Holyoke Public Schools

Mathematics Curriculum Map

Grade 5

Prisms and Pyramids

Table of Contents

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.
    - STUDENT MASTER – for project
5. INVESTIGATIONS:

- NOTEBOOK - includes: 3 Ring Binder, Bound Notebook, Portfolio
- ACCOUNTABLE TALK – using probing questions

6.. ON-DEMAND ASSESSMENTS - to be done during teaching of unit.

- STUDENT MASTERS- for on-demand assessments.

Mathematics
Evidence of Learning Artifacts

Artifact	K - 1	2 - 5	6 - 8
3 Ring Binder (3R)*	o Student Work[1]	o Vocabulary o Student sheets[1] ***All work should be dated and listed by investigation***	o Math books o Vocabulary o Core Problems[1] o Lab sheets ***All work should be dated and listed by investigation***
Marble Notebook (MNB)	o Journal entries[2]	o Table of Contents o Problem of the day o Journal entries o Class work ***All work should be dated and listed by investigation in the Table of Contents***	o Table of Contents o Work time o Journal entries ***All work should be dated and listed by investigation in the Table of Contents***
Portfolio[3] ***(P)***	o On-demand tasks o Projects o Teacher anecdotal notes	o On-demand tasks o Reflections o Projects ***All work should be dated and listed by investigation***	o On-demand tasks o Reflections o Projects ***All work should be dated and listed by investigation***

[*] *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*

Prisms and Pyramids
Probing Questions for Accountable Talk

As students progress through this unit, they should be asked the following questions to assess their knowledge about three-dimensional shapes and volume.

- *What are the attributes of a cube?*
- *What is the relationship between a change of one dimension of a box and the volume?*
- *How do prisms and pyramids differ?*
- *What strategies did you use to determine the number of cubes to fill the box?*
- *How can layers help you to find volume?*
- *What strategies can you use to double the volume of a package?*
- *How can changing the dimensions of a box change the number of cubes in a box?*
- *How do you determine what unit to use when measuring?*
- *How can you compare the volumes of different containers?*

Ten-Minute Math

Ten-Minute Math: Session 1.1, "Quick Images: 3D"
Ten-Minute Math: Session 1.1, "Estimation and Number Sense"

Ten-Minute Math activities 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 5: Please review pages 24-25 for the 2 Ten-Minute Math activities in this unit.

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 <….> 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:

- Find the volume of rectangular prisms
- Use standard units to measure volume
- Identify how the dimensions of a box change when the volume is changed
- Explain the relationship between the volumes of prisms and pyramids with the same base and height.

Math Content Standards:

(5.G.2) Identify, describe, and compare special types of three-dimensional shapes (cubes, prisms, spheres, pyramids) based on their properties, such as edges and faces.
(5.M.4) Find volumes and surface areas of rectangular prisms.

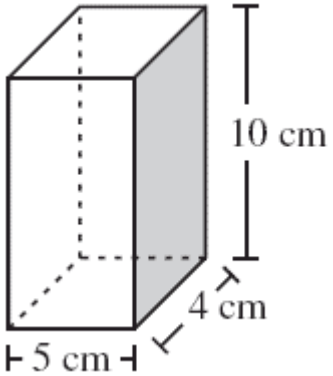
Performance Standards:

(M2g) Uses basic ways of estimating and measuring the size of figures and objects in the real world, including length, width, perimeter, and area
(M2i) Selects and uses units, both formal and informal as appropriate, for estimating and measuring quantities such as weight, length, area, volume, and time.

UNIT: Prisms and Pyramids

End-of-Unit Project

GRADE: 5

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.	Mattias has a rectangular prism with the dimensions shown below.  a. What is the area, in square centimeters, of the shaded face of the rectangular prism? Show or explain how you got your answer. b. What is the volume, in cubic centimeters, of the rectangular prism? Show or explain how you got your answer. c. What is the total surface area, in square centimeters, of the rectangular prism? Show or explain how you got your answer.

