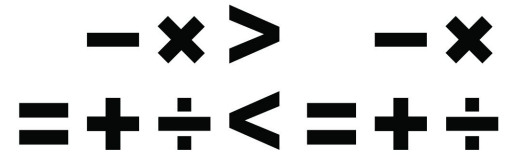


3-5 MATH

PERFORMANCE TASK

TEACHER INSTRUCTIONS



TASK OVERVIEW¹

TITLE	GRADE LEVEL	SUBJECT AREA	INSTRUCTIONAL UNIT	TIME FRAME: HOW LONG TO ADMINISTER THE TASK?
A Seedy Situation	4	Mathematics	Place Value, Rounding, and Algorithms for Addition and Subtraction	One to two 45 minute math blocks

¹ The current student work samples displayed with this task represent an abbreviated version of the original task necessitated by time constraints. The abbreviated version did not provide enough evidence for the team to assess the cross-curricular scoring criteria of Problem Solving and Critical Thinking.

CONTENT AREA²

PROFICIENCIES AND PERFORMANCE INDICATORS

GRADUATION PROFICIENCY	GRADUATION PROFICIENCY DESCRIPTION	PERFORMANCE INDICATOR	PERFORMANCE INDICATOR DESCRIPTION
#1 Mathematical Reasoning and Communication	Students will reason mathematically to solve problems and communicate with others.	E	Precisely communicate mathematical understandings and connections using a variety of representations. MP1
#4 Functions & Algebraic Reasoning	Students will create, interpret, use and analyze expressions, equations and inequalities including recognizing when a relationship is a function and evaluating that function.	A	Represent and solve problems involving all four operations (of all problem types). (3.OA.3, 8; 4.OA.1, 2, 3)

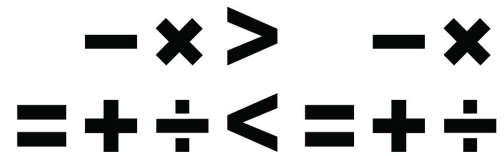
² Modifications were made to the Content Performance Indicators (PIs) after the task was administered. These modifications were based on a more thoughtful interpretation of the relevant CCSS standards. The modified versions are shown below.



3-5 MATH

PERFORMANCE TASK

TEACHER INSTRUCTIONS



GRADUATION PROFICIENCY	GRADUATION PROFICIENCY DESCRIPTION	PERFORMANCE INDICATOR	PERFORMANCE INDICATOR DESCRIPTION
#1 Mathematical Reasoning and Communication	Students will reason mathematically to solve problems and communicate with others.	E	Precisely communicate mathematical understandings and connections using a variety of representations. (MP1, 3, 6)
#4 Functions & Algebraic Reasoning	Students will create, interpret, use and analyze expressions, equations and inequalities including recognizing when a relationship is a function and evaluating that function.	A	Represent and solve problems (of all problem types) involving the four operations using the relationship between addition/subtraction and multiplication/division.* (3.OA.3, 4, 6, 8; 4.OA.1, 2, 3)

*Problem(s) do not need to require students to use all four operations but students should be required to decipher between and select from the four operations.

CROSS-CURRICULAR PROFICIENCIES AND PERFORMANCE INDICATORS

GRADUATION PROFICIENCY	GRADUATION PROFICIENCY DESCRIPTION	PERFORMANCE INDICATOR	PERFORMANCE INDICATOR DESCRIPTION
Problem Solving and Critical Thinking	Students will demonstrate problem solving and critical thinking by applying processes to define problems, evaluating possible outcomes, and persevering in solving complex problems.	2	Identify, collect and analyze relevant information.

