

Investigations/Technology

The Inventors Secret-investigate designing a toy, pgs:61-78 in Picture Perfect STEM

Burn- explore physical and chemical changes of a burning candle, Pgs: 137-160 in Picture Perfect STEM

Bottle Rockets-chemical reactions-pgs;54-55 (Steam Kids)

Rainbow Reactions-chemical reactions-Pgs:26-27 “ ”

Off to the Races- design a race car-pg:41 (50 Lab..)

Merry Go Round-balloon powered-pg:40 “ ”

Lay it All on the Line-balloon powered.pg:36

Create a plastic bridge-motion and forces-pg:44 (50 Stem Labs)

Assessments

- Sketch w/ labels-25%
- Explanation of strategies-25%
- Completion of project-25%
- Conclusions and reflections based on results-25%

Life Sciences

Investigations/Technology

Bionic Animals..pgs: 223-244 in Picture Perfect STEM by Morgan and Ansberry
From Seed to Tree..pgs:245-261 in Picture Perfect STEM

Growing Seeds Science..pg:82-83 (Steam Kids)

Fun with Fungus-pg:86-87 “ ”

Bedroom planetarium-constellations-pgs: 52-53 (Steam Kids)

Growing Shadow Artwork-shadows-pgs:89 “ ”

Diaper Science-growing polymer chains-pg:80 “ ”

Assessments

- Sketch w/ labels-25%
- Explanation of strategies-25%
- Completion of project-25%
- Conclusions and reflections based on results-25%

Earth Sciences

Investigations/Technology

Rock Candy-crystals-pg:81 (Steam Kids)

Crystal landscapes-pg:90 “ ”

Take to the Winds-create a windmill-pg:49 (50 Stem Labs)

Wind Powered Speed Boat-pg:32 (50 Stem Labs)

Assessments

- Sketch w/ labels-25%
- Explanation of strategies-25%
- Completion of project-25%
- Conclusions and reflections based on results-25%

Observable features of the student performance by the end of the grade:

1. Identifying the problem to be solved

- A. Students use given scientific information and information about a situation or phenomenon to define a simple design problem that includes responding to a need or want.
- B. The problem students define is one that can be solved with the development of a new _____ or improved object, tool, process, or system.
- C. Students describe* that people's needs and wants change over time.

2. Defining the boundaries of the system

- A. Students define the limits within which the problem will be addressed, which includes addressing something people want and need at the current time.

3. Defining the criteria and constraints

- A. Based on the situation people want to change, students specify criteria (required features) of a successful solution.
- B. Students describe* the constraints or limitations on their design, which may include:
 - i. Cost.
 - ii. Materials.
 - iii. Time.

II. Using scientific knowledge to generate design solutions

- A. Students use grade-appropriate information from research about a given problem, including the causes and effects of the problem and relevant scientific information.
Students generate at least two possible solutions to the problem based on scientific information and understanding of the problem.
- B. Students specify how each design solution solves the problem.
- C. Students share ideas and findings with others about design solutions to generate a variety of possible solutions.
- D. Students describe* the necessary steps for designing a solution to a problem, including conducting research and communicating with others throughout the design process to improve the design [note: emphasis is on what is necessary for designing solutions, not on a step-wise process].
- E. Describing* criteria and constraints, including quantification when appropriate
- A. Students describe*:
 - i. The given criteria (required features) and constraints (limits) for the solutions, including increasing benefits, decreasing risks/costs, and meeting societal demands as appropriate.
 - ii. How the criteria and constraints will be used to generate and test the design solutions.

III. Evaluating potential solutions

- A. Students test each solution under a range of likely conditions and gather data to determine how well the solutions meet the criteria and constraints of the problem.
- B. Students use the collected data to compare solutions based on how well each solution meets the criteria and constraints of the problem.

IV. Identifying the purpose of the investigation

- 1. Students describe* the purpose of the investigation, which includes finding possible failure points or difficulties to identify aspects of a model or prototype that can be improved.
- 2. Identifying the evidence to be address the purpose of the investigation
 - A. Students describe* the evidence to be collected, including:
 - i. How well the model/prototype performs against the given criteria and constraints.
 - ii. Specific aspects of the prototype or model that do not meet one or more of the criteria or constraints (i.e., failure points or difficulties).
 - iii. Aspects of the model/prototype that can be improved to better meet the criteria and constraints.
 - B. Students describe* how the evidence is relevant to the purpose of the investigation.

V. Planning the investigation

Students create a plan for the investigation that describes* different tests for each aspect of the criteria and constraints. For each aspect, students describe*:

- i. The specific criterion or constraint to be used.
- ii. What is to be changed in each trial (the independent variable).
- iii. The outcome (dependent variable) that will be measured to determine success.
- iv. What tools and methods are to be used for collecting data.
- v. What is to be kept the same from trial to trial to ensure a fair test.

VI. Collecting the data

Students carry out the investigation, collecting and recording data according to the developed plan.