



Earth as a System is Essential

Data and Graphing Assessment

Name: _____

Student scientists have been gathering data from a series of buoys in Boston Harbor. One student claims that wind speed relates to air temperature. A second student claims that water temperature relates to air temperature.

As an independent scientist you must verify the claims made by the students. In other words, you have to check to see if they are right and explain how you know.

Step 1:

Make a prediction. You are going to be looking at data collected from a buoy in Boston Harbor in October 2010. What kind of relationship do you think you might see between wind speed and air temperature? Why? What kind of relationship do you think you might see between water temperature and air temperature? Why?

Step 2:

Using the sheet "Buoy Data for Assessment," answer the following questions:



1. Where were these data sets collected?
2. When were these data sets collected?
3. Over what period of time were these data sets collected?
4. What is the range of temperature/wind speed in each data set?

Rubric

Goal	Exceeds	Meets	Partially Meets	Does Not Meet
Collecting Data (graph, Step 4:Q4)	Uses the data provided. Includes an insightful discussion of other data sets that could support/refute the original claims.	Uses the data provided. Suggests appropriate other data for Step 4; Question 4	Uses the provided data. Suggests data for Step 4; Question 4, but it is not clear how it could help support the original claim.	Does not use all provided data. Data not suggested for Step 4; Question 4.
Graphing (graph)	Graphs are neat and clear and contain appropriate scales, labels, axes and correctly plotted points. Graphs include additional element, such as color coding or an additional analysis.	Graphs are neat and clear and contain appropriate scales, labels, axes and correctly plotted points.	Graphs are neat and clear, but not completely labeled or some points plotted incorrectly or missing.	Graphs not neat and clear and missing points, labels or appropriate scales.
Relationship (Step 4: Q 1,2,3)	Includes a detailed and insightful description of relationship using appropriate terms. Description should: <ul style="list-style-type: none"> • Include a detailed discussion of any correlation • Compare and contrast data sets • Give specific examples to support reasoning • Discuss any outliers 	Describes relationship using appropriate terms. Description should: <ul style="list-style-type: none"> • Include a discussion of any correlation • Compare and contrast data sets • Mention any outliers 	Describes relationship using minimal language. Description includes one of the following: <ul style="list-style-type: none"> • A discussion of any correlation • Compare and contrast data sets. 	Describes relationship using minimal language.
Prediction (S1 and Step 4:Q4)	Prediction demonstrates extensive reasoning based on observations, known facts, and/or the data. Predictions do not have to be correct. Discussion of other data to analyze includes detailed reasoning and prediction.	Prediction demonstrates reasoning based on observations, known facts, and/or the data. Predictions do not have to be correct. Discussion of other data to analyze includes reasoning and some prediction.	Prediction includes some reasoning. Discussion of other data to analyze includes no clear reasoning.	Predictions include no discussion/reasoning, or prediction is missing.
Conclusion (Step 4:Q3, 4)	Answers questions correctly with detailed discussion. Does not confuse cause and effect. Correctly identifies several types of data that would further understanding of the relationship between the variables. This should contain significant reasoning.	Answers questions correctly. Does not confuse cause and effect. Correctly identifies more than one type of data that would further understanding of the relationship between the variables with some reasoning.	Answers questions appropriately, but answer may have some error or may confuse cause and effect. Identifies one type of data that would further understanding of the relationship between the variables with some reasoning.	Answers have significant error in understanding the analysis. Additional data identified has no clear connection to the original claims.



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Teacher Notes

Goals

This assessment is designed to evaluate student performance towards the following goals:

- Gathering appropriate data
- Creating a clear, appropriate graph
- Describing the relationship between the data, using specific examples
- Making a reasoned prediction/guess about the relationship between the data sets
- Drawing an appropriate conclusion from the relationship

Students do not need to be evaluated towards meeting all of the above goals, and teachers should choose the goals most appropriate to the class curriculum.

Preparation

Students will need copies of pages i, ii and iv of this assessment. For the graphs, students may use the sheets on pages v, vi, and vii or graph paper. Alternatively, the graphs may be done on a computer.

Students may also need pencils and rulers.

Possible Modifications

To simplify this assessment, students may complete Graphs A and B only and discuss the relationship between air temperature and water temperature. (This would also eliminate Question 1 in Step 4.)

This assessment was designed to evaluate student progress toward multiple goals. If necessary, eliminate sections of the rubric and related evidence to simplify the evaluation.

If students have already demonstrated mastery of graphing with pencil and paper, graphs can be generated by a computer.



Using the Rubric

Learning goals are listed down the left-hand column of the rubric on page viii, with the evidence in parentheses. For example, (graph, Step 4:Q4) means that evidence of student work towards that goal should be found in the graph, and Step 4, Question 4.

