مدرسة القديسة مريم الكاثوليكية الثانوية – دبي

ST. MARY'S CATHOLIC HIGH SCHOOL, DUBAI

Lesson Plan -PHYSICS

Subject	**Physics**
Class/ Section	**Yr 9 (A to F)**
Week	**Week 4 : 19th September to 23rd September, 2021**
Work send to students by	**Google classroom**
Total number of lessons per week	**3**
Unit/Topic	**Keeping warm, Stored Energies**
Key Vocabulary	thermal conductivity, gravitational potential energy, gravitational field strength, kinetic energy
Lesson 1,2,3 - Live Zoom lesson along with face to face instruction for students present on a particular day **Work will be assigned in google classroom which will be matched to the students' ability.** **Assessment Criteria/ Essential questions:** **Resources:**	**Lesson 1:** **Specific Learning objectives:** • Recall and explain the effects of the thickness and thermal conductivity of the walls of a building on its rate of cooling qualitatively. **Specific Intended Learning Outcomes:** • Understand the ways of reducing unwanted energy transfers using thermal insulation. • Describe the effects of the thickness and thermal conductivity of the walls of a building on its rate of cooling qualitatively. **Tasks:** 1. Discuss the group activity work and exam-style questions. 5. Complete the questions (pg 38 &39) assigned from the Physics text book in the notebook. When students have completed the textbook questions, check which students have difficulty with which questions and use the level of problem to identify any areas for revisiting before moving on to the next topic. **Support:** Ask students to complete questions 4 & 5. **Stretch :** Ask students to complete the Exam-style question. Edexcel GCSE (9-1) Physics Textbook Ppt on the topic

	Lesson 2 & 3: **Specific Learning objectives:** • Recall and use the equation to calculate the change in gravitational PE when an object is raised above the ground. $\Delta GPE = m \times g \times \Delta h$ • Recall and use the equation to calculate the amounts of energy associated with a moving object. $KE = \frac{1}{2} \times m \times v^2$ **Specific Intended Learning Outcomes:** • Describe how different factors affect the gravitational potential energy stored in an object. • Recall and use the equation for gravitational potential energy. • Describe how different factors affect the kinetic energy stored in an object. • Recall and use the equation for kinetic energy. **Tasks :** **Lesson 1:** 1. Use doodle interactive slides to explain gravitational potential energy stored in an object. 2. Students understand that the mass, height and the gravitational field strength affect the gravitational potential energy stored in an object. 3. Use the equation $\Delta GPE = m \times g \times \Delta h$ to solve the questions in the given worksheet **Lesson 2:** 1. Use doodle interactive slides to explain kinetic energy stored in an object. 2. Students understand that the mass and speed affect kinetic energy stored in an object. 3. Use the equation $KE = \frac{1}{2} \times m \times v^2$ to solve the questions in the given worksheet.
Assessment Criteria/ Essential questions:	***Support:*** Helps to write the formula in a triangular method to change the subject correctly while solving the problems .Show the ppt SP 3d- a presentation on how to calculate gravitational potential energy and kinetic energy. ***Stretch:*** Students could be given the calculation questions on the final screens of the presentation to attempt before viewing the presentation. worksheet 3d .3
Resources:	Edexcel GCSE (9-1) Physics Textbook Interactive power point from Board works

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Lesson Plan

Subject	**Physics**
Class/ Section	**Year 10**
Week	**Week 4 : 19th September to 23rd September, 2021**
Work send to students by	**Google classroom**
Total number of lessons per week	**4**
Unit/Topic	**SP 6 – Radioactivity** **SP 6 f – Radioactive decay** **SP 6 g – Half- life**
Key Vocabulary	**Nuclear equation, alpha decay, beta decay, gamma decay, half life.**
Lessons 1,2,3 –Live Zoom lesson along with face to face instruction for students present on a particular day **Work will be assigned in Google classroom which will be matched to the students' ability.**	**Lesson 1and 2** **SP 6 f Radioactive decay** **Specific Learning objectives** P6.20 Explain the effects on the atomic (proton) number and mass (nucleon) number of radioactive decays (α, β, γ and neutron emission). P 6.21 Recall that nuclei that have undergone radioactive decay often undergo nuclear rearrangement with a loss of energy as gamma radiation. P6.22 Use given data to balance nuclear equations in terms of mass and charge. **Specific Intended Learning Outcomes** • Explain how the proton and mass numbers are affected by different kinds of radioactive decay. • Describe what happens during nuclear rearrangement after radioactive decay. • Balance nuclear equations for mass and charge.

