The Asian International School
Unit Backward Design
Physics, Pre-Intermediate, 2018-2019

UNIT 2: *Motion*

Step 1—**DESIRED RESULTS** (*What students will learn…)*
Standards, benchmarks, other objectives as needed. What should students know, understand, & be able to do as a result of the lesson?

At the end of unit lesson, the students are able to:

- Describe the motion of every object related to its frame of reference;
- Define speed, velocity, acceleration and deceleration;
- Calculate Acceleration of a moving object;
- Plot a Position/Speed –Time Graph;
- Apply Newton's Laws of Motion to land transportation;
- Define friction, thinking time and terminal velocity;
- Describe the action of forces on a falling object;
- Analyze the data and Produce conclusions from Experiment #s 1 to 5.

CORE STANDARD: PS.5.8A

Enduring Understanding/Skills: *Students will understand:*	**Essential Question(s):**
✓ How to describe the motion of an object; ✓ Newton's Laws of Motion and **its relevance in** day to day life; ✓ Causes of friction; ✓ The methods to reduce friction; ✓ Factors affecting stopping distance; ✓ The effect of balanced and unbalanced forces on the motion of an object; ✓ The forces acting on a freely falling body and its practical use; ✓ The relevance of position-time graph, speed-time graph and acceleration-time graph.	✓ Why study movement? ✓ What all are the factors that affects motion? ✓ How does force affect motion? ✓ How can motion be measured? ✓ Distinguish speed and velocity? ✓ Distinguish distance and displacement? ✓ Define acceleration? ✓ What are the factors that affect the speed of rolling balls? ✓ Define inertia? ✓ State Newton's Laws of motion? What is its significance in our day to day life? ✓ What are the forces acting on a freely falling object? What is the result produced by these forces? What are its practical applications? ✓ Distinguish between balanced and unbalanced force

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Knowledge:	**Skills:**
Students will know: ✓ Everything is constantly moving; motion is relative, but the motion of an object can be described and predicted by tracing and measuring its position over time; ✓ To describe motion, there should be a frame of reference; ✓ Rocket propulsion is an application of Newton's third law of motion; ✓ The change in an object's motion depends on the sum of the forces on the object and the mass of the object; ✓ Motions are affected by the presence or absence of forces, some of which are not directly observable.	*Student will be able to:* ✓ Measure speed; ✓ Make a position-time graph for slow and fast-moving toy car; ✓ Identify what the slope of position-time graph shows; ✓ Make a speed-time graph for slow and fast-moving toy car; ✓ Identify what the slope of speed-time graph shows; ✓ Explain how mass affect Force and Acceleration; ✓ Present how Friction can be harmful and helpful in real life; ✓ Apply Newton's Third Law to design a solution to a problem involving the motion of two colliding objects; ✓ Design a Collision Safety Device ✓ To apply concepts of Physics on safety precautionary measures to be taken on the road; ✓ Synthesize data and conclusions from the experiments.

Step 2—**Assessment Evidence** *(Summative/Formative check for learning)*
Performance task—What will students do to show what they have learned?
Performance criteria—How good is good enough to meet standards? Provide checklists, rubric, or criteria.

Performance Task(s):	**Other Evidence:**
To assess student progress made in this course, student work in the following activities will be clearly recorded and evaluated according to criteria, rubrics, and the teacher's discretion. Homework assignments will be given 10% and all the others will be given 30% of student grades. • Worksheets *(multiple choice, true/false, sentence completion, match the following, homework, quizzes, etc.)* • Video Analysis • Group Presentations *(Posters, PPT, Video, etc.)* • Collaborative Discussions • Case-Analysis/Problem Solving • Graphic Organizers • Research Paper • Question-Answering *(See the Activities Column of the Curriculum Mapping)* • Laboratory Experiments #s 1 to 5 *(Pre-/Post-discussions)* • Think-Pair Share *(See the Activities Column of the*	*The following will also be observed, recorded, and considered for the final grade of students in each lesson activity* • Motivation • Engagement • Collaboration • Communication pattern among peers and with the teacher • Reactions Respect to others and different opinions

Curriculum Mapping) • Summative Assessment Activities *(See the Assessment column of the Curriculum Mapping)*	

Step 3—**Learning Plan (detailed enough for another teacher to follow)**

Learning activities:

✓ Motivation: Review previous lesson(s), Introduce desired results; ask essential question; connect with student experience and so forth.

