

TM/22/11/19

D-0.

PHYSICAL SCIENCE

FORM I

A. PHYSICS

1. MATTER

- (a) The variety of matter: examination of matter, properties of matter, use of the magnifying glass.
- (b) Raw materials: building industry, Chemical industry
- (c) The earth and its rocks: igneous, sedimentary & metamorphic.
- (d) Metals: pure, ores, alloys.
- (e) Solid, liquid, gas: ice, water and steam. Effects of heating and cooling.
- (f) Elements: compounds
- (g) The Microscope: various parts, viewing
- (h) Atoms: the field ion microscope
- (i) Scientists & Detectives: similarities

2. CRYSTALS

- (a) Examination of crystals, size, shape
- (b) Watching crystals grow (experiments with salt crystals)
- (c) Crystal models and atoms: Use sweets, polystyrene balls or a baseboard and balls.
- (d) Cleaving crystals: demonstrate with graphite
- (e) Crystals dissolving: volume change, watching salt crystals dissolve under a microscope.
- (f) Growing a large crystal: alum crystals, copper sulphate crys.
- (g) Molecules: e.g. of water.
- (h) Plastics and polymers: Cellulose, arrangement, artificial polymers.

3. MEASURING

- (a) The need to measure: in everyday life
- (b) The meter: definition, divisions
- (c) Measuring lengths: metric-mindedness, estimates and rough measurements.
- (d) Accuracy and averages:
- (e) Measuring large distances: kilometers, using a wheel, map scales, radar triangulation.
- (f) Powers of 10: sun-earth distance = 1.5×10^8 km
- (g) Measuring small lengths: millimeters, thickness
- (h) Measuring areas: Area-Length X Breadth, area of a country from the scale of the map
- (i) Volume: solids and liquids, irregular solids
- (j) Problems on volumes
- (k) Measuring time: estimating time intervals

4. WEIGHING

- (a) Weight and mass: kilogram, divisions definition
- (b) Weighing solids: size and weight
- (c) Density
- (d) Weighing liquids: Finding the density of liquids
- (e) Weighing air: finding the density of air
- (f) Densities and molecules: dry ice changing into gas
- (g) Invisible forces: magnetic forces, floating magnets
- (h) Floating and sinking
- (i) Balances: A simple balance, a microbalance

5. LEVERS AND SPRINGS

- (a) Levers: see-saws, pivot or fulcrum, balancing problems
- (b) Stretching materials: elastic materials and their uses.
- (c) Atoms and elasticity: repelling and attractive forces.
- (d) Looking at springs: COPPER WIRE SPRING
- (e) Importance of graphs in plotting readings from experiments

6. PRESSURE

- (a) Pressure in everyday life, $\text{pressure} = \frac{\text{force}}{\text{area}}$
- (b) Liquid pressure a liquid finds its own level, water pressure
- (c) atmospheric pressure: experiments
- (d) Bourdon pressure gauge, U-tube manometer, water manometer, mercury manometer.
- (e) Mercury barometer: Atmospheric pressure, making a simple barometer.
- (f) Aneroid barometer: its uses
- (g) Using air pressure: examples
- (h) The earth's atmosphere: four main regions of, space travel

7. MOLECULES

- (a) Odours of gases as example of presence of molecules
- (b) Brownian motion: examples, experiments
- (c) Diffusion: demonstrations
- (d) Kinetic theory: three states of matter, use models
- (e) Skin effect of molecules in liquids: Use this to estimate the thickness of an oil film and the size of a molecule.
- (f) The Angstrom unit: $\frac{1}{10^8} \text{ cm}$ $\text{\AA} = 10^{-8} \text{ cm} = 10^{-9} \text{ mm}$

8. ENERGY

- (a) Work, food and fuel
- (b) Energy and some of its forms: chemical, uphill, motion, springs, electrical energies.
- (c) Atomic energy: atomic reactor, atomic bomb
- (d) Radioactive atoms: cloud formation
- (e) Cloud chambers (expansion, diffusion, spark counter)

8. CHEMISTRY

1. Air and burning
2. Oxygen: acetylene, catalyst, equations
3. Nitrogen: proteins
4. Carbon Dioxide: fermentation, lime water
5. Carbon Dioxide and living things: bicarbonate indicator respiration.
6. Respiration:
7. Photosynthesis:
8. Indicators: acid & alkali, effect on litmus Universal Indicators, pH scale, other indicators, neutralization, concentration.
9. Salts: a salt, chloride, sulphate
10. Carbonates with acids
11. Metals with acids: Reactivity series
12. Rate of reaction
13. Hydrogen: Physical and chemical properties, uses, preparation Industrial manufacture
14. Oxygen: Lavoisier's experiment, discovery, physical and chemical properties, uses, respiration.
15. Carbon cycle
16. Nitrogen cycle
17. Atomic theory: Dalton's Atomic Theory
simple ideas about electrons, neutrons, and protons.
simple structure of the atoms of hydrogen, carbon dioxide, ammonia.