2022 Early Childhood Education

Program CIP: 19.0709—Child Care Provider/Assistant

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
601.359.3974

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

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.

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Standards

Standards and alignment crosswalks are referenced in the appendices. Depending on the curriculum, these crosswalks should identify alignment to the standards mentioned below, as well as possible related academic topics as required in the Subject Area Testing Program in Algebra I, Biology I, English II, and U.S. History from 1877, which could be integrated into the content of the units. Mississippi's CTE ECE curriculum is aligned to the following standards:

National Association for the Education of Young Children (NAEYC)
The National Association for the Education of Young Children (NAEYC) is the world's largest organization working on behalf of young children. NAEYC believes all young children thrive and learn in a society dedicated to ensuring they reach their full potential. NAEYC promotes high-quality early learning for all children, birth through age 8, by connecting practice, policy, and research. NAEYC is dedicated to improving the well-being of all young children, with particular focus on the quality of educational and developmental services for all children from birth through age 8. NAEYC is committed to becoming an increasingly high performing and inclusive organization. Since 1985, NAEYC has offered a national, voluntary accreditation system to set professional standards for early childhood education programs and to help families identify high-quality programs. Today, NAEYC accreditation represents the mark of quality in early childhood education. Over 6,500 child-care programs, preschools, early learning centers, and other center or school-based early childhood education programs are currently NAEYC-accredited. These programs provide high-quality care and education to nearly one million young children in the United States, its territories, and programs affiliated with the United States Department of Defense.
naeyc.org

Child Development Associate (CDA) credential
The Child Development Associate credential (CDA) ™ is the unique credentialing process, administered by the Council for Professional Recognition, which results in the award of the CDA Credential. The program uses a specific set of time-tested, research-based tools that follow the CDA Competency Standards to determine early childhood teacher competency, based on multiple sources of evidence. The CDA Competency Standards are the core of the CDA program. Candidates seeking to earn the CDA Credential are assessed based upon the CDA Competency Standards.
cdacouncil.org

Framework for 21st Century Learning
In defining 21st-century learning, the Partnership for 21st Century Skills has embraced key themes and skill areas that represent the essential knowledge for the 21st century: global awareness; financial, economic, business, and entrepreneurial literacy; civic literacy; health literacy; environmental literacy; learning and innovation skills; information, media, and technology skills; and life and career skills. 21 *Framework Definitions* (2019).
battelleforkids.org/networks/p21/frameworks-resources

Preface

Secondary CTE 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 applied 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. This document provides information, tools, and solutions that will aid students, teachers, and schools in creating and implementing applied, interactive, and innovative lessons. Through best practices, alignment with national standards and certifications, community partnerships, and a hands-on, student-centered concept, educators will be able to truly engage students in meaningful and collaborative learning opportunities.

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; Strengthening Career and Technical Education for the 21st Century Act, 2019 [Perkins V]; and Every Student Succeeds Act, 2015).

Mississippi Teacher Professional Resources

The following are resources for Mississippi teachers:

Curriculum, Assessment, Professional Learning
: Program resources can be found at the RCU's website, 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, call the RCU at 662.325.2510.

Executive Summary

Pathway Description
Early childhood education is a pathway in the human science career cluster. It is a two-year high school program designed to include classroom and hands-on experiences to prepare students for employment or continuing education in the early childhood education field. In the course of study, emphasis is placed on students' personal and professional preparation for careers or education in the field, history and trends of early childhood education, children's health and safety, child development, and child guidance and observation. Emphasis is also placed on career and professional development, characteristics of high-quality early childhood centers, management and administration in quality childcare programs, and the learning environment. Instructional strategies and activities implemented through the course of study are aligned to the NAEYC and CDA standards and assist students in meeting requirements for the CDA credential.

College, Career, and Certifications
Industry standards in the early childhood education curriculum are based on the NAEYC and CDA standards. NAEYC has set forth early childhood program standards, which are seamlessly integrated throughout the early childhood education curriculum. The NAEYC standards are nationally recognized and embraced by all stakeholders in the early childhood community. NAEYC, which is the largest organization in the early childhood field, also offers a prestigious certification for child-care centers and associate degree programs.

The CDA standards are also integrated into the curriculum. The CDA credential is a national credential that is awarded to quality caregivers who work with children from birth to age five years. In order to attain the CDA credential, an applicant must complete 480 hours of field experience, complete 120 hours of education coursework, and have a high school diploma or be enrolled in a high school career and technical program. After graduating from high school and gaining 120 hours of formal training, students have completed step one of the CDA credentialing process and may apply for the certification. CDA's standards are widely recognized by secondary and postsecondary early childhood technical programs, child-care centers, and the United States Department of Education. The CDA standards provide a mechanism for high school graduates to enter the workforce, with or without postsecondary training, to become highly qualified in the field of early childhood education and services.

The curriculum also combines effective classroom instruction with hands-on training to prepare students completing the early childhood education program and graduating from high school to enter the workforce or continue education at a postsecondary institution. Students who choose to enter the workforce after graduation from high school could gain employment as child-care providers or as teacher assistants. Students who choose to attend a postsecondary institution may enter a child-care technical program. After completion of the postsecondary program, students may enter the workforce as child-care providers, teacher assistants, or preschool teachers; however, students may also choose to further their education at an institution of higher learning. These students can major in early childhood education, elementary education, or child development.

Grade Level and Class Size Recommendations
It is recommended that students enter this program as a ninth or 10th grader. Exceptions to this are a district-level decision based on class size, enrollment numbers, and student maturity. A maximum of 20 students is recommended for this course.

Student Prerequisites
In order for students to experience success in the program, the following student 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 level of math instruction needed)
3. Instructor approval and TABE reading score (eighth grade or higher)

or

1. TABE reading score (eighth grade or higher)
2. Instructor approval

or

1. Instructor approval

Assessment
The latest assessment blueprint for the curriculum can be found at rcu.msstate.edu/curriculum/curriculumdownload.

Applied Academic Credit
The latest academic credit information can be found at mdek12.org/ese/approved-course-for-the-secondary-schools.

Teacher Licensure
The latest teacher licensure information can be found at mdek12.org/oel/apply-for-an-educator-license.

Professional Learning
If you have specific questions about the content of any of training sessions provided, please contact the RCU at 662.325.2510.

Course Outlines

Option 1—Four 1-Carnegie-Unit Courses

This curriculum consists of four 1-credit courses, which should be completed in the following sequence:

1. **Fundamentals of Early Childhood Education—Course Code: 996202**
2. **Child Development—Course Code: 996203**
3. **The Learning Environment—Course Code: 996204**
4. **Management of a Quality Child Care Program—Course Code: 996205**

Course Description: Fundamentals of Early Childhood Education
This course is an introduction to personal and professional preparation for a career in the field of early childhood education. Students are introduced to guidelines and regulations governing childcare facilities. Students will learn the components of child development for infant to three-year-old children. Participation in a student organization, field experiences, internships, and job-shadowing will be introduced in this course. Students will begin to develop skills and maintain documentation toward meeting requirements for the CDA credential.

Course Description: Child Development
The course continues with child development, but focusing on children four years of age and those with special needs. Other topics covered include using developmentally appropriate knowledge to design policies that promote the health and safety of children in a childcare facility. Students will continue exposure to field experiences, such as internships and job-shadowing, as well as develop skills and maintain documentation toward meeting requirements for the CDA credential.

Course Description: The Learning Environment
This course continues to emphasize knowledge in the areas of educational, career, and professional plans for the field of early childhood. The major topic of this course includes curriculum planning and scheduling in an early childhood program. Students will develop age-appropriate activities and create lesson plans that encompass all areas of child development. Methods of child guidance techniques are also introduced in this course. Students will participate in field experiences, internships, and job-shadowing on a more in-depth level. Students will continue to develop skills and maintain documentation toward meeting requirements for the CDA credential.

Course Description: Management of a Quality Child Care Program
This course includes methods and strategies that enhance the quality of a childcare program as it relates to parental and community involvement. Cultural diversity will be a major topic for this course. Students will develop skills to promote cultural awareness and inclusiveness in a program. Participation in field experience, internships, and job-shadowing will continue on the most in-depth level. Students will also continue to develop skills and documentation toward meeting requirements for the CDA credential.

Fundamentals of Early Childhood Education—Course Code: 996202

Unit	Unit Name	Hours
1	Program Orientation	40
2	Child Development: Infant to Three Years Old	100
Total		**140**

Child Development—Course Code: 996203

Unit	Unit Name	Hours
3	Child Development: Four Years Old and Special Needs Populations	90
4	Preparing a Healthy and Safe Environment	50
Total		**140**

The Learning Environment—Course Code: 996204

Unit	Unit Name	Hours
5	The Learning Environment	70
6	Curriculum Development	70
Total		**140**

Management of a Quality Child Care Program—Course Code: 996205

Unit	Unit Name	Hours
7	Family and Community Relationships	70
8	Career Development and Professionalism	70
Total		**140**

Option 2—Two 2-Carnegie-Unit Courses

This curriculum consists of two 2-credit courses, which should be completed in the following sequence:

1. **Early Childhood I—Course Code: 996200**
2. **Early Childhood II—Course Code: 996201**

Course Description: Early Childhood I
This year-long course begins with an introduction to personal and professional preparation for continued education, training, and careers in early childhood. Major topics of study in this course are stages of child development, ranging from birth through age five, and children's health and safety. Students are introduced to guidelines and regulations governing childcare facilities. Other topics covered are related to the importance of observing and assessing children. Methods of child guidance techniques are also introduced in this course. Participation in a student organization is ongoing. Students will participate in field experiences, internships, and job-shadowing, as well as develop skills and maintain documentation toward meeting requirements for the CDA credential.

Course Description: Early Childhood II
This course focuses on curriculum planning and the development of age-appropriate activities and lesson plans that encompass all areas of child development. Other major topics covered in this course are methods of child guidance techniques and strategies to enhance the quality of a facility such as cultural diversity, parental, and community involvement. Students will continue to develop educational, career, and professional plans in the area of early childhood. Participation in a student organization is ongoing. Students will participate in field experiences, internships, and job-shadowing, as well as continue to develop skills and maintain documentation toward meeting requirements for the CDA credential.

