

Grade 8 - Unit 1 – Mix and Flow of Matter Concepts

W.H.I.M.I.S.
Safety



Lab Procedures
&
Techniques

Properties and Classification

All Matter

Pure Substances
- contain only one type of particle
- can exist in three states of matter: solid, liquid, and gas

Elements

- examples:
iron, gold
oxygen

Compounds

- examples:
water, salt,
sugar

Mixtures
- contain two or more pure substances

Homogeneous
(solutions)

- appear to be
one substance

- particles of
different substances
are intermingled

- examples:
vinegar,
clear air

Heterogeneous
(mechanical mixtures)

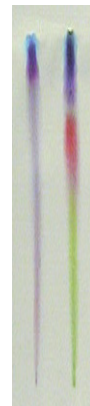
- two or more
parts can be
seen

- different kinds
of particles
stay together

- examples:
soil, blood,
concrete

APPLICATION

Paper
C
H
R
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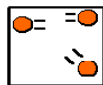
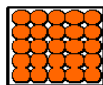


THE PARTICLE MODEL OF MATTER

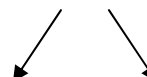
DILUTION

Concentration

SATURATION



Solubility



SOLUTE SOLVENT

Temperature - Surface Area - Agitation

Viscosity

Flow Rate

Density

Buoyancy

Plimsoll Line
Hot Air Balloons

Compression

Pressure – Pascal's Law

$$p = F / A$$

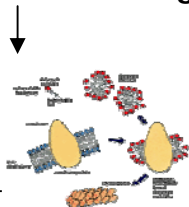
Hydraulics (liquid)

Hydraulic Lift
Pressure Washer

Pneumatics (gas)

Jackhammer
Air Brakes
Dentist Drill

Solubility-based Technologies



DETERGENT

SUBMARINE



Fluid Devices
SUBMERSIBLE



Transportation of Fluids

PUMPS & VALVES

BATHYSCAPH



Grade 8 - Unit 2 - **Cells and Systems** Concepts

Animals

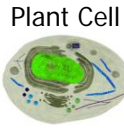
Cells
↓
Tissues
↓
Organs
↓
Systems



Plants

Roots
↓
Shoots

Structures & Functions



Osmosis Diffusion
Respiration

Technology (The Microscope)