✓ Presentation: Lecture/discussions on the topic

✓ Development Activities (Student-centered Learning Related Formative Assessment Activities)

✓ Conclusion & Evaluation: (Revisit enduring understanding(s)/ essential question(s) and Formative and/or Summative Assessment)

Notes for Teacher:

In this course, students are involved in a variety of class activities to understand concepts of Physics in a deeper level. In doing so they will be able to relate and apply whatever they have learned to their day to day life, to use and apply scientific principles and to improve their research skills appropriate to their grade level. The following is a summary of lesson activities for the course.

1. Individual/pair/small group activity

Students will do **hands-on project** to have a vivid and lasting understanding of what they DO much more than what they only hear or see. They will also do **experiments in the laboratory** pertaining to the topic they have learned to have a better understanding of the concept. They will also be given **assignments** on a specific topic requiring them to search for the materials outside their textbook and present it on paper. These activities will enable them build a scientific attitude in their life.

2. Experimental Observation, Discussion and presentation:

Students in pair or in small groups will do experiments in the laboratory or do simulation related to that experiment. They will be given a worksheet based on their experiment. They will have to discuss the questions within their group. After a certain period of time, they will share their ideas with the class. This activity will boost student imagination, thinking skills, application of knowledge and creativity, as well as cooperation and collaboration with peers.

3. Critical Thinking Activities

Students are involved in more challenging discussions and activities at grade level that are related to higher-order thinking skills according to the revised Bloom's Taxonomy as below:

Applying

Students can apply their knowledge on any of the topics learned by doing **project work** based on it.

They will have to present it before the whole class before the end of the school year.

Analyzing

Students will be given a problem based on real life situation and are asked to find out the scientific reason behind it.

Evaluating

Students are given worksheet based on their Phet activity (experimental simulations) and are asked to find the missing values.

Creating

Students can demonstrate their creativity by doing some kind of project work and presenting it before the whole class.

Resources, Timing, and Materials:

- Approximate time needed for lesson: *40 minutes*
- Resources (power point files, online, books, and requested materials from the office)

Step 4—**Differentiation/Accommodation/Modifications**

Which strategies will you use differentiate for different learning styles? How will you accommodate & modify for special needs students (IEP)?

No given list of students with Special Needs. Teachers should coordinate with the office if there are learners mainstreamed in the class. If there is, the should be modifications on the assessment's activities.

The Asian International School
Unit Backward Design
Physics, Pre-Intermediate, 2018-2019
UNIT 1: *Forces*

Step 1—**DESIRED RESULTS** (What students will learn…)
Standards, benchmarks, other objectives as needed. What should students know, understand, and be able to do as a result of the lesson?

At the end of unit lesson, the students are able to:

- Identify the forces acting on an object;
- Describe how a resultant force changes the motion of an object;
- Describe a vector quantity;
- Explain the difference between mass and weight;
- Use the relationship between force, mass and acceleration;
- Describe the turning effect of a force;
- Calculate moments, forces and distances;
- Create and appreciate simple machines;
- Interpret extension against load graphs;
- Produce extension data against load graphs;
- Explain Hooke's Law;
- Explain the principles of Springs: Elastic Limit, Springs in Series & Parallel;
- Use the formula of Weight (Weight = mass x gravity = m x g) on given situations;
- Describe the concept of "Moment" in relation to Force;
- Explain the tenets of Balance and Stability, and, analyse the drawing's suggested proportions;
- Apply the formula of Pressure (Pressure = Force / Area) on given situations, including in liquids;
- Analyze the data and Produce conclusions from Experiment #6 to 7.

CORE STANDARD: *Ps.5.8A and 6.8A*

Enduring Understanding/Skills:	**Essential Question(s):**
Students will understand: • Force and various kinds of force; • Centre of mass and stability; • Principle of levers; • How simple machines make our life easier; • The relationship between the location of the center of gravity and stability; • Application of Pressure in Hydraulic Machines; • Pressure in liquid increases with depth; • Reduce the area so that the force is more concentrated; • Increase the area so the force is more spread out.	✓ What is a 'force'? ✓ What effects do forces have on materials and moving objects? ✓ Why force is said to be a vector quantity and not a scalar one? ✓ How do objects balance? ✓ Define 'pressure' and how do we use it? ✓ Define elastic limit? ✓ What is meant by extension? ✓ Why is rubber a good material for making elastic bands and bicycle tires? ✓ People who want to get slimmer may go to a club called 'Weight Watchers'. Explain why scientists might argue that it should be called 'Mass Watchers'? ✓ Why do submarines need thick, strong walls? ✓ Why do scientists think of hydraulic jacks as 'force multipliers'? ✓ Why do the pipes containing the fluid in the excavator's hydraulic system need to have thick

