



Holyoke Public Schools Mathematics Curriculum Map Grade 3

Stories, Tables, and Graphs

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Curriculum Maps

GOALS:

1. To ensure that students are exposed to a rigorous curriculum in every school and every grade.
2. To have consistent instruction and assessment district wide.
3. To prepare students for the MCAS test.
4. To explain what is expected to be covered in each CMP or Investigations Unit.

EXPECTATIONS:

The district's expectation is for students to successfully meet the Massachusetts Mathematics Standards. In order to help facilitate this, teachers are required to follow the curriculum maps. The successful implementation of these maps requires teachers to thoroughly read each lesson in the TE and work through the project and problems in the map and the text prior to planning their lessons. Work should be kept in the binder with the curriculum map. Working through the math is an essential part of lesson planning, as it helps the teacher to better understand the concept being taught and the students' possible misunderstandings.

FEEDBACK TO STUDENTS:

Feedback needs to happen daily in the classroom. There are many ways to give feedback. Conferencing, observations, questions asked during your opening, work time and closing are all forms of feedback.

MAP COMPONENTS:

1. GENERAL PROBING QUESTIONS
2. UNIT SPECIFIC PROBING QUESTIONS
3. GOALS OF UNIT, CONTENT STANDARDS, & PERFORMANCE STANDARDS
4. PROJECT- to be done at end of unit and kept in the portfolio.
 - o STUDENT MASTER – for project
5. INVESTIGATIONS:
 - o NOTEBOOK - includes: 3 Ring Binder, Bound Notebook, Portfolio
 - o ACCOUNTABLE TALK – using probing questions
5. ON-DEMAND ASSESSMENTS - to be done during teaching of unit.
 - o STUDENT MASTERS- for on-demand assessments.

Mathematics

Evidence of Learning Artifacts

Artifact	K - 1	2 - 5	6 - 8
<i>3 Ring Binder (3R)*</i>	<ul style="list-style-type: none"> ○ Student Work¹ 	<ul style="list-style-type: none"> ○ Vocabulary ○ Student sheets¹ <p style="text-align: center;"><u>All work should be dated and listed by investigation</u></p>	<ul style="list-style-type: none"> ○ Math books ○ Vocabulary ○ Core Problems¹ ○ Lab sheets <p style="text-align: center;"><u>All work should be dated and listed by investigation</u></p>
<i>Marble Notebook (MNB)</i>	<ul style="list-style-type: none"> ○ Journal entries² 	<ul style="list-style-type: none"> ○ Table of Contents ○ Problem of the day ○ Journal entries ○ Class work <p style="text-align: center;"><u>All work should be dated and listed by investigation in the Table of Contents</u></p>	<ul style="list-style-type: none"> ○ Table of Contents ○ Work time ○ Journal entries <p style="text-align: center;"><u>All work should be dated and listed by investigation in the Table of Contents</u></p>
<i>Portfolio³ (P)</i>	<ul style="list-style-type: none"> ○ On-demand tasks ○ Projects ○ Teacher anecdotal notes 	<ul style="list-style-type: none"> ○ On-demand tasks ○ Reflections ○ Projects <p style="text-align: center;"><u>All work should be dated and listed by investigation</u></p>	<ul style="list-style-type: none"> ○ On-demand tasks ○ Reflections ○ Projects <p style="text-align: center;"><u>All work should be dated and listed by investigation</u></p>

* Folders may be used in place of binders for these grade levels

¹ Send home at the end of each unit

² Use grade level math journals

³ All documents should be kept for the entire year

Stories, Tables, and Graphs Probing Questions for Accountable Talk

As students progress through this unit, they should be asked the following questions to assess their knowledge about data representations and patterns.

Describe the shape of the graph?

What is the rate of change?

How did you figure out the rate of change?

What was your strategy for figuring out the pattern?

What was your strategy for figuring the difference in the two temperatures?

How does the information from your table relate to the graph?

Classroom Routines and Ten-Minute Math

Continue from previous unit

Classroom Routines: “What’s the Temperature?”

Ten Minute Math: “Counting Around the Class”

Ten Minute Math: “What Time Is It?”

