مدرسة القديسة مريم الكاثوليكية الثانوية – دبي

# ST. MARY'S CATHOLIC HIGH SCHOOL, DUBAI

## Physics Lesson Plan

| | |
|---|---|
| **Subject** | **Physics** |
| **Class/ Section** | **Yr 9 (A to F)** |
| **Week** | **Week 2 : 5th September to 9th September, 2021** |
| **Work send to students by** | **Google classroom** |
| **Total number of lessons per week** | **3** |
| **Unit/Topic** | **Conservation of Energy, Efficiency** |
| **Key Vocabulary** | energy stores, energy transfers, joules, conservation of energy, efficiency, dissipated |
| **Lesson 1,2,3 - Live Zoom lesson along with face to face instruction for students present on a particular day**<br><br>**Work will be assigned in google classroom which will be matched to the students' ability.** | **Lesson 1 & 2: Energy stores and energy transfers**<br><br>**Specific Learning objectives:**<br>• Discus what is meant by conservation of energy.<br>• Explain that where there are energy transfers in a closed system there is no change to the total energy in that system.<br>• Explain, using examples, how all system changes energy is dissipated so that it is stored in less useful ways.<br>• Draw and interpret energy transfer diagrams.<br>• Draw and interpret diagrams to represent energy transfers.(Sankey diagrams)<br><br>**Specific Intended Learning Outcomes:**<br>• Explain, using examples, that energy is conserved.<br>• Interpret diagrams that represent energy transfers.<br>• Represent energy transfers using diagrams. (energy flow diagram)<br>• Interpret sankey diagrams that represent energy transfers.<br>• Represent energy transfers using sankey diagrams.<br><br>**Tasks:**<br><br>**Lesson - 1**<br>1. Review law of conservation of energy<br>2. Look at the bullet and the egg in photo A (pg 34) of the students book and draw an energy transfer diagram.<br>4. Complete the questions (1-6) (pg 34 & 35) assigned from the Physics text book, in the notebook. |

| | |
|---|---|
| **Assessment Criteria/ Essential questions:** | **Lesson – 2**<br><br>Complete the worksheet and Exam style questions (pg35)<br><br>**Assessment Criteria/ Essential questions:**<br>When students have completed the worksheet 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.<br><br>**Support:** Students could work in pairs to complete this activity.<br><br>**Stretch :** Ask the students to sketch a sankey diagram for a kettle using the energy values given in question 4 (page 35)<br><br>**Extend:** Ask the students to complete question E1 (pg 35) assigned from the Physics text book, in the graph book. |
| **Resources:** | Edexcel GCSE (9-1) Physics Textbook<br>Ppt on the topic |
| | **Lesson 3: Efficiency**<br><br>**Specific Learning objectives:**<br>.<br>• Discuss the ways of reducing unwanted energy transfer including through lubrication, thermal insulation.<br>• Recall and use the equation: efficiency = (useful energy transferred by the device) / (total energy supplied to the device).<br>• Explain how efficiency can be increased.<br><br>**Specific Intended Learning Outcomes:**<br><br>• Explain some ways of reducing unwanted energy transfers in mechanical processes.<br>• Define what efficiency means.<br>• Explain how efficiency can be increased.<br>• Recall and use the equation for calculating energy efficiency.<br><br>**Tasks:**<br><br>Review change the subject of an equation and significant figures.<br><br>**Card sort activity ( Pair work) – worksheet SP3b-2:** Cut out all the cards and match each picture card with three other cards in efficiency.<br><br>Complete the questions assigned from the Physics text book, in the notebook. Also complete the problems given in the worksheet. |

| | |
|---|---|
| **Assessment Criteria/ Essential questions:** | **Support** – Help students to work through the calculations.<br><br>**Stretch -** Look at the diagram D (pg 37) of the students book and explain why modern low-energy bulbs are more efficient.<br><br>**Extended -** Ask students to work in group and answer for Textbook question E1 & answer exam style question. |
| **Resources:** | Edexcel GCSE (9-1) Physics Textbook<br>Ppt on the topic |

