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| **Learning Target(s):**1. Create equations that describe linear, quadratic and exponential relationships.
* I can create equations and inequalities in one variable and use them to model and/or solve problems.
* I can create and graph linear, quadratic and exponential equations in two variables.
* I can solve literal equations and formulas for a specified variable that highlights a quantity of interest.
 | **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 an algebraic 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 an algebraic problem.
* Communicate their reasoning clearly.
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| **Suggested Activity:**In this Problem, *Rod Trains*, students use mathematical concepts of combinatorics, number theory, and discrete mathematics. The mathematical topics that underlie this problem are knowledge of number sense, number patterns, counting principles, systematic charting, and closed form equations. The mathematics that includes counting principles and systematic charting is often referred to as discrete mathematics. In the first levels of the problem, students compare the length of rods to determine a numerical measurement of each of the rods. As one continues through the levels students analyze problems to determine the number of trains that are created by arranging the rods in different orders and different lengths. In the final levels of the problem, students are presented with situations that require them to use counting principles and organized lists to determine the number of ways trains can be assembled. In the final level, students are asked to generalize their findings in an equation given a train length of n.Activity Link: <https://www.insidemathematics.org/sites/default/files/materials/rod%20trains_23.pdf>**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
 | **Aligned Resources:*** **Lesson PDF:** <https://www.insidemathematics.org/sites/default/files/materials/rod%20trains_23.pdf>
* **Lesson Slide Set:**

n/a * **Cuisenaire Rods**

<https://nrich.maths.org/4348> | **Blooms:** Understand**DOK:** 3**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:**Open Exploration Activity (Ongoing Formative Assessment).   |