



Holyoke Public Schools Mathematics Curriculum Map Grade 3

Perimeter, Angles, and Area

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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.
 - STUDENT MASTER – for project
5. INVESTIGATIONS:
 - NOTEBOOK - includes: 3 Ring Binder, Bound Notebook, Portfolio
 - ACCOUNTABLE TALK – using probing questions
5. 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
<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

Perimeter, Angles, and Area Probing Questions for Accountable Talk

As students progress through this unit, they should be asked the following questions to assess their knowledge about area, perimeter and angles.

What is perimeter?

What is area?

Why do we measure area in square units?

What strategies do you use to find the perimeter of a non-rectangular figure?

What strategy did you use to compute the total area?

Classroom Routines and Ten Minute Math

Continue from previous units

Classroom Routines: “What’s the Temperature?”

Ten Minute Math: “Practicing Place Value”

New to this unit

Ten Minute Math: Session 1.5, “Quick Images: 2-D”

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, 29 -34, 40-42 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?

Goals, Content Standards, & Performance Standards

Unit Goals:

- Identify and measure the perimeter of a figure using U.S. standard and metric units.
- Identify and find the area of given figures by counting whole and partial square units.
- Identify triangles as three-sided closed figures with three vertices and three angles.
- Identify right angles, and recognize whether an angle is larger or smaller than a right angle.

Math Content Standards:

(3.N.12) Understand and use the strategies of rounding and regrouping to estimate quantities, measures, and the results of whole-number computations (addition, subtraction, and multiplication) up to two-digit whole numbers and amounts of money to \$100, and to judge the reasonableness of the answer.

(3.G.1) Compare and analyze attributes and other features (e.g., number of sides, corners, diagonals, and lines of symmetry) of two-dimensional geometrical shapes.

(3.G.2) Describe, model, draw, compare, and classify two-dimensional shapes, e.g., circles, triangles, and quadrilaterals. Identify and describe three-dimensional shapes e.g., cubes, spheres, and pyramids.

(3.G.3) Identify angles as right angles, less than a right angle, and greater than a right angle.

(3.M.1) Demonstrate and understanding of the attributes of length, area, weight, and select the appropriate type of unit for measuring each attribute using both the U.S. Customary (English) and metric system.

(3.M.4) Estimate and find the area and perimeter of a rectangle using diagrams and grids, or by measuring.

(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:

(M2g) Uses basic ways of estimating and measuring the size of figures and objects in real world including length, width, perimeter, and area.

(M2h) Use models to reason about the relationship between the perimeter and area of rectangles in simple situations.

(M2i) Selects and uses units both formal and informal as appropriate for estimating and measuring quantities such as length and area.

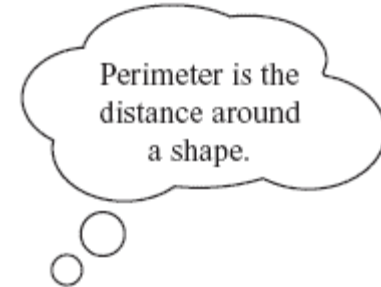
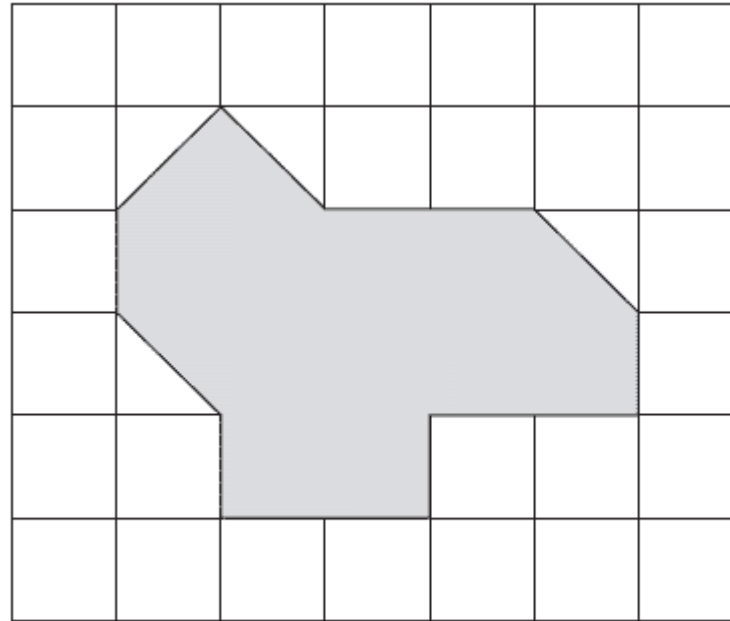
UNIT: Perimeter, Angles, and Area
End-of-Unit Project
GRADE: 3

