Frequency: The number of waves produced per second, Hertz

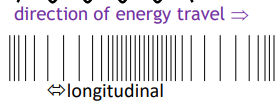
The particles vibrate at right angles to the direction of travel of the wave.

Shape

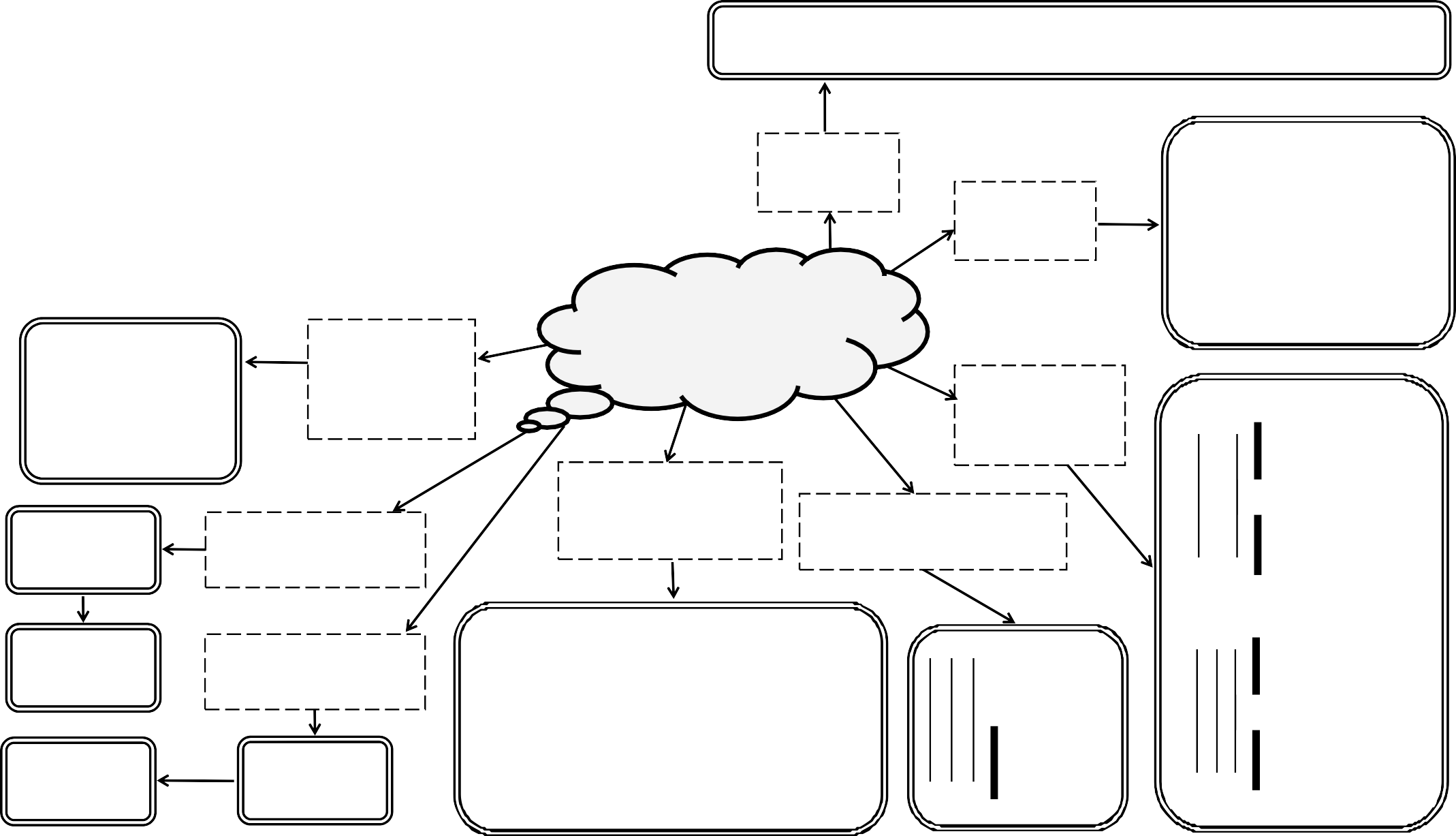
Description automatically generated

All EM waves are transverse.

