Color p.296 - 297

* The ***visible light spectrum*** is made of all the colors of visible light (ROYGBIV).
* All the colors of light **combine** to make *white light*.
* The separating of white light into a spectrum is called ***dispersion***.
* **Prisms** can be used to disperse light and combine light.
* **There are 2 theories that explain how we can create and see color:**

Additive Theory of Color p. 304-305

(adding colors of light together to get different colors)

Visible **white light** is made up of a spectrum of colours; however, colours of light can also be perceived in other ways. The illusion of a particular colour of light can be created by combining (adding) specific coloured light rays.

This **adding of colours to create a second colour is called the *additive theory of colour****.*

* The **primary additive colours** (colors you start with) are *blue, red, and green*.
* The **secondary (or resulting) colours** produced when two of the primary colours are mixed are *magenta, cyan, and yellow.*
* When **all three primary colours** of light are combined, they produce *white light*.

**Complimentary colors** are *pairs of light* (one primary + one secondary) colors that can be added together to *make white light*. Ex: Blue + yellow = white. The yellow contains the green and red, so if we add blue it creates white light.

**Complete the chart:** (use the website if needed)

[*http://phet.colorado.edu/en/simulation/color-vision*](http://phet.colorado.edu/en/simulation/color-vision) *- online interactive additive color activity*

|  |  |  |
| --- | --- | --- |
| **Colors added:** (lights combined) | **Resulting color:** (what you see) | **Name of light color(s):**  (primary, secondary or complimentary) |
| Blue |  |  |
| Red |  |  |
| Green |  |  |
| Blue + Green |  |  |
| Blue + Red |  |  |
| Red + Green |  |  |
| Blue + Red + Green |  |  |
| Blue + Yellow |  |  |
| Cyan + Red |  |  |
| Magenta + Green |  |  |

Subtractive color theory: p. 310-311

(pigments absorb and reflect colors)

Subtracting the colours from light that have been absorbed (by pigments) to determine the colour of an object is the ***subtractive theory of colour***.

* **Pigments** are materials that absorb certain colors, and reflect all others.
* Absorbing colors is just like *subtracting* that color from light.
* C:\Program Files\Microsoft Office\Media\CntCD1\ClipArt2\j0216564.wmfIf objects do not give off their own light, they are seen because light reflects off them.

Example: Black pigments absorb all colors, and reflect none. That is why objects that contain black pigments look black to our eyes – no light is reflected into our eye.

Types of pigments:

* The **primary pigment colours** are: **yellow, cyan, and magenta**. These *absorb only one* color.
* The **secondary pigment colours** are: **red, green, and blue**. These *absorb two colors* of light and are produced when two primary pigments are mixed.
* **White** is reflected when **no pigment** is present (R, B, G all reflect).
* **Black** is seen when pigment **absorbs all colors** from light.

Questions:

1. Explain why grass looks green to your eyes. Use the words “*pigment”, “absorb*” and *“reflect*” in your answer.
2. Draw a picture to explain why your t-shirt looks the color it does to your eyes. Include labels for *white light, reflected light, T-shirt pigment,* and *colors absorbed* in your answer.
3. Explain why green paint is named “green”, thinking about colors absorbed and colors reflected.

**Filters** contain pigments and absorb some colours of light but **let light pass through** them (do not reflect). Filters are **named by the color** of light they let pass through them.

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Example: White light that has a blue filter will transmit blue (lets blue light pass through it) but absorbs red and green light.

Questions:

1. A) What color would light passing through a magenta filter look like? Explain, using a picture if needed.
2. If this same filtered light (from part A) hits a green t-shirt, what color will the shirt appear to your eyes. Explain.

2. Imagine you only have a white lights and 3 colors of filters – a red one, a blue one and a green one. What color of filter (or filters) would be needed to make the light for following scenes for a movie:

a) Bright daylight -

b) Sunrise / Dawn-

c) Midnight-