



UNIT 3

OPTICS

Name: MS. Friess

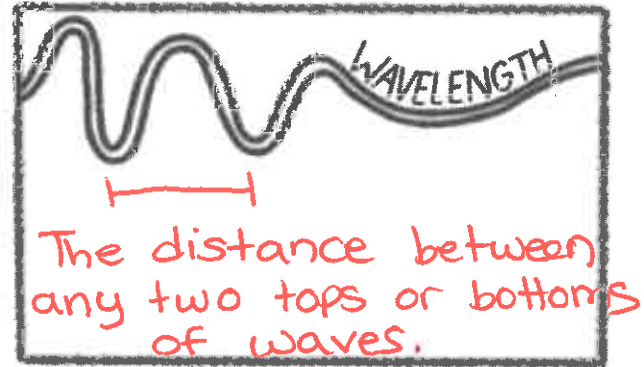
Class: _____

VOCABULARY BOOK

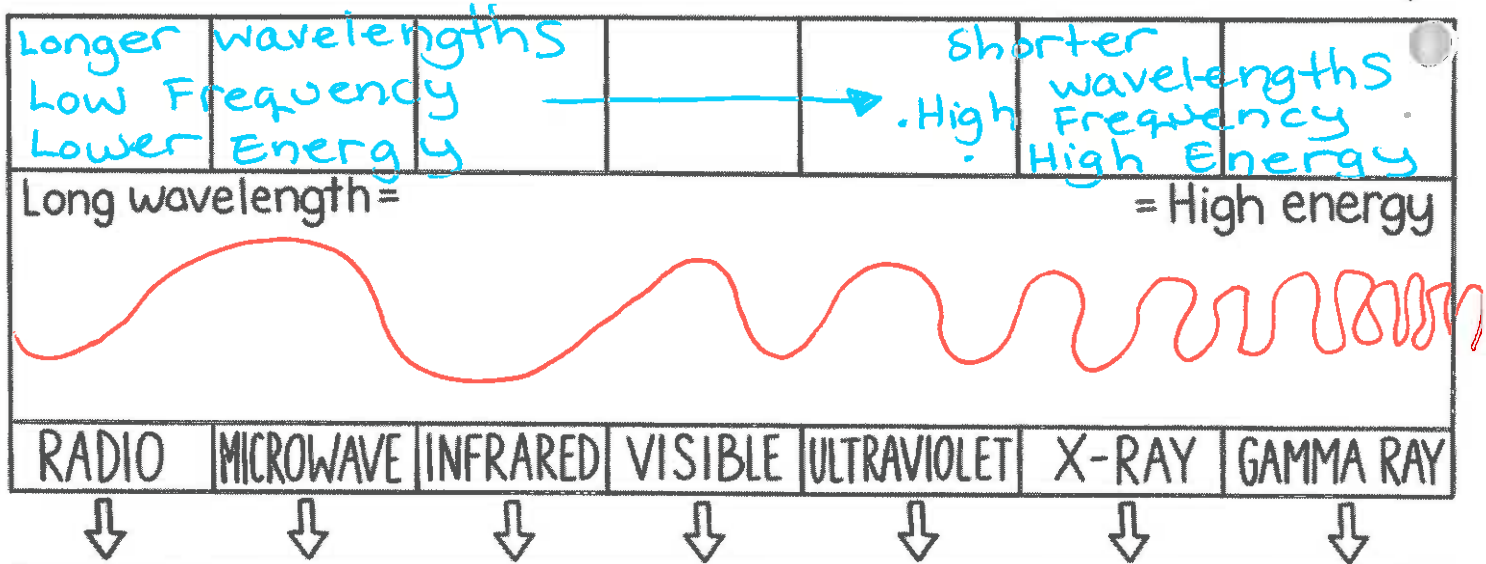


THE ELECTROMAGNETIC SPECTRUM

WHAT IS THE ELECTROMAGNETIC SPECTRUM? The arrangement of radiation (light) consisting of electric + magnetic waves that travel at speed of light.