Early Childhood I—Course Code: 996200

Unit	Unit Name	Hours
1	Program Orientation	40
2	Child Development: Infant to Three Years Old	100
3	Child Development: Four Year Olds and Special Needs Populations	90
4	Preparing a Healthy and Safe Environment	50
Total		**280**

Early Childhood II—Course Code: 996201

Unit	Unit Name	Hours
5	The Learning Environment	70
6	Curriculum Development	70
7	Family and Community Relationships	70
8	Career Development and Professionalism	70
Total		**280**

Career Pathway Outlook

Overview
Quality ECE programs benefit our future society and economy. Research shows that preschool education is a sound economic investment, due to the fact that every dollar invested in early education saves taxpayers costs in the future. It is an investment that pays great returns. The ECE curriculum prepares students for future success in the field of early childhood education by improving academic and technology skills, improving employability skills, and articulating courses to community colleges. The rigorous and relevant two-year program is based on state and national standards, CDA competency standards, NAEYC standards, and 21st-century workforce skills. The course is a two-year or four-year program offering four Carnegie units of credit.

The industry of ECE is preparing for changes due to high rates of teacher retirement, national and state initiatives, requirements, and increasing focus on the field of early childhood education. The course allows core academic subjects that are vital to students' success to be integrated into the curriculum.

Needs of the Future Workforce
Data for this synopsis were compiled from the Mississippi Department of Employment Security (2021). Employment opportunities for each of the occupations listed below are:

Table 1.1: Current and Projected Occupation Report

Description	Jobs, 2016	Projected Jobs, 2026	Change (Number)	Change (Percent)	Average Hourly Earning
Preschool Teachers, Except Special Education	2,340	2,470	130	5.6	$14.86
Kindergarten Teachers, Except Special Education	1,120	1,210	90	8.0	N/A
Elementary School Teachers, Except Special Education	15,060	16,280	1,220	8.1	N/A
Child Care Workers	8,660	8,890	230	2.7	$9.29
Teacher Assistants	11,490	12,420	930	8.1	N/A

Source: Mississippi Department of Employment Security; www.mdes.ms.gov (2021).

Perkins V Requirements and Academic Infusion
The ECE curriculum meets Perkins V requirements of introducing students to and preparing them for high-skill, high-wage occupations in the ECE fields. It also offers students a program of study, including secondary, postsecondary, and institutions of higher learning courses, that will further prepare them for ECE careers. Additionally, this curriculum is integrated with academic college- and career-readiness standards. Lastly, it focuses on ongoing and meaningful professional development for teachers as well as relationships with industry.

Transition to Postsecondary Education
The latest articulation information for secondary to postsecondary can be found at the Mississippi Community College Board (MCCB) website, mccb.edu.

Best Practices
Innovative Instructional Technologies
Classrooms should be equipped with tools that will teach today's digital learners through applicable and modern practices. The ECE educator's goal should be to include teaching strategies that incorporate current technology. To make use of the latest online communication tools—wikis, blogs, podcasts, and social media platforms, for example—the classroom teacher is encouraged to use a learning management system that introduces students to education in an online environment and places more of the responsibility of learning on the student.

Differentiated Instruction
Students learn in a variety of ways, and numerous factors—students' backgrounds, emotional health, and circumstances, for example—create unique learners. By providing various teaching and assessment strategies, students with various learning preferences can have more opportunity to succeed.

CTE Student Organizations
Teachers should investigate opportunities to sponsor a student organization. There are several here in Mississippi that will foster the types of learning expected from the ECE curriculum. FCCLA (Family, Career, and Community Leaders of America) and Skills USA are examples of student organizations for ECE. Student organizations provide participants and members with growth opportunities and competitive opportunities.

Cooperative Learning
Cooperative learning can help students understand topics when independent learning cannot. Therefore, you will see several opportunities in the ECE curriculum for group work. To function in today's workforce, students need to be able to work collaboratively with others and solve problems without excessive conflict. The ECE curriculum provides opportunities for students to work together and help each other complete complex tasks. There are many field experiences within the ECE curriculum that will allow and encourage collaboration with professionals currently in the field of ECE.

Work-Based Learning
Work-based learning is an extension of understanding competencies taught in the ECE classroom. The second year ECE program requires students to obtain a minimum of 100 clinical-type hours, which should include, but is not limited to, field trips, observations, job-shadowing, and preferably some sort of volunteer, internship, or apprenticeship experience. These real-world connections and applications provide a link to all types of students regarding knowledge, skills, and professional dispositions. Thus, supervised collaboration and immersion into the ECE world around the students are keys to students' success, knowledge, and skills development.

Professional Organizations

American Library Association
ala.org

Association of Career and Technical Education (ACTE)
acteonline.org

Association for Childhood Education International
ceinternational1892.org

Association for Education Communications and Technology
aect.org

Association for Experimental Education
aee.org

Association for Supervision and Curriculum Development
ascd.org

Council for Exceptional Children
cec.sped.org

Council for Learning Disabilities
cldinternational.org

Council for Professional Recognition, Child Development Associate (CDA) Credential
cdacouncil.org/about/cda-credential

Early Childhood Care and Development, Mississippi Department of Human Services
mdhs.state.ms.us/early-childhood-care-development/

International Literacy Association
literacyworldwide.org

International Society for Technology in Education
iste.org

Learning Disabilities Association of America
ldaamerica.org

Mississippi Building Blocks
zerotothree.org

Mississippi Day Care Listings
daycare.com

Mississippi Office of Healthy Schools
healthyschoolsms.org/

Mississippi State Department of Health
Child Care Facilities Licensure
msdh.state.ms.us

National Art Education Association
arteducators.org

National Association for Bilingual Education
nabe.org

National Association for Gifted Children
nagc.org

National Association for the Education of Young Children
naeyc.org

National Science Teachers Association
nsta.org

Southern Early Childhood Association
southernearlychildhood.org

Using This Document

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.

Teacher Resources
Teacher resources for this curriculum may be found in multiple places. Many program areas have teacher resource documents that accompany the curriculum and can be downloaded from the same site as the curriculum. The teacher resource document contains references, lesson ideas, websites, teaching and assessment strategies, scenarios, skills to master, and other resources divided by unit. This document could be updated periodically by RCU staff. Please check the entire document, including the entries for each unit, regularly for new information. If you have something you would like to add or have a question about the document, call or email the RCU's instructional design specialist for your program. The teacher resource document can be downloaded at rcu.msstate.edu/curriculum/curriculumdownload.aspx. All teachers should request to be added to the Canvas Resource Guide for their course. This is where all resources will be housed in the future if they are not already. To be added to the guide, send a Help Desk ticket to the RCU by emailing helpdesk@rcu.msstate.edu.

Perkins V Quality Indicators and Enrichment Material
Some of the units may include an enrichment section at the end. If the ECE program is currently using the Mississippi Career Planning and Assessment System (MS-CPAS) as a measure of accountability, the enrichment section of material will not be tested. If this is the case, it is suggested to use the enrichment material when needed or desired by the teacher and if time allows in the class. This material will greatly enhance the learning experiences for students. If, however, the ECE program is using a national certification, work-based learning, or other measure of accountability that aligns with Perkins V as a quality indicator, this material could very well be tested on that quality indicator. It is the responsibility of the teacher to ensure all competencies for the selected quality indicator are covered throughout the year.

Unit 1: Program Orientation

Competencies and Suggested Objectives
1. Describe the expectations, procedures, and opportunities in the early childhood education (ECE) program. DOK1 a. Review the curriculum standards, competencies, and objectives. b. Discuss school and classroom policies for emergency procedures and the proper use of lab equipment. c. Identify leadership opportunities in student organizations, such as FCCLA, Skills USA, or Educators Rising. d. Complete federally required safety test with 100% accuracy.
2. Explore the opportunities and trends in the field of ECE. DOK2 a. Research the education and training required in the various ECE careers. b. Identify characteristics and responsibilities of individuals working in the field. c. Describe the various types of early childcare programs and the historical changes that have affected the field of ECE. d. Investigate ECE organizations and their role in the field including licensing, regulations, and accreditations. • American Montessori Association (AMA) • Family, Career and Community Leaders of America (FCCLA) • National Association of Child Care Professionals (NACCP) • National Association for the Education of Young Children (NAEYC) • National Association for Family Child Care (NAFCC) • National Child Care Association (NCCA) • National Head Start Association (NHSA) • Child Development Association (CDA)

Enrichment
1. Students should obtain a copy of the CDA National Credentialing Program and Competency Standards guidebook to review the High School Child Development Associate Credentialing process. See the ECE teacher resource guide for fundraising options to purchase the book (GoFundMe, etc.). 2. Prepare a professional portfolio to include their philosophy of early childhood education, résumé, and work samples that are created throughout the program.

Note: Safety is to be taught as an ongoing part of the program. Students are required to complete a written safety test with 100% accuracy before participating in clinicals. This test should be documented in each student's file.
Note: Time allotted for this unit will be distributed over the entire year.

Unit 2: Child Development: Infant to Three Years Old

Competencies and Suggested Objectives
1. Apply methods to observe and assess children's developmental and educational goals. DOK2 a. Identify the general purpose of assessments and factors that determine when they are conducted in a childcare setting. b. Analyze factors involved in choosing assessments, including the advantages and disadvantages of each tool. • Checklist • Anecdotal records • Rating scales • Participation charts • Work samples/portfolios • Visual/technological
2. Analyze developmental stages and apply the appropriate strategies that promote growth in children from birth to two years of age. DOK3 a. Describe the characteristics associated with areas of development in children from birth to two years of age. • Physical • Cognitive • Social-emotional b. Examine the behaviors and needs described by Erik Erikson's psychosocial theory that apply to the developmental stages for this group. • Stage I • Stage II
3. Analyze developmental stages and apply the appropriate strategies that promote growth in children from two to three years of age. DOK3 a. Describe the characteristics associated with areas of development in children from two to three years of age. • Physical • Cognitive • Social-emotional b. Examine the stages of development for children in this age group according to theories and principles. • Piaget's theory of cognitive development • Erikson's psychosocial theory of human development

Unit 3: Child Development: Four Years Old and Special Needs Populations

Competencies and Suggested Objectives
1. Analyze developmental stages and apply the appropriate strategies that promote growth in children from four to five years of age. DOK3 a. Describe the characteristics associated with areas of development for children in this age group. • Physical • Cognitive • Social-emotional b. Examine the stages of development for children in this age group according to theoretical principles. • Piaget's theory of cognitive development • Erikson's psychosocial theory of human development • Maslow's hierarchy of needs
2. Develop strategies that support the inclusion and development of children with special needs into a program. DOK3 a. Examine the purpose and goals of laws regarding disabilities in childcare programs. • Individuals with Disabilities Education Act (IDEA) • Individualized Education Plan (IEP) • Individualized Family Service Plan (IFSP) • Americans with Disabilities Act (ADA) b. Apply strategies to identify and accommodate the various types of special needs. • Hearing • Speech/language • Visual • Physical • Cognitive/learning • Gifted

