# SITES-M Mathematics Challenge



Level: Grade Two

**Standard:** Number and Operations

Learning Target: Focus on Comparing and Ordering

#### **Grade Level Expectations**

**GLE 0206.2.1** Understand and use the base-ten numeration system.

#### **Checks for Understanding**

- **0206.2.3** Locate and interpret numbers on a number line.
- 0206.2.5 Compare and order multi-digit numbers up to 1000.
- **0206.3.8** Describe change in measures according to quantitative criteria such as growing 2 inches in one year.

# SITES-M Mathematics Challenge Grade 2–Focus on Comparing and Ordering Sunflowers 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.

Stage	Step	Task	
	Step 1.	Review the Mathematics Challenge Meeting Protocol	
Planning	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	
	Step 5.	For your own planning and documentation, respond to the Guiding Questions on the Analyzing Student Responses Protocol	
Analysis and Reflection	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	

## The Mathematics Challenge Process

# SITES-M Mathematics Challenge Grade 2–Focus on Comparing and Ordering Sunflowers 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.



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 multi-digit numbers up to 1000;
- ✓ Locate and interpret numbers on a number line;
- Describe change in measures according to quantitative criteria such as growing 2 inches in one year.

#### Task Preparation:

Each student will need copies of the Student Response Sheet and a pencil.

### Stimulus Cards (Drawing or Word Description):

None

#### Manipulatives/Supplies:

Copies of the Student Response Sheet for each student Pencils

#### Cues/Directions:

Distribute student response sheets and picture sheets. If a student is unable to respond in writing, a scribe may be appointed or verbal answers may be accepted, but these responses will need to be documented for scoring. 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: The students in Ms. Bradner's class planted sunflowers in the school garden.

- Student in the class were responsible for planting and watering 10 sunflowers each. There were 21 students in the class. Did the students plant more than 200 sunflowers or less than 200 sunflowers in all? (TEACHER NOTE: Students should check the correct box.) How do you know? (TEACHER NOTE: Students should write their answers in the box.)
- 2. Josh measured the height of same sunflower to see how much it grew each week. The table below shows his measurements. Complete the table by filling in how many inches the sunflower grew each week. Week 1 is filled in for you. (TEACHER NOTE: Students should fill in the missing values in the table.) Look at the table. In which week after planting did Josh's sunflower grow the most? (TEACHER NOTE: Students should circle the correct number.) How do you know? (TEACHER NOTE: Students should did Josh's sunflower grow the least? (TEACHER NOTE: Students should circle the correct number.) How do you know? (TEACHER NOTE: Students should circle the correct number.) How do you know? (TEACHER NOTE: Students should circle the correct number.) How do you know? (TEACHER NOTE: Students should circle the correct number.) How do you know? (TEACHER NOTE: Students should circle the correct number.) How do you know? (TEACHER NOTE: Students should circle the correct number.) How do you know? (TEACHER NOTE: Students should write their answers in the box.) After 5 weeks, was Josh's sunflower more than 5 feet tall or less than 5 feet tall? (TEACHER NOTE: Students should check the correct box.) How do you know? (TEACHER NOTE: Students should write their answers in the box.)
- 3. The students collected sunflower seeds from the sunflowers they grew. Josh collected 417 seeds from one of his sunflowers. On the number line below, circle the number that is <u>closest</u> to 417. (TEACHER NOTE: Students should the correct number that is closest to 417 on the number line.) How do you know the number you circled is closest to 417 ? (TEACHER NOTE: Students should write their answers in the box.) Elida collected 698 seeds from one of her sunflowers. On the number line below, circle the number that is <u>closest</u> to 698. (TEACHER NOTE: Students should the correct number that is closest to 698 on the number line.) How do you know the number that is closest to 698 on the number line.) How do you know the number that is closest to 698 on the number line.) How do you know the number you circled is closest to 698 ? (TEACHER NOTE: Students should write their answers in the box.) Did Josh and Elida collect more than 1,000 sunflower seeds or less than 1,000 sunflower seeds in all? (TEACHER NOTE:

Students should check the correct box.) How do you know? (TEACHER NOTE: Students should write their answers in the box.)

