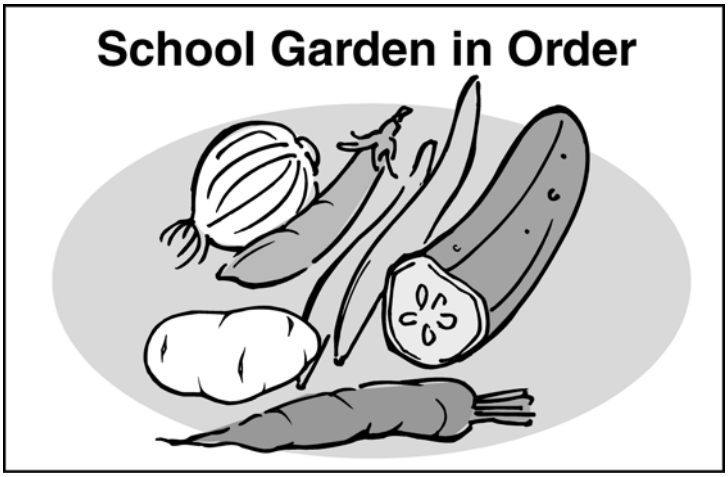
SITES-M Mathematics Challenge



Level: Grade One

Standard: Number and Operations

Learning Target: Focus on Comparing and Ordering

Grade Level Expectations

GLE 0106.2.2 Compare and order whole numbers to 100.

Checks for Understanding

0106.2.5 Order and compare (less than, greater than, or equal to) wholse numbers to 100.

0106.2.17 Represent whole numbers up to 100 on a number line.

SITES-M Mathematics Challenge

Grade 1–Focus on Comparing and Ordering
School Garden in Order

The purpose of the Mathematics Challenges is to provide opportunities for students to develop and demonstrate understanding of important mathematical concepts and standards. Each Challenge includes a set of tasks that require higher-order thinking skills. Because these types of tasks may be new for students and they will have varying levels of understanding, the student responses will vary. The Challenges and guiding questions were designed to help teachers plan their implementation and elicit, analyze, and act on evidence of student understanding.

You will be able to choose which Mathematics Challenge Packet to implement each month, according to the learning needs of your students and your teaching context. Each packet contains all the materials necessary to implement the Mathematics Challenge including a grade-appropriate Challenge, the Mathematics Challenge Meeting Protocol, and the Guiding Questions for Analyzing Student Responses to Mathematics Challenges.

For each Challenge, you will complete a six step process of planning, implementation, and analysis and reflection.

The Mathematics Challenge Process

Stage	Step	Task
Planning	Step 1.	Review the Mathematics Challenge Meeting Protocol
	Step 2.	Review and solve the Mathematics Challenge prior to your Professional Learning Community (PLC) meeting. Think about your responses to the guiding questions on the Meeting Protocol
	Step 3.	Hold your PLC meeting and discuss your responses to the Guiding Questions on the Meeting Protocol
Implementation	Step 4.	Implement the Mathematics Challenge with your class
Analysis and Reflection	Step 5.	For your own planning and documentation, respond to the Guiding Questions on the Analyzing Student Responses Protocol
	Step 6.	To help us improve the Challenges and to provide recommendations for teachers implementing them in future years, complete the Mathematics Challenge Feedback Log and provide copies of all student work to the Assessment Coordinator

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SITES-M Mathematics Challenge

Grade 1–Focus on Comparing and Ordering
School Garden in Order

Mathematics Challenge Meeting Protocol

Each month, your Professional Learning Community will meet to discuss the implementation of one Mathematics Challenge. In preparation for your monthly meeting, please print and review this month's Mathematics Challenge, solve all tasks within the Challenge, and think about the guiding questions below. These questions will be used to facilitate a group discussion regarding the implementation of the upcoming Mathematics Challenge.

