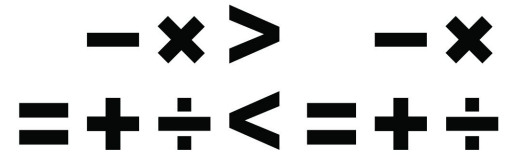


6-8 MATH

PERFORMANCE TASK

TEACHER INSTRUCTIONS



TASK OVERVIEW

| TITLE | GRADE LEVEL | SUBJECT AREA | INSTRUCTIONAL UNIT | TIME FRAME: HOW LONG TO ADMINISTER THE TASK? |
|-------------------|-------------|--------------|---|---|
| Sorting Scenarios | 8 | Mathematics | Investigating Solutions When Solving for One Variable | The unit is taught over the first month of school. The task itself should take either two classes (50 minutes) or one block (90 minutes). |

CONTENT AREA¹

PROFICIENCIES AND PERFORMANCE INDICATORS

| GRADUATION PROFICIENCY | GRADUATION PROFICIENCY DESCRIPTION | PERFORMANCE INDICATOR | PERFORMANCE INDICATOR DESCRIPTION |
|------------------------------------|---|-----------------------|--|
| #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. | B | Create and solve equations and inequalities in mathematical and real world problems. (6.EE.5, 7, 8, 9; 7.EE.4) |
| #2 Modeling | Students will choose the appropriate mathematics to describe, understand and analyze real-world situations. | A | Create an appropriate model using numbers, quantities, and other representations to describe a relationship in a real world situation. (MP4) |

¹ A modification was made to the Content Performance Indicator (PI) #4 Functions & Algebraic Reasoning B. It was decided that CCSS standards aligned to this PI should include 6.EE.6.

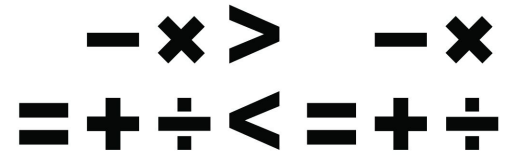
| | | | |
|------------------------------------|---|---|---|
| #4 Functions & Algebraic Reasoning | Students will create, interpret, use, and analyze expressions, equations and inequalities including recognizing when a relationship is a function and evaluating that function. | B | Create and solve equations and inequalities in mathematical and real world problems. (6.EE.5 - 9; 7.EE.4) |
|------------------------------------|---|---|---|



6-8 MATH

PERFORMANCE TASK

TEACHER INSTRUCTIONS



CROSS-CURRICULAR PROFICIENCIES AND PERFORMANCE INDICATORS

| GRADUATION PROFICIENCY | GRADUATION PROFICIENCY DESCRIPTION | PERFORMANCE INDICATOR | PERFORMANCE INDICATOR DESCRIPTION |
|---------------------------------------|---|-----------------------|--|
| Problem Solving and Critical Thinking | Student will demonstrate problem solving and critical thinking by applying processes to define problems, evaluating possible outcomes, and persevering in solving complex problems. | 5 | Show flexibility and persist through frustrations; continue to revise a plan or process of approach in order to arrive at a viable solution. |

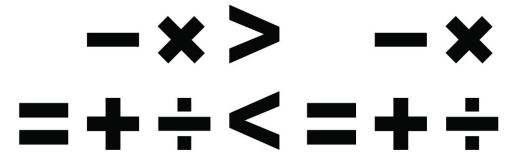
SCORING CRITERIA²

| PERFORMANCE INDICATOR | BEGINNING | DEVELOPING | PROFICIENT | EXPANDING |
|--|---|---|---|--|
| <p>#4 Functions & Algebraic Reasoning: B</p> <p>Create and solve equations and inequalities in mathematical and real world problems. (6.EE.5, 7, 8, 9; 7.EE.4)</p> | Model a situation using a flawed equation/inequality and flawed process to solve the equation/inequality. | <p>Create appropriate equations/inequalities to model situations and solve using a flawed process</p> <p>OR</p> <p>Create flawed equations/inequalities to model situations and solve using an appropriate process.</p> | Create appropriate equations/inequalities to model situations and use the equations/inequalities to find solution(s). | Justify and defend the equation/inequality and its solution. |
| <p>#2 Modeling: A</p> <p>Create an appropriate model using numbers, quantities, and other representations to</p> | Identify elements in a real-world situation. | Identify elements in a situation, describe a relationship between them, and select a representation. | Create a mathematical model that accurately represents a relationship in a | Justify and defend the model as an effective representation of a real world situation. |

