

**Course / Unit**

Mathematics 6 Grade - Ratio/Proportions  
E-mail Address- awrobel@nyc.rr.com

**New York City Department  
of Education**

**Magnet Program District**

**25**

School Name

IS 237Q - Rachel Carson

**Unit Name**

Mini-unit name

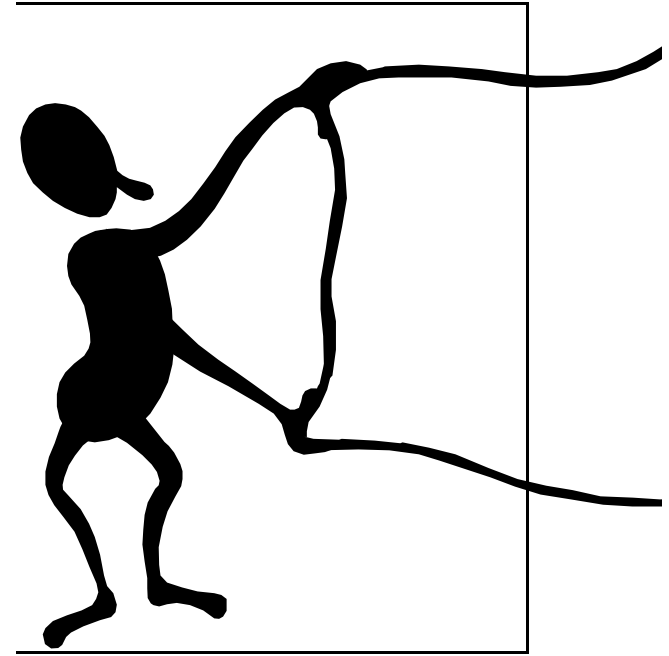
Mini-unit name

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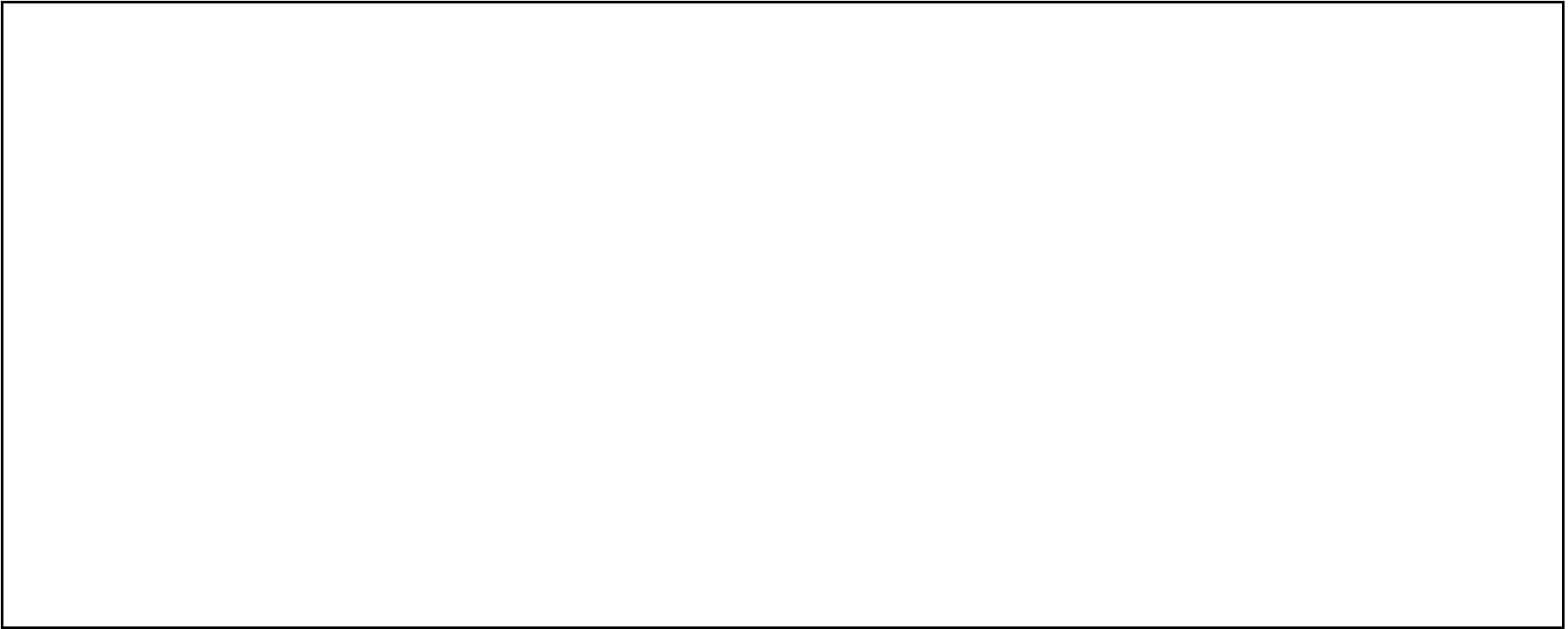
**Mini-Units**