Guiding Questions for Implementing the Mathematics Challenges

1. What is the title of the Challenge that you will use this month?
2. What skills or standards is this Challenge measuring?
3. Where does this Challenge fit within your curriculum? Within which unit?
4. At what point during the unit will you administer this Challenge (e.g., At the beginning of a unit to determine what students do or do not know, at the end of a unit to assess what students have or have not learned, in the middle of a unit to determine where to go next instructionally)?
5. How will your students complete this Challenge (e.g., individually, one-on-one, in small groups, as a class)? Why?
6. Are there any prerequisite skills, common misunderstandings, or vocabulary needs that you will have to address? What are they?
7. What difficulties do you anticipate your students will have with the Challenge? How will you address them?
8. Are these skills and difficulties different for special needs students, ELL students, etc.? How? Will you do anything different for these students? What?
9. How will you evaluate student responses (e.g., grade responses with the provided rubric, scan responses to identify common mistakes/misconceptions, have students evaluate one another's responses, have students evaluate their own response)?
10. What will student responses to this Challenge tell you about student understanding?
11. How might you use this evidence of student understanding to adapt your teaching and learning?
12. What other materials, resources, or support might you need? Where can you get them?
13. How can your colleagues assist you in the analysis of student understanding?
14. What other questions or concerns do you have about this Mathematics Challenge?

After you have implemented the challenge with your class, be sure to respond to the Guiding Questions on the Analyzing Student Responses Protocol.

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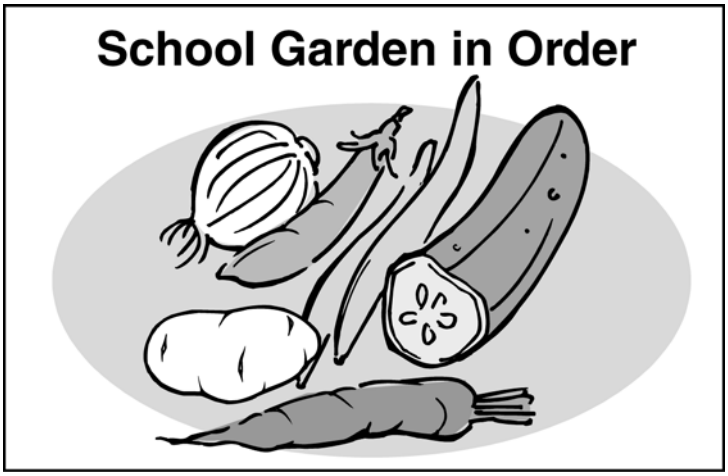
SITES-M Mathematics Challenge

Grade 1–Focus on Comparing and Ordering



Standard: Number and Operations

Learning Target: Focus on Comparing and Ordering

Claims:
Students should understand and be able to explain or demonstrate how to:

- ✓ Compare and order whole numbers to 100;
- ✓ Order and compare (less than, greater than, or equal to) whole numbers to 100;
- ✓ Represent whole numbers up to 100 on a number line.

Task Preparation:
Each student will need a copy of the Student Response Sheet, a pencil, and possibly crayons (for circling answers and drawing lines).

Stimulus Cards (Drawing or Word Description):
None

Manipulatives/Supplies:
A copy of the Student Response Sheet for each student
Pencils
Crayons (optional)

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SITES-M Mathematics Challenge

Grade 1–Focus on Comparing and Ordering

Cues/Directions:

Distribute student response sheets. Students should be directed to look carefully at each figure. Allow students time to answer.

Instruct students to follow along as you read aloud and say: **Ms. Belen's, Ms. Harper's, and Mr. Liu's classes went to the local farmers' market to sell the fruits and vegetables they grew in the school garden.**

1. Say: **There are 24 students in Ms. Belen's class. There are 20 students in Ms. Harper's class. And there are 26 students in Mr. Liu's class. In the box, circle the name of the teacher who has the most students. (TEACHER NOTE:** Students should circle the correct name.**) Put the numbers of students on the lines below in order from greatest to least. (TEACHER NOTE:** Be careful that students do not misunderstand this question because they are going from greatest to least instead of least to greatest, but the ordering is from left to right.**)**
2. **The classes brought 3 cases of potatoes to the farmers' market to sell. The numbers under the pictures tell how many potatoes are in each case. Draw a line from each number under the pictures to the mark on the number line where it belongs. (TEACHER NOTE:** Students should draw lines to tick marks on the number line, not spaces between the tick marks.**) How do you know that you put 36 where it belongs? (TEACHER NOTE:** Students should write their answers in the box.**)**
3. **Each class grew green beans in the school garden. They placed the green beans in bowls to sell at the market. In the pictures, the numbers show how many beans are in each bowl. Draw a circle around the bowl that has the fewest green beans. Draw a square around the bowl that has the most green beans. (TEACHER NOTE:** Students should draw one circle and one square.**)**
4. **Circle the row of numbers that is in order from least to greatest. (TEACHER NOTE:** Students should circle the correct list of numbers.**)**
5. **Put the list of numbers below in the correct blanks so that they are in order from least to greatest. (TEACHER NOTE:** Students should write the numbers from least to greatest, from left to right. Be careful they do not confuse the directions from question 1 and go from greatest to least.**)**

