Marietta City Schools

2023–2024 District Unit Planner

Teacher(s)	Cole Phillips & Thomas Shymala	**Subject Group and Course**	Group 4 - Physics		
Course Part and Topic	Topic 2 - The particulate nature of matter	**SL or HL / Year 1 or 2**	SL Year 1	**Dates**	October-January (10 weeks)
Unit Description and Texts		**DP Assessment(s) for Unit**			
Students examine the basics of motion through kinematic equations, Newton's 2nd law problems, conservation of energy, and conservation of momentum. ● Bowen-Jones, Michael, and David Homer. IB Physics. Oxford: Oxford UP, 2014. Print.		● B.1 Thermal Energy Transfer, B.2 Greenhouse Effect, B.3 Gas Laws, B.5 Current and Circuits ● Test (paper 1 + paper 2)			

INQUIRY: establishing the purpose of the unit

Transfer Goals

List here one to three big, overarching, long-term goals for this unit. Transfer goals are the major goals that ask students to "transfer" or apply their knowledge, skills, and concepts at the end of the unit under new/different circumstances, and on their own without scaffolding from the teacher.

Phenomenon: Technically, a perfectly designed roller coaster does not need harnesses.

Statement of Inquiry: An object is said to undergo projectile motion when it follows a curved path due to the influence of gravity.

1. Students will solve problems using kinematic equations.
2. Students will solve for an object's acceleration using Newton's 2nd law in various scenarios.
3. Students will calculate variables from an object's motion using conservation of energy and conservation of momentum.

ACTION: teaching and learning through inquiry

Content / Skills / Concepts - Essential Understandings	**Learning Process** *Check the boxes for any pedagogical approaches used during the unit. Aim for a variety of approaches to help facilitate learning.*
<u>Students will know the following content:</u> • ***Molecular Theory in solids liquids and gasses*** • ***Density*** • ***Kelvin and Celsius scales*** • ***Average kinetic energy of particles*** • ***Thermal energy transfer*** • ***Conduction, Convection, and Thermal Radiation*** • ***Internal Energy*** • ***Rate of Thermal energy transfer*** • ***Luminosity*** • ***Emission Spectrum*** • ***Conservation of Energy*** • ***Emissivity*** • ***Greenhouse effect*** • ***Absorption*** • ***Pressure*** • ***Avogadro's Constant*** • ***The Ideal Gas Law Equations*** • ***Momentum of Particles*** • ***Cells and EMF*** • ***Chemical cells and Solar Cells*** • ***Direct Current*** • ***Electric Power*** • ***Combination of resistors in series and parallel*** • ***Charge*** • ***Electric field***	Learning experiences and strategies/planning for self-supporting learning: ☒ Lecture □ Socratic seminar ☒ Small group/pair work ☒ PowerPoint lecture/notes ☒ Individual presentations □ Group presentations □ Student lecture/leading □ Interdisciplinary learning Details: *Students will learn through a combination of presentations, small group work, practice problems, and lab work.* ☒ Other(s): *practice problems, lab work* **Formative assessment(s):** *Paper 1 quizzes at the end of each subtopic.*

- *Coulomb's law*
- *Electric current*
- *Circuit diagrams*
- *Kirchhoff's circuit laws*
- *Heating effect of current and its consequences*
- *Resistance expressed as*
- *Power dissipation*
- *Internal resistance*
- *Secondary cells*
- *Terminal potential difference*
- *Electromotive force (emf)*
- *Magnetic fields*
- *Magnetic force*

<u>Students will develop the following skills:</u>

- **Identifying two forms of charge and the direction of the forces between them**
- **Solving problems involving electric fields and Coulomb's law**
- **Calculating work done in an electric field in both joules and electronvolts**
- **Identifying sign and nature of charge carriers in a metal**
- **Identifying drift speed of charge carriers**
- **Solving problems using the drift speed equation**
- **Solving problems involving current, potential difference and charge**
- **Drawing and interpreting circuit diagrams**
- **Identifying ohmic and non-ohmic conductors through a consideration of the V/I characteristic graph**
- **Solving problems involving potential difference, current, charge, Kirchhoff's circuit laws, power, resistance and resistivity**
- **Investigating combinations of resistors in parallel and series circuits**
- **Describing ideal and non-ideal ammeters and voltmeters**
- **Describing practical uses of potential divider circuits, including the advantages of a potential divider over a series resistor in controlling a simple circuit**
- **Investigating one or more of the factors that affect resistance experimentally**
- **Investigating practical electric cells (both primary and secondary)**

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- **Describing the discharge characteristic of a simple cell (variation of terminal potential difference with time)**
- **Identifying the direction of current flow required to recharge a cell**
- **Determining internal resistance experimentally**
- **Solving problems involving emf, internal resistance and other electrical quantities**
- **Determining the direction of force on a charge moving in a magnetic field**
- **Determining the direction of force on a current-carrying conductor in a magnetic field**
- **Sketching and interpreting magnetic field patterns**
- **Determining the direction of the magnetic field based on current direction**
- **Solving problems involving magnetic forces, fields, current and charges**

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Summative assessments:

Topic test consisting of questions from P1 and P2

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Differentiation:

❑ Affirm identity - build self-esteem
✓ Value prior knowledge
✓ Scaffold learning
✓ Extend learning

Details:

- *SWD/504 – Accommodations Provided*
- *ELL – Reading & Vocabulary Support*
- *Intervention Support*

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	• *Extensions – Enrichment Tasks and Project*

Approaches to Learning (ATL)

Check the boxes for any explicit approaches to learning connections made during the unit. For more information on ATL, please see the guide.

- ✓ Thinking
- ❑ Social
- ✓ Communication
- ❑ Self-management
- ❑ Research

Details:

Students will be continuously challenged to develop higher-order thinking skills as they take prior knowledge, combine it with new content, and analyze the data they collected to reach a conclusion

Students will communicate their findings to their peers in the form of small-group presentations.

Language and Learning *Check the boxes for any explicit language and learning connections made during the unit. For more information on the IB's approach to language and learning, please see the guide.*	**TOK Connections** *Check the boxes for any explicit TOK connections made during the unit*	**CAS Connections** *Check the boxes for any explicit CAS connections. If you check any of the boxes, provide a brief note in the "details" section explaining how students engaged in CAS for this unit.*
✓ Activating background knowledge ❑ Scaffolding for new learning ✓ Acquisition of new learning through practice ✓ Demonstrating proficiency Details:	❑ Personal and shared knowledge ❑ Ways of knowing ❑ Areas of knowledge ✓ The knowledge framework Details: *To what extent is scientific knowledge based*	❑ Creativity ✓ Activity ❑ Service Details: *Students will actively be carrying out experiments involving accelerating carts.*

Students will build on knowledge gained in Honors Physics. *Students will analyze data from a cart being accelerated by a hanging mass.* *Students will complete practice problems* *Students will produce a full scatter plot with high and low gradients as demonstration of learning.*	*on fundamental concepts such as energy? What happens to scientific knowledge when our understanding of such fundamental concepts changes or evolves?*	

Resources

List and attach (if applicable) any resources used in this unit

- Textbooks (see page 1)
- Laboratory resources
- Online notes and videos (Schoology)

REFLECTION: considering the planning, process, and impact of the inquiry

What worked well *List the portions of the unit (content, assessment, planning) that were successful*	**What didn't work well** *List the portions of the unit (content, assessment, planning) that were not as successful as hoped*	**Notes / Changes / Suggestions** *List any notes, suggestions, or considerations for the future teaching of this unit*