The particles vibrate parallel to the direction of travel of the wave.



Sound waves are longitudinal.



Or The number of waves passing a point per second,

Period: The time taken for one wave to pass a point, second

Wavelength: The distance between the same point on waves right next to each other. The distance between successive crests on a wave.

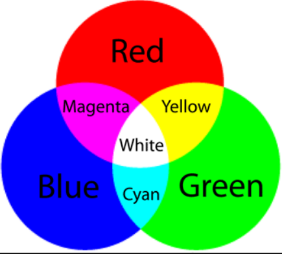
Describe a transverse wave. Give an example.

All waves transfer..

ENERGY.

Describe a longitudinal

wave. Give an example. Give the definition of...



Primary and secondary light colours?

1: RED, BLUE & GREEN

2 Magenta, Cyan, Yellow

What are the units of frequency, period, amplitude and wavelength?

Units

Frequency ⇒Hertz

Period ⇒ second

Amplitude⇒ metre

wavelength⇒metre

# 

# Waves &

# reflection

Draw a diagram of a wave and label the;

Diagram

Description automatically generatedDraw a labelled diagram of a ray reflecting off a plane mirror

Show light through a prism.

crest, trough, amplitude and wavelength

Give uses of curved mirrors

**Normal**: a line at right angles to a surface at the point where the incident ray strikes the mirror.

**Angle of incidence**: the angle measured from the normal to the incident ray

**Reflected ray**: the angle measured from the normal to the reflected ray.

Diagram

Description automatically generated

Inspection mirrors

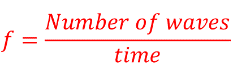
Rear view mirrors

Dental viewing mouths, solar oven

Beauty (magnifying)

