**Backwards Design Unit Planning**

**Teacher/School:**

# New York City Department of Education
# Magnet Program District 25 & 28

School Name
Robert Van-Wyck MS 217 Q

Functions
8th Grade

**Essential Question: How can math functions be used to solve problems related to the environment?**
**Suggested Time Frame: 4 weeks**
**Theme: Green Environment**

## Graphic Overview of Unit

**Suggested Time Frame:**

## Essential Question: How can math functions be used to solve problems related to the environment?

## Backwards Design Unit Planning

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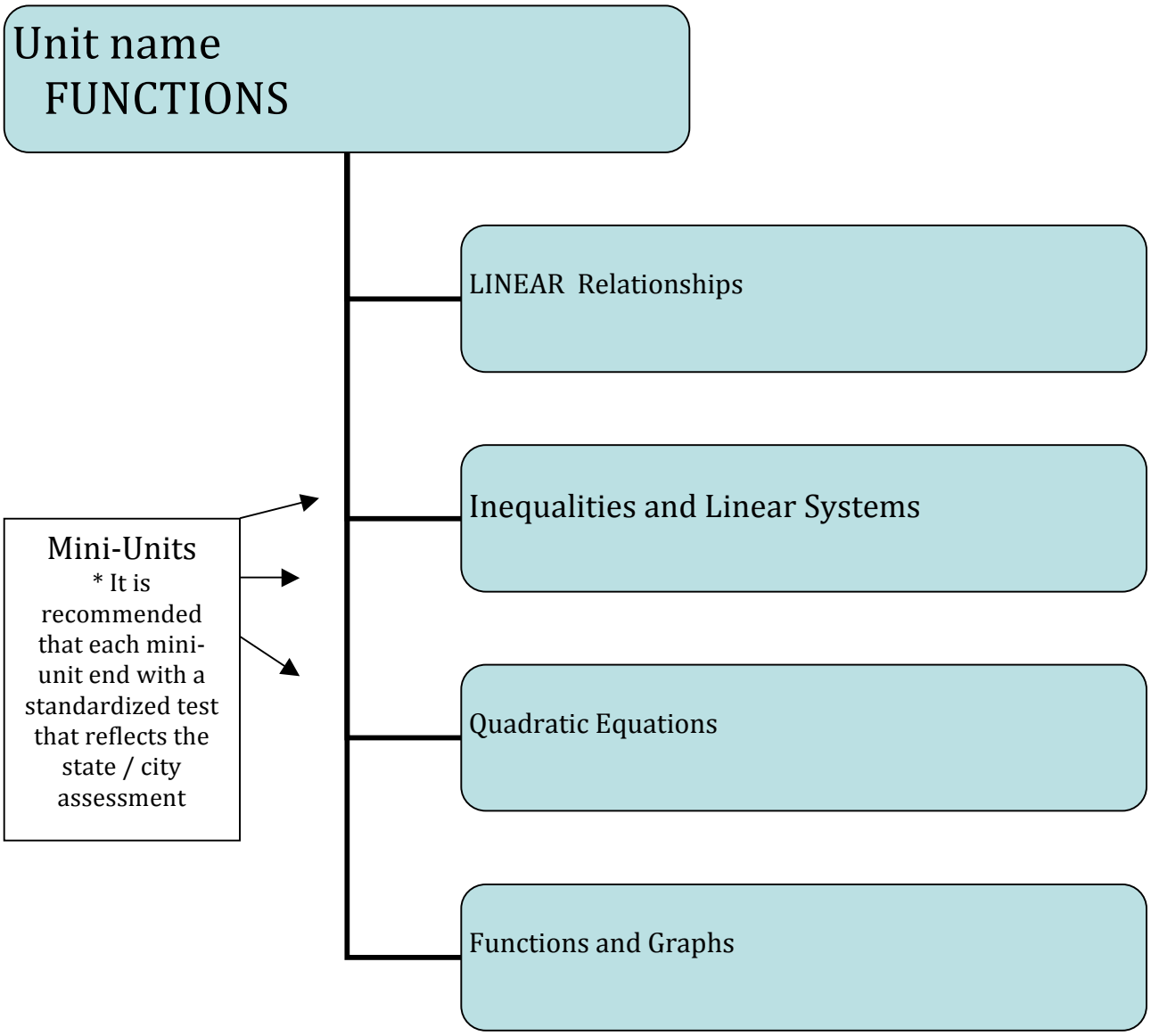


**Unit's Culminating Project: (briefly explain in 2-3 sentences):**
The students will conduct research on data about the amount of recycling bags that consumers can use in order to preserve the environment and to save money.
The students have to compare and contrast the amount of bags used in small grocery stores and the amount of bags used in supermarkets.