Unit 4: Preparing a Healthy and Safe Environment

Competencies and Suggested Objectives

1. Demonstrate developmentally appropriate equipment selection and space organization skills to promote healthy learning environments. DOK3
   a. Identify key elements and criteria involved in planning and preparing the environment.
      - Indoor environment
      - Indoor furniture and design
      - Activity areas
      - Outdoor environment
   b. Plan activities and select equipment, materials, and toys that encourage the developmental skills of children, such as motor, problem solving, exploration, and communication.
      - Birth to two years of age
      - Two to three years of age
      - Three to four years of age
      - Special needs populations
2. Develop policies that must be implemented to protect the safety and health of children in a childcare facility. DOK3
   a. Identify the necessary physical features to prevent or reduce injuries in a childcare facility.
      - Indoor and outdoor play areas
      - Furniture
      - Walls
      - Toys and equipment
   b. Explain emergency and safety procedures that must be implemented to maintain a safe environment for children.
      - Child supervision
      - Transportation
      - Fire and weather
      - Choking and poisonings
   c. Demonstrate procedures that minimize and prevent the spread of disease and infections.
      - Sanitizing and disinfecting
      - Hand washing
      - Diapering/toileting

d. Identify concepts to design nutritious meals and snacks in a childcare program.
    - Common nutritional problems/needs
    - Food groups and sources
    - Meal plans and preferences

e. Design a center's health policy that protects and improves the health of children.
    - Immunizations
    - Exclusion
    - Administering medications
    - Napping
    - Contacting parents
    - First aid
    - Wounds and burn treatment

3. Explain the legal requirements childcare centers use to promote children's safety. DOK2
    a. Explore a center's responsibility for ensuring the safety and health of children.
        - Types of liability
        - Health and safety forms
        - Privacy law
    b. Recognize signs of neglect and abuse in children.
        - Nonaccidental physical injury
        - Neglect
        - Emotional abuse
        - Sexual abuse
    c. Demonstrate procedures that minimize and prevent the spread of disease and infections.
        - Sanitizing and disinfecting
        - Hand washing
        - Diapering/toileting

Enrichment

1. Pursue a certification in first aid and infant or child CPR.
2. Research the MSDH guidelines for a safe physical area, proper sanitation/hygiene, disease control and prevention practices, and immunization requirements.

Unit 5: Learning Environment

Competencies and Suggested Objectives

1. Create a healthy, supportive, and challenging learning environment based on developmental skills of children. DOK3
   a. Identify reasons and guidelines for establishing classroom limits and enforcement techniques.
   b. Describe appropriate limitations for general classroom areas and activities.
      - Cooking
      - Sensory play
      - Playground activity
      - Dramatic play
      - Small manipulative activities
   c. Identify strategies that promote effective routines and activities for early childhood education programs.
      - Arrival routines
      - Meals/snacks
      - Nap times
      - Indoor and outdoor play
      - Toileting and hand washing
   d. Demonstrate the use of developmentally appropriate transition techniques that promote positive outcomes in a childcare setting.
2. Develop guidance skills to support developmental and educational goals. DOK2
   a. Differentiate the purpose of discipline, guidance, and in a childcare setting.
   b. Describe principles of direct and indirect guidance.
   c. Identify the purpose and goals of techniques designed to guide children's behavior.
      - Positive verbal environment
      - Positive reinforcement
      - Consequences
      - Warning
      - Time-out
      - I-messages
      - Praise
      - Prompting
      - Persuading
      - Redirecting
      - Modeling
      - Listening
      - Encouraging
      - Suggestions

Enrichment

1. Select a local childcare facility to compare and contrast classroom design and layout, including office, classrooms, restrooms, isolation room, rest areas, security, lighting, toys and equipment, flooring, and wall and window treatments.
2. Design a developmentally appropriate classroom with basic areas.

Unit 6: Curriculum Development

Competencies and Suggested Objectives
1. Demonstrate developmentally appropriate teaching methods and approaches to learning for early education. DOK2 a. Describe factors to consider, and the elements involved in the curriculum development process. • Program goals • Observations/assessments • Content vs. process-centered • Learning styles/interests • Themes • Resources • Activities • Technology
2. Demonstrate approaches to learning and teaching by incorporating developmentally appropriate themes. DOK2 a. Compile a list of developmentally appropriate themes for toddlers and preschool-age children. b. Develop a web or flowchart illustrating a connection between activities and themed units of lessons. c. Write a "block" format lesson plan based on a theme. d. Create a "daily lesson plan" to include the following: • Goals • Motivation or introduction • Subject • Learning objectives • Procedures • Accommodations (developmental delays) • Materials • Closure/transition • Guided questions • Evaluation

3. Design a plan to guide learning experiences. DOK3
   a. In the plan, include the necessary elements for the following:
      - Art
      - Language (storytelling, writing, play, or puppetry)
      - Math
      - Science
      - Social studies
      - Music or movement
      - Food experiences
      - Field trip experiences
      - Technology

Unit 7: Family and Community Relationships

Competencies and Suggested Objectives
1. Demonstrate cultural awareness and skills to build positive relationships with family and community members. DOK2 a. Identify the purpose and various methods for involving parents and families in the childcare program. • Parent-teacher conferences • Written communication • Home visits • Discussion groups • Volunteers b. Identify strategies to promote cultural diversity and the dangers associated with certain concepts. • Multicultural books, toys, and materials • Celebrations, events, and holidays • Intergenerational concepts • Stereotypes • Nonsexist toys and materials c. Identify strategies to promote cultural diversity and the dangers associated with certain concepts. • Cooking • Sensory play • Playground activity • Dramatic play • Small manipulative activities

Unit 8: Career Development and Professionalism

Competencies and Suggested Objectives
1. Demonstrate career readiness and work-based learning skills. DOK3 a. Research and compare available jobs in the ECE field based on key factors. • Minimum education • Certifications • Minimum experience • Job description/responsibilities • Salary b. Demonstrate basic interviewing skills led by the instructor and/or advisory committee members. • Professional attire • Cover letter • Application and/or résumé • Letters of recommendations • Thank you/follow up letters c. Review individual professional portfolios to ensure necessary documents are included and information is current. • Philosophy of education • Lesson plans • Food menus and schedules • Daily schedule of activities • Observation records

Enrichment
1. Obtain a copy of the Child Development Associate National Credentialing Program and CDA Competency Standards book to begin the preparation phase of the credentialing process. 2. Conduct mock interviews, in person or virtually (e.g., via Skype, Facetime, FlipGrid, etc.).

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: Program Orientation and Introduction		
	1.	Describe the expectations, procedures, and opportunities in the early childhood education (ECE) program.
	2.	Explore the opportunities and trends in the field of ECE.
Unit 2: Child Development: Infant to Three Years Old		
	1.	Apply methods to observe and assess children's developmental and educational goals.
	2.	Analyze developmental stages and apply the appropriate strategies that promote growth in children from birth to two years of age.
	3.	Analyze developmental stages and apply the appropriate strategies that promote growth in children from two to three years of age.
Unit 3: Child Development: Four Years Old and Special Needs Populations		
	1.	Analyze developmental stages and apply the appropriate strategies that promote growth in children from four to five years of age.
	2.	Develop strategies that support the inclusion and development of children with special needs into a program.
Unit 4: Preparing a Healthy and Safe Environment		
	1.	Demonstrate developmentally appropriate equipment selection and space organization skills to promote healthy learning environments.
	2.	Develop policies that must be implemented to protect the safety and health of children in a childcare facility.
	3.	Explain the legal requirements childcare centers use to promote children's safety.
Unit 5: Learning Environment		
	1.	Create a healthy, supportive, and challenging learning environment based on developmental skills of children.
	2.	Develop guidance skills to support developmental and educational goals.

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Unit 6: Curriculum Development		
	1.	Demonstrate developmentally appropriate teaching methods and approaches to learning for early education.
	2.	Demonstrate approaches to learning and teaching by incorporating developmentally appropriate themes.
	3.	Design a plan to guide learning experiences.
Unit 7: Family and Community Relationships		
	1.	Demonstrate cultural awareness and skills to build positive relationships with family and community members.
Unit 8: Career Development and Professionalism		
	1.	Demonstrate career readiness and work-based learning skills.

Appendix A: Unit References

All of the early childhood education units use the same resources for each unit. You will find suggested resources listed below.

Council for Professional Recognition Child Development Associate Credential. (n.d.). [Web site]. Retrieved from cdacouncil.org

Educators Rising. (n.d.). [Web site]. Retrieved from educatorsrising.org

Environment Rating Scales Institute. (n.d.). [Web site]. Retrieved from ersi.info/iters_notes.html

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Herr, J. (2008). *Working with young children*. Tinley Park, IL: Goodheart-Wilcox.

Mississippi Department of Education. (n.d.). [Web site]. Retrieved from mdek12.org/

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Office of Head Start. (n.d.). [Web site]. Retrieved from acf.hhs.gov/programs/ohs

SkillsUSA. (n.d.). [Web site]. Retrieved from skillsusa.org

U.S. Department of Education. (n.d.). Building the legacy: IDEA 2004. Retrieved from http://idea.ed.gov

U.S. Department of Education. (n.d.). Family Educational Rights and Privacy Act (FERPA). Retrieved from ed.gov/policy/gen/guid/fpco/ferpa/index.html

Appendix B: Industry Standards

National Association for the Education of Young Children (NAEYC)

NAEYC1 Promoting Child Development and Learning
NAEYC2 Building Family and Community Relationships
NAEYC3 Observing, Documenting, and Assessing
NAEYC4 Using Developmentally Effective Approaches to Connect with Children and Families
NAEYC5 Using Content Knowledge to Build Meaningful Curriculum
NAEYC6 Becoming a Professional

	Units	Unit 1	Unit 2	Unit 3	Unit 4	Unit 5	Unit 6	Unit 7	Unit 8
Standard									
NAEYC1		X	X	X	X	X		X	X
NAEYC2		X	X	X	X		X	X	X
NAEYC3		X	X	X		X		X	X
NAEYC4		X	X	X	X	X	X	X	X
NAEYC5		X	X	X	X	X	X	X	X
NAEYC6		X		X		X		X	X

Child Development Associate credential (CDA)

CDA1 To establish and maintain a safe, healthy learning environment
CDA2 To advance physical and intellectual competence
CDA3 To support social and emotional development and provide positive guidance
CDA4 To establish positive and productive relationships
CDA5 To ensure a well-run, purposeful program responsive to participant needs
CDA6 To maintain a commitment to professionalism

	Units	Unit 1	Unit 2	Unit 3	Unit 4	Unit 5	Unit 6	Unit 7	Unit 8
Standard									
CDA1		X	X		X	X	X	X	X
CDA2		X	X	X	X	X	X	X	X
CDA3			X	X	X	X		X	X
CDA4		X	X	X	X		X	X	X
CDA5		X		X	X	X		X	X
CDA6		X		X	X		X	X	

2017 Early Childhood Education

Program CIP: 19.0709-Child Care Provider/Assistant

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

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

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.