مدرسة القديسة مريم الكاثوليكية الثانوية – دبي

# ST. MARY'S CATHOLIC HIGH SCHOOL, DUBAI

Lesson Plan

| | |
|---|---|
| **Subject** | **Physics** |
| **Class/ Section** | **Year 10** |
| **Week** | **Week 2 : 5th September to 9th September, 2021** |
| **Work send to students by** | **Google classroom** |
| **Total number of lessons per week** | **4** |
| **Unit/Topic** | **Radioactivity** |
| **Key Vocabulary** | Nucleon, Isotopes, Kinetic theory, alpha particles<br>ionisation, ionising radiation emission and absorption spectra |

| | |
|---|---|
| **Specific Learning objectives And learning outcomes** | **Lesson 1. Inside atoms**<br><br>**Specific Learning objectives**<br><br>Recall that the nucleus of each element has a characteristic positive charge, but that elements differ in mass by having different numbers of neutrons.<br><br>Recall the relative masses and relative electric charges of protons, neutrons and electrons<br><br>Recall that in an atom the number of protons equals the number of electrons and is therefore neutral.<br><br>Describe the structure of nuclei of isotopes using the terms atomic (proton) number and mass (nucleon) number and using symbols in a format |
| | **Specific Intended Learning Outcomes**<br><br>Tabulate the relative masses charges and location of the particles that make up atoms<br><br>Define atomic number, mass number and nucleon number.<br><br>Explain why the atom is electrically neutral<br><br>Represent the mass number and atomic number in symbol form<br><br>Define isotopes and identify the isotopes of different elements from te atom models and it's symbols |
| **Tasks** | **Tasks:**<br><br>1. Tabulate the relative mass, charges and position of protons, electrons and neutrons<br>2. Write glossary definitions for these terms: atomic number, mass number and nucleon number<br>**Group activity**<br>3. Use periodic table and worksheet SP 6b.2 to workout atomic notation<br>4. Define isotopes and identify isotopes from atomic model images( ppt) and atomic notations ( SP 6b.2 worksheet) |
| **Assessment Criteria/ Essential questions** | **Support:** Provide a worked out example to complete first few questions in worksheet SP6b.2<br><br>**Stretch:** Complete question E1 from students book<br><br>**Extend:** What is carbon dating**?** |

| | |
|---|---|
| **Resources** | Edexcel GCSE (9-1) students book<br>Interactive power point from Board works<br>Worksheet SP 6b.2 ( differentiated) |
| **Specific Learning objectives And learning outcomes** | **Lesson 2 and 3 - Atom Models**<br><br>**Specific Learning objectives**<br><br>Recall the typical size (order of magnitude) of atoms and small molecules.<br><br>Describe how and why the atomic model has changed over time including reference to the plum pudding model and Rutherford alpha particle scattering leading to the Bohr model.<br><br>Describe an atom with the nuclear radius much smaller than that of the atom.<br><br>**Specific Intended Learning Outcomes**<br><br>Recall Dalton's hard sphere model and explain how particle theory explain how solids have a fixed shape<br><br>Compare the size of an atom and molecule<br><br>Describe J. J. Thompson's plum pudding model and describe how this model explain that atoms have no overall charge.<br><br>Explain Rutherford's scattering experiment to describe the nuclear model of an atom.<br><br>Describe how the Bohr Model of the atom improved Rutherford's atom model<br><br>Compare the nuclear radius with radius of an atom |
| **Task** | **Tasks**<br>**Lesson 2**<br>1. Use doodle interactive slides to explain Dalton's atomic models ( do question 1 in students book)<br><br>2. Use particle model to compare the size of an atom and molecule( Do question 3 in students book)<br><br>3. Demonstrate the image of plum pudding model , draw and label this structure in notebook<br>**Lesson 3**<br>4. Watch the video -Rutherford's scattering experiment- Write down the observations and conclusions in the note book<br><br>5. Distinguish between Bohr's atom model and Rutherford's atom model |

| | |
|---|---|
| | 6. Read last paragraph in the text book and answer question 5 in students book |
| **Assessment Criteria/ Essential questions** | **Support-** Discuss students' observations Dalton's atom model plum pudding model and Rutherford's experiment and use questioning to help them to work out the conclusions<br><br>Do questions 1-3 in the worksheet SP 6a.4<br><br>**Stretch:** Ask students to write a short paragraph comparing the plum pudding model and Rutherford's nuclear model<br>Do questions 3 and 4 in the worksheet SP 6a.4<br><br>**Extent** : Research and produce a timeline of ideas about atoms and what is inside them |
| **Resources** | Edexcel GCSE (9-1) students book<br>Interactive power point from Board works<br>Worksheet SP6a.4 |
| **Specific Learning objectives And learning outcomes** | **Lesson 4 Electrons and orbits**<br><br>**Specific Learning objectives**<br><br>Recall that in each atom its electrons orbit the nucleus at different set distances from the nucleus.<br><br>Explain that electrons change orbit when there is absorption or emission of electromagnetic radiation.<br><br>Describe how and why the atomic model has changed over time including reference to the plum pudding model and Rutherford alpha particle scattering leading to the Bohr model.<br><br>**Specific Intended Learning Outcomes**<br><br>Realise that electron shell radii are fixed and electrons can only orbit at those distances from the nucleus.<br><br>Understand the electrons need to gain or lose exactly the right amount of energy to move between shells.<br><br>Explain the colour emitted from the electrons depends on the amount of energy that is lost as the electrons move shells.<br><br>Describe how emission and absorption spectra leads to the discovery of Bohr's atom model |
| **Task** | **Task**<br>Students watch a video tutorial<br>1. Answer question 1-4 in the students book<br>2. Discuss the difference between absorption spectra and emission spectra and describe how it leads to the discovery of Bohr's atom |