Ten Minute Math activities and Classroom Routines offer practice and review of key concepts at each grade level. After their initial introduction, these short activities, designed to take no longer than 10 minutes, support and balance the in-depth work of each curriculum unit.

Implementing Investigations in Grade 3: Please review pages 24 -26, 36-38 for 2 Ten Minute Math activities in this unit and pg. 40-42 for Classroom Routines: “What’s the Temperature”.

Additional Probing Questions for Accountable Talk

The teacher's role in probing for understanding is to ask questions that will:

- Clarify student understanding
- Get at the objective of the lesson
- Go deeper into the mathematics
- Uncover misconceptions and misunderstandings
- Compare and contrast

The students' role is to be an active participant by:

- Explaining their strategies
- Asking clarifying questions to teacher and other students
- Being active listeners
- Using the language of mathematics

When probing for understanding the teacher and students can use one or more of these suggested questions:

- Why are you using $< >$?
- What are the ways you could $< >$?
- What else do you know?
- How do you know that?
- Can you show that?
- What convention did you use here?
- What can you do if you do not know?
- What standard does this work apply to?
- Is this always true?
- How does this connect to other mathematics we have learned?
- What is the same and what are the differences between $< >$?
- Can you back that up?
- Where is the math in your sketch?
- What does the answer mean?
- Does the answer make sense?
- Could you have used another operation to solve this task?
- Can you give examples?
- Can you say it another way?
- What's the math?
- Tell me about the task in your own words?
- What are you trying to find?
- How did you make your estimate?
- Will your answer be an over-estimate or an under-estimate? Why?
- I noticed that you used $< \dots >$ to help you understand the task. Can you show us what you did and tell us how it helped you?
- Where do you see $< >$ in your $<$ model, diagram, number line, chart, etc. $>$?
- How can we see $< >$ in your $<$ model, diagram, number line, chart, etc. $>$?
- You have used a representation that is different from others that I've seen. Can you show us your $<$ model, diagram, number line, chart, etc. $>$, and tell us how it helped you?
- How did you decide to solve the task? Why did you choose that method?
- Did you try any method that didn't work?
 - Tell us what you tried.
 - Why didn't it work?
 - Would it ever work?

Goals, Content Standards, & Performance Standards

Unit Goals:

- Interpret graphs of change over time, including both the meaning of points on the graph and how the graph shows that values are increasing, decreasing, or staying the same.
- Interpret temperature values (i.e., relate temperatures to seasons, to what outdoor clothing would be needed, and so on),
- Create a table of values for a situation with a constant rate change and explain the values in the table in terms of the situation.
- Compare related situations with a constant rate of change by interpreting the graphs, tables, and sequences that represent those situations.

Math Content Standards:

- (3.P.1) Create, describe, extend and explain symbolic (geometric) patterns and addition and subtraction patterns, e.g., 2, 6, 10 . . . and 50, 45, 40.
- (3.G.5) Using ordered pairs of whole numbers and/or letters, locate and identify points on a grid.
- (3.M.5) Identify and use appropriate metric and US Customary (English) units and tools (e.g., ruler, scale, thermometer, clock) to estimate, measure, and solve problems involving length, area, weight, temperature, and time.

Performance Standards:

- (M4a) Collects and organizes data to answer a question or test a hypothesis by comparing sets of data.
- (M4b) Displays data in line plots, graphs, tables and charts.
- (M4c) Makes statements and draws simple conclusions based on data

UNIT: STORIES, TABLES, AND GRAPHS

End-of-Unit Project

GRADE: 3

**End-of-Unit
Project (P)**

Student work should be placed in
portfolio (P).

The project is the culminating
assessment which will allow students
to apply what they learned in the
unit. It is written in MCAS form to
give students the experience of
answering an open-response
question.