This rubric does not include letter/number grades, and teachers should use a grading scale appropriate to their school/class scale. (Often, "Exceeds" is an "A", "Meets" is a "B", etc.)

Any goals that are not being assessed for a particular class should be removed from the rubric.



This Data and Graphing Assessment was developed by a group of middle school science teachers as a supplement to the EaSiE project's Data and Graphing lesson with funding from NOAA Environmental Literacy Grant NA07SEC4690002. For more information and to download lessons from the *Earth as a System is Essential: Seasons and the Seas* (EaSiE) project, visit www.mmsa.org/easie



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Data and Graphing Assessment

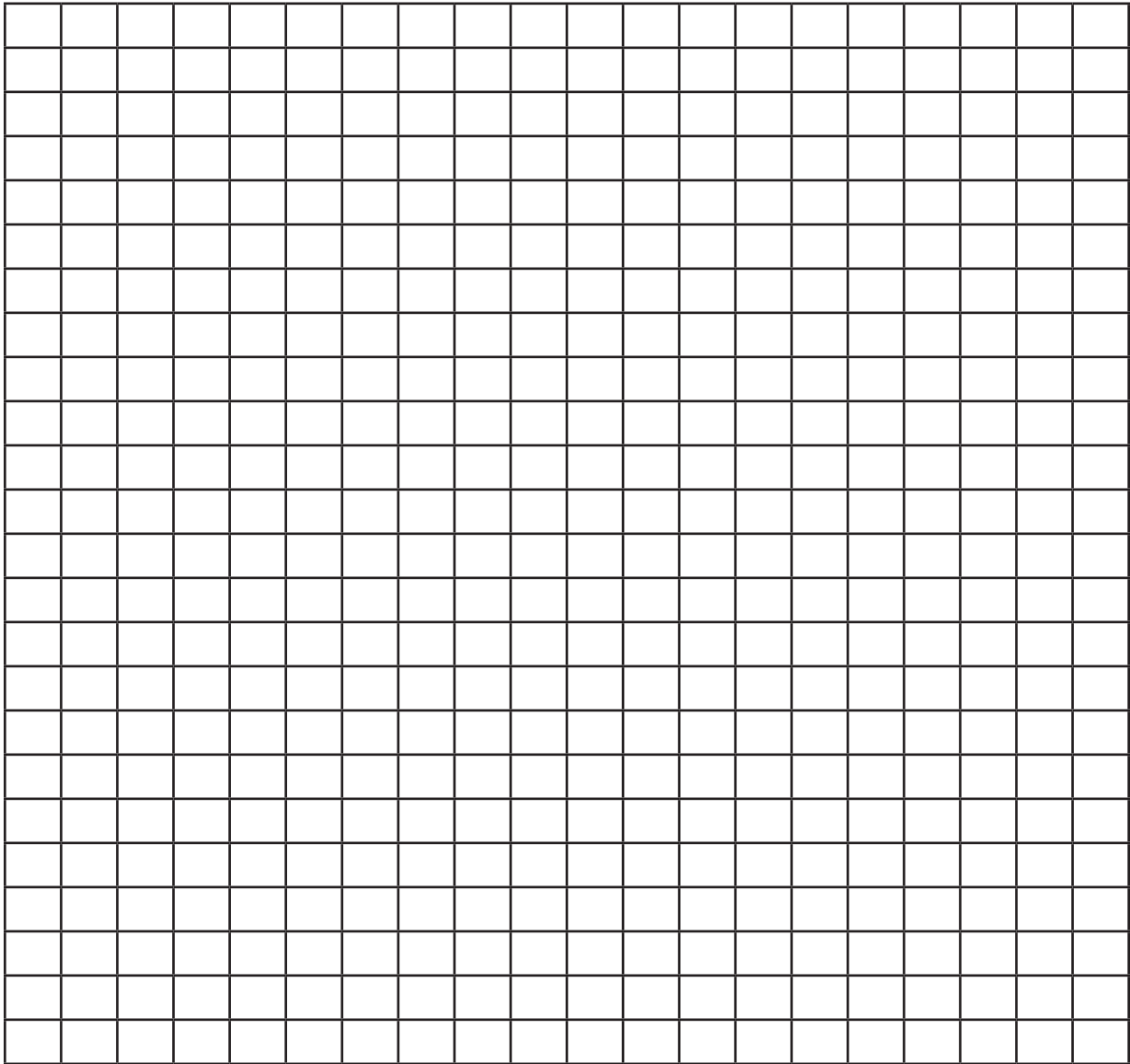
Buoy Data for Assessment

These data were collected at NOAA Buoy 44013 in Boston Harbor
(<http://www.neracoos.org/>)