UNIT: Prisms and Pyramids
Investigation 1 (1.1 – 1.7) DAYS: 7

GRADE: 5

Evidence of Learning Artifacts Journal and Reflection questions should be posted and referred to at the beginning of the appropriate *Investigation*. Journal and Reflection entries need to be done in class as part of the closure and assessment.	**(3R) – 3 ring binder; (MNB) – marble notebook; (P) – portfolio** ***Vocabulary*** – volume, rectangular prism, dimension, (3R) ***Work Time –*** Student Sheets: 1-30 (3R) ***Journal Entries*** – (MNB) *Maximum 5 minutes **Inv. 1.1** What strategies did you try for determining the number of cubes that would fit in a box without building it? **Inv. 1.2** What is volume and how do you find it? **Inv. 1.3** What are some strategies that could be used for doubling the volume? **Inv. 1.4** Is there only one way each package can fit in a box? Explain. **Inv. 1.5** None, due to assessment **Inv. 1.6** How do the dimensions of a box change when the volume is changed? **Inv. 1.7** How did you figure the dimensions of the box for each of the different size packages? ***Reflection*** – How can you use the dimensions of a box to determine how many separate packages can fit within the box? (P)
Accountable Talk 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.	*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:* How did you know that? How can you use …? Can you show another way? What convention did you use? *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.*

UNIT: Prisms and Pyramids
Investigation 2 (2.1 – 2.4) DAYS: 4

GRADE: 5

Evidence of Learning Artifacts Journal and Reflection questions should be posted and referred to at the beginning of the appropriate *Investigation*. Journal and Reflection entries need to be done in class as part of the closure and assessment.	**(3R) – 3 ring binder; (MNB) –marble notebook; (P) – portfolio** ***Vocabulary*** – cubic centimeter, linear, volume, cubic meter, length, width, height (3R) ***Work Time –*** Student Sheets: 31-38 (3R) ***Journal Entries*** – (MNB) *Maximum 5 minutes **Inv. 2.1** What is the difference between linear units and cubic units? **Inv. 2.2** Why is cubic meters the best measurement for measuring our classroom? **Inv. 2.3** A room has a volume of 480 cubic meters. The length measures 8m, and the width is 6m. Find the missing height. **Inv. 2.4** None, due to Assessment ***Reflection*** – How would you determine the volume of an aquarium with the given dimensions 12 x 14 x 10? Show and explain your work. Be sure to use correct units of measurement.(P)
Accountable Talk 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.	*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:* How did you know…? Can you solve the problem in a different way? Does your answer make sense? What was your strategy? *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.*

UNIT: Prisms and Pyramids
Investigation 3 (3.1 – 3.5) DAYS: 5

GRADE: 5

Evidence of Learning Artifacts Journal and Reflection questions should be posted and referred to at the beginning of the appropriate *Investigation*. Journal and Reflection entries need to be done in class as part of the closure and assessment.	**(3R) – 3 ring binder; (MNB) –marble notebook; (P) – portfolio** ***Vocabulary*** – pyramid, cylinder, cone (3R) ***Work Time –*** Student Sheets: 39 - 49 (3R) ***Journal Entries*** – (MNB) *Maximum 5 minutes **Inv. 3.1** How did the volume of a rectangular pyramid compare to the volume of a rectangular prism? **Inv. 3.2** What is the relationship between the bases and the heights of the pair of solids you have been investigating? **Inv. 3.3** What strategy did use to build your prism and how does it compare to the pyramid? **Inv. 3.4** What method did you find most useful for determining the volume of the solids? Why? **Inv. 3.5** None, due to assessment ***Reflection*** – Explain the volume relationship between solids with the same base and height.(P)
Accountable Talk 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.	*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:* How did you know…? Can you solve the problem in a different way? Does your answer make sense? What was your strategy? *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.*

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 three-dimensional shapes and volume. It is written in MCAS form to give students the experience of answering an open-response question.

NAME: _____ **DATE:** _____

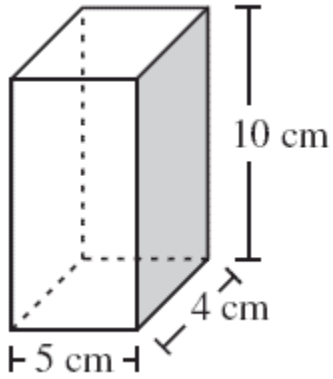
End-of-Unit Project

- **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.**

2005 MCAS Grade 6 Mathematics

Question 27: Measurement

Mattias has a rectangular prism with the dimensions shown below.