| | |
|---|---|
| | model.<br>3. Answer the worksheet SP 6C.3 and 5<br>4. Use the active teach ppt for assessing the students |
| **Assessment Criteria/ Essential questions** | **Support:** students should answer the questions 1 and 2 on the worksheet SP 6c.3<br><br>**Stretch**: Students to work in pairs to answer question E1 in the Student Book<br><br>**Extend** : What evidence was Bohr trying to explain when he developed his model? |
| **Resources** | Edexcel GCSE (9-1) students book<br><br>Interactive power point from Board works<br><br>Worksheet SP 6C.3 and 5 ( differentiated) |
| **Task** | **Tasks**<br><br>1. Use a GM tube to measure background radiations<br><br>2. Identify the main sources of background radiations from a pie chart and classify them into natural and artificial sources and answer questions 2-4 in the students book<br><br>3. Show ALDS video *SP6d Background radiation and describe the two methods of detecting radiation*<br><br>4. *Discuss why do we need to measure background radiations when we are investigating radioactivity and answer question 6 in the students book* |
| **Assessment Criteria/ Essential questions** | **Support:** Worksheet 6d.3 question 1 -3<br><br>**Stretch:** E1 in students book<br><br>**Extend** : Why do you think that radon gas in houses is more of a problem than it was 100 years ago? |
| **Resources** | Edexcel GCSE (9-1) students book<br>Interactive power point from Board works<br>Active learn ALDS video *SP6d Background radiation*<br>Worksheet SP 6d.3 |

مدرسة القديسة مريم الكاثوليكية الثانوية – دبي

# ST. MARY'S CATHOLIC HIGH SCHOOL, DUBAI

Lesson Plan

| | |
|---|---|
| **Subject** | **Physics** |
| **Class/ Section** | **Year 11- A - F** |
| **Week** | **Week 2- 5th September to 9th September,2021** |
| **Work send to students by** | **Google classroom** |
| **Total number of lessons per week** | **5** |
| **Unit/Topic** | **SP 7 – Astronomy**<br>**SP 7a – The solar system**<br>**SP 7 b – Gravity and orbits**<br>**SP 7c – Life cycle of stars** |
| **Key Vocabulary** | **Solar system, geocentric model, heliocentric model, telescope, dwarf planet, asteroids, comets, elliptical, natural satellites, artificial satellites, weight, gravity, orbits, gravitational force, orbital speed, velocity, nebula, protostar, main sequence, red giant, white dwarf, supernova, massive stars, red super giants , black hole, neutron star.** |
| **Lessons 1,2,3,4 and 5 – Live Zoom lesson along with face to face instruction for students present on a particular day**<br><br>**Work will be assigned in google classroom which will be matched to the students' ability.** | **Lesson 1: SP7a The Solar System**<br>**(Carried forward from the previous lesson)**<br>**Specific Learning objectives**<br>7.2P - 7.3 P Recall that our Solar System consists of the Sun (our star), eight planets and their natural satellites (such as our Moon); dwarf planets; asteroids and comets.<br>7.4P Describe how ideas about the structure of the Solar System have changed over time.<br>7.19P Describe how methods of observing the Universe have changed over time including why some telescopes are located outside the Earth's atmosphere.<br>**Specific Intended Learning Outcomes**<br>• Describe the different bodies that make up the Solar System.<br>• Recall the names and order of the planets in the Solar System.<br>• Describe how ideas about the structure of the Solar System have changed over time.<br>• Describe how methods of observing the Universe have changed over time.<br>**Tasks**<br>1. Recall about the solar system by making the concept map.<br>2. Teacher explains the changing ideas about the Solar System and gives a brief description about the current model of the universe.<br>3. Students will do research on |

