

Topic: Least Common Multiple

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Genre: Math

Grade Level: 6th

Unit: Math & Robotics

Duration: 110 Minutes

Essential Question

(Domain 1: Planning and Preparation-Component 1c: Designing Coherent Instruction)

- How do we apply the least common multiple of two whole numbers to a real life scenario?

Background Knowledge

Background Summary:

- **In this lesson students will apply the concept of least common multiples by analyzing a scenario involving two subway cars. One car is running local and one is running express and both .**

Lesson Objective:

Given two lego robots and programs, SWBAT find the least common multiple of two whole numbers by analyzing and executing a problem based scenario involving a local and express subway car.

Standards

(Domain 1: Planning and Preparation- Component 1a: Demonstrating Knowledge of Content and Pedagogy)

Common Core State Standards:

- o **6.NS.B.4** *Compute fluently with multi-digit numbers and find common factors and multiples.* Find the greatest common factor of two whole numbers less than or equal to 100 and the least common multiple of two whole numbers less than or equal to 12. Use the distributive property to express a sum of two whole numbers 1-100 with a common factor as a multiple of a sum of two whole numbers with no common factor. For example, express $36 + 8$ as $4(9 + 2)$.

Next Generation Science Standards:

- o **MS-ETS1-2.** Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem.
- o **MS-ETS1-3.** Analyze data from tests to determine similarities and differences among several design solutions to identify the best characteristics of each that can be combined into a new solution to better meet the criteria for success.

Vocabulary (Domain I: Planning and Preparation - Component 1e: Demonstrating Knowledge of Students.)	Prep Work/Materials (Domain 1 Planning and Instruction-Component 1e: Designing Coherent Instruction, Domain 3 Instruction-Component 3c: Instruction Engaging Students in Learning)	Cross Curricular Connection (Domain I: Planning and Preparation - Component 1a: Demonstrating Knowledge of Content and Pedagogy, Component 1b: Demonstrating Knowledge of Students.)
<p>Multiple Algorithm</p>	<p>Measuring Tape Number Line Markers (To mark on where both robots stop) Stop Watch Graph Paper EV3 Robots (Pre Programed) Laptop/iPad with Mindstorms Education version Interactive Handouts</p> <p>Teacher will be required to prepare the following materials for successful execution of this lesson:</p> <ul style="list-style-type: none"> ● Upload the local and express programs onto the the robots prior to the lesson. ● Copies of the interactive handout for each student ● For each group, prepare bins with measuring tape, markers, number line, stopwatch, graph paper, robots, and interactive handouts 	<p>Science Mathematics Social Studies/Literacy Technology Engineering</p>
Differentiation (Domain I Planning and Preparation-Component 1e: Designing Coherent Instruction, Domain 3: Instruction - Component 3b: Using Question and Discussion techniques Domain 3: Instruction - Component 3c: Engaging Students in Learning)		
<ul style="list-style-type: none"> ● Bodily kinesthetic learners - Local and Express Robots hands on activity ● Audio and Visual learners – Visual representation of activity using robots, number line, and markers. The observations/data collected throughout the activity. Video/simulation of how the robots should run during the experiment ● ELL/Low reader - Guided notes printed for those who require them ● Technology- Utilizing Lego Mindstorms robot kit and digital program ● Enrichment: Analyze the potential issues that could cause the subway trains to have varied times in a real life situation; delays, bumps, track issues, inclement weather etc. ● Extended time for those who require it ● Small groups according to levels, behavioral needs, and activity requirements 		

- Individual attention from ICT teachers and paraprofessionals.
- Resource room remediation for those who require