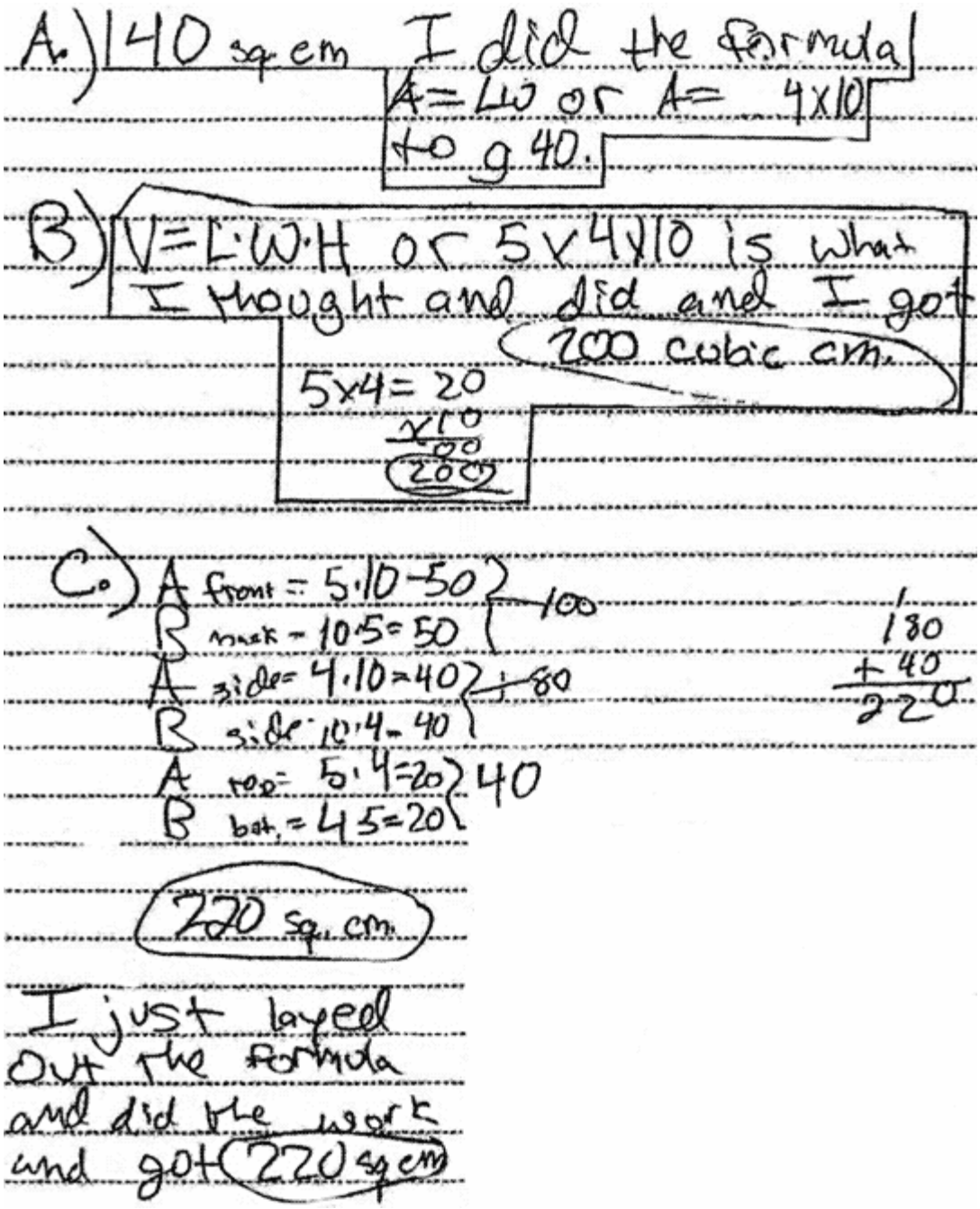
a. What is the area, in square centimeters, of the shaded face of the rectangular prism? Show or explain how you got your answer.
b. What is the volume, in cubic centimeters, of the rectangular prism? Show or explain how you got your answer.
c. What is the total surface area, in square centimeters, of the rectangular prism? Show or explain how you got your answer.

Scoring Guide and Sample Student Work

Select a score point in the table below to view the sample student response

Score	Description
4	The student response demonstrates an exemplary understanding of the Measurement concepts involved in finding the volume and surface area of a rectangular prism.
3	The student response demonstrates a good understanding of the Measurement concepts involved in finding the volume and surface area of a rectangular prism. Although there is significant evidence that the student is able to recognize and apply the concepts involved, some aspect of the response is flawed. As a result, the response merits 3 points.
2	The student response demonstrates a fair understanding of the Measurement concepts involved in finding the volume and surface area of a rectangular prism. While some aspects of the task are completed correctly, others are not. The mixed evidence provided by the student merits 2 points.
1	The student response demonstrates only a minimal understanding of the Measurement concepts involved in finding the volume and surface area of a rectangular prism.
0	The student response contains insufficient evidence of an understanding of the Measurement concepts involved in finding the volume and surface area of a rectangular prism to merit any points.