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amanda.tullos@rcu.msstate.edu

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leanne.long@rcu.msstate.edu

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Standards

Standards are superscripted in each unit and are referenced in the appendices. Standards in the Early Childhood Education Curriculum Framework and Supporting Materials are based on the following:

National Association for the Education of Young Children (NAEYC)

The National Association for the Education of Young Children (NAEYC) is the world's largest organization working on behalf of young children. NAEYC believes all young children thrive and learn in a society dedicated to ensuring they reach their full potential. NAEYC promotes high-quality early learning for all children, birth through age 8, by connecting practice, policy, and research. NAEYC is dedicated to improving the well-being of all young children, with particular focus on the quality of educational and developmental services for all children from birth through age 8. NAEYC is committed to becoming an increasingly high performing and inclusive organization. Since 1985, NAEYC has offered a national, voluntary accreditation system to set professional standards for early childhood education programs and to help families identify high-quality programs. Today, NAEYC accreditation represents the mark of quality in early childhood education. Over 6,500 child care programs, preschools, early learning centers, and other center or school-based early childhood education programs are currently NAEYC-accredited. These programs provide high-quality care and education to nearly one million young children in the United States, its territories, and programs affiliated with the United States Department of Defense. The following NAEYC standards are incorporated throughout the Early Childhood Education curriculum: 1) Promoting child development and learning; 2) Building family and community relationships; 3) Observing, documenting, and assessing; 4) Using developmentally effective approaches to connect with children and families; 5) Using content knowledge to build meaningful curriculum and 6) Becoming a professional. Reprinted from **http://www.naeyc.org**

Child Development Associate (CDA) credential

The Child Development Associate credential (CDA) ™ is the unique credentialing process, administered by the Council for Professional Recognition, which results in the award of the CDA Credential. The Program uses a specific set of time-tested, research-based tools that follow the CDA Competency Standards to determine early childhood teacher competency, based on multiple sources of evidence. The CDA Competency Standards are the core of the CDA program. Candidates seeking to earn the CDA Credential are assessed based upon the CDA Competency Standards. These national standards are incorporated throughout the Early Childhood Education curriculum: 1) To establish and maintain a safe, healthy learning environment; 2) To advance physical and intellectual competence; 3) To support social and emotional development and to provide positive guidance; 4) To establish positive and productive relationships; 5) To ensure a well-run, purposeful program responsive to participant needs; and 6) To maintain a commitment to professionalism. Reprinted from **http://www.cdacouncil.org**

College and Career-Ready Standards

The College and Career-Ready Standards emphasize critical thinking, teamwork and problem-solving skills. Students will learn the skills and abilities demanded by the workforce of today and the future. Mississippi adopted Mississippi College- and Career-Ready Standards (MCCRS) because they provide a consistent, clear understanding of what students are expected to learn so that teachers and parents know what they need to do to help them. Reprinted from http://www.mde.k12.ms.us/MCCRS

International Society for Technology in Education Standards (ISTE)

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; andEvery Student Succeeds Act, 2015.).

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.

Executive Summary

Pathway Description

Early childhood education is a pathway in the human science career cluster. It is a two year high school program designed to include classroom and hands-on experiences to prepare students for employment or continuing education in the early childhood education field. In the course of study, emphasis is placed on students' personal and professional preparation for careers or education in the field, history and trends of early childhood education, children's health and safety, child development, and child guidance and observation. Emphasis is also placed on career and professional development, characteristics of high quality early childhood centers, management and administration in quality child care programs, and the learning environment. Instructional strategies and activities implemented through the course of study are aligned to the National Association for the Education of Young Children (NAEYC) and Child Development Associate (CDA) standards and assist students in meeting requirements for the CDA credential.

Industry Certification

Industry standards in the early childhood education curriculum are based on the NAEYC and CDA standards. NAEYC has set forth early childhood program standards, which are seamlessly integrated throughout the early childhood education curriculum. The NAEYC standards are nationally recognized and embraced by all stakeholders in the early childhood community. NAEYC, which is the largest organization in the early childhood field, also offers a prestigious certification for child-care centers and associate degree programs.

The CDA standards are also integrated into the curriculum. The CDA credential is a national credential that is awarded to quality caregivers who work with children from birth to age five years. In order to attain the CDA credential, an applicant must complete 480 hours of field experience, complete 120 hours of education coursework, and have a high school diploma or be enrolled in a high school career and technical program. After graduating from high school and gaining 120 hours of formal training, students have completed step one of the CDA credentialing process and may apply for the certification. CDA's standards are widely recognized by secondary and postsecondary early childhood technical programs, child-care centers, and the United States Department of Education. The CDA standards provide a mechanism for high school graduates to enter the workforce, with or without postsecondary training, to become highly qualified in the field of early childhood education and services.

The curriculum also combines effective classroom instruction with hands-on training to prepare students completing the early childhood education program and graduating from high school to enter the workforce, continue education at a postsecondary institution, and then enter the workforce. Students who choose to enter the workforce after graduation from high school have the opportunity to gain employment as child-care providers or as teacher assistants. Students who choose to attend a postsecondary institution may enter a child-care technical program. After completion of the postsecondary program, students may enter the workforce as child-care providers, teacher assistants, or preschool teachers; however, students may also choose to further their education at an institution of higher learning. These students can major in early childhood education, elementary education, or child development.

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 experience success in the program, the following student 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 level of math instruction needed)
3. Instructor approval and TABE reading score (eighth grade or higher)

or

1. TABE reading score (eighth grade or higher)
2. Instructor approval

or

1. Instructor approval

Applied Academic Credit

The latest academic credit information can be found at http://www.mde.k12.ms.us/ACCRED/AAS.

Once there, click the "Mississippi Public School Accountability Standards Year" tab.

Review the appendices for graduation options and superscript information regarding specific programs receiving academic credit.

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.

Course Outlines

Option 1 – Four One-Carnegie-Unit Courses

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

1. **Fundamentals of Early Childhood Education – Course Code: 996202**
2. **Child Development – Course Code: 996203**
3. **The Learning Environment – Course Code: 996204**
4. **Management of a Quality Child Care Program – Course Code: 996205**

Course Description: Fundamentals of Early Childhood Education
This course is an introduction to personal and professional preparation and careers in the field of early childhood education. Much of this course relates to protecting children's health and safety. Students are introduced to MSDH (Mississippi State Department of Health) Guidelines and Regulations Governing Child Care Facilities. Other topics include history and trends in education. Participation in a student organization is ongoing. Students will participate in field experience, internships, and job-shadowing. Students will continue to develop skills toward meeting requirements for the CDA credential.

Course Description: Child Development
The majority of hours in this course are spent on child development, ranging from birth throughout the childhood years. Other topics covered are related to the importance of observing and assessing children. Methods of child guidance techniques are also introduced in this course. Participation in a student organization is ongoing. Students will participate in field experience, internships, and job-shadowing. Students will continue to develop skills toward meeting requirements for the CDA credential.

Course Description: The Learning Environment
This course is a continuation of year one, and students continue to develop educational, career, and professional plans in the area of early childhood. The major topic of this course includes curriculum planning and scheduling in an early childhood program. Students will develop age-appropriate activities and create lesson plans that encompass all areas of child development. Participation in a student organization is ongoing. Students will participate in field experience, internships, and job-shadowing. Students will continue to develop skills toward meeting requirements for the CDA credential.

Course Description: Management of a Quality Child Care Program

This course includes topics related to state licensing requirements for child care facilities and management principles as a center director (including responsibilities regarding management of personnel, the facility's physical indoor and outdoor space, inventory, record-keeping, accreditation, parental involvement, marketing, budgeting, and maintaining a healthy, effective learning environment). Participation in a student organization is ongoing. Students will participate in field experience, internships, and job shadowing. Students will continue to develop skills toward meeting requirements for the CDA credential.

Fundamentals of Early Childhood Education – Course Code: 996202

Unit	Unit Name	Hours
1	Orientation I	20
2	Health and Safety	80
3	History and Trends of Early Childhood Education	20
Total		120

Child Development – Course Code: 996203

Unit	Unit Name	Hours
4	Child Development: Infants-Early Childhood Years	80
5	Observation, Assessment, and Guidance	40
Total		120

The Learning Environment – Course Code: 996204

Unit	Unit Name	Hours
6	Orientation II	10
7	Characteristics of Quality Child Care Programs	30
8	The Learning Environment	30
9	Curriculum Development	50
Total		120

Management of a Quality Child Care Program – Course Code: 996205

Unit	Unit Name	Hours
10	Management and Administration	80
11	Career Development and Professionalism	40
Total		120

Option 2 – Two Two-Carnegie-Unit Courses

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

1. **Early Childhood I – Course Code: 996200**

2. **Early Childhood II – Course Code: 996201**

Course Description: Early Childhood I

This year-long course begins with an introduction to personal and professional preparation for continued education, training, and careers in early childhood. Major topics of study in this course are history and trends of early childhood education, stages of child development, ranging from birth through age five, and children's health and safety. Students are introduced to MSDH Guidelines and Regulations Governing Child Care Facilities. Other topics covered are related to the importance of observing and assessing children. Methods of child guidance techniques are also introduced in this course. Participation in a student organization is ongoing. Students will participate in field experience, internships, and job shadowing. Students will develop skills toward meeting requirements for the CDA credential.

