**REPUBLIC OF RWANDA CLASS & COMBINATION: S4…..**

**MINEDUC CLASS SIZE……..**

**GASABO DISTRICT**

**SCHOOL NAME:……………… NUMBER OF PERIOD PER WEEK:7**

**TEACHER’S NAMES………………………………………**

 ***PHYSICS - SCHEME OF WORK / UNIT PLAN 2022-2023 ACADEMIC YEAR***

***1st TERM,2022-2023***

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Time  | Topic, sub topic area and unit | Lesson title+ Evaluation | Learning activities and links to other subjects  | References and pedagogical materials  | Observation  |
| **4 weeks****26/10-21/11/2022****28periods** | Topic**:****Light** Unit:***Thin lens*** | * Characteristics of lenses.
* Types of lenses.
* Refraction of light through lenses.
* Ray drawing and properties of images formed by lenses for an object located at different positions.
* Graphical determination of focal length of lenses.
* Thin lens equation.

. * Lens combination.
* Derivation of lenses formulae
* Defects and correction of lenses.
* Applications of combined lenses.
* Refraction through prisms
* Terms associated with refraction of passing through a prism
* Deviation of light rays by a glass prism.
* Angle of minimum deviation
* Dispersion of light by a prism
* Applications of total internal reflection of light by prism
* Problem solving related to combined thin lenses and refraction of light.
* **General quiz**
 | * Working in groups

differentiate lenses anReport.* Carry out experiment

to determine characteristics of images formed by lenses given positions.* Establish

 experimentally the laws of refraction* Determine

experimentally the critical angle of a glass block and prism * Devise and perform

experiment to determine the focal length of a lens.* Solve problems

involving image position and linear magnification using lens formulae.* Search internet to for

details on properties of lenses, image formation and lens combinations.**Links to other subjects**: Medicine- Biology (Microscope, ) Astronomy, Photography (camera)* **General quiz**
 | Advanced physics by Tom Duncan 9th EditionS4 student physics book& teacher’s guide |  |
| 24/10-11/11/2022**3 weeks****21 periods** | Topic :**Light** Sub-Topic:***Optical instruments***Unit:**Simple and compound microscope.** | * Definition of an

optical instrument.* Image formation by

a camera, simple and compound microscope.* Magnifying power

of optical instruments.* Determination of

magnifying power of optical instruments* Astronomical

telescope. * Human eye as

single lens system, * Defects of vision

and their correction.* **General quiz**
 | * Discuss in groups

physical features of optical instruments.* Determine magnifying

 power of optical instruments.* Make group

presentation on the functioning of simple and compound microscope and other optical instruments and write a report. * Devise a project to

design a compound microscope * Search internet for

combinations of lenses**Links to other subjects**: In Astronomy (Telescopes observe distant), Biology and Medicine. (microscope used observe tinny organism)* **General quiz**
 | Advanced physics by Tom Duncan 9th EditionS4 student physics book& teacher’s guide |  |
| 14/11-02/12/2022**3 weeks****21 periods** | Topic: **Mechanics**Unit:**Moments and Equilibrium of bodies** | * Difference between

vector and scalar quantities.* Force as vector
* Moment of a force about a point.
* Principles of moment.
* Types of equilibrium.
* Condition for

 equilibrium of a body about an axis.* Stevinus proof
* Forces in equilibrium.
* Free –body diagrams.
* Couples and Torques,
* Equilibrium of Coplanar forces
* Archimedes and the principle of the lever.
* Equilibrium of moments of force.
* Centre of gravity and the total weight centre of gravity of a flat object
* Equilibrium of a system of objects (balancing on a seesaw).
* **General quiz**
 | * Discuss the difference vector and scalar quantities.
* Devise an experiment to determine the centre of gravity of a lamina.
* Carry out an experiment to demonstrate equilibrium of a system of objects.
* Search internet to learn about moments of force and equilibrium of a system of bodies

**Links to other subjects**: Mathematics (resolution of vectors).* **General quiz**
 | Advanced physics by Tom Duncan 9th EditionS4 student physics book& teacher’s guide |  |
| 05-09/12/2021**1 week****7 periods** | Revision + Examination | Revision + Examination | Revision + Examination |  |  |
| 12-16/12/2021**1 week****7 periods** | Examination+ marking | Examination+ marking | Examination+ marking |  |  |
| 19-23/12/2021**1 week****7 periods** | Marking+ reporting | Marking+ reporting | Marking+ reporting |  |  |

**REPUBLIC OF RWANDA CLASS & COMBINATION: S4…...**

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**GASABO DISTRICT**

**SCHOOL NAME:……………… NUMBER OF PERIOD PER WEEK:7**

TEACHER’S NAMES………………………………………

***2nd TERM ,2022-20223***

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| --- | --- | --- | --- | --- | --- |
| Time  | Topic and sub topic area | Lesson title+ Evaluation | Learning activities and links to other subjects  | References and pedagogical materials  | Observation  |
| 09-27/01/2023**3 weeks** **21periods** | Topic:**Mechanics** Unit:**Work, Energy and Power** | * Concepts of Work, Energy and Power.
* Mathematical expression of potential energy, kinetic energy, work, and power.
* Conservation of mechanical energy.
* Work energy theorem.
* Strain energy,
* Gravitational potential energy
* Power and motion
* Work done in deforming materials
* Collision and impulse.
* Conservation of linear

momentum. * Interactions and collisions.
* Solve problems related to energy conservation.
* **General quiz**
 | * Discuss in group the

relationship between work, energy, and power.* Observe the impact of

collision between two moving bodies then report* Solve problems

 Involving work, energy, power, and conservation of mechanical energy.* Solve problems on