| | |
|---|---|
| | • Heliocentric model and its relevance<br>• Geocentric model and its relevance in groups.<br>4. They share the ideas with other groups.<br>5. They compare and contrast the two models and write in their note book.<br>6. Students will fill up the table and describe how methods of observing the Universe have changed over time.<br>7. Provides a card-sort exercise looking at the advantages and disadvantages of ground and space-based telescopes. Students follow the instructions to sort the cards, and can then be asked to write a short paragraph summarising the advantages and disadvantages for each type of telescope.<br>**Assessment Criteria/Essential questions**<br><br>**Support:** Provide with a written passage about solar system in google classroom<br>***Stretch***: Explain the retrograde motion<br>**Extend :** Find out the typical size of the receiving part of a gamma ray or X-ray telescope and compare this to the size of a typical radio telescope, and suggest reasons for the difference. |
| **Resources** | Edexcel GCSE 9-1 Physics Text book |
| | **Lesson 2: SP7b Gravity and orbits**<br><br>**Specific Learning objectives**<br>7.1P Explain how and why both the weight of any body and the value of g differ between the surface of the Earth and the surface of other bodies in space, including the Moon.<br>7.5P Describe the orbits of moons, planets, comets and artificial satellites.<br><br>**Specific Intended Learning Outcomes**<br><br>• Recall the factors that affect the strength of the gravitational field.<br>• Explain why g has different values on different bodies in the Solar System.<br>• Describe the orbits of moons, planets, comets and artificial satellites.<br><br>**Tasks**<br>1. Asks them to write some facts about gravity. Give them a few minutes to do this, and then compile.<br>2. Recollect the knowledge about the relationship between weight and gravity that they have learned in SP2c.<br>3. Displays the table given in the text book page and asks them to identify the factors affecting the gravitational field strength.<br>4. Use the doodle interactive power point.<br>5. Students will solve the exam style questions.<br><br>**Assessment Criteria/ Essential questions:**<br>**Support**: Check that students understand that the same ideas about orbits apply whether we are talking about a planet, comet or satellite in orbit around the Sun, or a moon or satellite orbiting a planet.<br>***Stretch***: Asks the students to write about the different satellites and it's uses.<br>**Extend** : Ask students to view the video and answer the questions. |
| **Resources** | Edexcel GCSE 9-1 Physics Text book |

| | |
|---|---|
| | **Lesson 3: SP7b Gravity and orbits**<br><br>**Specific Learning objectives**<br>7.6P Explain for circular orbits how the force of gravity can lead to changing velocity of a planet but unchanged speed.<br>7.7P Explain how, for a stable orbit, the radius must change if orbital speed changes (qualitative only).<br><br>**Specific Intended Learning Outcomes**<br>• Recall the concept Circular motion.<br>• Explain why the velocity of a planet changes even if orbiting at a steady speed.<br>• Describe how changing the speed of an orbiting body affects the radius of its orbit.<br>• Explain how the radius of a stable orbit is affected by the orbital speed.<br>**Tasks**<br>1. Review the concept circular by asking the questions.<br>2. Displays the diagram from the student book page no.121.<br>3. Asks the students to solve the given questions.<br>4. Use the doodle interactive power point presentation.<br>5. Discuss the text book question answers.<br>**Assessment Criteria/ Essential questions:**<br><br>**Support**: Help students to understand the idea that if a satellite speeds up it will move further from the Earth/adopt a less curved path by discussing driving/cycling around corners. A sharp corner can only be taken slowly – if a vehicle is moving too fast it cannot turn sharply enough and will leave the road on the outside of the bend. Elicit the idea that, for the vehicle, the amount of friction between the tyres and the road determines<br>the maximum speed for a particular bend, whereas for a satellite the strength of gravity determines the speed<br>needed for a particular orbit.<br>***Stretch***: Ask students to think of the situation where two spacecraft are in the same orbit a few kilometres apart. Ask them to explain why, if one spacecraft needs to catch up with the other, it cannot do this simply by increasing its speed. |
| **Resources** | Edexcel GCSE 9-1 Physics Text book |
| | **Lesson 4: SP7c Life cycles of stars**<br><br>**Specific Learning objectives**<br>7.16P Describe the evolution of stars of similar mass to the Sun through the following stages: a nebula b star (main sequence) .<br>7.17P Explain how the balance between thermal expansion and gravity affects the life cycle of stars.<br><br>**Specific Intended Learning Outcomes**<br>• Describe the evolution of stars of similar mass to the Sun (including nebula, main sequence star).<br>• Describe the forces acting on a star in terms of thermal expansion and gravity.<br>• Explain how the balance of thermal expansion and gravity affects the life cycle of stars. |

