Light & Shadows

A scientific look into Oil Painting

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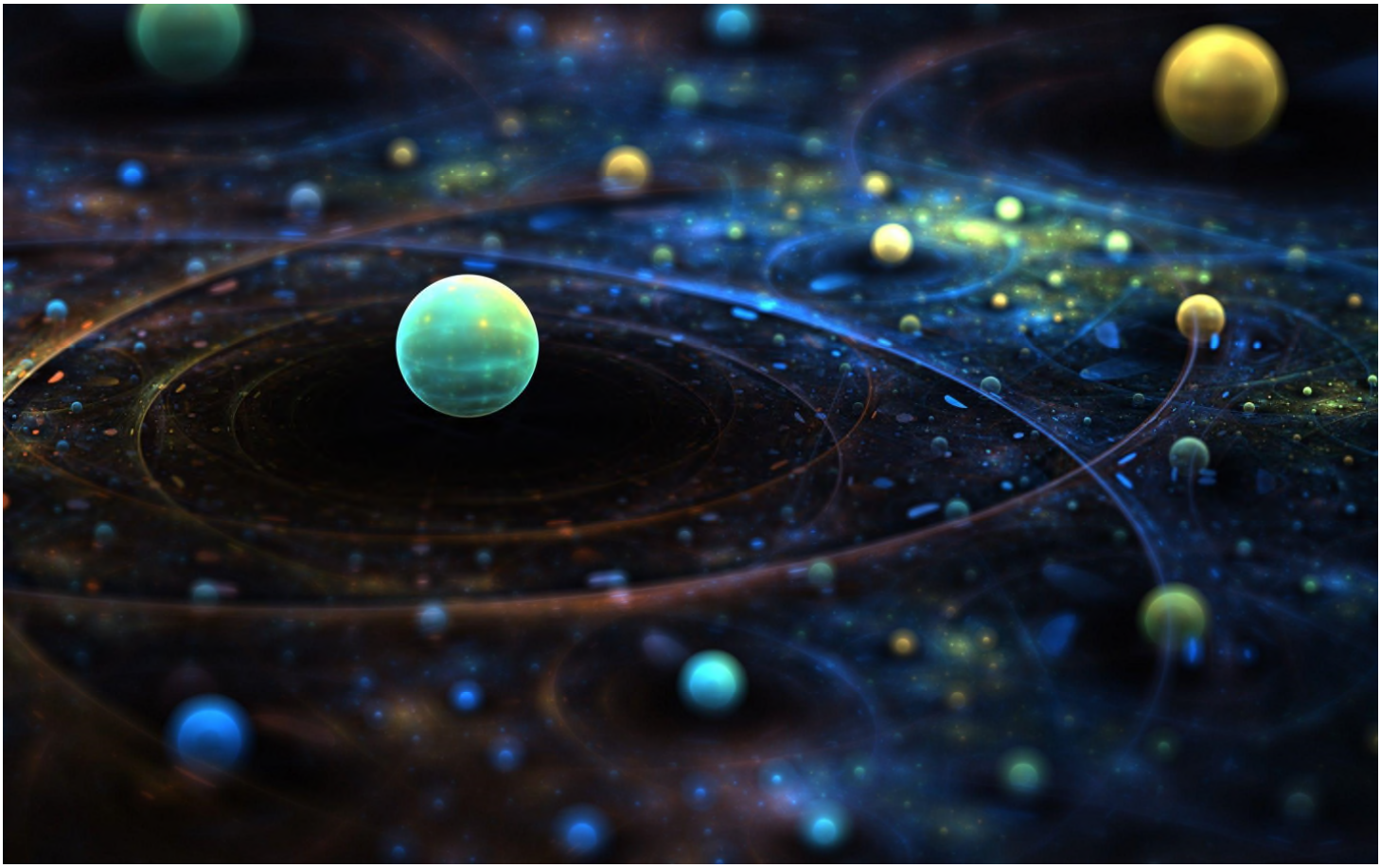
Contents

This sounds like Physics:

This is a collection of stories I once heard:

[GEOMETRY & What's up in the Universe]



For many year man questioned how does all around us exist?

They thought, first there must be a universe.

How does it look like… we don't know.

<Universe Photos>

But in our system, and our main guide is the Sun, that shall be our mother coordinate.

It is our source of heat and light, and without it, much of our experience would never be a word.

It shines from up above, and through its white light we are allowed to see all that surround us.

<Solar System Photos>

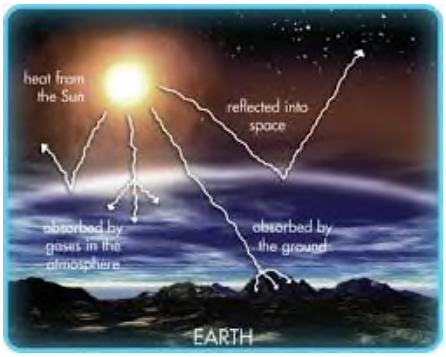
Scientists before us have told stories about the nature of light waves, how they travel from their source through a medium, assumed as vacuum for some reason, to the point where it reaches us.

<Sun Light Travel Photos>

As weird as it all sounds, it still works. And we collectively experience a reality where all this science capture the world around us and transform into something real.

So… the sunlight bounces on the moon, and it reflects on the earth, and for whichever reason that light exists when we are turning around some axis, that is somewhat defined by a global system of coordinates.