2005 MCAS
Grade 6 Mathematics
Question 27 - Score Point 4



2005 MCAS
Grade 6 Mathematics
Question 27 - Score Point 3

A. The shaded face is only 2 dimensonal, so only 2 factors will apply that side's length is 10 cm, and it's width is 4 cm. If you multiply those dimensions, the shaded region's area is 40 cm^2.

B. To get the volume of a rectangular prism, you must multiply the base times the width times the height. The volume of Mathew's rectangular prism is 200 cm^3.

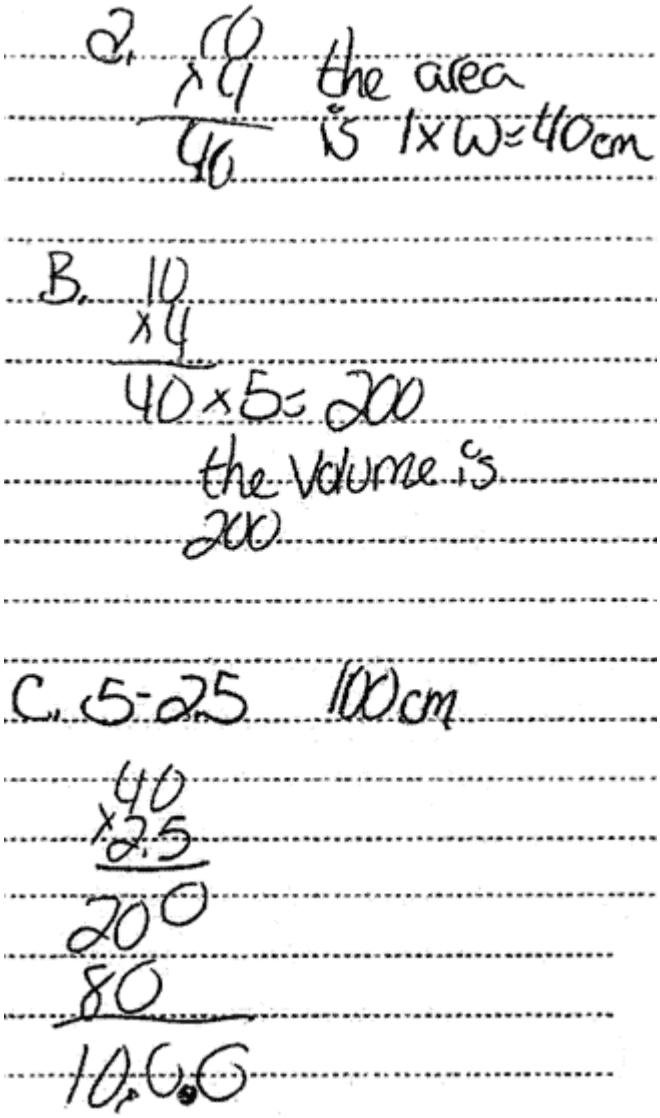
C. The total surface area is 200 cm^2. The top and bottom surfaces are 5 by 4 cm, making both 20 sq cm. The four sides are each 4 by 10 cm, making them 40 sq cm each. If you add them up, you will get 200 sq cm.

A
$$\begin{array}{r} 10 \\ \times\ 4 \\ \hline 40 \end{array}$$

B
$$\begin{array}{r} 5 \\ \times\ 4 \\ \hline 20 \\ \times\ 10 \\ \hline 00 \\ +200 \\ \hline 200 \end{array}$$

C
$$\begin{array}{r} 20 \\ 20 \\ 40 \\ 40 \\ 40 \\ +40 \\ \hline 200 \end{array}$$

2005 MCAS
Grade 6 Mathematics
Question 27 - Score Point 2



2005 MCAS
Grade 6 Mathematics
Question 27 - Score Point 1

(a) 5 + 4 + 10 = 19 cm

(B) 5 x 4 x 10 = 200

(C) 19 + 200 = 219

On-Demand Assessments

(To be filed in portfolio)

Prisms and Pyramids
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: Prisms and Pyramids

On-Demand Assessments

GRADE: 5

On-Demand Assessments (P) <u>Prisms and Pyramids</u> 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.	***<u>Inv. 1</u>:*** Resource Binder: Session 1.5, M19-M20** ***<u>Inv. 2</u>:*** Resource Binder: Session 2.4, M24**, Assessment Checklist M25* ***<u>Inv. 3</u>:*** Resource Binder: Session 3.5, End of Unit Assessment, M35-M36** *Assessment Checklists should be kept with tracking sheets.(if there is an assessment that we are asking them to use ****Please refer to the section in the Teacher's Unit Guide entitled, "Professional Development" for examples of student work for each assessment.**

Holyoke Public Schools
2007 - 2008
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