	Lesson 1 **Tasks:** 1. Teacher Writes the symbol for an element on the board, including the notation for atomic number and mass number. Asks students to suggest what will happen if this atom loses an alpha particle. 2. Students will explain how the proton and mass numbers are affected by different kinds of radioactive decay. (α, β, γ and neutron emission) by using the given examples. 3. Some questions will be given to balance the nuclear equations in terms of mass and charge. **Lesson 2** **Tasks:** 1. Three questions on SP 6f Radioactive decay will be given , answer the questions in their notebook and check themselves their understanding. 2. Solve worksheet (SP-6f) and exam style questions. 3. Solve the text book questions and discuss the answers. **Assessment Criteria/Essential questions** **Support:** Help the students to solve the exam style questions **Stretch :** Ask students to solve E1 in student book. **Extend**: Write a nuclear equation to show what happens when nitrogen-14 is struck by a neutron from cosmic radiation to form carbon-14
Resources	Edexcel GCSE (9-1) students book Interactive power point Worksheet
	Lesson 3 and 4 **SP6g- Half- life** **Specific Learning objectives** P6.23- 6.24 Describe how the activity of a radioactive source decreases over a period of time and recall that the unit of activity of a radioactive isotope is the Becquerel, Bq P6.25 – 6.26 Explain that the half-life of a radioactive isotope is the time taken for half the un decayed nuclei to decay or the activity of a source to decay by half and it cannot be predicted. P6.27 Use the concept of half-life to carry out simple calculations on the decay of a radioactive isotope, including graphical representations. **Specific Intended Learning Outcomes** • Describe how the activity of a substance changes over time. • State how half-life can be used to describe the changing activity of a substance.

	• Recall the unit of activity. • Describe how half-life can be used to work out how much of a substance will decay in a certain time. • Carry out calculations involving half-life. **Lesson 3** **Tasks:** 1. One diagram is displayed and asks the students what will happen to some of the unstable nuclei over a period of time. 2. Students will plot a graph to represent the changes. 3. They will analyse the graph and find out the half life from the graph. **Lesson 4** **Tasks** 1. Students revisit the concept by answering some questions on the topic half life. 2. Complete some problem solving questions on Half-life. 3. Complete the worksheet and text book questions. **Assessment Criteria/Essential questions** **Support**: help the students to draw the graph to represent the half life of a given sample. **Stretch**: Ask students to answer questions E1 and E2 in the Student Book. **Extend**: Asks the students to research on the concept Carbon-14 dating**.**
Resources	Edexcel GCSE (9-1) students book Interactive power point Worksheet.

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Lesson Plan

Subject	**Physics**
Class/ Section	**11 ____**
Week	**Week 4 -19th September to 23rd September**
Work send to students by	**Google classroom**
Total number of lessons per week	**5**
Unit/Topic	**Electricity**
Key Vocabulary	**Static electricity, charging by induction, spark, earthing, force field**
Specific Learning objectives and Specific Intended Learning Outcomes	**Lesson 1** **SP11a , Charges and static electricity** **Specific Learning objectives** Explain how an insulator can be charged by friction, through the transfer of electrons and charging by induction Recall that like charges repel and unlike charges attract. **Specific Intended Learning Outcomes** Recall the charged particles found in an atom. Explain why, when certain materials are rubbed together, they end up with opposite charges. Recall the rules of attraction and repulsion between charges. Explain how attraction by induction occurs.

