of a swimming pool. Find the wavelength of the light in water ($n = 1.33$).
8. For the scenario in question 7, find the maximum angle with the normal to the surface that the laser must be placed so that the beam will not exit the pool's surface.

9. A convex mirror has a focal length of -10 cm. An object 4 cm high is placed 20 cm in front of the mirror. Find the position (location away from the mirror) of the image.

10. For the scenario in question 9, find the size of the image.

11. An object 6 cm tall is placed 2 cm in front of a convex lens with focal length 10 cm. Determine the position of the image.

12. For problem 11, determine the size of the image.

13. For problem 11, is the image upright, inverted, real, virtual (choose two).

14. ____________ is the mirror-like reflection of waves, such as light, from a surface. In this process, each incident ray is reflected, with the reflected ray having the same angle to the surface normal as the incident ray.

15. ____________ is the reflection of light from a surface such that an incident ray is reflected at many angles rather than at just one angle as in the case of specular reflection.
16. The separation of visible light into its different colors is known as __________.

17. The lens's job is to __________ the light when it enters the eye.

18. The image is created on the __________, a thin layer of cells located at the back of the eye.

19. __________ occurs when the cornea distorts the light entering the eye.

20. __________ occurs when the eye's focusing power and ability to adjust the focus on the distance between the person and the object is lost.

21. Our first telescopes were all __________ telescopes.

22. Hans Lippershey invented the telescope in __________.

23. Ireland's "___________," a 40-ton reflecting telescope built by the Earl of Rosse in 1845, was the world's largest for seven decades. But wet weather kept it shut down most of the time.
24. List the colors of the visible light spectrum in ascending order according to photon energy (lowest photon energy first, highest last).

25. Two parallel glass plates are separated by an air space 300 nm thick. When illuminated with various monochromatic light sources from directly above the plates, which wavelength will produce the least amount of reflected light?

26. _________ is the mucous membrane that lines the visible part of the eye and the inner surface of the eyelids.

27. _________ is the clear part of the eye covering the iris and pupil; it lets light into the eye, permitting sight.

28. _________ is the muscle that moves the eye away from the nose.

29. It’s observed that for a certain metal surface illuminated with decreasing wavelengths of light, electrons are first ejected when light has a wavelength of 550 nm. Find the work function of the material and determine the stopping potential when light of wavelength 400 nm is incident on the surface.

Work function

Stopping potential
30. In the picture below a beam of light travels from air to linseed oil to water. The index of refraction for linseed oil is 1.48; for water it’s 1.333, of course.

\[ \theta_1 \]
\[ \text{Air} \]
\[ \theta_2 \]
\[ \text{Linseed oil} \]
\[ \text{Water} \]

a. What is \( \theta_1 \)?

b. What is \( \theta_2 \)?

31. In the picture below, \( \theta_1 \) is 34°, \( \phi \) is 58°, and the index of refraction of the prism is 1.48. What is the value of \( \theta_4 \)?