

Science 8 - Light and Optical Systems – Review notes

1.1 Challenge of Light – the various people who contributed to the understanding of light

- a. You should know that our understanding of light has changed. Watch the introduction videos (History of Light) for more details
- b. Speed of light – know approximately how fast light travels
- c. Properties of light – 5 key points

1.2 Optical Devices

- a. Microscope – parts and function
- b. Telescope – function, difference between reflecting and refracting
- c. Binoculars – function, how do they work?

2.1 Light travels in Rays and Interacts with materials

- a. Vocab - ray diagram, Transparent, translucent, opaque, Luminous, non-luminous, Regular reflection vs diffuse reflection
- b. Use ray diagrams to explain how light travels and how shadows are created

2.2 Law of Reflection

- a. Vocab - incident ray, reflected ray, normal line, plane mirror
- b. Angle of incidence = angle of reflection

2.3 Reflecting with curved mirrors

- a. vocab - concave, convex, focal point
- b. ray diagrams showing what happens with each mirror (convex vs concave)
- c. concave mirrors enlarge the image, convex mirrors shrink the image (but you see more of the surrounding area)

2.4 Transparent substance refract light

- a. vocab – refraction
- b. how does light change as it goes from air to water and visa versa? How is this related to density of those materials?
- c. Does the speed of light ever change?

2.5 Lenses refract and focus light

- a. concave, convex lenses
- b. how does light change as it goes through different lenses?
- c. Concave lenses spread light out, convex lenses bring light rays together

3.1 **Wave Model of Light**

- a. vocab – wavelength, frequency, crest, trough, amplitude
- b. as frequency of a wave increases, the wavelength shortens
- c. $\text{speed} = \text{wavelength} \times \text{frequency}$
- d. light travels in waves – the waves travel in straight lines

3.2 **Electromagnetic spectrum**

- a. low frequency, long wavelength, low energy
 - i. radio waves – MRI, radios
 - ii. microwaves – radar
 - iii. infrared radiation – heat
 - iv. visible light – colours of the rainbow (ROYGBIV) from longest to shortest
 - v. ultraviolet radiation (UV) – causes sunburn
 - vi. x-rays
 - vii. gamma rays
- b. high frequency, short wavelength, high energy

4.1 **Image formation in Eyes and cameras**

- a. Vocab – pupil, aperture, iris, diaphragm, shutter, retina, photoreceptors, rods, cones, optic nerve, film
- b. How does the eye work to capture images? Compare that to a camera.
- c. How do we correct vision problems? Near-sightedness (focal point too near the lens – concave lens), far sightedness (focal point too far from the lens – convex lens)

4.2 **Other eyes in the animal Kingdom**

- a. Vocab – camera eyes, nocturnal, compound eyes, ommatidium
- b. How do different eyes help species survive?