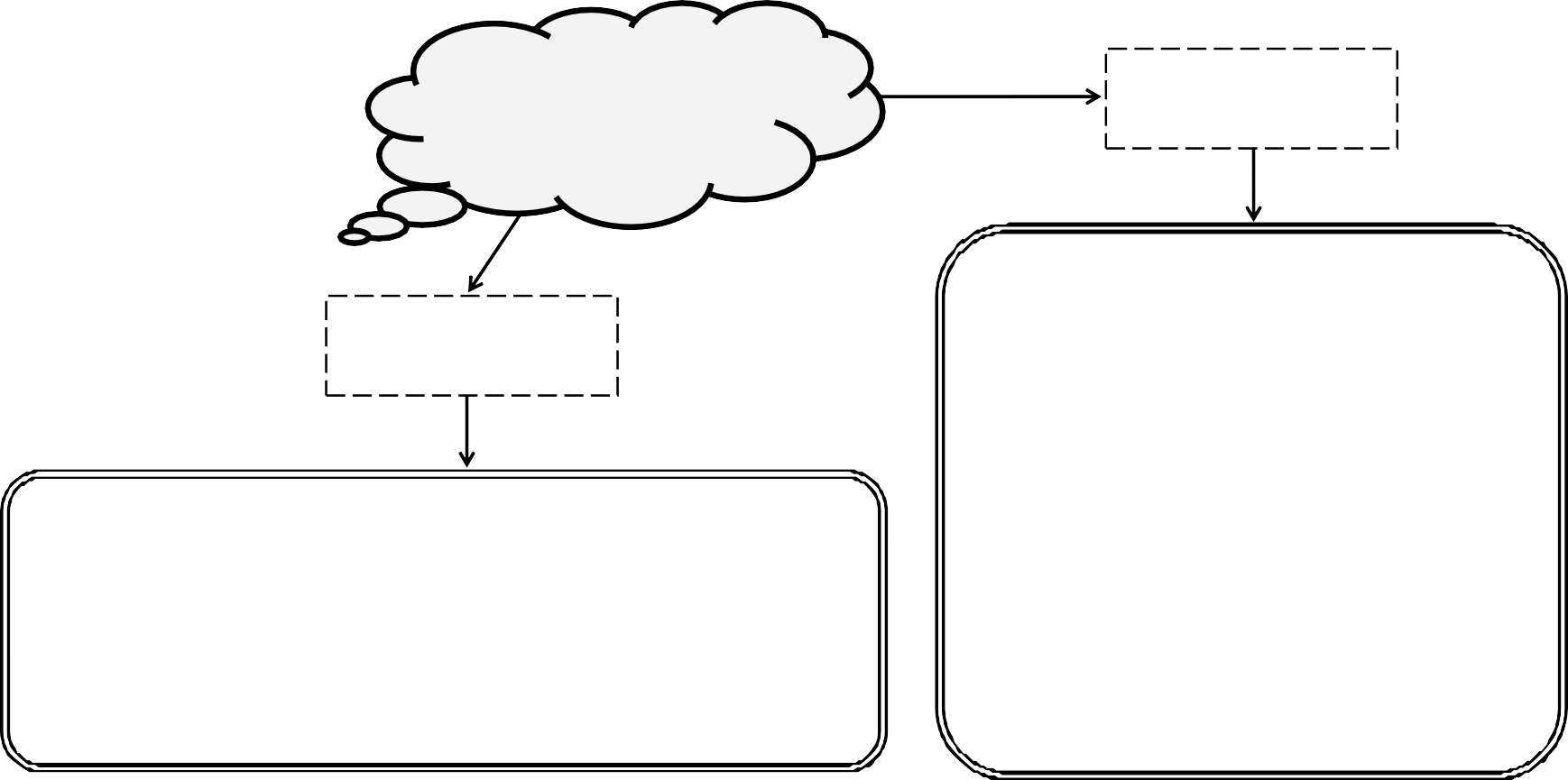
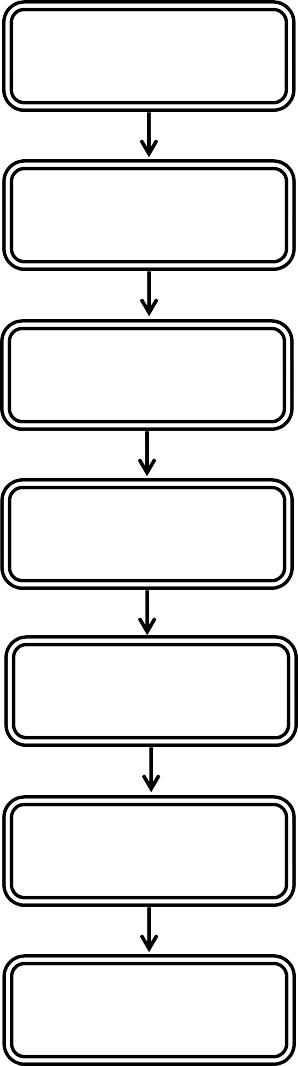
Security (shops, buses)

Icon

Description automatically generated with medium confidenceA picture containing logo

Description automatically generatedRelationships to calculate frequency and period

|  |  |
| --- | --- |
| Radio & TV | aerial |
| Microwaves | aerial |
| IR | photodiode, thermocouple, thermistor |
| Visible | black bulb thermometer |
| UV | photodiode, photographic film, retina CCD |
| X-Ray | photodiode / melanocyte skin cells, fluorescent materials |
| Gamma | photodiode / photographic film / electrical current detectors |



All EM waves, transfer energy, are transverse waves and travel at 300 million metres per second

(3.0 × 108 m/s) in air

They have no mass.

What do all EM waves have in common? What speed do they travel at?