	walls? ✓ How are levers useful? ✓ Imagine life without simple machines invented. How is it different? ✓ How do we know that things have energy? ✓ What is Hooke's Law?
Knowledge: Students will know: ✓ Vector quantity has got magnitude and direction and that force is a vector quantity; ✓ The mass of an object, measured in kilograms, tells how much matter it is composed of; ✓ The weight of an object, measured in Newtons, is the force of gravity that acts on it; ✓ Moment is the quantity that tells us the turning effect of a force; ✓ When a system is in equilibrium, the resultant force is zero and the resultant turning effect is zero; ✓ For an object to be stable, its Centre of mass must be low down and it must have a large base; ✓ When the forces are removed, the material may spring back to its original length; ✓ Springs produces different data when it is place in Series and Parallel; ✓ Gravity has influence on masses; ✓ Turning effect of a force is called its moment; ✓ The effect that a force has when it acts on surface depends on two things: the size of the force and the areas that is pressing on.	**Skills:** *Student will be able to:* ✓ Perform an experiment to investigate Hooke's law; ✓ Balance objects with different mass on a fulcrum; ✓ Demonstrate how water pressure increases with depth; ✓ Make use of moments; ✓ Investigate pressure exerted by different objects; ✓ Investigate pressure exerted by footwear; ✓ Create a simple pulley to send some snack to a hungry friend across the room; ✓ Synthesize data and conclusions from the experiments; ✓ Analyze data where Pressure formula applied on liquids; ✓ Perform experiments and projects with simple machines to demonstrate the relationship between forces and distance.

Step 2—**Assessment Evidence** (Summative/Formative check for learning)
Performance task—What will students do to show what they have learned?
Performance criteria—How good is good enough to meet standards? Provide checklists, rubric, or criteria.

Performance Task(s): *To assess student progress made in this course, student work in the following activities will be clearly recorded and evaluated according to criteria, rubrics, and the teacher's discretion. Homework assignments will be given 10% and all the others will be given 30% of student grades.* • Worksheets *(multiple choice, true/false, sentence completion, match the following, homework, quizzes, etc.)* • Video Analysis	**Other Evidence:** *The following will also be observed, recorded, and considered for the final grade of students in each lesson activity* • Motivation • Engagement • Collaboration • Communication pattern among peers and with the teacher • Reactions

• Group Presentations *(Posters, PPT, Video, etc.)* • Collaborative Discussions • Case-Analysis/Problem Solving • Graphic Organizers • Research Paper • Question-Answering *(See the Activities Column of the Curriculum Mapping)* • Laboratory Experiments #s 1 to 5 *(Pre-/Post-discussions)* • Think-Pair Share *(See the Activities Column of the Curriculum Mapping)* • Summative Assessment Activities *(See the Assessment column of the Curriculum Mapping)*	Respect to others and different opinions

Step 3—**Learning Plan (detailed enough for another teacher to follow)**

Learning activities:

- ✓ Motivation: Review previous lesson(s), Introduce desired results; ask essential question; connect with student experience and so forth.
- ✓ Presentation: Lecture/discussions on the topic
- ✓ Development Activities (Student-centered Learning Related Formative Assessment Activities)
- ✓ Conclusion & Evaluation: (Revisit enduring understanding(s)/ essential question(s) and Formative and/or Summative Assessment)

Notes for Teacher:

In this course, students are involved in a variety of class activities to understand concepts of Physics in a deeper level. In doing so they will be able to relate and apply whatever they have learned to their day to day life, to use and apply scientific principles and to improve their research skills appropriate to their grade level. The following is a summary of lesson activities for the course.

1. Individual/pair/small group activity

Students will do **hands-on project** to have a vivid and lasting understanding of what they DO much more than what they only hear or see. They will also do **experiments in the laboratory** pertaining to the topic they have learned to have a better understanding of the concept. They will also be given **assignments** on a specific topic requiring them to search for the materials outside their textbook and present it on paper. These activities will enable them build a scientific attitude in their life.