**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.

The picture below shows the shaded figure that Diego drew on a piece of grid paper.



1 unit

1 unit



Each  represents 1 square unit.

- What is the area, in square units, of the shaded figure? Show or explain how you got your answer.
- What are the dimensions (length and width), in units, of a rectangle with the same area as the shaded figure? Show or explain how you got your answer.
- What is the perimeter, in units, of the rectangle you described in part (b)? Show or explain how you got your answer.

UNIT: PERIMETER, ANGLES, AND AREA
Investigation 1 (1.1 – 1.5) DAYS: 6

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> – centimeter, inch, foot, measurement benchmark, meter, perimeter, yard (3R)</p> <p><i>Work Time</i> – Student Sheets 1 – 17 (3R)</p> <p><i>Journal Entries</i> – (MNB) *Maximum 5 minutes</p> <p style="padding-left: 40px;">Inv. 1.1 How can measurement benchmarks help you when you need to figure out how long something is when you don't have a measurement tool?</p> <p style="padding-left: 40px;">Inv. 1.4 What did you discover about the perimeter of the shapes we used today</p> <p style="padding-left: 40px;">Inv. 1.5 What strategy did you use to remember the Quick Image after seeing it quickly?</p> <p><i>Reflection</i> – Explain how different shapes can still have the same perimeter? Use pictures, numbers and words. (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 style="padding-left: 40px;">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 at the beginning of the map and on the probing question sheet in the district mathematics guide.</i></p>

UNIT: PERIMETER, ANGLES, AND AREA

Investigation 2 (2.1 – 2.6)

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>Vocabulary – area, congruent, rectangle, reflection (flip), rotation (turn), square unit, translation (slide), triangle, tetromino (3R)</p> <p>Work Time – Student Sheet pages 18 - 36 (3R)</p> <p>Journal Entries – (MNB) *Maximum 5 minutes</p> <p>Inv. 2.1 How do you know you found all of the shapes?</p> <p>Inv. 2.3 What is the relationship between a triangle and a rectangle?</p> <p>Inv. 2.5 What is the difference between area and perimeter?</p> <p>Reflection – Explain how you determine the area of a rectangle that is partially covered? Use pictures, numbers and words to explain your thinking.(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 be found at the beginning of the map and on the probing question sheet in the district mathematics guide.</i></p>

UNIT: PERIMETER, ANGLES, AND AREA

Investigation 3 (3.1 – 3.6)

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>Vocabulary – acute, attributes, degree, obtuse, parallelogram, quadrilateral, right angle, triangle, vertex (vertices) (3R)</p> <p>Work Time – Student Sheet pages 37 -57 (3R)</p> <p>Journal Entries – (MNB) *Maximum 5 minutes</p> <p>Inv. 3.1 What are some of the attributes you noticed about all of the triangles you made today?</p> <p>Inv. 3.3 Compare and contrast the attributes of squares and rectangles.</p> <p>Inv. 3.4 Draw a right angle, an acute angle, and an obtuse angle. Name a shape for each with those angles.</p> <p>Reflection – Compare and contrast rectangles, parallelograms, squares, and triangles. Use pictures, numbers, and words to show your thinking.(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)**.