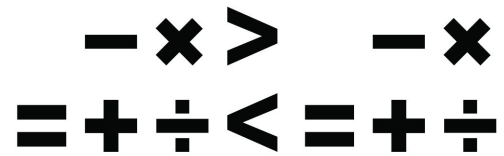
SCORING CRITERIA³

PERFORMANCE INDICATOR	BEGINNING	DEVELOPING	PROFICIENT	EXPANDING
#1 Mathematical Reasoning and	Communicate understanding	Communicate mathematical	Clearly and logically communicate	Enhance communication

3-5 MATH

PERFORMANCE TASK

TEACHER INSTRUCTIONS



<p>Communication: E</p> <p>Precisely communicate mathematical understandings and connections using a variety of representations. (MP1)</p>	<p>using language and representations.</p>	<p>understanding and connections using mathematical language and representation(s).</p>	<p>mathematical understanding and connections using technical mathematical language and appropriate representation(s).</p>	<p>through the intentional sequencing and presentation of ideas and the strategic selection and use of representations.</p>
<p>#4 Functions & Algebraic Reasoning: A</p> <p>Represent and solve problems involving all four operations (of all problem types). (3.OA.3, 8; 4.OA.1, 2, 3)</p>	<p>Identify the appropriate operation(s) in situations.</p>	<p>Create a model to represent problems involving all four operations.</p>	<p>Create and use an appropriate model to represent and solve problems involving all four operations.*</p>	<p>Create multiple representations of problems involving all four operations and use them to justify a solution.</p>
<p>Problem Solving and Critical Thinking: 2</p> <p>Identify, collect and analyze relevant information.</p>	<p>Make observations about a problem or situation.</p>	<p>Describe the problem and identify the parts of the problem.</p>	<p>Summarize the problem, identify variables, and analyze how elements of the situation define the problem.</p>	<p>Evaluate the relevance and importance of elements that define the problem and limit the solutions.</p>

**Note: problem(s) do not need to require students to use all four operations but students should be required to decipher between and select from the four operations.*

3 Modifications were made to the Scoring Criteria after the task was administered. These modifications were based on those made to the Performance Indicators. The modified versions are shown below.

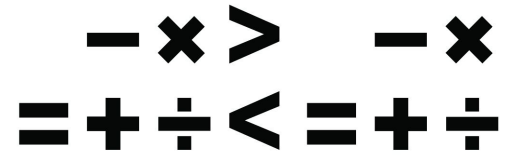
If the decision is made to use this task, we advise using the modified Scoring Criteria. This may require the user to make adaptations to the task before administering it to students.

When it came time to actually score student work there was some discussion about the use of the word “solve” in

3-5 MATH

PERFORMANCE TASK

TEACHER INSTRUCTIONS



the proficient and expanding categories for #4A. Team members debated whether this meant to accurately solve. They decided to proceed with this interpretation which in fact was the actual intent of the language choice.

PERFORMANCE INDICATOR	BEGINNING	DEVELOPING	PROFICIENT	EXPANDING
#1E Precisely communicate mathematical understandings and connections using a variety of representations. (MP1, 3, 6)	Communicate understandings or connections using at least one representation.	Communicate understandings and connections using appropriate representation(s).	Precisely communicate mathematical understandings and connections using a variety of representations.	Precisely communicate mathematical understandings and connections in an organized way using appropriate mathematical language and a variety of representations.
#4A Represent and solve problems (of all problem types) involving the four operations using the relationship between addition/subtraction and multiplication/division.* (3.OA.3, 4, 6, 8; 4.OA.1, 2, 3)	Identify the appropriate operation(s) in problems situations.*	Represent problems involving the four operations.*	Represent and solve problems (of all problem types) involving the four operations using the relationship between addition/subtraction and multiplication/division.*	Create multiple representations of problems (of all problem types) involving the four operations and use them to justify a solution.*

*Problem(s) do not need to require students to use all four operations but students should be required to decipher between and select from the four operations.

CONNECTIONS TO INSTRUCTIONAL UNIT

UNIT SUMMARY

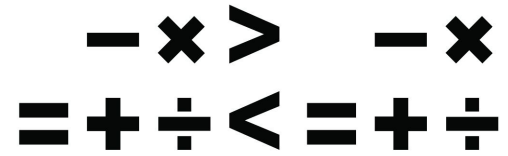
May include big ideas, authentic context, enduring understandings, essential questions.

