**The Material World**

**Chapter 1**

Characteristic physical properties: Density: **formula** *p*=m/V; g/cm3=g÷cm3 or g/mL=g÷mL, or **density** (*p*) is equal to mass (m) $÷$ by volume (V) 1 cm3 = 1 mL

Properties of solutions: *Solutions*: **solute** is dissolved in a **solvent**.

Ex: salt = solute dissolved in water = solvent, solution = salt water.

**Concentration**: amount of solute dissolved in solution. C=m/V g/L=g÷L, %(m/V), %(m/m), %V/V, g/L

 x ex1: 25L x 1000 = 25,000mL

1L = 1000 mL

÷ ex2: 372mL ÷ 1000 = 0.373 L

X10

X10

X10

X10

X10

X10

King Henry Died Uncle Didn’t Care Much

÷10

÷10

÷10

÷10

÷10

÷10

Kilo Hecta Deca (m,l,g) Deci Centi Milli

**Organization**

Pure substance: 1) **Element**: contains 1 type atom/particle. N, Nitrogen , OR N2

 2) **Compound**: at least 2 different atoms: Nitric Oxide , glucose C6H12O6

 3) **Molecule**: at least 2 atoms: Nitric Oxide , or Nitrogen

Mixtures: 1) **Homogeneous**: uniform throughout (looks the same): solutions ex: salt water, steel, air

 2) **Heterogeneous**: can see the different parts: granite, sand and water, smog

**Chapter 2**

**Radiant**

**Chemical**

**Mechanical**

**Thermal**

**Forms of Energy**: T he M an R aces C ars

Objects in motion

Electromagnetic wave

R M I V U X G

Chemical bonds

Random movement of particles

 Other forms: electrical, wind, sound

**Transformation of Energy:** Energy changes form; starts as one turns into another.

Ex: chemical (wood) Radiant (light)

 Thermal

**Chapter 3**

**Fluids:** flows and takes shape of container.

FLUIDS

types

COMPRESSIBLE INCOMPRESSIBLE

**Can** change its volume **Can’t** change its volume

GASES LIQUIDS

 O2, CO2 Blood, Urine, Sweat

**Chapter 4:**

**Waves**

**Frequency**: # of cycles (wavelengths) / unit of time (s) in Hz.

Frequency = pitch

Wavelength (ʎ):

wavelength

wa



Longitudinal: shorter the wavelength = more energy

 Longer the wavelength = less energy

Transverse: shorter the wavelength = more energy

 Longer the wavelength = less energy

**Amplitude**: *transverse wave*: distance from equilibrium to crest or trough. Higher = more energy

 *longitudinal wave*: region of compression. Smaller = more energy

* Indicates volume: greater amplitude, the higher the *volume*

Deviation of light waves:

1**Reflection:** bouncing of light rays off a surface.

 *Specular reflection:* angle of incidence = angle of reflection creates mirror image.

 *Diffuse reflection:* angle of incidence ≠ angle of reflection see objects.

2**Refraction:** deviation of light rays passing through different transparent medium.

 Use lenses to refract light: **converging lens** and **diverging lens**

**Chapter 5**

Cell division: 1**mitosis** and 2**meiosis**

 **1Mitosis:** produces 2 genetically identical cells with 46 chromosomes = diploid.

 -for growth and repair of tissue Ex: for someone still growing (cell count), fix broken bone.

 2**Meiosis:** produces 4 genetically different cells with 23 chromosomes = haploid. (only 1 cell for females)

 -for formation of sex cells/gametes

Sexual Development:

Pituitary Gland

Releases

FSH and LH

**Primary**

**Primary**

**Secondary**

**\*** Hair (body, underarms, pubic)

**\*** Body odour, acne

**\*** Psychological changes

Females

Matures ovaries

Stimulates production and secretion of Estrogen and Progesterone

Males

Matures testes

Stimulates Testosterone production

Produces

Sex Cells

(Gametes)

Spermatozoa/

Sperm

Ova/Eggs

**Chapter 8**

**Vaccinations:** stimulates an immune response creating immunity.

* Triggers production of antibodies
* Stimulates quick antibody production when re-exposed.