Course Description: Early Childhood II

This course focuses on curriculum planning and the development of age-appropriate activities and lesson plans that encompass all areas of child development and administration and management techniques needed in order to operate a successful, quality child care facility. Other major topics covered in this course are related to state licensing requirements for child care facilities, management principles as a center director (including responsibilities regarding management of personnel, the facility's physical indoor and outdoor space, inventory, record-keeping, accreditation, parental involvement, marketing, budgeting, and maintaining a healthy, effective learning environment). Students will continue to develop educational, career, and professional plans in the area of early childhood. Participation in a student organization is ongoing. Students will participate in field experience, internships, and job shadowing. Students will continue to develop skills toward meeting requirements for the CDA credential.

Early Childhood I – Course Code: 996200

Unit	Unit Name	Hours
1	Orientation I	20
2	Health and Safety	80
3	History and Trends of Early Childhood Education	20
4	Child Development: Infants-Early Childhood Years	80
5	Observation, Assessment, and Guidance	40
Total		240

Early Childhood II – Course Code: 996201

Unit	Unit Name	Hours
6	Orientation II	10
7	Characteristics of Quality Child Care Programs	30
8	The Learning Environment	30
9	Curriculum Development	50
10	Management and Administration	80
11	Career Development and Professionalism	40
Total		240

Research Synopsis

Introduction

Quality early childhood education programs benefit our future society and economy. Research shows that preschool education is a sound economic investment, due to the fact that every dollar invested in early education saves taxpayers costs in the future. It is an investment that pays great returns. The early childhood education curriculum prepares students for future success in the field of early childhood education by improving academic and technology skills, improving employability skills, and articulating courses to community colleges. The rigorous and relevant two-year program is based on state and national standards, CDA competency standards, NAEYC standards, and 21st-century workforce skills. The course is a two-year program offering four Carnegie units of credit. The industry of early childhood education is preparing for changes due to high rates of teacher retirement, national and state initiatives and requirements, and increasing focus on the field of early childhood education. The course allows core academic subjects that are vital to students' success to be integrated into the curriculum.

Needs of the Future Workforce

Data for this synopsis were compiled from the Mississippi Department of Employment Security (2013). Employment opportunities for each of the occupations listed below are:

Table 1.1: Current and Projected Occupation Report

Description	**Jobs, 2010**	**Projected Jobs, 2020**	**Change (Number)**	**Change (Percent)**	**Average Hourly Earning**
Education Administrators, Elementary and Secondary School	2,290	2,500	210	9.2	$34.33
Preschool Teachers, Except Special Education	3,390	3,670	280	8.3	$12.48
Kindergarten Teachers, Except Special Education	1,730	2,040	310	17.9	$20.06
Elementary School Teachers, Except Special Education	11,570	13,560	1,990	17.2	$20.06
Child Care Workers	4,920	5,330	410	8.3	$8.73

Source: Mississippi Department of Employment Security; www.mdes.ms.gov (accessed September 13, 2013).

Perkins IV Requirements

The early childhood education curriculum meets Perkins VI requirements by articulating specified courses with a postsecondary institution. This curriculum offers a program of study at the secondary and postsecondary levels that is intended to prepare students for occupations in the field of early childhood education. The program of study includes the following topics: child development, the learning environment, management and administration, children's health and safety, professionalism and career development, child observation, assessment and guidance techniques, history and trends of early childhood education, and characteristics of quality child-care programs. The early childhood education curriculum also focuses on academic skills in English/literacy proficiency, biology, health, and mathematics, as well as occupational skills. Along with academic and occupational skills, the curriculum focuses on a positive networking relationship with industry. Additionally, the early childhood education curriculum encourages the use of technology for students and teachers during the implementation of the written curriculum. Students will be assessed using an assessment tool, the Mississippi Career Planning Assessment System 2 (MS-CPAS 2).

Curriculum Content

Summary of Standards

The standards included in the early childhood education curriculum reflect state and national standards. The curriculum aligns with the NAEYC standards, the CDA credential standards, Mississippi College and Career Readiness Standards, National Educational Technology Standards (NETS), and 21st-Century Skills Standards. Aligning the curriculum content to these standards will result in students who are highly skilled, well-rounded, more academically proficient, and more likely to be successful in community colleges, institutions of higher learning, and the workforce.

Academic Infusion

The Early Childhood Education Curriculum is aligned to the Mississippi College and Career Readiness Standards. The Mississippi College and Career Readiness Standards are aligned with college and work expectations and include rigorous content and application of knowledge through high-order thinking skills. This applied approach to learning academic skills has long been the practice in career and technical education and brings relevance and enhances and reinforces these academic skills. Throughout the curriculum, students will be required to perform calculations and use strategic and critical thinking skills to solve real-world problems.

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 early childhood education educator's goal should be to include teaching strategies that incorporate current technology. 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 that introduces students to education in an online environment and places the responsibility of learning on 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. Many activities are graded by rubrics that allow students to choose the type of product they will produce. 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. There are several here in Mississippi that will foster the types of learning expected from the early childhood education curriculum. The FCCLA (Family, Career, and Community Leaders of America) and Skills USA are examples of student organizations for early childhood education. Student organizations provide participants/members with growth opportunities and competitive events. Student organizations also open the doors to the world of teaching and scholarship opportunities.

Cooperative Learning

Cooperative learning can help students understand topics when independent learning cannot. Therefore, you will see several opportunities in the early childhood education curriculum for group work. To function in today's workforce, students need to be able to work collaboratively with others and solve problems without excessive conflict. The early childhood education curriculum provides opportunities for students to work together and help each other complete complex tasks. There are many field experiences within the early childhood education curriculum that will allow and encourage collaboration with professionals currently in the field of early childhood education.

Field Experience/Lab Experience

Field experience is an extension of understanding competencies taught in the early childhood education classroom. A key component of each of the NAEYC standards is hands-on skills practice. The NAEYC stresses the importance of teachers' collaboration with high-quality sites in order for students to further develop and refine skills. Internships provide a link to all types of students in regards to knowledge, skills, and professional dispositions. Field experiences should encompass ongoing and increasingly more complex involvement with children in a variety of settings (e.g., public or private centers, preschools, Head Start). Thus, supervised internships in high-quality, accredited or licensed centers are keys to students' success, knowledge, and skills.

Conclusions

The early childhood education curriculum will prepare students completing the program and graduating from high school to enter the workforce, continue education at a postsecondary institution and then enter the workforce, continue education at a postsecondary institution and then continue at an institution of higher learning (IHL), or continue education at an IHL. Students who choose to enter the workforce after graduation will have the opportunity to gain employment as child-care providers or as teacher assistants. Students who choose to attend a postsecondary institution may enter a child-care technical program. After completion of the postsecondary program, students may enter the workforce as child-care providers, teacher assistants, or preschool teachers; however, students may also choose to further their education at an IHL. These students can major in early childhood education, elementary education, or child development. This curriculum provides an excellent foundation and transition into the early childhood education field.

Professional Organizations

American Library Association
50 E. Huron Street
Chicago, IL 60611
(800) 545-2433
http://www.ala.org

Association of Career and Technical Education (ACTE)
1410 King Street
Alexandria, VA 22314
(800) 826-9972
http://www.acteonline.org

Association for Childhood Education International
1101 16th St., N.W., Suite 300
Washington, D.C. 20036 USA
(800) 423-3563
acei.org

Association for Education Communications and Technology
320 W. 8th Street, Suite 101
Bloomington, IN 47404-3745
(812) 335-7675
http://www.aect.org

Association for Experimental Education
3775 Iris Avenue, Suite #4
Boulder, CO 80301-2043
(303) 440-8844
http://www.aee.org

Association for Supervision and Curriculum Development
1703 N. Beauregard Street
Alexandria, VA 22311
(800) 933-2723, press 1
http://www.ascd.org

Child Care Licensing Agency
Mississippi State Department of Health
570 East Woodrow Wilson Drive
P. O. Box 1700
Jackson, MS 39215-1700
Phone: (601) 576-7613
Toll Free: (800) 227-7308

Fax: (601) 576-7813
Mississippi Daycare Listings

Council for Exceptional Children
2900 Crystal Drive, Suite 1000
Arlington, VA 22202-3557
(888) 232-7733
http://www.cec.sped.org

Council for Learning Disabilities
11184 Antioch Road Box 405
Overland Park, KS 66210
(913) 491-1011
http://www.cldinternational.org

Council for Professional Recognition
Child Development Associate (CDA) Credential
2460 16th St. NW
Washington, DC 20009-3547
Phone: (202)265-9090
Toll Free: (800)424-4310
Fax: (202)265-9161
http://www.cdacouncil.org/

Early Childhood Care and Development
Mississippi Department of Human Services
750 North State Street
Jackson, MS 39202
Phone: (601) 359-4555
Toll Free: (800) 877-7882
Fax: (601) 359-4422
http://www.mdhs.state.ms.us/early-childhood-care-development/

International Literacy Association
800 Barksdale Road
P.O. Box 8139
Newark, DE 19714-8139
(800) 336-7323
http://literacyworldwide.org

International Society for Technology in Education
180 West 8th Ave, Suite 300
Eugene, OR 97401-2916
(800) 336-5191
http://www.iste.org

Learning Disabilities Association of America
4156 Library Road
Pittsburgh, PA 15234-1349
(412) 341-1515
http://www.ldanatl.org

Mississippi Building Blocks
403 B Towne Center Blvd., Ste C
Ridgeland, MS 39157
(601) 898-1400
http://www.msbuildingblocks.com

Mississippi State University Extension
Early Years Network
201 Research Park
Mississippi State University
P.O. Box 9745
Mississippi State, MS 39762
Phone: 662-325-3083
Fax: 662-325-1805
http://extension.msstate.edu/family

Mississippi Office of Healthy Schools
Mississippi Department of Education
359 North West St., Ste 218
P. O. Box 771
Jackson, Mississippi 39205-0771
Phone: (601) 359-1737
Fax: (601) 576-1417
http://www.healthyschoolsms.org/

Mississippi State Department of Health
Child Care Facilities Licensure
570 East Woodrow Wilson Drive
P.O. Box 1700
Jackson, MS 39215-1700
Phone: 601-576-7613
Toll Free: 800-227-7308
Fax: 601-576-7813
http://www.msdh.state.ms.us

Mississippi State University Early Childhood Institute
46 Blackjack Road
P. O. Box 6013
Mississippi State, MS 39762
(662) 325-4836
http://earlychildhood.msstate.edu/