4. Circle <u>all</u> the numbers in the box below that go <u>between</u> 344 and 349. (TEACHER NOTE: Students should circle the correct numbers.) Circle <u>all</u> the numbers in the box below that go <u>between</u> 950 and 1,000. (TEACHER NOTE: Students should circle the correct numbers.) Write the number that is <u>halfway</u> between 670 and 680. (TEACHER NOTE: Students should write the correct number on the line.) How do you know? (TEACHER NOTE: Students should write their answers in the box.)

Student Response Sheet



# **Sunflowers in Order**

Name: \_\_\_\_\_

Date: \_\_\_\_\_

The students in Ms. Bradner's class planted sunflowers in the school garden.

1. Student in the class were responsible for planting and watering 10 sunflowers each. There were 21 students in the class.

Did the students plant more than 200 sunflowers or less than 200 sunflowers in all?

Check one:

Μ	or	'e

Less

2. Josh measured the height of same sunflower to see how much it grew each week. The table below shows his measurements.

Weeks after Planting	Height of Sunflower	Inches Grown Each Week
0	0 inches	
1	6 inches	6
2	19 inches	
3	28 inches	
4	38 inches	
5	50 inches	

- a. Complete the table by filling in how many inches the sunflower grew each week. Week 1 is filled in for you.
- b. Look at the table. In which week after planting did Josh's sunflower grow the <u>most</u>?

Circle one: 1 2 3 4 5

# c. In which week after planting did Josh's sunflower grow the <u>least</u>?

Circle one:	1	2	3	4	5
How do y	ou know'	?			

d. After 5 weeks, was Josh's sunflower more than 5 feet tall or less than 5 feet tall?

Check one:		More		Less
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- 3. The students collected sunflower seeds from the sunflowers they grew.
  - a. Josh collected 417 seeds from one of his sunflowers. On the number line below, circle the number that is <u>closest</u> to 417.



How do you know the number you circled is closest to 417 ?

b. Elida collected 698 seeds from one of her sunflowers. On the number line below, circle the number that is <u>closest</u> to 698.



# How do you know the number you circled is closest to 698 ?



# c. Did Josh and Elida collect more than 1,000 sunflower seeds or less than 1,000 sunflower seeds in all?

Check one:	More	Less

4. Circle <u>all</u> the numbers in the box below that go <u>between</u> 344 and 349.

341	343	345	348	351

Circle <u>all</u> the numbers in the box below that go <u>between</u> 950 and 1,000.

945	958	984	991	1,002

Write the number that is <u>halfway</u> between 670 and 680.

# Learning and Teaching Considerations

#### Task 1:

- A) Be sure that students understand that the word "more" generally signifies comparing numbers or amounts to find out which is greater. Students should also know that the word "less" generally signifies comparing numbers or amounts to find out which is smaller. For task 1 students are comparing numbers.
- **B**) 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/multiplication facts. Be sure that they understand that they can get the correct answer using any of the strategies, though some are more efficient.
- C) Be sure that students understand that as they move right  $(\rightarrow)$  on a number line, the numbers increase in value. As they move left  $(\leftarrow)$ , the numbers decrease in value.
- **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 2:

- A) Be sure that students understand that the phrase "how many inches the sunflower grew each week" signifies comparing numbers to find out the difference. Determining exactly "how many" or "how many more" generally signifies subtracting one number from the other-the focus of part (a).
- **B)** Students may answer in words or symbols. They may also subtract traditionally, subtract the tens and ones separately and then add the subtotals, add on, add/subtract in chunks, or recall addition/subtraction facts. Be sure that they understand that they can get the correct answer using any of the strategies, though some are more efficient.
- **C)** Be sure that students understand that the word "most" signifies more than <u>all</u> the others, when comparing amounts—the focus of part (b). The word "more" signifies a greater amount than <u>one</u> other or <u>some</u> others.