List detectors for each type of radiation

RADIO

MICROWAVES

INFRA RED (IR )

VISIBLE

ULTRA VIOLET (UV)

X-RAYS

GAMMA

# Electromagnetic Spectrum

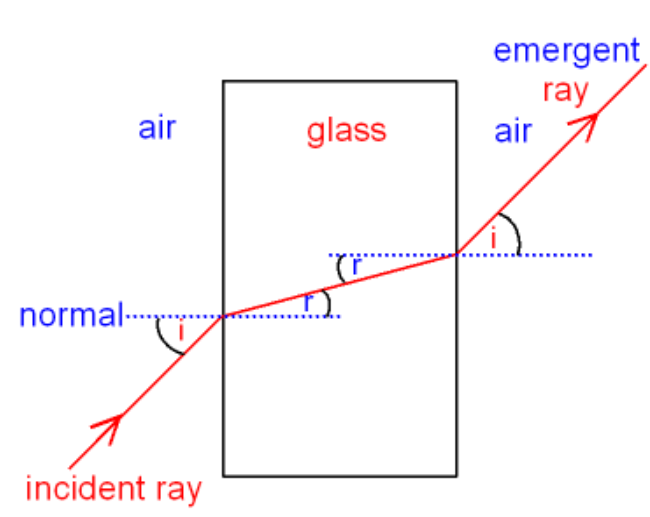
Put the EM spectrum in order of increasing frequency

List applications for each type of radiation

|  |  |
| --- | --- |
| **Radio & TV** | communication (under the sea, in space) Watching TV programmes, films, listening to the news |
| **Microwaves** | heating water molecules to warm food,  communications |
| **Infra Red** | remote controls, security systems, automatic external lights searching for people in dark |
| **Visible** | humans viewing the world, photography, |
| **Ultra violet** | detecting forged bank notes, causing white shirts to look cleaner kills bacteria and viruses |
| **X-Ray** | detecting broken bones, checking suitcases at the airport, |
| **Gamma Rays** | medical tracers to detect cancer, killing bacteria, sterilising intruments, detecting broken pipes underground |

List typical sources for each type of radiation

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Radio & TV | Micro-waves | Infra Red | Visible | Ultra violet | X-Ray | Gamma Rays |
| transmitter,  outer space | magnetron,  transmitters,  outer space | warm objects,  sun convector heaters | stars including the sun, LEDs, cinema screens | Fluorescent tubes, very hot objects, sun | X-ray tubes, stars | Radioactive nuclei,  outer space (stars) |



**Refraction** is a change in the speed and wavelength of a wave as it moves into a material of different optical densities and it can lead to a change in direction of the wave.

Define refraction in terms of wave speed and wavelength

Complete the diagram showing the path of the ray of light

**Refraction** occurs when a wave moves between material of different optical densities (like thickness)

When does refraction occur?

# Refraction of

**Light**

Label the angles of incidence and refraction; and the normal

Diagram

Description automatically generatedName this lens.

