



# Holyoke Public Schools Mathematics Curriculum Map Grade 4

# Fraction Cards and Decimal Squares

# Table of Contents

Curriculum Map Outline.....	4
Mathematic Evidence of Learning Artifacts.....	5
Probing Questions for Accountable Talk.....	6
Additional Probing Questions.....	7
Goals, Content Standards, & Performance Standards.....	8
End-of-Unit Project Preview.....	9
Investigations 1-3.....	10
End-of-Unit Project.....	13
On-Demand Assessments.....	20
HPS Mathematics Scoring Rubric.....	25

# 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

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

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

<sup>1</sup> Send home at the end of each unit

<sup>2</sup> Use grade level math journals

<sup>3</sup> All documents should be kept for the entire year

## Fraction Cards and Decimal Squares Probing Questions for Accountable Talk

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

- What patterns do you notice?
- What are some strategies for solving addition and subtraction problems?
- Does the strategy always work?
- Can you compare fractions to decimals?
- What relationship do they have?

### *Ten Minute Math*

Ten Minute Math: Investigation 1,3 Practicing Place Value  
Investigation 2, Quick Survey

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 4: Please review pages 23, 24 -34, for 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  $< \dots >$  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:

- Identify fractional parts of an area
- Identify fractional parts of a group (of objects, people, etc.)
- Read, write, and interpret fraction notation
- Order fractions with like and unlike denominators
- Read, write, and interpret decimal fractions in tenths and hundredths

## Math Content Standards:

(4.N.3) Demonstrate an understanding of fractions as parts of unit wholes, as parts of a collection, and as locations on a number line

(4.N.4) Select, use and explain models to relate common fractions and mixed numbers, find equivalent fractions, mixed numbers, and decimals, and order fractions.

(4.N.5) Identify and generate equivalent forms of common decimals and fractions less than one whole

(4.N.6) Exhibit an understanding of the base ten number system by reading, naming, and writing decimals between 0 and 1 up to the hundredths

(4.N.18) Use concrete objects and visual models to add and subtract common fractions

## Performance Standards:

(M1d) Describes and compares quantities by using concrete and real world models of simple fractions; that is

- finds parts of a simple whole
- recognizes the place of fractions on number lines
- uses drawings, diagrams, or models to show what the numerator and denominator mean

(M1e) Describes and compares quantities by using simple decimals

- recognizes relationships among simple fraction, decimals, and percents

# UNIT: Fraction Cards and Decimal Squares

## End-of-Unit Project

GRADE: 4

### 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.

Molly sings in the chorus at her school. In the chorus,  $\frac{3}{5}$  of the students are in the fourth grade, and the rest are in the fifth grade.

- a. What fraction of the students in the chorus are in the fifth grade? Show or explain how you got your answer.
- b. Write your answer from part (a) as a **decimal**. Show or explain how you got your answer.
- c. There are 35 students in the chorus. What is the total number of students in the chorus who are in the fifth grade? Show or explain how you got your answer.

UNIT: Fraction Cards and Decimal Squares  
Investigation 1 (1.1 – 1.7)                      DAYS: 7

GRADE: 4

<p><b>Evidence of Learning Artifacts</b></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><b>(3R) – 3 ring binder; (MNB) – marble notebook; (P) – portfolio</b></p> <p><i>Vocabulary</i> – fraction, denominator, numerator, thirds, sixths, halves, fourths, eighths(3R)</p> <p><i>Work Time</i> – Student Activity Book pgs. 1 – 25 (3R)</p> <p><i>Journal Entries</i> – (MNB) *Maximum 5 minutes</p> <p><b>Inv. 1.1</b> Explain the meaning of <math>\frac{3}{4}</math>. Give an example to illustrate your answer.</p> <p><b>Inv. 1.2</b> How are thirds and sixths related?</p> <p><b>Inv. 1.3</b> What strategies did you use to solve the problem we worked on today?</p> <p><b>Inv. 1.4</b> What strategy did you use to find the fractional part of the 5x12 rectangle?</p> <p><b>Inv. 1.5</b> None, due to assessment</p> <p><b>Inv. 1.6</b> How can you use the area of a rectangle to help you add fractions?</p> <p><b>Inv. 1.7</b> Is the sum of <math>\frac{1}{2}</math> and <math>\frac{3}{4}</math> more or less than 1? Explain.</p> <p><i>Reflection</i> – Divide a 4x12 rectangle into at least four different fractional parts. Then, write an equation showing how all of your fractional parts add up to 1. (P)</p>
<p><b>Accountable Talk</b></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 at the beginning of the map and on the probing question sheet in the district mathematics guide.</i></p>

UNIT: Fraction Cards and Decimal Squares  
Investigation 2 (2.1 – 2.6)                      DAYS: 9

