**Science 8 – Unit 2 - Optics Study Guide**  Name:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Block: \_\_\_\_\_\_\_

1. What is the difference between **transparent**, **translucent** and **opaque**?

How light is transmitted through a material.

**Transparent** – complete transmittance

**Translucent** – partial transmittance

**Opaque** – not transmittance

1. List the **7 regions of waves** found in the ***electromagnetic spectrum***:

Radio Waves, Microwaves, Infrared, Visible Light, Ultraviolet, X-Ray, Gamma Ray

* 1. Which one can we see? Visible
	2. Put them in order from highest to lowest **frequency**

Gamma Ray, X-Ray, UV, Visible Light, Infrared, Microwaves, Radio Waves

* 1. Put them in order from largest to smallest **wavelength**

Radio Waves, Microwaves, Infrared, Visible Light, Ultraviolet, X-Ray, Gamma Ray

* 1. What is the relationship between **frequency** and **wavelength** in the electromagnetic spectrum?

Inverse! As Frequency goes up, Wavelength goes down and VICE VERSA

1. List the **visible colours** from **lowest** to **highest frequency**

Red, Orange, Yellow, Green, Blue, Indigo, Violet

1. What is the difference between the **wave model** and the **ray model** of light?

The Ray Model states that light moves in straight lines and uses ray diagrams to explain things like how lenses focus light and how mirrors reflect light.

The wave model describes how light propagates much like how ocean waves move through the water and takes into account wavelength and frequency. As the Wave Model incorporates wavelength it can be used to explain colours.

1. Identify each of the following on the following diagram: **amplitude**, **trough**, **crest**, **rest position** and **wavelength:**



1. What is **frequency** and what unit is it measured in?

Frequency measure how fast a wave oscillates. It is measure in the number of cycles per second.

1. Which of the following has **high frequency** and which one has **a higher wavelength**.
2. For each diagram (above) determine the **wavelength** and the **amplitude** (the units are in metres).

Wave X: Amp = 2 m Wavelength = 4 m Wave Y: Amp = 2 m Wavelength = 4 m

1. What is **reflection**?

When light “bounces” off an object

1. Label the following diagram:



1. What is the physical difference between a **plane mirror**, **convex mirror** and **concave mirror**. (*include diagrams*)

|  |  |  |
| --- | --- | --- |
| **Plane** | **Convex** | **Concave** |
| Plane mirrors are flat, Concave bend in and Convex bend out |

1. What is **refraction**?

The “bending” of light when it is transmitted from one medium to another.

1. ***Label the diagram*** to the right:



1. What is the difference between ***refraction*** and ***reflection***?

Bending through (Refraction) vs. Bouncing back (Reflection)

1. What is the difference between a ***lens*** and a ***mirror***?

Refraction/Bending (Lens) vs. Reflection/Bouncing (Mirror)

1. What happens to the ***speed and direction of light*** as it travels from a dense material to less dense material?

Light rays speed up AND bend away from the normal.

1. When looking at a fish under water, why does it appear to be in a different location than it actually is?

The light from the fish bends as it moves from the two mediums (water 🡪 light)

1. Compare and contrast convex and concave lenses:

1st Draw a diagram of light hitting a: (**make sure to label the focal point for the Convex Lens**)

2nd List some uses of each

|  |  |
| --- | --- |
| Convex Lens | Concave Lens |
| UsesTelescopes/binoculars, The human eye, Focusing light in photovoltaic cells | UsesFlashlights, Glasses, Camera’s, Lasers |

***If you complete this whole document and then read it over and quiz yourself – you should do very well on the unit test.***