Tasks **Assessment Criteria/ Essential questions** **Resources**	**Tasks** 1. Draw the structure of an atom and explain why atom is electrically neutral 2. Watch a demo or animation which explains how an insulator can be charged by friction and answer que. 1 in the textbook. 3. Apply the concept like charges repel and unlike charges attracts in questions 2 to 4 in the students book 4. Use a charged plastic ruler to attract small pieces of paper or watch an animation and explain how a charged balloon can induce a charge in the wall. (Que .5) 5. Complete the text book questions **Support :** Explain why a duster gains a positive charge when a polythene rod is rubbed with it . *Ensure students recall that the electrons are the only particles that can be transferred away from atoms, so it is always the electrons that move when something is given an electrostatic charge.* **Stretch :** Challenge students to design their own practical methods to investigate the rule for attraction and repulsion of charges **Extend :** Explain why an anti-static effect is needed in furniture polish. How does it work? Edexcel GCSE (9-1) students book Interactive power point from Board works Worksheet SP 11a (differentiated) Glass rod, polythene rod , woollen cloth
Specific Learning objectives and Specific Intended Learning Outcomes	**Lesson 2** **SP11b Dangers and uses of static electricity** **Specific Learning objectives** Explain common electrostatic phenomena in terms of movement of electrons, including **a** shocks from everyday objects **b** lightning Explain how earthing removes excess charge by movement of electrons **Specific Intended Learning Outcomes** Demonstrate how spark is produced Explain how lightning occurs and why we sometimes get shocks from everyday objects. Describe what earthing is and explain how earthing works

Task	**Task** 1. Explain why do we sometimes get an electric shock if you touch a door handle ? 2. Watch an animation of lightning and explain how lighting conductor is an important way of earthing buildings and protect a building 3. Produce spark by using Van de Graaf generator answer the questions given in ppt.
Assessment Criteria/ Essential questions	**Support:** Describe how the bonding line prevents sparks ? **Stretch :** why the chance of sparks from static electricity is less on a humid day. **Extend :** Working of Van de Graaf generator
Resources	Edexcel GCSE (9-1) students book Interactive power point from Board works Worksheet SP 11b (differentiated) Van de Graaf generator
Research work (HW)	**Uses and dangers of static electricity** Explain some of the uses of electrostatic charges in everyday situations, including Smoke precipitator, insecticide sprayers or spray painting Describe some of the dangers of sparking in everyday situations, including fuelling cars, and explain the use of earthing to prevent dangerous build-up of charge.
Specific Learning objectives and Specific Intended Learning Outcomes	**Lesson 3 and 4** **SP 11c. Electric field** **Specific Learning objectives** Define an electric field as the region where an electric charge experiences a force. Describe the shape and direction of the electric field around a point charge and between parallel plates and relate the strength of the field to the concentration of lines. Explain how the concept of an electric field helps to explain the phenomena of static electricity. **Specific Intended Learning Outcomes** Recall what an electric field is.

	Recall how the direction of an electric field is defined. Interpret information shown by field lines. Describe the shape and direction of the electric field around a point charge and between charged electrical plates. Explain how static electricity effects can be explained using the idea of an electric field.
Tasks	**Tasks** 1. Draw an electric field around positive and negative electric charges 2. List the properties of field line 3. Interpret the electric field formed between two like charges and unlike charges 4. Compare the electric field of a point charge and electric field between two charged parallel plate 5. Complete the text book questions
Assessment Criteria/ Essential questions	**Support** : Provide scaffolding to interpret electric field around a point charge and between two charged parallel plates, identify strong electric field. **Stretch** : Challenge the students to explain the effect of a charged object's electric field on neutral object. **Extend :** Explain why electric field lines cannot cross.
Resources :	Edexcel GCSE (9-1) students book Interactive power point from Board works A power point to display learning objectives, tasks and images Worksheet SP 11c (differentiated)
Specific Learning objectives and Specific Intended Learning Outcomes	**Lesson 5** **SP 11a. Electric Circuit** **Specific Learning objectives** Draw and use electric circuit diagrams representing them with the conventions of positive and negative terminals **Specific Intended Learning Outcomes.** Describe the basic structure of an atom (positions, relative masses and relative charges of protons, neutrons and electrons) Explain why metals are good conductors of electricity and plastic, wood.. are poor conductors

