8th Grade IB MYP SCIENCE 2021-2022

Adams 12 Five Star Schools

Communication:

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Core: Blizzard	

Course Description:

At the end of 8th grade, students will be able to:

- 👓 Seek out and evaluate multiple scientific sources (both primary and secondary) to investigate how human activities alter the environment both deliberately and inadvertently.
- 🔬 Gather, analyze, model, and interpret data to describe the different forms of energy and energy transfer.
- 🛠️ Utilize a scale model to demonstrate the relationships, characteristics, and motion of objects in our solar system.
- ✏ Communicate scientific thinking by citing textual evidence, interpreting quantitative and qualitative data, and writing informational explanations and arguments based on their findings.

In accordance with the Adams 12 Five Star Schools Curriculum Framework, the following will be covered:

- 🎆 Energy transformations and conservation
- 🚀 Force and Motion
- 🌎 Our Place in Space
- ⛈ Weather and Climate
- 🔬 Properties of Matter

Major Topics of Learning:

Time	Mini-unit	Objectives
⚡ Energy ⚡ 30-32 days	Energy as a System	We Know… ☐ energy and waves exist in different forms (PE: gravitational, chemical, elastic, nuclear, electrostatic, magnetic; KE: mechanical , electromagnetic, nuclear, thermal, electrical, sound) ☐ energy can be transferred from one system to another (object to object) while total energy is conserved ☐ energy can be transformed from one form to another but total energy is conserved ☐ changes in mass, speed, and/or temperature are related to potential/kinetic energy We Understand… ☐ energy drives our universe We can… ☐ gather, analyze and interpret data and develop an analysis describing forms of energy and energy transfer (changes in temperature and motion) ☐ use evidence-based models to describe energy transfer, predict amounts of energy transferred, and the law of conservation of energy
	Law of Conservation of Energy	We Know… ☐ energy can be transferred from one system to another (object to object) while total energy is conserved ☐ energy can be transformed from one form to another but total energy is conserved We Understand… ☐ law of conservation of energy We can… ☐ use evidence-based models to describe energy transfer, predict amounts of energy transferred, and the law of conservation of energy

Energy 30-32 days	Waves	We Know… ☐ heat transfers through convection, conduction, and radiation ☐ changes in pitch, frequency, and/or sound are related ☐ changes in frequency, amplitude and/or wavelength are related ☐ mathematical representations for energy and waves (compare graphs) ☐ Digital waves are more reliable when transferring information than analog waves. ☐ Information can be transmitted through waves as pulses. We Understand… ☐ common characteristics and unique properties of waves ☐ qualitative and quantitative relationships related to energy and waves We can… ☐ plan and/or conduct investigations to determine the relationships among ☐ mass, speed, temperature, and energy ☐ reflection, refraction, and absorption ☐ describe the relationships among ☐ pitch, frequency, sound, and energy ☐ frequency, amplitude, wavelength, and energy ☐ use and apply mathematical representations of energy and waves (this can be a graphical representation or pictoral not equations) ☐ Evaluate the specific features to support a claim that digital signals are more reliable than analog transmission of signals.
 **Force & Motion** 30-32 days 	Force & Motion	We Know… ☐ Newton's First, Second and Third Laws ☐ mathematical expressions describe motion (F=ma s=d/t v=d/t acceleration) ☐ net force can be diagrammed ☐ the relationship between : ☐ kinetic energy and mass ☐ kinetic energy and speed ☐ k=½mv2 (familiarity not mastery) ☐ different sources of data can produce different outcomes ☐ experiments must be reproducible to be considered valid ☐ models are tools to demonstrate phenomena and ideas that are not readily accessible ☐ Forces can be classified as contact or non-contact forces. ☐ Non-contact forces include gravity, electrical, and magnetic forces. ☐ Non-contact forces can act at a distance between two different objects. The magnitude of noncontact forces is determined by the distance between the objects. ☐ key vocabulary ☐ Magnetism, Electric Fields, Contact vs Non-Contact Forces We Understand… ☐ natural phenomena are explained through Newton's Laws We can… ☐ draw and evaluate free-body diagrams to explain the net force and the resultant motion of an object ☐ utilize mathematical expressions and Newton's Laws to explain the movement of an object ☐ construct and interpret graphical displays of data to describe the relationships of kinetic energy to the mass and speed of an object ☐ share experimental data, and respectfully discuss conflicting results emulating the practice of scientists. ☐ students can design an experiment that can be reproduced. ☐ evaluate scientific models to gain an understanding of natural phenomena ☐ Plan an investigation to determine how changing the distance between objects changes the strength of the gravitational, magnetic or electrical field.

