

Grade – Eighth

Standard: Science as Inquiry

Skill: Use observation to pose questions that can be addressed through a scientific investigation

Context: Students will be expected to respond to items related to the following key concepts:

- Cells and cellular processes
- Heredity and biological evolution
- Interactions and energy flow
- Earth's processes and features
- Properties and changes
- Energy types
- Forces and motion
- Solar system and universe

Instructional suggestions: (Created to be user-friendly, teachers should be able to read these ideas and put them into practice in their classroom.)

- Students should read scientific investigations to:
 - identify science terminology
 - identify variables (dependent, controlled, independent, manipulated, responding, experimental);
 - develop familiarity with synonyms (i.e., manipulated = independent, responding = dependent)
 - pose relevant questions
 - interpret the purpose
- Read science scenarios to form hypotheses. Example: provide students studying genetics a genetic modification between a firefly and bacteria to produce luminescent plants.
- Use standardized release items with students to practice extracting the elements of the scientific method. Example: utilizing

national data banks determine what questions scientists were asking; what hypothesis did they formulate?

- Develop students' inquiry skills by manipulating aspects of a given scientific investigation to predict possible outcomes. Example: when doing units on force, have students predict possible outcomes by adjusting mass and/or position of a pendulum.
- In order to improve scores on constructed response items, consult your instructional facilitator to help you find and teach specific reading strategies such as text to text, text to self, text to world connections; extract main idea and supporting details; Inspiration Software (or other organizational software); key terms charts, or other appropriate strategies.
- Give students practice looking at data in table format to make inferences, draw conclusion, and write questions that would be answered from the data.
- Practice relating experiments to real-world applications.
- Teach strategies to filter information for relevance to the question being asked.
- Given a set of observations, write testable questions that relate to the observations.
- Have hotlinks to any websites or links to examples
- Use a current science article or data set to initiate a lesson
 - What question is the experimenter trying to answer?
 - What question(s) should be answered before forming a conclusion?
 - What questions can be answered by data examination?
 - What observations will most impact the results?
 - What natural world observations most likely led to this investigation?

Grade – Eighth

Standard: Science as Inquiry

Skill: Design and conduct a scientific investigation

Context: Students will be expected to respond to items related to the following key concepts:

- Cells and cellular processes
- Heredity and biological evolution
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Instructional suggestions: (Created to be user-friendly, teachers should be able to read these ideas and put them into practice in their classroom.)

- Students need more practice doing experiments that include a control group (something used as a basis for comparison).
- Provide multiple opportunities to use a variety of tools (for example: balances, volumetrics, rulers, thermometers, etc.) appropriately and inappropriately so students can decide which tools are best for the given situation. For example: Have students measure 50ml from a graduated cylinder and compare to the accuracy of measuring from a 100 ml flask.
- Student need to understand that increased reliability is related to increasing the number of trials and/or the sample size while reducing the sources of error. For example: have multiple labs put data on a spreadsheet to look for increased accuracy with more trials. Discuss potential sources of error.

- To develop an understanding about what makes an experiment better, students need to explain how two experimental scenarios are the same and different (compare and contrast). They could read other experiments possibly from journals.
- In order to improve scores on constructed response items, consult your instructional facilitator to help you find and teach specific reading strategies such as text to text, text to self, text to world connections; extract main idea and supporting details; Inspiration Software (or other organizational software); key terms charts, or other appropriate strategies.
- Use common statewide science vocabulary – question, hypothesis, variable (dependent & independent), control, and constant (variables that are kept the same).

Grade – Eighth

Standard: Science as Inquiry

Skill: Organize and represent data

Context: Students will be expected to respond to data related to the following key concepts:

- Cells and cellular processes
- Heredity and biological evolution
- Interactions and energy flow
- Earth's processes and features
- Properties and changes
- Energy types
- Forces and motion
- Solar system and universe

Instructional suggestions: (Created to be user-friendly, teachers should be able to read these ideas and put them into practice in their classroom.)

- Students need help analyzing data to identify patterns and trends (i.e., where trends change; where increments of data change).
- Students need to know how and when to scale data for easier interpretation. (i.e., using ratios, proportions).
- Students need to know how to identify and select data to solve numeric problems (calculate averages, find rate, and put data into formulas). Teach strategies to locate and extract relevant information from complex tables and graphs of data.
- In order to improve scores on constructed response items, consult your instructional facilitator to help you find and teach specific reading strategies such as text to text, text to self, text to world connections; extract main idea and supporting details; Inspiration Software (or other organizational software); key terms charts, or other appropriate strategies.
- Practice labeling graphs with independent, dependent variables, axis label and title. Use an appropriate scale by considering the range of data values, but provide example where time **is not** the independent variable.
- Provide practice graphing data sets and identifying the most appropriate type of graph for each set.
- Utilize data banks (internet websites) to practice identifying independent and dependent variables.
- Practice creating and labeling graphs.

Grade – Eighth

Standard: Science as Inquiry

Skill: Draw conclusions and make connections with concepts and knowledge

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Instructional suggestions: (Created to be user-friendly, teachers should be able to read these ideas and put them into practice in their classroom.)

- Students need to practice making multiple suggestions for improving investigation, drawing conclusions, and connecting experiments to real life applications.
- Students need to explain the science concept(s) evident from observed processes with specific statements using appropriate terminology. Provide students with opportunities to practice communicating and justifying their reasoning in writing. For example: have students explain the reasons for classification of the different states of matter.
- Students need practice explaining experimental results in terms of cause and effect or the relationship between two or more variables.

- In order to improve scores on constructed response items, consult your instructional facilitator to help you find and teach specific reading strategies such as text to text, text to self, text to world connections; extract main idea and supporting details; Inspiration Software (or other organizational software); key terms charts, or other appropriate strategies.
- Practice using, interpreting and predicting results with Punnett squares using simple monohybrid crosses (single trait, dominant/recessive).
- Practice identifying and continuing patterns and providing explanations for a variety of data sets (including nonlinear or messy data).
- Teach students to draw conclusions using a variety of content specific examples (life, Earth/space & physical science).
- Allow students to develop and defend conclusions before they receive teacher input.
- Have students solve a mystery by drawing conclusions based on evidence (CSI model).