2. Experimental Observation, Discussion and presentation:

Students in pair or in small groups will do experiments in the laboratory or do simulation related to that experiment. They will be given a worksheet based on their experiment. They will have to discuss the questions within their group. After a certain period of time, they will share their ideas with the class. This activity will boost student imagination, thinking skills, application of knowledge and creativity, as well as cooperation and

collaboration with peers.

3. Critical Thinking Activities

Students are involved in more challenging discussions and activities at grade level that are related to higher-order thinking skills according to the revised Bloom's Taxonomy as below:

Applying

Students can apply their knowledge on any of the topics learned by doing **project work** based on it. They will have to present it before the whole class before the end of the school year.

Analyzing

Students will be given a problem based on real life situation and are asked to find out the scientific reason behind it.

Evaluating

Students are given worksheet based on their Phet activity (experimental simulations) and are asked to find the missing values.

Creating

Students can demonstrate their creativity by doing some kind of project work and presenting it before the whole class.

Resources, Timing, and Materials:

- Approximate time needed for lesson: *40 minutes*
- Resources (power point files, online, books, and requested materials from the office)

Step 4—**Differentiation/Accommodation/Modifications**

Which strategies will you use differentiate for different learning styles? How will you accommodate & modify for special needs students (IEP)?

No given list of students with Special Needs. Teachers should coordinate with the office if there are learners mainstreamed in the class. If there is, the should be modifications on the assessments activities.

The Asian International School
Unit Backward Design
Physics, Pre-Intermediate, 2018-2019
UNIT 4: *Energy, Work and Fuels*

Step 1—**DESIRED RESULTS** (What students will learn…)
Standards, benchmarks, other objectives as needed. What should students know, understand, and be able to do as a result of the lesson?

At the end of unit lesson, the students are able to:

- Define energy;
- Define work done by a force;
- State the common forms of energy;
- Apply the formula for Work Done;
- Define joule;
- Convert value given in Calories to value in joules.

CORE STANDARD: PS.4.8A&C

Enduring Understanding/Skills:	**Essential Question(s):**
Students will understand: ✓ Types of energy; ✓ Work done by a force; ✓ Calorie; ✓ Common Fuels; ✓ Process of Releasing energy; ✓ Computing Energy used.	✓ What is 'energy'? ✓ What is "work'? ✓ Define 'joule'? ✓ Define 'calorie'? ✓ Which force does work when a ball rolls down a slope? ✓ What name is given to the energy of a moving object? ✓ What form of energy is stored by a stretched spring? ✓ Name three forms of energy that are given out by a television set. ✓ What are the common fuels and its examples? ✓ How do fuels releases energy? ✓ How do you solve energy used?
Knowledge: Students will know: ✓ Definition of Energy; ✓ Concept of work; ✓ Definition of 'Joule'; ✓ Definition of 'calorie'; ✓ Kind of force that does work when a ball rolls down a slope; ✓ The term is given to the energy of a moving object; ✓ Type or form of energy is stored by a stretched spring; ✓ Name three forms of energy that are given out by a television set; ✓ Name 5 common fuels and their application; ✓ State the process of releasing energy in fuels; ✓ Show the solution process on getting energy used.	**Skills:** *Student will be able to:* ✓ Identify various forms of energy; ✓ Calculate the Energy used in various cases; ✓ Explain the process of releasing energy in Fuels; ✓ State specific sources of fuels; ✓ Synthesize data and conclusions from the experiments.

The Asian International School
Unit Backward Design
Physics, Pre-Intermediate, 2018-2019

Step 2—**Assessment Evidence** (Summative/Formative check for learning)
Performance task—What will students do to show what they have learned?
Performance criteria—How good is good enough to meet standards? Provide checklists, rubric, or criteria.

Performance Task(s):

To assess student progress made in this course, student work in the following activities will be clearly recorded and evaluated according to criteria, rubrics, and the teacher's discretion. Homework assignments will be given 10% and all the others will be given 30% of student grades.