GRADE: 4

<p><b>Evidence of Learning Artifacts</b></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><b>(3R) – 3 ring binder; (MNB) –marble notebook; (P) – portfolio</b></p> <p><i>Vocabulary</i> – equivalent fractions, mixed numbers, improper fractions (3R)</p> <p><i>Work Time</i> – Student Activity Book pgs. 26 - 43 (3R)</p> <p><i>Journal Entries</i> – (MNB) *Maximum 5 minutes</p> <p><b>Inv. 2.1</b> How do you know your picture represents <math>\frac{3}{2}</math>?</p> <p><b>Inv. 2.2</b> How do you know if two fractions are equivalent?</p> <p><b>Inv. 2.3</b> How did you decide which fraction was greater?</p> <p><b>Inv. 2.4</b> How do you decide if a fraction is less than or more than <math>\frac{1}{2}</math>?</p> <p><b>Inv. 2.5</b> How can you use landmark fractions to order fractions on a number line?</p> <p><b>Inv. 2.6</b> None, due to assessment</p> <p><i>Reflection</i> – Which is larger <math>\frac{3}{2}</math> or <math>\frac{2}{3}</math>? Use words and pictures to explain your answer.(P)</p>
<p><b>Accountable Talk</b></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...?</p> <p style="padding-left: 40px;">Can you solve the problem in a different way?</p> <p style="padding-left: 40px;">Does your answer make sense?</p> <p style="padding-left: 40px;">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: Fraction Cards and Decimal Squares  
 Investigation 3 (3.1 – 3.7)                      DAYS: 9

GRADE: 4

<p><b>Evidence of Learning Artifacts</b></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><b>(3R) – 3 ring binder; (MNB) –marble notebook; (P) – portfolio</b></p> <p><i>Vocabulary</i> – decimal, tenths, hundredths, thousandths (3R)</p> <p><i>Work Time</i> – Student Activity Book pgs. 44-61 (3R)</p> <p><i>Journal Entries</i> – (MNB) *Maximum 5 minutes</p> <p><b>Inv. 3.1</b> How is place value used in decimals?  <b>Inv. 3.2</b> Why is 0.3 larger than 0.25?  <b>Inv. 3.3</b> What strategies can you use to combine decimals?  <b>Inv. 3.4</b> What strategies did you use for estimating?  <b>Inv. 3.5</b> On your running log how did you decide if your sum was reasonable or not?  <b>Inv. 3.6</b> Explain how you decided what decimals and whole numbers you used to get to 10.5 miles.  <b>Inv. 3.7</b> None, due to assessment</p> <p><i>Reflection</i> – Put these decimals in order on the number line.          0.6 (six-tenths), 0.8 (eight tenths), 0.55 (fifty-five hundredths),          0.125 (one hundred twenty-five thousandths)          Explain how you decided what the order of the decimals should be. (P)</p>
<p><b>Accountable Talk</b></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...?          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 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 fractions and decimals. 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.**

Molly sings in the chorus at her school. In the chorus,  $\frac{3}{5}$  of the students are in the fourth grade, and the rest are in the fifth grade.

- a. What fraction of the students in the chorus are in the fifth grade? Show or explain how you got your answer.
- b. Write your answer from part (a) as a **decimal**. Show or explain how you got your answer.
- c. There are 35 students in the chorus. What is the total number of students in the chorus who are in the fifth grade? 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 Number Sense and Operations concepts necessary to solve problems involving subtracting fractions and multiplying fractions by whole numbers. The student successfully subtracts a fraction from a whole number, converts a fraction into a percent, and multiplies a fraction by a whole number.
<u>3</u>	The student response demonstrates a good understanding of the Number Sense and Operations concepts necessary to solve problems involving subtracting fractions and multiplying fractions by whole numbers. 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 Number Sense and Operations concepts necessary to solve problems involving subtracting fractions and multiplying fractions by whole numbers. 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 Number Sense and Operations concepts involved in solving problems involving subtracting fractions and multiplying fractions by whole numbers.
<u>0</u>	The student response contains insufficient evidence of an understanding of the Number Sense and Operations concepts involved in solving problems involving subtracting fractions and multiplying fractions by whole numbers to merit any points.

2006 MCAS  
Grade 5 Mathematics  
Question 13 - Score Point 4

Ⓐ - I know that the whole thing would equal  $\frac{5}{5}$ .  $\frac{5}{5} - \frac{2}{5}$  is  $\frac{3}{5}$ . I used the operation of subtraction because to find out how many people are in 5th grade, I would need to subtract the subtotal from the real total.  $\frac{2}{5}$  means there are  $\frac{2}{5}$  of the students in chorus that is in 5th grade.