In Grade 4, students become fluent with the standard algorithms for addition and subtraction. In an instructional unit

3-5 MATH

PERFORMANCE TASK

TEACHER INSTRUCTIONS



in which Place Value, Rounding, and Algorithms for Addition and Subtraction are taught students focus on single like-unit calculations (ones with ones, thousands with thousands, etc.), at times requiring the composition of greater units when adding (10 hundreds are composed into 1 thousand) and decomposition into smaller units when subtracting (1 thousand is decomposed into 10 hundreds) (4.NBT.4). Throughout these topics, students apply their algorithmic knowledge to solve word problems. Students also use a variable to represent the unknown quantity. During these instructional units students should be able to solve and express their understanding of multi-step word problems and show how they were able to solve these problems, using words, symbols and visual models. These visual models and multiple ways of showing their understanding facilitate deeper comprehension and serve as a way to support the reasonableness of an answer.

This particular performance task will require students to solve a real world multi-step problem in which they will be required to demonstrate their understanding of the problem using several modes of communication:

Some of the essential questions that may surface are:

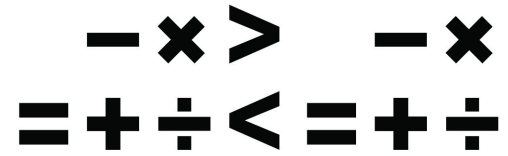
- What number model can you construct to represent a multiplication or division word problem?
- Given a specific word problem or task, how can you demonstrate multiple ways to solve the problem?

What will students know as a result of instruction in this unit in order to complete the task?	What will students be able to do as a result of instruction in this unit in order to complete the task?
<ul style="list-style-type: none"> • Factual information, vocabulary, and basic concepts related to each indicator • Appropriate operational choice 	<ul style="list-style-type: none"> • Assess the reasonableness of their answers • Read, understand and articulate what to do next with the numbers • Model, justify and represent the problem
How will teachers know what students know and can do prior to the task? Which relevant concepts and skills have students struggled with, had misconceptions about or missed entirely?	What background knowledge do students need (cultural, language, etc)? Have both content goals and language demands for ELL students been considered? Have the needs of diverse learners been considered?
<p>Formative Assessment</p> <p>Misconceptions</p> <ul style="list-style-type: none"> • Understanding which operation to use and what they mean • Application of information 	<ul style="list-style-type: none"> • Experience looking at data and making connections • ELL vocabulary support for parts of a pumpkin and meaning of “at least” • Experience reading tables and charts • Sensitivity to tactile issues when counting the pumpkin seeds

3-5 MATH

PERFORMANCE TASK

TEACHER INSTRUCTIONS



- Movement between ten times greater, movement within the place value chart

CULMINATING TASK

TASK SUMMARY

In groups, students determine the number of seeds in a pumpkin. Individually, they use this information to determine the number of seeds each group member would receive if the seeds were shared equally. They then extend this process to groups of different sizes. Finally, they use information about the class pumpkins to create a plan for buying a pumpkin for every class member.

STUDENT ACTIVITY⁴

- Students participate in a class discussion about the attributes of pumpkins.
- Students complete **Part 1** of the task independently.
- In their groups, students count the number of seeds in their pumpkin and record the results in **Part 2a - c** of the task.
- Students individually complete **Part 2d** of their task.
- Students complete the **Parts 3 and 4** of the task.
- Students share their work with their peers per teacher's directions and then complete the **Student Reflection**.
- Student completion of the extensions is optional.