<Global Maps>

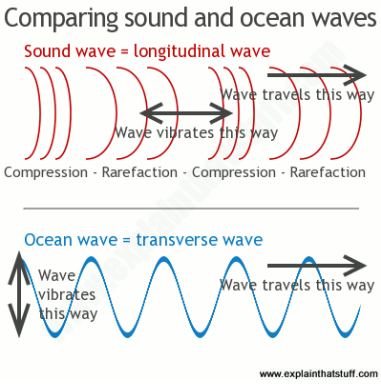


And that's just what happens in the Earth. Which is blue and green. But around here, the other planets are a bit different, for whatever materials they have there, and for whatever reason for which they exist at the distance that it orbits this 8-planet solar system.

(I will forever miss Pluto and the idea of how cold it is right outside that cone.)

Then there were some thoughts that it had to do with the forces of attraction between the physical and electric fields (not to mention magnetics) between two bodies, and through that law, we've continued to design our existing world.

Questioning Light & Heat?



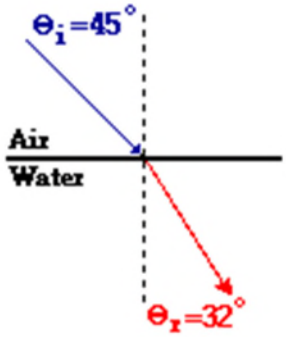
A long time ago, a boy named Albert questioned his professor proposition.

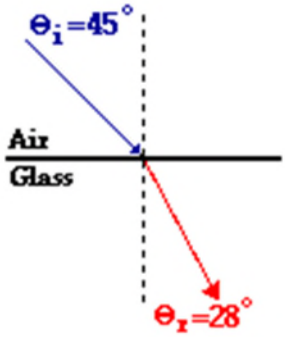
That story has been published on YouTube [Got existiere – Einstein, A.]

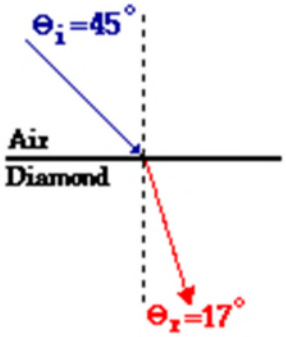
(https://www.youtube.com/watch?v=8O_NV7gtzoQ)

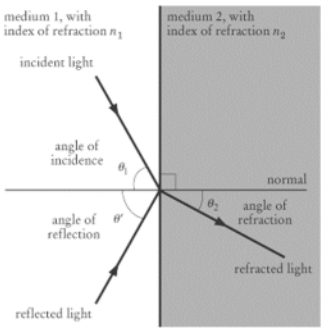
In it, Einstein speaks of two poles: Heat, Warmth, White Light, exists. Cold, Darkness, does not. In the fight between dark and light, it is only through light that we are able to see the world around us.

Therefore, understanding the physics behind it, will allow you to better understand the medium with which we work with and that we try to express through our art.

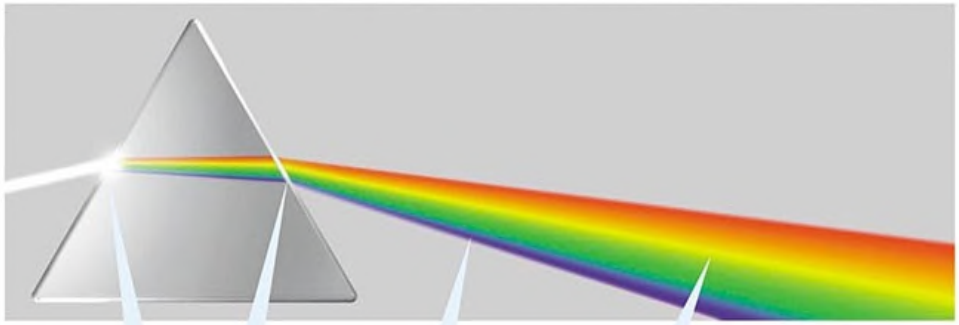








White Light Is Separated by a Prism



Light passing through a prism is refracted twice—once when it enters and once when it exits.

Violet light, which has a short wavelength, is refracted more than red light, which has a long wavelength.

You can see the colors of the rainbow when white light is separated by a prism.

What is light?

Light:

- Light travels in a straight line until it strikes an object
- If the object is:
  - **Opaque** then transmission is interrupted (i.e. piece of wood)
  - **Transparent** then transmission passes through it (i.e. window)
  - **Reflective** then transmission is reflected

It takes

8 minutes

for light to reach us from the Sun!

Light travels 300 000 kilometres through space every second!

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Sources of Light:

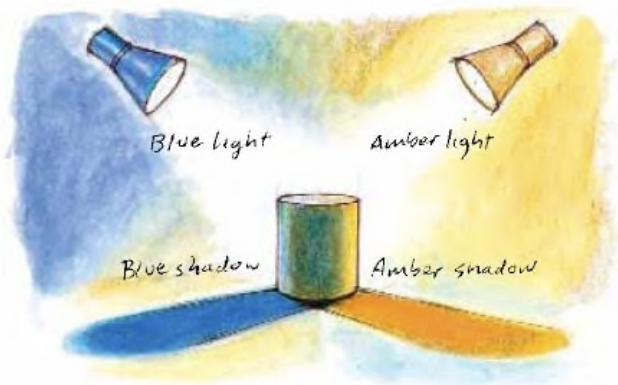
Light from the Sun

- Light from the sun takes 8.3 minutes to reach Earth
- The Earth is 150,000,000 km away from the sun
- Electromagnetic waves from the sun are major sources of energy on earth
- Plants use this energy to feed themselves and grow.
- Animals in turn take this energy when they eat the plants
- The Earth's fossil fuels are stored energy from the sun

Light

- Our primary source of light is the sun.
- Light travels in straight lines at a speed of 186,000miles per second.
- *Light waves travel faster than sound waves!
- When light reaches an object, it is absorbed, reflected, or passes through it.