National Art Education Association
901 Prince Street
Alexandria, VA 22314
(703) 860-8000
http://arteducators.org

National Association for Bilingual Education
8701 Georgia Avenue, Suite 700
Silver Spring, MD 20910
(240) 450-3799
http://www.nabe.org

National Association for Gifted Children
1331 H Street NW, Suite 1001
Washington, DC 20005
(202) 785-4268
http://www.nagc.org

National Association for the Education of Young Children
1509 16th Street, NW
Washington, DC 20036-1426
(800) 424-2460
http://www.naeyc.org

National Science Teachers Association
1840 Wilson Boulevard
Arlington, VA 22201-3000
(703) 243-7100
http://www.nsta.org

Southern Early Childhood Association
1123 S. University Ave.
Suite 255
Little Rock, AR 72204
1-800-305-7322
http://www.southernearlychildhood.org

Using This Document

Suggested Time on Task

This section indicates 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: Orientation I

Competencies and Suggested Objectives
1. Examine and research educational, occupational, and leadership opportunities in early childhood. (DOK 3) NAEYC2, NAEYC6, CDA1, CDA2, CDA4, CDA6 a. Identify career trends, workplace options, and opportunities that are available in early childhood. b. Compile safety information regarding emergency information, evacuation procedure, lab equipment use and procedure, and other classroom procedures according to school and classroom policies. c. Identify leadership opportunities in student organizations, such as FCCLA, Skills USA, and Educators Rising. d. Create learning management system log- ins and passwords and navigate throughout the site to become familiar with its use. Examples of learning management systems are Canvas, Blackboard, and Haiku. e. Complete federally required safety test with 100% accuracy.
2. Analyze knowledge, skills, and dispositions needed to work in an early childhood education profession. (DOK 3) NAEYC1, NAEYC2, NAEYC3, NAEYC4, NAEYC5, NAEYC6, CDA4, CDA5, CDA6 a. Investigate the personal characteristics, roles, and functions of individuals as professionals working in the early childhood education field. b. Locate information in the Mississippi State Department of Health (MSDH) publication, *Regulations Governing Licensure of Child Care Facilities*, and understand requirements for students, volunteers, and caregiver assistants regarding fingerprinting and background checks. c. Introduce NAEYC, ITERS-R (Infant/Toddler Environment Rating Scale Revised), ECERS-R (Early Childhood Environment Rating Scale Revised), and Mississippi Quality Rating and Improvement System standards.

Unit 2: Health and Safety

Competencies and Suggested Objectives
1. Recognize and explain the responsibilities of caregivers for protecting children's health and safety. (DOK 3) NAEYC1, NAEYC2, NAEYC3, NAEYC4, NAEYC5, CDA1, CDA2, CDA3, CDA4 a. Demonstrate proper sanitation practices of caregivers according to the MSDH regulation guidelines (with emphasis on hand washing and diapering). b. Investigate the proper procedures according to the MSDH regulation guidelines for: • Staffing • Equipment, Toys, and Materials • Buildings and Grounds • Program of Activities • Rest Periods (See appendices in MSDH document) c. Investigate and demonstrate the proper procedures according to the MSDH regulation guidelines for: • Health, Hygiene, and Safety • Diapering and Toileting (See appendices in MSDH document) d. Complete and preferably obtain certification in first aid and infant and child CPR. e. Research and identify childhood diseases, including signs and symptoms, incubation periods, and preventative measures (see Reportable Diseases and Communicable Diseases in MSDH appendices). f. Know types of immunizations that Mississippi requires for enrollment in a child care facility and kindergarten. g. Relate the importance of good nutrition and exercise for increased overall health in children.
2. Describe factors contributing to children's mental and emotional health. (DOK3) NAEYC1, NAEYC2, NAEYC4, NAEYC5, CDA1,CDA2, CDA3, CDA4 a. Recognize the physical and behavioral signs of stress in children. b. Investigate types of child abuse, prevention, and the reporting process. c. Identify methods and sources to help children and families cope with stress factors, such as handling negativism, thumb-sucking, fear, biting, tattling, body exploration, and inappropriate behaviors. d. Investigate ways to promote children's self-esteem, trust, and emotional well-being.

Unit 3: History and Trends of Early Childhood Education

Competencies and Suggested Objectives
1. Understand the history and evolution of early childhood education. (DOK 2) NAEYC1, NAEYC2, NAEYC4, NAEYC5, NAEYC6, CDA2, CDA3, CDA4, CDA5, CDA6 a. Recognize the contributions of leaders and theorists throughout the history of early childhood education (Maria Montessori, Abraham Maslow, Erik Erikson, Jean Piaget, Lev Vygotsky, and Howard Gardner). b. Analyze changes in early childhood education throughout history (e.g., first kindergarten, Head Start, Montessori schools, NAEYC). c. Describe types of child care, including but not limited to: parent cooperatives, lab schools, public and private center-based programs, family child care, in-home child care, nanny, au pair, and religious based child care.
2. Examine programs, initiatives and accreditations that influenced early childhood education. (DOK 2) NAEYC1, NAEYC2, NAEYC3, NAEYC4, NAEYC5, NAEYC6, CDA2, CDA3, CDA4, CDA5, CDA6 a. Summarize contributions of Head Start. b. Cite goals of the Mississippi Child Care Quality Step System.

Unit 4: Child Development:Infants – Early Childhood Years

Competencies and Suggested Objectives
1. Examine the physical, cognitive, social, and emotional development from birth to two years of age. (DOK 3) NAEYC1, NAEYC2, NAEYC4, NAEYC5, CDA1, CDA2, CDA3, CDA4 a. Explore brain development. b. Describe characteristics of physical development. c. List cognitive skills acquired. d. Examine social development. e. Explore Erikson's Psychosocial Theory of Human Development as related to this age. f. Describe emotional development. g. Select activities, toys, and equipment to promote all areas of development (physical, cognitive, social, and emotional).
2. Examine the physical, cognitive, social, and emotional development of children two and three years of age. (DOK 3) NAEYC1, NAEYC2, NAEYC4, NAEYC5, CDA1, CDA2, CDA3, CDA4 a. Describe characteristics of physical development. b. List cognitive skills acquired. c. Research Piaget's Theory of Cognitive Development as related to this age. d. Explore Erikson's Psychosocial Theory of Human Development as related to this age. e. Examine social development. f. Describe emotional development. g. Identify specific behaviors exhibited by two- and three-year-olds to include but not limited to the following: biting, temper tantrums, potty training, hitting, playing, eating, and sharing. h. Select activities, toys, and equipment to promote all areas of development (physical, cognitive, social, and emotional).
3. Examine the physical, cognitive, social, and emotional development of children four and five years of age. (DOK 3) NAEYC1, NAEYC2, NAEYC4, NAEYC5, CDA1, CDA2, CDA3, CDA4 a. Describe characteristics of physical development. b. List cognitive skills acquired. c. Explore language acquisition/ development and the use of phonological awareness in teaching literacy. d. Research Piaget's Theory of Cognitive Development as related to this age. e. Explore Erikson's Psychosocial Theory of Human Development and Maslow's Hierarchy of Needs as related to this age. f. Examine social development. g. Describe emotional development. h. Select activities, toys, and equipment to promote all areas of development (physical, cognitive, language, social, and emotional).

4. Survey inclusion and techniques to meet the developmental needs of special needs and culturally diverse children. (DOK 1) NAEYC1, NAEYC2, NAEYC4, NAEYC5, CDA1, CDA2, CDA3, CDA4, CDA5, CDA6

   a. Define the Individuals with Disabilities Education Act (IDEA).
   b. Examine an Individualized Educational Plan (IEP) and Individualized Family Service Plan (IFSP).
   c. Research types of physical, cognitive, and behavioral disabilities (including, but not limited to, hearing, speaking, speech, language, vision, and mental or emotional disorders).
   d. Describe how the Americans with Disabilities Act affects children, parents, and employees.
   e. Investigate accommodations for children with special needs.

Unit 5: Observation, Assessment, and Guidance

Competencies and Suggested Objectives
1. Investigate the importance of observing and assessing children in a child care setting. (DOK 4) NAEYC1, NAEYC3, NAEYC4, NAEYC5, CDA1, CDA2, CDA3, CDA5 a. Identify types of observation and assessment tools utilized in a child care setting (e.g., checklists, anecdotal records, rating scales, participation charts, work samples, portfolios, photographs, and videotapes). b. Determine the importance of assessments, both initial and ongoing. c. Explore the assessment tools found in the Mississippi Early Learning Standards publication.
2. Identify goals of effective guidance. (DOK 1) NAEYC1, NAEYC3, NAEYC4, NAEYC5, CDA1, CDA2, CDA3, CDA5 a. Explore positive child guidance methods and positive classroom management techniques. b. Describe principles of direct and indirect guidance. c. Demonstrate positive classroom management and guidance skills (e.g., giving I messages, praising, affirming, prompting, persuading, suggesting, redirecting, ignoring, modeling, listening, encouraging, warning, use of time-out, rules, and consequences).

Unit 6: Orientation II

Competencies and Suggested Objectives
1. Examine and research educational, occupational, and leadership opportunities in early childhood. (DOK 3) NAEYC2, NAEYC6, CDA1, CDA2, CDA4, CDA6 a. Compile safety information regarding emergency information, evacuation procedure, lab equipment use and procedure, and other classroom procedures, according to school and classroom policies (include confidentiality policies and FERPA). b. Identify leadership opportunities in student organizations, such as FCCLA, Skills USA, and Educators Rising. c. Create learning management system log- ins and passwords and navigate throughout the site to become familiar with its use. Examples of learning management systems are Canvas, Blackboard, and Haiku. d. Complete federally required safety test with 100% accuracy.

Unit 7: Characteristics of Quality Child Care Programs

Competencies and Suggested Objectives
1. Explain components of quality child care programs. (DOK 3) NAEYC1, NAEYC2, NAEYC3, NAEYC4 NAEYC5, NAEYC6, CDA1, CDA2, CDA3, CDA4, CDA5, CDA6 a. Review the NAEYC accreditation process. b. Interpret goals of the Mississippi Child Care Quality Step System (a five star rating system) developed for licensed early childhood facilities in Mississippi. c. Introduce ITERS-R and ECERS-3 rating scale system. d. Review IDEA in relation to providing services to developmentally delayed students.