**End-of-the unit Assessment: Sophie's and Tom's Race
Resource Binder, M33 – M36**

UNIT: STORIES, TABLES, AND GRAPHS

Investigation 1 (1.1 – 1.5)

DAYS: 5

GRADE: 3

<p>Evidence of Learning Artifacts</p> <p>Journal and Reflection questions should be posted and referred to at the beginning of the appropriate <i>Investigation</i>.</p> <p>Journal and Reflection entries need to be done in class as part of the closure and assessment.</p>	<p>(3R) – 3 ring binder; (MNB) – marble notebook; (P) – portfolio</p> <p>Vocabulary – temperature, degrees, negative, horizontal axis, vertical axis, (3R)</p> <p>Work Time – Student Sheets 1 – 26 (3R)</p> <p>Journal Entries – (MNB) *Maximum 5 minutes</p> <p>Inv. 1.1 – 1.2 What is your strategy for finding the difference between two temperatures?</p> <p>Inv. 1.3 – 1-4 What do the two axes represent on our temperature graph?</p> <p>Reflection – From your graph, “Summer Days: Graph 2” describe how the temperature changed for different parts of the day and give reasons. (P)</p>
<p>Accountable Talk</p> <p>To promote learning, explore solutions, and justify reasoning, conversations between students and students or students and teacher must be accountable – accountable to the learning community, to the mathematics discipline, and to rigorous thinking.</p>	<p><i>As a result of this Investigation, students should be able to talk and manipulate the vocabulary of the Investigation in response to this type of question:</i></p> <p>How did you know that? How can you use ...? Can you show another way? What convention did you use?</p> <p><i>These are some recommended questions that you might use. Others can be found be found at the beginning of the map and on the probing question sheet in the district mathematics guide.</i></p>

UNIT: STORIES, TABLES, AND GRAPHS
Investigation 2 (2.1 – 2.3) DAYS: 3

GRADE: 3

<p style="text-align: center;">Evidence of Learning Artifacts</p> <p>Journal and Reflection questions should be posted and referred to at the beginning of the appropriate <i>Investigation</i>.</p> <p>Journal and Reflection entries need to be done in class as part of the closure and assessment.</p>	<p>(3R) – 3 ring binder; (MNB) –marble notebook; (P) – portfolio</p> <p><i>Vocabulary</i> – repeating pattern, unit, multiple (3R)</p> <p><i>Work Time</i> – Student Sheets 27-41 (3R)</p> <p><i>Journal Entries</i> – (MNB) *Maximum 5 minutes Inv. 2.1 – 2.2 What is a repeating pattern? Give an example.</p> <p><i>Reflection</i> – Create a repeating pattern. Describe the unit of the pattern. Explain how you would know what color the 36th cube would be in your pattern. (P)</p>
<p style="text-align: center;">Accountable Talk</p> <p>To promote learning, explore solutions, and justify reasoning, conversations between students and students or students and teacher must be accountable – accountable to the learning community, to the mathematics discipline, and to rigorous thinking.</p>	<p><i>As a result of this Investigation, students should be able to talk and manipulate the vocabulary of the Investigation in response to this type of question:</i></p> <p style="padding-left: 40px;">How did you figure out your pattern? Can you solve the problem in a different way? Does your answer make sense? What was your strategy?</p> <p><i>These are some recommended questions that you might use. Others can be found at the beginning of the map and on the probing question sheet in the district mathematics guide.</i></p>

UNIT: STORIES, TABLES, AND GRAPHS

Investigation 3 (3.1 – 3.7)

