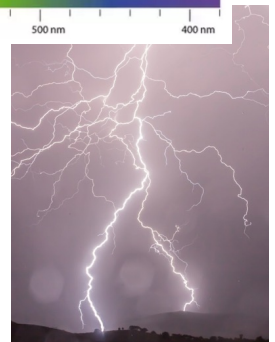
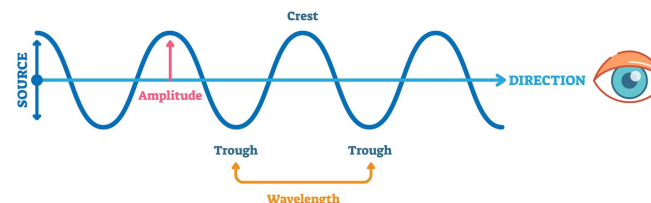
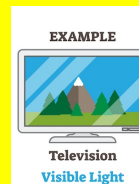
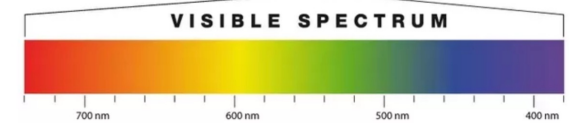
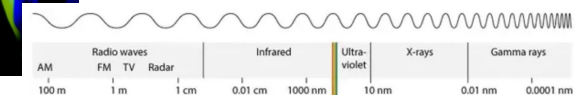
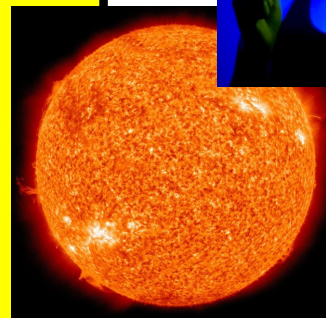
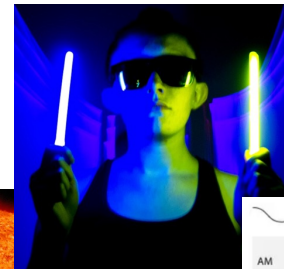
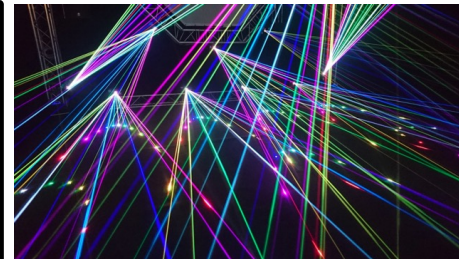


Light - Properties and Production

- Where Light Comes From
- Properties of Light
- The Strangeness of Light
- Electromagnetic Waves
- Wavelength and Frequency
- Colors and Rainbows
- Adding Colors
- Seeing Colors
- The Production of Light
- The Speed of Light



Preview File

Please enjoy this preview of your Student Version of the presentation. Please note within this sample file:

- Some slides appear blank because they have been removed
- Student versions have portions of the text removed which is given in the teacher version and appear as _____ which the students are to fill in
- Other slides may have on them, this represents writing that has been removed on this sample