Unit 8: The Learning Environment

Competencies and Suggested Objectives
1. Describe daily routines for infants, toddlers, and preschool-age children in a child care setting. (DOK 2) NAEYC1, NAEYC2, NAEYC3, NAEYC4, NAEYC5, CDA1, CDA4 a. Explain the importance of a daily schedule for the following age groups: infants, toddlers, and preschoolers. b. Develop a daily time schedule for both toddlers and preschoolers who are enrolled in a child care setting, including time slots allocated for eating, napping, indoor and outdoor play, toileting, hand washing, center times, free play, transitions, and educational time. c. Demonstrate the use of effective transitions that could be used in a child care setting.
2. Explore types of equipment and arrangement of physical space that help to promote learning. (DOK 2) NAEYC1, NAEYC6, CDA1,CDA2, CDA3, CDA5 a. Explore ways in which room arrangement, furniture, and equipment are utilized as teaching or learning tools in the environment. b. Illustrate effective ways to use outdoor space and equipment to enhance learning and physical activity. c. Compare and contrast area child care centers in regards to facility design or layout, including office, classrooms, restrooms, isolation room, rest areas, security, lighting, toys and equipment, flooring, and wall and window treatments.

Unit 9: Curriculum Development

Competencies and Suggested Objectives
1. Explore program goals and factors to consider when planning a curriculum. (DOK 2) NAEYC1, NAEYC 2, NAEYC 3, NAEYC4, NAEYC5, CDA1, CDA2, CDA3
2. Relate the importance of literature in the effective child care curriculum. (DOK 2) NAEYC 2, NAEYC 3, CDA1, CDA2, CDA3
3. Compile a list of developmentally appropriate themes for toddlers and preschool age children. (DOK 2) NAEYC 2, NAEYC 3, CDA2, CDA3
4. Explore how technology is used in preschool settings. (DOK 2) NAEYC1, NAEYC 2, NAEYC 3, NAEYC4, NAEYC5, CDA1, CDA2, CDA3
5. Plan a thematic unit of study. (DOK 4) NAEYC1, NAEYC 2, NAEYC 3, NAEYC4, NAEYC5, CDA1, CDA2, CDA3 a. Develop and illustrate a web or flowchart connecting activities to a themed unit of lessons. b. Plan and demonstrate theme-based learning activities in each of the following areas: language (storytelling, writing, play, or puppetry), art, math, science, social studies, music or movement, food experiences, field trip experiences, and computer technology. c. Write a "block" format lesson plan based on a theme. d. Create a "daily lesson plan" to include goals, motivation or introduction, subject, learning objectives, procedures, accommodations (developmental delays), materials, closure/transition, questions to guide children's learning in the activity, and evaluation.

Unit 10: Management and Administration

Competencies and Suggested Objectives
1. Explain the purpose of licensing and other regulations affecting child care services. (DOK 3) NAEYC1, NAEYC2, NAEYC3, NAEYC4, NAYC5, NAEYC6, CDA1, CDA2, CDA3, CDA4, CDA5, CDA6 a. Investigate the proper procedures according to current MSDH regulation guidelines for: • Licensure Requirements • Personnel Requirements • Facility Requirements • Records • Children with Special Needs • Facility Policy and Procedures
2. Summarize sound business and operating procedures that are necessary for a successful, productive child care center. (DOK 3) NAEYC6, CDA5, CDA6 a. Identify sources of income for a program. b. Explore types of expenses (fixed, variable, and optional expenditures) that may be involved in operating a program, such as mortgage or rent, salaries, utilities, insurance, food, maintenance, repairs, purchasing, indoor and outdoor equipment and supplies, field trip costs, and transportation. c. Investigate liability and legal concerns in operating a program, including local, state, and federal regulations. d. Explore ways to market and advertise a child care program.
3. Analyze the role of a director. (DOK 4) NAEYC1, NAEYC2, NAEYC3, NAEYC4, NAEYC5, NAEYC6, CDA1, CDA2, CDA3, CDA4, CDA5,CDA6 a. Identify skills and responsibilities needed in areas of communication, leadership, management, supervision, and administrative tasks, such as record-keeping, evaluation of staff, time management, inventory, use of technology, and networking. b. Outline moral and ethical characteristics stated in the NAEYC Code of Ethical Conduct and Statement of Commitment. c. Recognize the importance of developing written rules in handbooks for parents and staff/personnel. d. Formulate strategies to involve parents in the child care program.

Unit 11: Career Development and Professionalism

Competencies and Suggested Objectives
1. Investigate occupational, educational, and leadership opportunities in the field of early childhood. (DOK 3) NAEYC2, NAEYC6, CDA4, CDA5, CDA6 a. Update educational, career, and leadership plans related to early childhood to include workforce opportunities, certifications, postsecondary educational options, and IHL educational options. b. Research professional organizations (e.g., NAEYC, MsECA, SECA, and area child care director networks). c. Prepare a professional portfolio to include your philosophy of early childhood education, resume, work samples, and other documentation (e.g.,CPAS test scores, photographs, lesson plans or activities, menus, daily schedules, observation records, etc.). d. Demonstrate effective job-seeking skills needed for the interviewing process. e. Practice appropriate behaviors in relation to individual, family, community, career, and workplace settings to include attitude, appearance, and work ethic. f. Exemplify effective communication techniques to include clear and logical verbal and nonverbal communication, writing skills, listening skills, and speaking skills. g. Apply leadership and team skills in the school, community, and workplace through membership and projects in student organizations and other avenues of community service. h. Determine the importance of demonstrating respect for individuals' differences, including sensitivity to gender, race, age, and cultural diversity. i. Explore requirements for obtaining the CDA credential.

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: Orientation I		
	1.	Examine and research educational, occupational, and leadership opportunities in early childhood.
	2.	Analyze knowledge, skills, and dispositions needed to work in an early childhood education profession.
Unit 2: Health and Safety		
	1.	Recognize and explain the responsibilities of caregivers for protecting children's health and safety.
	2.	Describe factors contributing to children's mental and emotional health.
Unit 3: History and Trends of Early Childhood Education		
	1.	Understand the history and evolution of early childhood education.
	2.	Examine programs, initiatives and accreditations that influenced early childhood education.
Unit 4: Child Development: Infants – Early Childhood Years		
	1.	Examine the physical, cognitive, social, and emotional development from birth to two years of age.
	2.	Examine the physical, cognitive, social, and emotional development of children two and three years of age.
	3.	Examine the physical, cognitive, social, and emotional development of children four and five years of age.
	4.	Survey inclusion and techniques to meet the developmental needs of special needs and culturally diverse children.
Unit 5: Observation, Assessment, and Guidance		
	1.	Investigate the importance of observing and assessing children in a child care setting.
	2.	Identify goals of effective guidance.
Unit 6: Orientation II		
	1.	Examine and research educational, occupational, and leadership opportunities in early childhood.

~~Unit 7: Characteristics of Quality Child Care Programs~~		
	~~1.~~	~~Explain components of quality child care programs.~~
~~Unit 8: The Learning Environment~~		
	~~1.~~	~~Describe daily routines for infants, toddlers, and preschool-age children in a child care setting.~~
	~~2.~~	~~Explore types of equipment and arrangement of physical space that help to promote learning.~~
~~Unit 9: Curriculum Development~~		
	~~1.~~	~~Explore program goals and factors to consider when planning a curriculum.~~
	~~2.~~	~~Relate the importance of literature in the effective child care curriculum.~~
	~~3.~~	~~Compile a list of developmentally-appropriate themes for toddlers and preschool-age children.~~
	~~4.~~	~~Explore how technology is used in preschool settings.~~
	~~5.~~	~~Plan a thematic unit of study.~~
~~Unit 10: Management and Administration~~		
	~~1.~~	~~Explain the purpose of licensing and other regulations affecting child care services.~~
	~~2.~~	~~Summarize sound business and operating procedures that are necessary for a successful, productive child care center.~~
	~~3.~~	~~Analyze the role of a director.~~
~~Unit 11: Career Development and Professionalism~~		
	~~1.~~	~~Investigate occupational, educational, and leadership opportunities in the field of early childhood.~~

Appendix A: Unit References

All of the early childhood education units use the same resources for each unit. You will find suggested resources listed below.

Council for Professional Recognition Child Development Associate Credential. (n.d.). [Web site]. Retrieved from http://www.cdacouncil.org/

Environment Rating Scales Institute. (n.d.). [Web site]. Retrieved from http://www.ersi.info/iters_notes.html

Family, Career and Community Leaders of America. (n.d.). [Web site]. Retrieved from http://www.fcclainc.org

Educators Rising. (n.d.). [Web site]. Retrieved from http://www.educatorsrising.org

Herr, J. (2008). *Working with young children*. Tinley Park, IL: Goodheart-Wilcox.

Mississippi Department of Education. (n.d.). [Web site]. Retrieved from http://www.mde.k12.ms.us/

Mississippi State Department of Health. (n.d.). [Web site]. Retrieved from http://www.mdhs.state.ms.us

Mississippi Early Childhood Advocacy. (n.d.). [Web site]. Retrieved from http://www.msearlychildhood.org/

Mississippi State University Early Childhood Institute. (n.d.). [Web site]. Retrieved from http://earlyyearsnetwork.msucares.com

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National Association for the Education of Young Children. (n.d.). [Web site]. Retrieved from http://www.naeyc.org

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Appendix B: Industry Standards

National Association for the Education of Young Children (NAEYC)

NAEYC1 Promoting Child Development and Learning
NAEYC2 Building Family and Community Relationships
NAEYC3 Observing, Documenting, and Assessing
NAEYC4 Using Developmentally Effective Approaches to Connect With Children and Families
NAEYC5 Using Content Knowledge to Build Meaningful Curriculum
NAEYC6 Becoming a Professional

Crosswalk for Early Childhood Education

	Units	Unit 1	Unit 2	Unit 3	Unit 4	Unit 5	Unit 6	Unit 7	Unit 8	Unit 9	Unit 10	Unit 11
NAEYC1		X	X	X	X	X		X	X	X	X	
NAEYC2		X	X	X	X		X	X	X		X	X
NAEYC3		X	X	X		X		X	X		X	
NAEYC4		X	X	X	X	X	X	X	X	X	X	X
NAEYC5		X	X	X	X	X	X	X	X	X	X	X
NAEYC6		X		X		X		X	X		X	X

Child Development Associate credential (CDA)