\* It is recommended that each mini-unit end with a standardized test that reflects the state / city assessment

Mini-unit name



## Backwards Design Unit Planning



Essential Question: **How is proportionality demonstrated in the creation of architecture and its construction?**

Suggested Time Frame: Four weeks

Theme: **The Arts**

## Backwards Design Unit Planning

### Graphic Overview of Unit

Suggested Time Frame:

Essential Question: **How is proportionality demonstrated in the creation of architecture and its construction?**

**Unit Name: Rates/ Proportion**

## **Backwards Design Unit Planning**

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**Unit's Culminating Project: (briefly explain in 2-3 sentences):**

**The students are collaboratively creating a power point presentation on various options available for a new home. The presentation includes photos, cost/taxation rates, and design options. The power point will be presented to prospective home buyers.**

## Backwards Design Unit Planning

Stage 1- Desired Results	
<u>Standards-Based Learning Goals:</u>	<b>7PS. 1,2,4,5,6,7,8,9,10,11,16,17</b> <b>7RP. 1,2,3,4,5,7,8</b> <b>7CM. 2,4,8,9,11</b> <b>7CN. 1,3,5</b> <b>7A. 1,7,10</b>
Concepts	
<b>Big Ideas for this Unit</b> <ul style="list-style-type: none"><li>• <b>Relationship</b></li><li>• <b>Balance</b></li></ul>	<b>Magnet School Theme: The Arts</b>  How does the Big Idea in your unit connect to your theme?  <b>Students will use the concepts of ratio and proportion to better understand its relationship to equivalence or balance.</b> <b>The concepts of ratio and proportion are used in the art of architecture.</b>

## Backwards Design Unit Planning

<p>Enduring Understandings</p> <ul style="list-style-type: none"><li>• Ratio and rates are expressed in a fractional representation</li><li>• Proportionality shows a constant rate of change</li><li>• Equivalent ratios demonstrate similarity</li></ul>	<ul style="list-style-type: none"><li>• Overarching Essential Question: (this question should connect to your school theme)</li></ul> <p><b>How is proportionality demonstrated in the creation of architecture and its construction?</b></p>
<p>Content and Skills</p>	