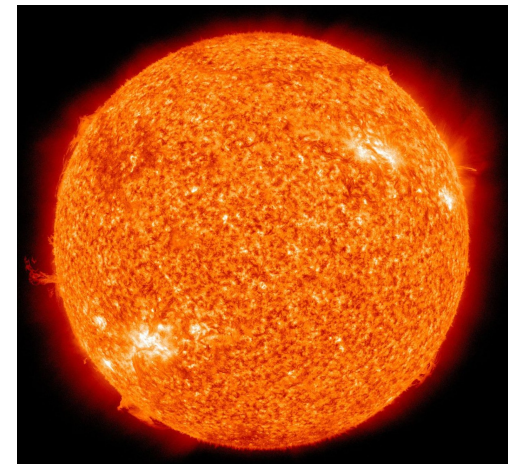
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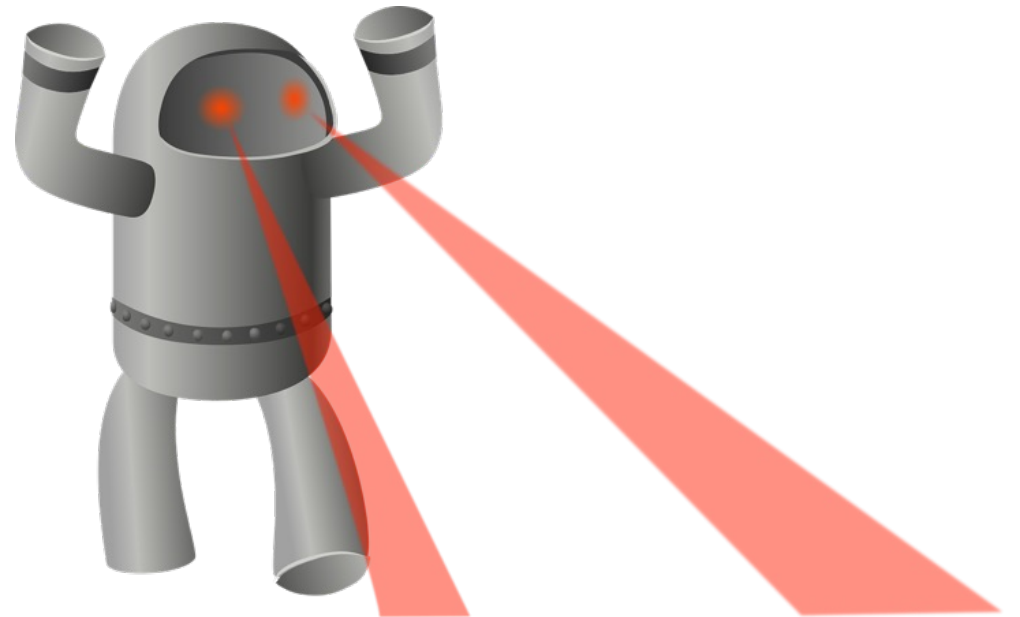
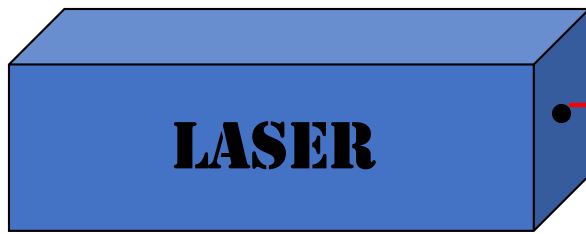
Where Does Light Come From?

- The sun is a star located 1.50×10^8 km, or 1 Astronomical Unit, away from Earth
- _____
- Nuclear fusion occurs when two atoms that naturally repelled each other are pulled together by a superior force and the atoms fuse together.
- _____

The SUN!!



Properties of Light



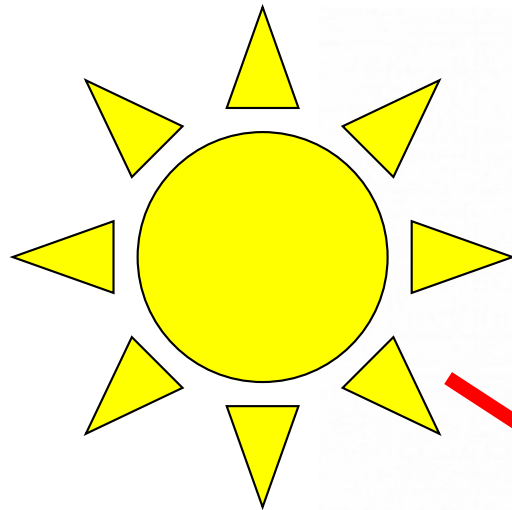
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For example:

Thunder and lightning
start at the same time,
but we will see the
lightning first.