| | |
|---|---|
| | **Tasks.**<br>• A small animation video showing the stages of the life cycle of star.<br>• Use doodle interactive power point.<br>• Identify the stages of the star till it reaches the main sequence stage.<br>• Discuss about the energy changes taking place in the nebulae, protostar and main sequence star.<br>• Realise the role of gravity in the three stages and explain it using a diagram and write in the note book.<br><br>**Assessment Criteria/Essential questions**<br>**Support**: Give students the stages in order, and direct them to appropriate websites.<br>***Stretch***: Ask students to find out approximately how long each stage lasts.<br>**Extend:** Use the idea of balancing forces to explain what happens when you blow up a balloon. |
| **Resources** | Edexcel GCSE 9-1 Physics Text book |
| | **Lesson 5: SP7c Life cycles of stars**<br><br>**Specific Learning objectives**<br>7.16P Describe the evolution of stars of similar mass to the Sun through the following stages: red giant ,white dwarf.<br>7.18P Describe the evolution of stars with a mass larger than the Sun<br>**Specific Intended Learning Outcomes**<br>• Describe why Stars will have shorter life spans with larger stars and longer life spans with smaller stars.<br>• Describe the formation of red giant and explain why this stage is unstable.<br>• Describe the final stages of a star similar to the Sun<br>• Describe the final stages of a massive star – supernova, neutron star and black hole.<br>• Compare and contrast the evolution of small as well as massive stars.<br><br>**Tasks**<br>1. Asks the students to draw a diagram which shows the balance of forces in a star such as the Sun.<br>2. Ask students to predict what happens to a star when nuclear reactions in the core stop.<br>3. Use doodle interactive power point.<br>4. Students will make a flowchart for the final stages of the star.<br>5. Students will compare and contrast the life cycles of stars of different masses.<br><br>**Assessment Criteria/Essential questions**<br>**Support:** Point out that the differences in the life cycles of stars with different masses are mainly after the red giant/red supergiant phase.<br>***Stretch***: Ask students to find out and explain why neutron stars have that name.<br>**Extend:** A comparative study of the evolution of star like sun and massive star than sun. Present their findings in a concept map. |
| **Resources** | Edexcel GCSE 9-1 Physics Text book |

مدرسة القديسة مريم الكاثوليكية الثانوية – دبي

# ST. MARY'S CATHOLIC HIGH SCHOOL, DUBAI

Lesson Plan

| | |
|---|---|
| **Subject** | **Physics** |
| **Class/ Section** | **Yr 12 – Batch A/B** |
| **Week** | **Week 2 : 5th September to 9th September, 2021** |
| **Work send to students by** | **Google classroom** |
| **Total number of lessons per week** | **3** |
| **Unit/Topic** | **1.1 Units** |
| **Key Vocabulary** | **Base units, Derived units** |
| **Resources:** | Edexcel AS/A level Physics 1 Textbook<br>Interactive power point from Board works |
| **Lessons 1,2,3 –Live Zoom lesson along with face to face instruction for students present on a particular day**<br><br>**Work will be assigned in Google classroom which will be matched to the students ability.** | **Lesson 1**<br><br>**Specific Learning objectives:**<br>• Know and understand the principle of homogeneity of equations<br>• Identify the common prefixes for the powers of ten<br><br>**Specific Intended Learning Outcomes:**<br>• To check whether the equation is correct using the principle of homogeneity<br>• Find the SI units of constants in an equation<br><br>**Tasks:**<br>1.Introduce the lesson objectives and success criteria<br>2.Teacher explains the principle of homogeneity of equations<br>3.Students identify that an equation will be homogeneous if all the terms in the given equation have the same base units<br>Teacher introduces the different prefixes for powers of ten.<br>4. Complete the given questions from the worksheet file.<br>Students will be put in break out rooms during Zoom lesson to encourage collaborative learning<br>5. Complete the questions (pg 11) assigned from the Physics 1 text book in the notebook. |

| | |
|---|---|
| | **Assessment Criteria/ Essential questions:**<br><br>***Support :****Skim through some worked examples and complete the questions given*<br><br>***Stretch:*** check whether the given equation is valid principle of homogeneity<br>**Extend:** explain how to find the SI units of unknown quantities in a given equation<br><br>**Resources:** Edexcel AS/A level Physics 1 Textbook<br>Interactive power point from Board works |
| | **Lesson 2 & 3:**<br>**Specific Learning objectives:**<br>• Estimate values for physical quantities and use their estimate to solve problems.<br>**Specific Intended Learning Outcomes:**<br>• Make estimates of physical quantities listed<br>• Express the estimates as powers of 10<br>• Understand the power of tens of the estimate is the same as the true value<br>• Identify what is meant by Fermi questions?<br>**Tasks:**<br>Lesson 2<br>1. Open ended question to the students " how can you estimate the kinetic energy of a fast moving car?"and *Introduce the lesson objectives and success criteria*<br>2. Teacher introduces estimations and provide the estimations of few quantities in powers of 10.<br>3.Explain that the power of tens of the estimate is the same as the true value<br>Lesson 3<br>4. Complete the questions (pg 13) assigned from the Physics 1 text book in the notebook. Students will be put in break out rooms during Zoom lesson to encourage collaborative learning.<br>5.Teacher introduce Fermi Questions and provide few examples<br>6. Students solve the given Fermi questions from the worksheet.<br>**Assessment Criteria/ Essential questions:**<br><br>***Support :*** *Arrange the given estimates in the order of magnitude*<br>***Stretch:*** Estimate the mass of a given meter ruler<br>**Extend:** Estimate the volume of the given container and also estimate the number of items that can be filled in it.<br>**Resources:**<br>Edexcel AS/A level Physics 1 Textbook<br>Interactive power point from Board works |