	Recognise the circuit symbols for a range of common electrical components Draw diagrams for circuits containing common electrical components, using conventions for positive and negative terminals.
Tasks	**<u>Tasks</u>** 1. Answer text book questions 1 and 2 to recall the structure of an atom 2. List the components needed for a simple circuit to work. 3. Watch the animation of the lattice structure of copper and explain why metals are good conductors. 4. Draw a simple circuit and show the direction of electron flow and convectional current.
Assessment Criteria/ Essential questions	**Support :** Identify the symbols of electrical components and draw a simple circuit using a cell, bulb and a switch. **Stretch**: a What is an electric current? b Compare conventional current with electron flow. **Extend:** A metal conducts electricity but an insulator like wood does not. Describe what is different about the structure of a metal that enables it to conduct electricity.
Resources	Edexcel GCSE (9-1) students book Interactive power point from Board works A power point to display learning objectives, tasks and images Worksheet SP 10 a(differentiated)

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Lesson Plan

Subject	**Physics**
Class/ Section	**Yr 12 – Batch 1 and 2**
Week	**Week 4 -19th September to 23rd September , 2021**
Work send to students by	**Google classroom**
Total number of lessons per week	**3**
Unit/Topic	**Electrical quantities**
Key Vocabulary	**Resistivity**
Assessment Criteria/ Essential questions:	**Lesson 1: Resistance** **Specific Learning objectives:** • state Ohm's law • calculate resistances **Specific Intended Learning Outcomes:** • Use Ohm's law V = I R • Realise that the resistance of a component is a measure of its opposition to the flow of charge through it. • Realise that resistance remains constant only if temperature is constant. • Draw and interpret VI graphs for metal wire **Tasks:** 1. Demonstrate how a lamp can be controlled using a rheostat or variable resistor. 2. Define 'resistance' using $R = \frac{V}{I}$. Hence state Ohms law. 3. Plan and draw the circuit diagram so that it can be used to calculate resistance of a wire. Identify the quantities to be measured. 4. Students investigate the *I*–*V* characteristic for an ohmic conductor **Support** – Students might confuse the gradient of an *I*–*V* curve for an ohmic conductor with the resistance rather than the reciprocal of the resistance of the conductor.

	Stretch - Explore the reasons why resistance varies with temperature in metals **Extend –** Students could research into how overhead transmission cables are constructed and the reasons for the materials used.
Resources:	Edexcel AS/A level Physics 1 Textbook Interactive power point from Board works
Assessment Criteria/ Essential questions: **Resources**	**Lesson 2 and 3: Factors affecting resistance** **Specific Learning objectives:** • Identify the factors on which resistance of a wire depends • define resistivity **Specific Intended Learning Outcomes:** • Realise that resistance of a wire is directly proportional to its length and inversely proportional to its area of cross section. • Realise that the resistance depends on the material. • Define resistivity of a material **Tasks:** 1. Initiate a discussion of factors that might affect resistance of a metal. 2. Teacher explains that resistance depends on the nature of the material. 3. Students are to identify and explore the other factors that affect resistance of materials and Formulate the expression for resistivity **Support** – Provide an understanding of the difference between resistance and resistivity **Stretch -** Explore the discovery and nature of superconductivity. **Extend –** Discussion of a microscopic model of metallic conduction Edexcel AS/A level Physics 1 Textbook Interactive power point from Board works

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Lesson Plan

Subject	**Physics**
Class/ Section	**Yr 12 – Batch A/B**
Week	**Week 4 -19th September to 23rd September**
Work send to students by	**Google classroom**
Total number of lessons per week	**3**
Unit/Topic	**2.12 Motion Graphs**
Key Vocabulary	Displacement–time graph, Velocity–time graph
Lessons 1,2,3 –Live Zoom lesson along with face to face instruction for students present on a particular day **Work will be assigned in Google classroom which will be matched to the students ability.**	**Lesson 1 and 2:** **Specific Learning objectives:** • Use graphical methods to represent distance, displacement, speed, velocity and acceleration • Draw and interpret velocity/ time and acceleration/ time graphs for uniformly accelerated motion. **Specific Intended Learning Outcomes:** • Recognise the shape of displacement time graphs for objects which are i) stationary ii) moving with constant speed/velocity iii) accelerating. • Analyse situations with objects that are moving with constant speed, velocity, acceleration and those with these quantities varying. • Calculate velocity from the gradient of s-t graph. • Determine acceleration using gradient of velocity-time graph • Determine displacement from the area under a velocity-time graph • Recognise the shapes of velocity-time graph sections for objects which are: i) stationary ii) moving with constant speed/velocity iii) accelerating.

