



Grades 9–12

and You!

NUMERACY MATTERS

A FoodMASTER Curriculum

Using Food to Teach Math and Science Skills

MATHEMATICS EDITION

CREATED BY:

Sharon Phillips, MEd

Sarah T. Henes, PhD, RDN

Melani W. Duffrin, PhD, RDN

SPONSORED BY:

SEPA SCIENCE EDUCATION
PARTNERSHIP AWARD
SUPPORTED BY THE NATIONAL INSTITUTES OF HEALTH

PARTNERED WITH:



Food, Mathematics And Science Teaching Enhancement Resource Initiative

www.foodmaster.org

Primary Authors

Sharon Phillips, MSEd
Talented and Gifted Elementary Teacher

Sarah T. Henes, PhD, RD, LD
Assistant Professor and Extension Specialist
UGA EFNEP Coordinator

Melani W. Duffrin, PhD, RD, LDN
Professor of Nutrition Science

Technical Writers

Allender Lynch, MS
Program Coordinator, K-16 Education and Outreach
North Carolina Association of Biomedical Research

Meredith P. Nelson
FoodMASTER Research Assistant
Department of Nutrition, College of Allied Health Science

Contributing Authors

Virginia Carraway-Stage, PhD, RDN, LDN
Assistant Professor of Nutrition Science

Ashley T. Roseno, MAEd, MS, RDN, LDN
Lecturer, Health, Nutrition, and Exercise Sciences
Program Coordinator, Dietitian Education Program

Editor

Kelly Furr, MAEd
FoodMASTER Program Coordinator

Jasmina Mesic, BS
FoodMASTER Research Assistant

Review Panel

Susan Camasta, PhD
STEM Educator and Consultant
DuPage Regional Office of Education

Sylvia Escott-Stump, MA, RDN, LDN, FAND
Faculty Associate

Henna Muzaffar, PhD, RD
Assistant Professor and EDOC Facilitator
Nutrition, Dietetics & Wellness; School of Health Studies

©2020 FoodMASTER — www.foodmaster.org

These resource materials were supported by the Science Education Partnership Award which is funded from the National Center for Research Resources, a component of the National Institutes of Health. The content is solely the responsibility of the authors and does not necessarily represent the official views of NCRR or NIH.

Book Design by Cara Cairns Design, Inc.

***This book is dedicated
to the teachers that selflessly
give so much every day***

*We wish to thank family, friends, co-workers and teachers
who have provided so much love, support and feedback.*



The Science Education Partnership Award (SEPA) was created to improve K-12 health sciences education and to develop public awareness of life sciences. SEPA brings educators, media experts, community leaders, and biomedical and behavior scientists together in partnership to design and disseminate innovative K-12 science programs. SEPA is administered by the National Center for Research Resources, a component of the National Institutes of Health.

The Food, Math, and Science Teaching Enhancement Resource (FoodMASTER) initiative received five years of SEPA-Phase funding to develop the FoodMASTER Middle Curriculum and investigate its impact. Fourteen classrooms in eastern North Carolina participated in the pilot program. Initial results showed promise in using food as a tool to teach science to middle school students.

INTRODUCTION

Background

Food and YOU! Mathematics Matters is a grade 9-12 workbook focusing on nutritional assessment and food composition calculations for high school students, providing you with a story about high schoolers, Savannah and James. Both characters have common concerns and questions about their nutrition and health, and story information will guide you in using mathematical equations to learn more about the characters' concerns and exploration around topics having to do with health, food and nutrition. Under the direction of a teacher, you can complete the activities in the classroom to ensure accuracy and skill in using mathematical equations. You should be able to use mathematical equations to calculate your own numbers in private, later using the information to discuss your personal health with your parents and healthcare providers. The workbook aims to assist you in becoming acquainted with your own numbers in order to become mathematically literate consumers of healthcare information. Food is conducive to a learning process that uses multiple senses, one that is hands-on or virtual, inquiry-based and active. Utilizing food in learning allows for an interdisciplinary approach to concepts and ideas in a variety of scientific subjects like biology, chemistry, microbiology, nutrition, and health. Additionally, food labs are a dynamic way to teach math concepts such as numbers and operations, algebra, geometry, measurements, and problem solving.