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SITES-M Mathematics Challenge

Grade 1–Focus on Comparing and Ordering

Student Response Sheet

School Garden in Order

Name: _____ **Date:** _____

Ms. Belen's, Ms. Harper's, and Mr. Liu's classes went to the local farmers market to sell the fruits and vegetables they grew in the school garden.

1. **There are 24 students in Ms. Belen's class. There are 20 students in Ms. Harper's class. And there are 26 students in Mr. Liu's class.**

   In the box, circle the name of the teacher who has the <u>most</u> students.

Ms. Belen	Ms. Harper	Mr. Liu

   Put the <u>numbers</u> of students on the lines below in order from <u>greatest to least</u>.

_____ _____ _____

Greatest **Least**

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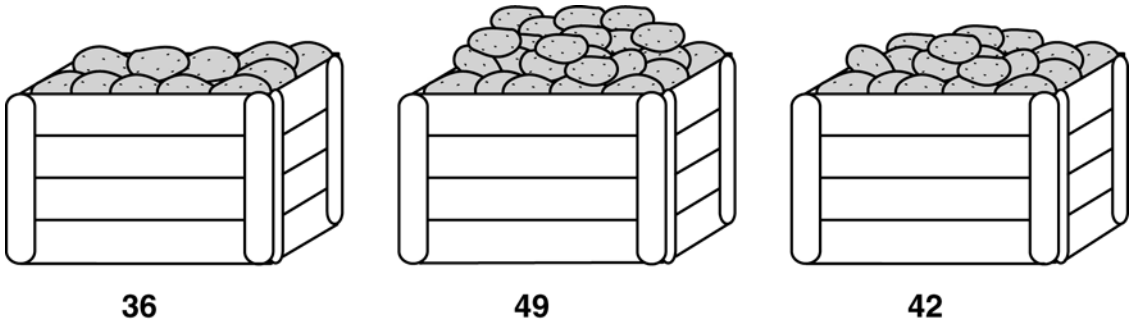
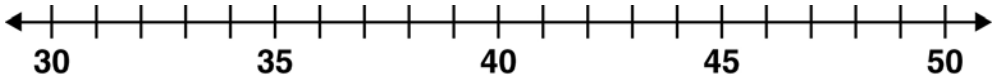
2. The classes brought 3 cases of potatoes to the farmers market to sell. The numbers under the pictures tell how many potatoes are in each case.

Draw a line from each number under the pictures to the <u>mark</u> on the number line where it belongs.





How do you know that you put the number 36 where it belongs?

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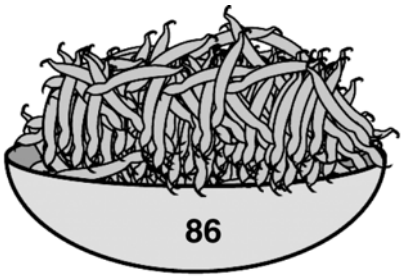
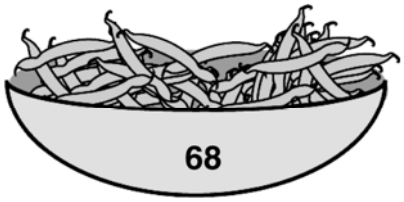
3. Each class grew green beans in the school garden. They placed the green beans in bowls to sell at the market. In the pictures the numbers show how many beans are in each bowl.

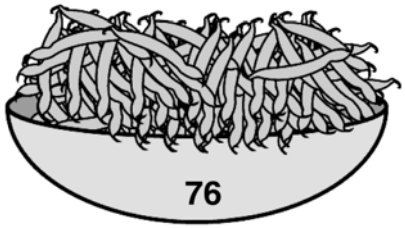
Draw a <u>circle</u> around the bowl that has the fewest green beans. Draw a <u>square</u> around the bowl that has the most green beans.