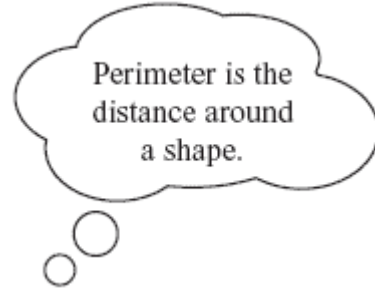
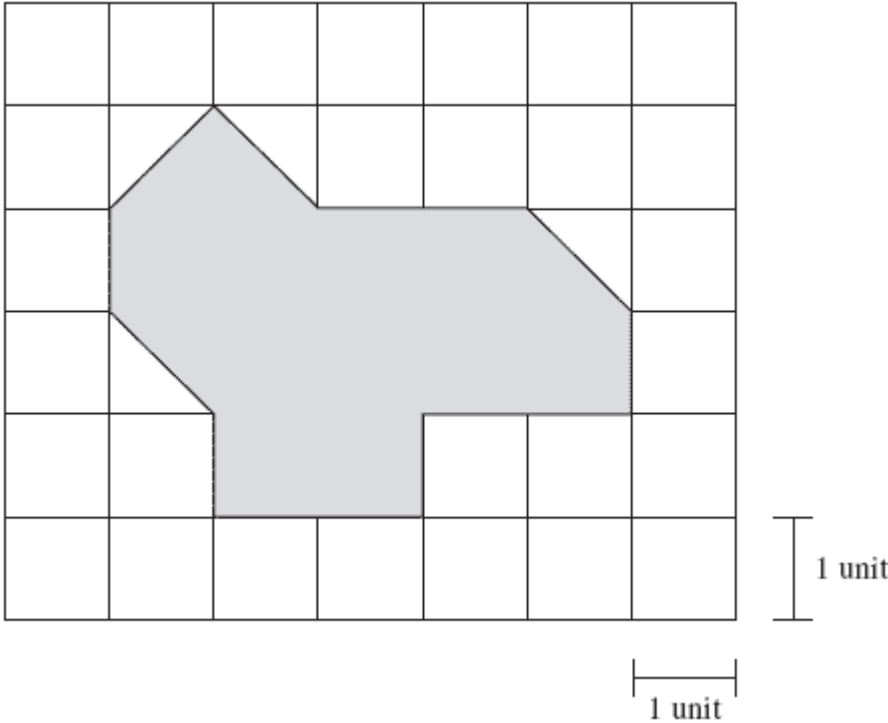
The project is the culminating assessment which will allow students to apply what they learned about perimeter, area, and angles. It is written in MCAS form to give students the experience of answering an open-response question.

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.**



Each  represents 1 square unit.

- What is the area, in square units, of the shaded figure? Show or explain how you got your answer.
- What are the dimensions (length and width), in units, of a rectangle with the same area as the shaded figure? Show or explain how you got your answer.
- What is the perimeter, in units, of the rectangle you described in part (b)? Show or explain how you got your answer.

Scoring Guide and Sample Student Work

Score	Description
<u>4</u>	The student response demonstrates an exemplary understanding of the Measurement concepts involved in estimating and finding area and perimeter of a rectangle or irregular shape using grids. The student finds the area of an irregular shape and then finds the dimensions and perimeter of a rectangle with the same area as a given shape.
<u>3</u>	The student response demonstrates a good understanding of the Measurement concepts involved in estimating and finding area and perimeter of a rectangle or irregular shape using grids. Although there is significant evidence that the student recognizes and applies the concepts involved, some aspect of the response is flawed. As a result, the response merits 3 points.
<u>2</u>	The student response demonstrates a fair understanding of the Measurement concepts involved in estimating and finding area and perimeter of a rectangle or irregular shape using grids. While some aspects of the task are completed correctly, others are not. The mixed evidence provided by the student merits 2 points.
<u>1</u>	The student response demonstrates a minimal understanding of the Measurement concepts involved in estimating and finding area and perimeter of a rectangle or irregular shape using grids.
<u>0</u>	The student response contains insufficient evidence of an understanding of the Measurement concepts involved in estimating and finding area and perimeter of a rectangle or irregular shape using grids to merit any points.