	Tasks: 1. Introduce motion graphs. Recall the general concepts behind construction of a line graph and calculation of gradient. 2. Explain how to measure the gradient of a graph and use this to calculate velocities and accelerations from displacement–time and velocity–time graphs. 3. Explain how the area under a velocity–time graph is related to displacement. Provide data or graphs for students to analyse. 4. Explain how to identify trends/ patterns showed by different graphs. **Student activities:** 1. Identify regions of positive and negative velocity and acceleration and to relate the shape of the displacement and velocity graphs to the type of motion. 2. Use exemplar data or pre-prepared graphs of motion for students to plot and analyse 3. Use exemplar velocity–time data or graphs to analyse 4. Start with a velocity–time graph for constant velocity and show that the rectangular area is equivalent to multiplying constant velocity by time to give displacement. 5. Graphs with varying velocities can be treated as the sum of many such narrow rectangles.
Assessment Criteria/ Essential questions: **Resources:**	***Support:*** Student Book – Page 18-20. Read worked out examples and grasp the problem solving techniques ***Stretch:*** Do questions1- 2 on page 20 **Extend:** worksheet question #..... Edexcel AS/A level Physics 1 Textbook Interactive power point
	Lesson 3: **Specific Learning objectives:** • Analyse the variation of the gradients in curved graphs • Interpret the area under curved graphs **Specific Intended Learning Outcomes:** • Calculate the rate of change of a curved graph by drawing a suitable tangent at the point. • Estimate the area under a curved graph. **Tasks** 1. Discuss how displacement, velocity and acceleration graphs for a bouncing ball can be drawn. 2. Illustrates how to draw and use a tangent to determine rate of change of non uniform variation. Use a ppt.

Assessment Criteria/ Essential questions:	3. Discuss the importance of using large triangles for calculating gradient. 4. Use a curved graph to illustrate how to divide curved areas into smaller strips to find the total area or to count the squares with appropriate scales ***Support:*** Worksheet Questions – ……to …… Exceeding: Qn ….. to …… ***Stretch:*** Q…… from the Student Book. **Extend:** Given a displacement–time graph, students plot the velocity–time graph for the same object Students should practise calculations from graphs, Worksheet Questions will be assigned in GC.
Resources:	Edexcel AS/A level Physics 1 Textbook Interactive power point from Doodle learn. worksheet file, Online animations and ppt

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Lesson Plan

Subject	**Physics**
Class/ Section	**Yr 13 – Batch A/B**
Week	**Week 4 : 19th September to 23rd September, 2021**
Work send to students by	**Google classroom**
Total number of lessons per week	**3**
Unit/Topic	**Circular Motion**
Key Vocabulary	centripetal acceleration and centripetal force ,Banking ,Tangential speed
Lesson 1,2,3 Live Zoom lesson along with face to face instruction for students present on a particular day **Work will be assigned in google classroom which will be matched to the students' ability.** **Tasks**	**Lesson 1** **Specific Learning objectives:** • define centripetal acceleration, and derive and use the equations for it • explain that a centripetal force is required to produce and maintain circular motion use the equations for centripetal force **Specific Intended Learning Outcomes:** • Explain what is meant by centripetal acceleration and centripetal force; • Select and apply the equations for speed $v = 2\pi r/T$ and centripetal acceleration $a = v^2/r = r\omega^2$ & centripetal force $F = ma = mv^2/r = mr\omega^2$ • Apply the principles of circular motion to orbital motion of electrons, planets, amusement park rides etc. **Task:** 1 Describe some circular motion scenarios These should include orbits, roundabouts, throwing hammers, and so on. 2.derive and use the equations for centripetal acceleration Combine the equation $F = ma$ with the circular motion equations to produce the equations $F = \frac{mv^2}{r}$ and $F = mr\omega^2$. **3.** Students identify the forces causing the motion and other forces in the system. 4.Students should use these, to analyse a few scenarios similar to those shown in the Student Book