Date	Daily Average Windspeed	Daily Average Air Temp. (° F)	Daily Average Water Temp. (° F)
10/1/2010	19	68.2	61.7
10/2/2010	16	59.1	61.4
10/3/2010	19	56.2	60.8
10/4/2010	27	56.9	59.2
10/5/2010	22	56.8	58.2
10/6/2010	19	58.7	59.3
10/7/2010	20	56.6	58.9
10/8/2010	19	59.7	57.8
10/9/2010	16	58.4	57.6
10/10/2010	18	53.7	57.2
10/11/2010	10	57.9	57.4
10/12/2010	12	55.5	57.3
10/13/2010	12	52.8	57.2
10/14/2010	12	55.5	57
10/15/2010	28	54.1	56.9
10/16/2010	31	49.9	56.4
10/17/2010	20	52.9	56.2
10/18/2010	17	54.1	55.9
10/19/2010	10	50.7	55.8
10/20/2010	10	53.7	55.7

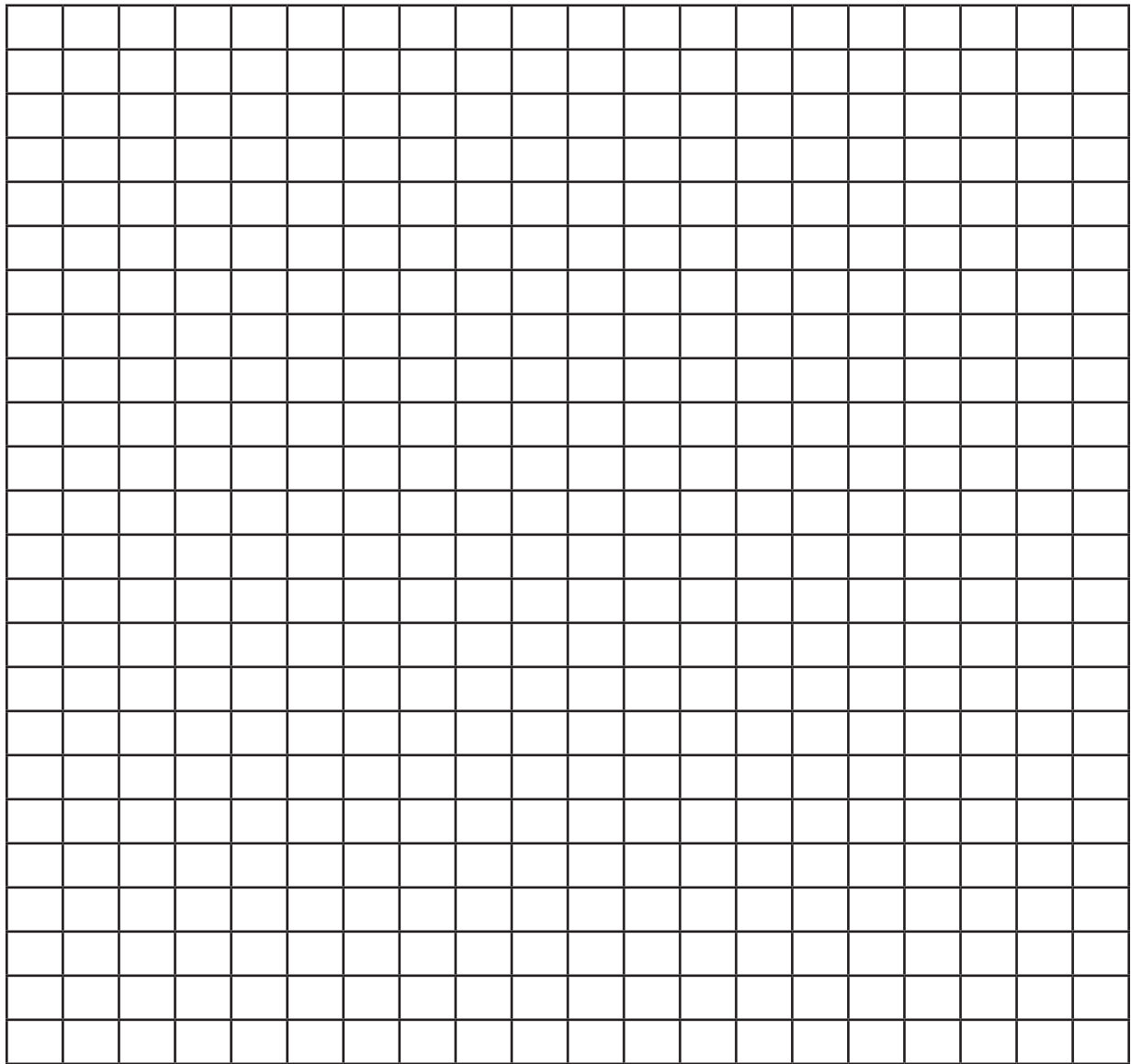
6

Graph A
Air Temperature



7

Graph B
Water Temperature



Graph C
Wind Speed

