

# Unit 9: Putting It All Together

Content Area: **Mathematics**  
Course(s): **Math - Grade 6**  
Time Period: **May**  
Length: **18 days**  
Status: **Published**

## Unit Overview

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In this optional unit, students use concepts and skills from previous units. In solving Fermi problems, they use measurement conversions together with their knowledge of volumes or surface areas of right rectangular prisms or the relationship of distance, rate, and time.

## Transfer

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Students will be able to independently use their learning to solve real world situations involving skills from the previous 8 units.

## Meaning

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## Understandings

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Students will understand:

- The first lesson concerns Fermi problems—problems that require making rough estimates for quantities that are difficult or impossible to measure directly (MP4).
- The second lesson involves finding approximately equivalent ratios for groups from two populations, one very large (the population of the world) and one comparatively small (a 30-student class).
- The third lesson is an exploration of the relationship between the greatest common factor of two numbers, continued fractions, and decomposition of rectangles with whole-number side lengths, providing students an opportunity to perceive this relationship through repeated reasoning (MP8) and to see correspondences between two kinds of numerical relationships, and between numerical and geometric relationships (MP1).
- The remaining three lessons explore the mathematics of voting (MP2, MP4). In some activities, students choose how to assign votes and justify their choices (MP3).

## **Essential Questions**

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## **Application of Knowledge and Skill**

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## **Students will know...**

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Students will know:

- the vocabulary that goes along with all 8 units.
- routines designed to grow robust disciplinary language, both for their own sense-making and for building shared understanding with peers.

## **Students will be skilled at...**

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Students will be skilled at:

- ways to interpret and represent characteristics of the world population, describe distributions of voters, and generalize about decomposition of area and numbers.

## **Learning Goal**

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Solve real-world and mathematical problems involving area, surface area, and volume.

## **Vocabulary**

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No new vocabulary.

## Daily Target- Lesson 1

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- Estimate quantities in a real-world situation and explain (orally and in writing) the estimation strategy.
- Justify (orally) why it is unreasonable to have an exact answer for a situation that involves estimation, and critique (orally) different estimates.
- Make simplifying assumptions and determine what information is needed to solve a Fermi problem about distance, volume, or surface area.

MA.6.G.A	Solve real-world and mathematical problems involving area, surface area, and volume.
MA.6.NS.B	Compute fluently with multi-digit numbers and find common factors and multiples.
MA.6.RP.A	Understand ratio concepts and use ratio reasoning to solve problems.

## Daily Target- Lesson 2

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- Apply reasoning about percentages and equivalent ratios to analyze and approximate characteristics of the world's population.
- Generate (orally and in writing) mathematical questions about the world's population, e.g., "How many people . . . ?"
- Present (using words and other representations) a comparison that uses the number of students in the class to represent the proportion of the world's population with a particular characteristic.

MA.6.NS.B	Compute fluently with multi-digit numbers and find common factors and multiples.
MA.6.RP.A	Understand ratio concepts and use ratio reasoning to solve problems.

## Daily Target- Lesson 3

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- Coordinate diagrams and expressions involving equivalent fractions.
- Interpret and create diagrams involving a rectangle decomposed into squares.
- Recognize that decomposing rectangles into squares is a geometric way to determine the greatest common factor of two numbers.

MA.6.NS.A	Apply and extend previous understandings of multiplication and division to divide fractions by fractions.
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## Daily Target- Lesson 4

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- Apply reasoning about ratios and percentages to analyze (orally and in writing) voting situations involving two choices.
- Comprehend the terms "majority" and "supermajority" (in spoken and written language).
- Critique (using words and other representations) a statement reporting the results of a vote.

MA.6.RP.A.1	Understand the concept of a ratio and use ratio language to describe a ratio relationship between two quantities.
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MA.6.RP.A.3	Use ratio and rate reasoning to solve real-world and mathematical problems, e.g., by reasoning about tables of equivalent ratios, tape diagrams, double number line diagrams, or equations.
MA.6.RP.A.3c	Find a percent of a quantity as a rate per 100 (e.g., 30% of a quantity means 30/100 times the quantity); solve problems involving finding the whole, given a part and the percent.

### Daily Target- Lesson 5

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- Apply reasoning about ratios and percentages to analyze (orally and in writing) voting situations involving more than two choices.
- Choose and justify (orally) which voting system seems the fairest for dealing with more than two choices.
- Compare and contrast (orally and in writing) different voting systems for dealing with more than two choices, i.e., plurality, runoff, and instant runoff.

MA.6.RP.A.3	Use ratio and rate reasoning to solve real-world and mathematical problems, e.g., by reasoning about tables of equivalent ratios, tape diagrams, double number line diagrams, or equations.
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### Daily Target- Lesson 6

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- Compare and contrast different ways to distribute representatives, and recognize that changing the way the votes are grouped can affect the outcome.
- Critique (orally and in writing) whether a method for distributing representatives is fair.
- Suggest a method for distributing representatives and justify (orally) why is it fair.

