2014 Health Sciences (Core)

Mississippi Department of Education

Program CIP 51.00000 Health Services/Allied Health/Health Sciences, General

Direct inquiries to

Instructional Design Specialist
Research and Curriculum Unit
P.O. Drawer DX
Mississippi State, MS 39762
662.325.2510

Program Coordinator
Office of Career and Technical Education
Mississippi Department of Education
P.O. Box 771
Jackson, MS 39205
601.359.3461

Published by

Office of Career and Technical Education
Mississippi Department of Education
Jackson, MS 39205

Research and Curriculum Unit
Mississippi State University
Mississippi State, MS 39762

Betsey Smith, Curriculum Manager
Scott Kolle, Project Manager
Jolanda Harris, Educational Technology Specialist

The Research and Curriculum Unit (RCU), located in Starkville, MS, as part of Mississippi State University, was established to foster educational enhancements and innovations. In keeping with the land grant mission of Mississippi State University, the RCU is dedicated to improving the quality of life for Mississippians. The RCU enhances intellectual and professional development of Mississippi students and educators while applying knowledge and educational research to the lives of the people of the state. The RCU works within the contexts of curriculum development and revision, research, assessment, professional development, and industrial training.

Table of Contents

Acknowledgments

The Health Sciences (Core) curriculum was presented to the Mississippi Board of Education on March 20, 2014. The following persons were serving on the state board at the time:

Dr. Carey M. Wright, State Superintendent of Education
Dr. O. Wayne Gann, Chair
Mr. Howell "Hal" N. Gage, Vice Chair
Ms. Kami Bumgarner
Mr. William Harold Jones
Dr. John R. Kelly
Mr. Charles McClelland
Mr. Richard Morrison
Mrs. Rosemary G. Aultman
Mr. Simon F. Weir II

Jean Massey, Associate Superintendent of Education for the Office of Career and Technical Education, at the Mississippi Department of Education assembled a taskforce committee to provide input throughout the development of the *Health Sciences (Core) Curriculum Framework and Supporting Materials.*

Suzanne Tribble, PhD, Instructional Design Specialist for the Research and Curriculum Unit at Mississippi State University researched and authored this framework. suzanne.tribble@rcu.msstate.edu

Also, special thanks are extended to the teachers who contributed teaching and assessment materials that are included in the framework and supporting materials:

Lee Ann Rhaly, West Lauderdale High School, Collinsville, MS
Karan Burns, Senatobia-Tate County Career Technical Center, Coldwater, MS
Naomi Jordan, Madison Career & Technical Center, Madison, MS
Martha Stokes, Philadelphia-Neshoba County Career Technical Center, Philadelphia, MS
Melissa Parker, Calhoun County Career and Technical Center, Calhoun City, MS
Susan Siedell, Pascagoula Applied Technology Center, Pascagoula, MS
Judy Dalgo, Ocean Springs Career and Technical Education Center, Ocean Springs, MS
Sharon Murphey, Carl Keen Career and Technical Center, Clarksdale, MS
Rae Hollingsworth, Forest-Scott County Career and Technical, Forest, MS
Julie Owen, Clarke County Career and Technology Center, Quitman, MS
Tammy Creel, McComb Business and Technology Complex, McComb, MS
Brenda White, Simpson County Technical Center, Mendenhall, MS
Mary Slaughter, Madison Career and Technical Center, Madison, MS
Laura Fails, Lamar County Career and Technical Center, Purvis, MS
Kay Berry, Simpson County Technical Center, Mendenhall, MS
Judy Grice, Forrest County AHS, Brooklyn, MS
Shelly Varnon, Pontotoc Ridge Career and Technology Center, Pontotoc MS
Jerri Montgomery, Pontotoc Ridge Career and Technology Center, Pontotoc MS

Appreciation is expressed to the following professional who provided guidance and insight throughout the development process:

Pam Hindman, Program Coordinator, Office of Career and Technical Education and Workforce Development, Mississippi Department of Education, Jackson, MS phindman@mde.k12.ms.us

Standards

Standards are superscripted in each unit and referenced in the appendices. Standards in the Health Sciences (Core) Curriculum Framework and supporting materials are based on the following:

National Healthcare Skill Standards
The National Healthcare Skill Standards were developed by the National Consortium on Health Science Education (formerly the National Consortium on Health Science and Technology Education) and WestEd Regional Educational Laboratory West, in partnership with educators and health care employers. The standards were developed to inform current and future health care workers, employers, and educators on what skills and knowledge workers need to succeed.

Common Core State Standards Initiative
The Common Core State Standards provide a consistent, clear understanding of what students are expected to learn, so teachers and parents know what they need to do to help them. The standards are designed to be robust and relevant to the real world, reflecting the knowledge and skills that our young people need for success in college and careers. With American students fully prepared for the future, our communities will be best positioned to compete successfully in the global economy. Copyright 2010. National Governors Association Center for Best Practices and Council of Chief State School Officers. All rights reserved. States and territories of the United States as well as the District of Columbia that have adopted the Common Core State Standards in whole are exempt from this provision, and no attribution to the National Governors Association Center for Best Practices and Council of Chief State School Officers is required. Reprinted from http://www.corestandards.org/.

National Educational Technology Standards for Students
Reprinted with permission from *National Educational Technology Standards for Students: Connecting Curriculum and Technology*, Copyright 2007, International Society for Technology in Education (ISTE), 800.336.5191 (U.S. and Canada) or 541.302.3777 (International), iste@iste.org, www.iste.org. All rights reserved. Permission does not constitute an endorsement by ISTE.

21st Century Skills and Information and Communication Technologies Literacy Standards
In defining 21st-century learning, the Partnership for 21st Century Skills has embraced five content and skill areas that represent the essential knowledge for the 21st century: global awareness; civic engagement; financial, economic, and business literacy; learning skills that encompass problem-solving, critical-thinking, and self-directional skills; and information and communication technology (ICT) literacy.

Preface

Secondary career and technical education programs in Mississippi face many challenges resulting from sweeping educational reforms at the national and state levels. Schools and teachers are increasingly being held accountable for providing true learning activities to every student in the classroom. This accountability is measured through increased requirements for mastery and attainment of competency as documented through both formative and summative assessments.

The courses in this document reflect the statutory requirements as found in Section 37-3-49, *Mississippi Code of 1972*, as amended (Section 37-3-46). In addition, this curriculum reflects guidelines imposed by federal and state mandates (Laws, 1988, Ch. 487, §14; Laws, 1991, Ch. 423, §1; Laws, 1992, Ch. 519, §4 eff. from and after July 1, 1992; Carl D. Perkins Vocational Education Act IV, 2007; and No Child Left Behind Act of 2001).

Mississippi Teacher Professional Resources

The following are resources for Mississippi teachers.

Curriculum, Assessment, Professional Learning, and other program resources can be found at The Research and Curriculum Unit's website: http://www.rcu.msstate.edu

Learning Management System: An online resource

Learning Management System information can be found at the RCU's website, under Professional Learning.

Should you need additional instructions, please call 662.325.2510.

My PLC: An online registration for all professional-development sessions

To register for any session, teachers will need an account in the registration system, MyPLC, https://myplc.rcu.msstate.edu. To create an account, click on the link and navigate to the "Request a Guest ID" link. The ID should be the teacher's first initial and last name and the last four (4) digits of the social security number. Teachers should complete the entire form, which will then be sent to a secure server. Upon activation of the teacher's account, he or she will receive an e-mail with login instructions. The teacher may then browse for the available sessions and register for the desired courses.

Should you need additional instructions, please call 662.325.2510.

Executive Summary

Pathway Description

Health Sciences (Core) is a pathway of courses for students in the Health Sciences career cluster. The Health Sciences (Core) pathway includes classroom and hands-on experiences that will provide students with an overview of the health-care field, as outlined according to the Health Science Cluster in the National Career Clusters Framework and the National Consortium on Health Science Education (NCHSE), as well as begin to prepare students for careers in occupations predicted to have a high number of available jobs in the next 10 years, including careers in nursing services (registered nurse, nurse aide, practical nurse, home health aide), therapeutic services (sports medicine, athletic trainer, dietitian, respiratory therapy), diagnostic services (radiologist, phlebotomist, radiologic tech, sonographer, CT technology, medical lab technician), health informatics (health information technician, medical coder), veterinary services, medical services (optometrists, medical assistants), emergency services, rehabilitative services (physical therapy, occupational therapy, speech therapy) counselors, pharmacists, mental health services (psychologists).

Scheduling and operating more than one course in the same classroom/laboratory with the same teacher is not recommended. In order to enable the teacher to instruct students in skills on a 1 on 1 basis, the recommended class size is 12-15 students for the first 2 credits. For students taking the last 2 credits who are job shadowing, the recommended class size is 10 - 12 students. Please be aware that health care facilities often require a 10 to 1 student/teacher ratio in order to participate in job shadowing. Having a class that is too large decreases the quality experience that Health Sciences (Core) is meant to be for the student.

This program includes a minimum of 100 hours of clinical-type experience to be obtained by the program's completion. It is recommended to spread these hours out among the length of the program. This clinical-type experience can include: tours of health-care facilities, guest speakers, participation in health fairs or community service, laboratory practice, demonstration in the classroom, and observation or job shadowing experiences in medical facilities.

It is recommended that students complete Health Sciences (Core) with a grade of C or higher in classwork to advance to the next level.

Industry Certification

By implementing the standards set forth in the Health Sciences (Core) pathway, students who successfully master the curriculum should have the necessary skills to be successful in a health science field. In addition, students whose programs meet additional criteria and approval by their respective agencies are prepared to complete the requirements and take a certification test.

Assessment

The latest assessment blueprint for the curriculum can be found at http://www.rcu.msstate.edu/Curriculum/CurriculumDownload.aspx

Student Prerequisites

In order for students to be able to experience success in the Health Sciences (Core) pathway, the following prerequisites are suggested:

1. C or higher in English (the previous year)
2. C or higher in math (last course taken or the instructor can specify the math)
3. Instructor approval and a TABE Reading Score of eighth grade or higher
4. C or higher in biology (or the last science course taken as approved by instructor)

or

1. TABE Reading Score of eighth grade or higher
2. Instructor approval

or

1. Instructor approval

Academic Credit

The latest academic credit information can be found at https://www.rcu.msstate.edu/MDE/PathwaystoSuccess.aspx. Once there, click the "*Counselor Resources*" Tab, then click "*Curriculum Enhancement List."* Check this site often as it is updated frequently.

Teacher Licensure

The latest teacher licensure information can be found at http://www.mde.k12.ms.us/educator-licensure

Professional Learning

If you have specific questions about the content of any of training sessions provided, please contact the Research and Curriculum Unit at 662.325.2510 and ask for an instructional design specialist.

Course Outlines

Option 1—Two One-Carnegie-Unit Courses

This curriculum consists of two one-credit courses, which should be completed in the following sequence:

1. **Health Sciences Core I —Course Code: 995003**

2. **Health Sciences Core II—Course Code: 995004**

Course Description: Health Sciences Core I
The Health Sciences Core A course introduces students to the theory and practical applications of tasks related to employment in the field of health science. Students will cover topics such as safety in the workplace, infection control, and health care systems. The course offers insight into careers in health care as well as the educational requirements, and the professional, legal, and ethical responsibilities involved.

Course Description: Health Sciences Core II
The Health Sciences Core B course continues to familiarize students with the theory and practical applications of the field of health science. Topics covered include the vital organs of the human body and health maintenance practices. Students will explore careers in health care as well as the educational requirements, and the professional, legal, and ethical responsibilities involved.

Health Sciences Core I—Course Code: 995003

Unit	Unit Name	Hours
1	Course Orientation and Professional Organizations	7
2	Safety and Infection Control	35
3	Health Care Systems, Legal and Ethical Practices	25
4	Communication and Teamwork	28
5	Body Organization, Covering, Support, and Movement	45
Total		140

Health Sciences Core II — Course Code: 995004

Unit	Unit Name	Hours
6	Vital Organs and Protection	42
7	Intake and Elimination	40
8	Control, Regulation, and Coordination	33
9	Reproduction, and Health Maintenance Practices	25
Total		140

Option 2—One Two-Carnegie-Unit Course

This curriculum consists of one two-credit course, which should be completed in the following sequence:

Health Sciences (Core)—Course Code: 995000

Course Description: Health Sciences (Core)
The Health Sciences (Core) course introduces students to the theory and practical applications of tasks related to employment in the field of health science. Students will cover topics such as safety in the workplace, infection control, health care systems, and the vital organs of the human body. The course offers insight into careers in health care as well as educational requirements and the professional, legal, and ethical responsibilities involved.

Health Sciences (Core)—Course Code: 995000

Unit	Unit Name	Hours
1	Course Orientation and Professional Organizations	7
2	Safety and Infection Control	35
3	Health Care Systems, Legal and Ethical Practices	25
4	Communication and Teamwork	28
5	Body Organization, Covering, Support, and Movement	45
6	Vital Organs and Protection	42
7	Intake and Elimination	40
8	Control, Regulation, and Coordination	33
9	Reproduction and Health Maintenance Practices	25
Total		280

Research Synopsis

Introduction

The Health Sciences (Core) pathway covers the broad field of occupations related to health care and medicine. Health care is the largest and fastest growing industry in the United States. The health care field alone will generate more new jobs in the coming years than any other industry, largely in response to rapid growth in the elderly population. In fact, ten of the 20 fastest growing occupations are related to health care. Employment in home-health care and nursing and residential care should increase rapidly as life expectancies rise and families need assistance caring for their elderly family members and thus rely more on long-term care facilities. New technologies will continue to enable earlier diagnoses of many diseases, which often increases the ability to treat conditions that were previously terminal. Industry growth will also occur as a result of the shift from inpatient to less expensive outpatient and home-health care because of improvements in diagnostic tests and surgical procedures, along with patients' desires to be treated at home. Rapid growth is expected for workers in occupations concentrated outside the inpatient hospital sector, such as pharmacy technicians and personal and home-care aides. Traditional inpatient hospital positions are no longer the only option for many future health care workers.

The Health Sciences (Core) pathway will target careers at the professional and technical levels in health care. Students enrolled in these courses should be well prepared to pursue degrees at the community college and 4-year-college level.

Needs of the Future Workforce

Description	Current Jobs (2012)	Projected Jobs (2020)	Change (Number)	Change (Percent)	Median Hourly Earning
Anesthesiologists	160	165	5	3.00	$76
Dentists (General)	784	957	173	22.00	$78
Dietician Technicians	166	194	28	17.00	$9
Dieticians/Nutritionists	384	433	49	13.00	$26
Emergency Medical Technicians and Paramedics	1,595	1,778	183	11.00	$15
Health Diagnosing and Treating Practitioners	178	221	436	24.00	$28
Home Health Aides	4,701	7,359	2,658	57.00	$9
Licensed Practical Nurses	752,300	920,800	168,500	22.00	$19
Medical and Clinical Laboratory Technicians	1,489	1,771	282	19.00	$17
Nursing Aides, Orderlies, and Attendants	15,090	18,423	3,333	22.00	$9
Obstetricians and Gynecologists	220	227	7	3.00	$26
Occupational Therapists	961	1,290	329	34.00	$34
Optometrists	245	338	93	38.00	$46
Orthodontists	51	62	11	22.00	$26
Orthotists and Prosthetists	18	25	7	39.00	$41
Pharmacists	591	688	97	16.00	$53
Physical Therapists	1,442	1,976	534	37.00	$35
Physical Therapy Assistant	553	761	208	38.00	$18
Podiatrists	80	90	10	13.00	$25
Recreational Therapists	292	645	53	18.00	$15
Registered Nurses	2,737,400	3,449,300	711,900	26.00	$31
Respiratory Therapists	1,195	1,479	284	24.00	$22
Surgeon	350	361	11	3.00	$26

Source: U.S. Department of Labor, Bureau of Labor Statistics, 2011

Perkins IV Requirements

The Health Sciences (Core) curriculum meets Perkins IV requirements of high-skill, high-wage, and/or high-demand occupations by introducing students to and preparing them for occupations in health care fields. It also offers students a program of study, including secondary, postsecondary, and Institutions of Higher Learning (IHL) courses, that will further prepare them for health care careers. Additionally, this curriculum is integrated with academic Common Core

Standards. Lastly, the curriculum focuses on ongoing and meaningful professional development for teachers as well as relationships with industry.

Curriculum Content

Summary of Standards

The standards to be included in the Health Sciences (Core) curriculum are the Common Core Standards for Mathematics, Common Core Standards for English/Language Arts, 21st Century Skills, and the National Educational Technology Standards (NETS) for Students. Combining these standards to create this document will result in highly skilled, well-rounded students who are prepared to enter a postsecondary academic or career and technical program. They will also be prepared to compete academically at a national level, as the Common Core Standards are designed to prepare students for success in community colleges, institutes of higher learning, and the workforce.

Academic Infusion

The Health Sciences (Core) curriculum is aligned to the Mississippi Academic Science Standards for Human Anatomy and Physiology. The content of the courses has been aligned to the Human Anatomy and Physiology Framework.

Transition to Postsecondary Education

The latest articulation information for Secondary to Postsecondary can be found at the Mississippi Community College Board (MCCB) website http://www.mccb.edu/

Best Practices

Innovative Instructional Technologies

Recognizing that today's students are digital learners, the classroom should be equipped with tools that will teach them in the way they need to learn. The Health Sciences teacher's goal should be to include teaching strategies that incorporate current technology. It is suggested that

each classroom house a set of desktop computers for students and one laptop for the teacher. To make use of the latest online communication tools such as wikis, blogs, and podcasts, the classroom teacher is encouraged to use a learning management system (LMS), such as the Health Sciences teacher learning management system that introduces students to education in an online environment and places the responsibility of learning with the student.

Differentiated Instruction

Students learn in a variety of ways. Some are visual learners, needing only to read information and study it to succeed. Others are auditory learners, thriving best when information is read aloud to them. Still others are tactile learners, needing to participate actively in their learning experiences. Add the student's background, emotional health, and circumstances, and a very unique learner emerges. By providing various teaching and assessment strategies, students with various learning styles can succeed.

Career and Technical Education Student Organizations

Teachers should investigate opportunities to sponsor a student organization. Future Health Professionals (HOSA) is the student organization for Health Sciences. HOSA provides a unique program of leadership development, motivation, and recognition exclusively for secondary, postsecondary, adult, and collegiate students enrolled in health occupations education programs.

Cooperative Learning

Cooperative learning can help students understand topics when independent learning cannot. Therefore, you will see several opportunities in the Health Sciences (Core) curriculum for group work. To function in today's workforce, especially within the health care system, students need to be able to work collaboratively with others and solve problems without

excessive conflict. The Health Sciences (Core) curriculum provides opportunities for students to work together and help one another to complete complex tasks.

Conclusions

Health Sciences (Core) is one of Mississippi's most comprehensive health curricula. Students that complete these programs are well equipped for a variety of endeavors. Instructors are urged to encourage these students to pursue educational opportunities at community colleges and universities in Mississippi.