6-8 MATH

PERFORMANCE TASK

TEACHER INSTRUCTIONS



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| describe a relationship in a real world situation. (MP4) | | | real world situation. | |
| <p>Problem Solving and Critical Thinking: 5</p> <p>Show flexibility and persist through frustrations; continue to revise a plan or process of approach in order to arrive at a viable solution.</p> | <p>Identify a strategy that could be used to overcome an obstacle in problem solving.</p> | <p>Make an attempt to reach a viable solution by applying a strategy.</p> | <p>Make multiple attempts, persisting as needed, to reach a viable solution by applying and adjusting varied strategies and approaches.</p> | <p>Make multiple attempts, if needed, until an effective solution is reached by applying, evaluating and adjusting strategies and approaches.</p> |

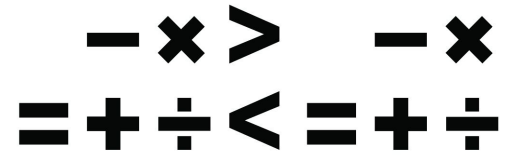
2 Modifications were made to the Scoring Criteria after the task was administered. These modifications were based on those made to the Performance Indicator for Functions & Algebra and further discussion on the modeling process. For purposes of scoring, the team felt it was better to first consider the modeling component, thus the change in position of the indicators below.

| PERFORMANCE INDICATOR | BEGINNING | DEVELOPING | PROFICIENT | EXPANDING |
|---|--|---|--|---|
| <p>#2 Modeling: A</p> <p>Create an appropriate model using numbers, quantities, and other representations to describe a relationship in a real world situation. (MP4)</p> | Identify elements in a real world situation. | Identify elements in a real world situation, describe a relationship between them, and select a representation. | Create an appropriate model using numbers, quantities, and other representations to describe a relationship in a real world situation. | Explain why the model is an effective representation of a real world situation. |
| <p>#4 Functions & Algebraic Reasoning: B</p> <p>Create and solve equations and inequalities in mathematical and real world problems. (6.EE.5-9; 7.EE.4)</p> | Write expressions to represent mathematical and real world problems. | Create equations and inequalities in mathematical and real world problems. OR Solve equations | Create and solve equations and inequalities in mathematical and real world problems. | Justify solutions for equations and inequalities in mathematical and real world problems. |

6-8 MATH

PERFORMANCE TASK

TEACHER INSTRUCTIONS



| | | | |
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| | | and inequalities in mathematical and real world problems. | |
|--|--|---|--|

CONNECTIONS TO INSTRUCTIONAL UNIT

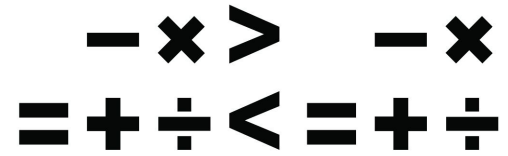
| |
|--|
| <p>UNIT SUMMARY May include big ideas, authentic context, enduring understandings, essential questions.</p> |
| <p>Solving single variable linear equations is a culminating standard in eighth grade. This concept will not be revisited as a stand-alone skill after this, but will be embedded into much of the problem solving that follows.</p> <p>During this unit, students will work with solving equations with variables on both sides of an equation. They will use properties of equality to isolate a variable with the ultimate intent of manipulating the equation so it is in a form that they can use inspection to determine whether the equation has a single solution, infinite solutions, or no solution. During the process, students will gain the understanding that different forms of the same equation all have the same solution set. Students will then apply their learning to real world situations that can be represented by equations.</p> |

| 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"> • What steps would you use to solve any linear equation in one variable? • How can real life situations be modeled by equations? • What are the possible types of solutions to any linear equation in one variable? | <ul style="list-style-type: none"> • I can identify and interpret the different parts of expressions and equations. • I can solve linear equations in a single variable by identifying the solution set. The equations will involve: <ul style="list-style-type: none"> ○ Distribution ○ Combining like terms ○ Variable occurring on both sides of the equations ○ Rational numbers (in the equation and in the solution set) ○ Proportions • I can use linear equations and expressions in a single variable to model real-life situations. |

6-8 MATH

PERFORMANCE TASK

TEACHER INSTRUCTIONS



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| | <ul style="list-style-type: none"> • I can identify equations that conclude in a solution set of all Real numbers. • I can identify equations that conclude in a solution set that is empty. |
|--|--|

| | |
|--|---|
| 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>In seventh grade students have used algebraic expressions to describe patterns, real life and problem situations. They will be able to manipulate algebraic expressions by identifying and combining like terms and by using the distributive, associative, commutative, and identity properties.</p> <p>In particular, the ability to model real life situations using algebraic expressions, especially when reading comprehension is involved, can be a struggle for students.</p> <p>They also will have solved numerical linear equations in one variable including one-step, two-step, and multi-step equations.</p> <p>Earlier in the unit they will have worked on identifying and creating single variable linear equations that have one solution, no solution, and a solution set of all Real numbers.</p> | <p>This task can be modified in a number of ways, both for struggling learners and with extensions. The number of scenarios presented to students can be decreased strategically in order to accommodate. Additionally, students can be asked to explain their thinking in a number of different ways in order to extend their understanding.</p> |