**3 Types: 1** *Live (attenuated*): use whole virus to make. Ex: MMR, polio

 **2** *Inactive*: use part, the antigens to make. Ex: typhoid, cholera, flu

 **3***Genetically engineered:* whole virus with modified DNA. Ex. Hep B, HPV

**Combination Vaccines**: multiple in one shot.

**Booster**: extra dose after a few years to reintroduce infectious agent for immunity.

**Assisted reproduction:** facilitate union between sperm and egg.

**4 types:** *1Ovarian Stimulation*: hormones injected into female to cause ovarian follicles to mature. Used if

you rarely ovulate.

* To increase chance of fertility

2*Artificial Insemination:* Semen injected into uterus. Used if low sperm count or motility.

3 *In Vitro Fertilization:* ovum with sperm fertilization in petri dish (in lab), embryos implanted into uterus.

4*Microinjection:* sperm nucleus injected into egg.

CHAPTER 6

Nutrition: Can Frank/Larry Please Visit My Walmart

Types of foods

Digestive system

Digestive tract: My Parents Eat Salami Sandwiches Like Red Apes

Transformation of food: mechanical and chemical digestion

Respiratory and circulatory systems

Respiratory system: Naughty Nick Planted Lettuce & Tomatoes Behind Lazy Betty’s Apt.

Circulatory system

Functions of

blood constituents:1Plasma: waste (urea, CO2), nutrients, hormones, antibodies

2formed elements (Red =moving O2, White=phagocytosis, Platelets= blood coagulation)

Lymphatic system:

Role: 1Filters lymph: spleen and lymph nodes

2Fighting Infection: white blood cells (lymphocytes) produce antibodies; battle in lymph nodes; body remembers to produce *antibodies*: neutralize and mark for death. WBC eat (phagocytosis) infectious agent.

3Returns fluid to blood: lymph is dumped into subclavian veins.

Lymph = plasma = Extracellular fluid

Excretory system: eliminate wastes

Urinary system: KUBU

Components of urine: Urea, water, minerals, medication, drugs,

**CHAPTER 7**

Nervous and musculoskeletal systems

 SIGHT

Sensory receptors: stimulus-sensory organ-converter-transporter-processor

Eye: CAPIL V BROCS

Musculoskeletal system

Function of joints: Connection between 2 or more bones. Allows for movement.

Types of joint movement Fixed, Semi-movable, Freely movable (examples for each)

**The Technological World**

Chapter 11

**Graphical Language**

Basic lines: study 338-339

Scales: Scale reduction: when drawing is smaller than object. Ex: 1:40 *Note*: measurement always in mm.

 Scale Increase: drawing is larger than object. Ex: 40:1

 Full Size: drawing is the same size as object. Ex: 1:1

Dimensioning: what the range measurement needs to be to still work. Ex: 5+ 0.7 5+0.7 = 5.7, 5-0.7 = 4.3

Tolerances range: 4.3-5.7

**Chapter 12**

**Mechanical Engineering**

Basic Mechanical Functions: Linking (connects), Guiding (controls movement), Sealing (air tight, block off), Lubricating (reduces friction)

motion transmission systems: always same motion (rotational) Fred Smiles Politely Causing Winks

motion transformation systems: change of motion (r-t or t-r) Some Rats Can Skate

**Electrical engineering (pg. 401)**

Power supply: battery, electrical outlet

Conduction: wires, circuit board

Insulation: wire sheath, anything that doesn’t conduct electricity

Protection: fuse, circuit breaker

Control: power switch

Transformation of energy: light bulb (radiant), blender (mechanical), radio (sound)

**Materials**

Mechanical properties of materials: Hardness (doesn’t indent), Elasticity (returns to shape), Ductility (can stretch and keep shape= wire), tensile strength (resist tension), Malleability (can flatten or bend), Resilience (resist shock)

Other properties: Corrosion Resistance (won’t rust), electrical conductivity, thermal conductivity, density

Constraints: Torsion (twisting), Compression (towards each other), Tension (opposite forces)