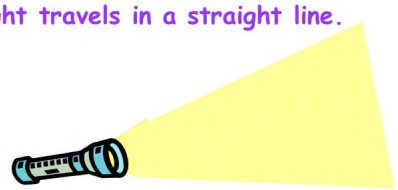
<2-lights & 1 shadow>



The cast shadow from each colored light source is the color of the other source.

Shadows

- Light travels in a straight line.



- If something gets in its path the light is blocked.
- A shadow is formed.

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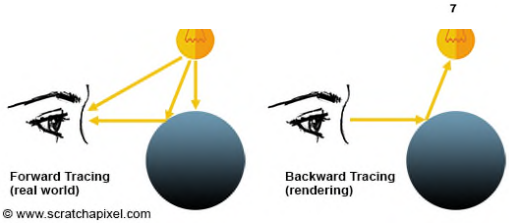
How light diffuses through different mediums:

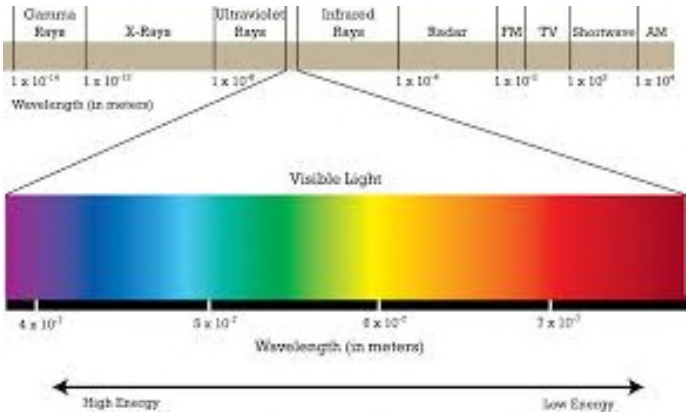
Based on densities… and other properties. But light works more or less like this:



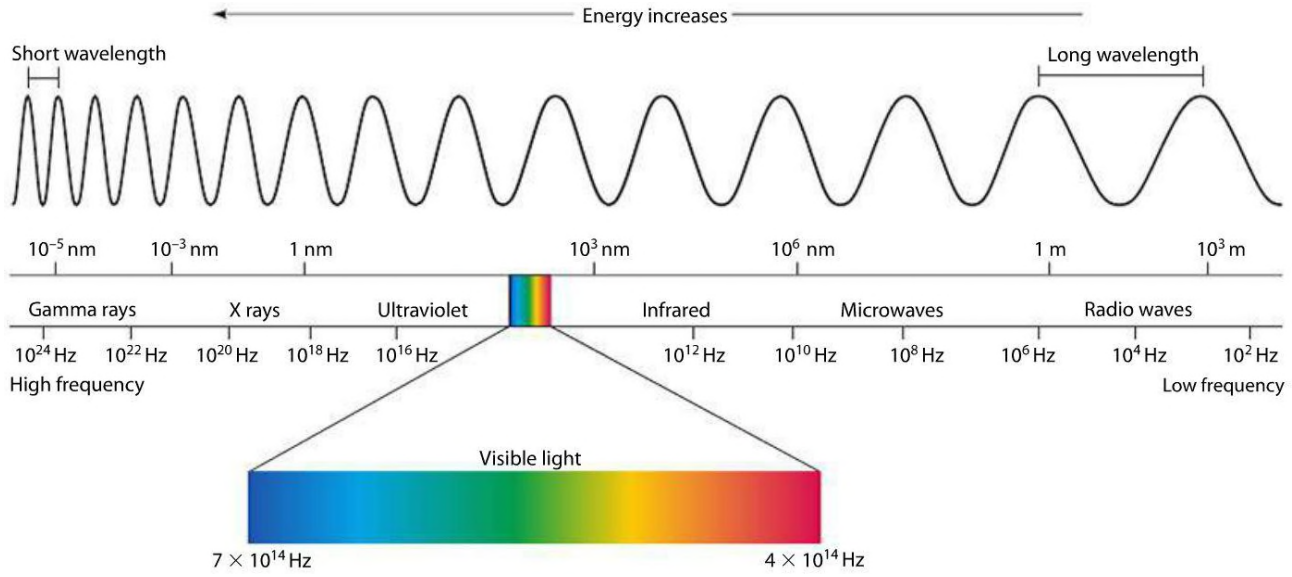
From white light to a rainbow – prism:

Rainbows are Refracted Light

- When light waves from the sun pass through a droplet of water in the air, the light is refracted.
- The different colors of light travel at different speeds through the drop therefore the colors are refracted by different amounts= RAINBOW



From a spectrum of light to a series of colorful waves:



Electromagnetic Waves

- Waves that do not *require* a medium.
- Light travels by electromagnetic waves called ***radiation***.
- Light (*radiation)* can travel through the emptiness of space (no medium) from the Sun to the Earth.
- Light (*radiation)* can also travel through many types of matter (medium) like air, water, glass…

