

8TH Grade Science

HARDING
MIDDLE SCHOOL



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Can be reached by phone
at Harding from 8:05-8:45
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Questions? Reach
out to the emails
above!

Course Expectations

COLLABORATIVE

- Students will be expected to do some work in groups. Please interact with one another and work together to keep our classroom clean, safe, and productive

PROFESSIONAL

- Everyday, students will be asked to complete a Do Now or activity in the first 10 minutes of class. Students are expected to bring a pencil, binder, and a growth mindset to class everyday. Make sure you are on time to class.

Respectful

- Listening to peers and teachers is necessary for success in class. Treat everyone well and respect every person in the room. Show your respect by keeping electronics put away, unless your teacher gives you permission. Use appropriate voice levels.

Year Long Standards: Reading & writing

1. Write informative/explanatory texts, scientific procedures/experiments, or technical processes
2. Use technology, including the Internet to produce and publish writing and present the relationships between information
3. Cite specific textual evidence to support analysis of science and technical texts
4. Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks
5. Integrate quantitative or technical information expressed in words in a text with a version of the information expressed visually (flowchart, diagram, model, graph, table, etc.)
6. Compare and contrast the information gained from experiments, simulations, video or multimedia sources with that gained from reading a text on the same object

Year Long Standards: Inquiry

1. Identify and generate questions that can be answered through scientific investigations
2. Design and conduct different kinds of scientific investigations
3. Understand that different kinds of questions suggest different kinds of scientific investigations
4. Select and use appropriate tools and techniques to gather, analyze, and interpret data
5. Incorporate mathematics in scientific inquiry
6. Use evidence to develop descriptions, explanations, predictions, and models
7. Think critically and logically to make the relationships between evidence and explanations
8. Recognize and analyze alternative explanations and predictions
9. Communicate and defend procedures and explanations
10. Use appropriate safety procedures when conducting investigations

Unit Breakdown

Unit One: Motion, Forces, and Energy

Topic One: Motion (October)

Topic Two: Forces (October- November)

-  **4** Above and beyond
- 3** - Compare and contrast the motion of objects by their position, direction of motion, and speed
-  - Illustrate an objects motion by measuring its movement and creating a graph
- Measure and interpret an objects motion to determine acceleration
- Manipulate the formula to determine an objects speed, distance, or time ($S=D/T$)
- 2** - VOCAB: speed, acceleration, velocity, reference point, distance, constant, time
- KNOWLEDGE:
 - Velocity is speed with a direction
 - Acceleration is a change in velocity
 - Calculate speed as distance/time
 - Describe motion as a change in position
 - Graph an objects change in position

-  **4** Above and beyond
- 3** - Plan and conduct an investigation that provides evidence of Newton's 3 laws
- Develop a model that illustrates that objects in contact exert forces on one another
-  - Apply Newton's Law of Universal Gravitation to explain the motion of objects
- 2** - VOCAB: force, net force, friction, gravity, momentum, mass, weight, balanced vs. unbalanced forces, inertia, Newton's (units, and acceleration
- KNOWLEDGE:
 - Describe and give examples of Newton's 3 laws
 - Explain how un/balanced affect motion
 - Gravity is affected by mass and distance
 - Describe how friction affects motion
 - Explain weight is a function of gravity

Unit One: Motion, Forces, and Energy

Topic Three: Energy (November-January)

 **4** Above and beyond

3 - Create a model to explain the Law of Conservation of Energy

 - Develop an explanation with evidence to account for the movement of heat/thermal energy in a system

2 - **VOCAB:** Energy (potential, kinetic, mechanical, chemical, light, sound, electrical, thermal, nuclear), conservation, heat, temperature, conversion, Joules (unit), convection, conduction, radiation, transfer

- **KNOWLEDGE:**

 - Explain the Law of Conservation Of Energy

- Differentiate between heat and temperature

- Differentiate between KE and PE

- Recognize that chemical, light, sound, electrical, thermal, nuclear, and mechanical are all forms of energy

- Describe how energy can transfer through radiation, conduction, and convection

Unit Details:

- Key Projects:
 - Speed Lab
 - Forces & Newton's Laws
 - Energy in every day

Unit Two: Waves (January- February)

Topic One: Properties of Waves

 **4** Above and beyond

3 - Describe a wave model that includes how the amplitude, wavelength, and frequency

 - Develop an explanation based on evidence for why a waves speed is affected by the media it is traveling through

2 - **VOCAB:** wavelength, frequency, amplitude, crest, trough, longitudinal wave, transverse wave, vibration, medium, compression, rarefaction, wave speed, Hertz (units), electromagnetic wave, mechanical wave

- **KNOWLEDGE:**

 - Describe how waves transfer energy

- Recognize the wavelength, amplitude, crest, and trough on a transverse wave

- Recognize the compressions and rarefactions of a longitudinal wave

- Describe that wave speed is affected by the media through which they travel

Topic Two: Interactions of Waves

 **4** Above and beyond

3 - Develop a wave model to describe that waves are reflected, absorbed, or transmitted through materials