2006 MCAS
Grade 4 Mathematics
Question 10 - Score Point 4

a. 12 square units, is the area

How I got my answer is I made boxes in the figure, from the lines outside. I noticed they were halves too, and there were four halves. 4 halves = equals 2 wholes so, in all there were 12 square units.

b. 2 by 6 could be one, because I thought, what times what equals 12. so I knew $2 \times 6 = 12$.

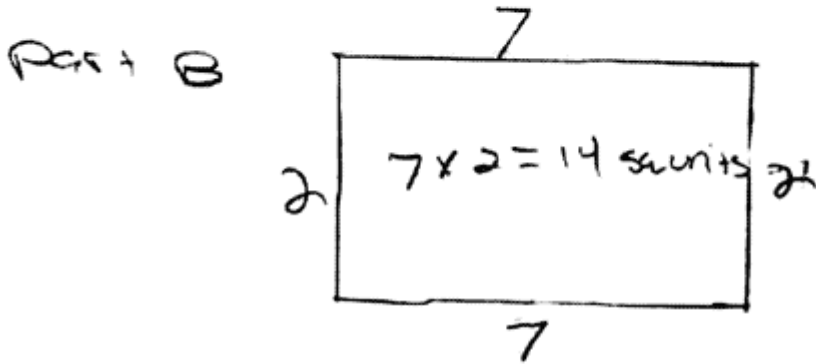
c. The perimeter is 16 inches

How, I got my answer is I did $2+2+6+6$ which equals 16 inches.

$$\begin{array}{r} 2+2=4 \\ 6+6=12 \\ \hline 12 \\ + 4 \\ \hline 16 \end{array}$$

2006 MCAS
Grade 4 Mathematics
Question 10 - Score Point 3

Part A I drew squares in the shaded figure to get my answer. I had to count them and then I got 14 square units.



Part C

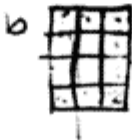
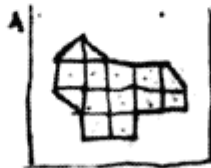
$$\begin{array}{r} 7 \\ + 7 \\ + 2 \\ \hline 18 \text{ units} \end{array}$$

2006 MCAS
Grade 4 Mathematics
Question 10 - Score Point 2

A. 12 square units

B. 4 length 3 width.

C. 10 is the perimeter.
I counted the boxes to get the perimeter.



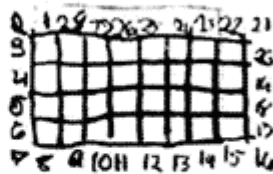
2006 MCAS
 Grade 4 Mathematics
 Question 10 - Score Point 1

A) 12 I made lines in the figure to make 4 wholes = 2 wholes

B) 8 and 4 because 12 is the measure of the figure so

$$6 + 6 = 12$$

$$8 + 4 = 12$$



28

C) 28 is my Perimeter



On-Demand Assessments

(To be filed in portfolio)

Perimeter, Angles, and Area 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: PERIMETER, ANGLES, AND AREA

On-Demand Assessments

GRADE: 3

On-Demand Assessments (P)

Perimeter, Angles, and Area 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.

Inv. 1: Resource Binder: Session 1.3, M15** Assessment Checklist on M14

Inv. 2: Resource Binder: Session 2.6, M20 **

*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.**



Assessment Checklist: Measuring Perimeter

M14

Unit 4

Sessions 1.3, 1.4, 1.5

	Correctly identifies the perimeter of the shape	Uses measurement tools correctly (Keeps tool straight, no gaps or overlaps, begins each iteration at 0, etc.)	Keeps track of partial measurements	Accurately calculates the total perimeter (Records in U.S. or metric units; does not mix units)
Student				



Holyoke Public Schools

2006 - 2007

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 mathematical 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 mathematical 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