- Worksheets *(multiple choice, true/false, sentence completion, match the following, homework, quizzes, etc.)*
- Video Analysis
- Group Presentations *(Posters, PPT, Video, etc.)*
- Collaborative Discussions
- Case-Analysis/Problem Solving
- Graphic Organizers
- Research Paper
- Question-Answering *(See the Activities Column of the Curriculum Mapping)*
- Laboratory Experiments #s 1 to 5 *(Pre-/Post-discussions)*
- Think-Pair Share *(See the Activities Column of the Curriculum Mapping)*
  Summative Assessment Activities *(See the Assessment column of the Curriculum Mapping)*

Other Evidence:

The following will also be observed, recorded, and considered for the final grade of students in each lesson activity

- Motivation
- Engagement
- Collaboration
- Communication pattern among peers and with the teacher
- Reactions
  Respect to others and different opinions

Step 3—**Learning Plan (detailed enough for another teacher to follow)**

Learning activities:

- ✓ Motivation: Review previous lesson(s), Introduce desired results; ask essential question; connect with student experience and so forth.
- ✓ Presentation: Lecture/discussions on the topic
- ✓ Development Activities (Student-centered Learning Related Formative Assessment Activities)
- ✓ Conclusion & Evaluation: (Revisit enduring understanding(s)/ essential question(s) and Formative and/or Summative Assessment)

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Physics, Pre-Intermediate, 2018-2019

Notes for Teacher:

In this course, students are involved in a variety of class activities to understand concepts of Physics in a deeper level. In doing so they will be able to relate and apply whatever they have learned to their day to day life, to use and apply scientific principles and to improve their research skills appropriate to their grade level. The following is a summary of lesson activities for the course.

1. Individual/pair/small group activity

Students will do **hands-on project** to have a vivid and lasting understanding of what they DO much more than what they only hear or see. They will also do **experiments in the laboratory** pertaining to the topic they have learned to have a better understanding of the concept. They will also be given **assignments** on a specific topic requiring them to search for the materials outside their textbook and present it on paper. These activities will enable them build a scientific attitude in their life.

2. Experimental Observation, Discussion and presentation:

Students in pair or in small groups will do experiments in the laboratory or do simulation related to that experiment. They will be given a worksheet based on their experiment. They will have to discuss the questions within their group. After a certain period of time, they will share their ideas with the class. This activity will boost student imagination, thinking skills, application of knowledge and creativity, as well as cooperation and collaboration with peers.

3. Critical Thinking Activities

Students are involved in more challenging discussions and activities at grade level that are related to higher-order thinking skills according to the revised Bloom's Taxonomy as below:

Applying

Students can apply their knowledge on any of the topics learned by doing **project work** based on it. They will have to present it before the whole class before the end of the school year.

Analyzing

Students will be given a problem based on real life situation and are asked to find out the scientific reason behind it.

Evaluating

Students are given worksheet based on their Phet activity (experimental simulations) and are asked to find the missing values.

Creating

Students can demonstrate their creativity by doing some kind of project work and presenting it before the whole class.

Resources, Timing, and Materials:

- Approximate time needed for lesson: *40 minutes*
- Resources (power point files, online, books, and requested materials from the office)

Step 4—**Differentiation/Accommodation/Modifications**

Which strategies will you use differentiate for different learning styles? How will you accommodate & modify for special needs students (IEP)?

No given list of students with Special Needs. Teachers should coordinate with the office if there are learners mainstreamed in the class. If there is, the should be modifications on the assessments activities.

The Asian International School
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Physics, Pre-Intermediate, 2018-2019
UNIT 3: *Solids, Liquids and Gasses + Heat: Conduction, Convection and Radiation (Added from Vietnamese Curriculum, MOET-based)*

Step 1—**DESIRED RESULTS** (What students will learn…)
Standards, benchmarks, other objectives as needed. What should students know, understand, and be able to do as a result of the lesson?

At the end of unit lesson, the students are able to:

- Identify different forms / physical states of matter;
- Calculate density of an irregular solid;
- Calculate density of a liquid;
- Define Surface tension;
- Define thermal equilibrium;
- Plot a changing state graph;
- Explain the 3 characteristics of Heat (Conduction, Convection and Radiation);
- Construct data, synthesis and conclusions from the experiments;
- Explain the molecular movements of Kinetic Theory and Brownian Motion;
- Convert data from Kelvin to Celsius and vice-versa.