Ms. Belen



Ms. Harper



Mr. Liu

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4. Circle the row of numbers that is in order from <u>least to greatest</u>.

25, 10, 3, 37, 84, 44

22, 25, 37, 49, 62, 73

21, 13, 14, 15, 27, 72

5. Put the list of numbers below in the correct blanks so that they are in order from <u>least to greatest</u>.

78 12 97 43 35

_____ _____ _____ _____ _____

Least **Greatest**

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Learning and Teaching Considerations

Task 1:

A) Be sure that students understand that the word "most" signifies more than all the others, when comparing numbers. The word "more" signifies a greater number than one other or some others.

B) Some students may have the misconception that the word "more" signifies the same meaning as "most" and will circle Ms. Belen because there are more students in her class than in Ms Harper's. Working with manipulatives of different numbers may help.

C) Be sure that students understand that the word "greatest" signifies a number larger in value than all the others, and the word "least" signifies a number smaller in value than all the others.

D) Be sure that students understand that the words "in order" signify that each number in the list has a certain relationship to the ones on either side of it. For task 1 each number must be greater in value than the one to its right and lesser in value than the one to its left.

E) Be sure that students understand that the words "greatest to least" signify that the numbers should decrease in value going from left to right, as they read.

Task 2:

A) Be sure that students understand that each mark on the number line shown corresponds to a whole number that is greater in value by one than the mark to its left and lesser in value by one than the mark to its right. For the first part students have to count the correct number of marks on either side of the numbers on the line to determine where the numbers under the pictures belong.

B) Be sure that students understand that the arrows on either end of any number line indicate that as you move right (→), the numbers continue to increase in value, and as you move left (←), the numbers decrease in value. That particular number line is just a segment that runs from (positive) 30 to 50.

C) Students may answer in words, symbols (digits, dots, dashes, base-10 block representations, etc.), pictures, or by using manipulatives (blocks, cubes). They may also count on their fingers, use number lines, add on, or recall number sense and addition facts. Be sure that they understand that they can get the correct answer using any of the strategies, though some are more efficient.

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D) If a student says or writes, "I just know," prompt him or her by saying something like "I'm glad you know, but it's important in math to be able to explain your answers so other people can understand what you're thinking." (That applies to the other tasks, as well.)

E) If a student says or writes, "I don't know," say something positive like "Let's start with what you do know about this problem." Students often know more than they think or say, and getting them to vocalize or write about that knowledge is all they need. (That applies to the other tasks, as well.)

Task 3:

A) Be sure that students understand that the word "fewest" signifies fewer than all the others, when comparing counts or numbers of objects. The word "fewer" signifies a smaller count or number than one other or some others.

B) Some students may have the misconception that the word "fewer" signifies the same meaning as "fewest" and will circle Mr. Liu because his bowl has fewer beans than Ms. Belen's. Working with manipulatives of different counts may help.

C) Be sure that students understand that the word "most" signifies more than all the others, when comparing numbers or amounts. The word "more" signifies a greater number or amount than one other or some others.

D) Some students may have the misconception that the word "more" signifies the same meaning as "most" and will draw a square around Mr. Liu's bowl because his bowl has more beans than Ms. Harper's. Working with manipulatives of different counts and amounts may help.

Tasks 4 and 5:

A) Be sure that students understand that the word "least" signifies a number smaller in value than all the others, and the word "greatest" signifies a number larger in value than all the others. For task 4 students need to compare each number in the list with the one to the right and the left of it.

B) Be sure that students understand that the words "in order" signify that each number in the list has a certain relationship to the ones on either side of it. For task 4 each number must be greater in value than the one to its left and lesser in value than the one to its right.

C) Be sure that students understand that the words "least to greatest" signify that the numbers should increase in value going from left to right, as they read.

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Name: ANSWER KEY Date: _____

Ms. Belen's, Ms. Harper's, and Mr. Liu's classes went to the local farmers market to sell the fruits and vegetables they grew in the school garden.

1. **There are 24 students in Ms. Belen's class. There are 20 students in Ms. Harper's class. And there are 26 students in Mr. Liu's class.**

In the box, circle the name of the teacher who has the <u>most</u> students.

Ms. Belen	Ms. Harper	Mr. Liu

Put the <u>numbers</u> of students on the lines below in order from <u>greatest to least</u>.