## Backwards Design Unit Planning

<b>Content</b>	<b>Skills</b>
<b>Students will know...</b> <ul style="list-style-type: none"><li>• equality</li><li>• inequality</li><li>• proportion</li><li>• unit rate</li><li>• ratio</li><li>• rate</li><li>• ratio table</li><li>• rise/run</li><li>• slope</li><li>• similarity</li><li>• percentage</li><li>• scale</li><li>• increase</li><li>• decrease</li><li>• part-to-part</li><li>• part-to-whole</li><li>• extreme</li><li>• mean</li><li>• scaling-up</li></ul>	<b>Students will be able to...</b> <ul style="list-style-type: none"><li>• Use strategies to understand new math content and develop more efficient methods</li><li>• Construct extensions to problem situations</li><li>• Observe patterns and formulate generalizations</li><li>• Make conjectures from generalizations</li><li>• Represent problem verbally, numerically, algebraically, &amp; graphically</li><li>• How do you work a problem backwards</li><li>• Simplify complex problem to similar and simpler problem</li><li>• Use proportionality to model problem</li><li>• Collaborate with others to solve problem</li><li>• Justify solution through logical argument</li><li>• Evaluate efficiency of different representation of a problem</li><li>• Various strategies can be employed</li><li>• Use math strategy to reach your conclusion</li><li>• Make appropriate estimates and evaluate relevancy</li><li>• Support and defend approach used mathematically</li><li>• Share ideas through different means i.e. charts, tables etc.</li><li>• Understand vocabulary and language to communicate math ideas</li><li>• Translate 2-step verbal expressions into algebraic expression</li><li>• Draw a graphic representation of a pattern from equation</li><li>• Write equation of table of values</li></ul>

## Backwards Design Unit Planning

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## **Backwards Design Unit Planning**

### **Stage 2- Summative Assessment Evidence**

**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.**

## Backwards Design Unit Planning

### GRASP

G- (goal): The goal is to have student understand that although fractions and ratio are similar in appearance, they are essentially different in their equivalence. While fractions are equal and exactly the same, ratios are proportionally equal (when scaled-up) when doubled, tripled, etc...

Consequently, the ratio of specific ingredients used in building materials is essential in creating consistency and similarity. The use of paint and cement require specific “recipes” in their formulation. Construction also entails a close examination of proportionality in order to create consistent results.

R- (role) : Designer/Photographer/ Advertiser/ Accountant

A- (audience): Purchasers of houses that will be placed on the market and the options offered them.

S- (situation): Students will design pattern tiles, create paint colors, enlarge drawings proportionally, build fencing materials, etc.

P- (purpose/product): Students will create a team presentation of the assorted materials that they will offer to a purchaser of one their houses under construction.

S<sub>2</sub>(standard): Your presentation should demonstrate clear understanding of proportionality & balance.

## **Backwards Design Unit Planning**

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### **Student Task**

**Students will assume the roles of a sales force team working for a developer of custom-built suburban homes. Their job is to show buyers of the high-end homes options that they have when they purchase the house. They therefore will present a power-point presentation to prospective clients as to what is available to them. This presentation will require the various tasks of the team which include a designer, photographer and advertiser.**

**1. The photographer will take pictures of the various homes that are available and point out the assorted benefits and shortfalls of each design. They will focus on the aesthetic qualities of the design and the sense of balance or imbalance.**

**2. The designer will employ the use of materials and point out the variety of choices available to the client. This will include the color assortments, pattern tiling designs, exterior fencing, roofing, and dimensions of the interior rooms, as well. The designer is creating a custom-built home using the input of the client to arrive at a satisfactory result.**

**3. The advertiser will be used to create the appropriate label for the various offerings. The use of labels that are enticing to the purchaser will only further enhance the prospects of creating desirable selling points.**

**4. The accountant will offer information regarding the cost of items used and will also give the buyer clear understanding of overall cost of the home including the taxation that will apply.**

**5. These tasks will be the function of individual students, however the research required will be done collectively by the team. Students will create the materials by working on these materials and creating the options that will be available to clients.**

**6. The hypothesis of the presentation created will hopefully offer students an insight as to how homes are constructed and the decisions that are made through research on the various elements used in building a home.**

**7. The presentation will be completed only after the creation of the various components of paint colors, tiling options, roofing , fencing design, room dimensions etc.**

## **Backwards Design Unit Planning**

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## Backwards Design Unit Planning

### Rubric For Culminating Project

[www.rubistar.com](http://www.rubistar.com)