Ⓑ - I know that  $\frac{5}{5}$  is 100%.  $100\% \div 5$  is 20%. Since  $\frac{1}{5}$  is 20%,  $20\% \times 2$  is 40%. The answer 40% represents the answer from Part A in a percent.

Ⓒ - Since there is 35 peoples in all in the Chorus and there are 5 parts to the answer,  $35 \div 5$  is 7. I knew that one part is 7,  $\frac{2}{5}$  must be 14 peoples. The 14 peoples represents the number of peoples in 5th grade that is in chorus.

2006 MCAS

Grade 5 Mathematics

Question 13 - Score Point 3

Ⓐ  $\frac{5}{5} - \frac{3}{5} = \frac{2}{5}$   $\frac{2}{5}$  are in fifth grade

Ⓑ  $40\%$   $100 \div 5 = 20$   $20 \times 2 = 40$

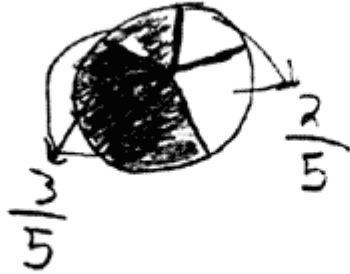
Ⓒ  $35 \div 5 = 8$   $8 \times 3 = 24$   $24$  students  
are fifth graders

2006 MCAS  
Grade 5 Mathematics  
Question 13 - Score Point 2

- Ⓐ I think  $\frac{2}{5}$  of the chowas is fifth graders.
- Ⓑ  $\frac{2}{5}$  in percentedge is 40% because 20 goes into 100 5 times so  $\frac{1}{5} = 20\%$  so  $\frac{2}{5} = 40\%$ .
- Ⓒ I think it is 7 because 7 goes into 35 5 times so I think it would be 7.

2006 MCAS  
Grade 5 Mathematics  
Question 13 - Score Point 1

a.  $\frac{2}{5}$  of the students are in the fifth grade.



b.  $\frac{2}{5} = 40\%$

# On-Demand Assessments

(To be filed in portfolio)

## Fraction Cards and Decimal Squares 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: Fraction Cards and Decimal Squares

## On-Demand Assessments

GRADE: 4

### On-Demand Assessments (P)

#### Fraction Cards and Decimal Squares 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 1.5, M12\*

**Inv. 2:** Resource Binder: Session 2.6, M23\*

**Inv. 3:** Resource Binder: Session 3.7 (End of Unit) M31\*

**\*Please refer to the section in the Teacher's Unit Guide entitled, "Professional Development" for examples of student work for each assessment.**

Name \_\_\_\_\_

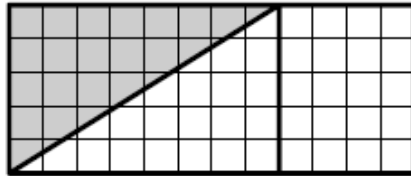
Date \_\_\_\_\_



# Assessment: Identifying and Comparing Fractions



1. Is the shaded area  $\frac{1}{3}$  of the whole rectangle?  
Explain your answer.



2. There are 24 apples in Mr. Lee's basket.  $\frac{2}{6}$  of them spill out. How many did he lose? Explain how you know.

3. Some students say that  $\frac{1}{8}$  is larger than  $\frac{1}{4}$  because 8 is larger than 4. What do you think? Explain your reasoning.

Name \_\_\_\_\_

Date \_\_\_\_\_



**Fraction Cards and Decimal Squares**

# Assessment: Comparing Fractions



Circle the fraction that is larger in each pair. Explain how you decided which is larger.

1.  $\frac{3}{8}$        $\frac{1}{2}$

2.  $\frac{2}{3}$        $\frac{5}{6}$

3.  $\frac{3}{4}$        $\frac{4}{3}$

Name \_\_\_\_\_

Date \_\_\_\_\_



**Fraction Cards and Decimal Squares**

# End-of-Unit Assessment

1. Tasha told her brother Kareem that she would give him either  $\frac{1}{4}$  of her 24 marbles OR  $\frac{3}{12}$  of her 24 marbles.

Which one should Kareem choose if he wants to get the most marbles? Show how you figured it out.

2. Place the following fractions on the number line in order from least to greatest.

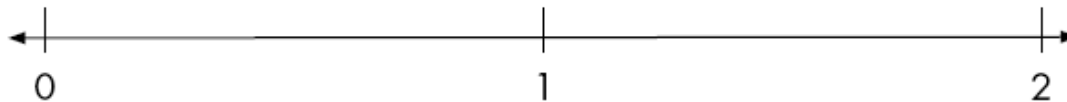
$\frac{3}{2}$

$\frac{3}{4}$

$\frac{2}{3}$

$\frac{9}{8}$

$\frac{3}{6}$



3. Circle the decimal that is greater. Explain how you know it is greater.

0.9

0.45



# 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