MA.6.NS.B.3	Fluently add, subtract, multiply, and divide multi-digit decimals using the standard algorithm for each operation.
MA.6.RP.A.2	Understand the concept of a unit rate $a/b$ associated with a ratio $a:b$ with $b \neq 0$ , and use rate language in the context of a ratio relationship.
MA.6.RP.A.3	Use ratio and rate reasoning to solve real-world and mathematical problems, e.g., by reasoning about tables of equivalent ratios, tape diagrams, double number line diagrams, or equations.
MA.6.RP.A.3c	Find a percent of a quantity as a rate per 100 (e.g., 30% of a quantity means 30/100 times the quantity); solve problems involving finding the whole, given a part and the percent.

### Summative Assessment

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Group Presentation

Chapter Test

Chapter Project

CRP.K-12.CRP1	Act as a responsible and contributing citizen and employee.
CRP.K-12.CRP1.1	Career-ready individuals understand the obligations and responsibilities of being a member of a community, and they demonstrate this understanding every day through their interactions with others. They are conscientious of the impacts of their decisions on others and the environment around them. They think about the near-term and long-term consequences of their actions and seek to act in ways that contribute to the betterment of their teams, families, community and workplace. They are reliable and consistent in going beyond the minimum expectation and in participating in activities that serve the greater good.
CRP.K-12.CRP2	Apply appropriate academic and technical skills.
CRP.K-12.CRP2.1	Career-ready individuals readily access and use the knowledge and skills acquired through experience and education to be more productive. They make connections between abstract concepts with real-world applications, and they make correct insights about when it is appropriate to apply the use of an academic skill in a workplace situation.
CRP.K-12.CRP4	Communicate clearly and effectively and with reason.
CRP.K-12.CRP4.1	Career-ready individuals communicate thoughts, ideas, and action plans with clarity, whether using written, verbal, and/or visual methods. They communicate in the workplace with clarity and purpose to make maximum use of their own and others' time. They are excellent writers; they master conventions, word choice, and organization, and use effective tone and presentation skills to articulate ideas. They are skilled at interacting with others; they are active listeners and speak clearly and with purpose. Career-ready individuals think about the audience for their communication and prepare accordingly to ensure the desired outcome.
CRP.K-12.CRP6	Demonstrate creativity and innovation.
CRP.K-12.CRP6.1	Career-ready individuals regularly think of ideas that solve problems in new and different ways, and they contribute those ideas in a useful and productive manner to improve their organization. They can consider unconventional ideas and suggestions as solutions to issues, tasks or problems, and they discern which ideas and suggestions will add greatest value. They seek new methods, practices, and ideas from a variety of sources and seek to apply those ideas to their own workplace. They take action on their ideas and understand how to bring innovation to an organization.
CRP.K-12.CRP8	Utilize critical thinking to make sense of problems and persevere in solving them.
CRP.K-12.CRP8.1	Career-ready individuals readily recognize problems in the workplace, understand the nature of the problem, and devise effective plans to solve the problem. They are aware of problems when they occur and take action quickly to address the problem; they thoughtfully investigate the root cause of the problem prior to introducing solutions. They carefully consider the options to solve the problem. Once a solution is agreed upon, they follow through to ensure the problem is solved, whether through their own actions or the actions of others.
CAEP.9.2.8.B.3	Evaluate communication, collaboration, and leadership skills that can be developed through school, home, work, and extracurricular activities for use in a career.
CAEP.9.2.8.B.6	Demonstrate understanding of the necessary preparation and legal requirements to enter the workforce.
TECH.8.1.8.B	Creativity and Innovation: Students demonstrate creative thinking, construct knowledge and develop innovative products and process using technology.
TECH.8.1.8.B.CS2	Create original works as a means of personal or group expression.
TECH.8.1.8.D	Digital Citizenship: Students understand human, cultural, and societal issues related to technology and practice legal and ethical behavior.
TECH.8.1.8.D.CS1	Advocate and practice safe, legal, and responsible use of information and technology.

## **Formative Assessment and Performance Opportunities**

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Use the Lists tab.

- Academic Game
- BrainPop
- Centers
- Class Discussions
- Clickers
- Do Now
- Exit Ticket
- Graphic Organizer
- LinkIT
- Project
- Quiz
- Self-Assessment
- Student Teacher
- Teacher Interview
- Teacher Observation
- Think, Pair, Share

## **Accommodations and Modifications**

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- Teacher provides notes for student(s)
  - Teacher will modify test for student(s)
  - Students may use graph paper to help organize data
  - A word bank can be provided
  - Leveled centers can be used
  - Small group instruction can be utilized
  - Calculators may be used
  - Extra Practice Board can be utilized to review pre-requisite skills
  - Interactive games/websites may be used to practice skills
  - Teacher can conference with student(s) to "check-in"
  - Utilize items in the room to demonstrate skills as they relate to their life (book to wrap for SA, etc.)
  - Use coordinate plane to count spaces for area and surface area
  - Use blocks to help visualize volume of 3D shapes
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- Calculators
  - Compass Learning
  - Extra Practice Board
  - Interactive Games/Websites
  - Leveled Centers

- Manipulatives
- Modify Assessments
- Provide Notes
- Teacher Conferences
- Word Bank

## **Unit Resources**

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Mr. Morgan's Math Help <https://sites.google.com/view/mrmorgansmathhelp/illustrative-mathematics/math-6/unit-1-area-and-surface-area>

## **Interdisciplinary Connections**

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