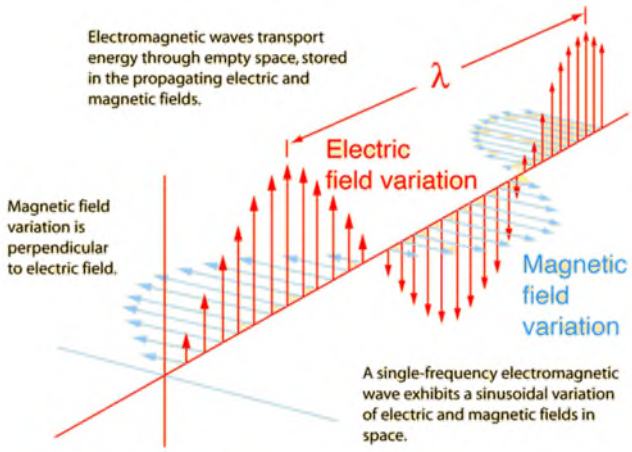
Light Waves

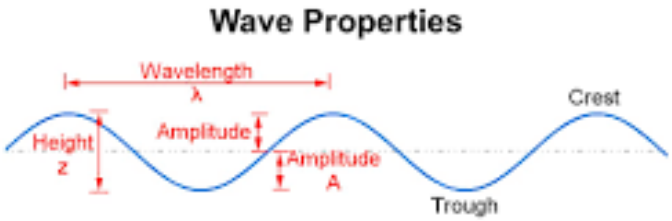
- Light travels outward in electromagnetic waves from sources such as the sun, a lamp, or a fire.
- When light waves travel through a medium that is uniform, or unchanging, such as open air, they travel in straight lines…light waves travel in straight lines unless something, like a change in medium, disturbs their motion.
- Light waves also travel in all directions from their source.

<Brain-waves & other waves in physics>

How these waves behave:

<Between physics & mathematics>





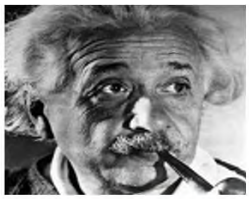
- Wave Number (k) $k = 2\pi/\lambda$
- Wave Period (T)
- Wave Frequency (ω) $\omega = 2\pi/T$
- Velocity (c) $c = \omega/k = \lambda/T$
- Steepness $St = z/\lambda$

What did Einstein say about relativity?

<Referential.m>

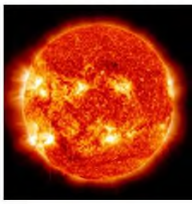
He probably said a lot more than just that, but that's a whole different story.

But from the light up above, we get into world of colors… this is how:



•Albert Einstein was a Scientist from Germany he studied light.
It was for his work on light that he was awarded the Nobel Prize in 1921 when he was just 42 years old.

"For services to theoretical physics and especially for the discovery of the law of the **photoelectric effect**."



Light Sources

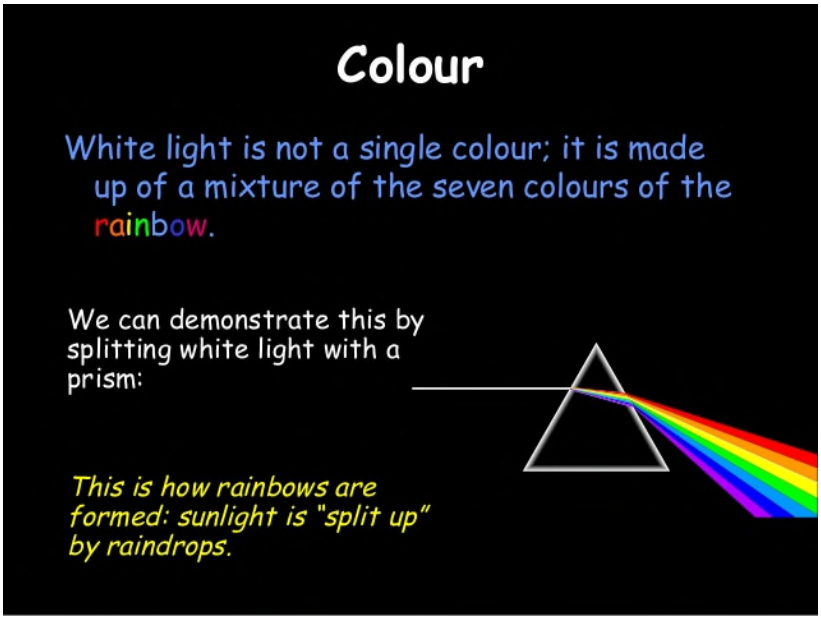
All light comes from the sun
Light travel at constant speed of 300 million metres per second.

The sun is 150 million km from the earth.
Light from the sun reaches the earth in 8.5 minutes.

