

Data Set #2

Type of response:	Source Dependent Response
Grade level:	10
Subject:	Science
Training set size:	1278
Final evaluation set size:	426
Average length of responses:	50 words
Scoring:	Score1, Score2
Final score:	Final score is score 1. Score 2 is for inter-rater reliability purposes.
Rubric range:	0-3

Prompt—Polymer Investigation

A student performed the following investigation to test four different polymer plastics for stretchability.

Procedure:

1. Take a sample of one type of plastic, and measure its length.
2. Tape the top edge of the plastic sample to a table so that it is hanging freely down the side of the table.
3. Attach a clamp to the bottom edge of the plastic sample.
4. Add weights to the clamp and allow them to hang for five minutes.
5. Remove the weights and clamp, and measure the length of the plastic types.
6. Repeat the procedure exactly for the remaining three plastic samples.
7. Perform a second trial (T2) exactly like the first trial (T1).

The student recorded the following data from the investigation.

Data Table:

Plastic Type	Amount Stretched (mm)	
	T1	T2
A	10	12
B	22	23
C	14	13
D	20	20

- a. Draw a conclusion based on the student's data.
- b. Describe two ways the student could have improved the experimental design and/or validity of the results.

Scoring Rubric for Science Open-Ended Items

Open-ended items are scored on a four-point scale (0–3) using a holistic scoring method. This method involves judging the overall quality of the student response. The general scoring rubric for the science open-ended items (see following page) describes the characteristics of a response at each score point. Included with each item is the content guide (description of a good response to the question), the specific scoring rubric for the item (description of each score point), and the classification of the item

based on the Science Framework. This is followed by two scored student responses at each score point along with a brief discussion of why the response received a particular score.

Each score category contains a range of student responses which reflect the descriptions given below.

Score 3

The response is an excellent answer to the question. It is correct, complete, and appropriate and contains elaboration, extension, and/or evidence of higher-order thinking and relevant prior knowledge. There is no evidence of misconceptions. Minor errors will not necessarily lower the score.

Score 2

The response is a proficient answer to the question. It is generally correct, complete, and appropriate, although minor inaccuracies may appear. There may be limited evidence of elaboration, extension, higher-order thinking, and relevant prior knowledge, or there may be significant evidence of these traits but other flaws (e.g., inaccuracies, omissions, inappropriateness) may be more than minor.

Score 1

The response is a marginal answer to the question. While it may contain some elements of a proficient response, it is inaccurate, incomplete, and/or inappropriate. There is little evidence, if any, of elaboration, extension, higher-order thinking, or relevant prior knowledge. There may be evidence of significant misconceptions.

Score 0

The response, though possibly on topic, is an unsatisfactory answer to the question. It may fail to address the question, or it may address the question in a very limited way. There may be no evidence of elaboration, extension, higher-order thinking, or relevant prior knowledge. There may be evidence of serious misconceptions.

Rubric for Polymer Investigation

Sample Response:

Conclusions:

- Plastic sample B has more stretchability than the other polymer plastics.
- Plastic sample A has the least amount of stretchability compared to the other polymer plastics.
- Not all polymer plastics have the same stretchability.
- Different polymer plastics have different stretchability (and are therefore suited for different applications).
- A reasonable conclusion cannot be drawn due to procedural errors.
- Other reasonable conclusions

Experimental Design Improvements:

- Provide the before and after measurements for length (Did the samples all start out the same size?).
- Make sure the samples are all of the same thickness. Variations in thickness could have caused variations in stretchability.

- Perform additional trials. Some of the samples have similar stretchability (A and C, B and D). Two trials may not be enough to conclusively state that one is more stretchable than the other.
- Indicate how many weights were added to the clamps (Was it the same number for each sample?).
- Other acceptable responses

3-Point Rubric:

Score 3

The response draws a valid conclusion supported by the student's data and describes two ways the student could have improved the experimental design and/or the validity of the results.

Score 2

The response draws a valid conclusion supported by the student's data and describes one way the student could have improved the experimental design and/or the validity of the results.

-or-

The response describes two ways the student could have improved the experimental design and/or the validity of the results but fails to draw or incorrectly draws a conclusion from the student's data.

Score 1

The response draws a valid conclusion supported by the student's data but fails to describe, or incorrectly describes, how the student could have improved the experimental design and/or the validity of the results.

-or-

The response describes one way the student could have improved the experimental design and/or the validity of the results but fails to draw or incorrectly draws a conclusion from the student's data.

Score 0

The response provides little or no correct information from the polymer investigation.