⁴As mentioned above, an abbreviated version of the task was administered. Students were asked to make estimates about their pumpkins, to measure to attain actual values, and then they were asked the following questions:

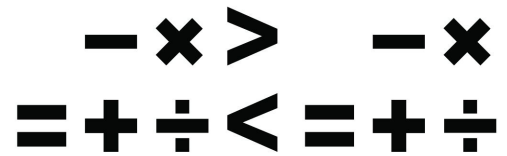
1. If you were to distribute the seeds equally to a group of 4 people how many seeds would each person get? How many seeds would be left over? Show your work.
2. Do you think there is a connection between the size of the pumpkin and the number of seeds the pumpkin has and what is your evidence of this connection?

CONSIDERATIONS FOR DIFFERENTIATION AND ACCESSIBILITY

3-5 MATH

PERFORMANCE TASK

TEACHER INSTRUCTIONS



- Given time and resources, students could weigh their group's pumpkin.
- Support for vocabulary words associated with pumpkins for ELL students may be necessary.
- Cultural sensitivity for using a food product for something other than human consumption may also need to be considered.
- If there is no access to pumpkins or the cost is too great, the actual doing could be skipped to the analyzing of the data given.
- Groups may record their own data in the class chart.
- Manipulatives or other supports can be made available to students at this point.

ADMINISTRATION NOTES AND DIRECTIONS ⁵

- Teacher obtains an assortment of pumpkins which have been pre-weighed. The weight and price of the pumpkin should be written on the pumpkins. The weight and dollar values of the pumpkins should be rounded to the nearest whole number.
- Teacher conducts a class discussion about pumpkins and their attributes.
- Teacher asks students to complete **Part 1** of the task on their own. They may choose to suggest connections such as:
 - weight vs. cost
 - weight vs seeds
 - cost vs seeds
- Teacher divides students into groups and provides each group with a pumpkin.
- Teacher creates and displays a class chart with columns for group name, weight, cost, and number of seeds. Data from each group is transferred into the chart.
- Teacher then directs students to individually complete **Part 2d** of their task.

Optional follow-up: Teacher makes the decision if and when to collect individual student responses for this part. The teacher may choose to have a class discussion about student responses to Part 2d. Information from the class could be recorded and posted.

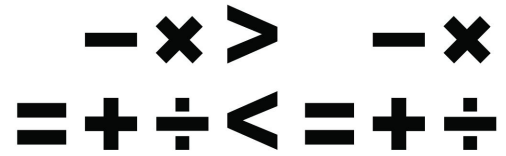
Teacher directs students to complete **Parts 3 and 4** of the task.

- Teacher decides on a format for students to share their work with their peers and then directs students to complete the **Student Reflection**.

3-5 MATH

PERFORMANCE TASK

TEACHER INSTRUCTIONS



5 Teacher Reflection - Later in the year I was able to administer the entire task. I found that students needed the opportunity to physically engage with the objects - giving them the data about the pumpkins was not enough to excite them about the task. The group work was essential. The task demanded dialogue and working individually did not provide them with the manner in which to clarify their thinking. Of course the downside of this is not being able to ascertain individual student understanding.

Here are some suggestions I would propose for altering the task.

Group work:

- Physically collect and then organize the data using a visual representation.
- Encourage students to try multiple means of organizing and representing the data. Ask them not to erase any of their work in order to gain insight into their thought processes.
- Add a question about whether they could apply another operation to solve portions of the problem.
- Ask if there are any seeds left over after dividing them equally, what will they do with them? What does the remainder mean?

Individual work:

- Determine some follow-up questions for the part where students are asked what would happen if they needed to share with 2, 5, or 10 people? Take this thinking and apply it to a new idea.

MATERIALS AND RESOURCES

- Pumpkins (vegetables, apples, and so forth could be substituted)
- Tools to assist students in counting the number of seeds in each pumpkin
- Chart paper
- Manipulatives
- Names of local farms, supermarkets, etc...
- Optional: Graphic organizers regularly used in class

Supporting Resources:

[Definition of Rigor](#) (Achieve the Core)

[Achieve the Core Coherence Map](#)

[Standards for Mathematical Practice](#)

[Progressions for the Common Core Math Standards](#)