ARAB UNITY SCHOOL

CURRICULUM OVERVIEW

2019 – 2020

A guide for Parents and Students

SUBJECT: PHYSICS Year: 10

Overview of the year:

The IGCSE curriculum aims to ensure that all pupils:
• to provide an enjoyable and worthwhile educational experience for all learners, whether or not they go on to study science beyond this level

• to enable learners to acquire sufficient knowledge and understanding to: become confident citizens in a technological world and develop an informed interest in scientific matters, be suitably prepared for studies beyond Cambridge IGCSE

• to allow learners to recognise that science is evidence based and understand the usefulness, and the limitations, of scientific method

• to develop skills that: are relevant to the study and practice of physics, are useful in everyday life, encourage a systematic approach to problem solving, encourage efficient and safe practice, encourage effective communication through the language of science

• to develop attitudes relevant to physics such as: concern for accuracy and precision, objectivity, integrity, enquiry, initiative and inventiveness

• to enable learners to appreciate that: science is subject to social, economic, technological, ethical and cultural influences and limitations, the applications of science may be both beneficial and detrimental to the individual, the community and the environment.

PLEASE USE THE FOLLOWING WEBSITES FOR SOLVING PAST PAPER QUESTIONS AND FOR DETAILED NOTES TOPIC WISE –

https://znotes.org/cie-igcse/physics-0625
https://www.physicsandmathstutor.com/physics-revision/igcse-cie/
https://www.savemyexams.co.uk/igcse-physics-cie-new/
http://www.oxnotes.com/igcse-physics.html
https://www.physicsclassroom.com/
https://gcsephysicsninja.com/

SIMULATIONS –

https://phet.colorado.edu/en/simulations/category/physics
https://interactives.ck12.org/simulations/physics.html

TERM ONE

Main topic	Skills and content:	ASSESSMENTS:
Length & Time	**Length and volume measurements.** Choose appropriate instruments to measure the given objects (Self – managers) **Measure the interval of time between events**. (Reflective Thinkers, Enquirers) **Calculate the period of a pendulum.** (Effective organizers, Reflective Thinkers) **Calculation of average values (distance, time)** (Effective organizers, Reflective Thinkers) Find the diameter of a needle- investigation (BYOD)	

Density & Volume **Motion** **Forces**	**Density and Volume –** Recall and use the equation ρ = mass/ Volume Describe an experiment to determine the density of a liquid and of a regularly	**Research work** An independent project by the student to plot the speed-time and velocity-time graph of their own long journey of choice. the same will be used by the student to analyse and understand the difference between distance and displacement. The data entry of journey facilitates the students to be self-managers. In order for successful data collection they will have to stay organized the entire time which in turn makes them effective organizers. The project itself makes the students creative thinkers with lot of

	shaped solid and make the necessary calculation. (scientific enquiry and reflective learning) Experiment- Describe the determination of the density of an irregularly shaped solid by the method of displacement. (work in teams) Predict whether an object will float based on density data. (creative thinkers) **Motion –** Introduction to scalars and vectors. Define and calculate speed, average speed, acceleration. Plotting and interpretation of different types of graphs of motion. Differentiate motion types using variation of velocity and acceleration. Introduce concept of deceleration. Motion of objects experiencing free fall acceleration. Roles of air resistance and gravity on motion. Concept of terminal velocity. Experiment – plan and investigate the variation of terminal velocity of a free falling object. (creative thinkers, enquiry skills, team builders) **Forces and momentum** Define force and its effect. Describe the change of motion due to a force acting on it. Plan an experiment and investigate the factors affecting effectiveness of crumple zones. (creative scientific enquiry, self-managers, application of knowledge) Finding resultant force algebraically and using vector diagrams. Identify air resistance and friction as forces that act in the direction opposite to motion. Friction between surfaces can cause production of heat.	innovation incorporated. The students remain to be reflective learners as the project done for the unit learned will be constantly used and knowledge applied. The enquiry skills of the student will help them analyze the graph successfully for calculation of requisite quantities. The students are required to submit the projects on or before 5th of January 2020. **Curricular test** A test will be conducted between the week of 20-24 October 2019 to ensure continuous learning among the students. All topics covered till the previous week to that will be included for the test. 30% of the curricular test marks will be taken for the end of year grades. The skills tested on the students will be in line with the curriculum standards set by Cambridge which includes, knowledge and understanding, applications, scientific enquiry, inventiveness and objectivity. **End of term exam** At the end of the term all the units will be included for the exam to check the level of understanding and skills of the students. **Homework –** Teachers will be assigning homework to the students as he/she sees fit. An example given here: For given scenarios students are asked to find the direction of forces and the factors affecting the resultant.

	Introduce centripetal force and the turning effect of force including circular motion. Explain planetary motion using the concept (application of knowledge) Understand the concepts of momentum and impulse Calculate p and I Conservation of momentum	The simulations can be used for better understanding. Scope for BYOD. **Research** some ideas about motion proposed by scientists of different era. Work in terms to come up with an illustrated talk (creative thinkers and team builders). Individual essays about the discussion of new ideas proposed as years progressed (self-managers).