CORE STANDARD: PS.1.12A, PS3.12A, PS.1.8.D, PS.1.4.D, PS.1.8D, PS.2.12A, PS.1.8D, PS.1.8E, PS.3.4B, PS.3.8B and AHS, Vietnamese Curriculum, MOET-based

Enduring Understanding/Skills:	**Essential Question(s):**
Students will understand: ✓ The states of matter; ✓ Density and its measuring process; ✓ Surface tension; ✓ Lattice; ✓ Thermal equilibrium; ✓ The difference in density when matter changes from one state to another; ✓ Kinetic Theory; ✓ Brownian Motion; ✓ Usage of Kinetic Theory; ✓ Molecular Motion and Theory; ✓ Heat's characteristics (Conduction, Convection & Radiation);	✓ What are 'physical states'? ✓ How does density change as matter in one state changes to another state? ✓ How is measuring density of liquid and solid different? ✓ How can we explain the behaviour of solids, liquids and gases? ✓ How does heating affect materials? ✓ What evidence do we have to support for the assumption that the molecules in a material are constantly in motion? ✓ How does the kinetic theory explain the fact that liquids cool down as they evaporate? ✓ Why do you hold the neck of a bottle under a hot water tap when a stopper is stuck in the bottle? ✓ Give a scientific reason for each of the following: After a marathon race, competitors are wrapped in aluminum foil, Firefighters will enter a room full of smoke by crawling, Divers and people who explore caves wear rubber or nylon suits to help them stay warm ✓ What are the movements in Brownian motion? ✓ What happens to the molecules in Expanding Solids, Evaporating Liquids and Conducting Solids? ✓ How do you convert a temperature in Celsius to

	Kelvin scale ✓ How do you differentiate Conduction, Convection and Radiation in Heat concept? s
Knowledge: Students will know: ✓ Matter exists in three states known as the Physical states ✓ The atoms are held in a regular structure called a lattice ✓ Kinetic Theory explains behavior of solids, liquids, and gases in terms of moving particles. ✓ Brownian Motion: fast moving molecules in jerky and zig-zagging motion. ✓ Usage of Kinetic Theory can be used to explain some things which you may have noticed happening ✓ thermal energy (heat) is transferred by conduction, convection, and radiation, & how heat conduction differs in conductors and insulators;	**Skills:** *Student will be able to:* ✓ Measure the density of solids and liquids ✓ Perform an experiment on changing state ✓ Infer how expansion affects everyday objects ✓ Investigate the conduction of heat in different solids ✓ Investigate heat conduction in water and air ✓ Investigate the effect of heat on gases ✓ Investigate how liquid behaves when heated ✓ Investigate how different solids expand at different rates ✓ Investigate convection ✓ Construct a Calorimeter ✓ Observe Brownian motion ✓ Apply the kinetic model to explain some observations ✓ Synthesize data and conclusions from the experiments.
Step 2—**Assessment Evidence** (Summative/Formative check for learning) *Performance task—What will students do to show what they have learned?* *Performance criteria—How good is good enough to meet standards? Provide checklists, rubric, or criteria.*	
Performance Task(s): *To assess student progress made in this course, student work in the following activities will be clearly recorded and evaluated according to criteria, rubrics, and the teacher's discretion. Homework assignments will be given 10% and all the others will be given 30% of student grades.* • Worksheets *(multiple choice, true/false, sentence completion, match the following, homework, quizzes, etc.)* • Video Analysis • Group Presentations *(Posters, PPT, Video, etc.)* • Collaborative Discussions • Case-Analysis/Problem Solving • Graphic Organizers • Research Paper • Question-Answering *(See the Activities Column of the Curriculum Mapping)*	**Other Evidence:** *The following will also be observed, recorded, and considered for the final grade of students in each lesson activity* • Motivation • Engagement • Collaboration • Communication pattern among peers and with the teacher • Reactions Respect to others and different opinions

• Laboratory Experiments #s 1 to 5 *(Pre-/Post-discussions)* • Think-Pair Share *(See the Activities Column of the Curriculum Mapping)* Summative Assessment Activities *(See the Assessment column of the Curriculum Mapping)*	

Step 3—**Learning Plan (detailed enough for another teacher to follow)**

Learning activities:

- ✓ Motivation: Review previous lesson(s), Introduce desired results; ask essential question; connect with student experience and so forth.
- ✓ Presentation: Lecture/discussions on the topic
- ✓ Development Activities (Student-centered Learning Related Formative Assessment Activities)
- ✓ Conclusion & Evaluation: (Revisit enduring understanding(s)/ essential question(s) and Formative and/or Summative Assessment)

Notes for Teacher:

In this course, students are involved in a variety of class activities to understand concepts of Physics in a deeper level. In doing so they will be able to relate and apply whatever they have learned to their day to day life, to use and apply scientific principles and to improve their research skills appropriate to their grade level. The following is a summary of lesson activities for the course.

