**Lenses and Mirrors**

**Ch. 18 & 17**

**Objectives:**

**Solve** problems involving refraction

**Explain** total internal reflection.

**Explain** some optical effects caused by refraction.

**Describe** how real and virtual images are formed by single convex and concave lenses.

**Explain** how chromatic aberration can be reduced.

**Locate** images formed by lenses using ray tracing and equations.

**Describe** how the eye focuses light to form an image.

**Explain** nearsightedness and farsightedness and how eyeglass lenses correct these defects.

**Describe** the optical systems of some common optical instruments.

**Explain** the Law of Reflection.

**Distinguish** between specular and diffuse reflection.

**Locate** the image formed by plane mirrors.

**Explain** how concave and convex mirrors form images.

**Describe** the properties and uses of spherical mirrors.

**Determine** the locations and sizes of spherical mirror images.

**Vocabulary:**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Index of Refraction | Snell’s Law of Refraction | Critical Angle | Total Internal Reflection | Dispersion |
| Lens | Convex Lens | Concave Lens | Thin Lens Equation | Chromatic Aberration |
| Achromatic Lens  | Nearsightedness | Farsightedness | Specular Reflection | Diffuse Reflection |
| Plane Mirror | Object  | Image | Virtual Image | Concave Mirror |
| Convex Mirror | Principle Axis  | Focal Point | Focal Length | Spherical Aberration |
| Real Image | Magnification |  |  |  |

**Formulas:**

n1sinθ1 = n2sinθ2

sinθc =

f-1 = di-1 + do-1

m = - =

θr = θi

**Sign Conventions:**

|  |  |  |
| --- | --- | --- |
|  | **Converge** | **Diverge** |
| C or 2f | + | + |
| f | + | - |
| do | + | + |
|  |  |  |
| di | + Real | * Virtual
 |
| m | + upright | * Inverted
 |
| m | >1 Magnified | <1 Reduced |

**Problems to Study:**

Ch 18 Practice Problems: 1-5, 15-19, 20-24

Ch 18 EoC Problems: 37-40, 42-52, 53-61, 67-73, 76-79, 81-88, 89-92, 95-97

Ch 17 Practice Problems: 1-5, 12-16, 17-21

Ch 17 EoC Problems: 30-43, 44-48, 53-56, 61-73, 74-81