Our Place in Space
30-33 days

The Solar System

We Know…
- [ ] roles of gravity
- [ ] mass and distance affect gravitational pull
- [ ] force fields exist in space (electric, magnetic, gravitational)
- [ ] scientific theories explaining the formation of the solar system
- [ ] scale properties of objects in our solar system
- [ ] characteristics to classify objects in our solar system
- [ ] the relationship among objects in our solar system

We Understand…
- [ ] gravitational interactions
- [ ] the formation, components, and interactions of objects in our solar system

We can…
- [ ] develop and use a model to describe the role of gravity in the motions within galaxies and the solar system
- [ ] create a scale model to demonstrate the relationships, characteristics and motion of objects in our solar system
- [ ] explain and support a scientifically accepted theory about the formation of our solar system using evidence

Experience & Observation

We Know…
- [ ] The current understanding of forces and waves has changed overtime as a result of technological advances and methods.
- [ ] Some wave phenomena can not be measured using our available tools, so we must rely on models to gain an understanding.
- [ ] There are differing theories of the relative position of the Sun, Earth, and Moon. (geocentric and heliocentric)
- [ ] Students understand that multiple theories can be acceptable
- [ ] Observable laws on Earth apply to our whole universe

We Understand…
- [ ] positions and motions of Earth, Moon, and Sun relative to each other cause natural phenomenon that can be experienced and observed

We can…
- [ ] analyze and interpret data to explain why we have seasons
- [ ] develop and use a model of the Earth-sun-moon system to describe the cyclic patterns of lunar phases, eclipses, tides, and seasons
- [ ] Evaluate how our understanding of forces has allowed humans to explore the universe.
- [ ] Evaluate models to show an understanding of wave phenomena that cannot be currently measured using our available tools.
- [ ] Example: technology research
- [ ] Review others work and value others opinions
- [ ] Apply laws to predict observable patterns or behaviors (Newton's 3 Laws)

Weather & Climate
43-45 days

Application of energy

We Know…
- [ ] The Sun's energy is either reflected, absorbed, and/or transmitted through various materials
- [ ] Heating of atmosphere, land, and water are impacted by:
  - [ ] Latitude
  - [ ] Quantity of water/water vapor
  - [ ] Altitude
  - [ ] Earth's rotation
- [ ] The heating of atmosphere, land, and water results in different types of air masses and fronts.

We Understand…
- [ ] The Sun's uneven heating of the Earth's atmosphere, land, and water causes weather

We can…
- [ ] Explain the cause & effect relationship of the uneven heating of the Earth's atmosphere, land, and water
- [ ] Use data to provide evidence for how motions and complex interactions of air masses result in changes in weather conditions
- [ ] Design, construct, and test a device that either minimizes or maximizes thermal energy transfer