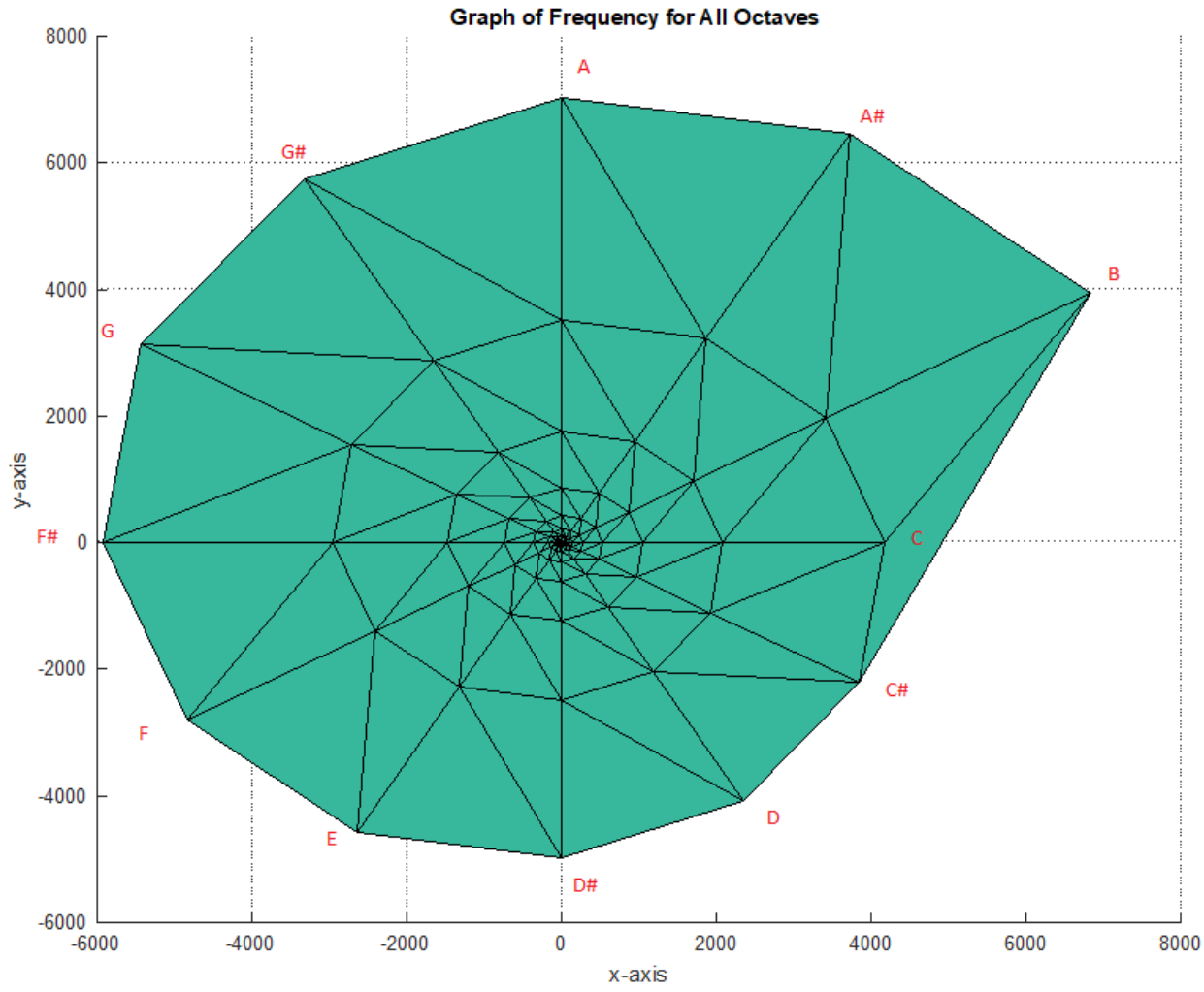
Light from the sun travels through the vacuum of space and then through the atmosphere.

Light travels through the atmosphere which is transparent (allows light through).

So… What is Color?



And How does the 7-color spectrum form a sonic world too?



<TheMusicalNautilus.m>
(www.github.com/anagouveia1/matlab/README.MD)

Beyond Colors:

In this planet, we observe things nearby us. The world we see has a blue sky, the grass is green, and those same principles from up above in the universe apply to this space. Not everywhere though, the world has many different landscapes to be drawn.

Where lines make up planes, the different levels in the one plane of the canvas, allows the observers to experience the reality the artist is trying to communicate.

The way these lines are drawn may keep a very well-structured reality, such as in an Architectural Drawing Set, or they may convey a unique world the artist sees.

Ideas can be utilized to stimulate the imagination and allow the young artist into developing its own creative thoughts into a piece of art.

Art Concepts

The following topics are some of the concepts that are utilized through many artistic practices. The many figure included within topics are representations of the ideas transposed through the image's material.

Perspective, Reflexes & Tones:

<Figure1: Golden World>

What is wrong with Figure 1 photo? _____.

Does this image give you a feeling of **warmth** or **coolness**? (Circle the emotion you feel through it)

<Figure2: Silverly Lines>

What about this second figure, what type of feelings does it express?