Collisions* Make a group

presentation on mechanical energy give a report. **Links to other subjects:** Chemistry, Astronomy, Civil engineering and Military science.* **General quiz**
 | Advanced physics by Tom Duncan 9th EditionS4 student physics book& teacher’s guide |  |
| 30/01-17/02/2023**3 weeks****21 periods** | Topic: **Electricity** Sub-Topic:**Current electricity** Unit: **Kirchhoff’s laws and Electric Circuit** | * Review elements of

simple electric circuit and state the application* Definition of electromotive force.
* Voltage or terminal

potential and electromotive force.* Sources of electric current

 and electric receptors/appliances.* Internal and external

 resistance, potential difference across a cell.* Connection of electrical

current source and resistors either in series or parallel or mix-up.* Kirchhoff’s laws (loop

rule and junction rule)* Application of Kirchhoff’s

laws to simple circuits.* **General quiz**
 | * Use a voltmeter to

 measure terminal potential difference and compare it with electromotive force.* Construct a simple

 electric circuit consisting of current source (battery) , electric receptors(resistors) and use it to verify Kirchhoff laws.* Observe electrical

components at home and school and explain their use* Search internet to

 learn about sources of electric current, electric receptors (resistors) and Kirchhoff ‘laws.* **General quiz**
 | Advanced physics by Tom Duncan 9th EditionS4 student physics book& teacher’s guide |  |
| 20/02-24/02/2023**1 week****7 periods** | Topic: **Energy, power and climate change**Sub-Topic:**Sources of world energy.**Topic: **Sources of Energy in the world** | * World energy sources

(fossil fuel, nuclear fuel and renewable sources).* Extraction and creation

of renewable and nonrenewable energy sources (Fossil and non fossil fuels, power production), * Solar energy(photovoltaic

cells and solar heating panels), * Hydroelectric power, wind

 power and wave power. | * Discuss in groups

and present on extraction and creation of renewable and nonrenewable energysources.* Search internet for

details on world energy resources, extraction and conservation clean energy resources and level of emission of harmful gases.**Links to other subjects**: Graphical representation in mathematics, photographic interpretation in Geography , compound formation inchemistry , Environment and Agriculture. | Advanced physics by Tom Duncan 9th EditionS4 student physics book& teacher’s guide |  |
| 27/02-03/03/2023**1 week** **7 periods** | Topic: **Energy, power and climate change**Sub-Topic:**Energy degradation and power generation.**Unit:**Energy degradation and power generation** | * Definition of energy

degradation/dilapidation* Production of electrical

energy by rotating coils in a magnetic fields.* Conversion of thermal

energy into work by single cyclic processes.* Energy flow diagrams

illustrating energy degradation.* **General quiz**
 | * Discuss in groups

and present on mechanisms of electrical energy production.* Present as a group

investigation about conversion of thermal energy into work* Search internet for

Computer simulations illustrating energy flow in a system.**Links to other subjects:** Flow diagrams in Computer Science,, cyclic processes in Biology, photograph interpretations in Geography.* **General quiz**
 |  |  |
| 06-10/03/2023**1week****7periods** | Topic:**Mechanic** Sub-topic:**Dynamic** Unit:**Projectile and Uniform Circular motion** | * Definition of projectile

motion and related terms* Applications of projectile

motion.* Graphs of projectile

 motion.* Expressions of projectile

Motion (horizontal range and maximum height)* Definition of key terms in

circular motion: angular displacement, linear and angular velocity, period, frequency, angular and linear acceleration.* Relationship between

 angular and linear parameters.* Uniform circular motion
* Constant acceleration in

circular motion, tangential acceleration.* Distance time graph of

 circular motion.* Centripetal force.
* Application of circular

 motion motion.(vertical and horizontal circles, conical pendulum , spinning drier and road banking).* **General quiz**
 | * Observe, discuss

and report on parameters in projectile motion.* Use the equations

of linear motion to determine the horizontal and vertical velocities of a projectile* Working in groups,

observe circular motion and distinguish between linear and angular quantities.* Discuss in groups

and make presentation on relationship between angular and linear motion* Work in groups to