TERM TWO Main topic, skills and content: **Moment of force** **Wave properties** **Sound** **Work, power & energy**	**Moment of force** Identify elastic force by defining Hooke's law. Draw extension-load graphs and identify types of graphs using the forces acting. Significance of limit of proportionality. Calculation and significance of moment of force. Conditions for equilibrium. Perform and describe an experiment to determine the position of the center of mass of a plane lamina. (team building, reflective learners) Describe qualitatively the effect of the position of the center of mass on the stability of simple objects. **Wave properties** Describe wave motion in terms of energy transfer and illustrate as vibrations by ropes and springs. Describe the significance of a wave front. Define speed, frequency, amplitude and wavelength. Plan an experiment and investigate to prove the equation frequency = speed x wavelength. (scientific enquiry, team, effective organizers) Study and distinguish between transverse and longitudinal waves. Reflection, refraction and diffraction of waves, (explain using water waves). Effect of change in properties of waves on diffraction. Calculation of unknown quantities using f= w x s **Sound** Nature and production of sound waves.	**ASSESSMENTS:** **Research and experimental work** An independent project by the student to calculate the work done and power of your body while conducting a physical experiment. Students are needed to take data while walking up a flight of stairs and use the data collected to calculate the requisite quantities. The data by research can be collected for different world heritage sites like burj khalifa, leaning tower of pisa, Eiffel tower, etc. time estimates should be done by students and in turn use it for calculations. The data entry of journey facilitates the students to be self-managers. In order for successful data collection they will have to stay organized the entire time which in turn makes them effective organizers. The project itself makes the students creative thinkers with lot of innovation incorporated. The students remain to be reflective learners as the project done for the unit learned will be constantly used and knowledge applied. The enquiry skills of the student will help them analyze the graph successfully for calculation of requisite quantities. The students are required to submit the projects on or before 12th of April 2020. **Curricular test**

	State the approximate audible frequency range to humans. Understanding of ultrasound. Speed of sound – experiment. (solid, liquid and air). Relate the loudness and pitch of sound waves to amplitude and frequency. Activity - Work in teams to analyse the musical sound produced using a wave diagram of oscilloscope to describe the properties. (reflective learning, enquiry) Describe how the reflection of sound may produce an echo. **Work, power and energy** Identify different types of energy and energy transfers. Principle of conservation of energy. Learn and understand calculation of energy and energy transfers using formulae for kinetic and potential energy. Learn about some energy resources and effective ways of using them. Energy from sun identified as nuclear energy due to fusion. (Solar cells) Calculation of efficiency of the engine using formula. Experiment- Creative scientific enquiry, use set of bouncing balls to calculate the efficiency by planning and conducting an investigative experiment. (team building, effective organisers, self managers) Understanding and calculation of work done as W = F x d Power calculations and definitions.	A test will be conducted between the week 9-13 February 2020 to ensure continuous learning among the students. All topics covered till the previous week to that will be included for the test. 30% of the curricular test marks will be taken for the end of year grades. The skills tested on the students will be in line with the curriculum standards set by Cambridge which includes, knowledge and understanding, applications, scientific enquiry, inventiveness and objectivity. **End of term exam** At the end of the term all the units will be included for the exam to check the level of understanding and skills of the students. **Homework –** Teachers will be assigning homework to the students as he/she sees fit. An example given here: To find out how forces affect the length of the spring. Analyse the results and prove the Hooke's law. Skills – scientific enquiry and application of knowledge. Scope of BYOD. The data, analysis and the graphs for the experiment can be plotted on their own device.
TERM THREE Main topic, skills and content:	**Pressure** Define pressure and force per unit area. Describe the simple mercury barometer and its use in measuring atmospheric pressure.	**ASSESSMENTS:** **Progression tests –**

Pressure **Light** **EM spectrum**	Relate (without calculation) the pressure beneath a liquid surface to depth and to density, using appropriate examples. Use and describe the use of a manometer. Pressure in terms of depth, density. **Light** Differentiate between light and sound waves. Formation of optical image by plane mirror. State the law of reflection. Demonstration of refraction and define it. State Snell's law and associated formulae. Identify angles during refraction. Define critical angle and explain Total internal reflection. Application of TIR in optical fibre and endoscopy. Image formation by convex lens. Nature of images formed at different positions of objects. Terminology for lens Ray diagrams for the lens. Magnifying glass- ray diagram and application. Dispersion of light into colours. **EM spectrum** Features of em spectrum. Comparison of properties of light waves and em spectrum. Typical properties and uses. Explain some harmful effects and safety risks. Speed of em waves in vacuum and air.	PT is scheduled to be conducted between 3rd of May to 4th of June. **End of term exam** At the end of the term all the units from term 1 to 3 will be included for the exam to check the level of understanding and skills of the students. **Activities –** Light unit when taught in class will consist of activities to be done in class to engage them in team building. **Homework –** Teachers will be assigning homework to the students as he/she sees fit. An example given here: Draw ray diagrams accurately for a given type lens by placing objects at different positions. Skills – Application of knowledge, reflective learning, analysis In class with BYOD, similar programs can be done and tabulate the data using simulation programs.