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## Teacher/School:

| Stage 1- Desired Results | |
|---|---|
| **Standards-Based Learning Goals:**<br><br>8.A.17 Define and use correct terminology when referring to function (Domain and Range)<br>8.A.18 Determine if a relation is a function<br>8.A.19 Interpret multiple representations using equations, table of values and graph<br>8.G.15 Graph a line using a table of values<br>8.G.16 Determine the equation of the line given the slope and the y-intercept<br>8.G.17 Graph a line from an equation in slope intercept form (y=mx +b)<br>8.G.18 Solve system of equations graphically (only linear, integral solutions, y= mx +b) format, not vertical/horizontal lines)<br>8.G.19 Graph a solution set of an inequality on a number line<br>8.G.20 Distinguish between linear and non linear equations $ax^2 + bx + c$; a=1 (only graphically)<br>8.G.21 Recognize the characteristics of quadratics I tables, graphs, equations, and situations. | |
| **Concepts** | |
| **Big Ideas for this Unit**<br>**This unit is about a topic in math that has a relationship with the environment and how what the students learn in class may be applied in their real life for survival.** | **Magnet School Theme:**<br><br>**Green Magnet for Career Exploration**<br><br>**Relevant/Connected Big Idea:**<br><br>**Are we harming the environment?**<br><br>**S.O.S for our planet** |
| | |
| **Enduring Understandings**<br>**Students will understand…**<br>• **how to use functions to solve problems related to the environment.**<br>• **the necessity of finding ways to reduce pollutants** | **Overarching Essential Question(s):**<br>• **How can math functions be used to solve problems related to the environment?**<br>• **Why do we need a healthy environment?**<br>• **Why is it important to find ways to reduce pollutants?** |

# Backwards Design Unit Planning

## Teacher/School:

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|---|---|
| **Content and Skills** | |
| **Content**<br>**Students will know…**<br>**coordinate Plane**<br>**tables**<br>**lines**<br>**slope intercept**<br>**linear Equations**<br>**system of Equations**<br>**inequalities**<br>**exponential Variation** | **Skills**<br>**Students will be able to…**<br>**explain what a function is. (Domain, Range).**<br>**analyzes the behavior of a function.**<br>**interpret multiple representations using equations table values and graphs.**<br>**apply functions in a real life situation.**<br>**determine the slope and y-Intercept.** |

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**Teacher/School:**

| **Stage 2- Summative Assessment Evidence**<br>**If students understand, know and are able to do the items in Stage 1, they should be able to show their understanding by completing an authentic task found in the world beyond the classroom.** |
|---|
| ➢ Design the Culminating/Summative Task:<br><br>G- (goal)<br>Your goal is to help the Mayor to collect data and show evidence on the effect of plastic bags in an environmental issue.<br><br>R- (role)<br>You are the student intern at Mayor Bloomberg's office.<br><br>A- (audience)<br>The audience is Mayor Bloomberg and staff.<br><br>S- (situation)<br>You have been asked to perform a research on data about the amount of recycling plastic bags that consumers can reuse in order to preserve the environment and to save money.<br><br>P- (purpose and product)<br>You need to prepare a research report about the number of supermarkets and small businesses that operate in NYC and collect data of the amount of plastic bags used weekly or monthly and the amount of money consumers can save over a period of time (yearly). |

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S- (standards for performance)

You need to include...
- a graph showing the amount of plastic bags used in businesses in NYC as a function of time
- a graph showing the amount of money consumers can save as a function of time.
- compare and contrast of the amount of bags used in small grocery stores and supermarkets
- create two line graphs comparing and contrasting the amount of plastics bags used in two different neighborhoods
- the following standards must be met:
8.A.18 Determine if a relation is a function
8.A.19 Interpret multiple representations using equations, table of values and graph
8.G.15 Graph a line using a table of values

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**Teacher/School:**

## Student Task

**You are a student intern working for Mayor Bloomberg's office. He is working to pass a Bill about preserving the environment by charging five cents per every plastic bag to the consumers in every supermarket in NYC. You are asked to research the environmental and economic effects of using versus recycling plastic bags in supermarkets. ?**