_____.

<Figure 3: Allston Living Room>

Reality

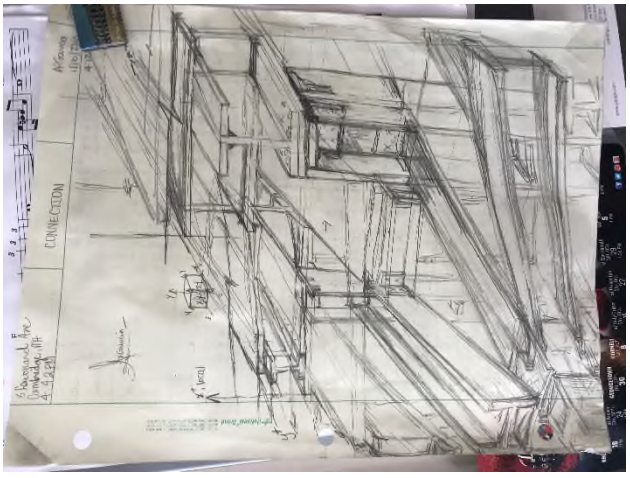
<Figure 4: Living Room on a Canvas>

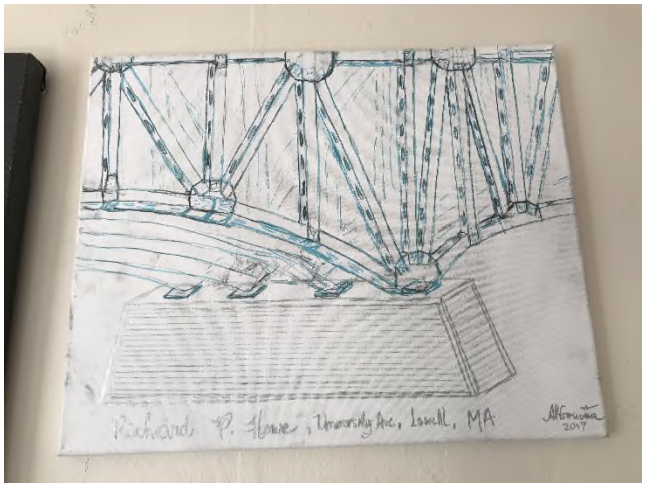
Canvas

Notes: _____
_____.

Q. **Or what type of emotions it communicates/ express?**
_____.

What type of art do you think each of the following drawings represent?





Possible Test Question Answers:

<Figure 1> <Figure 2>| <Figure 3><Figure 4> | <Figure 5-8> | Warmth Cold Perspective & Reality 4imgs

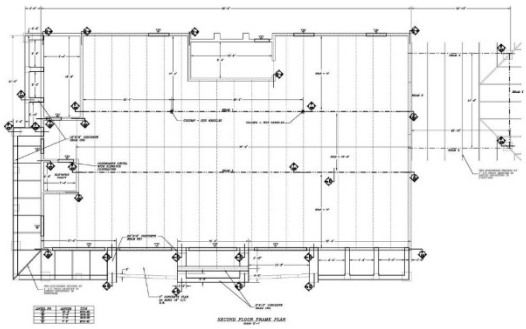
Geometry:

Lines, Planes, 3-D

Line Properties

Surface Areas & Engineering Plans, Elevations, Sections & Details.

House Plan:



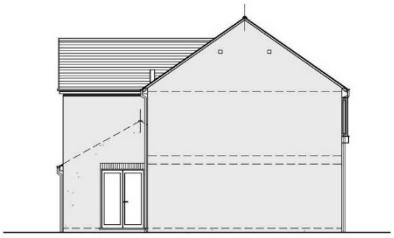
(Structural Framing Plan for Levels 1-N)

House Elevations & Side Sections:

North (Rear) Elevation - Existing

West (Side) Elevation - Existing

North (Rear) Elevation - Proposed



West (Side) Elevation - Proposed

Structures:

Bridges vs. Buildings

DWG	Bridges	Buildings
Plan	Top View	Different floors
Elevation	East & West	North & South
Section	North & South Approaches	East & West
Details	*	A connection

Exercise – Find and Glue below Plans, Elevations, 3-D Views, Sections or Any Images That You Appreciate:

Materials & Textures:

Through the different boundaries multiple universe collide. Below a few examples of color boundaries.

Sand & Ocean:

Any other boundaries you notice here? _____.

Mountain & Sky

River & Field:

Leaves, Flowers & Clouds… What other details do you think we could mention?

_____

_____

Dynamics & Movement:

Where is the wind going? _____.

Exercise - Find and glue below two different pictures that show dynamic & movement:

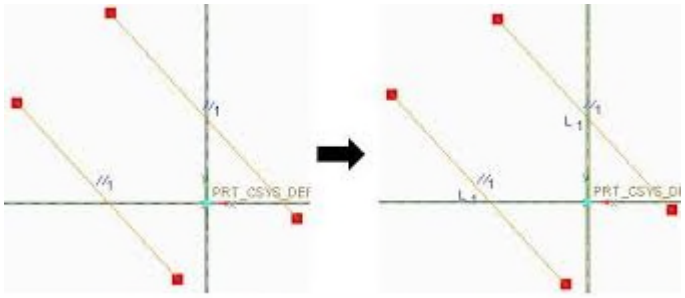
Painting Layers

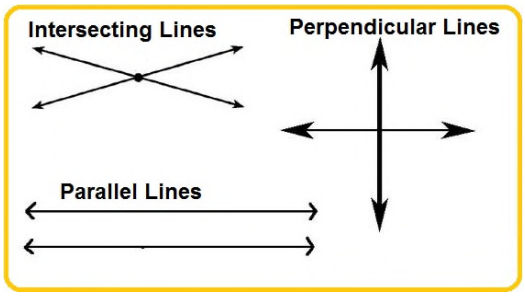
So how do we go about painting?

Defining Boundaries

From idea to first sketch.

Understanding Quantities & Ratios (Perpendicular) (Parallel) (Slopes)





Visualizing In Between The Lines [Two sketches errors]

Can you see the line sketch error? What is it?