Properties of Light



Shadows

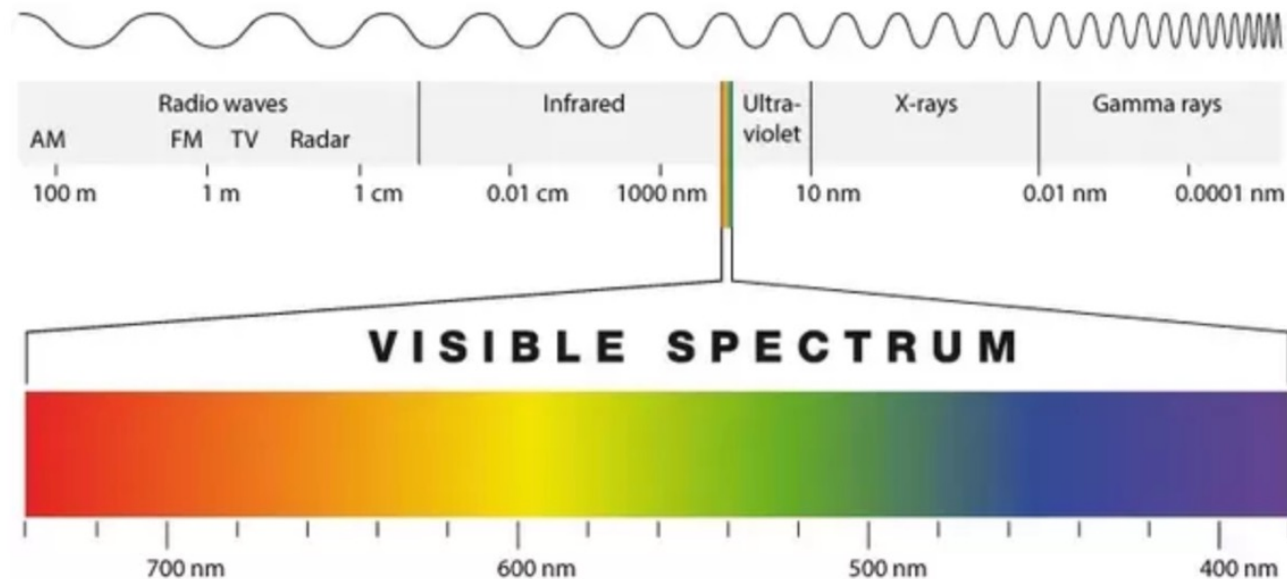


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The Strangeness of Light

- Nothing moves faster than the speed of light
 $3.0 \times 10^8 \text{ m/s}$
- Anything with mass cannot travel at the speed of light
- _____
 - _____
- 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



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The Electromagnetic Spectrum