**You research will need to address the following questions**

- **Compare and contrast the amount of bags use in grocery stores and bags used in supermarkets**
- **Compare and contrast the amount of bags used in two different communities over a period of time weekly, monthly, yearly**
- **How much money a community will save over one year?**
- **As a community school, what would it be the benefit of the school if the community save money over a year?**

**Your presentation will contain:**

- **A verbal response to the above questions**
- a graph showing the amount of plastic bags use in businesses in NYC as a function of time
- a graph showing the amount of money consumers can save as a function of time.
- A chart that compare and contrast of the amount of bags used in Grocery store and supermarkets
- A two line graphs comparing and contrasting comparing and contrasting the amount of plastics bags used in two different neighborhoods (Alternative – Power point presentation)

### Rubric For Culminating Project

The rubric for this activity is as follows:

Scale 4. 60%

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## Teacher/School:

The solution is completely well developed and thoroughly informs readers that the mathematical process is clearly presented w/lots of mathematical support addresses all the mathematical components (clear, step-by-step, detailed explanation, accurate mathematical representation and/or terminology). The student shows a sophisticated understanding of relevant ideas or processes that go beyond the GRASP.

Scale 4. 30%

The use of function is extremely well organized and fully developed with extensive evidence of original ideas and assertions supported by consistent evidence of independent research.

Scale 4. 10%

Culminating presentation is characterized by highly effective attention to the needs of the audience as well as creative use of data, line graphs to reinforce rationality, development and persuasiveness.

Scale 3. 60%

The solution shows that the student has a broad understanding of the problem. A clear explanation is given with accurate mathematical representation and/or terminology. All parts of the solution are correct. Other sections need additional evidence to support fully with evidence all major claims and assertions.

Scale 3. 30%

Some specific mathematical details that adequately explain the topic are generally clearly organized, with some sections fully developed through original analysis, but other sections would benefit from greater attention to support details and elaboration.

Scale 3. 10%

The presentation is organized most of the way through the use of underdeveloped approach

with some use of graphs and collected data for a clear understanding and responsiveness to audience needs.

Scale 2. 60%

There is some evidence of mathematical reasoning which leads some way toward a solution, but not to a full solution of the problem. Some use of appropriate mathematical representation and/or terminology is used but the explanation is incomplete. Some parts may be correct but the final answer is incorrect. Many aspects need much more development and evidence to make convincing, complete and insightful argument.

Scale 2. 30%

The composition is somewhat superficial in its approach. Little development and minimal information about problem/process. The mathematical process is presented with little mathematical support. Much greater attention to supporting details, relevant evidence, and coherent of organization are required.

Scale 2. 10%

Culminating the presentation is inadequate, some mathematical terminology are not correctly used. The student did not correctly connect reasoning to mathematical knowledge. No evidence is present of the need to organize information and claims visually.

Scale 1. 60%

There is no evidence of a strategy or a strategy is used that does not help solve the problem. The explanation cannot be understood or is unrelated to the problem. Little evidence or no use of mathematical representations and/or terminology is used. Many aspects of argument are sketchy or undeveloped, with no little, if any, attention to balance and reliable evidence to support claims and assertion.

Scale 1. 30%

No organization is evident; the product is ineffective. There is little evidence of prior planning and poor organization. No mathematical terminology used

Scale 1. 10%

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## Teacher/School:

Culminating presentation is inadequate, lacking any attention to the needs and background of the audience. There is no attempt to connect reasoning to mathematical knowledge.

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| Stage 2- Formative Assessment Evidence | |
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| **Throughout the unit how will you check to make sure students are mastering the knowledge, skills, and understandings they need to be successful at the summative/culminating task?** | |
| **Assessment Formats on the State Test**<br><br>**Standardized tests**<br><br>**Formal and informal assessments** | **Weekly Formative Assessments**<br>**For Content…**<br>**Coordinate plane**<br>**Lines**<br>**Tables of values** |

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<table>
<tr><td rowspan="3">Predictive acuity tests<br><br>Exit Projects</td><td></td></tr>
<tr><td>For Skills…<br><br>Domain, range<br>Equations<br>Tables of value and graphs</td></tr>
<tr><td>For Understandings…<br>Exit tickets<br>Thinking Maps</td></tr>
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