HOW DO scientists USE THIS INFO? ↓

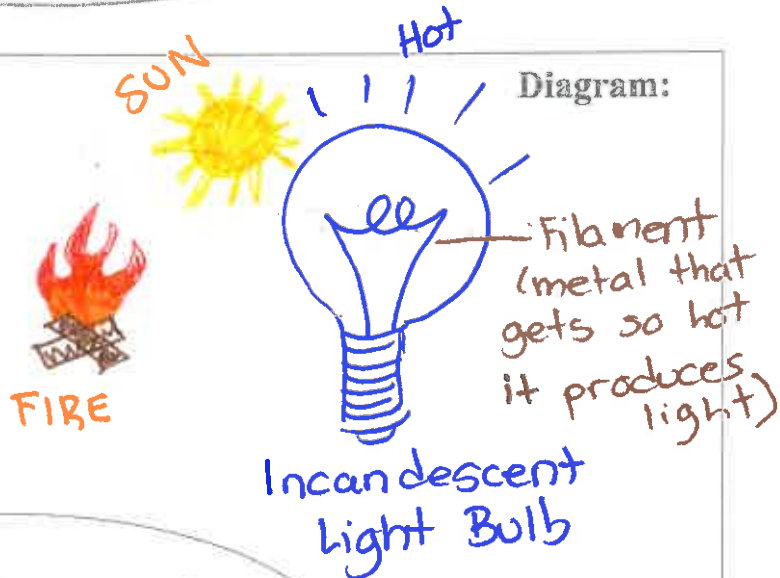


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|--|--|--|---|--|--|--|
| <ul style="list-style-type: none"> • AM/FM Radio • communication • TV signals | <ul style="list-style-type: none"> • cell phones • Radar • Microwaves | <ul style="list-style-type: none"> • "heat" • thermal images • night vision cameras | <p>The part we can see</p> <p>ROYGBIV (spectrum)</p> <ul style="list-style-type: none"> • Light Bulbs • Flashlights | <ul style="list-style-type: none"> • used for Sterilization • tanning bulbs • water treatment | <ul style="list-style-type: none"> • used in medical Scanning (see bones) • sterilization • study black holes | <ul style="list-style-type: none"> • cancer treatment • study black holes • sterilization |
|--|--|--|---|--|--|--|

What this word reminds me of...


Definition: A light source that burns so hot it glows. (Hot light)

• This light is produced from heating an object



Incandescent Light

Life Examples:

FIRE
The sun
Incandescent Light Bulb
Halogen Light Bulb 

Sentences:

What this word
reminds me of...

Definition: A light source
that is not hot.
(cold-light)

• No major change
in temperature
when this light
is emitted.

Diagram:

* see the next
four pages
for examples

**Luminescent
Light**

**4 Major Types of
Luminescent Light**

- 1) Fluorescent
- 2) Phosphorescent
- 3) chemiluminescent
- 4) Bioluminescent

Life Examples:

Sentences: Light is emitted in some other
way (without heat) in a luminescent
light)

What this word
reminds me of...

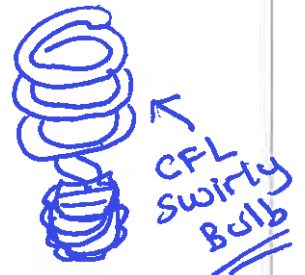
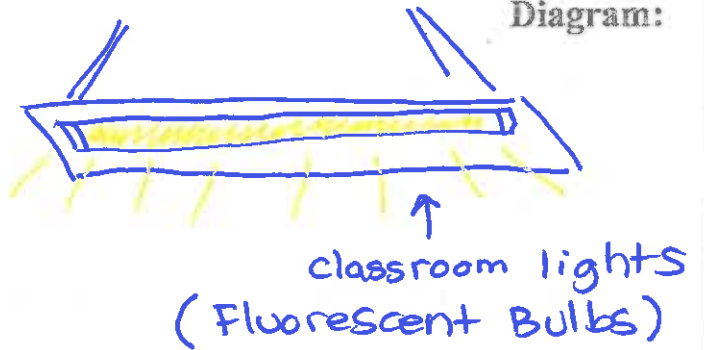
Definition:

A gas gives off light only while it is supplied with electrical energy.

The electricity reacts with chemicals within a tube (or space filled with vapour) such as mercury vapour.

Luminescent Light
1) Fluorescent

Diagram:



Life Examples:

Fluorescent Light Bulb

- CFL
(compact fluorescent bulb... aka swirly bulb)

Sentences:

What this word
reminds me of...

Definition:

A source that continues to give off light even after the initial source of energy is taken away.