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



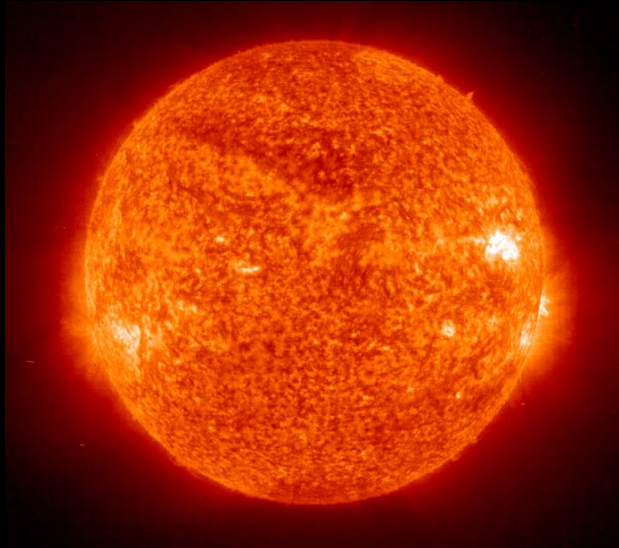
The Electromagnetic Spectrum

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

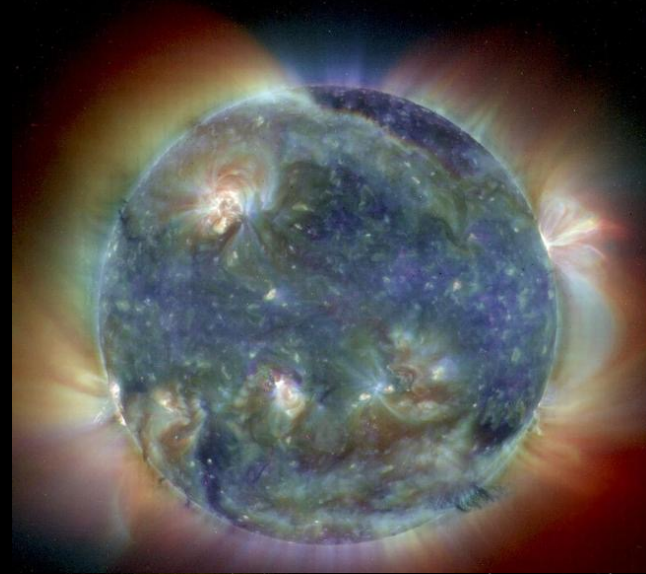


Example – The Sun

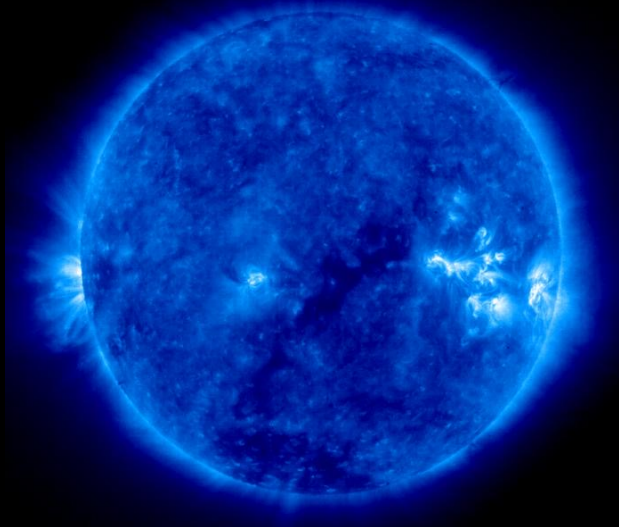
visible



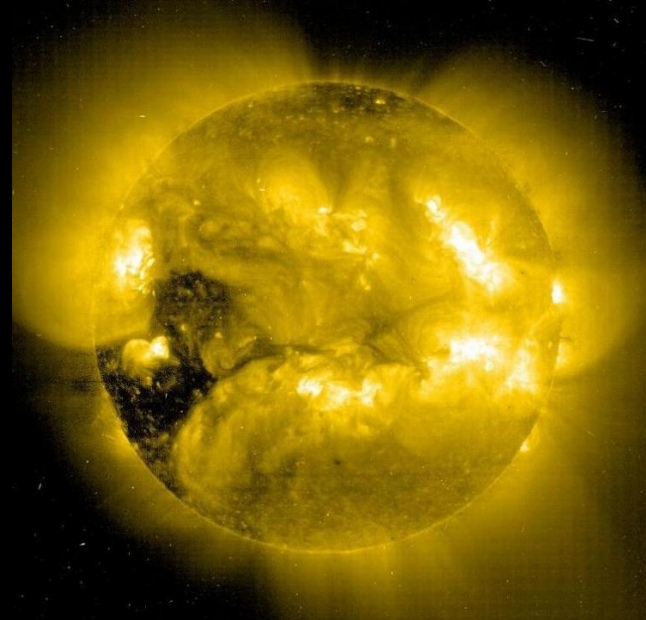
x-ray



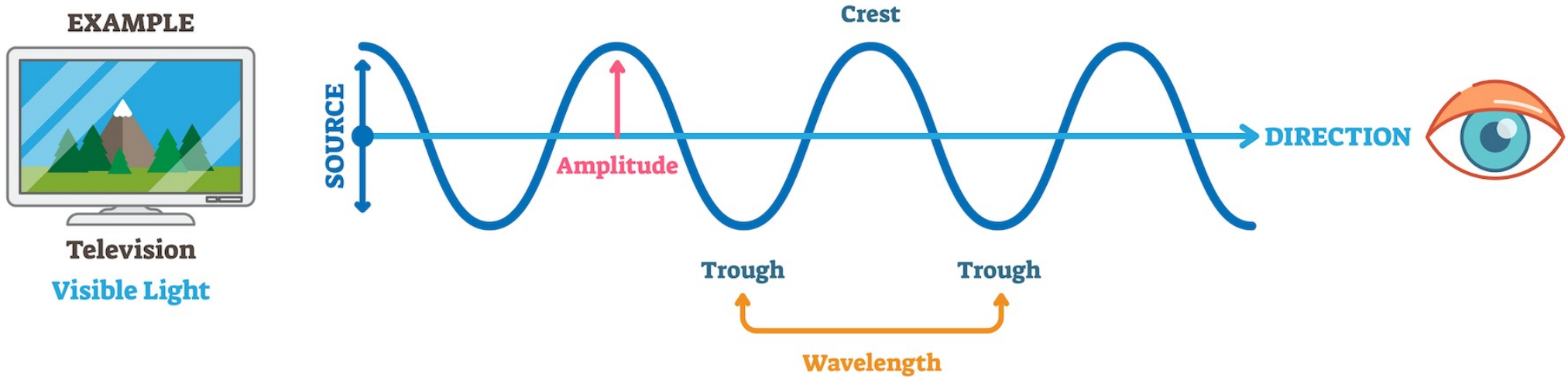
UVA



UVB



Wavelength and Frequency



- **Wavelength** – the distance between successive crests on a wave
- **Frequency** – the number of cycles a wave goes through in one second

