Mark Schemes Practice

Exploration (formerly Design)

Honors Physical Science

Exploration

Exploration	
Mark	Descriptor
0	• The student's report does not reach a standard described by the descriptors below.
1–2	• The topic of the investigation is identified and a research question of some relevance is stated but it is not focused. • The background information provided for the investigation is superficial or of limited relevance and does not aid the understanding of the context of the investigation. • The methodology of the investigation is only appropriate to address the research question to a very limited extent since it takes into consideration few of the significant factors that may influence the relevance, reliability and sufficiency of the collected data. • The report shows evidence of limited awareness of the significant safety, ethical or environmental issues that are relevant to the methodology of the investigation*.
3–4	• The topic of the investigation is identified and a relevant but not fully focused research question is described. • The background information provided for the investigation is mainly appropriate and relevant and aids the understanding of the context of the investigation. • The methodology of the investigation is mainly appropriate to address the research question but has limitations since it takes into consideration only some of the significant factors that may influence the relevance, reliability and sufficiency of the collected data. • The report shows evidence of some awareness of the significant safety, ethical or environmental issues that are relevant to the methodology of the investigation.*
5–6	• The topic of the investigation is identified and a relevant and fully focused research question is clearly described. • The background information provided for the investigation is entirely appropriate and relevant and enhances the understanding of the context of the investigation. • The methodology of the investigation is highly appropriate to address the research question because it takes into consideration all, or nearly all, of the significant factors that may influence the relevance, reliability and sufficiency of the collected data. • The report shows evidence of full awareness of the significant safety, ethical or environmental issues that are relevant to the methodology of the investigation.*

Step 1: Defining the problem and selecting the variables

- A. Define the problem
  - When given an open-ended problem to investigate, students must identify a focused problem or specific research question
  - EX: Given – Investigate some physical characteristic of bubble gum.
    Question – How does the chew time affect the bubble size?

Part 1: Continued

- B. Select the variables
  - Independent variables: those that are manipulated (by scientist)
  - Dependent variable: results from the manipulation of the independent variable
  - Controlled variables: held constant so as not to hide the effect of the independent variable on the dependent variable
  - EX: IV - type of bubble gum, DV – bubble size, CV - time chewing, person blowing bubble, method of measuring, etc.

Part 1: Students should NOT be…

- 1. Given a focused research question
- 2. Told the outcome of the investigation
- 3. Told which independent variable to select
- 4. Told which variables to hold constant

Part 2: Controlling Variables

Refers to:

- A. Manipulation of independent variable
  EX: test 3 different brands of gum with 5 trials of each
- B. Attempt to maintain the controlled variables at a constant rate
  EX: equal chewing time, same person chewing, same method of measurement, etc.

Part 2: Continued

- Uncertainties / Error: If the control of the variables is not practically possible, some effort should be made to monitor the variable(s).

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- If a standard measurement technique is used it should be referenced
  EX: Using a technique from a literature source.
  A standard reference would be expected as a footnote. Also, included in materials section.

Part 2: Students should NOT be told…

- 1. Which apparatus to select
- 2. The experimental method

Part 3: Developing a method for collection of data

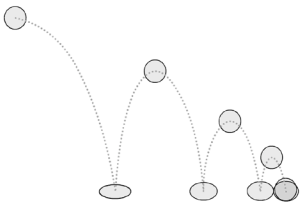
- Sometimes known as Methods or Procedure
- Plan should have a trial run and repeats until consistent results are obtained.
- Plan should anticipate collection of sufficient data so research question can be suitably addressed and evaluation of reliability of data can be made.

Part 3: Students should NOT be told…

- How to collect the data
- How much data to collect

Prompt

- Investigate some physical property of a bouncy ball.
  1. Create your own exploration.
  2. Analyze your exploration using rubric and checklist
- 3. Analyze your partner's exploration
  4. Reflect on the process, strengths and weaknesses



1. Create your exploration

- Research Question / Identify variables
  - Independent
  - Dependent
  - Controlled
- Control Variables
  - Manipulate independent variable
  - Attempt to maintain the controlled variables
- Method for collection of data
  - Collect sufficient amount of data
  - Trial run and repeats until consistent results are obtained

2. Analyze YOUR Exploration by using the checklist

- Take 5 minutes or so and read over your Exploration.
- Make sure you have included all the listed requirements.
- Assess your aspects using the checklist and the rubric.
- "What grade would I earn?"

3. Analyze Partner's Exploration

- Trade with the partner (See Board)
- Analyze using the checklist and rubric.
- Assign a grade at the top of the paper
  - Write the number, 1-6
  - Justify using the checklist

4. Reflection Time!

- Trade with partner to get YOUR Exploration back
- Look at feedback – agree or disagree? No hard feelings, we're all new at this :)
- Reflection free write:
  - 1. Which part was my strength? Why?
  - 2. Which part was my weakness? Why?
  - 3. How can I improve my current Exploration?
  - 4. What will I do differently when I create my next Exploration?
- Hand in your Exploration and Reflection and…