DAYS: 7

GRADE: 3

<p>Evidence of Learning Artifacts</p> <p>Journal and Reflection questions should be posted and referred to at the beginning of the appropriate <i>Investigation</i>.</p> <p>Journal and Reflection entries need to be done in class as part of the closure and assessment.</p>	<p>(3R) – 3 ring binder; (MNB) –marble notebook; (P) – portfolio</p> <p><i>Vocabulary</i> – column, row, table, rate of change, intersect (3R)</p> <p><i>Work Time</i> – Student Sheets 43-73 (3R)</p> <p><i>Journal Entries</i> – (MNB) *Maximum 5 minutes</p> <p>Inv. 3.1 How did you organize your representation?</p> <p>Inv. 3.2 Explain why Tovar is not able to catch up to Zupin.</p> <p>Inv. 3.3 Without looking at your table, how many marbles will Winger have on day 12? How do you know?</p> <p>Inv. 3.4 If Tovar and Winger keep getting the same amount of marbles for 30 more days, will their graphs ever meet? Why or why not?</p> <p>Inv. 3.5 Why do you think the 2 graphs for Tovar and Gowen will cross?</p> <p><i>Reflection</i> – What conditions would have to exist for lines to intersect in your graph? (P)</p>
<p>Accountable Talk</p> <p>To promote learning, explore solutions, and justify reasoning, conversations between students and students or students and teacher must be accountable – accountable to the learning community, to the mathematics discipline, and to rigorous thinking.</p>	<p><i>As a result of this Investigation, students should be able to talk and manipulate the vocabulary of the Investigation in response to this type of question:</i></p> <p>How did you know...?</p> <p>Can you solve the problem in a different way?</p> <p>Does your answer make sense?</p> <p>What was your strategy?</p> <p><i>These are some recommended questions that you might use. Others can be found at the beginning of the map and on the probing question sheet in the district mathematics guide.</i></p>

End-of-Unit Project

Student work should be placed in **portfolio (P)**.

The project is the culminating assessment which will allow students to apply what they learned about data representations and patterns. It is written in MCAS form to give students the experience of answering an open-response question.

NAME: _____

DATE: _____

End-of-Unit Project

- **BE SURE TO ANSWER AND LABEL ALL PARTS OF EACH QUESTION.**
- **Show all work (diagrams, tables, and computations) on your answer sheet.**
- **If you do the work in your head, explain in writing how you did the work.**

Sophie's and Tom's Race

Sophie and Tom are training to run in a race. They each run several miles every day. So far, Sophie has run a total of 10 miles and Tom has run 30 miles.

There are 14 days left until the race.

Sophie thinks she should practice more, so she decides to run 5 miles every day until the race.

Tom thinks he is training too hard and decides to run 3 miles every day until the race.

1. a. Fill in the table to show how many miles Sophie and Tom will run in the next 10 days.

Days	Total Number of Miles	
	Sophie	Tom
So far	10	30
1	15	33
2		
3		
4		
5		
6		
7		
8		
9		
10		

- b. There are four more days until the race. How many miles will Sophie and Tom have run by the 14th day?

14		
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On-Demand Assessments

(To be filed in portfolio)

Stories, Tables, and Graphs Investigations

In class individualized On-Demand tasks assess knowledge of mathematical facts, operations, concepts, and skills, and their efficient application to problem solving. The results of these different forms of assessment provide rich profiles of students' achievements in mathematics and serve as the basis for identifying curricula and instructional approaches to best develop their talents.

UNIT: STORIES, TABLES, AND GRAPHS

On-Demand Assessments

GRADE: 3

<p>On-Demand Assessments (P)</p> <p><u>Stories, Tables, and Graphs Investigations</u></p> <p>In class individualized On-Demand tasks assess knowledge of mathematical facts, operations, concepts, and skills, and their efficient application to problem solving. The results of these different forms of assessment provide rich profiles of students' achievements in mathematics and serve as the basis for identifying curricula and instructional approaches to best develop their talents.</p>	<p><u>Inv. 1:</u> Resource Binder: Session 1.5, M20 and M21*</p> <p><u>Inv. 2:</u> none</p> <p><u>Inv. 3:</u> Resource Binder: Session 3.7, M30-32</p> <p>*Please refer to the section in the Teacher's Unit Guide entitled, "Professional Development" for examples of student work for each assessment.</p>
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Name _____