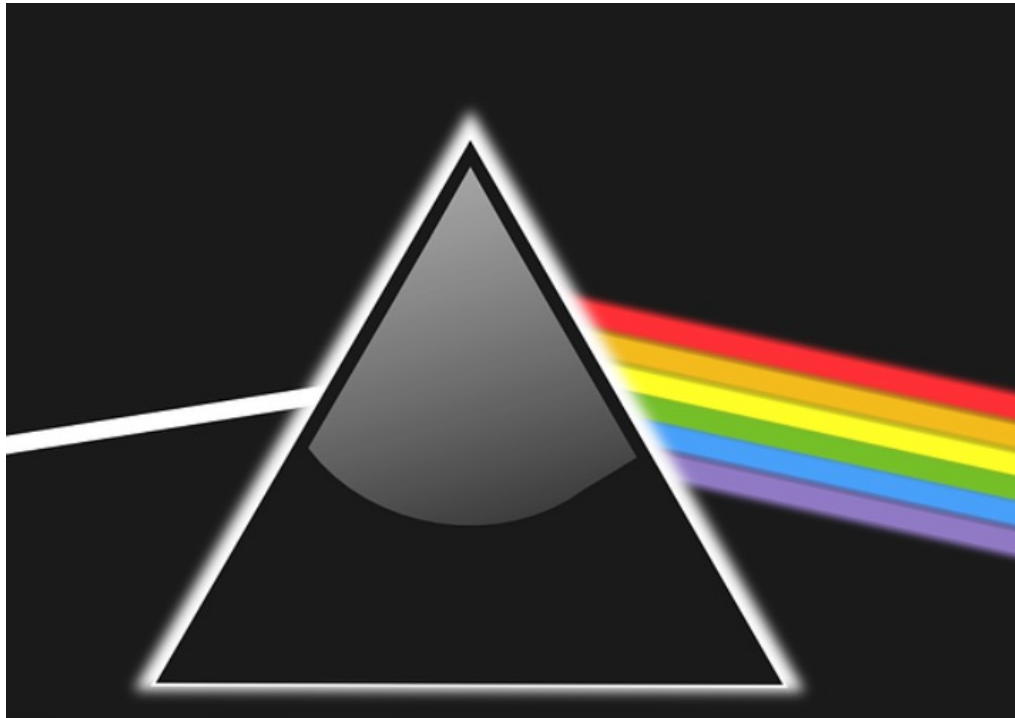
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Colours and Rainbows

- White light is not a single colour; it is made up of a mixture of the seven colours of the **rainbow**
- We can demonstrate this by splitting white light with a prism
- This is how rainbows are formed: _____



The Colours of the Rainbow

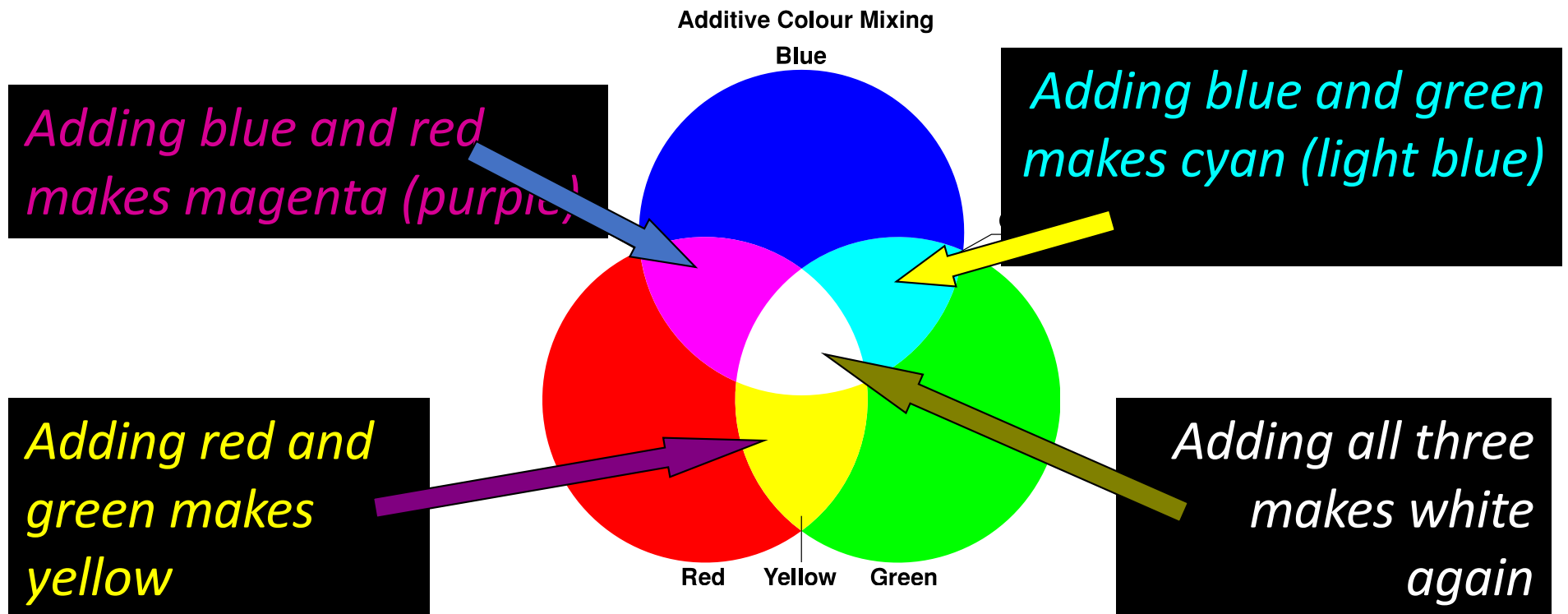


- Red
- Orange
- Yellow
- Green
- Blue
- Indigo
- Violet

Adding Colours

- White light can be split up to make separate colours
- These colours can be added together again