Professional Organizations

Association for Career and Technical Education
https://www.acteonline.org

Mississippi ACTE http://www.mississippiacte.com/

American Association of Medical Transcriptionist
4230 Kiernan Avenue
Suite 130
Modesto, CA 95356
800.982.2182 (toll free)
209.527.9620 (direct)
209.527.9633 (fax)
www.ahdionline.org
ahdi@ahdionline.org

American Association for Respiratory Care
9425 N. MacArthur Blvd.
Suite 100
Irving, TX 75063-4706
972.243.2272
www.aarc.org

American Dental Assistants Association
35 East Wacker Drive
Suite 1730
Chicago, IL 60601-2211
312.541.1550
312.541.1496 (fax)
www.dentalassistant.org

American Dental Association
211 East Chicago Ave.
Chicago, IL 60611-2678
312.440.2500
www.ada.org

American Health Care Association
1201 L Street, N.W.
Washington, DC 20005
202.842.4444
202.842.3860 (fax)
www.ahca.org

American Hospital Association
One North Franklin
Chicago, Illinois 60606-3421
312.422.3000
www.aha.org

American Medical Association
515 N. State Street
Chicago, IL 60610
800.621.8335
www.ama-assn.org

American Red Cross National Headquarters
2025 E Street NW
Washington, DC 20006
800.REDCROSS (toll free)
800.257.7575 (Español)
www.redcross.org

American Society of Radiologic Technologists
15000 Central Ave. SE
Albuquerque, NM 87123-3909
800.444.2778, Press 5 (toll free)
505.298.4500, Press 5 (direct)
505.298.5063 (fax)
www.asrt.org

Hospital Corporation of America
One Park Plaza
Nashville, TN 37203
615.344.9551
www.hcahealthcare.com

National Association of Emergency Medical Technicians
P.O. Box 1400
Clinton, MS 39060-1400
Physical Address
132-A East Northside Dr.
Clinton, MS 39056
1-800-34-NAEMT (toll free)
601.924.7744 (direct)
601.924.7325 (fax)
info@naemt.org
www.naemt.org

National Athletic Trainer's Association
2952 Stemmons Freeway #200
Dallas, TX 75247
214.637.6282
214.637-2206 (fax)
www.nata.org

LifeWorks: Explore Health and Medical Science Careers Early
http://science.education.nih.gov/lifeworks

National Health Council
1730 M Street, NW
Suite 500
Washington, DC 20036
202.785.3910
202.785.5923 (fax)
www.nationalhealthcouncil.org

Nurses for a Healthier Tomorrow
www.nursesource.org

Nursing Spectrum
www.nurse.com

Ovarian Cancer National Alliance
910 17th Street, N.W.
Suite 1190
Washington, D.C. 20006
202.331.1332
202.331.2292 (fax)
ocna@ovariancancer.org
www.ovariancancer.org

Society of Nuclear Medicine
1850 Samuel Morse Drive
Reston, Virginia 20190
703.708.9000
www.snm.org

St. Jude Children's Research Hospital
332 N. Lauderdale
Memphis, TN 38105
901.495.3300
www.stjude.org

Le Bonheur Children's Medical Center
50 N. Dunlap Street
Memphis, TN 38103
901.287.KIDS (5437)
info@lebonheur.org

Mississippi Nurses Association
31 Woodgreen Place
Madison, MS 39110
601.898.0670
601.898.0190 (fax)
http://www.msnurses.org/

American Heart Association
440 E. Pass Road Gulfport, MS, 39507
609 Corinne Street Hattiesburg, MS, 39401
4830 McWillie Circle Jackson, MS, 39206
www.americanheart.org

The Center for Health and Health Care in Schools
202.466.3396
chhcs@gwu.edu
www.healthinschools.org

American Cancer Society
800.ACS.2345 (toll free)
www.cancer.org

The Diabetes Foundation of Mississippi
16 Northtown Drive
Suite 100
Jackson, MS 39211
601.957.7878
601.957.9555 (fax)
www.msdiabetes.org

Mississippi Office of Healthy Schools — A Division of Mississippi Department of Education
Central High School
359 Northwest Street
P.O. Box 771
Jackson, MS 39205-0771
www.healthyschoolsms.org
www.rxlist.com
www.PDR.net

American Health Information Management Association – AHIMA
233 N. Michigan Ave, 21st Floor
Chicago, IL 60601-5800
312.233.1100
www.ahima.org

American Lung Association of Mississippi
P.O. Box 2178
Ridgeland, MS 39158
731 Pear Orchard Road
Suite 18
Ridgeland, MS 39157
800.586.4872 (toll free)
601.206.5810 (direct)
601.206.5813 (fax)
www.alams.org

American Nurses Association
8515 Georgia Ave, Suite 400
Silver Springs, MD 20910
800.274.4ANA
www.nursingworld.org

American Speech-Language-Hearing Association
2200 Research Boulevard
Rockville, MD 20850-3289
800.638.8255
www.asha.org

American School Health Association
7263 State Route 43
P.O. Box 708
Kent, Ohio 44240
330.678.1601
330.678.4526 (fax)
asha@ashaweb.org
www.ashaweb.org

National School Boards Association
1680 Duke Street
Alexandria, VA 22314
703.838.6722
703.683.7590 (fax)
info@nsba.org
www.nsba.org

Association for Professionals in Infection Control and Epidemiology
1275 K St., NW, Suite 1000
Washington, D.C .20005-4006
202.789.1890
202.789.1899 (fax)
www.apic.org

The American Assembly for Men in Nursing
AAMN 6700 Oporto-Madrid Blvd.
Birmingham, AL 35206
(205) 956-0146 (phone)
www.aamn.org

Association of Allied Health Programs
4400 Jenifer Street, NW Suite 333
Washington, D.C. 20015
202.237.6481 (phone)
202.237.6485 (fax)
www.asahp.org

Health Professions Network
1850 Samuel Morse Drive
Reston, VA 20190-5316

703.708.9000 (phone)
703.708.9015 (fax)
membership@healthpronet.org
www.healthpronet.org

American Health Information Management Association- AHIMA
233 N. Michigan Avenue, 21st Floor
Chicago, IL 60601-5800
(312) 233-1100
www.ahima.org

Using this Document

Suggested Time on Task
An estimated number of clock hours of instruction that should be required to teach the competencies and objectives of the unit. A minimum of 140 hours of instruction is required for each Carnegie unit credit. The curriculum framework should account for approximately 75–80% of the time in the course.

Competencies and Suggested Objectives
A competency represents a general concept or performance that students are expected to master as a requirement for satisfactorily completing a unit. Students will be expected to receive instruction on all competencies. The suggested objectives represent the enabling and supporting knowledge and performances that will indicate mastery of the competency at the course level.

Integrated Academic Topics, 21st Century Skills and Information and Communication Technology Literacy Standards, ACT College Readiness Standards, and Technology Standards for Students
This section identifies related academic topics as required in the Subject Area Testing Program (SATP) in Algebra I, Biology I, English II, and U.S. History from 1877, which are integrated into the content of the unit. Research-based teaching strategies also incorporate ACT College Readiness standards. This section also identifies the 21st Century Skills and Information and Communication Technology Literacy skills. In addition, national technology standards for students associated with the competencies and suggested objectives for the unit are also identified.

References
A list of suggested references is provided for each unit. The list includes some of the primary instructional resources that may be used to teach the competencies and suggested objectives. Again, these resources are suggested, and the list may be modified or enhanced based on needs and abilities of students and on available resources.

Unit 1: Course Orientation and Professional Organizations

Competencies and Suggested Objectives
1. Describe the purpose of the course and related professional organizations. DOK 1 a. Identify student and course expectations. b. Explore health science professional organizations (HOSA). c. Explore leadership skills and parliamentary procedures with professional organizations. Note: A list of skills and activities, which may be used to enhance the teaching of the Health Science Core, may be found at the RCU download page, "Teacher Resource Documents". The practice/performance of the skills on this list may be used to count toward the clinical hours required for this course.

Scenarios

Unit 1

There are no scenarios associated with the orientation unit.

Attachments for competencies:

http://www.hosa.org/

Unit 2: Safety and Infection Control

Competencies and Suggested Objectives

1. Describe personal and environmental safety practices. **(**NOTE: The content from this unit will be reinforced throughout the program.)[CNA, DOK 1, HCFS 7]
   a. Apply principles of body mechanics.
   b. Apply safety techniques (personal and patient) in the health care setting in order to prevent accidents and injuries.
2. Identify common safety hazards. **(**NOTE: The content from this unit will be reinforced throughout the program.) [DOK 1, HCFS 7]
   a. Comply with safety signs, symbols, and labels.
   b. Recognize Safety Data Sheets (SDS) and discuss safety implications of handling hazardous materials (checking labels, and checking solutions).
3. Utilize emergency procedures and protocols. **(**NOTE: The content from this unit will be reinforced throughout the program.) [DOK 2, HCFS 7]
   a. Practice fire safety in a health care setting.
   b. Recognize principles of basic emergency response in natural disasters and other emergencies
4. Describe the principles of infection control. **(**NOTE: The content from this unit will be reinforced throughout the program.) [CNA, DOK 1, HCFS 7]
   a. Explain the classes of microorganisms and diseases caused by each one. Include the following:
      - Aerobic
      - Anaerobic
      - Bacteria
      - Fungi
      - Helminths
      - Nonpathogens
      - Pathogens
      - Protozoa
      - Rickettsiae
      - Viruses

   b. Identify the types of infections. Include the following:
      Bacterical:
      - boils
      - botulism
      - cholera
      - diphtheria
      - gonorrhea
      - meningitis
      - methicillin-resistant staphylococcus
      - pertussis
      - pneumonia
      - rheumatic fever
      - strep throat
      - syphilis
      - tetanus
      - toxic shock
      - tuberculosis
      - typhoid
      - urinary tract infections
      - wound infections

Protozoa:

- African sleeping sickness
- amebic dysentery
- malaria
- trichomonas

Fungal:

- athlete's foot
- ring worm
- histoplasmosis
- thrush
- yeast vaginitis

Rickettsiae:

- Rocky Mountain spotted fever
- typhus fever

Viruses:

- chicken pox
- common cold
- ebola
- H5N1 (bird flu)
- hepatitis B
- hepatitis C
- herpes
- human immunodeficiency
- influenza
- Marburg
- measles
- monkey pox
- mumps
- polio
- severe acute respiratory syndrome (SARS)
- virus (HIV)
- warts
- West Nile virus (WNV)

Helminths:

- hook worms or flukes
- ascariasis
- enterobiasis
- taenia solium
- trichinella spiralis

c. Describe the chain of infection and describe the types of infections (endogenous, exogenous, nosocomial (hospital acquired or health care associated), and opportunistic).
d. Identify the levels of aseptic control.
e. Demonstrate the proper procedure for aseptic hand washing.

5. Explain standard precaution based on Occupational Safety and Health Administration (OSHA) and Centers for Disease Control (CDC) regulations. **(**NOTE: The content from this unit will be reinforced throughout the program.) CNA, DOK 1, HCFS 7
   a. Describe OSHA's blood-borne pathogen standards.
   b. Explore employer requirements according to the Needle Stick Safety and Prevention Act.
   c. Identify the basic rules of standard precaution.
6. Describe the principles of sterile technique. **(**NOTE: The content from this unit will be reinforced throughout the program.) CNA, DOK 1, HCFS 7

a. Demonstrate skills related to sterile technique for example, donning sterile gloves, sterile dressing, and sterilizing instruments.
7. Explain the importance of maintaining transmission-based isolation precautions. **(**NOTE: The content from this unit will be reinforced throughout the program.) DOK 1, HCFS 7 a. Identify the precautions needed to prevent the spread of communicable diseases. b. Demonstrate the proper procedure for applying personal protective equipment (PPE). c. Explain the need for protective or reverse isolation.

Scenarios

Unit 2

1) Working in pairs, students will be assigned a certain area of the school (e.g., cafeteria, school office, gymnasium, or CTE classrooms) to evaluate for potential health and safety hazards. Students will note the hazards on paper and will follow their notations with an explanation of how that particular hazard might be harmful and then make a suggestion for removing the hazard.

2) Set up the scene of a hospital room with a mannequin (or a student playing the patient). Create safety violations such as bed rails down, hair dryer where oxygen is in use, loose cords or other ambulatory hazards. Have the students check the room for safety hazards and record what they find. Have them identify the hazards, explain the associated risks, including any specific danger to the patient, and state what actions would correct the hazards.

3) In small groups of three to four students, develop an educational presentation for middle school students. The presentation will include appropriate infection control procedures for a determined medical hazard. Groups will deliver the presentation in front of middle school students and videotape the performance.

4) Using the plastic wounds from a wound care kit, glue them on the appropriate body part using body glue. Add liquid to the wound (simulated blood, or drainage) and cover. Using a sterile dressing tray, have a student complete the procedure of a sterile dressing change. The student should read the physician's order and follow its instructions to clean and redress the wound. Have other students watch for a break in the sterile technique.

Attachments for Scenarios

None

Unit 3: Health Care Systems, Legal and Ethical Practices

Competencies and Suggested Objectives
1. Explain the role of the health care professional in a department, organization, and the overall health care environment. DOK 1, HCFS 3 a. Explain the health care delivery system (public, private, government, and non-profit facilities/agencies). b. Explain the factors influencing health care delivery systems. c. Describe the responsibilities of consumers within the health care system.
2. Identify how health care systems affect the services that are performed and the quality of care. DOK 2, HCFS 3 a. Explain the impact of emerging issues such as technology, epidemiology, bioethics, and socioeconomics on health care delivery systems. b. Discuss common methods of payment for health care.
3. Describe the legal implications associated with health care. DOK 2, HCFS 5 a. Analyze legal responsibilities of health care systems. b. Apply procedures for accurate documentation and record keeping.
4. Describe and demonstrate legal practices associated with health care. DOK 2, HCFS 5 a. Identify the standards of Health Insurance Portability and Accountability Act (HIPAA). b. Describe advance directives. c. Summarize the Patient's Bill of Rights (for acute care) and the Resident's Bill of Rights (for long-term care). d. Recognize informed consent. e. Explain criminal laws governing harassment, labor, and scope of practice. f. Explain civil laws including torts.
5. Recognize and discuss ethical boundaries within the health care environment. DOK 2, HCFS 6 a. Differentiate between ethical and legal issues impacting health care. b. Recognize ethical issues and their implications related to health care.
6. Discuss the accepted ethical practices within the health care environment. DOK 1, HCFS 6 a. Define procedures for reporting activities and behaviors that affect the health, safety, and the welfare of others.
7. Identify cultural, social, and ethnic diversity within the health care environment. DOK 2, HCFS 6 a. Compare religious, spiritual, and cultural values as they impact health care. b. Demonstrate respectful and empathetic treatment of all patients/clients.

Scenarios

Unit 3

1) Divide students into small groups. Bring a variety of health insurance Explanation of Benefits packages from area businesses. Distribute one Explanation of Benefits package to each group. (As an alternative, ask students to go to area businesses they are interested in and ask about the benefits the companies offer.) Students will read through the plans and complete the Understanding Health Benefits Worksheet.

2) Students consider a situation wherein their best friend's 72-year-old grandfather has been diagnosed with terminal cancer and has less than 6 months to live. His income is just below the poverty level. Students should determine what health services and/or insurance he is likely to need and is eligible to receive. Students should prepare to present and defend their conclusions to the class.

3) Working in small groups, students will analyze court cases related to liability, standard of care, privacy, confidentiality, privileged communication, or negligence. Each group will make a chart to highlight the pertinent facts surrounding the case. As a class, discuss the similarities and differences in the cases and their verdicts.

4) Students assume the roles of members of the Medical Center Transplant Committee.
Case: Three people are on the transplant list for a kidney due to irreversible renal failure.

- Patient #1 is a 22-year-old woman who was in good health prior to a motor vehicle accident, where internal injuries damaged her kidneys. She has a history of alcohol use and recreational drug use, mostly marijuana. Her father is often a financial contributor to the hospital.
- Patient #2 is a 65-year-old man with a history of diabetes. His renal failure is due to diabetic complications. His diabetes is now fairly well controlled.
- Patient #3 is a 36-year-old single mother who suddenly went into renal failure following a hysterectomy. She is a smoker and a social drinker. She is 30 lbs overweight.

All three patients are a perfect blood and tissue match. The committee must decide who will receive the kidney.

Attachments for Scenarios

PBS. (2008). National discussion and debate series: Health care (Lesson two: Health insurance overview). Retrieved from *http://www.pbs.org/newshour/extra/teachers/lessonplans/us/jan-june08/healthcare_lp2.pdf*

Unit 4: Communication and Teamwork

Competencies and Suggested Objectives
1. Describe the concepts of effective communication. DOK 2, HCFS 2 a. Interpret verbal and nonverbal communication. b. Recognize barriers to communication. c. Differentiate subjective and objective information. d. Recognize the elements of communication using a sender-receiver model. e. Demonstrate speaking and active listening skills.
2. Compare the roles and responsibilities of individual members as part of the health care team. DOK 1, HCFS 8 a. Describe roles and responsibilities of team members. b. Recognize characteristics of effective teams.
3. Explain the principles of interacting effectively and sensitively with all members of the health care team. DOK 2, HCFS 8 a. Recognize methods for building positive team relationships. b. Analyze attributes and attitudes of an effective leader. c. Apply effective techniques for managing team conflict.
4. Introduce appropriate medical terminology and abbreviations. DOK 1, HCFS 2 a. Use roots, prefixes, and suffixes to communicate information. (See below.) b. Use medical abbreviations to communicate information. (See below.) c. Describe elements of written and electronic communication (spelling, grammar, and formatting).