26	24	20
Greatest		Least

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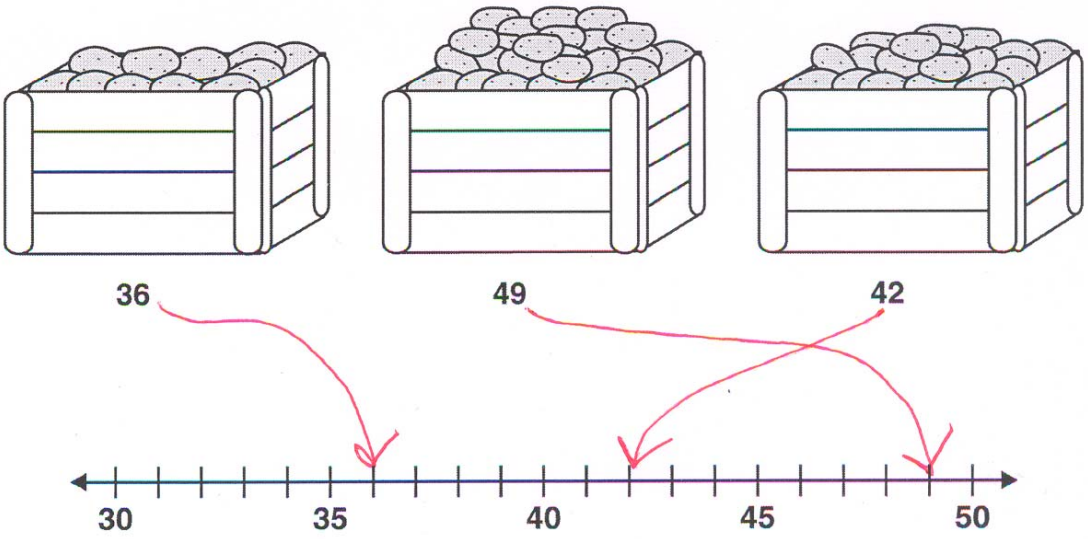
2. The classes brought 3 cases of potatoes to the farmers market to sell. The numbers under the pictures tell how many potatoes are in each case.

Draw a line from each number under the pictures to the mark on the number line where it belongs.



How do you know that you put the number 36 where it belongs?

36 IS 1 MORE THAN 35 AND EACH MARK ON THE NUMBER LINE IS 1 MORE THAN THE NEXT (GOING RIGHT.) SO 36 IS THE FIRST MARK AFTER 35.
(OTHER REASONS CAN INCLUDE 6 MARKS AFTER 30, OR 4 MARKS BEFORE 40.)

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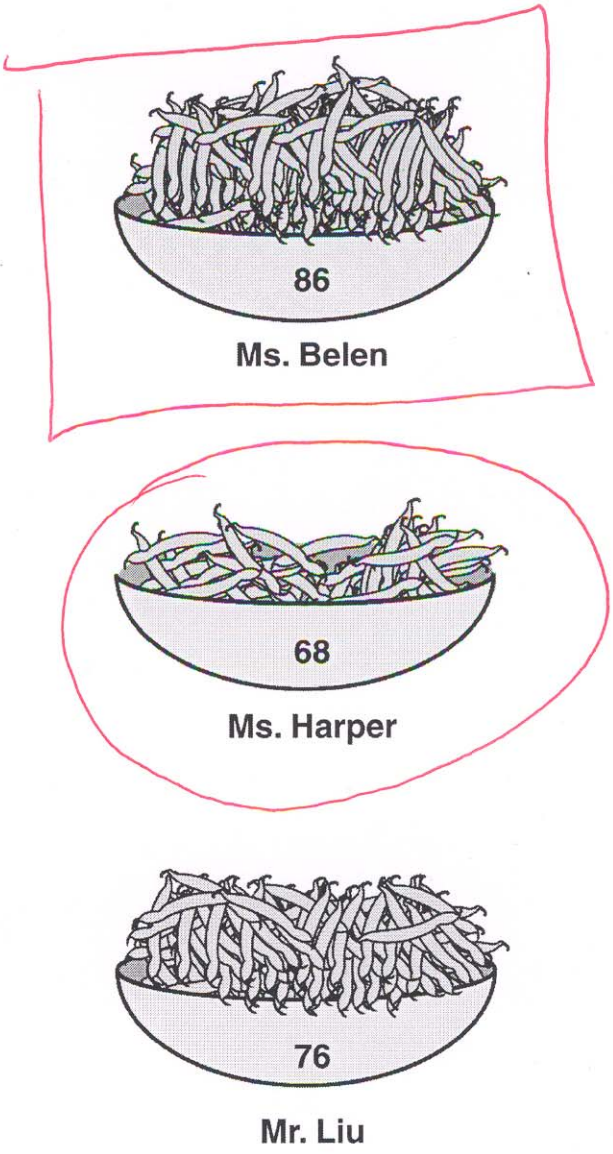
3. Each class grew green beans in the school garden. They placed the green beans in bowls to sell at the market. In the pictures the numbers show how many beans are in each bowl.