 - Analyze the relationship between visible light wavelength and frequency; and discuss how color of light is determined

- Classify types of radiation on EM spectrum

2 - **VOCAB:** transmission, absorption, reflection, refraction, interference, scattering, transparent, translucent, opaque, diffraction, Electromagnetic Spectrum

- **KNOWLEDGE:**

 - Describe the difference between transparent, translucent, and opaque

- Illustrate the ranges of the EM Spectrum

- Describe the characteristics of the visible spectrum

Unit Details:

- Key Projects:
 - Whoa, Waves in Your Life

Unit Three: Astronomy (February-April)

Topic Six: Universe

Topic Seven: Solar System

-  **4** Above and beyond
- 3** - *Create a model to explain the Law of Conservation of Energy*
- *Develop an explanation with evidence to account for the movement of heat/thermal energy in a system*
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- 2** - **VOCAB:** Energy (potential, kinetic, mechanical, chemical, light, sound, electrical, thermal, nuclear), conservation, heat, temperature, conversion, Joules (unit), convection, conduction, radiation, transfer
- **KNOWLEDGE:**
 - Explain the Law of Conservation Of Energy
 - Differentiate between heat and temperature
 - Differentiate between KE and PE
 - Recognize that chemical, light, sound, electrical, thermal, nuclear, and mechanical are all forms of energy
 - Describe how energy can transfer through radiation, conduction, and convection
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-  **4** Above and beyond
- 3** - *Develop a model to describe gravity's role in galaxy motion, with in the solar system*
- *Develop a model of the Earth-Sun-Moon system that describes the patterns of lunar phases, sun/moon eclipses, and seasons*
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- 2** - **VOCAB:** sun, planet, moon, asteroid, comet, eclipse, orbit, rotation, revolution, seasons, tide, meteoroids, satellite, gravity, day, month, year, tilt, probe, AU
- **KNOWLEDGE:**
 - Describe the motion of types of satellites
 - Illustrate how planets travel in patterns
 - Recall that that the Sun is an average sized star
 - Explain how we explore the solar system
 - Recall the order of the planets from the Sun
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Unit Details:

- Key Projects:
 - Space & Cyber Warfare

Unit Four: Cells & Heredity (April- End of Year)

Topic Six: Cells

Topic Seven: Heredity

-  **4** Above and beyond
- 3** - *Develop a model to describe the function of a cell as a whole and ways parts of cells contribute to the cells function*
- *Conduct an investigation to provide evidence that photosynthesis and cellular respiration are mirror processes*
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- 2** - **VOCAB:** cell, organelle, mitochondria, chloroplast, cell wall, cell membrane, nucleus, DNA, photosynthesis, cellular respiration, unicellular, multicellular, cell theory, mitosis
- **KNOWLEDGE:**
 - Describe the differences in function of a cell wall and cell membrane
 - Describe how energy is converted in a cell
 - Provide evidence that all living things are made of one or more cells
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-  **4** Above and beyond
- 3** - *Predict the phenotype of an offspring using a Punnett square*
- *Create an explanation for how differences in DNA replication can cause mutation and changes in genotypes can be + / -*
- *Compare and contrast a/sexual reproduction*
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- 2** - **VOCAB:** meiosis, Punnett Square, genetic, mutation, gene, DNA, allele, genotype, phenotype, chromosomes, dominant, recessive, homozygous, heterozygous, heredity, trait, inherit, sexual, asexual
- **KNOWLEDGE:**
 - Complete a Punnett square using dominant and recessive alleles
 - Describe the relationship between genotype and phenotype
 - Explain the role of dominant and recessive alleles in determining an offspring's traits
 - Compare the products of meiosis and mitosis
 - Describe how variation can occur during cellular respiration
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Unit Details:

- Key Projects:
 - New World Populations & Mutations

Unit Five: Science Inquiry August- May

Topic Eight: Tools & Measurement

Topic Nine: Investigative Skills

-  **4** Above and beyond
-  **3** - Convert between units with in the metric system and standard system
-  - Choose an appropriate tool for a specific task and use it to gather accurate scientific data
- 2** - VOCAB: meter stick, graduated cylinder, density, volume, length, scale, mass, weight, displacement, glassware, thermometer, microscope
-  - KNOWLEDGE:
 - Describe the general function and use of each tool
 - Apply appropriate units of measurement (g, kg, m, cm, km, L, mL, °C)
 - Choose an appropriate tool for a specific use

-  **4** Above and beyond
-  **3** - *Design, Conduct, and Collect* data for a scientific investigation
 - Question, Hypothesize, Experiment design
-  - *Analyze, write, and communicate* for a scientific investigation
 - Data analysis, conclusion, communication
- 2** - VOCAB: hypothesis, observation, qualitative, quantitative, inference, procedure, evidence, claim, conclusion, graph, theory, law, prediction, model, opinion, cause, effect, variables, control, experiment, validity, testable question
-  - KNOWLEDGE:
 - Create a testable question
 - Conduct an investigative experiment
 - Identify the variables and control in an experiment

Unit Details:

- Key Projects:
 - Designer Investigation