Medical Roots, Prefixes, and Suffixes

1.	gastr-	stomach	20.	-ologist	a specialist in the study of
2.	cardi-	heart	21.	rhin-	nose
3.	megal-	enlarged	22.	gingiv-	gum
4.	-itis	inflammation	23.	-malacia	soft, soft condition
5.	dermat-	skin	24.	-ology	study of
6.	plast-	surgical repair, plastic repair	25.	spasm	involuntary contraction
7.	cerebr-	brain	26.	-algia	pain, painful condition
8.	path-	disease	27.	crani-	skull
9.	-ectomy	surgical removal of all or part of	28.	end-	inside, within
			29.	hemi-	half
10.	enter-	intestines (usually small)	30.	-oid	like, resembling
11.	-osis	condition, any condition	31.	hyper-	above, more than normal
12.	-otomy	cut into, incision into	32.	cyst-	sac containing fluid, bladder
13.	aden-	gland	33.	chole-	bile
14.	angi-	vessel (usually blood)	34.	hypo-	under, beneath, deficient
15.	-oma	tumor	35.	scop-	look, observe
16.	nephr-	kidney	36.	hyster-	uterus (womb)
17.	hepat-	liver	37.	-ostmy	to create an opening
18.	arthr-	joint	38.	para-	beside, beyond
19.	blephar-	eyelid	39.	-lysis	loosening, destruction, set free

40.	cervic-	neck
41.	chondr-	cartilage
42.	cyan-	blue
43.	hem(at)-	blood
44.	ost-	bone
45.	psycho-	mind
46.	lip-	fat
47.	my-	muscle
48.	lith-	stone
49.	ophthalm-	eye
50.	proct-	anus
51.	cost-	rib
52.	-gram	record, write
53.	acro-	extremities
54.	rhexis-	break, burst
55.	carcin-	cancer
56.	-penia	decrease
57.	gen-	original, production
58.	burso-	sac
59.	retr(o)-	backwards
60.	trip-	rub, friction
61.	strept-	twist
62.	-desis	binding, fixation
63.	mani-	madness, mental disturbance
64.	glosso-	tongue
65.	-trophy	development, growth
66.	supra-	above, over
67.	-ptosis	falling, drooping
68.	dyn-	pain
69.	mast-	breast
70.	-rrhaphy	suture, suturing
71.	dent-	teeth
72.	cephal-	head
73.	auto-	self
74.	epi-	upon, in addition to
75.	hydro-	water
76.	lobo-	section
77.	-emesis	vomiting
78.	contra-	against, counter
79.	-iasis	condition, formation of, presence of
80.	trans-	through, across, beyond
81.	brady-	slow
82.	-ectasis	expansion
83.	cyt-	cell
84.	odont-	tooth
85.	leuk-	white
86.	-esthesia	sensation, feeling
87.	cantho-	angle at the end of the eyelid
88.	steno-	narrow, contracted
89.	cheil-	lip
90.	-cele	hernia, tumor or swelling
91.	benign	mild, not cancerous
92.	semen	seed
93.	celio-	abdomen
94.	erythro-	red
95.	vaso-	vessel
96.	melan-	black
97.	cauda-	tail
98.	lingua-	tongue
99.	myring-	eardrum
100.	spondyl-	spinal column or vertebra
101.	ovar-	egg (female reproduction cell)
102.	-centesis	puncture
103.	oto-	ear
104.	bili-	bile
105.	squam-	scale
106.	mening-	membrane
107.	cec-	blind passage
108.	macul-	spot (or stain)
109.	-pexy	suspension, fixation
110.	onco-	tumor, swelling or mass
111.	or-	mouth
112.	sub-	under, beneath, below
113.	spiro-	coil
114.	lacrim-	tear
115.	viscero-	organ
116.	lact-	milk
117.	onych-	nail, claw
118.	thorac-	chest
119.	pyle-, pyloro-	gate
120.	vesic-	bladder
121.	sphenic-	wedge, wedge-shaped
122.	myel-	marrow (spinal cord)
123.	anti-	against
124.	myco-	fungus
125.	hallux	great toe, big toe
126.	physio-	nature
127.	bucc(o)-	cheek
128.	palpebr-	eyelid
129.	plasia-	development or growth
130.	rug-	wrinkle, fold, crease
131.	aur-	ear
132.	acoust(i)	hearing, sound
133.	colp(o)-	hollow, vagina
134.	phon-	voice, sound
135.	leio-	smooth
136.	cor-	heart
137.	ren-	kidney
138.	orchi-	testis
139.	encephal-	brain
140.	thalam-	inner chamber
141.	plexus	braid, an interweaving, or network
142.	cilia	eyelash
143.	dendr-	tree, branching (as in nervous system)
144.	phleb-	vein
145.	pilo-	hair
146.	histo-	tissue
147.	stoma-	mouth or opening
148.	tympan-	eardrum or its enclosure

149.	umbilic-	navel
150.	salpingo-	tube
151.	helio-	sun, light
152.	astr-	star-shaped
153.	-asthenia	weakness
154.	facia	sheet, band
155.	iso-	equal
156.	tarso-	ankle region or framework of the eyelid
157.	-tope	place
158.	pod-	foot
159.	malign-	bad, harmful
160.	adnexa	ties, connections
161.	ocul-	eye
162.	lapar-	abdominal wall
163.	dacry-	tear
164.	ment-	mind
165.	part-	labor, bring forth
166.	scler(a)-	hard
167.	somato-	body
168.	trachel-	neck, neck like
169.	sinus	hollow space
170.	hypno-	sleep
171.	sept-	wall, fence
172.	scirr(h)-	hard
173.	antr-	cavity or chamber
174.	-crine	to secrete
175.	dura	hard
176.	pneum-	lung, air
177.	phage	to eat
178.	phren-	mind
179.	corne-	horny, hornlike
180.	plak-	plate
181.	iris	rainbow (eye membrane)
182.	kerat-	horny, horny tissue
183.	pulmon-	lung
184.	ptyal-	saliva
185.	alveol-	cavity, socket
186.	oophor-	ovary (female reproductive gland)
187.	oment-	covering (of internal abdominal organs)
188.	sedat-	quiet, calm
189.	furca-	fork-shaped
190.	radic-	root
191.	radi-	ray
192.	fistul-	pipe, a narrow passage
193.	edema-	swelling (by fluid)
194.	dactyl-	finger, toe
195.	metabol(e)-	change
196.	pariet-	wall
197.	ependym-	wrapping, a covering
198.	gravid	pregnant
199.	aer-	air
200.	glyco-	sweet, sugar
201.	tarso-	ankle region
202.	cheir-, chir-	hand
203.	calc-	heel, stone
204.	cine-	move, movement
205.	digit	finger, toe
206.	dors-	back
207.	gangli-	swelling, knot-like mass
208.	gemin-	twin, double
209.	grad-	walk, take steps
210.	gran-	grain, particle
211.	labi-	lip
212.	micr-	small
213.	peps-, pept-	digest
214.	pleur-	pleura (membrane), rib, side
215.	mamm-	breast
216.	colla-	glue, gelatin like
217.	later-	side
218.	rachi-	spinal column
219.	phob-	fear
220.	phot-	light
221.	dys-	bad, out of order
222.	cut-	skin
223.	en-	in
224.	peri-	about, around
225.	pro-	in front of, before
226.	mechano-	machine
227.	dynam-	power
228.	osmo-	odor
229.	traumat-	wound, injury
230.	trich-	hair
231.	maxill-	upper jawbone
232.	an-, a-	without, not
233.	phak-	lens
234.	pre-	in front of, before
235.	strict-	to draw tight, narrowing
236.	turbin-	shaped like a top
237.	ameb-	change
238.	semi-	half
239.	neo-	new
240.	hormone-	excite or set in motion
241.	therm-	heat
242.	syn-, sym-	together
243.	vuls(e)-	twitch or pull
244.	post	after, behind in time
245.	metr-	uterus
246.	tegument	covering or skin
247.	pan-	all
248.	poly-	many or much
249.	ramus	branch
250.	neuro-	nerve (nervous system)
251.	thromb-	lump, clot
252.	ab-	away from, not
253.	-plegia	paralysis
254.	ante-	before
255.	thel-	nipple
256.	ex-	out, away from
257.	lien-	spleen

258.	tumor	swelling
259.	vestibule	entrance
260.	puer-	child
261.	sarc-	flesh
262.	proli-	offspring
263.	macro-	large
264.	lal-	speech
265.	intra-	within
266.	inter-	between
267.	infra-	beneath
268.	cryo-	cold
269.	mal-	bad
270.	glom-	ball
271.	tens-	stretch
272.	spas-	pull, draw
273.	somni-	sleep
274.	pharmac-	drug
275.	lumbo-	loins
276.	arter-	artery
277.	appendic-	appendix
278.	thyro-	thyroid
279.	splen-	spleen
280.	ovario-	ovary
281.	adreno-	adrenal gland
282.	basi-	base
283.	pelvi-	pelvis
284.	vena-	vein
285.	urethr-	urethra
286.	utero-	uterus
287.	sacro-	sacrum
288.	pharyng-	pharynx
289.	duodeno-	duodenum
290.	ureter	ureter
291.	laryng-	larynx
292.	bronch-	bronchus
293.	col-	colon
294.	esophagi-	esophagus
295.	bi-	two, double, both
296.	tri-	three
297.	ile-	ileum
298.	ili-	ilium
299.	lig-	ligament
300.	therap-	therapy
301.	ventr-	front
302.	vert-	turn
303.	eu-	good
304.	ambi-	both
305.	amphi-	around, on both sides
306.	brachy-	short
307.	capit-	head
308.	cau-	burn
309.	clas-	break
310.	duct-	tube
311.	fiss-	split
312.	ger-	old
313.	heter-	other
314.	infer-	under
315.	hom-	same
316.	olfact-	smell
317.	orth-	straight
318.	gyn-	female
319.	pachy-	thick
320.	phrag-	fence
321.	poster-	back part
322.	cata-	down
323.	platy-	flat
324.	pseud-	false
325.	schiz-	split
326.	proxim-	nearest
327.	scol-	curved
328.	apo-	away from
329.	di-	twice
330.	dia-	through
331.	eury-	broad
332.	pect-	chest
333.	necr-	dead
334.	mi-	less
335.	morph-	form
336.	dis-	apart
337.	fac-	make, do
338.	lept-	slender
339.	lymph-	watery fluid
340.	meta-	beyond
341.	-rrhag	burst, burst forth
342.	sta-	stand
343.	ton-	stretch
344.	volv-	to roll
345.	splanchn-	internal organs
346.	-rrhe	flow
347.	med-	middle
348.	xer-	dry
349.	per-	throughout
350.	blast-	bud

Medical Abbreviations

• A & P	anatomy and physiology
• ad lib	freely, at will
• ac	before meals
• adm	admission
• AED	automated external defibrillator
• amb	ambulate
• ASAP	as soon as possible
• ax	axillary
• bid	twice a day
• BM	bowel movement
• BMI	body mass index
• BMR	basal metabolic rate

- BP — blood pressure
- BRP — bathroom privileges
- c — with
- CBC — complete blood count
- CC — chief complaint
- CHO — carbohydrate
- cl liq — clear liquids
- c/o — complains of
- CPR — cardiopulmonary resuscitation
- CT — computerized tomography
- D/C — discontinue
- DNR — do not resuscitate
- Dx — diagnosis
- EEG — electroencephalogram
- EKG, ECG — electrocardiogram
- FBAO — foreign body airway obstruction
- FBS — fasting blood sugar
- FF — force fluids
- GB — gallbladder
- Hgb — hemoglobin
- Hct — hematocrit
- HOB — head of bed
- hs — hour of sleep, bedtime
- ht — height
- hx — history
- IM — intramuscular
- IV — intravenous
- LOC — level of consciousness
- LPN, LVN — licensed practical (vocational) nurse
- LTC — long-term care
- L — left
- MD — Medical Doctor
- MI — Myocardial Infarction
- MRI — magnetic resonance imaging
- N/A — not applicable
- neg — negative
- NG — nasogastric
- noct — night
- NKA — no known allergies
- NPO — nothing by mouth
- O2 — oxygen
- OOB — out of bed
- OR — operating room
- OTC — over the counter
- p — after
- pc — after meals
- po — by mouth
- PPE — personal protective equipment
- prn — as necessary
- pt — patient
- q2h — every 2 hours
- qhs — every night at bedtime
- qs — quantity sufficient
- qid — four times a day
- R — respiration
- R — right
- RBC — red blood cell
- RN — registered nurse
- R/O — rule out
- ROM — range of motion
- Rx — prescription, take, treatment
- s — without
- ss — one half
- STAT — immediately
- STD — sexually transmitted disease
- T — temperature
- tab — tablet
- tid — three times a day
- TPR — temperature, pulse, respiration
- UA — urinalysis
- VS — vital signs
- WBC — white blood cells
- w/c — wheelchair
- wt — weight
- WNL — within normal limits

Scenarios

Unit 4

1) Have students role-play a situation involving a family member who becomes irate when the patient's nurse misinterprets a physician's order for medication and gives the patient the wrong dosage. Although the patient is not harmed, the family is upset and verbally abusive to the nurse. The nurse and supervisor must utilize communication skills to resolve the situation. Roles to include: patient, nurse, family member, and nurse supervisor.

2) Prior to class, the teacher will make a crazy, abstract model out of play dough. The more colors used, the more difficult the task, which will likely make the lesson more effective. After the observation period described below, the teacher should place the model behind a curtain or otherwise out of sight. Divide class into groups of four to five students. Each group must decide who will have which job: One will be the observer, one the communicator and the other two to three students will be the builders. The goal of each group is to make a play-dough model as close as possible to the one made by the teacher. Place groups in areas of the classroom away from each other so that they do not try to copy one another's models. The roles of each job are as follows:

a. Observer—The observers from each group will have 2 minutes to observe as much detail as possible about the model. Then he or she will describe to the communicator what was observed. Observers should sit with their backs to the rest of the class so that they cannot see what the groups are building.
b. Communicator—The communicator from each group will listen to his or her respective observers and then relay the information to the group of builders, instructing them how to build the models. The communicator should not help build. He or she can go back and forth between the builders and observer as often as needed.
c. Builders—The builders will attempt to construct the models according to what their respective communicators tell them to build.

After about 5-10 minutes, the observers will be allowed to observe the teacher's model again for an additional 1 minute. Then the groups will spend approximately another 5 minutes to finish. After the time allotted has elapsed, show the class the original model again. Compare the products of each group to the original to determine who came the closest to replicating the original.

In closing, have the students journal using the following prompts:
1. How did you have to use communication skills?
2. How did you use teamwork?
3. What was most frustrating to you?
4. What could happen if good communication is not being used in health care?
5. How do health care workers work together in teams?

Adapted from:
Glenn, A. (n.d.). Health science teamwork and communication activity. Retrieved from *https://docs.google.com/folder/d/0BxQiDn1iTqWHNzRiYzI1ZDAtZTM2Ny00NGZlLTk5NGQtNGNhYWJmOTE3Y2Ux/edit?hl=en_US&pli=1&docId=0BxQiDn1iTqWHNDgwNmJiODMtMGE3MS00MDFhLWFlYTItYjE2N2FjYzdhYmM4*

Attachments for Scenarios

None

Unit 5: Body Organization, Covering, Support, and Movement

Body Organization, Integumentary System, Skeletal System, and Muscular System

NOTE: The following academic foundations are for teaching and reinforcement of the content within this unit only. These are to be embedded throughout all of the competencies and objectives as the instructor deems applicable.

1. Apply inquiry-based and problem-solving processes and skills to scientific investigations. DOK 3 HCFS 1
   a. Use current technologies such as CD-ROM, DVD, Internet, and online data searches to explore current research related to a specific topic.
   b. Clarify research questions and design laboratory investigations.
   c. Demonstrate the use of scientific inquiry and methods to formulate, conduct, and evaluate laboratory investigations (e.g., hypotheses, experimental design, observations, data analyses, interpretations, theory development).
   d. Organize data to construct graphs (e.g., plotting points, labeling x- and y-axes, creating appropriate titles and legends for circle, bar, and line graphs) in order to draw conclusions and make inferences.
   e. Evaluate procedures, data, and conclusions to critique the scientific validity of research.
   f. Formulate and revise scientific explanations and models using logic and evidence (data analysis).
   g. Collect, analyze, and draw conclusions from data to create a formal presentation using available technology (e.g., computers, calculators, SmartBoard, or CBL's).
2. Apply mathematical skills in health care practices. DOK 2, HCFS 1
   a. Apply mathematical computations related to health care procedures (metric and household, conversions and measurements).
   b. Analyze diagrams, charts, graphs, and tables to interpret health care results.
   c. Record time using the 24-hour clock.

Competencies and Suggested Objectives

1. Describe the organization of the body. DOK 1, HCFS 1
   a. Apply and relate appropriate anatomical terms to the body in anatomical position.
      - Relationship of body parts
      - Major cavities and essential organs
   b. Explain how specific mechanisms (e.g., feedback, transport, pH, or temperature regulation) maintain homeostasis.
   c. Categorize the relationship of the cell and its functions to the more complex levels of organization within the body.
      - Four major categories of tissues and their respective locations, structures, and functions.
2. Discuss the structures and functions of the integumentary system. DOK 1, HCFS 1
   a. Identify the parts comprising the integumentary system and their respective functions.

b. Discuss the concept of pigmentation.

3. Explain diseases and disorders of the integumentary system and related signs and symptoms and treatment methods. DOK 1, HCFS 1
   a. Identify diseases and disorders that affect the integumentary system. Include the following:
      - acne vulgaris
      - athlete's foot
      - basal cell carcinoma
      - dermatitis
      - eczema
      - impetigo
      - melanoma
      - psoriasis
      - ringworm
      - squamous cell carcinoma
      - verrucae
   b. Identify signs, symptoms, and treatment methods associated with diseases and disorders of the integumentary system.
   c. Describe various skin eruptions. Include: macules, papules, vesicles, pustules, crusts, wheals, and ulcers.

4. Compare the structures and functions of the skeletal system with its relationship to movement. DOK 1, HCFS 1
   a. Identify the bones of the body, noting differences between males and females. AP3
   b. Identify the structures that comprise bones. AP3
   c. Explain the functions of the skeletal system. AP3
   d. Identify the types of joints and their related movements. AP3

5. Discuss diseases and disorders of the skeletal system and related signs, symptoms, and treatment methods. DOK 1, HCFS 1
   a. Identify diseases and disorders that affect the skeletal system. Include the following:
      - bursitis
      - colles fracture
      - comminuted fracture
      - compound or open fracture
      - depressed fracture
      - dislocation
      - green stick fracture
      - impacted fracture
      - osteoarthritis
      - osteomyelitis
      - osteoporosis
      - Rheumatoid arthritis
      - ruptured disk
      - simple or close fracture
      - spinal curvatures (scoliosis, lordosis, and kyphosis)
      - spiral fracture
      - sprain
   b. Identify signs, symptoms, and treatment methods associated with skeletal diseases, disorders, and injury. AP3

6. Compare the structures and functions of the muscular system with its relationship to movement. DOK 1, HCFS 1
   a. Identify the three types of muscles.
   b. Identify the major components and functions of skeletal muscle fiber.
   c. Identify the major skeletal muscles.
   d. Explain the function of the muscles.
   e. Describe the process of muscle contraction.

f. Introduce active/passive range of motion: adduction, abduction, flexion, extension, rotation, and circumduction.

7. Discuss diseases, disorders, and injury of the muscular system and related signs, symptoms, and treatment methods. DOK 1, HCFS 1
   a. Identify diseases and disorders that affect the muscular system. Include the following:
      - fibromyalgia
      - muscle spasms
      - muscular dystrophy
      - strain
      - myasthenia gravis
   b. Identify signs, symptoms, and treatment methods associated with muscular diseases and disorders.
   c. Research and evaluate the impact of medical technology on muscle physiology and disease.

Scenarios

Unit 5

1) With a partner and using play dough or clay, have students create a stick-like figure with a head, trunk, arms, and legs. As the teacher calls out directional or organizational terms, the students will use toothpicks to identify the respective areas. After discussing the terms, students will cut the figure according to body planes.

2) Create poster or diagram showing at least 1 specific mechanism that assists in maintaining the body's homeostasis. Determine what would happen if the body did not have this ability.

3) Tape a small piece of paper to various places on patient-care mannequins. Some pieces have the words *wound*, *fracture*, and *internal damage*. Each will have a description of the injury. Have the students use directional terms, planes, and abdominal regions to describe the location of the injured area (e.g., spiral fracture of the left distal fibula).

4) Using various shapes of dry pasta, have students construct a skeleton on precut squares of cardboard. Have students label specific bones as determined by the teacher.

