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| **Learning Target(s):**1. Represent and solve linear and exponential equations and inequalities graphically.
* I can explain that the graph of an equation in two variables is the set of all its solutions plotted in the Cartesian coordinate plane.
* I can graph the solution to a linear inequality in two variables.
* I can solve problems involving a system of linear inequalities.
 | **Pacing:*** 1 Day
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| **In previous grades, students have:*** In 7th Grade students develop an understanding of rational numbers and work with expressions and linear equations.
* In 6th Grade students write interpret and use expressions and equations.
* In 4th Grade students develop an understanding of fluency with multi-digit multiplication and dividing to find quotients with multi-digit dividends.
* In 2nd Grade students build fluency with addition and subtraction.
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| **Success Criteria** (to be able to do this, students must learn and understand…):* Understand how to represent the constraints and variables mathematically.
* Understand how to select appropriate mathematical methods to use.
* Understand how to make sensible estimates and assumptions.
* Understand how to investigate a multivariable problem.
* Understand how to communicate their reasoning clearly.
 | **Performance Task** (students will show they can do this by):* Interpret a situation and represent the constraints and variables mathematically.
* Select appropriate mathematical methods to use.
* Make sensible estimates and assumptions.
* Investigate a multivariable problem.
* Communicate their reasoning clearly.
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| **Suggested Activity:** This task is based upon the following scenario: Susie is organizing the printing of tickets for a show. She has collected prices from several printers. (*This is an Apprentice Level task*)Your task is to use graphs and algebra to advise Susie on how to choose the best printer.Task Level Descriptors***Novice Tasks***Novice tasks are short items, each focused on a specific concept or skill, as set out in the standards. They involve only two of the mathematical practices (MP2 – reason abstractly and quantitatively; MP6 – attend to precision), and do so only at the comparatively low level that short items allow.***Apprentice Tasks***Apprentice tasks are substantial, often involving several aspect of mathematics, and structured so as to ensure that all students have access to the problem. Students are guided through a “ramp” of increasing challenge to enable them to show the levels of performance they have achieved. While any of the mathematical practices may be required, these tasks especially feature MP2, MP6 and two others (MP3 – construct viable arguments and critique the reasoning of others; MP7 – look for and make use of structure). Because the structure guides the students, the mathematical practices involved are at a comparatively modest level.***Expert Tasks***Expert tasks are rich tasks, each presented in a form in which it might naturally arise in mathematics, science or daily life. They require the effective use of problem solving strategies, as well as concepts and skills. Performance on these tasks indicates how well a person will be able to do and to use mathematics beyond the mathematics classroom. They demand the full range of mathematical practices, as described in the standards, including: MP1 – make sense of problems and persist in solving them; MP4 – model with mathematics; MP5 – use appropriate tools strategically; MP8 – look for and express regularity in repeated reasoning.Task Difficulty DescriptorsIt is known from research that the difficulty of a task depends on various factors, notably its:* **Complexity** – the number of variables, the variety and amount of data, and the number of modes in which information is presented, are some of the aspects of task complexity that affect the difficulty it presents.
* **Unfamiliarity** – non-routine tasks (those which aren’t just like the tasks one has practiced solving) are more difficult than routine exercises.
* **Technical Demand** – tasks that require more sophisticated mathematics for their solution are more difficult than those that can be solved with more elementary mathematics.
* **Student Autonomy** – guidance from an expert (usually the teacher), or from the task itself (e.g., by structuring or “scaffolding” it into successive parts) makes a task easier than if it is presented without such guidance.

Assessments of student performance need to take these factors into account. For example, these factors imply that, in order to design a task for a given level of difficulty, a relatively complex non-routine task that students are expected to solve without guidance needs to be technically easier than a short exercise that tests a routine skill.Activity Link: <https://www.map.mathshell.org/tasks.php?unit=HA12&collection=9>**Re-teaching:**Student Focus Questions and Thinking Guide:* What is known and what is unknown?
* What are you asked to find out?
* What kind of representation will help you tackle this problem?

*Try not to make suggestions that move students towards a particular approach to this task. Instead, ask questions that help students to clarify their thinking and encourage checking:* * Can you set out your work using a table or diagram?
* What would be a good way?
* What assumptions have you made?
* How can you check your solution?
* Do you think there is just one solution?

**Extension:*** What was your strategy for solving this problem?
* What do you know now that you did not know before?
* Would you continue to use this strategy on similar problem types?
* Are there any other approaches you could try?

Peer Reflection/Assessment:* If you are visiting another group, read through their work. If their work makes sense, explain it in your own words. If the work does not make sense to you, ask for clarification.
* If you are staying at your desk, either carefully listen to the explanation and check it matches your own thinking or answer the visiting students’ questions.
* You may then want to consider improving your artifact.
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| **EL Accommodations:*** Provide written instructions.
* Provide a vocabulary list.
* Peer support.
* Discourse strategies.
* Reading and writing prompts.
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| **Vocabulary:*** Linear
* Quadratic
* Expression
* Equation
* Domain
* Range
* Functional Notation
* Systems of Equations
 | **Aligned Resources:*** **Task PDF:** <https://www.map.mathshell.org/download.php?fileid=772>
* **Task Rubric:**

<https://www.map.mathshell.org/download.php?fileid=773> | **Blooms:** Apply**DOK:** 2**21st Century Skills:**Learning and Innovation Skills:* Creativity and Innovation
* Critical Thinking and Problem Solving
* Communication
* Collaboration

Information, Media and Technology Skills:* Information Literacy
* Media Literacy
* Technology Skills
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| **Test Item Exemplars:**Students will analyze and correct, as necessary, the “Printing Tickets” activity (pg. T-2 and S-1 of linked MAP Mathshell lesson)… Then, after individual and peer reflections, they shall create their own Cat Poster with corrected data and conclusions. |