Draw a circle around the bowl that has the fewest green beans. Draw a square around the bowl that has the most green beans.



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4. **Circle the row of numbers that is in order from least to greatest.**

25, 10, 3, 37, 84, 44

22, 25, 37, 49, 62, 73

21, 13, 14, 15, 27, 72

5. **Put the list of numbers below in the correct blanks so that they are in order from least to greatest.**

78 12 97 43 35

12 35 43 78 97

Least Greatest

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SITES-M Mathematics Challenge

Grade 1–Focus on Comparing and Ordering
Rubric

CATEGORY	4	3	2	1
Mathematical concepts	**Response shows complete understanding of the mathematical concepts used to solve the problem(s).**	**Response shows substantial understanding of the mathematical concepts used to solve the problem(s).**	**Response shows some understanding of the mathematical concepts needed to solve the problem(s).**	**Response shows very limited understanding of the underlying concepts needed to solve the problem(s), OR the response is not written.**
	Response shows evidence in ALL of the following tasks. **Task 1**. Student circles Mr. Liu and writes numbers in order 26, 24, 20. **Task 2**. Student identifies 36 as first tick mark to the right of 35, 49 as the first tick mark to the left of 50, and 42 as the second tick mark to the right of 40. Student explains that each tick mark represents one more on the number line. **Task 3**. Student draws a circle around Ms. Harper and a square around Ms. Belen. **Task 4**. Student recognizes the second row of numbers as being in order from least to greatest. **Task 5**. Student lists numbers as 12, 35, 43, 78, 97.	Response shows evidence in only 4 of the tasks described in category 4.	Response shows evidence in only 2 or 3 of the tasks described in category 4.	Response shows evidence in 1 or none of the tasks described in category 4.

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SITES-M Mathematics Challenge

Grade 1–Focus on Comparing and Ordering
Rubric

CATEGORY	4	3	2	1
Strategy and procedures	**Student typically uses an efficient and effective strategy to solve the problem(s).**	**Student typically uses an effective strategy to solve the problem(s).**	**Student sometimes uses an effective strategy to solve the problem(s), but not consistently.**	**Student rarely uses an effective strategy to solve the problem(s).**
	Response shows evidence in ALL of the following tasks. **Task 1**. Student shows evidence of writing numbers by the name of each teacher. **Task 2**. Student shows evidence of counting individual tick marks on the number line. Student may show evidence of labeling tick marks. **Task 4**. Student shows evidence of putting each list of numbers in order. **Task 5**. Student shows evidence of crossing out numbers as each is used.	Response shows evidence in only 3 of the tasks described in category 4.	Response shows evidence in only 2 of the tasks described in category 4.	Response shows evidence in only 1 or none of the tasks described in category 4.

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SITES-M Mathematics Challenge

Grade 1–Focus on Comparing and Ordering
Rubric

CATEGORY	4	3	2	1
Explanation and communication	**Explanation is detailed and clear; uses appropriate terminology and/or notation.**	**Explanation is clear; uses some appropriate terminology and/or notation.**	**Explanation is a little difficult to understand, but includes critical components; shows little use of appropriate terminology and/or notation.**	**Explanation is difficult to understand, is missing several components, and does not use or include appropriate terminology and/or notation.**
	Response shows evidence in the following explanations. **Task 2**. Student explains that the space between 35 and 40 has been divided into 5 parts so that each tick mark is one more in value than the mark to its immediate left. Student explains that 36 is one more than 35 or that 36 is 4 less than 40.	Response does not explain that each tick mark is one more than the previous value but does explain that 36 is one more than 35 or that 36 is 4 less than 40.	Response only says that 36 is between 35 and 40.	No response is shown.

