



Straight or Curved? Riding the Math of the Five Boro Bike Tour

Teacher: Shana Elizabeth Henry	Date: 30 th of July 2026
Class Type: Algebra I or Algebra II - Quadratics	Grade: Mixed 9-12
Course Background and Connection to Given Topic: One semester advanced math course called: Quadratic Modeling in Sports. This lesson is a part of the case study, "Bicycle" where the mathematical focus is 'squaring'.	
Time Frame: 90 minutes	

Lesson Overview
Unit/ Overarching Focus of Lesson: Differentiating between linear and quadratic, and reviewing their equations.
Objectives/Aims: Students will demonstrate how to mathematically represent and analyze sports involving quadratic relationships.
Aligned Standards: → NYS Next Generation Mathematics Learning Standards (2019) Algebra II, AII-A.CED.1.Create equations that describe numbers or Relationships. → The Standards for Mathematical Practice, #4 - Model with mathematics.
Key Vocabulary and Concepts: Linear, Quadratic, Parabola, Modeling, Symmetry, General Equation
Materials & Resources: Five Boro Bike: Tour Map Online resources:  Straight or Curved? Riding the Math of the Five Boro Bike Tour
Safety Practices: n/a
Differentiation Strategies: → Writing protocol: Buzz Words → Students will be provided with guided notes → Flexible Grouping (partners if they choose)

→ New vocabulary will be highlighted (and translated if necessary)	
Cultural Context: → Students will choose a part of the bike tour that is personally relevant to them and/or their community. → By creating the lesson focused on real events that happen in their community and city students are centered in the lesson. They will learn real world skills (training an AI model). It supports students seeing technology as a tool to explore the world, think critically, and connect with their city, rather than just be consumers of the technology. → Use "brain breaks" to help students stay engaged.	
Prior Knowledge: Youtube Videos: → How AI Works → AI: Training Data & Bias → How Computer Vision Works	
Prior Lesson: Bicycle Field Trip	Follow-up Lesson: unknown - new curriculum
Lesson Overview/ Abstract: Students will determine (using AI built application) which parts of the path of the bicycle during a particular part of the Five Boro Bike Tour are linear or parabolic.	

Lesson Activities		
Time	Activities	Rationale
5 min	<i>Do Now:</i> Explain why we have visitors. Do they know anyone who has participated in the Five Boro Bike Tour? After our lesson, how many students think in the future, they might participate in it? Ask students why it might be important to use Computer Vision and the Five Boro Bike Tour. <i>Materials:</i> The three youtube videos from the prior knowledge section.	A short routine that students understand is expected to engage in as they enter the classroom. Routines lower stress and begin academic engagement.

15 min	<i>Mini-Lecture:</i> Review how the following works: AI, AI trains data & bias, and computer vision. <i>Materials:</i> Claude, VCS.	Short interactive information concentrating on a specific topic. The brain has an attention limit so students can deeply focus and retain the information shared during the mini-lecture.
15 min	<i>Mini-Lecture - CS3 Smart Streets Connection:</i> Give a brief summary of my summer RET experience. Explain what CS3 Smart Streets are. Show them the website with the teacher's lesson. Demonstrate to students how to use Claude & Visual Studio Code to create an interactive AI application. <i>Materials:</i> CS3 Smart Streets website	Same as above.
40 min	<i>Hands-On:</i> Students use the interactive application. <i>Materials:</i> ❖  Straight or Curved? Riding the Math of the Five Boro Bike Tour Activity ❖ guided notes	Active engagement is very important to stimulate the brain to build stronger neural connections and skill mastery. This activity is interactive and then they have to transfer their learning to a note-catcher to support processing their learning.
10 min	<i>Group Debrief:</i> What skills did you learn today? Would you want to participate in the next Five Boro Bike Tour? <i>Materials:</i> none	Debriefing allows for discussion after the lesson that is guided and reflective. This helps students process experiences, connect actions to deeper concepts, build social-emotional skills, and transition from passive participants to active, self-aware learners.

5 min	<i>Reflection:</i> Ask them what skills did they see me using during the demonstration. Do they want to learn it? Why or why not? <i>Materials:</i> none	This allows thinking about learning, the mistakes, and new understanding. The brain tells us our ability to understand our own thinking habits supports lasting knowledge and self-awareness (building metacognition skills).
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Lesson Assessments	
Follow-Up Assignment: Students will re-do this assignment for a randomly assigned part of the Bike Tour the following day. This reinforces the concepts and skills and gives struggling and absent students a chance to experience this lesson.	
Additional Accommodations for Students: Students who have difficulty with previous concepts (parabolas and/or AI tool) will be given a) a second day to absorb the lesson b) individual detailed instructions from either one of the two teachers c) videos and review on Fridays during remote review time.	
Methods of Assessment: Completion of guided notes.	