Multi-cellular



Variation

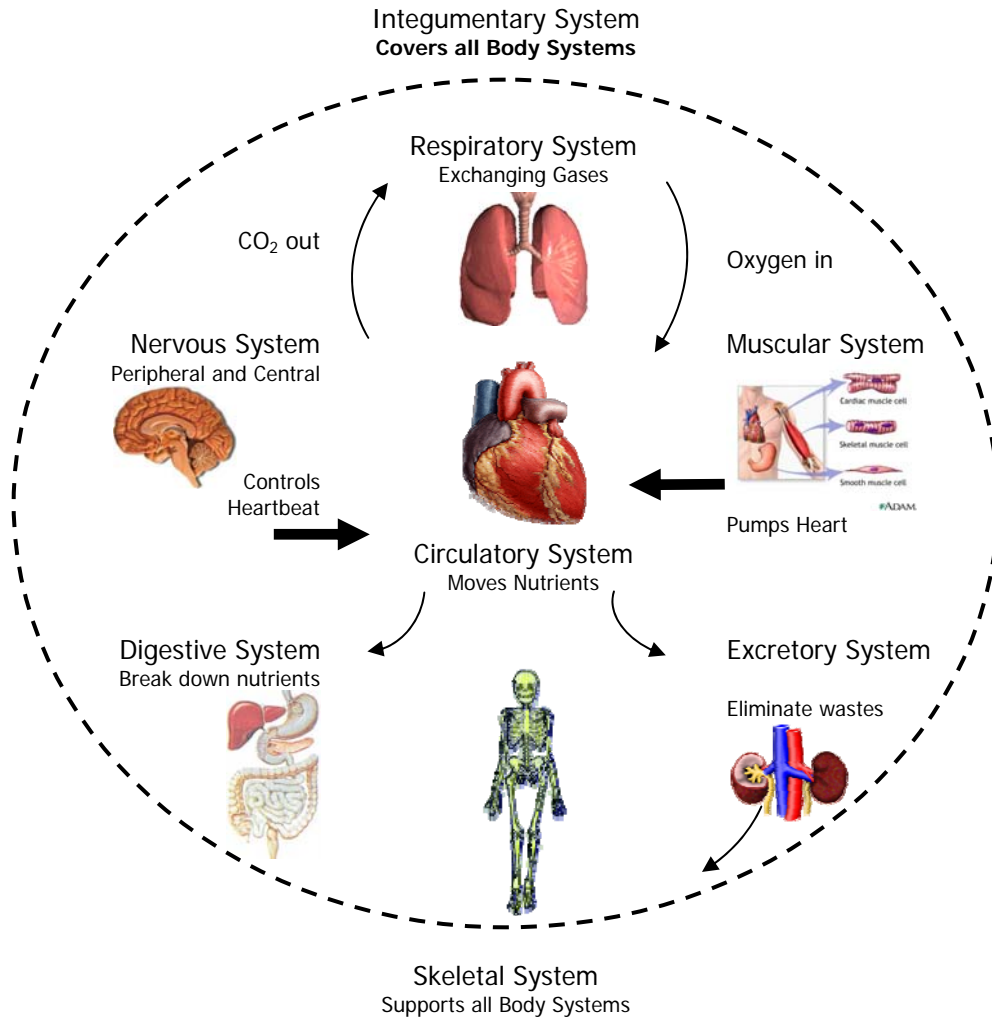


Specialization of cells – tissues – organs and organ systems

C H A R A C T E R I S T I C S

of Living Things

Cellular
Need Energy
Grow
Respond
Reproduce
Adapt



Disease Affects Living Things

Research

Discoveries

Vaccines

Medicines

Technologies

Lifestyles

Nutrition

Exercise

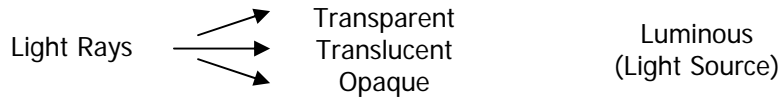
Stress

Substance Abuse

Grade 8 - Unit 3 – Light and Optical Systems Concepts

The Theory of Light

LIGHT TRAVELS IN STRAIGHT LINES
LIGHT CAN BE REFLECTED
LIGHT CAN BEND
LIGHT IS A FORM OF ENERGY



Thoughts About Light

Archimedes (Warships)

Pythagorus (Eyes – Light Source)

Euclid (Reflected)

Al-Haytham (Optics)

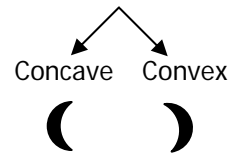
Sir Isaac Newton (Prism)

Ole Romer (Speed of Light)

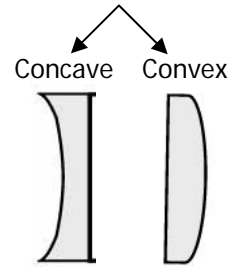
Albert Michelson (Light Speed)

Devices Using Light

Mirrors

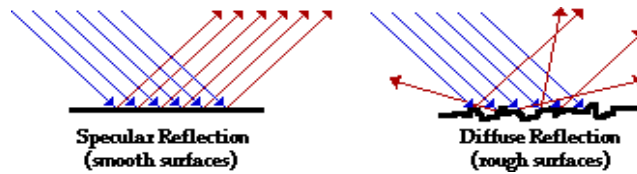


Lenses



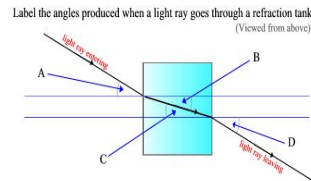
REFLECTION

LAW OF REFLECTION – The *Angle of Incidence*, of the light hitting a plane mirror, equals the *Angle of Reflection*, of the light being reflected by the mirror.