Project Component	1	2	3	4

**Unit's Essential Question: How is proportionality demonstrated in the creation of**

## Backwards Design Unit Planning

### architecture and its construction ?

<b>Mini-Unit Title</b> (each mini-unit is approx 1 week long)	<b>Big ideas of the mini-unit /</b> concept statement (macro) What is the big idea of this mini-unit?	<b>Key Content /Knowledge</b> (Important Content to Know about, vocabulary, the specifics) (Micro)	<b>Skills</b> What should the students be able to do? (rule of thumb - skills are verbs – knowledge is a noun)	<b>List of Topical / Content Based Questions</b> (make sure to amend the essential question so that it becomes topical for this mini-unit)	<b>Mini-Unit Assessment</b> (must be aligned to the NYS / NYC exams. It can be a test or a quiz - i.e.: DBQ Essay; 10 multiple choice questions; or 3 constructed response questions)	<b>Scaffolding towards the culminating project</b> (what can be done during this mini-unit to develop the stage 2 culminating assessment (grasp)
<b>Comparing with ratios and rates</b>  (1 week)	<b>Ratio and rates</b>	<b>Fractions, equivalent fractions, scaling-up</b>	<ul style="list-style-type: none"> <li>• <b>Observe patterns</b></li> <li>• <b>Make conjecture</b></li> <li>• <b>Understand vocabulary</b></li> <li>• <b>Construct extensions to problem</b></li> </ul>	<b>Why is ratio different than rates?</b> <b>How is equal fraction similar to ratios?</b>	<ul style="list-style-type: none"> <li>• <b>Create ratio table</b></li> </ul>	<b>Ratio found on a pattern</b>  <b>Pattern show a consistency of balance</b>
<b>Using Proportion</b>  (1 week)	<b>What is a proportion?</b>	<b>Equality, inequality, ratio table, extremes, means</b>	<ul style="list-style-type: none"> <li>• <b>Use proportionality models</b></li> <li>• <b>Simplify complex to simpler forms</b></li> </ul>	<b>How does cross-multiplication find proportion ?</b> <b>How can scaling-up find proportion?</b> <b>How do equivalent fractions help in proportion?</b>	<b>Testing on missing value in a proportion</b>  <b>Ability to see proportional In</b>  <b>Compare what is and is not a proportion ?</b>	<b>Task on what is a balanced look regarding structure</b>

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<p><b>Percentage and proportion</b> <b>(1 week)</b></p>	<p><b>How can we use our knowledge of proportion to find percentage ?</b></p>	<p><b>Percentage, increase, decrease, part-to-part, part-to-whole, similarity</b></p>	<ul style="list-style-type: none"> <li>• <b>Use various strategies can</b></li> <li>• <b>Justify answer logical</b></li> </ul>	<p><b>How do we determine percent using proportion ?</b> <b>What is the percent of change ?</b> <b>How do we determine the percent of percent ?</b></p>	<p><b>Color in a hundred-grid using percent of numbers not 100</b></p> <p><b>Test on sale price</b></p> <p><b>Test on taxation</b></p>	<p><b>The task will include preparing cost and taxation. Of costs. Design of patterns and their proportional break-down</b></p>

## Backwards Design Unit Planning

*A Week at a Glance – Copy as Necessary*

<p>WHERE is the student going and what is expected          HOOK with needed skills to experience and explore          Opportunity to REVISE and RETHINK their understanding</p>	<p>Allow students to EVALUATE work and implications          TAILOR work to student needs          Be ORGANIZED to maximize engagement</p>			
Monday	Tuesday	Wednesday	Thursday	Friday
<p>Content Focus: What is a ratio ?</p> <p>Hook: Compare girls/boys in class; Classroom environment chairs/tables</p> <p>Daily Assessment: Find the ratio of ingredients on a label i.e. fat to cholesterol</p>	<p>Content Focus: How can we compare ratios?</p> <p>Hook: Find different ratios that you can find on a pattern tile.</p> <p>Daily Assessment: Draw a pattern based on specific ratio using a graph paper.</p>	<p>Content Focus: How do we use ratio tables?</p> <p>Hook: How do merchants create price charts?</p> <p>Daily Assessment: The price of gas is \$2.10 @ gal., make a Table of rates using a ratio table</p>	<p>Content Focus: What is comparative shopping ?</p> <p>Hook: How do people know if they are getting the best deals when they are out shopping ?</p> <p>Daily Assessment: Find the best deal between the items of different sizes and prices</p>	<p>Content Focus: What is a unit rate ?</p> <p>Hook: How do shoppers know the best price of an item in a supermarket ?</p> <p>Daily Assessment: How does unit rate compare to scaling-up as a method ?</p>