Assessment Criteria/ Essential questions:	**Support:** Provide scaffolding to the derivation of centripetal acceleration **Stretch:** Assess the derivation of centripetal acceleration **Extended:** Complete the *Thinking Bigger* activity on artificial gravity. Discuss the designs of suggested space stations or interplanetary spacecraft such as those shown in the films *2001: A Space Odyssey* and *The Martian*. Write a report summarising whether any of these designs are truly practical, and if the effects of the 'gravity gradient' will be significant
Resources:	Edexcel A level Physics 2 Textbook Interactive power point from Doodle
Tasks **Assessment Criteria/ Essential questions:**	**Lesson 2:** **Specific Learning objectives:** • Apply the principles of circular motion to banking of curved roads, banking of aircrafts etc. **Specific Intended Learning Outcomes:** • Identify frictional force of tyres responsible for centripetal force on a car taking a curved path. • Explain how banking of curved roads helps the smooth and safe movement of cars. • Explain why aircrafts change their orientation while taking a curved path. **Tasks:** *1. Show* an animated movement of Watch the "video clip" and observe when the car loses traction and slides off the track. 2.Establish friction or contact force as the main source of centripetal force in most cases of circular motion. 3.Draw the FBD of the car Identify frictional force of tyres responsible for centripetal force on a car taking a curved path. 4.Watch the video/pic of the YAS MARINA CIRCUIT for Formula 1 race in Abu Dhabi. 5.Group discussion on banking angles to Discuss and identify the advantage of a banked race track 6.Deduce an expression for the angle theta to which the road is banked for the maximum velocity, with which circular motion is possible 7.Ask the students to plan an experiment to investigate circular motion Independent student-led activity: 8.A quick discussion on the method and answer question no 14 based on the investigation from the worksheet file **Support:** Use the diagram provided to draw the FBD of a car on a banked road. students will be guided through steps to find the components of Normal contact force **Stretch:** Identify the component that provides the centripetal force and which counteracts the weight **Extension:** Differentiated questions (Q # 3 to 6) used from the worksheet given.

Resources:	**Home work** Self/Peer assessment - question # 7 from the worksheet 1 . The worksheet 1 questions 1-6 can be used to conduct a quiz Answer the text book question Page 24. Question # 8 & 9 from the worksheet 1 . Edexcel A level Physics 2 Textbook Interactive power point from Doodle Board works
Tasks **Assessment Criteria/ Essential questions:** **Resources:**	**Lesson 3:** **Specific Learning objectives:** • Apply the principles of circular motion to vertical circular motion of objects in amusement park rides **Specific Intended Learning Outcomes:** • Differentiate between vertical and horizontal motion • Explain the variation in contact forces on a roller coaster car during a vertical looping. **TASKS** **1.** Show a video from Ferrari World Abu Dhabi of a rollercoaster loop- the – loop ride to introduce motion in a vertical circle. 2.Quick recap (Q & A technique) to recall that centripetal force is the resultant force at all points. 3.Discuss the nature of normal reaction force/Tension 4.Explore the forces acting on an object in vertical circular motion.- 5.Use the diagram given and **Formulate** an expression for the centripetal force at the top and bottom of a vertical loop. **Support:** Draw only the free body force diagrams on the car at the positions indicated. **Stretch:** Identify the force /(s)that provides the centripetal force **Extended:** students can formulate an expression for the centripetal force at these positions. Answer the questions in the worksheet file Q : NO:7 page 24 worksheet file question no 13 and question no 16 Edexcel A level Physics 2 Textbook Interactive power point from Board works **Homework:** Read the given passage on weightlessness and answer the questions Q1) Considering the path of the roller-coaster to be a segment of a circle so that it can be related to the centripetal acceleration, Identify the condition for weightlessness? Q2) *How fast would you need to be traveling to experience apparent "weightlessness" while passing over the top of a vertical circle?* Deduce the expression for critical speed?