مدرسة القديسة مريم الكاثوليكية الثانوية – دبي

# ST. MARY'S CATHOLIC HIGH SCHOOL, DUBAI

Lesson plan

| | |
|---|---|
| **Subject** | **Physics** |
| **Class/ Section** | **Yr 12 – Batch 1 and 2** |
| **Week** | **Week 2 - 5th September to 9th September , 2021** |
| **Work send to students by** | **Google classroom** |
| **Total number of lessons per week** | **3** |
| **Unit/Topic** | **3.1 Electric quantities** |
| **Key Vocabulary** | Charge, coulomb, current |
| | **Lesson 1 and 2: Electric current**<br><br>**Specific Learning objectives:**<br>• Describe electric current as the rate of flow of charged particles<br>• make calculations of electric current.<br><br>**Specific Intended Learning Outcomes:**<br>• Understand that electric current is the rate of flow of charged particles.<br>• Explain that electric current in a metal is due to the movement of electrons, whereas in an electrolyte the current is due to the movement of ions.<br>• Explain what is meant by conventional current and electron flow<br>• Define the coulomb<br>• Solve problems using the equation $Q = It$ and $\Delta Q = I\delta t$<br>• Describe how an ammeter may be used to measure the current in a circuit<br>• Recall and use the elementary charge ($e = 1.6 \times 10^{-19}$ C)<br><br>**Tasks 1:**<br>1. Review simple electrostatic effects and electrostatic forces.<br>2. Teacher would introduce law of conservation of charge and quantisation of charge ($Q = ne$).<br>**Tasks 2:**<br>1. Identify the coulomb in terms of electric current and introduce the equation $Q = It$ and $\Delta Q = I\,\Delta t$.<br>2. Students draw a simple circuit diagram to show how the ammeter is connected in a circuit<br>3. Interpret the area under I-t graph as the total charge that passes |

| | |
|---|---|
| **Assessment Criteria/ Essential questions:** | 4. Differentiate a.c and d.c<br>5. Complete the questions assigned from the Physics 1 text book in the notebook.<br>**Support** – Express Coulomb in terms of base units. Determine the number of electrons in one coulomb of charge.<br>**Stretch -** Discuss and identify the charge carriers in different types of conductor such as metals, electrolytes, plasma, charged beams, semiconductors.<br>**Extend –** Investigate the shuttling ball experiment to observe current as the transport of charge. |
| **Resources:** | Edexcel AS/A level Physics 1 Textbook<br>Interactive power point from Board works |
| | **Lesson 3: Electrical energy transfer**<br><br>**Specific Learning objectives:**<br>●define electromotive force and potential difference<br>●make calculations of voltage and the energy transfer in components<br><br>**Specific Intended Learning Outcomes:**<br>• Define e.m.f. in terms of the energy transferred by a source in driving unit charge round a complete circuit<br>• Use the expression V = W/Q to solve a few numerical problems<br>• Differentiate between emf and potential difference<br>• State what is meant by the term mean drift velocity of charge carriers.<br><br>**Tasks:**<br>*1.* Demonstrate a very simple electrical circuit and ask students to identify the key energy transfers taking place.<br>2. Teacher explains that there is a source of electrical energy and that the electrical energy is then transferred to other forms.<br>3. Define 'emf' and 'potential difference' and introduce the equation $V = . W/Q$.<br>4. Students work out numerical problems based on the equation<br>Complete questions no:1 and 2 from textbook page no: 71<br>5. Teacher introduce the term drift velocity of charge carriers |
| **Assessment Criteria/ Essential questions:** | **Support** – Discuss emf is caused by converting the other form of energy into electrical energy whereas in potential difference the electrical energy is converted into other forms of energy.<br>**Stretch -** Find out the energy stored in different types of cell, such as a car battery by using the capacity of the battery in Ah to calculate the total charge that flows through it and multiplying this by the terminal pd of the battery.<br>**Extend –** Set students an experimental write-up and analysis to estimate the energy needed to raise 1 kg of water through 1 °C. |
| **Resources** | Edexcel AS/A level Physics 1 Textbook<br>Interactive power point from Board works |