- _____



Seeing Colour

- _____
- For example, a red book only reflects red light

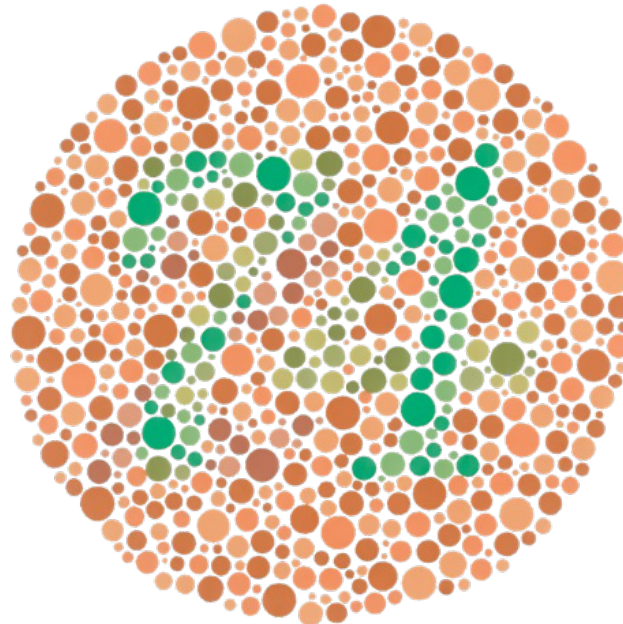


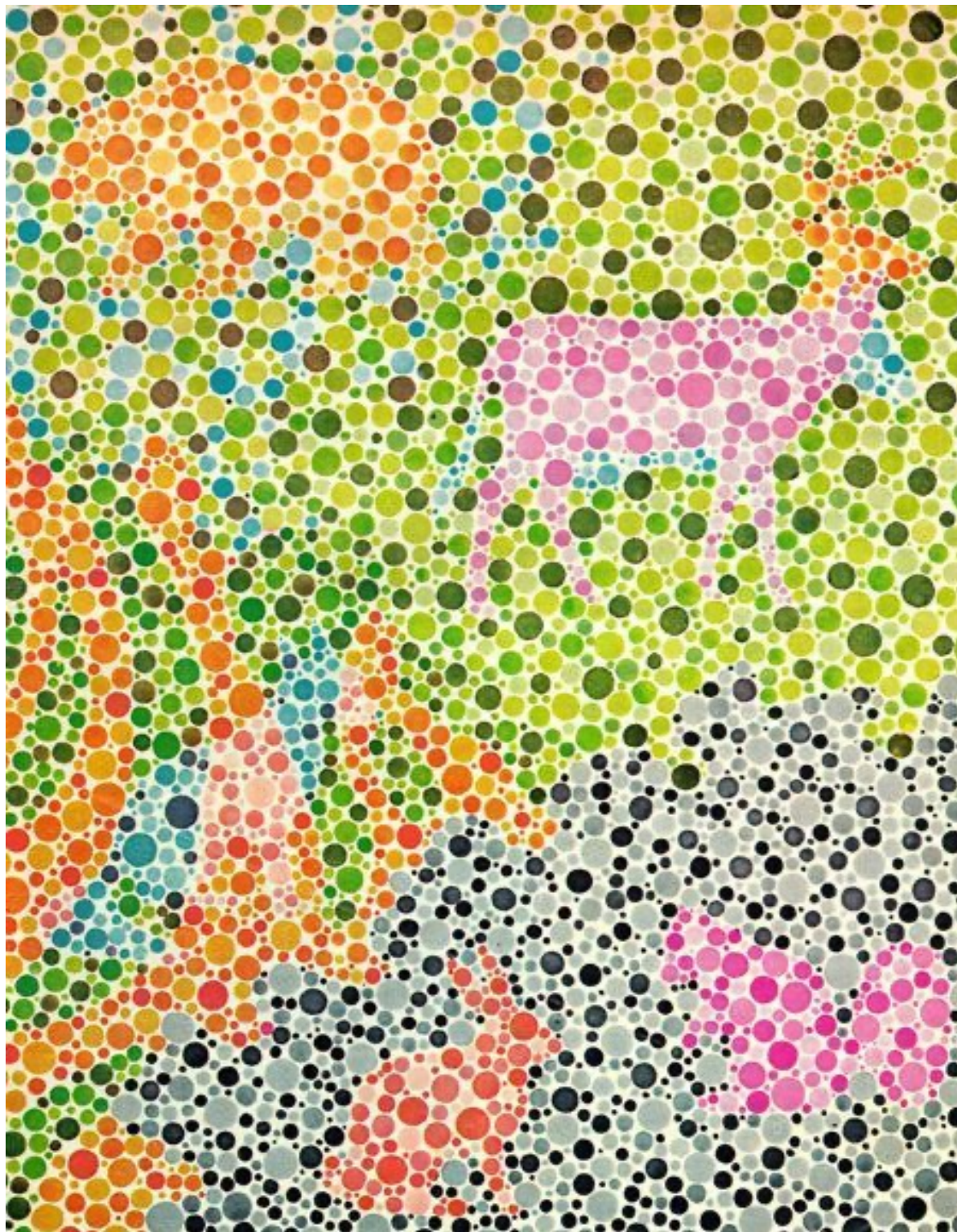
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Colour Blindness