- **D**) Some students may have the misconception that the word "more" signifies the same meaning as "most" and will circle week 5 because growing 12 inches is more than growing 10 inches. Working with manipulatives of different numbers may help.
- **E)** Be sure that students understand that the word "least" signifies less than <u>all</u> the others, when comparing amounts—the focus of part (c). The word "less" signifies a smaller amount than <u>one</u> other or <u>some</u> others.
- **F)** Some students may have the misconception that the word "less" signifies the same meaning as "least" and will circle week 4 because growing 10 inches is less than growing 12 inches. Working with manipulatives of different counts may help.
- **G)** Be sure that students understand that there are 12 inches in a foot. Students may answer in words or symbols. They may also add or multiply traditionally, add on, add in chunks, or recall addition/multiplication facts. Be sure that they understand that they can get the correct answer using any of these strategies, though some are more efficient.
- **H**) Some students may have the misconception that there are 10 inches in a foot, like the decimal number system. Those students may not check either box and will explain that the sunflower grew exactly 5 feet or 50 inches after 5 weeks.

#### Task 3:

- A) Be sure that students understand that the word "closest" signifies being nearer in value or location than <u>all</u> the others, when comparing numbers. The word "closer" signifies being nearer in value or location than <u>one</u> other or <u>some</u> others. For part (a) students should compare either the difference in value between 417 415 and 420 417 or the distance between the points on the number line. For part (b) students should compare either the difference in value between 698 695 and 700 698 or the distance between the points on the number line.
- **B)** Some students may have the misconception that the word "closer" signifies the same meaning as "closest." Such a student may look at 405 and 410 and, of the two, identify 410 as being closer to 417 and circle 410. Such a student may also circle 690 because it is closer to 698 than 685 is.
- C) 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. The particular number lines are just segments that run from (positive) 400 to 435 or from 675 to 710.

- **D**) Students may answer parts (a) and (b) in words, symbols, or by using manipulatives. They may also count on their fingers, place tick marks on the number line, 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.
- **E**) Be sure that students understand that the word "more" generally signifies comparing numbers or amounts to find out which is greater. Students should also know that the word "less" generally signifies comparing numbers or amounts to find out which is smaller. For part (c) students are comparing numbers.
- **F)** Students may answer part (c) in words or symbols. They may also add or subtract traditionally, add on, add or subtract in chunks, or recall addition/subtraction facts. Be sure that they understand that they can get the correct answer using any of the strategies, though some are more efficient.

#### Task 4:

- A) Be sure that students understand that the word "all" signifies more than one. For task 4 students need to circle more than one correct number.
- **B**) Be sure that students understand that the word "between" signifies having a greater value than one number but a lesser value than the other number. It also signifies being located in the middle of two numbers on a number line.
- **C)** Some students may have the misconception that there is never more than one correct answer to a question or prompt. For example, they may circle 345 but not 348, or they may circle 958 but not 984.
- **D**) Be sure that students understand that the word "halfway" signifies being exactly midway in value or location from two other numbers. For part three students need to determine a number whose value is equally greater than 670 and less than 680, or a number that is located exactly midway between 670 and 680 on the number line.
- **E**) Students may answer in words, symbols, or by using manipulatives. They may also count on their fingers, use number lines, add on, or recall number sense and addition/subtraction facts. Be sure that they understand that they can get the correct answer using any of the strategies, though some are more efficient.

Name: ANSWER KET Date:

Date: \_\_\_\_\_

The students in Ms. Bradner's class planted sunflowers in the school garden.

1. Students in the class were responsible for planting and watering 10 sunflowers each. There were 21 students in the class.

Did the students plant more than 200 sunflowers or less than 200 sunflowers in all?



10 X 21 = 210 AND 210 >200. OR IF THERE WERE 20 STUDENTS WITH 10 SUNFLOWERS EACH, THEAT IS 200. BUT THERE ARE MORE THEAN 20 STUDENTS SO THERE MUST BE MORE THAN 200 SUN FLOWERS. OR 21 ANDER THEAT OR 21 ADDED 10 TIMES IS 210.

2. Josh measured the height of same sunflower to see how much it grew each week. The table below shows his measurements.

Weeks after Planting	Height of Sunflower	Inches Grown Each Week
0	0 inches	
1	6 inches	6
2	19 inches	13
3	28 inches	9
4	38 inches	10
5	50 inches	12

- a. Complete the table by filling in how many inches the sunflower grew each week. Week 1 is filled in for you.
- b. Look at the table. In which week after planting did Josh's sunflower grow the <u>most</u>?

Circle one: 1 2 3 4 5 How do you know? IT GREW 13 INCHES IN WEEK 2, AND 13 IS MORE THAN 6, 9, 10, AND 12.

c. In which week after planting did Josh's sunflower grow the <u>least</u>?