مدرسة القديسة مريم الكاثوليكية الثانوية – دبي

# ST. MARY'S CATHOLIC HIGH SCHOOL, DUBAI

Lesson plan

| | |
|---|---|
| **Subject** | **Physics** |
| **Class/ Section** | **Yr 13 – Batch A/B** |
| **Week** | **Week 2 : 5th September to 9th September, 2021** |
| **Work send to students by** | **Google classroom** |
| **Total number of lessons per week** | **3** |
| **Unit/Topic** | **6.1 Further Momentum** |
| **Key Vocabulary** | Impulse, Momentum conservation ,vector addition |
| **Lesson 1,2,3 - 6 Live Zoom lesson along with face to face instruction for students present on a particular day**<br><br>**Work will be assigned in google classroom which will be matched to the students' ability.** | **Lesson 1 and 2:**<br><br>**Specific Learning objectives:**<br>Derive and use the expression Ek = $p^2/2m$ for the kinetic energy of a non-relativistic particle.<br>Investigate and apply the principle of conservation of linear momentum to problems in one dimension.<br>Make calculations based on the conservation of linear momentum to determine energy changes in collisions<br>Explain the difference between elastic and inelastic collisions<br><br>**Specific Intended Learning Outcomes:**<br>State that total linear momentum is always conserved in a collision.<br>Apply the principle of conservation of momentum to solve problems when bodies interact in one dimension.<br>Predict whether a collision is elastic or inelastic depending on whether KE is conserved or not.<br>Explain that whilst the momentum of a system is always conserved in the interaction between bodies, some change in kinetic energy usually occurs.<br>Realise that conservation of momentum is valid only if there is no external force.<br>Apply the principle of conservation of momentum to explosions.<br>Plan an experiment to verify the conservation of linear momentum. that momentum is 'lost' when something comes to rest<br><br>**Tasks:**<br>**Lesson 1**<br>**Introduction:**<br>Show an animation of Newton's cradle and use it to recall conservation of momentum.<br>1.Recap conservation of momentum.<br>2.Demonstrate a range of simple collisions, for example using a linear air |

| | |
|---|---|
| | track or marbles -This ensures that students can describe collisions and find the momentum of objects both before and after the collisions.<br>**3.Students:( group work):**Discuss possible energy transfers that take place during collisions, demonstrating that impacts can cause heating and produce sounds.<br>**4.**Use the concept of conservation of energy to discuss whether there would be any corresponding reduction in kinetic energy.<br>**5.**Mathematically analyse an inelastic collision.<br>**Lesson 2**<br>1.Students investigate collisions between two trolleys using light gates or other data logging equipment.<br>2.W rite a plan of an experiment to verify the conservation of linear momentum.<br>3.Discussion and peer check of the plan once turned in GC<br>.Students:( group work)<br>Investigate the relationship between the force exerted on an object and its change of momentum. |
| **Assessment Criteria/ Essential questions:**<br><br>**Resources:** | **Formative assessment**<br>Student book page 11<br>**Support :** Encourage students to start by adopting a sign convention, such as 'right is positive', and then to write out 'momentum before' and 'momentum after'before equating these to solve a problem.<br>Students who are visual learners will appreciate a treatment of conservation of linear momentum using vector arrows to represent the momentum of the system before and after a collision or explosion.<br>**Stretch :** Question number 1,2,3<br>**Extended:** worksheet file page .. Qn: number 6-8<br><br>Edexcel A level Physics 2 Textbook<br>Interactive power point from Board works |
| | **Lesson 3:**<br><br>**Specific Learning objectives:**<br>Analyse and interpret data to calculate the momentum of (non-relativistic) particles and apply the principle of conservation of linear momentum to problems in two dimensions<br><br>**Specific Intended Learning Outcomes:**<br>Resolve velocities into components and construct and solve equations for conservation of momentum in two dimensions<br>Determine the final velocity and direction of one colliding object after a collision with another object at an angle.<br>**Tasks:**<br>**Introduction:**<br>Illustrate change in momentum in two dimensions with a video.<br>1. students to resolve some simple force vectors and velocity vectors into perpendicular components. For example, students can resolve a displacement of 40 m at an angle of 20 degrees north of east (into northward and eastward components).<br>**2.** Recall resolution of vector components. |

| | |
|---|---|
| **Assessment Criteria/ Essential questions:** | **3.** Teacher Illustrates the problem solving techniques in conservation of momentum in two dimensions.<br><br>**Support:** Start with some scale-drawing representations of forces to show how they can be combined to find a resultant as described earlier. For the first example of a collision, use an impact that occurs at right angles to simplify the analysis.<br>**Stretch:** Qn……., worksheet file.<br>**Extended:** Three-dimensional problem can be analysed in a similar way to the two-dimensional examples<br>collisions between sub-atomic particles can be truly elastic. |
| **Resources** | Edexcel A level Physics 2 Textbook<br>Interactive power point from Board works |