5) Divide the class into groups of three to five students. Have some students act as patients in hospital beds. After determining what causes skin breakdown that may lead to the formation of decubitus ulcers, have the students situate the patients in bed in each of the following positions: prone, supine, fowlers, and side lying. Then, discuss for each case where on the body the skin is in the most danger of breaking down. Next, students should turn and adjust the patient in each of the above positions, but this time providing proper support with pillows, towel rolls, or blanket rolls to help prevent a chance of skin breakdown. Have the students perform peer assessments.

Attachments for Scenarios

The HOSA Physical Therapy Assisting Rubric can be found at:
http://www.hosa.org

Unit 6: Vital Organs and Protection

Cardiovascular, Respiratory, and Lymphatic Systems

NOTE: The following academic foundations are for teaching and reinforcement of the content within this unit only. These are to be embedded throughout all of the competencies and objectives as the instructor deems applicable.

1. Apply inquiry-based and problem-solving processes and skills to scientific investigations. DOK 3 HCFS 1
   a. Use current technologies such as CD-ROM, DVD, Internet, and online data searches to explore current research related to a specific topic.
   b. Clarify research questions and design laboratory investigations.
   c. Demonstrate the use of scientific inquiry and methods to formulate, conduct, and evaluate laboratory investigations (e.g., hypotheses, experimental design, observations, data analyses, interpretations, theory development).
   d. Organize data to construct graphs (e.g., plotting points, labeling x- and y-axes, creating appropriate titles and legends for circle, bar, and line graphs) in order to draw conclusions and make inferences.
   e. Evaluate procedures, data, and conclusions to critique the scientific validity of research.
   f. Formulate and revise scientific explanations and models using logic and evidence (data analysis).
   g. Collect, analyze, and draw conclusions from data to create a formal presentation using available technology (e.g., computers, calculators, SmartBoard, or CBL's).
2. Apply mathematical skills in health care practices. DOK 2, HCFS 1
   a. Apply mathematical computations related to health care procedures (metric and household, conversions and measurements).
   b. Analyze diagrams, charts, graphs, and tables to interpret health care results.
   c. Record time using the 24-hour clock.

Competencies and Suggested Objectives

1. Identify and discuss the structures and functions of the cardiovascular system and their role in maintaining homeostasis. DOK 1, HCFS 1
   a. Identify blood types (A, B, AB, and O including Rh factor) and the four parts of blood in terms of morphology, function, and origin.
   b. Identify the type of blood vessels and the action of each.
   c. Identify the anatomy of the heart and its electrical conduction.
   d. Describe pulmonary and systemic circulation.
   e. Define systolic and diastolic pressures in relationship to cardiovascular health.
2. Discuss diseases and disorders of the cardiovascular system and related signs, symptoms, and treatment methods. DOK 1, HCFS 1
   a. Identify diseases and disorders that affect the cardiovascular system. Include the following:
      - aneurysm
      - aplastic anemia
      - iron deficiency anemia
      - leukemia

- arteriosclerosis
- atherosclerosis
- congestive heart failure
- embolus
- hemophilia
- hypertension
- myocardial infarction
- pernicious anemia
- phlebitis
- sickle cell anemia
- varicose veins

b. Identify signs, symptoms, and treatment methods associated with cardiovascular diseases and disorders.

3. Describe the structures and functions of the respiratory system. DOK 1, HCFS 1
   a. Identify the structures of the respiratory system.
   b. Differentiate between breathing and respiration.
   c. Describe the gaseous exchange between air and blood.
   d. Explain how gaseous transport takes place in the blood.

4. Discuss diseases and disorders of the respiratory system and related signs, symptoms, and treatment methods. DOK 1, HCFS 1
   a. Identify diseases and disorders that affect the respiratory system. Include the following:
      - asthma
      - bronchitis
      - chronic obstructive pulmonary disease
      - emphysema
      - epistaxis
      - influenza
      - laryngitis
      - lung cancer
      - pleurisy
      - pneumonia
      - rhinitis
      - sinusitis
      - sleep apnea
      - tuberculosis
      - upper respiratory infection

   b. Identify signs, symptoms, and treatment methods associated with respiratory diseases and disorders.

5. Explain the structures and functions of the lymphatic system. DOK 1, HCFS 1
   a. Identify the structures and components that comprise the lymphatic system and their respective functions.
   b. Identify the types of immunity and immune responses.
   c. Describe the relationship of the lymphatic system to the circulatory system and immunity.

6. Discuss diseases and disorders of the lymphatic system and related signs, symptoms, and treatment methods. DOK 1, HCFS 1
   a. Identify diseases and disorders that affect the lymphatic system.
      - adenitis
      - Hodgkin's disease
      - lymphangitis
      - splenomegaly
      - tonsillitis

   b. Identify signs, symptoms, and treatment methods associated with diseases and disorders of the lymphatic system.

Scenarios

Unit 6

1) In small groups, students will develop a children's book or play to tell the story of a blood cell's journey through the body. The story should include the flow of blood and the effects it has on organs along the way (or vice versa).

2) Using large paper, draw the structures of the heart and label it. Have the students walk in sock feet showing the blood flow through the heart. Color the right side red and the left side blue to show oxygenation of the blood.

Attachments for Scenarios

The HOSA Nursing Assisting Rubric can be found at: http://www.hosa.org

Unit 7: Intake and Elimination

Digestive System and Urinary System

NOTE: The following academic foundations are for teaching and reinforcement of the content within this unit only. These are to be embedded throughout all of the competencies and objectives as the instructor deems applicable.

1. Apply inquiry-based and problem-solving processes and skills to scientific investigations. DOK 3 HCFS 1
   a. Use current technologies such as CD-ROM, DVD, Internet, and online data searches to explore current research related to a specific topic.
   b. Clarify research questions and design laboratory investigations.
   c. Demonstrate the use of scientific inquiry and methods to formulate, conduct, and evaluate laboratory investigations (e.g., hypotheses, experimental design, observations, data analyses, interpretations, theory development).
   d. Organize data to construct graphs (e.g., plotting points, labeling x- and y-axes, creating appropriate titles and legends for circle, bar, and line graphs) in order to draw conclusions and make inferences.
   e. Evaluate procedures, data, and conclusions to critique the scientific validity of research.
   f. Formulate and revise scientific explanations and models using logic and evidence (data analysis).
   g. Collect, analyze, and draw conclusions from data to create a formal presentation using available technology (e.g., computers, calculators, SmartBoard, or CBL's).
2. Apply mathematical skills in health care practices. DOK 2, HCFS 1
   a. Apply mathematical computations related to health care procedures (metric and household, conversions and measurements).
   b. Analyze diagrams, charts, graphs, and tables to interpret health care results.
   c. Record time using the 24-hour clock.

Competencies and Suggested Objectives

1. Describe the structures and functions of the digestive system. DOK 1, HCFS 1
   a. Identify the structures comprising the digestive system (alimentary canal and accessory structures).
   b. Describe the roles of each digestive organ in the mechanical and chemical digestion of food and nutrient absorption.
   c. Explain the pathway of food as it moves through the alimentary canal.
   d. Discuss the role of enzymes and gland secretions as they relate to the absorption of digestion products.
2. Discuss diseases and disorders of the digestive system and related signs, symptoms, and treatment methods. DOK 1, HCFS 1
   a. Identify diseases and disorders that affect the digestive system. Include the following:
      - appendicitis
      - cholecystitis
      - cirrhosis
      - constipation
      - hepatitis type A (HAV)
      - hepatitis type B (HBV)
      - hepatitis type C (HCV)
      - hernia

- diarrhea
- diverticulitis
- gastroenteritis
- gastroesophageal reflux disease (GERD)
- hemorrhoids
- pancreatitis
- peritonitis
- ulcer
- ulcerative colitis

b. Identify signs, symptoms, and treatment methods associated with diseases and disorders of the digestive system.

3. Explain the structures and functions of the urinary system as they relate to the formation, composition, and elimination of urine. DOK 1, HCFS 1
   a. Identify the structures comprising the urinary system.
   b. Describe the roles of each of the urinary structures as it relates to the production and elimination of urine.

4. Discuss diseases and disorders of the urinary system and related signs, symptoms, and treatment methods. CNA, DOK 1, HCFS 1
   a. Identify diseases and disorders that affect the urinary system. Include the following:
      - albuminuria
      - anuria
      - cystitis
      - dysuria
      - glomerulonephritis
      - hematuria
      - incontinence
      - nocturia
      - oliguria
      - polyuria
      - proteinuria
      - pyelonephritis
      - pyuria
      - renal calculus
      - renal failure
      - uremia
      - urethritis
      - urine retention
   b. Identify signs, symptoms, and treatment methods associated with diseases and disorders of the urinary system.

Scenarios

Unit 7

1) Give students a list of food and drink consumed by a patient for a 24-hour period. The patient has IV fluids infusing and a nasogastric tube for intermittent suction. Give them the amount of IV fluid infused and the amount of gastric fluid removed. Also, give them a list of times and amounts of urine output and bowel movement. Have students calculate the total amount of the patient's intake and the total amount of output. Determine if the patient is in danger of over-hydration, dehydration, or possibly an electrolyte imbalance.

2) Trace the path that food takes, beginning with the first bite taken and ending with elimination from the body. Include the role played by the accessory organs on digestion, along with enzymes that act on the food. Create a poster, skit, story, or other visual aid and present it to the class.

Attachments for Scenarios

None

Unit 8: Control, Regulation, and Coordination

Nervous System, Sensory Organs, Endocrine System

NOTE: The following academic foundations are for teaching and reinforcement of the content within this unit only. These are to be embedded throughout all of the competencies and objectives as the instructor deems applicable.

1. Apply inquiry-based and problem-solving processes and skills to scientific investigations. DOK 3 HCFS 1
   a. Use current technologies such as CD-ROM, DVD, Internet, and online data searches to explore current research related to a specific topic.
   b. Clarify research questions and design laboratory investigations.
   c. Demonstrate the use of scientific inquiry and methods to formulate, conduct, and evaluate laboratory investigations (e.g., hypotheses, experimental design, observations, data analyses, interpretations, theory development).
   d. Organize data to construct graphs (e.g., plotting points, labeling x- and y-axes, creating appropriate titles and legends for circle, bar, and line graphs) in order to draw conclusions and make inferences.
   e. Evaluate procedures, data, and conclusions to critique the scientific validity of research.
   f. Formulate and revise scientific explanations and models using logic and evidence (data analysis).
   g. Collect, analyze, and draw conclusions from data to create a formal presentation using available technology (e.g., computers, calculators, SmartBoard, or CBL's)
2. Apply mathematical skills in health care practices. DOK 2, HCFS 1
   a. Apply mathematical computations related to health care procedures (metric and household, conversions and measurements).
   b. Analyze diagrams, charts, graphs, and tables to interpret health care results.
   c. Record time using the 24-hour clock.

Competencies and Suggested Objectives

1. Describe the structures and functions of the nervous system. DOK 1, HCFS 1
   a. Identify the four types of neurological cells and their respective functions.
   b. Identify the major structures of the nervous system and their respective functions.
   c. List and describe the divisions of the nervous system (central nervous system, peripheral nervous system, sympathetic, and parasympathetic).
   d. Describe the conduction of a nerve impulse.

2. Discuss diseases and disorders of the nervous system and related signs, symptoms, and treatment methods. DOK 1, HCFS 1
   a. Identify diseases and disorders that affect the nervous system. Include:
      - amyotrophic lateral sclerosis
      - carpal tunnel syndrome
      - cerebral palsy
      - cerebrovascular accident
      - encephalitis
      - multiple sclerosis
      - neuralgia
      - hemiplegia
      - paraplegia
      - quadriplegia

- epilepsy
- hydrocephalus
- meningitis
- Parkinson's disease
- shingles

b. Identify signs, symptoms, and treatment methods associated with nervous system diseases and disorders.

3. Identify the basic structures and functions associated with the sensory organs. DOK 1, HCFS 1
   a. Identify each of the sensory organs and describe their respective functions.
   b. Identify environmental factors that affect the responses of the sensory organs.
4. Discuss diseases and disorders of the sensory organs. DOK 1, HCFS 1
   a. Identify diseases and disorders that affect the sensory organs.
      - amblyopia
      - astigmatism
      - cataract
      - conjunctivitis
      - glaucoma
      - hearing loss
      - hyperopia
      - macular degeneration
      - meniere's disease
      - myopia
      - otitis externa
      - otitis media
      - otosclerosis
      - presbyopia
      - strabismus

   b. Identify signs, symptoms, and treatment methods associated with sensory organ diseases and disorders.
5. Identify the structures and functions of the endocrine system. DOK 1, HCFS 1
   a. Identify and locate the structures comprising the endocrine system.
   b. Identify the function of and type of hormones generated by each endocrine gland. (See below.)
6. Discuss diseases and disorders of the endocrine system and related signs, symptoms, and treatment methods. DOK 1, HCFS 1
   a. Identify diseases and disorders that affect the nervous system.
      - acromegaly
      - Addison's disease
      - Cushing's syndrome
      - diabetes insipidus
      - diabetes mellitus
      - dwarfism
      - giantism
      - goiter
      - Graves' disease
      - hyperparathyroidism
      - hyperthyroidism
      - hypothyroidism

   b. Identify signs, symptoms, and treatment methods associated with endocrine system diseases and disorders.

The Endocrine System

GLAND	HORMONE	ACTION
Pituitary (Anterior Lobe)	ACTH-adrenocorticotropic	Stimulates growth & secretion of the cortex of the adrenal gland
	TSH-thyrotropin	Stimulates growth & secretion of the

		thyroid gland
	GH-somatotropin	Growth hormone, stimulates normal body growth
	FSH-follicle stimulating	Stimulates growth & hormone production in the ovarian follicles of females, production of sperm in males
Pituitary (Posterior Lobe)	ADH-vasopressin	Antidiuretic hormone, promotes, reabsorption of water in kidneys, constricts blood vessels
	Oxytocin (Pitocin)	Causes constriction of uterus during childbirth, stimulates milk flow from breasts
Thyroid	Thyroxine & tri-iodothyronine	Increase metabolic rate; stimulate physical and mental growth; regulate metabolism of carbohydrates, fats, and proteins.
Parathyroid	Parathormone (PTH)	Regulates amount of calcium and phosphate in the blood, increases reabsorption of calcium and phosphates from bones, stimulates kidneys to conserve blood calcium, stimulates absorption of calcium in the intestine.
Adrenal (Cortex)	Mineralocorticoids --Aldosterone	Regulate the reabsorption of sodium in the kidney & elimination of potassium, increase the reabsorption of water by the kidneys
	Glucocorticoids --Cortisol-hydrocortisone --Cortisone	Aide in metabolism of proteins, fats, and carbohydrates; increase amount of glucose in blood; provide resistance to stress; and depress immune response (anti-inflammatory)
	Gonadocorticoids --Estrogens --Androgens	Act as sex hormones --Stimulate female sexual characteristics --Stimulate male sexual characteristics
Adrenal (Medulla)	Epinephrine (adrenaline)	Activates sympathetic nervous system, acts in times of stress to increase cardiac output and increase blood pressure
	Norepinephrine	Activates body in stress situations
Pancreas	Insulin	Used in metabolism of glucose (sugar) by promoting entry of glucose into cells to decrease blood glucose levels, promotes transport of fatty acids and amino acids (proteins) into the cells
	Glucagon	Maintains blood level of glucose by stimulating the liver to release stored glycogen in the form of glucose
Ovaries	Estrogen	Promotes growth and development of sex

		organs in female individuals
	Progesterone	Maintains lining of uterus
Testes	Testosterone	Stimulates growth and development of sex organs in male individuals, stimulates maturation of sperm
Thymus	Thymosin (thymopoietin)	Stimulates production of lymphocytes and antibodies in early life
Pineal	Melatonin	May delay puberty by inhibiting gonadotropic (sex) hormones, may regulate sleep/wake cycles
	Serotonin	May prevent vasoconstriction of blood vessels in the brain, inhibits gastric secretions
Placenta	Estrogen	Stimulates growth of reproductive organs
	Chorionic gonadotropin	Causes corpus luteum of ovary to continue secretions
	Progesterone	Maintains lining of uterus to provide fetal nutrition

Scenarios

Unit 8

Have students group into pairs, with one in each pair playing the role of the patient and the other performing a basic neurological assessment. Check sensory responses to sharp and dull objects, pupil response to light, eye movement and the ability to follow objects, reflexes, coordination, balance, and gait. Each pair should perform the assessment in front of the class for peer review, with classmates noting any missed or inaccurate protocol.

Attachments for Scenarios

None

Unit 9: Reproduction and Health Maintenance Practices

Reproductive System

NOTE: The following academic foundations are for teaching and reinforcement of the content within this unit only. These are to be embedded throughout all of the competencies and objectives as the instructor deems applicable.

1. Apply inquiry-based and problem-solving processes and skills to scientific investigations. DOK 3 HCFS 1
   a. Use current technologies such as CD-ROM, DVD, Internet, and online data searches to explore current research related to a specific topic.
   b. Clarify research questions and design laboratory investigations.
   c. Demonstrate the use of scientific inquiry and methods to formulate, conduct, and evaluate laboratory investigations (e.g., hypotheses, experimental design, observations, data analyses, interpretations, theory development).
   d. Organize data to construct graphs (e.g., plotting points, labeling x- and y-axes, creating appropriate titles and legends for circle, bar, and line graphs) in order to draw conclusions and make inferences.
   e. Evaluate procedures, data, and conclusions to critique the scientific validity of research.
   f. Formulate and revise scientific explanations and models using logic and evidence (data analysis).
   g. Collect, analyze, and draw conclusions from data to create a formal presentation using available technology (e.g., computers, calculators, SmartBoard, or CBL's).
2. Apply mathematical skills in health care practices. DOK 2, HCFS 1
   a. Apply mathematical computations related to health care procedures (metric and household, conversions and measurements).
   b. Analyze diagrams, charts, graphs, and tables to interpret health care results.
   c. Record time using the 24-hour clock.

Competencies and Suggested Objectives

1. Discuss the structures and functions of the male and female reproductive systems. DOK 1, HCFS 1
   a. Identify the major structures and functions of the female and male reproductive system.
   b. Discuss the role of hormones in maturation and reproduction.

2. Discuss diseases and disorders of the reproductive system and related signs, symptoms, and treatment methods. DOK 1, HCFS 1
   a. Identify diseases and disorders that affect the reproductive system. Include the following:
      - breast tumors
      - cervical cancer
      - endometriosis
      - epididymitis
      - orchitis
      - ovarian cancer
      - pelvic inflammatory disease
      - premenstrual syndrome
      - prostate cancer
      - prostatic hypertrophy
      - testicular cancer
      - uterine cancer
   b. Identify sexually transmitted diseases (STDs). Include the following:
      - acquired immune deficiency syndrome,
      - pubic lice

- chlamydia
- gonorrhea
- herpes
- syphilis
- trichomoniasis

c. Identify signs, symptoms, and treatment methods associated with diseases (including STDs) and disorders of the reproductive system.

