3. An image in a plane mirror is the same size as the original; upright; reversed; there is an equal distance between the object and mirror and image; and the image is virtual.
4. The angle between an incoming light ray and the normal is the same as the angle between the normal and the reflected ray. The incoming ray, the normal, and the reflected ray all lie on a single plane.
5. **(a)** In phosphorescence, UV light is absorbed by a material and re-emitted as visible light over a period of time.
   (b) In electric discharge, light is produced by passing an electric current through a gas.
   (c) In triboluminescence, light is produced by scratching, crushing, or rubbing certain crystals.
6. radio waves, microwaves, infrared light, red light, green light, ultraviolet light, X-rays

WHAT DO YOU UNDERSTAND?

7. The word will appear reversed.
8. The light ray concept is a useful model because light sources give off light in all directions (except for lasers). Light rays allow us to use only a few parts of the light to describe where all of the light will go.
9. Rays reflecting from a convex mirror diverge and will never converge, so the image cannot be real.
10. For a real image to form, the object should be in any location farther away from the mirror than its focus.
    For a virtual image to form, the object should be in any location between the mirror's surface and its focus.
11. **(a)** Dry asphalt exhibits diffuse reflection; the surface is rough and dull.
    (b) A car windshield producing glare in your eyes exhibits specular reflection; glare is a reflection of light with little scattering.
    (c) A sweater exhibits diffuse reflection; the sweater is fuzzy and it scatters light in many directions.
    (d) High-gloss paint exhibits specular reflection. High-gloss means shiny, and shiny surfaces produce specular reflections.

12.

Initial condition	Angle of incidence	Angle of reflection
angle between the reflected ray and the normal is 47°	47°	47°
angle between the incident ray and the normal is 52°	52°	52°
angle between the incident ray and a plane mirror is 14°	76°	76°
the incident ray comes in along the normal	0°	0°