REFRACTION

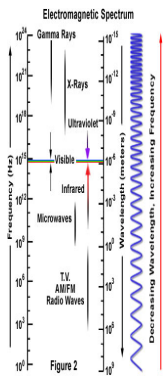
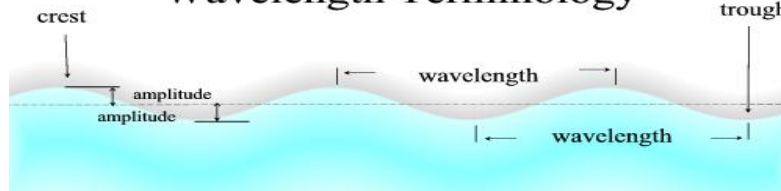
LAW OF REFRACTION - The *Angle of Incidence* of the light entering a medium of greater or less density will have an *Angle of Refraction* that will increase or decrease from the normal, because the light is bent (slows down or speeds up)



Label the angles produced when a light ray goes through a refraction tank. (Viewed from above)

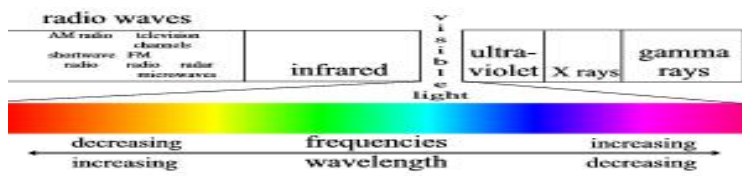
Wave Model of Light

Wavelength Terminology



Light Sources: Natural ↔ Artificial
 Colours of Light: ROYGBIV

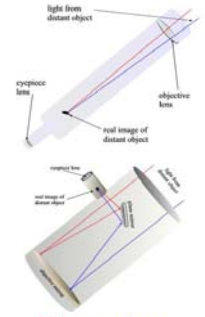
The Electromagnetic Spectrum



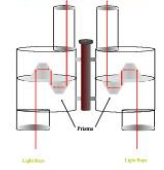
Microscopes



Telescopes



Binoculars

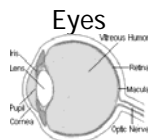


Television
Computer
Laser

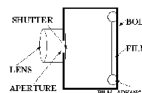
Analog Images

Digital Images (Pixels)

Image Formation



Camera



Stadium Image

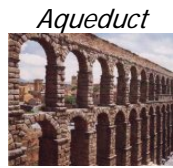
Resolution

CCD

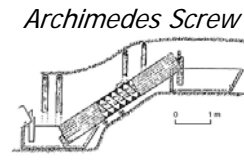
Grade 8 - Unit 4 – Mechanical Systems Concepts

Simple Machines

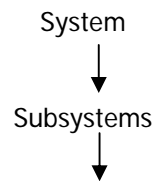
- ❖ change direction
- ❖ multiply force
- ❖ change speed
- ❖ transfer force



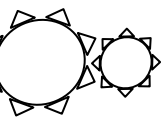
Machines from the Past



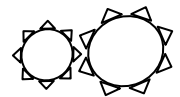
Complex Machines



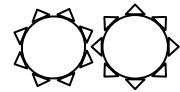
Gears



Reducing



Parallel

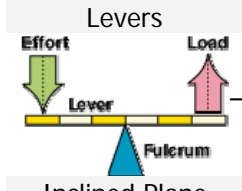


Linkage

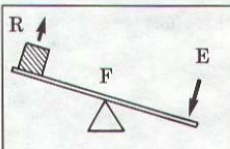


Transmission

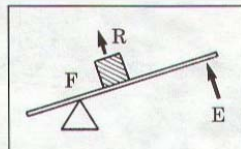
Mousetrap Vehicle



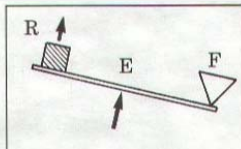
1st Class Lever



2nd Class Lever



3rd Class Lever



Inclined Plane (Ramp)



Wedge



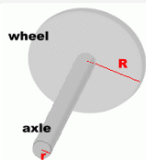
Screw



Pulley



Wheel and Axle



$$\text{Work} = \text{Force} \times \text{distance}$$

Mechanical Advantage

Speed Ratio

$$\text{MA} = \frac{\text{Output force}}{\text{Input force}}$$

$$\text{SR} = \frac{\text{Input distance}}{\text{Output distance}}$$

$$\text{Efficiency} = \frac{\text{MA}}{\text{SR}} \times 100$$

Machine Efficiency

$$\text{Efficiency} = \frac{\text{Work}_{\text{output}}}{\text{Work}_{\text{input}}} \times 100$$