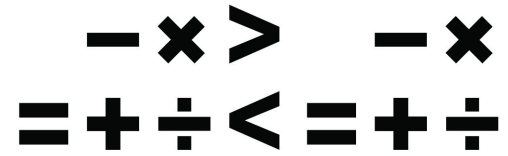
CULMINATING TASK

| |
|----------------------------------|
| TASK SUMMARY ³ |
|----------------------------------|

6-8 MATH

PERFORMANCE TASK

TEACHER INSTRUCTIONS



Students are asked to classify a variety of scenarios as characterized by their solutions sets, providing a rationale for their choices. They then are asked to apply their understanding by solving three scenarios, identifying the type of solution set of that equation, and explaining their solution.

3 After reviewing student work, the design team made modifications to the task. Here is the revised Task Summary:

Students are asked to classify a variety of scenarios as characterized by their solutions sets, providing a rationale for their choices. They then are asked to apply their understanding by solving three scenarios, identifying the type of solution set of that equation, and explaining their solution.

STUDENT ACTIVITY **4**

- Students will be given a number of scenarios that can be modeled using linear equations in one variable.
- With a partner or group, they will be asked to classify each according to the type of solution set they have. (One solution, No solution, all Real numbers)
- Individually, students reflect on their work in their group.
- For each solution type, students will choose one of the categorized scenarios and explain how they determined how to classify the solution set. Their explanations must include the solutions they found for the chosen scenarios.
- Students create their own scenario and equation for one of the solution set types.
- Students complete a final reflection.

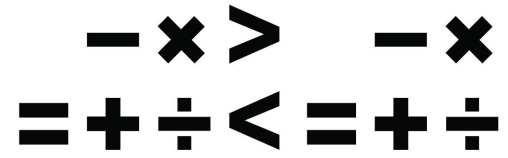
4 After reviewing student work, the design team made modifications to the task. The decision was made to provide an example of each type of situation for the independent work as opposed to students providing their own examples. This decision was based on their desire for students to interact with examples that represented the appropriate models. The revised Student Activity is presented below and this is the link for the newly tooled [Sorting Scenarios Recording Sheet](#).

- *Students will be given a number of scenarios that can be modeled using linear equations in one variable.*
- *With a partner or group, they will be asked to classify each according to the type of solution set they have. (One solution, No solution, all Real numbers)*
- *Each student will write and solve equations for three given scenarios. Their explanations must include the solutions they found for the chosen scenarios.*

6-8 MATH

PERFORMANCE TASK

TEACHER INSTRUCTIONS



- *Students complete a final reflection.*

CONSIDERATIONS FOR DIFFERENTIATION AND ACCESSIBILITY

- Students could be given fewer scenarios to classify.
- Student Task Questions 2+5: Students could respond through writing, creating a diagram to explain their process, or orally reporting out (possible accommodation).
- The teacher could assign particular scenarios to be explained by struggling learners, rather than letting them choose.
- Some students may need assistance with reading.
- The teacher can choose to give feedback on correct/incorrect classifications prior to students moving on to explanations in order to give students opportunities to revise their thinking.
- The teacher can choose to include additional examples of just equations to be sorted as well.
- The scenarios could be physically sorted into the three categories.
- Revisit the scenarios during systems instruction.

ADMINISTRATION NOTES AND DIRECTIONS

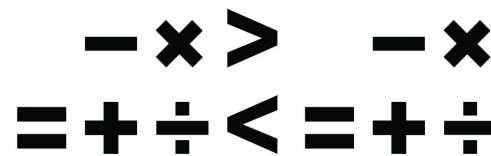
- Students should have practiced sorting equations by solution type prior to sorting scenarios.
- Teachers have the option of giving student groups/partners the scenarios as a set of cards to sort, or a recording sheet.
- Classifications should be checked and approved by the teacher before students are given the opportunity to go ahead and write their individual explanations.
- Students will take their work pages with them to refer to when writing their explanations. This makes it important for them to take their own notes on their work pages since they will not be working together during that part.

MATERIALS AND RESOURCES

- [Sorting Scenarios Classification Sheet](#)
- [Sorting Scenarios Card Sort Set](#)
- [Sorting Scenarios Work Space](#) (Optional)
- [Sorting Scenarios Original Student Recording Sheet](#) (Original version)
- [Sorting Scenarios Student Recording Sheet](#) (Newly designed to reflect task modifications)
- [Sorting Scenarios Answer Key](#)

6-8 MATH

PERFORMANCE TASK TEACHER INSTRUCTIONS



Supporting Resources:

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

[Achieve the Core Coherence Map](#)

[Standards for Mathematical Practice](#)

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