Date _____



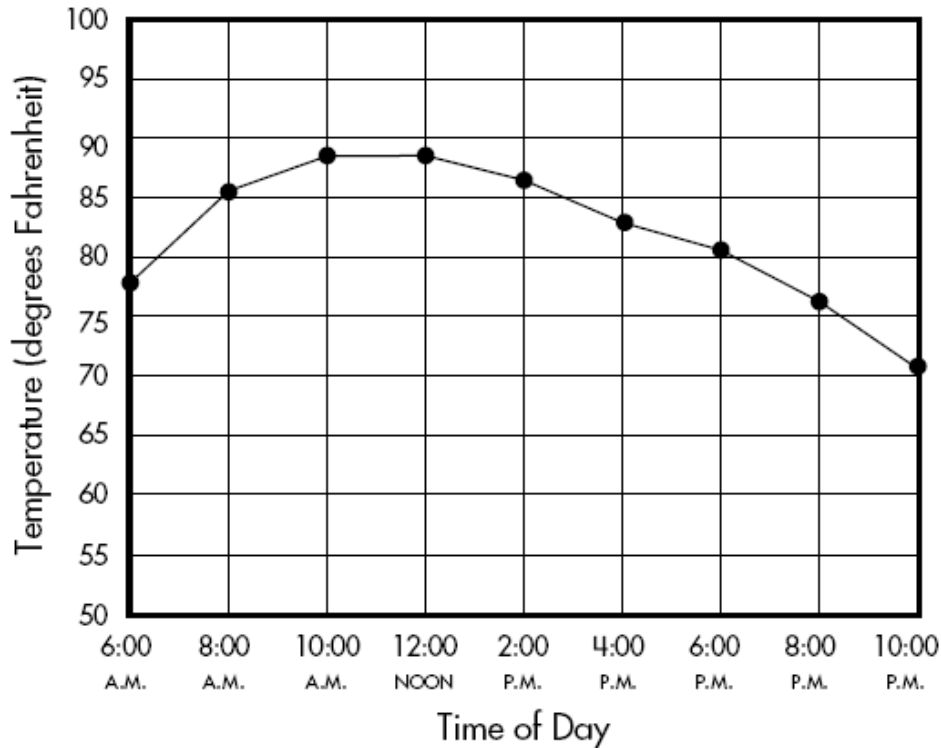
Stories, Tables, and Graphs

Assessment: A Summer Day in Cairo, Egypt

(page 1 of 2)



A Summer Day in Cairo, Egypt



1. Describe the shape of the graph. What does it tell you about this day?

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Name _____

Date _____



Stories, Tables, and Graphs

Assessment: A Summer Day in Cairo, Egypt (page 2 of 2)

2. On your graph, write the following above each part of the line where the temperature is:
Getting warmer Getting cooler Staying the same
3. What is the highest temperature on the graph? _____
What is the lowest temperature? _____
4. What kind of clothing might you wear if you were in Cairo on this day?

5. Compare this day in Cairo with a day where you live. Is there a month when you might have a day like this in your town?

Name _____

Date _____

Stories, Tables, and Graphs



End-of-Unit Assessment (page 2 of 7)



3. What is the same or different about the temperatures in Sydney on July 4 and December 26?

4. Compare the temperatures in Sydney on December 26 with the temperatures where you live on December 26. What is the same or different about the temperatures in Sydney and where you live?

