**Marietta City Schools**

**2024–2025 District Unit 1 Planner**

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| **Teacher(s)** | Thomas Shamyla | **Subject Group and Course** | Group 4 - Physics | | |
| **Course Part and Topic** | Topic A - Space, Time, and Motion | **SL or HL / Year 1 or 2** | SL Year 1 | **Dates** | August- October (11 weeks) |
| **Unit Description and Texts** | | **DP Assessment(s) for Unit** | | | |
| • Bowen-Jones, Michael, and David Homer. IB Physics. Oxford: Oxford UP, 2014. Print. | | • A.1 Quiz, A.2 Quiz, A.3 Quiz, Topic test | | | |

## *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: All objects, which have mass, can have their motion described mathematically in relation to their displacement, velocity, and acceleration within a given reference frame.

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<br><br>*Check the boxes for any pedagogical approaches used during the unit. Aim for a variety of approaches to help facilitate learning.* |
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| <u>Students will know the following content:</u><br>• ***displacement , velocity, and acceleration***<br>• ***Motion graphs***<br>• ***Kinematic equations***<br>• ***Projectile motion***<br>• ***Newton's laws of motion***<br>• ***Free body diagrams***<br>• ***Types of energy***<br>• ***Conversation of energy***<br>• ***Power***<br>• ***Conservation of linear momentum***<br><br><u>Students will develop the following skills:</u><br>• **Define displacement, velocity, and acceleration**<br>• **Explain the difference between distance and displacement in terms of scalar and vector**<br>• **Calculate instantaneous and average velocity, speed, and acceleration**<br>• **Recognise situations where acceleration is uniform and non-uniform**<br>• **Understand that kinematic equations are valid for uniform accelerated motion**<br>• **Resolve vectors into rectangular components and solve projectile motion problems**<br>• **Describe the effects of air resistance on the characteristics of projectile motion**<br>• **Explain newton's laws of motion**<br>• **Describe forces as interactions between bodies**<br>• **Draw free-body diagrams and analyze them**<br>• **Understand Normal force, friction, elastic force, tension force.**<br><br>• **Describe forces as interactions between bodies** | Learning experiences and strategies/planning for self-supporting learning:<br><br>☒ Lecture<br><br>□ Socratic seminar<br><br>☒ Small group/pair work<br><br>☒ PowerPoint lecture/notes<br><br>☒ Individual presentations<br><br>□ Group presentations<br><br>□ Student lecture/leading<br><br>□ Interdisciplinary learning<br><br>Details:<br><br>*Students will learn through a combination of presentations, small group work, practice problems, and lab work.*<br><br>☒ Other(s): *practice problems, lab work* |

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- **Draw free-body diagrams and analyze them**
- **Understand the nature and use of the following field forces: gravitational, electric, and magnetic**
- **Explain momentum, impulse and analyze net force as a rate of change of momentum**
- **Understand the scenarios of elastic and inelastic collisions in terms of law of conservation of momentum**
- **Discuss the uniform circular motion and analyze the acceleration produced in it**
- **Recognise the direction of velocity, acceleration, and force on an object in circular motion**
- **Relate circular motion to universal gravitation**
- **Explain the principle of conservation of energy explain work-energy theorem**
- **Solve Problems using the mechanical energy of a system**
- **Define power as the rate of work done, or rate of energy transfer**

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**Formative assessment(s):**

*Paper 1 quizzes at the end of each subtopic.*

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**Summative assessments:**

*Topic test consisting of questions from P1 and P3*

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**Differentiation:**

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

Details:

- *SWD/504 – Accommodations Provided*

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| | • *ELL – Reading & Vocabulary Support*<br>• *Intervention Support*<br>• *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**<br>*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**<br>*Check the boxes for any explicit TOK connections made during the unit* | **CAS Connections**<br>*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.* |
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| ✓ Activating background knowledge<br>❑ Scaffolding for new learning<br>✓ Acquisition of new learning through practice | ❑ Personal and shared knowledge<br>✓ Ways of knowing<br>❑ Areas of knowledge<br>❑ The knowledge framework | ❑ Creativity<br>✓ Activity<br>❑ Service<br>Details: |

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| ✓ Demonstrating proficiency<br><br>Details:<br><br>*Students will collect data using a concept learned in MYP Physics (free fall) for students to then analyze. Students will discuss their margin of error from calculations.*<br><br>*Students will complete practice problems*<br><br>*Students will produce a full scatter plot with high and low gradients as demonstration of learning.* | Details:<br><br>*What has influenced the common language used in science? To what extent does having a common standard approach to measurement facilitate the sharing of knowledge in physics?* | *Students will actively be carrying out experiments involving dropping objects and free fall.* |
| **Resources**<br><br>*List and attach (if applicable) any resources used in this unit* | | |
| ● Textbooks (see page 1)<br>● Laboratory resources<br>● Online notes and videos (Schoology) | | |

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

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