Circle one: 1 2 3 4 5How do you know? IT GREW 6 INCHES IN WEEK 1, AND 6 IS LESS HUMM 9, 10, 12, AND 13.

d. After 5 weeks, was Josh's sunflower more than 5 feet tall or less than 5 feet tall?

Check one:

More

Less

50 INCHES IS 48+2 INCHES, AND 48 INCHES IS 4 FEET, THE SUNFLOWER WAS 4 FEET 2 INCHES, LESS THAN 5 FEET. OR, SFEET IS GO INCHES, 50 260.

- 3. The students collected sunflower seeds from the sunflowers they grew.
  - a. Josh collected 417 seeds from one of his sunflowers. On the number line below, circle the number that is <u>closest</u> to 417.



How do you know the number you circled is closest to 417 ?

 b. Elida collected 698 seeds from one of her sunflowers. On the number line below, circle the number that is <u>closest</u> to 698.



How do you know the number you circled is closest to 698?

698 IS OPLY 2 AWAY FROM 700. 700-698=2. 698 IS 3 AWAY FROM 695, 698-695=3. 698 IS MORE THAN 5 AWAY FROM ALLTHE OTHER NUMBERS SHOWN, SO IT IS CLOSEST TO 700.

c. Did Josh and Elida collect more than 1,000 sunflower seeds or less than 1,000 sunflower seeds in all?





Less



4. Circle <u>all</u> the numbers in the box below that go <u>between</u> 344 and 349.



Circle <u>all</u> the numbers in the box below that go <u>between</u> 950 and 1,000.



Write the number that is <u>halfway</u> between 670 and 680.

675

675 IS 5 AWAY FROM 670 C 5 AWAY FROM 680, IT IS THE SAME DISTANCE FROM BOTH NUMBERS. 680-675 = 675-670

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. <u>Task 1</u> . Student answers more and shows evidence of multiplication, repeated addition, or estimation of 10 × 21. <u>Task 2</u> . Student completes table, as shown on answer sheet. Student identifies week 2 as the most and week 1 as the least. Student shows evidence of converting 5 feet into 60 inches. <u>Task 3</u> . Student circles 415 on the number line in part (a) and explains why that number is closest to 417. Student circles 700 on the number line in part (b) and explains why that number is closest to 698. Student answers more in part (c) and shows evidence of addition or estimation. <u>Task 4</u> . Student circles 345 and 348 in the first box and 958, 984, and 991 in the second box. Student explains why 675 is halfway between 670 and 680.	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 1 or none of the tasks described in category 4.

	4	2	8	4
Strategy and procedures	4 Student typically uses an efficient and effective strategy to solve the problem(s).	3 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.	The problem(s).
	Response shows evidence in ALL of the following tasks. <u>Task 1</u> . Student shows evidence of multiplication or repeated addition or estimation to compare $10 \times 21$ to 200. <u>Task 2</u> . Student shows evidence of subtraction to determine how many inches the sunflower grew each week. Student shows evidence of comparing the weekly growths, possibly by ordering. In part (d) student shows evidence of converting 5 feet to 60 inches or of converting 50 inches to 4 feet 2 inches. <u>Task 3</u> . In part (a) student shows evidence of marking number line into equal parts (fifths) to determine placement of 417. In part (b) student shows evidence of marking number line into equal parts (fifths) to determine placement of 698. In part (c) student shows evidence of addition of 417 and 698 or evidence of estimation of 400 and 700.	Response shows evidence in only 2 of the tasks described in category 4.	Response shows evidence in only 1 of the tasks described in category 4.	Response shows evidence of strategy or procedure.

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 ALL of the following explanations. <u>Task 1</u> . Student explains why the number of sunflowers is more than 200 using a multiplication, repeated addition, or estimation argument. <u>Task 2</u> . Student explains how numbers in right column are obtained and how they are ordered. In part (d) student explains that 50 inches is less than 60 inches, or 5 feet. <u>Task 3</u> . In parts (a) and (b), student uses a distance argument and compares the number to both ends of the interval; for example, $417 - 415 < 420 - 417$ . In part (c) student uses an addition or an estimation argument to explain why there are more than 1,000 seeds; for example, $400 + 600 = 1,000$ , Josh has more than 400, and Elida has more than 600. <u>Task 4</u> . Student uses a distance argument to explain why 675 is halfway between 670 and 680; that is, 680 - 675 = 675 - 670.	Student shows evidence of explanations for only 3 of the tasks described in category 4.	Student shows evidence of explanations for only 2 of the tasks described in category 4.	Student shows evidence of explanations for only 1 or none of the tasks described in category 4.