3. Describe the fundamentals of wellness, healthy behaviors, and the prevention of disease processes. DOK 1, HCFS 9
   a. Discuss the aspects of good nutrition.
   b. Discuss the aspects of normal weight.
   c. Discuss the aspects of exercise.
   d. Discuss the aspects of sleep.
4. Describe strategies for the prevention of diseases, including health screenings, examinations, and self-care. DOK 1, HCFS 9
   a. Discuss routine check-ups.
   b. Discuss periodic screenings.
   c. Discuss dental visits.
   d. Discuss treatment of illnesses.
   e. Discuss immunizations.
   f. Discuss stress management.
   g. Discuss minimizing health risks.
5. Discuss complementary (alternative) health practices as they relate to wellness and disease prevention. DOK 1, HCFS 9
   a. Explore complementary therapies including alternative medical systems, natural therapies, manipulative methods
   b. Explore holistic medicine including expanding traditional medicine, considering the entire person, and psychosomatic illnesses.

Scenarios

Unit 9

1) Following the method taught in this unit, have students determine the total number of calories they need each day. Students who are overweight should determine how many fewer calories they need to consume each week in order to lose 1-2 pounds per week. Students who are underweight should determine how many more calories they need to consume each week in order to gain 1-2 pounds per week. Next, have students determine the type and duration of exercise they do each week and how many calories are burned during each activity. Have students adjust their calculated caloric intake goals to account for the number of calories they burn through exercise. Finally, have students keep a food and exercise journal (for a predetermined amount of time) to see how closely they adhere to their calculations.

2) Create patient scenarios describing the weight, health, dietary restrictions, activity level, and desired outcomes and distribute scenarios to the students. Have the students prescribe a diet and/or fitness plan for their patients to help them reach the desired results. (Alternative option: Allow the students to determine the desired results as well as prescribe the diet/fitness plan for their assigned patient scenarios based on the other information.)

Attachments for Scenarios

None

Student Competency Profile

Student's Name: _____

This record is intended to serve as a method of noting student achievement of the competencies in each unit. It can be duplicated for each student, and it can serve as a cumulative record of competencies achieved in the course.

In the blank before each competency, place the date on which the student mastered the competency.

Unit 1: Course Orientation and Professional Organizations		
	1.	Describe the purpose of the course and related professional organizations.
Unit 2: Safety, and Infection Control		
	1.	Describe personal and environmental safety practices.
	2.	Identify common safety hazards.
	3.	Utilize emergency procedures and protocols.
	4.	Describe the principles of infection control.
	5.	Explain standard precaution based on Occupational Safety and Health Administration (OSHA) and Centers for Disease Control (CDC) regulations.
	6.	Describe the principles of sterile technique.
	7.	Explain the importance of maintaining transmission-based isolation precautions.
Unit 3: Health Care Systems, Legal and Ethical Practices		
	1.	Explain the role of the health care professional in a department, organization, and the overall health care environment.
	2.	Identify how health care systems affect the services that are performed and the quality of care.
	3.	Describe the legal implications associated with health care.
	4.	Describe and demonstrate legal practices associated with health care.
	5.	Recognize and discuss ethical boundaries within the health care environment.
	6.	Discuss the accepted ethical practices within the health care environment.
	7.	Identify cultural, social, and ethnic diversity within the health care environment.
Unit 4: Communication and Teamwork		
	1.	Describe the concepts of effective communication.
	2.	Compare the roles and responsibilities of individual members as part of the health care team.
	3.	Explain the principles of interacting effectively and sensitively with all members of the health care team.
	4.	Introduce appropriate medical terminology and abbreviations.

Unit 5: Body Organization, Covering, Support, and Movement		
	1.	Describe the organization of the body.
	2.	Discuss the structures and functions of the integumentary system.
	3.	Explain diseases and disorders of the integumentary system and related signs and symptoms and treatment methods.
	4.	Compare the structures and functions of the skeletal system with its relationship to movement.
	5.	Discuss diseases and disorders of the skeletal system and related signs, symptoms, and treatment methods.
	6.	Compare the structures and functions of the muscular system with its relationship to movement
	7.	Discuss diseases, disorders, and injury of the muscular system and related signs, symptoms, and treatment methods
Unit 6: Vital Organs and Protection		
	1.	Identify and discuss the structures and functions of the cardiovascular system and their role in maintaining homeostasis.
	2.	Discuss diseases and disorders of the cardiovascular system and related signs, symptoms, and treatment methods.
	3.	Describe the structures and functions of the respiratory system.
	4.	Discuss diseases and disorders of the respiratory system and related signs, symptoms, and treatment methods.
	5.	Explain the structures and functions of the lymphatic system.
	6.	Discuss diseases and disorders of the lymphatic system and related signs, symptoms, and treatment methods.
Unit 7: Control, Regulation, and Coordination		
	1.	Describe the structures and functions of the nervous system.
	2.	Discuss diseases and disorders of the nervous system and related signs, symptoms, and treatment methods
	3.	Identify the basic structures and functions associated with the sensory organs.
	4.	Discuss diseases and disorders of the sensory organs.
	5.	Identify the structures and functions of the endocrine system.
	6.	Discuss diseases and disorders of the endocrine system and related signs, symptoms, and treatment methods.
Unit 8: Intake and Elimination		
	1.	Describe of the structures and functions of the digestive system.
	2.	Discuss diseases and disorders of the digestive system and related signs, symptoms, and treatment methods.
	3.	Explain the structures and functions of the urinary system as they relate to the formation, composition, and elimination of urine.
	4.	Discuss diseases and disorders of the urinary system and related signs, symptoms, and treatment methods.

Unit 9: Reproduction and Health Maintenance Practices		
	1.	Discuss the structures and functions of the male and female reproductive systems.
	2.	Discuss diseases and disorders of the reproductive system and related signs and symptoms, and treatment methods.
	3.	Describe the fundamentals of wellness, healthy behaviors, and the prevention of disease processes.
	4.	Discuss strategies for the prevention of diseases, including health screenings, examinations, and self-care.
	5.	Discuss complementary (alternative) health practices as they relate to wellness and disease prevention

Appendix A: Unit References

All of the Health Sciences (Core) units use the same resources. Suggested resources are listed below.

Badasch, S., Chesebro, D. (2008). Health science fundamentals: Exploring career pathways (7th ed.). Upper Saddle River, NY: Prentice Hall.

Booth, K.A. (2004). *Health care science technology: Career foundations.* New York, NY: Glencoe/McGraw Hill.

DCM Instructional Systems (2013). Dean Vaughn Total Retention System™ series of educational programs for Healthcare. Retrieved from: https://www.dcminstructionalsystems.com

Ehrlich, A., Schroeder, C. L. (2009). *Introduction to Medical Terminology (2nd ed).* Clifton Park, NY: Delmar Cengage Learning.

Gerdin, J. (2011). *Health careers today* (5th ed.). St. Louis, MO: Mosby Elsevier.

Health Sciences Instructional Supplements (n.d.). National Consortium for Health Science Education. Retrieved from: www.healthscienceconsortium.org

National Governors Association Center for Best Practices, Council of Chief State School Officers (2010). Common core state standards initiative. Retrieved from: http://www.corestandards.org

National Educational Technology Standards for Students: Connecting Curriculum and Technology (2007). Advancing digital age teaching. Retrieved from: http://www.iste.org/standards/nets-for-teachers

Partnership for 21st Century Skills (2010). 21st century skills standards. Retrieved from: http://www.p21.org

Practice Fusion, Inc. (2013). The largest physician-patient platform. Retrieved from: http://practicefusion.com

Simmers, L., Simmers-Nartker, K., & Simmers-Kobelak, S. (2009). *Diversified health occupations* (7th ed.). Clifton Park, NY: Delmar Cengage.

Scott, A. S., Fong, E. (2008). Body structures and functions (12th ed.). Clifton Park, NY: Cengage Learning.

Appendix B: Certified Nursing Assistant (CNA) Skills

Crosswalk for Certified Nursing Assistant (CNA) Skills

		Unit 1	Unit 2	Unit 3	Unit 4	Unit 5	Unit 6	Unit 7	Unit 8	Unit 9
a. i			X						X	X
a. ii.			X	X	X					
a. iii.						X	X	X	X	
b. i.										
b. ii.					X					
c.				X	X					
d. i.			X							X
d. ii.										X
d. iii.										
d. iv.									X	
d. v.										X
d.vi.										
d. vii.										
d. viii.			X							
d. ix.										X
d. x.										X
d. xi.										
d. xii.										
d. xiii.										
d. xiv.									X	
d. xv.										
d. xvi.										
d. xvii.										
d. xviii.										X
d. xix.										
d. xx.										X
d. xxi.										X
d. xxii.										X
d. xxiii.									X	
d. xxiv.										

The following are skills required to become a certified nursing assistant (CNA). DOK 2

a. Explain the following categories of physical care skills:
   i. Activities of daily living (ADL): hygiene, dressing and grooming, nutrition and hydration, elimination, and rest/sleep/comfort.

ii. Basic nursing: infection control, safety/emergency procedures, therapeutic/technical procedures, data collection and reporting.
iii. Restorative: injury prevention and self-care/independence.

b. Identify and explain the following categories of psychosocial care skills:
   i. Emotional and mental health needs.
   ii. Spiritual and cultural needs.
c. Describe the role of the nurse aide as it relates to communication, client rights, legal and ethical behavior, and as a member of the health care team.
d. Perform required ADL skills:
   i. Wash hands.
   ii. Apply one knee-high, elastic stocking.
   iii. Assist to ambulate using transfer belt.
   iv. Assist with use of bedpan.
   v. Clean upper or lower denture.
   vi. Count and record radial pulse.
   vii. Count and record respirations.
   viii. Donning and removing Personal Protective Equipment (gown and gloves).
   ix. Dress client with affected (weak) right arm.
   x. Feed client who cannot feed self.
   xi. Give modified bed bath (face, one arm, hand, and underarm).
   xii. Make an occupied bed (patient/client does not need assistance to turn).
   xiii. Measure and record blood pressure.
   xiv. Measure and record urinary output.
   xv. Measure and record weight of ambulatory client.
   xvi. Perform passive range of motion (PROM) for one knee and one ankle.
   xvii. Perform PROM for one shoulder.
   xviii. Position on side.
   xix. Provide catheter care for a female patient.
   xx. Provide fingernail care on one hand.
   xxi. Provide foot care on one foot.
   xxii. Provide mouth care.
   xxiii. Provide perineal care (peri-care) for a female patient.
   xxiv. Transfer from bed to wheelchair using transfer belt.

Appendix C: Industry Standards

National Healthcare Foundation Standards

Crosswalk for Health Sciences (Core)										
		Unit 1	Unit 2	Unit 3	Unit 4	Unit 5	Unit 6	Unit 7	Unit 8	Unit 9
NHFS 1.1			X			X	X	X	X	X
NHFS 1.2			X			X	X	X	X	X
NHFS 1.3			X			X	X	X	X	X
NHFS 2.1					X					
NHFS 2.2					X					
NHFS 2.3					X					
NHFS 3.1				X						
NHFS 4.1		X								
NHFS 4.2		X								
NHFS 4.3		X		X						
NHFS 4.4										
NHFS 5.1				x						
NHFS 5.2				X						
NHFS 6.1				X						
NHFS 6.2				X						
NHFS 7.1			X							
NHFS 7.2			X							
NHFS 7.3			X							
NHFS 7.4			X							
NHFS 7.5			X							
NHFS 8.1					X					
NHFS 8.2					X					
NHFS 9.1										X
NHFS 10.1						X	X	X	X	X
NHFS 11.1					X	X	X	X	X	X
NHFS 11.2					X	X	X	X	X	X
NHFS 11.3					X	X	X	X	X	X

Foundation Standard 1: Academic Foundation

Health care professionals will know the academic subject matter required for proficiency within their area. They will use this knowledge as needed in their role. The following accountability criteria are considered essential for students in a health science program of study.

Accountability Criteria

1.1 Human Structure and Function

1.11 Classify the basic structural and functional organization of the human body (tissue, organ, and system).

1.12 Recognize body planes, directional terms, quadrants, and cavities.

1.13 Analyze the basic structure and function of the human body.

1.2 Diseases and Disorders

1.21 Describe common diseases and disorders of each body system (prevention, pathology, diagnosis, and treatment).

1.22 Recognize emerging diseases and disorders.

1.23 Investigate biomedical therapies as they relate to the prevention, pathology, and treatment of disease.

1.3 Medical Mathematics

1.31 Apply mathematical computations related to health care procedures (metric and household, conversions and measurements).

1.32 Analyze diagrams, charts, graphs, and tables to interpret health care results.

1.33 Record time using the 24-hour clock.

Foundation Standard 2: Communications

Health care professionals will know the various methods of giving and obtaining information. They will communicate effectively, both orally and in writing.

Accountability Criteria

2.1 Concepts of Effective Communication

2.11 Interpret verbal and nonverbal communication.

2.12 Recognize barriers to communication.

2.13 Report subjective and objective information.

2.14 Recognize the elements of communication using a sender-receiver model.

2.15 Apply speaking and active listening skills.

2.2 Medical Terminology

2.21 Use roots, prefixes, and suffixes to communicate information.

2.22 Use medical abbreviations to communicate information.

2.3 Written Communication Skills

2.31 Recognize elements of written and electronic communication (spelling, grammar, and formatting).

Foundation Standard 3: Systems

Health care professionals will understand how their role fits into their department, their organization and the overall health care environment. They will identify how key systems affect services they perform and quality of care.

Accountability Criteria

3.1 Health Care Delivery Systems

3.11 Understand the health care delivery system (public, private, government, and non-profit).

3.12 Explain the factors influencing health care delivery systems.

3.13 Describe the responsibilities of consumers within the health care system.

3.14 Explain the impact of emerging issues such as technology, epidemiology, bioethics, and socioeconomics on health care delivery systems.

3.15 Discuss common methods of payment for health care.

Foundation Standard 4: Employability Skills

Health care professionals will understand how employability skills enhance their employment opportunities and job satisfaction. They will demonstrate key employability skills and will maintain and upgrade skills, as needed.

Accountability Criteria

4.1 Personal Traits of the Health Care Professional

- 4.11 Classify the personal traits and attitudes desirable in a member of the health care team
- 4.12 Summarize professional standards as they apply to hygiene, dress, language, confidentiality and behavior.

4.2 Employability Skills

- 4.21 Apply employability skills in health care.

4.3 Career Decision-making

- 4.31 Discuss levels of education, credentialing requirements, and employment trends in health care.
- 4.32 Compare careers within the health science career pathways (diagnostic services, therapeutic services, health informatics, support services, or biotechnology research and development).

4.4 Employability Preparation

- 4.41 Develop components of a personal portfolio.
- 4.42 Demonstrate the process for obtaining employment.

Foundation Standard 5: Legal Responsibilities

Health care professionals will understand the legal responsibilities, limitations, and implications of their actions within the health care delivery setting. They will perform their duties according to regulations, policies, laws and legislated rights of clients.

Accountability Criteria

5.1 Legal Implications

- 5.11 Analyze legal responsibilities.
- 5.12 Apply procedures for accurate documentation and record keeping.

5.2 Legal Practices

- 5.21 Apply standards for Health Insurance Portability and Accountability Act (HIPAA).
- 5.22 Describe advance directives.
- 5.23 Summarize the Patient's Bill of Rights.
- 5.24 Understand informed consent.
- 5.25 Explain laws governing harassment, labor and scope of practice.

Foundation Standard 6: Ethics

Health care professionals will understand accepted ethical practices with respect to cultural, social, and ethnic differences within the health care environment. They will perform quality health care delivery.

Accountability Criteria

6.1 Ethical Boundaries

- 6.11 Differentiate between ethical and legal issues impacting health care.
- 6.12 Recognize ethical issues and their implications related to health care.

6.2 Ethical Practice

6.21 Apply procedures for reporting activities and behaviors that affect the health, safety, and welfare of others.

6.3 Cultural, Social, and Ethnic Diversity

6.31 Understand religious and cultural values as they impact health care.

6.32 Demonstrate respectful and empathetic treatment of ALL patients/clients (customer service).

Foundation Standard 7: Safety Practices

Health care professionals will understand the existing and potential hazards to clients, co-workers, and self. They will prevent injury or illness through safe work practices and follow health and safety policies and procedures.

Accountability Criteria

7.1 Infection Control

7.11 Explain principles of infection control.

7.12 Describe methods of controlling the spread and growth of microorganisms.

7.2 Personal Safety

7.21 Apply personal safety procedures based on Occupational Safety and Health Administration (OSHA) and Centers for Disease Control (CDC) regulations.

7.22 Apply principles of body mechanics.

7.3 Environmental Safety

7.31 Apply safety techniques in the work environment.

7.4 Common Safety Hazards

7.41 Comply with safety signs, symbols, and labels.

7.42 Understand implications of hazardous materials.

7.5 Emergency Procedures and Protocols

7.51 Practice fire safety in a health care setting.

7.52 Apply principles of basic emergency response in natural disasters and other emergencies.

Foundation Standard 8: Teamwork

Health care professionals will understand the roles and responsibilities of individual members as part of the health care team, including their ability to promote the delivery of quality health care. They will interact effectively and sensitively with all members of the health care team.

Accountability Criteria

8.1 Health Care Teams

8.11 Understand roles and responsibilities of team members.

8.12 Recognize characteristics of effective teams.

8.2 Team Member Participation

8.21 Recognize methods for building positive team relationships.

8.22 Analyze attributes and attitudes of an effective leader.

8.23 Apply effective techniques for managing team conflict.4

Foundation Standard 9: Health Maintenance Practices

Health care professionals will understand the fundamentals of wellness and the prevention of disease processes. They will practice preventive health behaviors among the clients.

Accountability Criteria

9.1 Healthy Behaviors

9.11 Apply behaviors that promote health and wellness.

9.12 Describe strategies for the prevention of diseases including health screenings and examinations.

9.13 Discuss complementary (alternative) health practices as they relate to wellness and disease prevention.

Foundation Standard 10: Technical Skills

Health care professionals will apply technical skills required for all career specialties. They will demonstrate skills and knowledge as appropriate.

Accountability Criteria

10.1 Technical Skills

10.11 Apply procedures for measuring and recording vital signs including the normal ranges.

10.12 Apply skills to obtain training or certification in cardiopulmonary resuscitation (CPR), automated external defibrillator (AED), foreign body airway obstruction (FBAO) and first aid.

Foundation Standard 11: Information Technology Applications

Health care professionals will use information technology applications required within all career specialties. They will demonstrate use as appropriate to health care applications.

Accountability Criteria

11.1 Health Information Literacy and Skills

11.11 Identify methods and types of data collected in health care.

11.12 Use health record data collection tools (such as input screens, document templates).

11.13 Differentiate between types and content of health records (patient, pharmacy, and laboratory).

11.14 Ensure that documentation in the health record reflects timeliness, completeness, and accuracy.

11.15 Adhere to information systems policies and procedures as required by national, state, local, and organizational levels.