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2. Experimental Observation, Discussion and presentation:

Students in pair or in small groups will do experiments in the laboratory or do simulation related to that experiment. They will be given a worksheet based on their experiment. They will have to discuss the questions within their group. After a certain period of time, they will share their ideas with the class. This activity will boost student imagination, thinking skills, application of knowledge and creativity, as well as cooperation and collaboration with peers.

3. Critical Thinking Activities

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Analyzing

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Evaluating

Students are given worksheet based on their Phet activity (experimental simulations) and are asked to find the missing values.

Creating

Students can demonstrate their creativity by doing some kind of project work and presenting it before the whole class.

Resources, Timing, and Materials:

- Approximate time needed for lesson: *40 minutes*
- Resources (power point files, online, books, and requested materials from the office)

Step 4—**Differentiation/Accommodation/Modifications**

Which strategies will you use differentiate for different learning styles? How will you accommodate & modify for special needs students (IEP)?

No given list of students with Special Needs. Teachers should coordinate with the office if there are learners mainstreamed in the class. If there is, the should be modifications on the assessments activities.

The Asian International School
Unit Backward Design
Physics, Pre-Intermediate, 2018-2019
UNIT 8: *The Solar System*

Step 1—**DESIRED RESULTS** (What students will learn…)
Standards, benchmarks, other objectives as needed. What should students know, understand, and be able to do as a result of the lesson?

At the end of unit lesson, the students are able to:

- Identify planets, constellations and stars seen in the night sky
- Explain the reason behind the occurrence of day and night
- Explain the reason behind the occurrence of seasons
- Differentiate between solar eclipse and lunar eclipse
- Analyze and research the life cycle of stars
- Explain the reason behind the daylight saving observed in some countries
- Explain the reason behind various time zones
- Describe the significant information about the Sun
- Explain the relevance and importance of Gravity on each planet
- Describe the important details of Bullets, Missiles and Artificial Satellites.

CORE STANDARD: ESS.1.4B, ESS.1.8B, ESS.1.4C, ESS.1.8A, ESS.1.4C, ESS.1.8A, ESS.1.4C

Enduring Understanding/Skills:
Students will understand:

- ✓ The occurrence of day and night
- ✓ The occurrence of seasons
- ✓ How technology aid in the exploration of the solar system?
- ✓ How satellites affect our daily life?
- ✓ Gravity and its role in keeping the satellites in place.
- ✓ The difference between a comet, asteroid and a meteor.
- ✓ Sun's the star of our Solar System.
- ✓ A certain motion is connected to gravitational force, pulling the object attracted to or pushing away from Earth and other planets.
- ✓ Bullets, Missiles and Artificial Satellites: parabola, centripetal force, usages, geostationary and low-polar-orbit satellites.

Essential Question(s):

- ✓ How did the universe begin?
- ✓ What is the solar system?
- ✓ Describe the position of the solar system in the Milky Way?
- ✓ What causes days, months, and years?
- ✓ Why do we have seasons?
- ✓ Why are there tides?
- ✓ How do people get into space?
- ✓ What is a galaxy? What galaxy does the Earth belong to? How does it get its name?
- ✓ What is a nebula? Suggest how the Horse Head nebula got its name?
- ✓ Explain what is meant by a light year?
- ✓ Why is it dark at night?
- ✓ Why do we have leap years?
- ✓ What is the difference between a full moon and a new moon?
- ✓ Why can Australians have Christmas dinner on the beach?
- ✓ How were craters formed on the surface of the Moon?
- ✓ State Newton's Law of gravitation.
- ✓ Differentiate Lunar eclipse and Solar eclipse.
- ✓ How does technology aid in the exploration of the solar system?
- ✓ How can you identify constellations from the planets in the night sky?
- ✓ What are the different phases of the moon and