CATEGORY	4	3	2	1
Mathematical	All or almost all of the steps and	Most of the steps and	Some of the steps and	Few of the steps and
accuracy	solutions have no mathematical	solutions have no	solutions have no	solutions have no
	errors.	mathematical errors.	mathematical errors.	mathematical errors.
	Student provides correct answers for	Student provides correct	Student provides correct	Student provides a correct
	ALL of the following tasks.	answers for only 3 of the	answers for only 2 of the	answer for only 1 or none
	Task 1. Student answers more and	tasks described in	tasks described in	of the tasks described in
	compares 210 to 200.	category 4.	category 4.	category 4.
	Task 2. Student completes table, as			
	shown on answer sheet. Student			
	circles 2 in part (b) and circles 1 in part			
	(c). Student answers less in part (d).			
	Task 3. Student circles 415 on the			
	number line in part (a) and circles 700			
	on the number line in part (b). Student			
	answers more in part (c).			
	Task 4. Student circles 345, 348, and			
	nothing else in the first box. Student			
	circles 958, 984, 991, and nothing else			
	in the second box. Student answers			
	675.			

## **Scoring Notes Checklist**

Task	Check Yes	Category
Task 1		
Student answers more and shows evidence of multiplication,		Concept
repeated addition, or estimation of $10 \times 21$ .		
Student shows evidence of multiplication or repeated addition or		Strategy
estimation to compare $10 \times 21$ to 200.		05
Student explains why the number of sunflowers is more than 200		Explanation
using a multiplication, repeated addition, or estimation argument.		-
Student answers more and compares 210 to 200.		Accuracy
Task 2		
Student completes table, as shown on answer sheet. Student		Concept
identifies week 2 as the most and week 1 as the least. Student		-
shows evidence of converting 5 feet into 60 inches.		
Student shows evidence of subtraction to determine how many		Strategy
inches the sunilower grew each week. Student shows evidence of		
student shows evidence of converting 5 feet to 60 inches or of		
converting 50 inches to 4 feet 2 inches		
Student explains how numbers in right column are obtained and		Explanation
how they are ordered. In part (d) student explains that 50 inches		Explanation
is less than 60 inches, or 5 feet.		
Student completes table, as shown on answer sheet. Student		Accuracy
circles 2 in part (b) and circles 1 in part (c). Student answers less		5
in part (d).		
Task 3		
Student circles 415 on the number line in part (a) and explains		Concept
why that number is closest to 417. Student circles 700 on the		
number line in part (b) and explains why that number is closest to		
addition or actimation		
In part (a) student shows evidence of marking number line into		Stratagy
equal parts (fifths) to determine placement of 417 In part (b)		Strategy
student shows evidence of marking number line into equal parts		
(fifths) to determine placement of 698. In part (c) student shows		
evidence of addition of 417 and 698 or evidence of estimation of		
400 and 700.		
In parts (a) and (b), student uses a distance argument and		Explanation
compares the number to both ends of the interval; for		-
example, $417 - 415 < 420 - 417$ . In part (c) student uses an		
addition or an estimation argument to explain why there are more		
than 1,000 seeds; for example, $400 + 600 = 1,000$ , Josh has		
Thore than 400, and Elida has more than 600.		<b>A</b>
on the number line in part (b). Student answers more in part (c)		Accuracy
on the number line in part (b). Student answers more in part (c).		

Task 4	
Student circles 345 and 348 in the first box and 958, 984, and	Concept
991 in the second box. Student explains why 675 is halfway	-
between 670 and 680.	
Student uses a distance argument to explain why 675 is halfway	Explanation
between 670 and 680; that is, $680 - 675 = 675 - 670$ .	1
Student circles 345, 348, and nothing else in the first box. Student	Accuracy
circles 958, 984, 991, and nothing else in the second box.	5
Student answers 675.	

#### **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?

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:**

- 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.