Light and the Electromagnetic Spectrum - Student Notes

**Where does light come from?**

The SUN!!

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**Properties of Light**

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• Light travels VERY FAST – 3.0X108m/s = 300,000 kilometres per second.

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For example:

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**Luminous and non-luminous objects**

A non-luminous object is one that reflects light

**Properties of Light summary**

1) Light travels in straight lines

2)

3) We see things because they reflect light into our eyes

**The Strangeness of Light**

• Nothing moves faster than the speed of light 3.0 x 108 m/s

• Anything with mass cannot travel at the speed of light

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• Unlike heat and sound energy which requires a medium (a physical substance) to move, light does not

– Light is transferred through radiation (via electromagnetic waves) in a vacuum

**Modern electromagnetic waves**

• Today we have identified many types of electromagnetic waves which makes up our **\_\_\_\_\_\_\_\_**

**The Electromagnetic Spectrum**

• Your eyes can only see the visible part of the EM spectrum, but your hands can feel the infrared part.

**The Electromagnetic Spectrum**

• Machines can detect other parts of the EM spectrum, but the information needs to be converted into colors for us to see it.

**Example – The Sun**

**Modern View Continued**

**Wavelength and Frequency**

• **Wavelength** – the distance between successive crests on a wave.

• **Frequency** – the number of cycles a wave goes through in one second.

**The Visible Light Spectrum**

•Different colors have different wavelengths!

**Color**

• White light is not a single color; it is made up of a mixture of the seven colors of the rainbow.

**The colors of the rainbow:**

• Red

• Orange

• Yellow

• Green

• Blue

• Indigo

• Violet

**Adding colors**

•White light can be split up to make separate colors. These colors can be added together again.

•The primary colors of light are**:**

**Seeing color**

•The color an object appears:

**Color Blindness**

• The tricky thing about color blindness is that many people don’t know they are color blind until they get tested

–40% of color blind pupils currently leaving secondary school are unaware that they are color blind

• How many animals are there?

**Red Green Color Blindness** is caused by a gene on the X chromosome therefore, since males have 1 X and 1 Y while females carry 2 X’s, this issue is predominately found in males (7-10% of the overall population) and is very rarely seen in females.

•For these people, they cannot see red and green light.

**Blue Color Blindness** is equally unlikely for both males and females as the deficient gene is found on chromosome 7. These people can’t see blue color light

• In both these cases the problem isn't as straight forward as not seeing blue, red or green light.

**The Production of Light**

• Light is produced by three main ways:

1.Incandescence

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**The Production of Light**

2. Luminescence

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**The Production of Light**

3. Chemoluminescence

–Chemical reactions

**The speed of light**

• The speed of light in a vacuum is a universal constant. 300,000,000m/s

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**How long will it take?**

**Looking Into The Past**

• By looking at objects in the universe (stars and galaxies), you are looking into the past. Why?