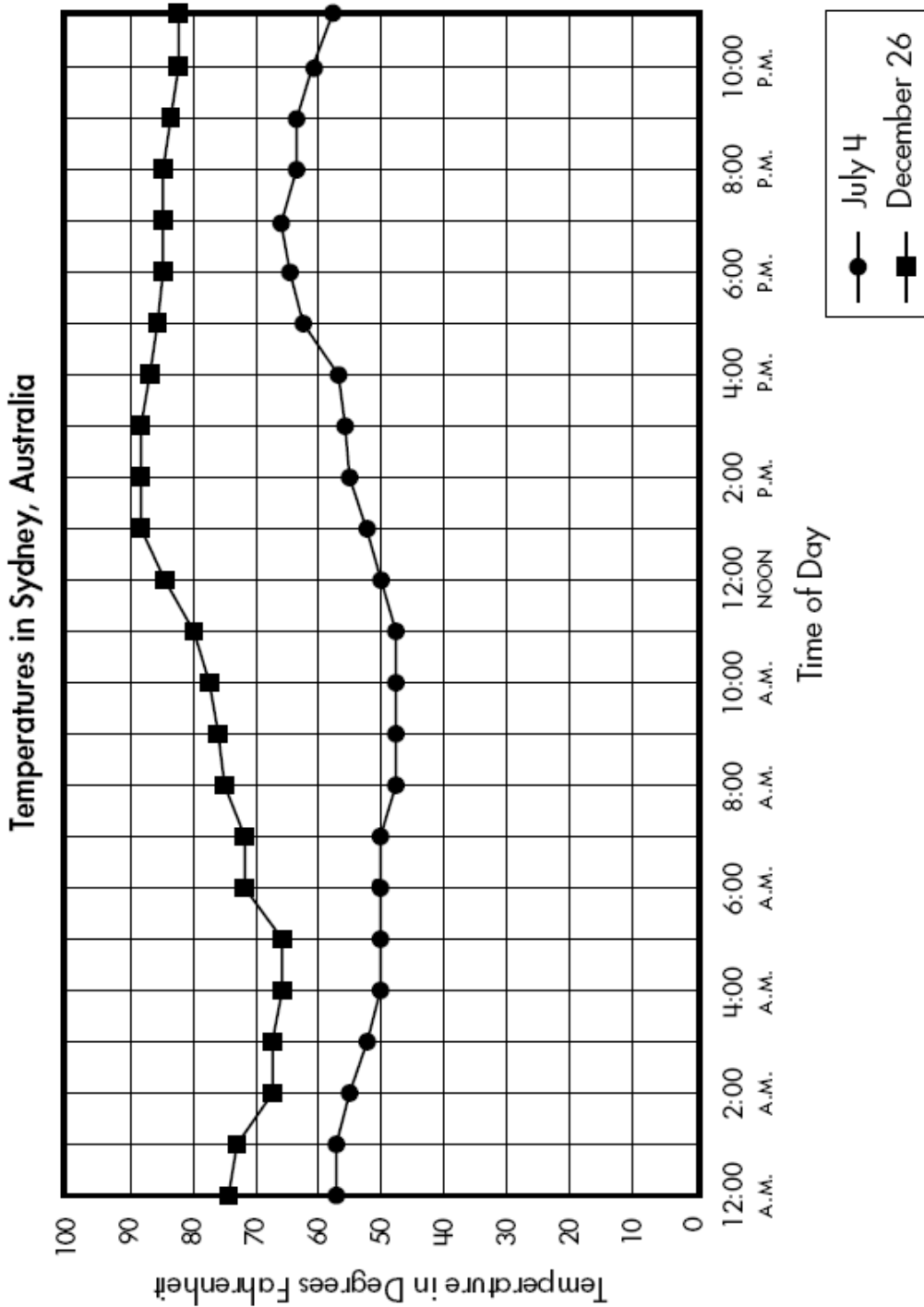
Name _____

Date _____



Stories, Tables, and Graphs

End-of-Unit Assessment (page 3 of 7)



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Mathematics

Scoring Rubric

Score point 4:

The response shows a *comprehensive* understanding of the mathematical concept(s) and/or procedures embodied in the task(s). It indicates that the student has *completed the task(s) correctly*, using mathematically sound procedures. It contains *clear, complete explanations* and/or *adequate work required*.

Score point 3:

The response shows a *general* understanding of the mathematical concept(s) and/or procedures embodied in the task(s). It indicates that the student has *completed the task(s)*, using mathematically sound procedures. It contains *complete explanations* and/or *adequate work required*.

Score point 2:

The response shows a *basic* understanding of the mathematical concept(s) and/or procedures embodied in the task(s). It addresses *most aspects of the task(s)*, using mathematically sound procedures. It may contain a correct solution but provides *incomplete procedures, reasoning and/or explanations*. It may reflect *some misunderstandings* of the underlying mathematical concepts and/or procedures.

Score point 1:

The response shows a *minimal* understanding of the mathematical concepts and/or procedures embodied in the task(s). It addresses *some elements of the task(s) correctly* but reaches an *inadequate solution and/or provides reasoning that is faulty or incomplete*. It exhibits *multiple flaws related to a misunderstanding of important aspects* of the task(s), *misuse* of mathematical procedures, or faulty mathematical reasoning. It reflects a *lack of essential understanding* of the underlying mathematical concepts. It may contain a correct numerical answer but the *required work is not provided*.

Score point 0:

The response is *completely incorrect, irrelevant, or incoherent*, or contains a correct response arrived at using an *obviously incorrect procedure*.

NOTES