_____.

Painting in Engineering & Architecture: (Plan) (Elevation) (Section) (Details)

Concepts Overviewed: (Top-Down) (Heights & Levels) (Cuts & Planes) (3-D) (Dynamics) (Wind)

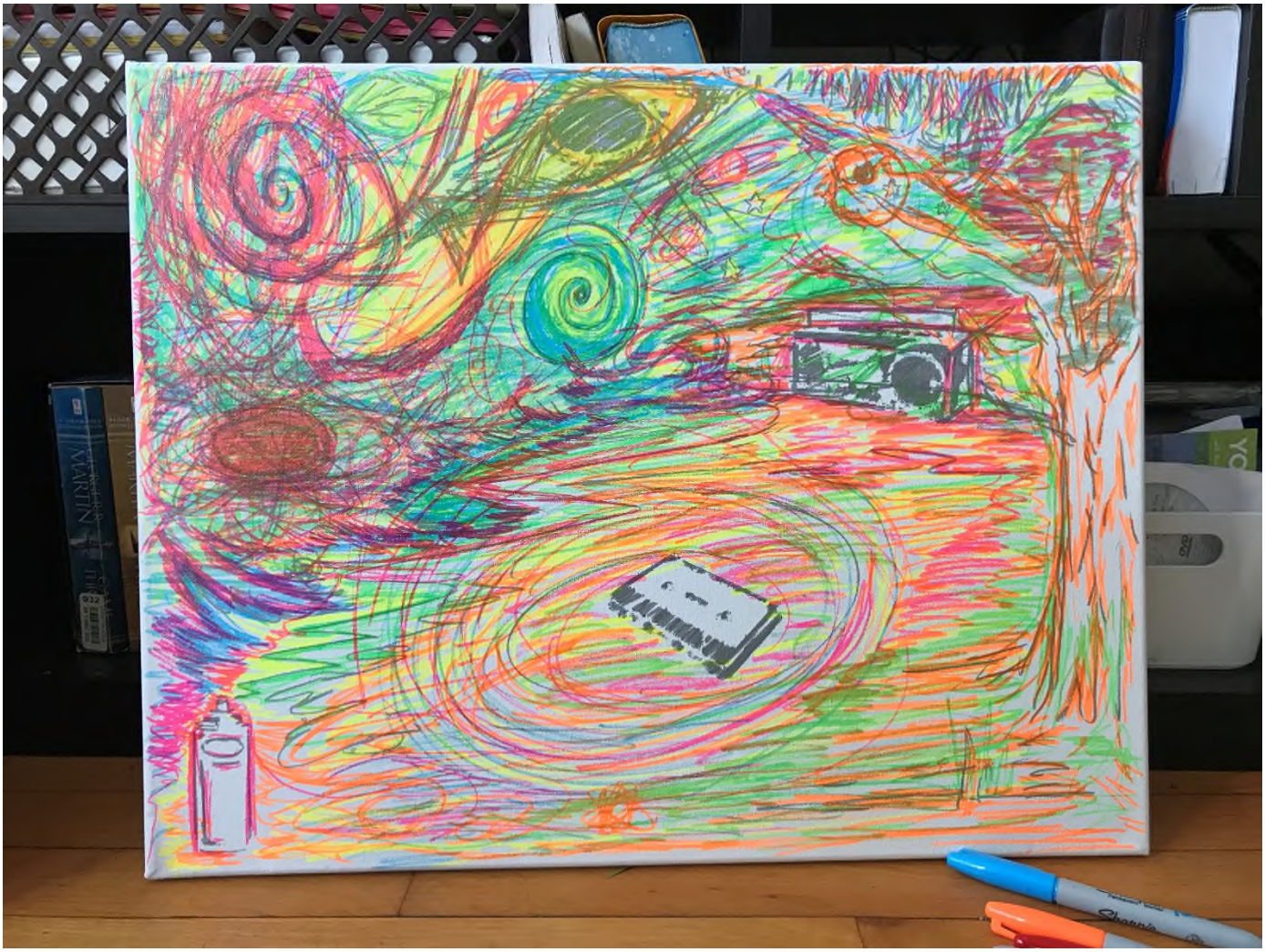
Questions? _____.

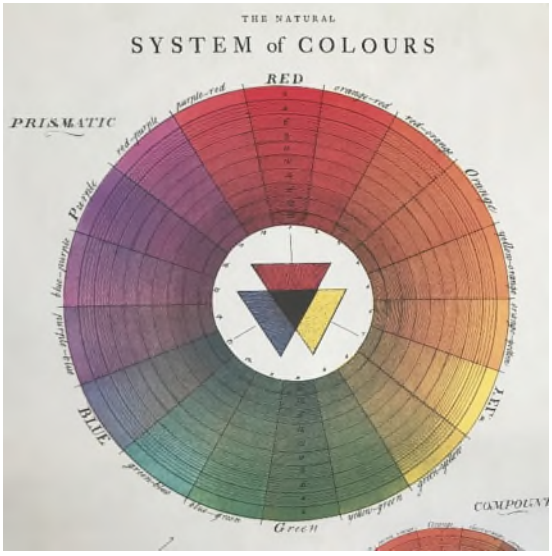
Painting

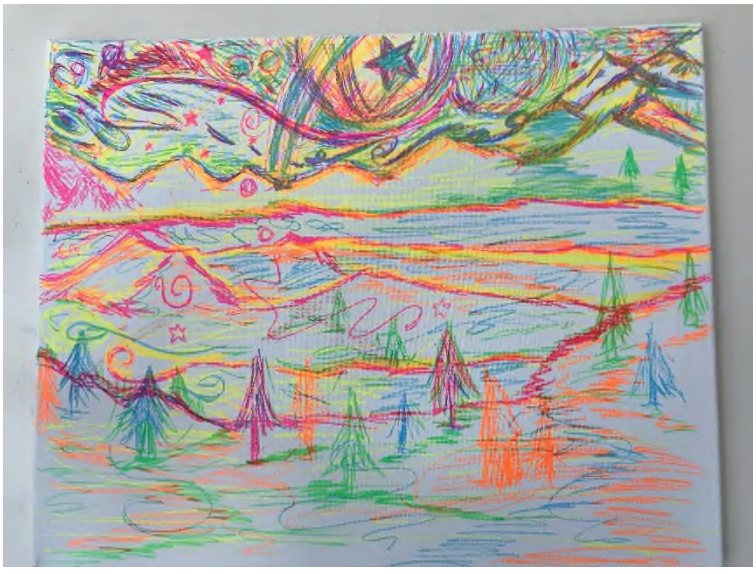
From having a designated area to paint, to using your creativity to set up the materials needed to paint, the photo below shows my current art set-up as a suggestion:

Going from lines to backgrounds:

Mixing colors - Always keep a good balance: black – colors – white;







<Palette Idea>

Transparency & Glows:

<Beach Detail>

See how the water glows over the sand… ever so slightly eventually creating shadow in some spots?