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SITES-M Mathematics Challenge

Grade 1–Focus on Comparing and Ordering
Rubric

CATEGORY	4	3	2	1
Mathematical accuracy	**All or almost all of the steps and solutions have no mathematical errors.**	**Most of the steps and solutions have no mathematical errors.**	**Some of the steps and solutions have no mathematical errors.**	**Few of the steps and solutions have no mathematical errors.**
	Student provides correct answers for ALL of the following tasks. **Task 1**. Student circles Mr. Liu and puts numbers in correct order, as shown on the answer sheet. **Task 2**. Student draws a line from each number to its correct place on the number line, as shown on the answer sheet. **Task 3**. Student circles Ms. Harper and puts a square around Ms. Belen. **Task 4**. Student circles only the middle row of numbers. **Task 5**. Student lists numbers as 12, 35, 43, 78, 97.	Student provides correct answers for only 4 of the tasks described in category 4.	Student provides correct answers for only 2 or 3 of the tasks described in category 4.	Student provides a correct answer for only 1 or none of the tasks described in category 4.

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Scoring Notes Checklist

Task	Check Yes	Category
Task 1		
Student circles Mr. Liu and writes numbers in order 26, 24, 20.		Concept
Student shows evidence of writing numbers by the name of each teacher.		Strategy
Student circles Mr. Liu and puts numbers in correct order, as shown on the answer sheet.		Accuracy
Task 2		
Student identifies 36 as first tick mark to the right of 35, 49 as the first tick mark to the left of 50, and 42 as the second tick mark to the right of 40. Student explains that each tick mark represents one more on the number line.		Concept
Student shows evidence of counting individual tick marks on the number line. Student may show evidence of labeling tick marks.		Strategy
Student explains that the space between 35 and 40 has been divided into 5 parts so that each tick mark is one more in value than the mark to its immediate left. Student explains that 36 is one more than 35 or that 36 is 4 less than 40.		Explanation
Student draws a line from each number to its correct place on the number line, as shown on the answer sheet.		Accuracy
Task 3		
Student draws a circle around Ms. Harper and a square around Ms. Belen.		Concept
Student circles Ms. Harper and puts a square around Ms. Belen.		Accuracy
Task 4		
Student recognizes the second row of numbers as being in order from least to greatest		Concept
Student shows evidence of putting each list of numbers in order.		Strategy
Student circles only the middle row of numbers.		Accuracy
Task 5		
Student lists numbers as 12, 35, 43, 78, 97.		Concept
Student shows evidence of crossing out numbers as each is used.		Strategy
Student lists numbers as 12, 35, 43, 78, 97.		Accuracy

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SITES-M Mathematics Challenge

Grade 1–Focus on Comparing and Ordering

Analyzing Student Responses Protocol

The purpose of the Mathematics Challenges is to provide opportunities for students to develop and demonstrate understanding of important mathematical concepts and standards. They include extended responses, open-ended tasks, and tasks that require higher-order thinking skills. Because these types of tasks may be novel for students and they will have varying levels of understanding, the student responses will vary.

The guiding questions below were designed to assist you in analyzing your class' response to the Challenge and determining appropriate next steps for your teaching and learning. Responses to these questions are for your reflection and documentation and will not be collected.

Guiding Questions for Analyzing Student Responses to the Mathematics Challenges

1. When completing the Challenge, what did your students do well? How do you know?

2. When completing the Challenge, what did your students struggle with? How do you know?

3. When your students completed the Challenge, did they implement multiple correct solutions strategies? What insightful approaches to problem solving did you observe?

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4. What, if any, patterns (e.g., common errors/misconceptions) did you observe across your student responses?

5. What questions or concerns did your students have when working through this Challenge or a particular task? Are these things you should address for the class as a whole?

6. What, if any, feedback did you provide to your class? How did you provide it?

7. What did you learn about your students' mathematical understanding based on their responses to this Challenge?

Reminders:

1) After you have completed the Challenge with your class and responded to these Guiding Questions for Analyzing Student Responses, please complete the Challenge Feedback Log. A link to this Log is e-mailed to you each month. Responses will be used to improve the Challenges and to provide recommendations for teachers implementing the Challenges in future years.

2) Please provide copies of all student work to the Assessment Coordinator.

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