## Backwards Design Unit Planning

<p>Weekly Assessment (must be aligned to the NYS / NYC exams):</p> <p>Quizzes or Bi -weekly exams based on State requirements.</p> <p>What have the students produced that scaffolds towards the units culminating assessment? (for example if the unit's culminating assessment is a newspaper – perhaps the students have written an article)</p> <p>Color paint , fencing design, pattern tiles, room dimensions</p>				
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## **Backwards Design Unit Planning**

*: A Week at a Glance – Copy as Necessary*

WHERE is the student going and what is expected HOOK with needed skills to experience and explore Opportunity to REVISE and RETHINK their understanding	Allow students to EVALUATE work and implications TAILOR work to student needs Be ORGANIZED to maximize engagement			
Monday	Tuesday	Wednesday	Thursday	Friday

## Backwards Design Unit Planning

<p>Content Focus: What is a proportional relationship ?</p> <p>Hook: How do we create enlargements of pictures without altering relative sizes?</p> <p>Daily Assessment: How can we maintain color integrity when we increase the quantity?</p>	<p>Content Focus: How can we find equal ratios ?</p> <p>Hook: Create a classroom of students (girls/boys) that will have the same ratio, despite number of total students.</p> <p>Daily Assessment: Why makes ratios equal and how can we create a visual example of this truth.</p> <p>Daily Assessment:</p>	<p>Content Focus: How can we solve proportions ?</p> <p>Hook: How does looking at a ratio/rate table help us to create proportions?</p> <p>Daily Assessment: How do we know we have a proportion ?</p>	<p>Content Focus: What is similarity and how does it relate to proportionality ?</p> <p>Hook: Draw a room with the dimensions of a 10 x 15 feet on graph paper. Now doubled it, what would it look like?</p> <p>Daily Assessment: Why would similarity be important to artists who do murals ?</p>	<p>Content Focus: How can proportion be graphed ?</p> <p>Hook: How is it that proportion graphs have constancy and balance?</p> <p>Daily Assessment: Draw a graph with a given ratio. What picture have you created ?</p>
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## Backwards Design Unit Planning

<p>Weekly Assessment (must be aligned to the NYS / NYC exams): Quizzes and Bi-weekly exams aligned with State exam One-on-one evaluations. Mini-Projects given students</p> <p>What have the students produced that scaffolds towards the units culminating assessment? (for example if the unit's culminating assessment is a newspaper – perhaps the students have written an article)</p> <p>Proportional appearances. Establishing costs and taxation</p>				
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## Backwards Design Unit Planning

*A Week at a Glance – Copy as Necessary*

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<p>WHERE is the student going and what is expected HOOK with needed skills to experience and explore Opportunity to REVISE and RETHINK their understanding</p>	<p>Allow students to EVALUATE work and implications TAILOR work to student needs Be ORGANIZED to maximize engagement</p>			
Monday	Tuesday	Wednesday	Thursday	Friday
Content Focus:	Content Focus:	Content Focus:	Content Focus:	Content Focus:
Hook:	Hook:	Hook:	Hook:	Hook:
Daily Assessment:	Daily Assessment:	Daily Assessment:	Daily Assessment:	Daily Assessment:
Weekly Assessment: (must be aligned to the NYS / NYC exams):				
What have the students produced that scaffolds towards the units culminating assessment?				

## Backwards Design Unit Planning

<p>(for example if the unit's culminating assessment is a newspaper – perhaps the students have written an article)</p>				
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# **Backwards Design Unit Planning**

## **Unit Resources**

**Books:**

**Websites:**

**Teacher Materials:**

**Other:**