- Light energy is stored by special chemicals (phosphors)

- you can "charge" these chemicals with sunlight/uv/ or other light

Sentences:

Glow in the dark toys



Diagram:



Glow in the dark stickers

Luminescent light

2) Phosphorescent



Life Examples:

- Glow in the dark stickers

- Glow in the dark toys

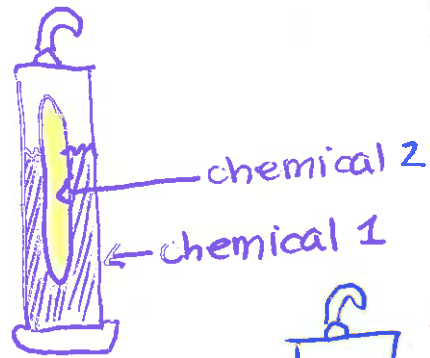
- Glow in the dark watch

What this word
reminds me of...

Definition:

Light occurs when
a chemical reaction
between substances
gives off light
without
creating
heat.

Diagram:



Luminescent
Light
3) Chemiluminescent



* Often requires
2 or more
chemicals to mix.

Life Examples:

• Glow Stick

Sentences:

What this word
reminds me of...

Definition: A light source
that is a form
of chemiluminescence
that occurs in
living organisms.

• These living
organisms
may have
different
purposes for
emitting this form
of light

(ex. attracting mates,
attracting prey,
navigation, escaping
predators)

Sentences:

Diagram:



← Glowing
worms +
insects



- Fire Fly
some
Jelly-
Fish



Angler
Fish

Life Examples:

- Glowing worms +
insects
- Fire Fly
- some Jelly Fish
- Angler-
fish

Luminescent
Light
4) Bioluminescent

LIGHT



Additive Colour Theory

The process
of adding colours
of LIGHT together

* Helps us
understand
human vision

Light directly
from sources +
reflected light
off objects
will enter our
eyes + help
us see colour.

* See
hand-out
for primary
colours
+
secondary

PIGMENT



Subtractive Colour Theory

Subtractive
Theory

Explains how

PIGMENTS mix
together to obtain
new colours.

A pigment is a
chemical that
absorbs certain
colours of light +
reflect others.

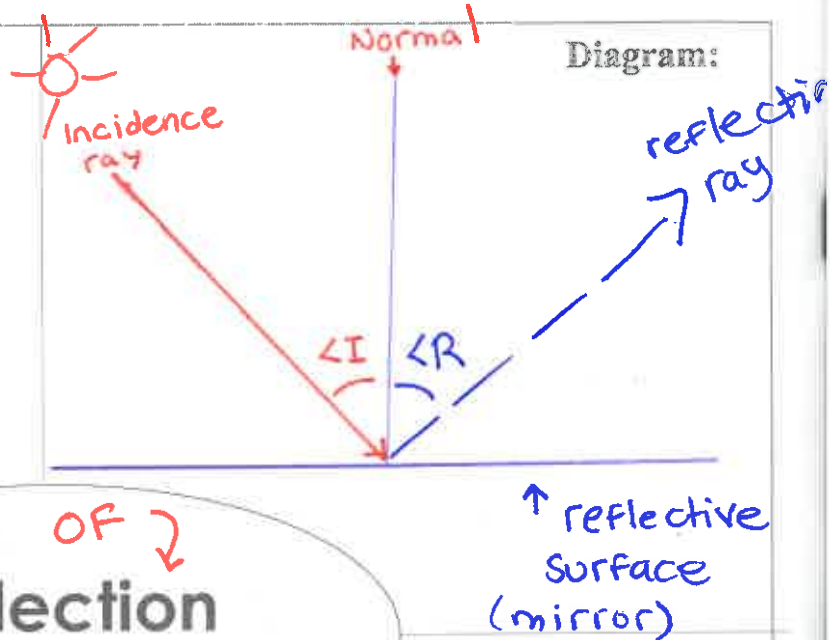
* All objects/
Matter will
have different
pigment
properties.

* See
handout
for primary
+
secondary
colours

What this word
reminds me of...

Definition:

The angle of
a reflected light
ray is equal
to the angle
of the
incident
light ray



Law OF Reflection

$$\angle I = \angle R$$

$\angle I$ = Angle of Incidence
 $\angle R$ = Angle of Reflection

* The angles would
be equal (the same)

Example: If the incident light ray hits a reflective surface at 55° angle from the normal... then light ray would bounce out at a 55° angle.

What this word reminds me of...