- _____

- i.e. 40% of colour blind pupils currently leaving secondary school are unaware that they are colour blind



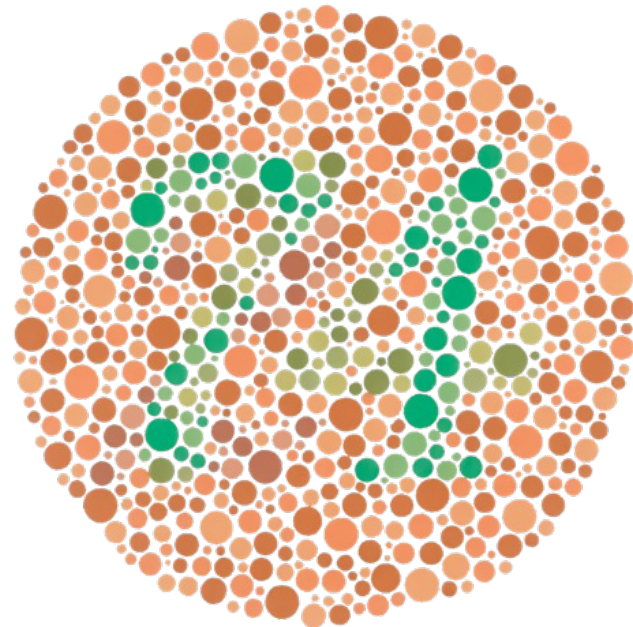


How many animals
are there?

Red Green Colour Blindness

- _____

- For these people, they cannot tell the difference between red and green light

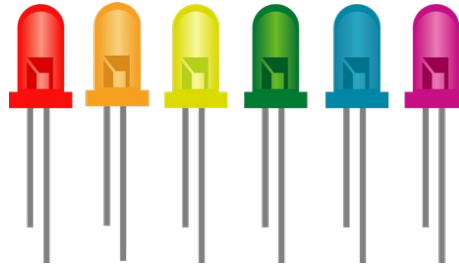


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The Production of Light

Light is produced by three main ways:

1. _____
2. _____
3. _____



Incandescence

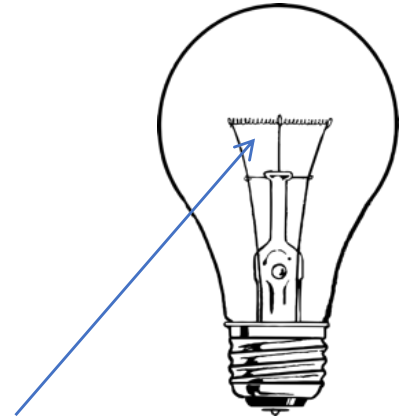
- Any object, as it gets hotter and hotter, will eventually produce light
 - Observe the molten metal on the right
- As the object gets hotter, the colours of light produced change from red, to orange, to yellow, to white, and then to bluish-white
- _____



Incandescence

- Incandescence also occurs in an incandescent light bulb

- _____



- The filament becomes so hot that it gives off visible light



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Chemiluminescence

- Chemiluminescence is the production of light as a direct by-product of a chemical reaction
- _____
- Bending the light stick in the middle causes a small glass vial to break, allowing two chemicals to mix producing visible light



Bioluminescence

- _____
- Bioluminescence occurs in a wide variety of organisms, including certain bacteria, fungi, marine invertebrates, fish, glow-worms, fireflies