**concave**

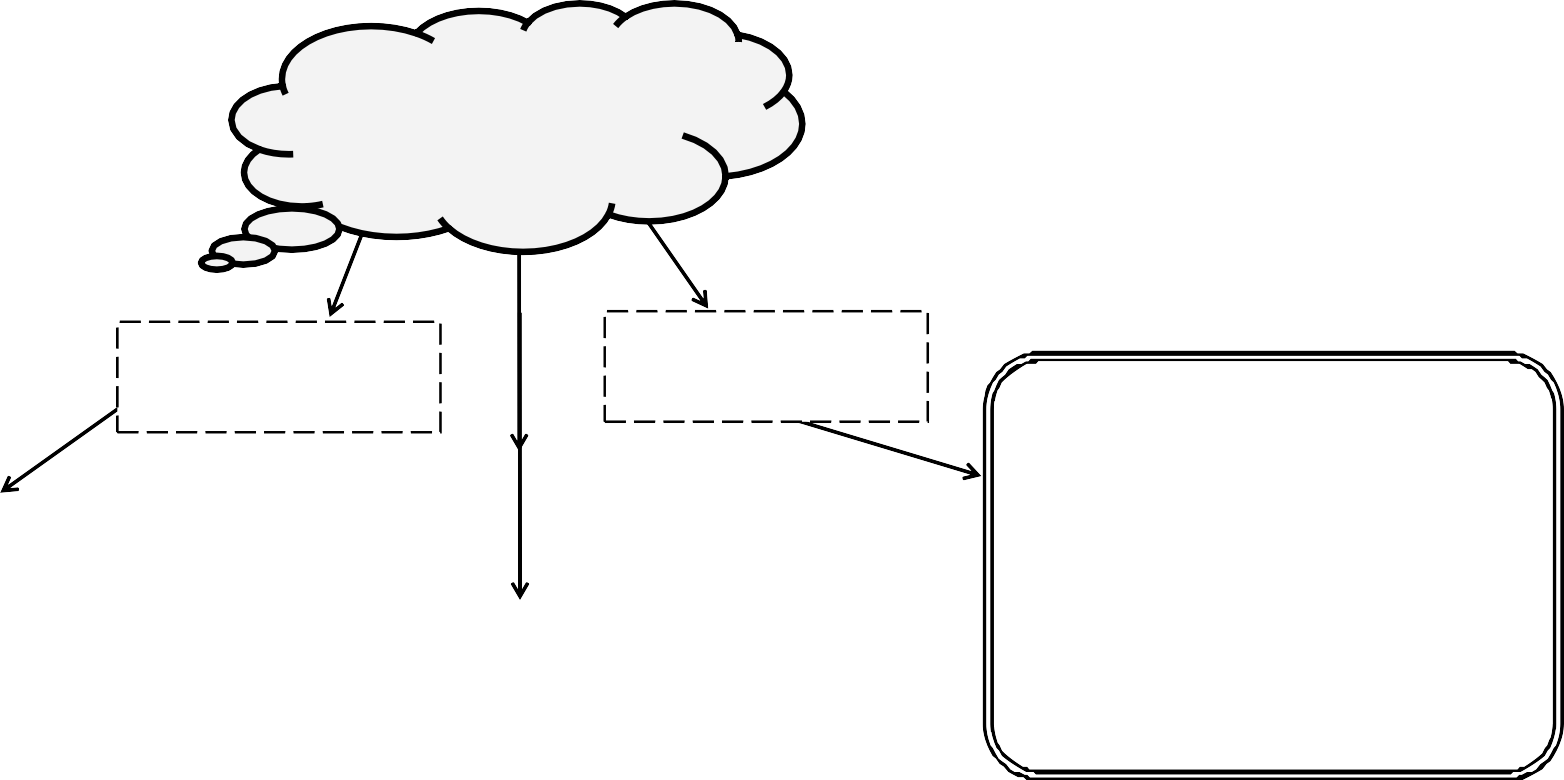
Complete the diagram

Name this lens.

Diagram

Description automatically generatedComplete the diagram

**convex**



Define

Angle of incidence: the angle measured from the normal to the incident ray

Angle of refraction: the angle measured from the normal to the refracted ray:

Diagram

Description automatically generated

|  |  |  |
| --- | --- | --- |
| **Letter** | **Part Name** | **Function (What is does)** |
| **A** | **RETINA** | **Detects the light** |
| **B** | **IRIS** | **Controls the size of the pupil** |
| **C** | **CORNEA** | **Protects the eye and refracts the light as it enters the eye** |
| **D** | **PUPIL** | **Controls the quantity of light that enters the eye** |
| **E** | **OPTIC NERVE** | **Carries the electrical signals from the retina to the brain** |
| **F** | **LENS** | **Fine-tunes the focussing of light on the retina** |