Pascal's Law

Pressure is transmitted equally in all directions throughout an enclosed fluid.

$$\text{Pressure} = \text{Force} / \text{Area}$$

Hydraulics



Pneumatics



$$\frac{\text{Force of the small piston}}{\text{Area of the small piston}} = \frac{\text{Force of the large piston}}{\text{Area of the large piston}}$$

Evaluation Criteria

Efficiency
Safety

Effectiveness
Convenience

Function
Esthetics

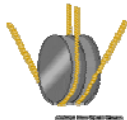
Design
Packaging

Cost
Environmental Impact

Improvement

Societal and Technological Impact of Machines

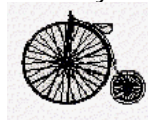
Block and Tackle



Steam Engine



Early



Modern



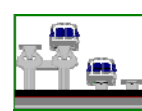
Egg Beater



Pop Can Tab



MagLev Trains



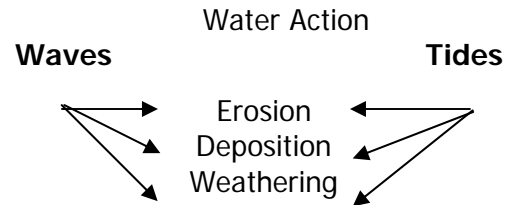
Robots



Grade 8 - Unit 5 – Fresh and Saltwater Systems Concepts

Water Distribution

Water source	% of total water	Potable, or not?
Oceans	97.24%	Saltwater
Icecaps, Glaciers	2.14%	Frozen
Ground water	0.61%	Fresh - but not entirely accessible
Fresh-water lakes	0.009%	Potable
Inland seas	0.008%	Saltwater
Soil moisture	0.005%	Indirect access
Atmosphere	0.001%	Indirect access
Rivers	0.0001%	Potable
Total water	100%	



Water Systems
 Watersheds
 Continental Drainage Systems

Glaciers → Glacial Landform Features

Currents
Climate

Water Quality

Chemical

Biological

Water Quality Testing

Water, Water, Everywhere

Monitoring Quality

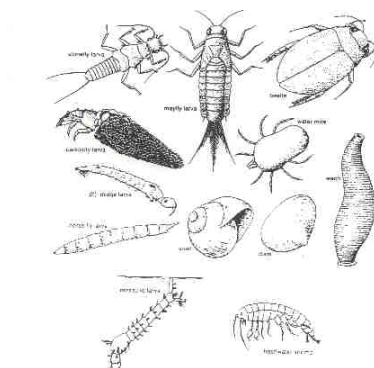
Water for Life

Biological Indicators

Water Use Processes to Improve Water Quality

Distillation

Reverse Osmosis



Factors Affecting the Diversity of Aquatic Organisms

Temperature

Light

Water Movement

Environmental Changes

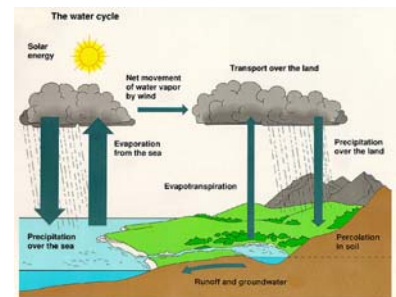
Seasonal

Short-Term

Pressure

Salinity

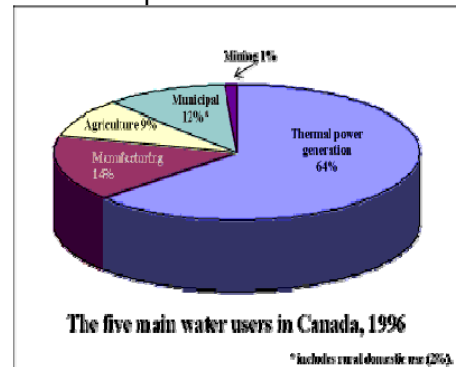
Long-Term



Water Use



Human Impact on Water Resources



Factors Affecting Water Quality
Runoff
Dumping
Spills

Sewage
Construction
Pollution