Introduction

This workbook will help you learn and explore how measurements and mathematics are used to assess health and make healthy decisions. Health is not determined by one's weight and Body Mass Index (BMI) alone. The World Health Organization defines health as "a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity" (2022). There are many variables that determine one's health such as their lifestyle, genetics, and more. If you are concerned about your health, consult with your healthcare provider.

Healthy behaviors support a healthy life, and a healthy lifestyle can be present in someone regardless of their size. Weight-based stigmatization, stereotyping, and/or bias can have a harmful effect on one's psychological and physical health. We can be a positive influence on others by focusing on healthy choices without discussing an individual's weight.

By being respectful to everyone involved, a great learning environment can be created to help everyone learn about nutrition and math!

Some ways to help create a great learning environment include:

- **Be mindful of word choices.** Use terms that are neutral such as “healthy weight” or “associated with health risks.” Focus on discussing healthier lifestyle choices such as eating more fruits, vegetables, and a wide variety of foods.
- **Protect others’ privacy.** Practice applying the skills learned with your own measurements in the privacy of your home. Allow everyone to keep their information private and to themselves. Please remember to use the characters provided in this workbook as the example- their story might be helpful for everyone!
- **Ask your healthcare providers (like doctors, nurses, and registered dietitians).** If you have a question about your own medical or nutritional needs, ask your healthcare providers.

This workbook is not intended to offer medical advice.

Sometimes there may be situations that harm the great learning environment. In these situations:

- **Inform your teacher.** It is important that your teacher is informed of any problems that happen. Your teacher can help guide the situation into one that builds onto the great learning environment.
- **Remind each other that some things should stay private.** Others make share their health information with you or may ask you to share your health information. Respectfully remind them that health information is something that should stay private.

Responsible Use of Numbers

Healthcare professionals use numerical values of data to review aspects of one’s physical health to be able to prevent, treat, and manage illnesses that may affect an individual. This workbook consists of mathematical equations that healthcare providers may use to gain some information about an individual’s nutrition status and food intake. However, these equations only provide an **estimation** for learning how to work with numbers. This workbook is not intended to offer medical advice.

Every person is unique, and these equations are meant to be used in an educational context. The data may provide a peek into one’s physical health but cannot accurately determine a person’s overall health. For example, Body Mass Index (BMI) uses a person’s height and weight to determine their body weight status, but does not take into account their gender or ethnicity, two factors that can make a difference in someone’s weight. There is no single equation or data point that can determine your health and your value is not tied to the number on their scale.

What it takes to be a FoodMASTER

Are you enthusiastic enough to be a FoodMASTER? The FoodMASTER activities found in this workbook takes the commitment of a special student, one who is willing to take the extra time necessary to learn to apply real-life mathematics in the classroom. We hope that you will find the packet of materials easy to use. If you are interested in learning more about each of the topics in FoodMASTER, check out www.foodmaster.org with a parent or guardian for more information. This website will also allow you to access the full FoodMASTER curriculum.

Reference

World Health Organization. (2022). *Constitution*. WHO. <https://www.who.int/about/governance/constitution>



Table of Contents

Get to Know Savannah and James: Starting New All Around	1
Section 1: Body Composition, Calories, and Fitness	2
<i>Activity 1: Height, Weight, & Growth Charts</i>	4
<i>Activity 2: Calculating Body Mass Index</i>	12
<i>Activity 3: Calculating Calories</i>	18
<i>Activity 4: Expending Energy</i>	26
Section 2: Understanding Nutrients	32
<i>Activity 5: Energy-Yielding Nutrients</i>	34
<i>Activity 6: Vitamins and Minerals</i>	42
<i>Activity 7: Estimating Fluid Needs</i>	48
<i>Activity 8: Empty Calories</i>	54
Appendix	62