11.2 Privacy and Confidentiality of Health Information

11.21 Apply the fundamentals of privacy and confidentiality policies and procedures.

11.22 Identify legal and regulatory requirements related to the use of personal health information.

11.23 Identify and apply policies and procedures for access and disclosure of personal health information.

11.24 Describe the consequences of inappropriate use of health data in terms of disciplinary action.

11.25 Describe appropriate methods to correct inaccurate information/errors personally entered into an electronic medical record (EMR).

11.3 Basic Computer Literacy Skills

11.31 Apply basic computer concepts and terminology in order to use computers and other mobile devices.

11.32 Demonstrate basic computer operating procedures.
11.33 Demonstrate use of file organization and information storage.
11.34 Use basic word processing, spreadsheet, and database applications.
11.35 Evaluate the validity of web-based resources.
11.36 Demonstrate use of appropriate email and social media usage.

Appendix D: 21st Century Skills[1]

21st Century Crosswalk for Health Sciences (Core)										
		Unit 1	Unit 2	Unit 3	Unit 4	Unit 5	Unit 6	Unit 7	Unit 8	Unit 9
CS1			X		X					
CS2		X		X						
CS3			X		X					
CS4		X	X	X	X	X	X	X	X	X
CS5			X	X						
CS6					X					
CS7					X					
CS8					X					
CS9										
CS10										
CS11										
CS12										
CS13										
CS14										
CS15										
CS16										

CSS1-21st Century Themes

CS1 Global Awareness

1. Using 21st century skills to understand and address global issues
2. Learning from and working collaboratively with individuals representing diverse cultures, religions, and lifestyles in a spirit of mutual respect and open dialogue in personal, work, and community contexts
3. Understanding other nations and cultures, including the use of non-English languages

CS2 Financial, Economic, Business, and Entrepreneurial Literacy

1. Knowing how to make appropriate personal economic choices
2. Understanding the role of the economy in society
3. Using entrepreneurial skills to enhance workplace productivity and career options

CS3 Civic Literacy

1. Participating effectively in civic life through knowing how to stay informed and understanding governmental processes
2. Exercising the rights and obligations of citizenship at local, state, national, and global levels
3. Understanding the local and global implications of civic decisions

CS4 Health Literacy

1. Obtaining, interpreting, and understanding basic health information and services and using such information and services in ways that enhance health
2. Understanding preventive physical and mental health measures, including proper diet, nutrition, exercise, risk avoidance, and stress reduction
3. Using available information to make appropriate health-related decisions

[1] *21st century skills.* (n.d.). Washington, DC: Partnership for 21st Century Skills.

4. Establishing and monitoring personal and family health goals
5. Understanding national and international public health and safety issues

CS5 Environmental Literacy

1. Demonstrate knowledge and understanding of the environment and the circumstances and conditions affecting it, particularly as relates to air, climate, land, food, energy, water, and ecosystems.
2. Demonstrate knowledge and understanding of society's impact on the natural world (e.g., population growth, population development, or resource consumption rate).
3. Investigate and analyze environmental issues, and make accurate conclusions about effective solutions.
4. Take individual and collective action toward addressing environmental challenges (e.g., participating in global actions, designing solutions that inspire action on environmental issues).

CSS2-Learning and Innovation Skills

CS6 Creativity and Innovation

1. Think Creatively
2. Work Creatively with Others
3. Implement Innovations

CS7 Critical Thinking and Problem Solving

1. Reason Effectively
2. Use Systems Thinking
3. Make Judgments and Decisions
4. Solve Problems

CS8 Communication and Collaboration

1. Communicate Clearly
2. Collaborate with Others

CSS3-Information, Media and Technology Skills

CS9 Information Literacy

1. Access and Evaluate Information
2. Use and Manage Information

CS10 Media Literacy

1. Analyze Media
2. Create Media Products

CS11 ICT Literacy

1. Apply Technology Effectively

CSS4-Life and Career Skills

CS12 Flexibility and Adaptability

1. Adapt to change
2. Be Flexible

CS13 Initiative and Self-Direction

1. Manage Goals and Time
2. Work Independently

3. Be Self-directed Learners

CS14 Social and Cross-Cultural Skills

1. Interact Effectively with others
2. Work Effectively in Diverse Teams

CS15 Productivity and Accountability

1. Manage Projects
2. Produce Results

CS16 Leadership and Responsibility

1. Guide and Lead Others
2. Be Responsible to Others

Appendix E: Common Core Standards

	Units	Unit 1	Unit 2	Unit 3	Unit 4	Unit 5	Unit 6	Unit 7	Unit 8	Unit 9
Common Core Standards										
RL.11.1.										
RL.11.2.										
RL.11.3.										
RL.11.4.										
RL.11.5.										
RL.11.6.										
RL.11.7.										
RL.11.8.										
RL.11.9.										
RL.11.10.										
RI.11.1.										
RI.11.2.										
RI.11.3.										
RI.11.4.										
RI.11.5.										
RI.11.6.										
RI.11.7.										
RI.11.8.					X					
RI.11.9.										
RI.11.10.										
W.11.1.										
W.11.2.										
W.11.3.										
W.11.4.										
W.11.5.										
W.11.6.										
W.11.7.					X					
W.11.8.										
W.11.9.										
W.11.10.										
SL.11.1.										
SL.11.2.										
SL.11.3.										
SL.11.4.										
SL.11.5.					X					
SL.11.6.										
L.11.1.					X					
L.11.2.										
L.11.3.										
L.11.4.										
L.11.5.										
L.11.6.										
RH.11.1.										
RH.11.2.										
RH.11.3.										
RH.11.4.										
RH.11.5.										
RH.11.6.										
RH.11.7.										
RH.11.8.										
RH.11.9.										
RH.11.10.										
RST.11.1.										
RST.11.2.										
RST.11.3.										

RST.11.4.					X					
RST.11.5.										
RST.11.6.										
RST.11.7.										
RST.11.8.										
RST.11.9.										
RST.11.10.										
WHST.11.1.										
WHST.11.2.					X					
WHST.11.3.										
WHST.11.4.										
WHST.11.5.										
WHST.11.6.										
WHST.11.7.										
WHST.11.8.										
WHST.11.9.										
WHST.11.10.										

Reading Standards for Literature (11-12)

College and Career Readiness Anchor Standards for *Reading Literature*

Key Ideas and Details

RL.11.1. Cite strong and thorough textual evidence to support analysis of what the text says explicitly as well as inferences drawn from the text, including determining where the text leaves matters uncertain.

RL.11.2. Determine two or more themes or central ideas of a text and analyze their development over the course of the text, including how they interact and build on one another to produce a complex account; provide an objective summary of the text.

RL.11.3. Analyze the impact of the author's choices regarding how to develop and relate elements of a story or drama (e.g., where a story is set, how the action is ordered, how the characters are introduced and developed).

Craft and Structure

RL.11.4. Determine the meaning of words and phrases as they are used in the text, including figurative and connotative meanings; analyze the impact of specific word choices on meaning and tone, including words with multiple meanings or language that is particularly fresh, engaging, or beautiful. (Include Shakespeare as well as other authors.)

RL.11.5. Analyze how an author's choices concerning how to structure specific parts of a text (e.g., the choice of where to begin or end a story, the choice to provide a comedic or tragic resolution) contribute to its overall structure and meaning as well as its aesthetic impact.

RL.11.6. Analyze a case in which grasping point of view requires distinguishing what is directly stated in a text from what is really meant (e.g., satire, sarcasm, irony, or understatement).

Integration of Knowledge and Ideas

RL.11.7. Analyze multiple interpretations of a story, drama, or poem (e.g., recorded or live production of a play or recorded novel or poetry), evaluating how each version interprets the source text. (Include at least one play by Shakespeare and one play by an American dramatist.)

RL.11.8. (Not applicable to literature)

RL.11.9. Demonstrate knowledge of eighteenth-, nineteenth- and early-twentieth-century foundational works of American literature, including how two or more texts from the same period treat similar themes or topics.

Range of Reading and Level of Text Complexity

RL.11.10. By the end of grade 11, read and comprehend literature, including stories, dramas, and poems, in the grades 11–CCR text complexity band proficiently, with scaffolding as needed at the high end of the range.
By the end of grade 12, read and comprehend literature, including stories, dramas, and poems, at the high end of the grades 11–CCR text complexity band independently and proficiently.

Reading Standards for Informational Text (11-12)

College and Career Readiness Anchor Standards for *Informational Text*

Key Ideas and Details

RI.11.1. Cite strong and thorough textual evidence to support analysis of what the text says explicitly as well as inferences drawn from the text, including determining where the text leaves matters uncertain.

RI.11.2. Determine two or more central ideas of a text and analyze their development over the course of the text, including how they interact and build on one another to provide a complex analysis; provide an objective summary of the text.

RI.11.3. Analyze a complex set of ideas or sequence of events and explain how specific individuals, ideas, or events interact and develop over the course of the text.

Craft and Structure

RI.11.4. Determine the meaning of words and phrases as they are used in a text, including figurative, connotative, and technical meanings; analyze how an author uses and refines the meaning of a key term or terms over the course of a text (e.g., how Madison defines faction in Federalist No. 10).

RI.11.5. Analyze and evaluate the effectiveness of the structure an author uses in his or her exposition or argument, including whether the structure makes points clear, convincing, and engaging.

RI.11.6. Determine an author's point of view or purpose in a text in which the rhetoric is particularly effective, analyzing how style and content contribute to the power, persuasiveness, or beauty of the text.

Integration of Knowledge and Ideas

RI.11.7. Integrate and evaluate multiple sources of information presented in different media or formats (e.g., visually, quantitatively) as well as in words in order to address a question or solve a problem.

RI.11.8. Delineate and evaluate the reasoning in seminal U.S. texts, including the application of constitutional principles and use of legal reasoning (e.g., in U.S. Supreme Court majority opinions and dissents) and the premises, purposes, and arguments in works of public advocacy (e.g., The Federalist, presidential addresses).

RI.11.9. Analyze seventeenth-, eighteenth-, and nineteenth-century foundational U.S. documents of historical and literary significance (including the Declaration of Independence, the Preamble to the Constitution, the Bill of Rights, and Lincoln's Second Inaugural Address) for their themes, purposes, and rhetorical features.

Range of Reading and Level of Text Complexity

RI.11.10. By the end of grade 11, read and comprehend literary nonfiction in the grades 11–CCR text complexity band proficiently, with scaffolding as needed at the high end of the range.
By the end of grade 12, read and comprehend literary nonfiction at the high end of the grades 11–CCR text complexity band independently and proficiently.

College and Career Readiness Anchor Standards for *Writing*

Text Types and Purposes

W.11.1. Write arguments to support claims in an analysis of substantive topics or texts, using valid reasoning and relevant and sufficient evidence.

a. Introduce precise, knowledgeable claim(s), establish the significance of the claim(s), distinguish the claim(s) from alternate or opposing claims, and create an organization that logically sequences claim(s), counterclaims, reasons, and evidence.

b. Develop claim(s) and counterclaims fairly and thoroughly, supplying the most relevant evidence for each while pointing out the strengths and limitations of both in a manner that anticipates the audience's knowledge level, concerns, values, and possible biases.

c. Use words, phrases, and clauses as well as varied syntax to link the major sections of the text, create cohesion, and clarify the relationships between claim(s) and reasons, between reasons and evidence, and between claim(s) and counterclaims.

d. Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing.

e. Provide a concluding statement or section that follows from and supports the argument presented.

W.11.2. Write informative/explanatory texts to examine and convey complex ideas, concepts, and information clearly and accurately through the effective selection, organization, and analysis of content.

a. Introduce a topic; organize complex ideas, concepts, and information so that each new element builds on that which precedes it to create a unified whole; include formatting (e.g., headings), graphics (e.g., figures, tables), and multimedia when useful to aiding comprehension.

b. Develop the topic thoroughly by selecting the most significant and relevant facts, extended definitions, concrete details, quotations, or other information and examples appropriate to the audience's knowledge of the topic.

c. Use appropriate and varied transitions and syntax to link the major sections of the text, create cohesion, and clarify the relationships among complex ideas and concepts.

d. Use precise language, domain-specific vocabulary, and techniques such as metaphor, simile, and analogy to manage the complexity of the topic.

e. Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing.

f. Provide a concluding statement or section that follows from and supports the information or explanation presented (e.g., articulating implications or the significance of the topic).

W.11.3. Write narratives to develop real or imagined experiences or events using effective techniques, well-chosen details, and well-structured event sequences.

a. Engage and orient the reader by setting out a problem, situation, or observation and its significance, establishing one or multiple point(s) of view, and introducing a narrator and/or characters; create a smooth progression of experiences or events.

b. Use narrative techniques, such as dialogue, pacing, description, reflection, and multiple plot lines, to develop experiences, events, and/or characters

c. Use a variety of techniques to sequence events so that they build on one another to create a coherent whole and build toward a particular tone and outcome (e.g., a sense of mystery, suspense, growth, or resolution).

d. Use precise words and phrases, telling details, and sensory language to convey a vivid picture of the experiences, events, setting, and/or characters.
e. Provide a conclusion that follows from and reflects on what is experienced, observed, or resolved over the course of the narrative.

Production and Distribution of Writing

W.11.4. Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. (Grade-specific expectations for writing types are defined in standards 1–3 above.)

W.11.5. Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience. (Editing for conventions should demonstrate command of Language standards 1–3 up to and including grades 11–12 on page 54.)

W.11.6. Use technology, including the Internet, to produce, publish, and update individual or shared writing products in response to ongoing feedback, including new arguments or information.

Research to Build and Present Knowledge

W.11.7. Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.

W.11.8. Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation.

W.11.9. Draw evidence from literary or informational texts to support analysis, reflection, and research.

a. Apply grades 11–12 Reading standards to literature (e.g., "Demonstrate knowledge of eighteenth-, nineteenth- and early-twentieth-century foundational works of American literature, including how two or more texts from the same period treat similar themes or topics").

b. Apply grades 11–12 Reading standards to literary nonfiction (e.g., "Delineate and evaluate the reasoning in seminal U.S. texts, including the application of constitutional principles and use of legal reasoning [e.g., in U.S. Supreme Court Case majority opinions and dissents] and the premises, purposes, and arguments in works of public advocacy [e.g., The Federalist, presidential addresses]").

Range of Writing

W.11.10. Write routinely over extended time frames (time for research, reflection, and revision) and shorter time frames (a single sitting or a day or two) for a range of tasks, purposes, and audiences.

College and Career Readiness Anchor Standards for *Speaking and Listening*

Comprehension and Collaboration

SL.11.1. Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grades 11–12 topics, texts, and issues, building on others' ideas and expressing their own clearly and persuasively.

a. Come to discussions prepared, having read and researched material under study; explicitly draw on that preparation by referring to evidence from texts and other research on the topic or issue to stimulate a thoughtful, well-reasoned exchange of ideas.

b. Work with peers to promote civil, democratic discussions and decision-making, set clear goals and deadlines, and establish individual roles as needed.

c. Propel conversations by posing and responding to questions that probe reasoning and evidence; ensure a hearing for a full range of positions on a topic or issue; clarify, verify, or challenge ideas and conclusions; and promote divergent and creative perspectives.

d. Respond thoughtfully to diverse perspectives; synthesize comments, claims, and evidence made on all sides of an issue; resolve contradictions when possible; and determine what additional information or research is required to deepen the investigation or complete the task.

SL.11.2. Integrate multiple sources of information presented in diverse formats and media (e.g., visually, quantitatively, orally) in order to make informed decisions and

solve problems, evaluating the credibility and accuracy of each source and noting any discrepancies among the data.

SL.11.3. Evaluate a speaker's point of view, reasoning, and use of evidence and rhetoric, assessing the stance, premises, links among ideas, word choice, points of emphasis, and tone used.

Presentation of Knowledge and Ideas

SL.11.4. Present information, findings, and supporting evidence, conveying a clear and distinct perspective, such that listeners can follow the line of reasoning, alternative or opposing perspectives are addressed, and the organization, development, substance, and style are appropriate to purpose, audience, and a range of formal and informal tasks.

SL.11.5. Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance understanding of findings, reasoning, and evidence and to add interest.

SL.11.6. Adapt speech to a variety of contexts and tasks, demonstrating a command of formal English when indicated or appropriate. (See grades 11–12 Language standards 1 and 3 for specific expectations.)

College and Career Readiness Anchor Standards for *Language*

Conventions of Standard English

L.11.1. Demonstrate command of the conventions of standard English grammar and usage when writing or speaking.

a. Apply the understanding that usage is a matter of convention, can change over time, and is sometimes contested.

b. Resolve issues of complex or contested usage, consulting references (e.g., Merriam-Webster's Dictionary of English Usage, Garner's Modern American Usage) as needed.

L.11.2. Demonstrate command of the conventions of standard English capitalization, punctuation, and spelling when writing.

a. Observe hyphenation conventions.

b. Spell correctly.

Knowledge of Language

L.11.3. Apply knowledge of language to understand how language functions in different contexts, to make effective choices for meaning or style, and to comprehend more fully when reading or listening.

a. Vary syntax for effect, consulting references (e.g., Tufte's Artful Sentences) for guidance as needed; apply an understanding of syntax to the study of complex texts when reading.

Vocabulary Acquisition and Use

L.11.4. Determine or clarify the meaning of unknown and multiple-meaning words and phrases based on grades 11–12 reading and content, choosing flexibly from a range of strategies.

a. Use context (e.g., the overall meaning of a sentence, paragraph, or text; a word's position or function in a sentence) as a clue to the meaning of a word or phrase.

b. Identify and correctly use patterns of word changes that indicate different meanings or parts of speech (e.g., conceive, conception, conceivable).

c. Consult general and specialized reference materials (e.g., dictionaries, glossaries, thesauruses), both print and digital, to find the pronunciation of a word or determine or clarify its precise meaning, its part of speech, its etymology, or its standard usage.

d. Verify the preliminary determination of the meaning of a word or phrase (e.g., by checking the inferred meaning in context or in a dictionary).

L.11.5. Demonstrate understanding of figurative language, word relationships, and nuances in word meanings.

a. Interpret figures of speech (e.g., hyperbole, paradox) in context and analyze their role in the text.
b. Analyze nuances in the meaning of words with similar denotations.

L.11.6. Acquire and use accurately general academic and domain-specific words and phrases, sufficient for reading, writing, speaking, and listening at the college and career readiness level; demonstrate independence in gathering vocabulary knowledge when considering a word or phrase important to comprehension or expression.

Reading Standards for Literacy in History/Social Studies (11-12)

Key Ideas and Details

RH.11.1 Cite specific textual evidence to support analysis of primary and secondary sources, connecting insights gained from specific details to an understanding of the text as a whole.

RH.11.2. Determine the central ideas or information of a primary or secondary source; provide an accurate summary that makes clear the relationships among the key details and ideas

RH.11.3. Evaluate various explanations for actions or events and determine which explanation best accords with textual evidence, acknowledging where the text leaves matters uncertain

Craft and Structure

RH.11.4. Determine the meaning of words and phrases as they are used in a text, including analyzing how an author uses and refines the meaning of a key term over the course of a text (e.g., how Madison defines faction in Federalist No. 10).

RH.11.5. Analyze in detail how a complex primary source is structured, including how key sentences, paragraphs, and larger portions of the text contribute to the whole.