مدرسة القديسة مريم الكاثوليكية الثانوية – دبي

# ST. MARY'S CATHOLIC HIGH SCHOOL, DUBAI

## Lesson Plan 2021-22

| | |
|---|---|
| **Subject** | **Physics** |
| **Class/ Section** | **Yr 13 – Batch 1 and 2** |
| **Week** | **Week 2 : 5th Sept – 9th September, 2021** |
| **Work send to students by** | **Google classroom** |
| **Total number of lessons per week** | **3** |
| **Unit/Topic** | **7.1 Electric fields** |
| **Key Vocabulary** | Electric field, Electric field lines, Electric field strength, |
| **Lesson 1,2,3 - Live Zoom lesson along with face to face instruction for students present on a particular day**<br><br>**Work will be assigned in google classroom which will be matched to the students' ability.** | **Lesson 1 - 2: Electric fields-Coulomb's law**<br><br>**Specific Learning objectives:**<br>• Define Coulomb's law in electrostatics.<br>• Make calculations of the electrostatic force between charged particles<br>• Verify coulomb's law experimentally.<br><br>**Specific Intended Learning Outcomes:**<br>• State Coulomb's law to describe the size of the force between two point charges. |

| | |
|---|---|
| | • Use the expression $F = k\frac{Q_1Q_2}{r^2}$ , where k = $1/4\pi\varepsilon_0$<br>• Discuss the fact that the force between two charges obeys inverse square law with distance and predict the graph.<br>• **Discuss an experiment using electronic balance to measure the force between two charges.**<br><br>**Tasks:**<br>1. Review simple electrostatic effects and electrostatic forces.<br>2. Discuss law of conservation of charge and quantisation of charge ($Q = ne$).<br>3. Brainstorm with students what the force between two point charges depends upon and draw out the equation from the discussion.<br>4. State Coulomb's law in the form: $F = k\frac{Q_1Q_2}{r^2}$<br>5. State and explain the inverse square law - F α $1/r^2$.<br>6. Complete the questions 2-3 (pg 43) assigned from the Physics 2 text book in the notebook. Students will be put in break out rooms during Zoom lesson to encourage collaborative learning. |
| **Assessment Criteria/ Essential questions:** | **Support** – Find the units of constant k in Coulomb's law equation and derive its base units.<br>**Stretch -** Describe the force between two charges obeys inverse square law with distance and predict the graph.<br>**Extend –** Investigate an experiment using electronic balance to measure the force between two charges. |
| **Resources:** | Edexcel A level Physics 2 Textbook<br>Interactive power point from Board works, ppt – electric fields |
| | **Lesson 3: Electric fields**<br><br>**Specific Learning objectives:**<br>• Define electric field.<br>• Use the equation for electric field strength E=F/Q.<br>• Define radial electric fields.<br>• Draw and interpret diagrams of electric fields.<br><br>**Specific Intended Learning Outcomes:**<br>• Define electric field as space where charges experience force.<br>• Define electric field strength as force per unit positive charge (E=F/Q).<br>• State that electric field due to a point charge is radial.<br>• Draw electric patterns of positive and negative charges, like charges and unlike charges. |

| | |
|---|---|
| **Assessment Criteria/ Essential questions:** | **Tasks:**<br>1. Describe the concept of field as a region in which a body experiences a force.<br>2. Students should recognise that a field can be represented as a vector, the direction of the force on a positive charge.<br>3. Show students the shape of a field surrounding a point charge, highlighting the field lines.<br>4. Discuss the direction of the field and what the spreading of the field lines indicates. Include the idea of what would happen to a small positive charge placed in the field to explain the direction of the lines.<br>5. Derive and use the expression $E = k\frac{Q}{r^2}$ for the electric field due to a point charge.<br><br>**Support** – Derive the expression $E = kq/r^2$ for the electric field due to a point charge.<br>**Stretch –** Draw the field line pattern between a plate and a point charge.<br>**Extend –** Discuss the idea of an inverse square relationship where the field strength decreases with the square of the distance. Investigate experiments to verify the inverse square relationship between field strength and distance |
| **Resources:** | Edexcel A level Physics 2 Textbook<br>Interactive power point from Board works, ppt – electric field |