Procedure (Domain I Planning and Preparation-Component 1e: Designing Coherent Instruction, Domain 3: Instruction - Component 3b: Using Question and Discussion techniques Domain 3: Instruction - Component 3c: Engaging Students in Learning)	Student Engagement (Teacher Assessment)
<ol style="list-style-type: none"> 1. Have students complete the LCM do now as a warm up for the day's activity and review (8 minutes) 2. Introduce the question for the day, "You are on your way to go see a Zombie Apocalypse movie. Your BFF takes a local train and you are on the express train. You want to figure out which subway stop you both will meet at so that you can travel to the theater together. What subway station will you both meet at? Explain activity #1: (20 Minutes) <ol style="list-style-type: none"> a. Your local robot will move forward and will stop every 3 seconds; your express robot will also move forward but will stop every 5 seconds. If your robots start together at the same time, will they ever stop at the same stations? If yes, then find out the first stop that local and express robots will arrive at? b. Students will be required to fill out the data table on the interactive handout. The data table includes the time elapsed for each stop on both the local and express trains c. As your robot travels its path be sure to mark each stop with a marker, sticker, post-it, lego piece (color differentiated for local and express robots) d. Also make students aware of the time display on both the local and express robots 3. Explain activity #2: (10 Minutes) <ol style="list-style-type: none"> a. Students will illustrate/diagram their findings with respect to the timing of the local and express robot using two number lines. 4. Explain activity #3: (10 Minutes) <ol style="list-style-type: none"> a. Students will prove their findings by using an algorithm to identify by circling common multiples. 5. Distribute exit ticket: (7 Minutes) <ol style="list-style-type: none"> a. Using the graph provided, have students graph their response to the following question, "Commuter trains depart from a train station every 10 minutes. Subway trains depart every 4 minutes. A subway train and a commuter train both leave the station together. How long will it be before the subway train and the commuter train depart at the same time?" <p>Extension Activity:</p> <ol style="list-style-type: none"> 1. Do Now: (10 Minutes) <ol style="list-style-type: none"> a. Have students watch River of Steel: The Building of the New York City Subway ask students to respond to 	

<p>the following question: Based on the clip that you just watch about the construction of the NYC Subways, how do you think that science, math, engineering, and technology were utilized during this process? Defend your response by using evidence from the clip.</p> <ol style="list-style-type: none"> 2. Activity 1: Experimentation & Data Collection (10 Minutes) <ol style="list-style-type: none"> a. Have students run the local and have them record the time elapsed and distance on Table 1. b. Have students run the express and have them record the time elapsed and distance on Table 2. 3. Activity 2: Graphing (12 Minutes) <ol style="list-style-type: none"> a. Have students graph the local and express robots 4. Activity 3: Analyzing the data (5 Minutes) <ol style="list-style-type: none"> a. Determine at the point or stop that the local and express robots meet at 5. Activity 4: One stop further (10 Minutes) <ol style="list-style-type: none"> a. Suppose your friend missed the first stop that you were both going to meet at. What are the next three subway stops that both trains will meet at? b. You have a friend who wants to meet up with you and your BFF after the <i>Zombie Apocalypse Movie</i>. If she is taking the local train at which stop after the movie theater would she meet you at? 6. Exit Ticket: Expanding your views <ol style="list-style-type: none"> a. In what other real life scenarios do you think using a least common multiple will be useful? 	
<p>Assessment (<i>Formative or Summative</i>) (Domain 1 Planning and Instruction- Component 1e: Designing Coherent Instruction, Domain 3 Instruction- Component 3c: Engaging Students in Learning, Domain 3 Instruction- Component 3d: Using Assessment in Instruction)</p>	<p>Student Engagement (Teacher Assessment)</p>
<ol style="list-style-type: none"> A. Teacher Observation B. Interactive Handout completion/ accuracy C. Do Now/Exit Ticket D. Following experimental procedure & data collection E. Analyzing the collected data and explaining where systematic error could have skewed results F. Lab write-up 	
<p>Additional Resources</p>	

1. Interactive handout for the Least Common Multiple Lesson
2. [River of Steel: The Building of the New York City Subway](#)
3. Experiment simulation clip for Least Common Multiple Lesson