RH.11.6. Evaluate authors' differing points of view on the same historical event or issue by assessing the authors' claims, reasoning, and evidence.

Integration of Knowledge and Ideas

RH.11.7. Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., visually, quantitatively, as well as in words) in order to address a question or solve a problem.

RH.11.8. Evaluate an author's premises, claims, and evidence by corroborating or challenging them with other information.

RH.11.9. Integrate information from diverse sources, both primary and secondary, into a coherent understanding of an idea or event, noting discrepancies among sources.

Range of Reading and Level of Text Complexity

RH.11.10. By the end of grade 12, read and comprehend history/social studies texts in the grades 11–CCR text complexity band independently and proficiently.

Reading Standards for Literacy in Science and Technical Subjects (11-12)

Key Ideas and Details

RST.11.1. Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account.

RST.11.2. Determine the central ideas or conclusions of a text; summarize complex concepts, processes, or information presented in a text by paraphrasing them in simpler but still accurate terms.

RST.11.3. Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text.

Craft and Structure

RST.11.4. Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11–12 texts and topics.

RST.11.5. Analyze how the text structures information or ideas into categories or hierarchies, demonstrating understanding of the information or ideas.

RST.11.6. Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, identifying important issues that remain unresolved.

Integration of Knowledge and Ideas

RST.11.7. Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem.

RST.11.8. Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information.

RST.11.9. Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible.

Range of Reading and Level of Text Complexity

RST.11.10. By the end of grade 12, read and comprehend science/technical texts in the grades 11–CCR text complexity band independently and proficiently.

Writing Standards for Literacy in History/Social Studies, Science, and Technical Subjects (11-12)

Text Types and Purposes

WHST.11.1. Write arguments focused on discipline-specific content.

a. Introduce precise, knowledgeable claim(s), establish the significance of the claim(s), distinguish the claim(s) from alternate or opposing claims, and create an organization that logically sequences the claim(s), counterclaims, reasons, and evidence.

b. Develop claim(s) and counterclaims fairly and thoroughly, supplying the most relevant data and evidence for each while pointing out the strengths and limitations of both claim(s) and counterclaims in a discipline-appropriate form that anticipates the audience's knowledge level, concerns, values, and possible biases.

c. Use words, phrases, and clauses as well as varied syntax to link the major sections of the text, create cohesion, and clarify the relationships between claim(s) and reasons, between reasons and evidence, and between claim(s) and counterclaims.

d. Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing.

e. Provide a concluding statement or section that follows from or supports the argument presented.

WHST.11.2. Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes.

a. Introduce a topic and organize complex ideas, concepts, and information so that each new element builds on that which precedes it to create a unified whole; include formatting (e.g., headings), graphics (e.g., figures, tables), and multimedia when useful to aiding comprehension.

b. Develop the topic thoroughly by selecting the most significant and relevant facts, extended definitions, concrete details, quotations, or other information and examples appropriate to the audience's knowledge of the topic.

c. Use varied transitions and sentence structures to link the major sections of the text, create cohesion, and clarify the relationships among complex ideas and concepts.

d. Use precise language, domain-specific vocabulary and techniques such as metaphor, simile, and analogy to manage the complexity of the topic; convey a knowledgeable stance in a style that responds to the discipline and context as well as to the expertise of likely readers.

e. Provide a concluding statement or section that follows from and supports the information or explanation provided (e.g., articulating implications or the significance of the topic).

WHST.11.3. (Not applicable as a separate requirement)

Production and Distribution of Writing

WHST.11.4. Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.

WHST.11.5. Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience.

WHST.11.6. Use technology, including the Internet, to produce, publish, and update individual or shared writing products in response to ongoing feedback, including new arguments or information.

Research to Build and Present Knowledge

WHST.11.7. Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.

WHST.11.8. Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation.

WHST.11.9. Draw evidence from informational texts to support analysis, reflection, and research.

Range of Writing

WHST.11.10. Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences.

Common Core Crosswalk for Mathematics (11-12)

	Units	1	2	3	4	5	6	7	8	9
Common Core Standards										
N-RN.1.										
N-RN.2.										
N-RN.3.			X							
N-Q.1.									X	
N-Q.2.									X	
N-Q.3.									X	
N-CN.1.										
N-CN.2.										
N-CN.3.										
N-CN.4.										
N-CN.5.										
N-CN.6.										
N-CN.7.										
N-CN.8.										
N-CN.9.										
N-VM.1.										
N-VM.2.										
N-VM.3.										
N-VM.4.										
N-VM.5.										
N-VM.6.										
N-VM.7.										
N-VM.8.										
N-VM.9.										
N-VM.10.										
N-VM.11.										
N-VM.12.										
A-SSE.1.										
A-SSE.2.										
A-SSE.3.										
A-SSE.4.										
A-APR.1.										
A-APR.2.										
A-APR.3.										
A-APR.4.										
A-APR.5.										
A-APR.6.										
A-APR.7.										
A-CED.1.										
A-CED.2.										
A-CED.3.										
A-CED.4.										
A-REI.1.										
A-REI.2.										
A-REI.3.										
A-REI.4.										
A-REI.5										
A-REI.6.										
A-REI.7.										
A-REI.8.										
A-REI.9.										
A-REI.10.										
A-REI.11.										
A-REI.12.										
F-IF.1.										
F-IF.2.										
F-BF.3.										

F-BF.4.										
F-LE.1.										
F-LE.2.										
F-LE.3.										
F-LE.4.										
F-LE.5.										
F-TF.1.										
F-TF.2.										
F-TF.3.										
F-TF.4.										
F-TF.5.										
F-TF.6.										
F-TF.7.										
F-TF.8.										
F-TF.9.										
G-CO.1.										
G-CO.2.										
G-CO.3.										
G-CO.4.										
G-CO.5.										
G-CO.6.										
G-CO.7.										
G-CO.8.										
G-CO.9.										
G-CO.10.										
G-CO.11.										
G-CO.12.										
G-CO.13.										
G-SRT.1.										
G-SRT.2.										
G-SRT.3.										
G-SRT.4.										
G-SRT.5.										
G-SRT.6.										
G-SRT.7.										
G-SRT.8.										
G-SRT.9.										
G-SRT.10.										
G-SRT.11.										
G-C.1.										
G-C.2.										
G-C.3.										
G-C.4.										
G-C.5.										
G-GPE.1.										
G-GPE.2.										
G-GPE.3.										
G-GPE.4.										
G-GPE.5.										
G-GPE.6.										
G-GPE.7.										
G-GMD.1.										
G-GMD.2.										
G-GMD.3.										
G-GMD.4.										
G-MG.1.										
G-MG.2.										
G-MG.3.										
S-ID.1.										
S-ID.2.										
S-ID.3.										
S-ID.4.										
S-ID.5.										
S-ID.6.										

S-ID.7.										
S-ID.8.										
S-ID.9.										
S-IC.1.										
S-IC.2.										
S-IC.3.										
S-IC.4.										
S-IC.5.										
S-IC.6.										
S-CP.1.										
S-CP.2										
S-CP.3.										
S-CP.4.										
S-CP.5.										
S-CP.6.										
S-CP.7.										
S-CP.8.										
S-CP.9.										
S-MD.1.										
S-MD.2.										
S-MD.3.										
S-MD.4.										
S-MD.5.										
S-MD.6.										
S-MD.7.										

Mathematics (High School)

Number and Quantity

The Real Number System

N-RN.1. Explain how the definition of the meaning of rational exponents follows from extending the properties of integer exponents to those values, allowing for a notation for radicals in terms of rational exponents.

N-RN.2. Rewrite expressions involving radicals and rational exponents using the properties of exponents.

N-RN.3. Explain why the sum or product of two rational numbers is rational; that the sum of a rational number and an irrational number is irrational; and that the product of a nonzero rational number and an irrational number is irrational.

Quantities

N-Q.1. Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays.

N-Q.2. Define appropriate quantities for the purpose of descriptive modeling.

N-Q.3. Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.

The Complex Number System

N-CN.1. Know there is a complex number i such that i2= –1, and every complex number has the form a + bi with a and b real.

N-CN.2. Use the relation i2= –1 and the commutative, associative, and distributive properties to add, subtract, and multiply complex numbers.

N-CN.3. (+) Find the conjugate of a complex number; use conjugates to find moduli and quotients of complex numbers.

N-CN.4. (+) Represent complex numbers on the complex plane in rectangular and polar form (including real and imaginary numbers), and explain why the rectangular and polar forms of a given complex number represent the same number.

N-CN.5. (+) Represent addition, subtraction, multiplication, and conjugation of complex numbers geometrically on the complex plane; use properties of this representation for computation. For example, $(–1 + \sqrt{3}\ i)3= 8$ because $(–1 + \sqrt{3}\ i)$ has modulus 2 and argument 120°.

N-CN.6. (+) Calculate the distance between numbers in the complex plane as the modulus of the difference, and the midpoint of a segment as the average of the numbers at its endpoints.

N-CN.7. Solve quadratic equations with real coefficients that have complex solutions.

N-CN.8. (+) Extend polynomial identities to the complex numbers. For example, rewrite x2+ 4 as (x + 2i)(x – 2i).

N-CN.9. (+) Know the Fundamental Theorem of Algebra; show that it is true for quadratic polynomials.

Vector and Matrix Quantities

N-VM.1. (+) Recognize vector quantities as having both magnitude and direction. Represent vector quantities by directed line segments, and use appropriate symbols for vectors and their magnitudes (e.g., v, |v|, ||v||, v).

N-VM.2. (+) Find the components of a vector by subtracting the coordinates of an initial point from the coordinates of a terminal point.

N-VM.3. (+) Solve problems involving velocity and other quantities that can be represented by vectors.

N-VM.4. (+) Add and subtract vectors

N-VM.4.a. Add vectors end-to-end, component-wise, and by the parallelogram rule. Understand that the magnitude of a sum of two vectors is typically not the sum of the magnitudes.

N-VM.4.b. Given two vectors in magnitude and direction form, determine the magnitude and direction of their sum.

N-VM.4.c. Understand vector subtraction $v – w$ as $v + (–w)$, where $–w$ is the additive inverse of w, with the same magnitude as w and pointing in the opposite direction. Represent vector subtraction graphically by connecting the tips in the appropriate order, and perform vector subtraction component-wise.

N-VM.5. (+) Multiply a vector by a scalar.

N-VM.5.a. Represent scalar multiplication graphically by scaling vectors and possibly reversing their direction; perform scalar multiplication component-wise, e.g., as $c(vx, vy) = (cvx, cvy)$.

N-VM.5.b. Compute the magnitude of a scalar multiple cv using $||cv|| = |c|v$. Compute the direction of cv knowing that when $|c|v \neq 0$, the direction of cv is either along v (for $c > 0$) or against v (for $c < 0$).

N-VM.6. (+) Use matrices to represent and manipulate data, e.g., to represent payoffs or incidence relationships in a network.

N-VM.7. (+) Multiply matrices by scalars to produce new matrices, e.g., as when all of the payoffs in a game are doubled.

N-VM.8. (+) Add, subtract, and multiply matrices of appropriate dimensions.

N-VM.9. (+) Understand that, unlike multiplication of numbers, matrix multiplication for square matrices is not a commutative operation, but still satisfies the associative and distributive properties

N-VM.10. (+) Understand that the zero and identity matrices play a role in matrix addition and multiplication similar to the role of 0 and 1 in the real numbers. The determinant of a square matrix is nonzero if and only if the matrix has a multiplicative inverse.

N-VM.11. (+) Multiply a vector (regarded as a matrix with one column) by a matrix of suitable dimensions to produce another vector. Work with matrices as transformations of vectors.

N-VM.12. (+) Work with 2×2 matrices as transformations of the plane, and interpret the absolute value of the determinant in terms of area.

Algebra

Seeing structure in expressions

A-SSE.1. Interpret expressions that represent a quantity in terms of its context.

A-SSE.1.a. Interpret parts of an expression, such as terms, factors, and coefficients.

A-SSE.1.b. Interpret complicated expressions by viewing one or more of their parts as a single entity. For example, interpret P(1+r)n as the product of P and a factor not depending on P.

A-SSE.2. Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression.

A-SSE.3. Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression.

A-SSE.3.a. Factor a quadratic expression to reveal the zeros of the function it defines.

A-SSE.3.b. Complete the square in a quadratic expression to reveal the maximum or minimum value of the function it defines.

A-SSE.3.c. Use the properties of exponents to transform expressions for exponential functions.

A-SSE.4. Derive the formula for the sum of a finite geometric series (when the common ratio is not 1), and use the formula to solve problems. For example, calculate mortgage payments.

Arithmetic with Polynomials and Rational Expressions

A-APR.1. Understand that polynomials form a system analogous to the integers, namely, they are closed under the operations of addition, subtraction, and multiplication; add, subtract, and multiply polynomials

A-APR.2. Know and apply the Remainder Theorem: For a polynomial p(x) and a number a, the remainder on division by x – a is p(a), so p(a) = 0 if and only if (x – a) is a factor of p(x).

A-APR.3. Identify zeros of polynomials when suitable factorizations are available, and use the zeros to construct a rough graph of the function defined by the polynomial.

A-APR.4. Prove polynomial identities and use them to describe numerical relationships.

A-APR.5. (+) Know and apply the Binomial Theorem for the expansion of (x+ y)n in powers of x and y for a positive integer n, where x and y are any numbers, with coefficients determined for example by Pascal's Triangle.

A-APR.6. Rewrite simple rational expressions in different forms; write a(x)/b(x) in the form q(x) + r(x)/b(x), where a(x), b(x), q(x), and r(x) are polynomials with the degree of r(x) less than the degree of b(x), using inspection, long division, or, for the more complicated examples, a computer algebra system.

A-APR.7. (+) Understand that rational expressions form a system analogous to the rational numbers, closed under addition, subtraction, multiplication, and division by a nonzero rational expression; add, subtract, multiply, and divide rational expressions.

Creating Equations

A-CED.1. Create equations and inequalities in one variable and use them to solve problems. Include equations arising from linear and quadratic functions, and simple rational and exponential functions.

A-CED.2. Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.

A-CED.3. Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or nonviable options in a modeling context. For example, represent inequalities describing nutritional and cost constraints on combinations of different foods.

A-CED.4. Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations. For example, rearrange Ohm's law V =IR to highlight resistance R.

Reasoning with Equations and Inequalities

A-REI.1. Explain each step in solving a simple equation as following from the equality of numbers asserted at the previous step, starting from the assumption that the original equation has a solution. Construct a viable argument to justify a solution method.

A-REI.2. Solve simple rational and radical equations in one variable, and give examples showing how extraneous solutions may arise.

A-REI.3. Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters.

A-REI.4. Solve quadratic equations in one variable.

A-REI.4.a. Use the method of completing the square to transform any quadratic equation in x into an equation of the form $(x – p)2= q$ that has the same solutions. Derive the quadratic formula from this form.

A-REI.4.b. Solve quadratic equations by inspection (e.g., for $x2= 49$), taking square roots, completing the square, the quadratic formula and factoring, as appropriate to the initial form of the equation. Recognize when the quadratic formula gives complex solutions and write them as $a \pm bi$ for real numbers a and b.

A-REI.5. Prove that, given a system of two equations in two variables, replacing one equation by the sum of that equation and a multiple of the other produces a system with the same solutions.

A-REI.6. Solve systems of linear equations exactly and approximately (e.g., with graphs), focusing on pairs of linear equations in two variables.

A-REI.7. Solve a simple system consisting of a linear equation and a quadratic equation in two variables algebraically and graphically. For example, find the points of intersection between the line $y = –3x$ and the circle $x2+y2= 3$.

A-REI.8. (+) Represent a system of linear equations as a single matrix equation in a vector variable.

A-REI.9. (+) Find the inverse of a matrix if it exists and use it to solve systems of linear equations (using technology for matrices of dimension 3×3 or greater).

A-REI.10. Understand that the graph of an equation in two variables is the set of all its solutions plotted in the coordinate plane, often forming a curve (which could be a line).

A-REI.11. Explain why the x-coordinates of the points where the graphs of the equations $y = f(x)$ and $y = g(x)$ intersect are the solutions of the equation $f(x) = g(x)$; find the solutions approximately, e.g., using technology to graph the functions, make tables of values, or find successive approximations. Include cases where $f(x)$ and/or $g(x)$ are linear, polynomial, rational, absolute value, exponential, and logarithmic functions.

A-REI.12.Graph the solutions to a linear inequality in two variables as a half plane (excluding the boundary in the case of a strict inequality), and graph the solution set to a system of linear inequalities in two variables as the intersection of the corresponding half-planes.

Functions

Interpreting Functions

F-IF.1. Understand that a function from one set (called the domain) to another set (called the range) assigns to each element of the domain exactly one element of the range. If f is a function and x is an element of its domain, then f(x) denotes the output of f corresponding to the input x. The graph of f is the graph of the equation y = f(x).

F-IF.2. Use function notation, evaluate functions for inputs in their domains, and interpret statements that use function notation in terms of a context.

F-IF.3. Recognize that sequences are functions, sometimes defined recursively, whose domain is a subset of the integers. For example, the Fibonacci sequence is defined recursively by $f(0) = f(1) = 1$, $f(n+1) = f(n) + f(n-1)$ for $n \geq 1$.

F-IF.4. For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship. Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity.

F-IF.5. Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes. For example, if the function h(n) gives the number of person-hours it takes to assemble n engines in a factory, then the positive integers would be an appropriate domain for the function.

F-IF.6. Calculate and interpret the average rate of change of a function (presented symbolically or as a table) over a specified interval. Estimate the rate of change from a graph.

F-IF.7. Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases.

F-IF.7.a. Graph linear and quadratic functions and show intercepts, maxima, and minima.

F-IF.7.b. Graph square root, cube root, and piecewise-defined functions, including step functions and absolute value functions.

F-IF.7.c. Graph polynomial functions, identifying zeros when suitable factorizations are available, and showing end behavior.

F-IF.7.d. (+) Graph rational functions, identifying zeros and asymptotes when suitable factorizations are available, and showing end behavior.

F-IF.7.e. Graph exponential and logarithmic functions, showing intercepts and end behavior, and trigonometric functions, showing period, midline, and amplitude.

F-IF.8. Write a function defined by an expression in different but equivalent forms to reveal and explain different properties of the function.

F-IF.8.a. Use the process of factoring and completing the square in a quadratic function to show zeros, extreme values, and symmetry of the graph, and interpret these in terms of a context.

F-IF.8.b. Use the properties of exponents to interpret expressions for exponential functions.

F-IF.9. Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). For example, given a graph of one quadratic function and an algebraic expression for another, say which has the larger maximum.

Building Functions

F-BF.1. Write a function that describes a relationship between two quantities.

F-BF.1.a. Determine an explicit expression, a recursive process, or steps for calculation from a context.

F-BF.1.b. Combine standard function types using arithmetic operations. For example, build a function that models the temperature of a cooling body by adding a constant function to a decaying exponential, and relate these functions to the model.

F-BF.1.c. (+) Compose functions. For example, if T(y) is the temperature in the atmosphere as a function of height, and h(t) is the height of a weather balloon as a function of time, then T(h(t)) is the temperature at the location of the weather balloon as a function of time.