Definition: Laws of Refraction

1. Light that moves at an angle from less dense medium to a more dense bends toward the normal.

① Air

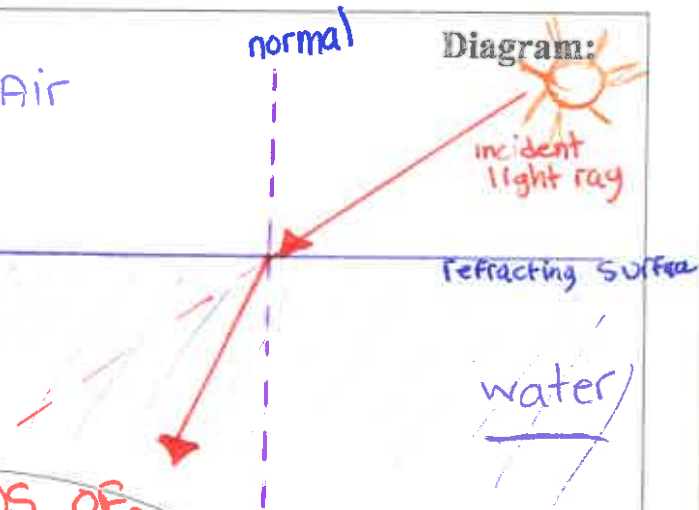


Diagram:

incident light ray

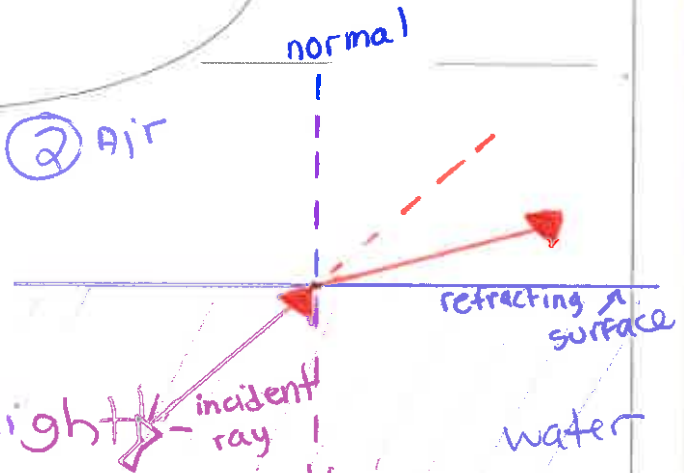
refracting surface

water

Laws of Refraction

2. Light that moves at an angle from a more dense medium to less dense bends away from the normal

② Air



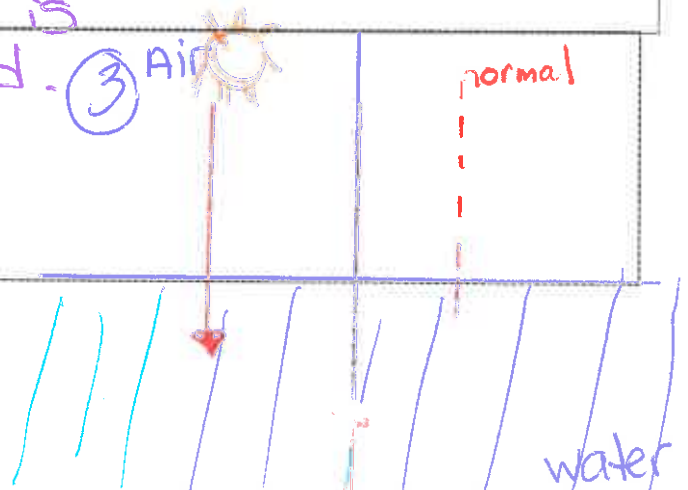
normal

refracting surface

water

3. Light that moves straight on from one medium to another does not bend. It is not refracted.

③ Air



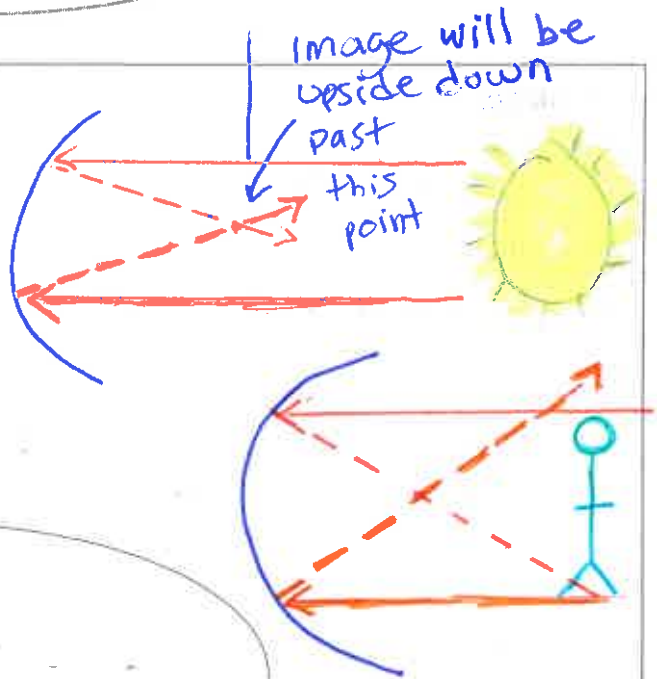
normal

water

What this word reminds me of...