Solve problems in circular motion.* Search internet

Information on projectile or circular motion and their applications.**Links to other subjects:** Physical sports (basketball, football, netball, golf, darts), Military missiles and cannon balls.* **General quiz**
 | Advanced physics by Tom Duncan 9th EditionS4 student physics book& teacher’s guide |  |
| 13-17/03/2023**2 week****14 periods** | Topic:**Mechanic** Sub-topic:**Dynamic** Unit:**Universal gravitational field potential**  | * Newton's law of universal

gravitation.* Gravitational field
* Universal gravitational

field potential.* Gravitational potential

Energy* Relation between universal

gravitational constant and force of gravity.* Kepler’s laws.
* Problems on gravitational

 potential.* Problems on natural and

 artificial satellites.* **General quiz**
 | * Solve problems

involving the Law of universal gravitation* Solve problems

involving Kepler’s laws* Use internet search

for history of scientists who contributed to model the universe and make report* Use internet to get

 information about Kepler’s law.**Links to other subjects:** Geography and Astronomy (landslides, motion of planets and satellites) Chemistry (electrons orbiting the nucleus)* **General quiz**
 | Advanced physics by Tom Duncan 9th EditionS4 student physics book& teacher’s guide |  |
| 20-24/03/2023**1 week****7 periods**  | Revision + Examination | Revision + Examination | Revision + Examination |  |  |
| 27-31/03/2023**1 week****7 periods** | Examination+ marking | Examination+ marking | Examination+ marking |  |  |

**REPUBLIC OF RWANDA CLASS & COMBINATION: S4….**

**MNEDUC**

**GASABO DISTRICT CLASS SIZE……...**

**SCHOOL NAME……………… NUMBER OF PERIODS PER WEEK:7**

**TEACHER’S NAMES………………………………………**

***3rd TERM,2023***

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Time  | Topic and subtopic area | Lesson title+ Evaluation | Learning activities and links to other subjects  | References and pedagogical materials  | Observation  |
| 17/04 -05/05/2023**3 weeks****21 periods** | Topic:**Motion in field**Sub-topic:**Electric field and electric potential** Unit:**Effects of electric and potential field** | * Electric charge and

 Coulomb's law* Charge and electric fields

Properties of electric field* Electric field patterns and

field lines* Electric field due to a single

electric charge* Electric field pattern due

to more than one charge(resultant electric field)* Electric potential
* The potential of a point

charge * Electric Potential Energy
* Relation between electric

potential and electric field E=−V/d* Motion of electric charge in

uniform electric field* Lightening and lightening

Arrestor* Problems on uniform

electric field and electric potential | * Devise and perform an

experiment to illustrate electric fields between two parallel plates* Solve problems

involving electric field strength and electric potential Investigate the patternsof electric field lines and present them in diagrams* Search internet for

Electric field patterns and their Combination.**Links to other subjects:** Chemistry (electrolysis, dye cells) Geography formation of clouds and lightening. | Advanced physics by Tom Duncan 9th EditionS4 student physics book& teacher’s guide |  |
| 08/05-26/05/2023**3 weeks****21 periods** | Topic:**Heat and thermodynamic** Sub-topic:**Thermal effect** Unit:**Applications of thermo-dynamics laws** | * Internal energy andtotal energy.
* Work done by an expanding gas.
* First law of thermodynamics.
* Applications of first law:
* Isothermal, Isochoric and isobaric processes etc.
* Second law of thermodynamics: Adiabatic process, Carnot cycle.
* Applications of second

law of thermodynamics: Carnot engine, diesel engine and refrigerator.* Efficiency of heat

engine.* Heat engine and climate change
 | * Work in groups to

 differentiate first, second and third laws of thermodynamics.* Work in groups to

investigate changes in energy and work done for a thermodynamic process and present findings.* Work in groups to

 evaluate change in energy and work done during the Carnot cycle and report* Solve problems related

 to efficiency of a refrigerators * Work in groups to solve

 problems related to heat engine and its efficiency. * Search internet to new

applications of laws of thermodynamics and present a report**Links to other subjects:** chemistry ( reactions) | Advanced physics by Tom Duncan 9th EditionS4 student physics book& teacher’s guide |  |
| 29/05-23/06/2023**4 weeks****28 periods** | Topic:**Astrophysics** Sub-topic:**Earth and space** Unit:**General Structure of the Solar System** | * Astronomical scales
* Sun-Earth-Moon system:

(eclipses, and phases of the moon)* The Solar system: Inner

planets, outer Planets, comets, meteorites, asteroids* Kepler's laws.
* Star patterns: constellations
* Celestial coordinates:

Horizontal system (hour angle, zenith angle); Equatorial system(right ascension, declination) | * Work in groups and

investigate acceleration due to gravity at the earth’s surface and present the results.* Work in groups to

 discuss Kepler’s laws of planetary motion and report* Work in groups to solve

problems on planetary motion. * Search for simulations

 from the Internet on planetary motion.**Links to other subjects:** Geography (climate change and seasons), telecommunication (radio, Global positioning system(GPS),) | Advanced physics by Tom Duncan 9th EditionS4 student physics book& teacher’s guide |  |
| 26-30/06/2023**7 periods** | Revision + Examination | Revision + Examination | Revision + Examination |  |  |
| 03/07-07/07/2022**1 week****7 periods** | Examination+ marking | Examination+ marking | Examination+ marking |  |  |
| 10-14/07/2022**1 week****7 periods** | Marking+ reporting | Marking+ reporting | Marking+ reporting |  |  |