F-BF.2. Write arithmetic and geometric sequences both recursively and with an explicit formula, use them to model situations, and translate between the two forms.

F-BF.3. Identify the effect on the graph of replacing f(x) by f(x) + k, k f(x), f(kx), and f(x + k) for specific values of k (both positive and negative); find the value of k given the graphs. Experiment with cases and illustrate an explanation of the effects on the graph using technology. Include recognizing even and odd functions from their graphs and algebraic expressions for them.

F-BF.4. Find inverse functions.

F-BF.4.a. Solve an equation of the form f(x) = c for a simple function f that has an inverse and write an expression for the inverse.

F-BF.4.b. (+) Verify by composition that one function is the inverse of another.

F-BF.4.c. (+) Read values of an inverse function from a graph or a table, given that the function has an inverse.

F-BF.4.d. (+) Produce an invertible function from a non-invertible function by restricting the domain.

F-BF.5. (+) Understand the inverse relationship between exponents and logarithms and use this relationship to solve problems involving logarithms and exponents.

Linear, Quadratic, and Exponential Models

F-LE.1. Distinguish between situations that can be modeled with linear functions and with exponential functions.

F-LE.1.a. Prove that linear functions grow by equal differences over equal intervals, and that exponential functions grow by equal factors over equal intervals.

F-LE.1.b. Recognize situations in which one quantity changes at a constant rate per unit interval relative to another.

F-LE.1.c. Recognize situations in which a quantity grows or decays by a constant percent rate per unit interval relative to another

F-LE.2. Construct linear and exponential functions, including arithmetic and geometric sequences, given a graph, a description of a relationship, or two input-output pairs (include reading these from a table).

F-LE.3. Observe using graphs and tables that a quantity increasing exponentially eventually exceeds a quantity increasing linearly, quadratically, or (more generally) as a polynomial function.

F-LE.4. For exponential models, express as a logarithm the solution to ab ct = d where a, c, and d are numbers and the base b is 2, 10, or e; evaluate the logarithm using technology.

F-LE.5. Interpret the parameters in a linear or exponential function in terms of a context.

Trigonometric Functions

F-TF.1. Understand radian measure of an angle as the length of the arc on the unit circle subtended by the angle.

F-TF.2. Explain how the unit circle in the coordinate plane enables the extension of trigonometric functions to all real numbers, interpreted as radian measures of angles traversed counterclockwise around the unit circle.

F-TF.3. (+) Use special triangles to determine geometrically the values of sine, cosine, tangent for $\pi/3$, $\pi/4$ and $\pi/6$, and use the unit circle to express the values of sine, cosine, and tangent for $\pi - x$, $\pi + x$, and $2\pi - x$ in terms of their values for x, where x is any real number.

F-TF.4. (+) Use the unit circle to explain symmetry (odd and even) and periodicity of trigonometric functions.

F-TF.5. Choose trigonometric functions to model periodic phenomena with specified amplitude, frequency, and midline.

F-TF.6. (+) Understand that restricting a trigonometric function to a domain on which it is always increasing or always decreasing allows its inverse to be constructed.

F-TF.7. (+) Use inverse functions to solve trigonometric equations that arise in modeling contexts; evaluate the solutions using technology, and interpret them in terms of the context.

F-TF.8. Prove the Pythagorean identity $\sin^2(\theta) + \cos^2(\theta) = 1$ and use it to find $\sin(\theta)$, $\cos(\theta)$, or $\tan(\theta)$ given $\sin(\theta)$, $\cos(\theta)$, or $\tan(\theta)$ and the quadrant of the angle.

F-TF.9. (+) Prove the addition and subtraction formulas for sine, cosine, and tangent and use them to solve problems.

Geometry

Congruence

G-CO.1. Know precise definitions of angle, circle, perpendicular line, parallel line, and line segment, based on the undefined notions of point, line, distance along a line, and distance around a circular arc.

G-CO.2. Represent transformations in the plane using, e.g., transparencies and geometry software; describe transformations as functions that take points in the plane as inputs and give other points as outputs. Compare transformations that preserve distance and angle to those that do not (e.g., translation versus horizontal stretch).

G-CO.3. Given a rectangle, parallelogram, trapezoid, or regular polygon, describe the rotations and reflections that carry it onto itself.

G-CO.4. Develop definitions of rotations, reflections, and translations in terms of angles, circles, perpendicular lines, parallel lines, and line segments.

G-CO.5. Given a geometric figure and a rotation, reflection, or translation, draw the transformed figure using, e.g., graph paper, tracing paper, or geometry software. Specify a sequence of transformations that will carry a given figure onto another.

G-CO.6. Use geometric descriptions of rigid motions to transform figures and to predict the effect of a given rigid motion on a given figure; given two figures, use the definition of congruence in terms of rigid motions to decide if they are congruent.

G-CO.7. Use the definition of congruence in terms of rigid motions to show that two triangles are congruent if and only if corresponding pairs of sides and corresponding pairs of angles are congruent.

G-CO.8. Explain how the criteria for triangle congruence (ASA, SAS, and SSS) follow from the definition of congruence in terms of rigid motions.

G-CO.9. Prove theorems about lines and angles. Theorems include: vertical angles are congruent; when a transversal crosses parallel lines, alternate interior angles are congruent and corresponding angles are congruent; points on a perpendicular bisector of a line segment are exactly those equidistant from the segment’s endpoints.

G-CO.10. Prove theorems about triangles. Theorems include: measures of interior angles of a triangle sum to 180°; base angles of isosceles triangles are congruent; the segment joining midpoints of two sides of a triangle is parallel to the third side and half the length; the medians of a triangle meet at a point.

G-CO.11. Prove theorems about parallelograms. Theorems include: opposite sides are congruent, opposite angles are congruent, the diagonals of a parallelogram bisect each other, and conversely, rectangles are parallelograms with congruent diagonals.

G-CO.12. Make formal geometric constructions with a variety of tools and methods (compass and straightedge, string, reflective devices, paper folding, or dynamic geometric software). Copying a segment; copying an angle; bisecting a segment; bisecting an angle; constructing perpendicular lines, including the perpendicular bisector of a line segment; and constructing a line parallel to a given line through a point not on the line.

G-CO.13. Construct an equilateral triangle, a square, and a regular hexagon inscribed in a circle.

Similarity, Right Triangles, and Trigonometry

G-SRT.1. Verify experimentally the properties of dilations given by a center and a scale factor:

G-SRT.1.a. A dilation takes a line not passing through the center of the dilation to a parallel line, and leaves a line passing through the center unchanged.

G-SRT.1.b. The dilation of a line segment is longer or shorter in the ratio given by the scale factor.

G-SRT.2. Given two figures, use the definition of similarity in terms of similarity transformations to decide if they are similar; explain using similarity transformations the meaning of similarity for triangles as the equality of all corresponding pairs of angles and the proportionality of all corresponding pairs of sides.

G-SRT.3. Use the properties of similarity transformations to establish the AA criterion for two triangles to be similar.

G-SRT.4. Prove theorems about triangles. Theorems include: a line parallel to one side of a triangle divides the other two proportionally, and conversely; the Pythagorean Theorem proved using triangle similarity.

G-SRT.5. Use congruence and similarity criteria for triangles to solve problems and to prove relationships in geometric figures.

G-SRT.6. Understand that by similarity, side ratios in right triangles are properties of the angles in the triangle, leading to definitions of trigonometric ratios for acute angles.

G-SRT.7. Explain and use the relationship between the sine and cosine of complementary angles.

G-SRT.8. Use trigonometric ratios and the Pythagorean Theorem to solve right triangles in applied problems.

G-SRT.9. (+) Derive the formula $A = 1/2\ ab \sin(C)$ for the area of a triangle by drawing an auxiliary line from a vertex perpendicular to the opposite side.

G-SRT.10. (+) Prove the Laws of Sines and Cosines and use them to solve problems.

G-SRT.11. (+) Understand and apply the Law of Sines and the Law of Cosines to find unknown measurements in right and non-right triangles (e.g., surveying problems, resultant forces).

Circles

G-C.1. Prove that all circles are similar.

G-C.2. Identify and describe relationships among inscribed angles, radii, and chords. Include the relationship between central, inscribed, and circumscribed angles; inscribed angles on a diameter are right angles; the radius of a circle is perpendicular to the tangent where the radius intersects the circle.

G-C.3. Construct the inscribed and circumscribed circles of a triangle, and prove properties of angles for a quadrilateral inscribed in a circle.

G-C.4. (+) Construct a tangent line from a point outside a given circle to the circle.

G-C.5. Derive using similarity the fact that the length of the arc intercepted by an angle is proportional to the radius, and define the radian measure of the angle as the constant of proportionality; derive the formula for the area of a sector.

Expressing Geometric Properties with Equations

G-GPE.1. Derive the equation of a circle of given center and radius using the Pythagorean Theorem; complete the square to find the center and radius of a circle given by an equation.

G-GPE.2. Derive the equation of a parabola given a focus and directrix.

G-GPE.3. (+) Derive the equations of ellipses and hyperbolas given the foci, using the fact that the sum or difference of distances from the foci is constant.

G-GPE.4. Use coordinates to prove simple geometric theorems algebraically. For example, prove or disprove that a figure defined by four given points in the coordinate plane is a rectangle; prove or disprove that the point $(1, \sqrt{3})$ lies on the circle centered at the origin and containing the point (0, 2).

G-GPE.5. Prove the slope criteria for parallel and perpendicular lines and use them to solve geometric problems (e.g., find the equation of a line parallel or perpendicular to a given line that passes through a given point).

G-GPE.6. Find the point on a directed line segment between two given points that partitions the segment in a given ratio.

G-GPE.7. Use coordinates to compute perimeters of polygons and areas of triangles and rectangles, e.g., using the distance formula.

Geometric Measurement and Dimension

G-GMD.1. Give an informal argument for the formulas for the circumference of a circle, area of a circle, volume of a cylinder, pyramid, and cone. Use dissection arguments, Cavalieri's principle, and informal limit arguments.

G-GMD.2. (+) Give an informal argument using Cavalieri's principle for the formulas for the volume of a sphere and other solid figures.

G-GMD.3. Use volume formulas for cylinders, pyramids, cones, and spheres to solve problems.

G-GMD.4. Identify the shapes of two-dimensional cross-sections of three-dimensional objects, and identify three-dimensional objects generated by rotations of two-dimensional objects.

Modeling with Geometry

G-MG.1. Use geometric shapes, their measures, and their properties to describe objects (e.g., modeling a tree trunk or a human torso as a cylinder).

G-MG.2. Apply concepts of density based on area and volume in modeling situations (e.g., persons per square mile, BTUs per cubic foot).

G-MG.3. Apply geometric methods to solve design problems (e.g., designing an object or structure to satisfy physical constraints or minimize cost; working with typographic grid systems based on ratios).

Statistics and Probability

Interpreting Categorical and Quantitative Data

S-ID.1. Represent data with plots on the real number line (dot plots, histograms, and box plots).

S-ID.2. Use statistics appropriate to the shape of the data distribution to compare center (median, mean) and spread (interquartile range, standard deviation) of two or more different data sets.

S-ID.3. Interpret differences in shape, center, and spread in the context of the data sets, accounting for possible effects of extreme data points (outliers).

S-ID.4. Use the mean and standard deviation of a data set to fit it to a normal distribution and to estimate population percentages. Recognize that there are data sets for which such a procedure is not appropriate.
Use calculators, spreadsheets, and tables to estimate areas under the normal curve.

S-ID.5. Summarize categorical data for two categories in two-way frequency tables. Interpret relative frequencies in the context of the data (including joint, marginal, and conditional relative frequencies). Recognize possible associations and trends in the data.

S-ID.6. Represent data on two quantitative variables on a scatter plot, and describe how the variables are related.

S-ID.6.a. Fit a function to the data; use functions fitted to data to solve problems in the context of the data. Use given functions or choose a function suggested by the context. Emphasize linear, quadratic, and exponential models.

S-ID.6.b. Informally assess the fit of a function by plotting and analyzing residuals.

S-ID.6.c. Fit a linear function for a scatter plot that suggests a linear association.

S-ID.7. Interpret the slope (rate of change) and the intercept (constant term) of a linear model in the context of the data.

S-ID.8. Compute (using technology) and interpret the correlation coefficient of a linear fit.

S-ID.9. Distinguish between correlation and causation.

Making Inferences and Justifying Conclusions

S-IC.1. Understand statistics as a process for making inferences about population parameters based on a random sample from that population.

S-IC.2. Decide if a specified model is consistent with results from a given data-generating process, e.g., using simulation. For example, a model says a spinning coin falls heads up with probability 0.5. Would a result of 5 tails in a row cause you to question the model?

S-IC.3. Recognize the purposes of and differences among sample surveys, experiments, and observational studies; explain how randomization relates to each.

S-IC.4. Use data from a sample survey to estimate a population mean or proportion; develop a margin of error through the use of simulation models for random sampling.

S-IC.5. Use data from a randomized experiment to compare two treatments; use simulations to decide if differences between parameters are significant.

S-IC.6. Evaluate reports based on data.

Conditional Probability and the Rules of Probability

S-CP.1. Describe events as subsets of a sample space (the set of outcomes) using characteristics (or categories) of the outcomes, or as unions, intersections, or complements of other events ("or," "and," "not").

S-CP.2. Understand that two events A and B are independent if the probability of A and B occurring together is the product of their probabilities, and use this characterization to determine if they are independent.

S-CP.3. Understand the conditional probability of A given B as P(A and B)/P(B), and interpret independence of A and B as saying that the conditional probability of A given B is the same as the probability of A, and the conditional probability of B given A is the same as the probability of B.

S-CP.4. Construct and interpret two-way frequency tables of data when two categories are associated with each object being classified. Use the two-way table as a sample space to decide if events are independent and to approximate conditional probabilities. For example, collect data from a random sample of students in your school on their favorite subject among math, science, and English. Estimate the probability that a randomly selected student from your school will favor science given that the student is in tenth grade. Do the same for other subjects and compare the results.

S-CP.5. Recognize and explain the concepts of conditional probability and independence in everyday language and everyday situations. For example, compare the chance of having lung cancer if you are a smoker with the chance of being a smoker if you have lung cancer.

S-CP.6. Find the conditional probability of A given B as the fraction of B's outcomes that also belong to A, and interpret the answer in terms of the model.

S-CP.7. Apply the Addition Rule, P(A or B) = P(A) + P(B) – P(A and B), and interpret the answer in terms of the model.

S-CP.8. (+) Apply the general Multiplication Rule in a uniform probability model, P(A and B) = P(A)P(B|A) = P(B)P(A|B), and interpret the answer in terms of the model.

S-CP.9. (+) Use permutations and combinations to compute probabilities of compound events and solve problems.

Using Probability to Make Decisions

S-MD.1. (+) Define a random variable for a quantity of interest by assigning a numerical value to each event in a sample space; graph the corresponding probability distribution using the same graphical displays as for data distributions.

S-MD.2. (+) Calculate the expected value of a random variable; interpret it as the mean of the probability distribution.

S-MD.3. (+) Develop a probability distribution for a random variable defined for a sample space in which theoretical probabilities can be calculated; find the expected value. For example, find the theoretical probability distribution for the number of correct answers obtained by guessing on all five questions of a multiple-choice test where each question has four choices, and find the expected grade under various grading schemes.

S-MD.4. (+) Develop a probability distribution for a random variable defined for a sample space in which probabilities are assigned empirically; find the expected value. For example, find a current data distribution on the number of TV sets per household in the United States, and calculate the expected number of sets per household. How many TV sets would you expect to find in 100 randomly selected households?

S-MD.5. (+) Weigh the possible outcomes of a decision by assigning probabilities to payoff values and finding expected values.

> S-MD.5.a. Find the expected payoff for a game of chance. For example, find the expected winnings from a state lottery ticket or a game at a fast-food restaurant.
>
> S-MD.5.b. Evaluate and compare strategies on the basis of expected values. For example, compare a high-deductible versus a low-deductible automobile insurance policy using various, but reasonable, chances of having a minor or a major accident.

S-MD.6. (+) Use probabilities to make fair decisions (e.g., drawing by lots, using a random number generator).

S-MD.7. (+) Analyze decisions and strategies using probability concepts (e.g., product testing, medical testing, pulling a hockey goalie at the end of a game).

Appendix F: National Educational Technology Standards for Students (NETS-S)

NETS Crosswalk for Health Sciences (Core)										
		Unit 1	Unit 2	Unit 3	Unit 4	Unit 5	Unit 6	Unit 7	Unit 8	Unit 9
NETS Standards										
T1										
T2					X					
T3					X					
T4					X					
T5					X					
T6					X					

T1 Creativity and Innovation
T2 Communication and Collaboration
T3 Research and Information Fluency
T4 Critical Thinking, Problem Solving, and Decision Making
T5 Digital Citizenship
T6 Technology Operations and Concepts

T1 Creativity and Innovation
Students demonstrate creative thinking, construct knowledge, and develop innovative products and processes using technology. Students do the following:

a. Apply existing knowledge to generate new ideas, products, or processes.
b. Create original works as a means of personal or group expression.
c. Use models and simulations to explore complex systems and issues.
d. Identify trends and forecast possibilities.

T2 Communication and Collaboration
Students use digital media and environments to communicate and work collaboratively, including at a distance, to support individual learning and contribute to the learning of others. Students do the following:

a. Interact, collaborate, and publish with peers, experts, or others employing a variety of digital environments and media.
b. Communicate information and ideas effectively to multiple audiences using a variety of media and formats.
c. Develop cultural understanding and global awareness by engaging with learners of other cultures.
d. Contribute to project teams to produce original works or solve problems.

T3 Research and Information Fluency

Students apply digital tools to gather, evaluate, and use information. Students do the following:

a. Plan strategies to guide inquiry.
b. Locate, organize, analyze, evaluate, synthesize, and ethically use information from a variety of sources and media.
c. Evaluate and select information sources and digital tools based on the appropriateness to specific tasks.
d. Process data and report results.

T4 Critical Thinking, Problem Solving, and Decision Making

Students use critical-thinking skills to plan and conduct research, manage projects, solve problems, and make informed decisions using appropriate digital tools and resources. Students do the following:

a. Identify and define authentic problems and significant questions for investigation.
b. Plan and manage activities to develop a solution or complete a project.
c. Collect and analyze data to identify solutions and/or make informed decisions.
d. Use multiple processes and diverse perspectives to explore alternative solutions.

T5 Digital Citizenship

Students understand human, cultural, and societal issues related to technology and practice legal and ethical behavior. Students do the following:

a. Advocate and practice safe, legal, and responsible use of information and technology.
b. Exhibit a positive attitude toward using technology that supports collaboration, learning, and productivity.
c. Demonstrate personal responsibility for lifelong learning.
d. Exhibit leadership for digital citizenship.

T6 Technology Operations and Concepts

Students demonstrate a sound understanding of technology concepts, systems, and operations. Students do the following:

a. Understand and use technology systems.
b. Select and use applications effectively and productively.
c. Troubleshoot systems and applications.
d. Transfer current knowledge to learning of new technologies.