Definition: concave mirror

- Reflective surface curved inwards
- Light rays will reflect inward coming together (converge)
- Image appears larger and inverted unless close

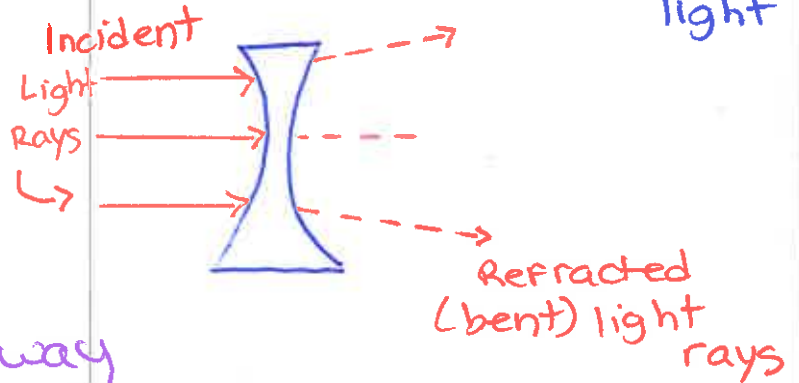


Concave

ex. used in camera flash to focus light

concave Lenses

- Bends light rays so they spread out away from each other.
- helps see farther away



ex. glasses to help see farther away

Mirror (reflective)

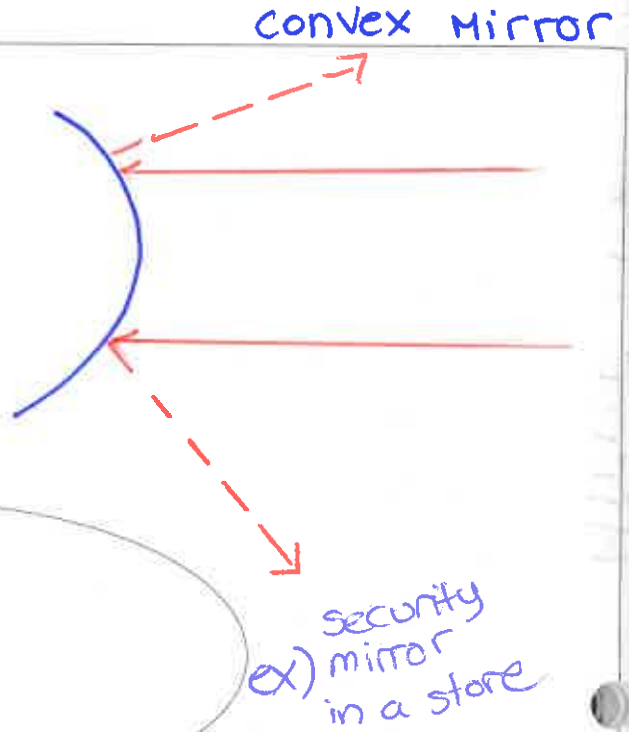
Lens (refractive)

What this word
reminds me of...

Mirror (reflective)

Definition: convex mirror

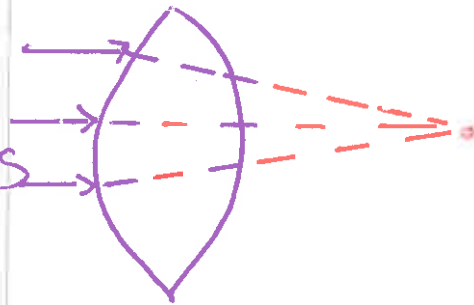
- Reflective surface curves outward
- Light rays spread out
- image allows a greater surrounding view (larger area) appearing smaller



Convex

Convex Lens

Bends light rays inward so they converge and focus light



convex Lens

Sentences:

ex, glasses to help read or see "close"

ex. Magnifying glass

(refractive) Lens