Weather & Climate 43-45 days	Weather & Climate	We Know… ☐ Weather data can be represented through various maps and models ☐ The complexity of weather patterns result in predictions based on probability ☐ Components of daily weather ☐ Various tools and technologies used to measure and predict weather ☐ There are different climate zones (tropical, dry, moist subtropical midlatitude (temperate), moist continental midlatitude, polar, highlands) ☐ Differences and relationships between weather and climate We Understand… ☐ The Sun's uneven heating of the Earth's atmosphere, land, and water causes weather ☐ Weather and climate are driven by Earth's position and motion in space ☐ Models have strengths and limitations We can… ☐ Evaluate weather data and models to predict the resulting weather ☐ Recognize and interpret patterns in weather data to determine climate
	Human Impact	We Know… ☐ Increases in temperatures, greenhouse gases, and rate of change over time are documented ☐ The causal relationship between human behavior and climate: fossil fuel combustion, agriculture, industry (i.e. cement production) ☐ The natural causes of climate change: solar radiation, volcanic activity We Understand… ☐ Human impact on global temperatures We can… ☐ Create an action plan for severe weather conditions (blizzards, tornadoes, floods) that saves lives, protects property, and conserves resources ☐ Use evidence to justify a claim explaining the change in global temperatures over the past century
Matter & its Interactions 20-23 Days	Matter	We Know… ☐ properties of matter (density, boiling and melting point, solubility, flammability, magnetic, odor, pH scale) ☐ techniques for separating matter We Understand… ☐ All matter has identifiable properties We can… ☐ develop an investigation to identify and separate matter based on its properties (teacher provided mixture) ☐ apply the concepts of separation to waste removal (mining, human body, industry, pollutants)
	Physical & Chemical Changes	We Know… ☐ evidence of physical change ☐ evidence of chemical change ☐ law of Conservation of Mass ☐ chemical reactants equal chemical products We Understand… ☐ matter and mass are always conserved We can… ☐ use evidence to distinguish between physical and chemical changes ☐ justify Law of Conservation of Mass using atomic models ☐ Investigate the application of physical and chemical changes (industry, natural resources, living things)
	Human Impact	We Know… ☐ bias exists in scientific literature ☐ living systems interact with the biotic and abiotic environment (effects of pollution) We Understand… ☐ human activities alter ecosystems We can… ☐ use their understanding of physical separations to develop, communicate and justify an evidence-based solution to help an ecosystem recover from human impact

IBMYP Aims & Objectives:

We are (Learner Profiles)

- ☐ Inquirers
- ☐ Caring
- ☐ Thinkers
- ☐ Communicators
- ☐ Open-Minded
- ☐ Reflective
- ☐ Principled
- ☐ Risk-Takers
- ☐ Knowledgeable
- ☐ Balanced

We understand (Global Contexts)

- ☐ Identities & Relationships
- ☐ Orientation in Space & Time
- ☐ Fairness & Development
- ☐ Scientific & Technical Innovation
- ☐ Globalization & Sustainability
- ☐ Personal & Cultural Expression

We can (Approaches to Learning)

- ☐ Think Critically
- ☐ Communicate Clearly
- ☐ Socialize Appropriately
- ☐ Create & Innovate
- ☐ Self Manage & Organize
- ☐ Research Effectively

Criteria-Based Grading:

1. Grades and assessment scores are based on specific rubrics and reflect the student's level of achievement of standards (MYP Criterion).
2. Assessments and grading standards are applied consistently to students of similarly demonstrated ability.
3. Student learning for the identified report card criteria will be evaluated based on rubrics, proficient/advanced student work samples, and checklists.
4. A student's level of achievement of a standard/criteria at any given time is best approximated by trends evident in his/her most recent assessments. In order to determine the student's current level of proficiency with respect to the standard, teachers use professional judgment based on evidence (Wormeli, 2009). Grades then are NOT the results of an average of all assessments.
5. A symbol such as INC or M will be used for missing/incomplete assignments.
6. Multiple opportunities will be given to allow students to demonstrate their level of competence with respect to a standard.
7. Homework, when used as practice, is not calculated into trend data that is used to formulate a student's overall understanding of a standard. *This is not to say that all formative work will not be included in the calculation of a student's score*.

IBMYP Science Assessment Criteria:

Criterion A: Knowing & Understanding🧠📚 ● Facts, memorization, vocabulary skills	Criterion B: Inquiring & Designing🕵️👩‍🔬 ● Lab writing, Hypotheses, Questioning skills
Criterion C: Processing & Evaluating💬📊 ● Data, graphs, conclusions, interpreting skills	Criterion D: Reflecting on the Impacts of Science🌍 ● Whole world, connecting, reflecting skills

Grading of Group Work: On all group assignments, two marks will be given to each student in regards to the standard: one for the group performance and another for the individual student performance.

Plagiarism/Cheating: Plagiarism and cheating will not be tolerated. Please refer to the CMS Agenda for specifics.

Learner Profile: These are a set of guiding principles that support our learning and interactions with each other inside and outside of school. These will be graded & reported separately from gradebook reporting criteria.