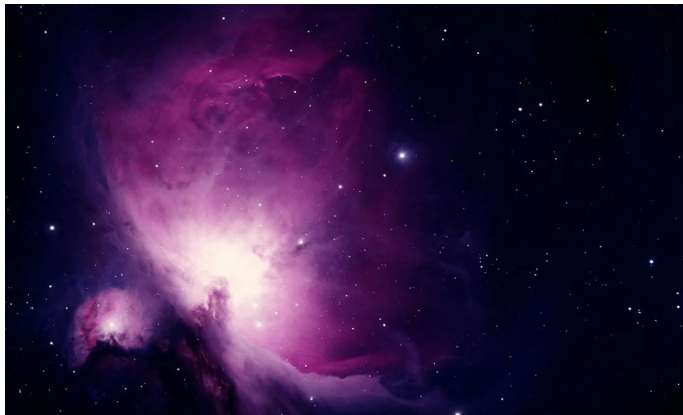


The Speed of Light

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

- _____

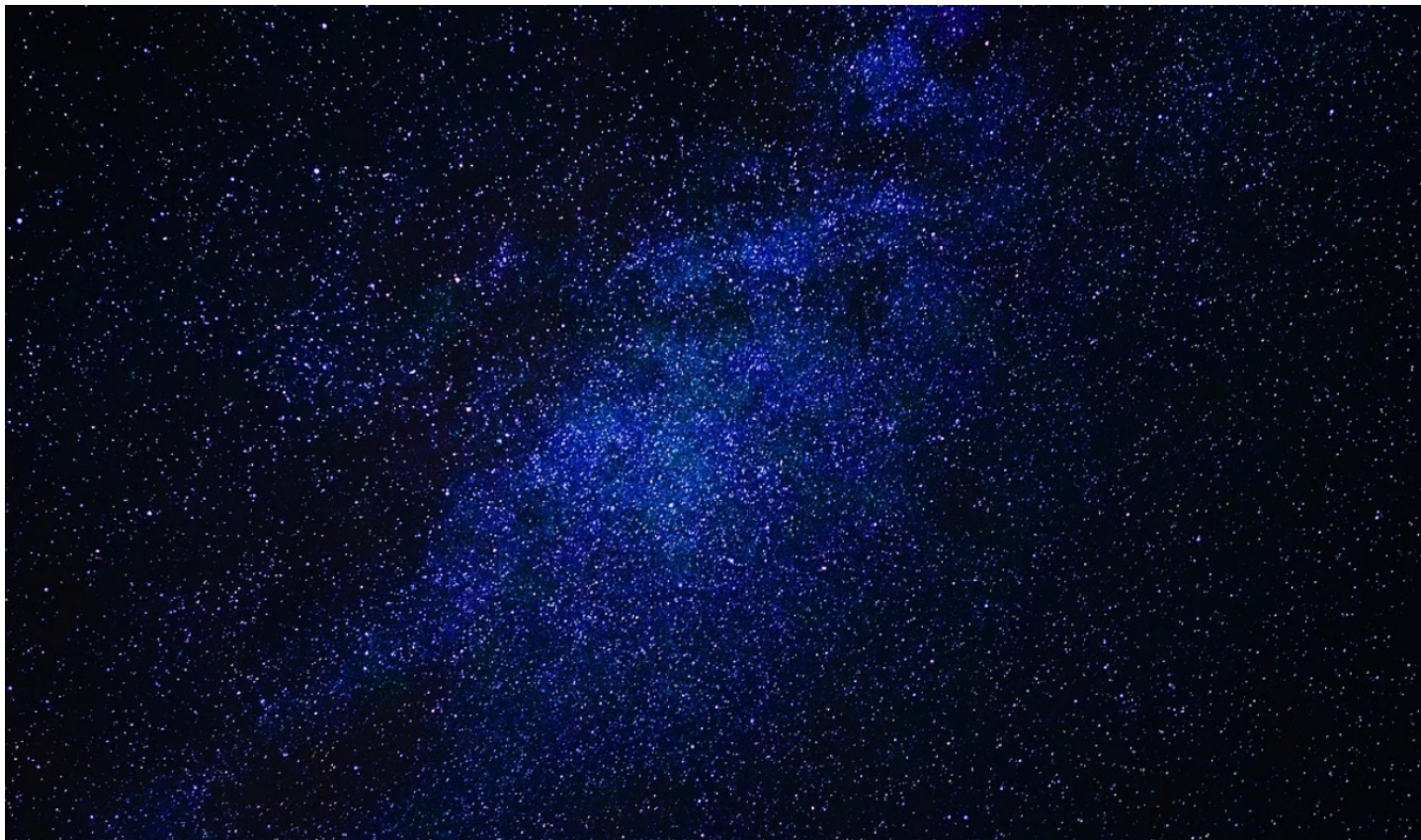
- _____



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Looking Into The Past

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



Looking Into The Past

Object	Time for the light to reach us
The Moon	1.3 seconds
The Sun	8.3 minutes
Jupiter	35 to 52 minutes
Pluto	5.5 hours
Alpha Centauri (nearest star)	4.3 years
Sirius (Brightest star in our sky)	9 years
Betelgeuse (Another bright star)	430 years
Orion Nebula	1500 years
Andromeda Galaxy	2.5 million years