Mists & Smokes:

<Chimney>

Same as a chimney smoke, or water mist… it is somewhat of the same color, no?

Fine line Details:

<Flowers in Field> <Fox Hair & Expressions>

Up Keep & Materials Maintenance:

Once you have the following materials staged you are ready to start:

- ☐ Paint + Palette + Brushes + Containers w/ Solvents + Rags + Easel(canvas)
- ☐ <Amazon Oil Painting Material List> (http://www.amazon.com/hz/wishlist/ls/SUECQDK8X4YK)

Paint – Always use it minimally. A drop on the palette is a good start. Put the cap back on the tube, so it won't ooze and dry out. You are allowed to measure out how much paint the content you are doing requires. Backgrounds generally require _____ paint.

Palette – Wood vs. Plastic vs. Styrofoam: (A little math exercise)

Qualities	Wood	Plastic	Styrofoam	ALT D
Price ($)				
Vol (oz)				
Mass (g)				
Dims (ft or in)				
Chemistry				
Surface Area	**Drier.**	**Oily**	**More oily.**	
RATIOS				
$/VOL or $/mass				
Effectiveness				

Notes: _____.

#RealWorldPOP

Skiing on metal rail vs. Skiing on wooden rail.

Metal had more friction, not sure if it had less ice built up in it than the wood, which then end up becoming smoother.

Your thoughts? _____.

Brushes – Like pencils these should be used to match the type of drawing done. Backgrounds may be easier done like a wall. So a wider bushier brush should do a good job. For most lines, a brush that is as comfortable as a pencil can allow the artist to gain more control over the instrument. The finer the brush tip, the more detailed the drawing will be.

In a way, a well-balanced paint should proceed from a wider and bigger brush defining background planes, to the first observable lines in a standard brush lines, to detail filling with the use of fine brushes.

<Brush Types w/ Dimensions>

Maintenance:

So what do you think are best practices to keep your oil painting supplies longer? _____.

Cleaning up the Palette + Brushes + Containers + Rags

Chemistry of Oil Paint:

<Where you can check this info: Google>

Even in the Renaissance when **oils** first inspired artists to delve wholeheartedly as a medium, a number of **oils** were tried as vehicles for pigments. And their properties differ. Linseed **Oil** - made from flax, linseed is the most popular due to its flexibility and resistance to cracking. Jul 31, 2011

The Chemistry of Oil Painting - Scientific American Blog Network
https://blogs.scientificamerican.com/.../httpblogsscientificamericancomsymbiartic201108...

Use solvent (**paint** thinner) to **clean oil paint** from paintbrushes; soap and water won't work. **Cleaning** paintbrushes before the **paint** has a chance to dry on them is the best way to keep your equipment in good shape. **Cleaning** with **paint** thinner can be quite messy. Work in a garage or outdoors, if you can.

How to Clean Oil Paint from Paint Brushes - dummies
www.dummies.com/home-garden/...painting/how-to-clean-oil-paint-from-paint-brushes/

Questions? _____.

How long does it take for oil paint to dry? _____.

How did you measure that? _____.

More on it: (https://blogs.scientificamerican.com/symbiartic/httpblogsscientificamericancomsymbiartic20110802the-chemistry-of-oil-painting/)

How do you get oil based paint off your hands?

To remove oil paints from your skin:

1. Wash and dry hands thoroughly.
2. Soak a cotton ball or rag with baby oil or mineral oil.
3. Rub vigorously in a circular pattern over the paint.
4. As the paint begins to lift, apply more oil and repeat step 3.
5. Continue until the paint is removed.
6. Wash and dry hands thoroughly.

Can you use acetone to clean up oil based paint?

And because **acetone** is miscible with mineral spirits, it's very useful for speeding the **cleaning** of varnish, **oil**-stain and **oil**-glaze brushes before washing in soap and water. ... The solvent strength makes **acetone** excellent for removing **paints** and finishes, so it is a common ingredient in **paint** and varnish removers. Dec 21, 2009

How do I clean my oil paint brushes?

Repeat the washing and rinsing process until the soap and water runs clear. If you've been working with **oils**, use a rag to wipe away as much colour as possible from your **brush**. Then rinse any remaining colour using Winsor & Newton **Artists**' White Spirit or **Brush Cleaner**.

Cleaning up materials chemistry:

Qualities	ALT A	Turpenoid	Linseed Oil	ALT B
Price ($)				
Vol (oz)				
Mass (g)				
Dims (ft or in)				
Chemistry				
RATIOS				
$/VOL or $/mass				
Effectiveness				

Notes: _____

_____

_____

_____

QUESTIONS:

How do solvents and oil bond? _____.

What mixture do you think will best clean up your brushes, palette & containers? _____.
Why would you think so? _____.

What kind of moods do the following paintings allow you to feel?