	describe its effect on the Earth? ✓ What are the important information about the Sun? ✓ Why gravity plays a significant role on Earth's orbit and so as planets. ✓ What are the principles behind Bullets, Missiles and Artificial Satellites.
Knowledge: Students will know: ✓ The Solar System originated in a primitive Solar nebula, a rotating disc of gas and dust. ✓ Day and night are caused by rotation of the Earth. ✓ Seasons are caused by revolution of the Earth as well as due to the fact that the Earth's axis is tilted at an angle to its orbit. ✓ The Sun will end up as a white dwarf star. ✓ The Centripetal force is a force towards the center. ✓ The different layers of the Sun as Photosphere, Chromosphere and Corona. ✓ Gravity's important on Earth's and other planet's orbit. ✓ Principles involve on Bullets, Missiles and Artificial Planets.	**Skills:** *Student will be able to:* ✓ Create a Solar System Model ✓ Design an experiment to show that when a ball rolls off the end of a flat table, the path it follows as it falls is a parabola. ✓ Find out about the death of stars which are much more massive than our Sun. ✓ Research on the life cycle of stars ✓ Demonstrate the phases of the moon by showing the alignment of the earth, moon, and sun; ✓ Research and write about the Solar System's Sun, and in doing so, a group would be assigned to present the information; ✓ Present information, significances and examples about artificial satellites orbiting around earth's atmosphere.
Step 2—**Assessment Evidence** (Summative/Formative check for learning) *Performance task—What will students do to show what they have learned?* *Performance criteria—How good is good enough to meet standards? Provide checklists, rubric, or criteria.*	
Performance Task(s): *To assess student progress made in this course, student work in the following activities will be clearly recorded and evaluated according to criteria, rubrics, and the teacher's discretion. Homework assignments will be given 10% and all the others will be given 30% of student grades.* • Worksheets *(multiple choice, true/false, sentence completion, match the following, homework, quizzes, etc.)* • Video Analysis • Group Presentations *(Posters, PPT, Video, etc.)* • Collaborative Discussions • Case-Analysis/Problem Solving • Graphic Organizers • Research Paper • Question-Answering *(See the Activities Column of the Curriculum Mapping)* • Laboratory Experiments #s 1 to 5 *(Pre-/Post-*	**Other Evidence:** *The following will also be observed, recorded, and considered for the final grade of students in each lesson activity* • Motivation • Engagement • Collaboration • Communication pattern among peers and with the teacher • Reactions Respect to others and different opinions

discussions) • Think-Pair Share *(See the Activities Column of the Curriculum Mapping)* Summative Assessment Activities *(See the Assessment column of the Curriculum Mapping)*	

Step 3—**Learning Plan (detailed enough for another teacher to follow)**

Learning activities:

- ✓ Motivation: Review previous lesson(s), Introduce desired results; ask essential question; connect with student experience and so forth.
- ✓ Presentation: Lecture/discussions on the topic
- ✓ Development Activities (Student-centered Learning Related Formative Assessment Activities)
- ✓ Conclusion & Evaluation: (Revisit enduring understanding(s)/ essential question(s) and Formative and/or Summative Assessment)

Notes for Teacher:

In this course, students are involved in a variety of class activities to understand concepts of Physics in a deeper level. In doing so they will be able to relate and apply whatever they have learned to their day to day life, to use and apply scientific principles and to improve their research skills appropriate to their grade level. The following is a summary of lesson activities for the course.

1. Individual/pair/small group activity

Students will do **hands-on project** to have a vivid and lasting understanding of what they DO much more than what they only hear or see. They will also do **experiments in the laboratory** pertaining to the topic they have learned to have a better understanding of the concept. They will also be given **assignments** on a specific topic requiring them to search for the materials outside their textbook and present it on paper. These activities will enable them build a scientific attitude in their life.

2. Experimental Observation, Discussion and presentation:

Students in pair or in small groups will do experiments in the laboratory or do simulation related to that experiment. They will be given a worksheet based on their experiment. They will have to discuss the questions within their group. After a certain period of time, they will share their ideas with the class. This activity will boost student imagination, thinking skills, application of knowledge and creativity, as well as cooperation and collaboration with peers.

3. Critical Thinking Activities

Students are involved in more challenging discussions and activities at grade level that are related to higher-order thinking skills according to the revised Bloom's Taxonomy as below:

Applying

Students can apply their knowledge on any of the topics learned by doing **project work** based on it. They will have to present it before the whole class before the end of the school year.

Analyzing

Students will be given a problem based on real life situation and are asked to find out the scientific reason behind it.

Evaluating

Students are given worksheet based on their Phet activity (experimental simulations) and are asked to find the missing values.

Creating

Students can demonstrate their creativity by doing some kind of project work and presenting it before the whole class.

Resources, Timing, and Materials:

- Approximate time needed for lesson: *40 minutes*
- Resources (power point files, online, books, and requested materials from the office)

Step 4—**Differentiation/Accommodation/Modifications**

Which strategies will you use differentiate for different learning styles? How will you accommodate & modify for special needs students (IEP)?

No given list of students with Special Needs. Teachers should coordinate with the office if there are learners mainstreamed in the class. If there is, the should be modifications on the assessments activities.