OPTICS REVIEW: Important things to remember:

1. Properties of light:

Light is an Electromagnetic Wave: light travels in a straight line
Methods of producing light
Colour Theory: Additive and Subtractive Colours
Law of Reflection: 1. the incident ray, the reflected ray and the normal are on the same plane
2. angle of incidence = angle of reflection

- Index of refraction n (ratio of speed of light in a vacuum to speed of light in a medium) $\boldsymbol{n = \frac{c}{v}}$
- Critical angle: finding the value of i° such that $R^\circ = 90$
- Total internal reflection occurs when $i^\circ > \text{critical angle}$ *and when* $n_1 > n_2$ *(if that is the case, it will follow only Laws of reflection)*

2. Mirrors deal with reflection of light

3 rays to remember:
1. Rays going parallel to principle axis at mirror, **reflect** through F
2. Rays going through F, **reflect** parallel to principle axis
3. Rays hitting the vertex, **reflect** back at the same angle

F = ½ C (**F**ocal length is ½ the radius of **C**urvature)

Concave (converging) mirrors:
5 cases (1 no images, 3 real and inverted, 1 virtual, upright & bigger)

Convex (diverging) mirrors: only 1 case, which is a virtual, smaller, upright image

3. Lenses deal with refraction of light

3 rays to remember:
1. Rays going parallel to principle axis, **refract** through F
2. Rays going through centre of lens, **goes** straight through (doesn't bend)
3. Rays going through the focal point, refract parallel to principle axis

Converging lenses (at least one convex surface)

5 cases (1 no images, 3 real and inverted, 1 virtual, upright & bigger)

Diverging lenses (at least one concave surface)

1 case = a virtual, smaller, upright image

4. Human Eye

Imaging in the human eye, key parts of the eye.
What is normal vision (20/20)

Visual Impairments:

Myopia (nearsighted, you can see close, but not far, focus point is in eye): fix with concave lenses
Hyperopia (farsighted, you can see far, but no close, focus point is in back of eye): fix with convex lenses
Presbyopia (due to old age, muscles get weak and do not adjust eye ball)
Astigmatism (due to oval shaped cornea instead of a spherical cornea)

5. Mirror/Lens Calculations

$$\frac{1}{f} = \frac{1}{d_i} + \frac{1}{d_o} \qquad\qquad m = \frac{h_i}{h_o} = -\frac{d_i}{d_o}$$

- + f = converging mirrors/lenses = concave mirrors & convex lenses
- - f = diverging mirrors = convex mirrors
- $+d_i$ = real image
- $-d_i$ = virtual image, **you cannot see virtual images on a white screen!!**
- $+h_i$= upright image
- $-h_i$ = inverted image

- |m| > 1 = bigger image
- |m| < 1 = smaller image

Textbook Practice Questions

- Text Book – Unit 4 Optics, starting on page 399
  - Page 427, #1-4, (concave mirrors)
  - Page 436 #1-7, (convex mirrors)
  - Page 455 #1-3, (refractive index)
  - Page 500 #1-4, (converging lenses)

  answers can be found on page 571

Google Classroom Notes:

Note 1 : The Nature of Light

Note 2 : Reflection

Note 3 : Locating Images in Plane Mirrors

Note 4 : Curved Mirrors

Note 5 : Concave Mirrors

Note 6 : Convex Mirrors

Note 7 : The Mirror Equations

Note 8 : Refraction (the bending of light)

Note 9 : Lenses

Note 10 : The Human Eye