CDA1 To establish and maintain a safe, healthy learning environment
CDA2 To advance physical and intellectual competence
CDA3 To support social and emotional development and provide positive guidance
CDA4 To establish positive and productive relationships
CDA5 To ensure a well-run, purposeful program responsive to participant needs
CDA6 To maintain a commitment to professionalism

Crosswalk for Early Childhood Education

	Units	Unit 1	Unit 2	Unit 3	Unit 4	Unit 5	Unit 6	Unit 7	Unit 8	Unit 9	Unit 10	Unit 11
CDA1		X	X		X	X	X	X	X	X	X	
CDA2		X	X	X	X	X	X	X	X	X	X	
CDA3			X	X	X	X		X	X	X	X	
CDA4		X	X	X	X		X	X	X		X	X
CDA5		X		X	X	X		X	X		X	X
CDA6		X		X	X		X	X			X	X

Appendix C: 21st Century Skills[1]

21st Century Crosswalk for Early Childhood Education												
	Units	Unit 1	Unit 2	Unit 3	Unit 4	Unit 5	Unit 6	Unit 7	Unit 8	Unit 9	Unit 10	Unit 11
21st Century Standards												
CS1		X	X	X	X	X	X	X	X	X	X	X
CS2				X							X	X
CS3		X	X	X	X	X	X	X	X		X	X
CS4		X	X	X	X	X	X	X	X		X	X
CS5			X	X					X		X	
CS6		X	X	X	X	X	X	X	X	X	X	X
CS7		X	X	X	X	X	X	X	X	X	X	X
CS8		X	X	X	X	X	X	X	X	X	X	X
CS9		X	X	X	X	X	X	X	X	X	X	X
CS10		X	X	X	X	X	X	X	X	X	X	X
CS11		X	X	X	X	X	X	X	X	X	X	X
CS12		X	X	X	X	X	X	X	X	X	X	X
CS13		X	X	X	X	X	X	X	X	X	X	X
CS14		X	X	X	X	X	X	X	X	X	X	X
CS15		X	X	X	X	X	X	X	X	X	X	X
CS16		X	X	X	X	X	X	X	X	X	X	X

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, resource consumption rate, etc.).
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 D: College and Career Ready Standards

English Standards											
	Units	Unit 1	Unit 2	Unit 3	Unit 4	Unit 5	Unit 6	Unit 7	Unit 8	Unit 9	Unit 10
W.9.4		X	X	X	X	X	X	X	X	X	X
W.9.5		X	X	X	X	X	X	X	X	X	X
W.9.6		X	X	X	X	X	X	X	X	X	X
W.9.7		X	X	X	X	X	X	X	X	X	X
W.9.8		X	X	X	X	X	X	X	X	X	X
SL.9.1		X	X	X	X	X	X	X	X	X	X
SL.9.4		X	X	X	X	X	X	X	X	X	X
SL.9.6		X	X	X	X	X	X	X	X	X	X
L.9.1		X	X	X	X	X	X	X	X	X	X
L.9.2		X	X	X	X	X	X	X	X	X	X
L.9.3		X	X	X	X	X	X	X	X	X	X
L.9.4		X	X	X	X	X	X	X	X	X	X
L.9.6		X	X	X	X	X	X	X	X	X	X
RH.9-10.1				X							
RH.9-10.2				X							
RH.9-10.7		X	X	X	X	X	X	X	X	X	X
RST.9-10.3		X	X			X	X	X	X	X	X
RST.9-10.4		X	X			X	X	X	X	X	X
WHST.9-10.4		X	X	X	X	X	X	X	X	X	X
WHST.9-10.5		X	X	X	X	X	X	X	X	X	X
WHST.9-10.6		X	X	X	X	X	X	X	X	X	X
WHST.9-10.7		X	X	X	X	X	X	X	X	X	X
WHST.9-10.8		X	X	X	X	X	X	X	X	X	X
WHST.9-10.9		X	X	X	X	X	X	X	X	X	X
WHST.9-10.10		X	X	X	X	X	X	X	X	X	X

College and Career Readiness English I

Reading Literature Key Ideas and Details

RL.9.1 Cite strong and thorough textual evidence to support analysis of what the text says explicitly as well as inferences drawn from the text.

RL.9.2 Determine a theme or central idea of a text and analyze in detail its development over the course of the text, including how it emerges and is shaped and refined by specific details; provide an objective summary of the text.

RL.9.3 Analyze how complex characters (e.g., those with multiple or conflicting motivations) develop over the course of a text, interact with other characters, and advance the plot or develop the theme.

Craft and Structure

RL.9.4 Determine the meaning of words and phrases as they are used in the text, including figurative and connotative meanings; analyze the cumulative impact of specific word choices on meaning and tone (e.g., how the language evokes a sense of time and place; how it sets a formal or informal tone).

RL.9.5 Analyze how an author's choices concerning how to structure a text, order events within it (e.g., parallel plots), and manipulate time (e.g., pacing, flashbacks) create such effects as mystery, tension, or surprise.

RL.9.6 Analyze a particular point of view or cultural experience reflected in a work of literature from outside the United States, drawing on a wide reading of world literature.

Integration of Knowledge and Ideas

RL.9.7 Analyze the representation of a subject or a key scene in two different artistic mediums, including what is emphasized or absent in each treatment (e.g., Auden's "Musée des Beaux Arts" and Breughel's Landscape with the Fall of Icarus).

RL.9.8 Not applicable to literature.

College and Career Readiness English I

RL.9.9 Analyze how an author draws on and transforms source material in a specific work (e.g., how Shakespeare treats a theme or topic from Ovid or the Bible or how a later author draws on a play by Shakespeare).

Range of Reading and Level of Text Complexity

RL.9.10 By the end of grade 9, read and comprehend literature, including stories, dramas, and poems, in the grades 9–10 text complexity band proficiently, with scaffolding as needed at the high end of the range.

College and Career Readiness English I

Reading Informational Text Key Ideas and Details

RI.9.3 Analyze how the author unfolds an analysis or series of ideas or events, including the order in which the points are made, how they are introduced and developed, and the connections that are drawn between them.

Craft and Structure

RI.9.5 Analyze in detail how an author's ideas or claims are developed and refined by particular sentences, paragraphs, or larger portions of a text (e.g., a section or chapter).

RI.9.6 Determine an author's point of view or purpose in a text and analyze how an author uses rhetoric to advance that point of view or purpose.

Integration of Knowledge and Ideas

RI.9.7 Analyze various accounts of a subject told in different mediums (e.g., a person's life story in both print and multimedia), determining which details are emphasized in each account.

RI.9.8 Delineate and evaluate the argument and specific claims in a text, assessing whether the reasoning is valid and the evidence is relevant and sufficient; identify false statements and fallacious reasoning.

RI.9.9 Analyze seminal U.S. documents of historical and literary significance (e.g., Washington's Farewell Address, the Gettysburg Address, Roosevelt's Four Freedoms speech, King's "Letter from Birmingham Jail"), including how they address related themes and concepts.

College and Career Readiness English I

Writing Text Types and Purposes

W.9.1 Write arguments to support claims in an analysis of substantive topics or texts, using valid reasoning and relevant and sufficient evidence.

W.9.1a Introduce precise claim(s), distinguish the claim(s) from alternate or opposing claims, and create an organization that establishes clear relationships among claim(s), counterclaims, reasons, and evidence.

W.9.1b Develop claim(s) and counterclaims fairly, supplying evidence for each while pointing out the strengths and limitations of both in a manner that anticipates the audience's knowledge level and concerns.

W.9.1c Use words, phrases, and clauses 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.

W.9.1d Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing.

W.9.1e Provide a concluding statement or section that follows from and supports the argument presented.

W.9.2 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.

W.9.2a Introduce a topic; organize complex ideas, concepts, and information to make important connections and distinctions; include formatting (e.g., headings), graphics (e.g., figures, tables), and multimedia when useful to aiding comprehension.

W.9.2b Develop the topic with well-chosen, relevant, and sufficient facts, extended definitions, concrete details, quotations, or other information and examples appropriate to the audience's knowledge of the topic.
W.9.2c Use appropriate and varied transitions to link the major sections of the text, create cohesion, and clarify the relationships among complex ideas and concepts.

College and Career Readiness English I

W.9.2d Use precise language and domain-specific vocabulary to manage the complexity of the topic.
W.9.2e Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing.
W.9.2f 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.9.3 Write narratives to develop real or imagined experiences or events using effective technique, well-chosen details, and well-structured event sequences.
W.9.3a Engage and orient the reader by setting out a problem, situation, or observation, establishing one or multiple point(s) of view, and introducing a narrator and/or characters; create a smooth progression of experiences or events.
W.9.3b Use narrative techniques, such as dialogue, pacing, description, reflection, and multiple plot lines, to develop experiences, events, and/or characters.
W.9.3c Use a variety of techniques to sequence events so that they build on one another to create a coherent whole.
W.9.3d Use precise words and phrases, telling details, and sensory language to convey a vivid picture of the experiences, events, setting, and/or characters.
W.9.3e 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.9.4 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.9.5 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 9–10.)
W.9.6 Use technology, including the Internet, to produce, publish, and update individual or shared writing products, taking advantage of technology's capacity to link to other information and to display information flexibly and dynamically.

Research to Build and Present Knowledge

W.9.7 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.

College and Career Readiness English I

W.9.8 Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the usefulness of each source in answering the research question; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and following a standard format for citation.
W.9.9 Draw evidence from literary or informational texts to support analysis, reflection, and research.
W.9.9a Apply grades 9–10 Reading standards to literature (e.g., "Analyze how an author draws on and transforms source material in a specific work [e.g., how Shakespeare treats a theme or topic from Ovid or the Bible or how a later author draws on a play by Shakespeare]").
W.9.9b Apply grades 9–10 Reading standards to literary nonfiction (e.g., "Delineate and evaluate the argument and specific claims in a text, assessing whether the reasoning is valid and the evidence is relevant and sufficient; identify false statements and fallacious reasoning").

Range of Writing

W.9.10 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 audience.

College and Career Readiness English I

SL.9.1 Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grades 9–10 topics, texts, and issues, building on others' ideas and expressing their own clearly and persuasively.

SL.9.1a 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.

SL.9.1b Work with peers to set rules for collegial discussions and decision making (e.g., informal consensus, taking votes on key issues, presentation of alternate views), clear goals and deadlines, and individual roles as needed.

SL.9.1c Propel conversations by posing and responding to questions that relate the current discussion to broader themes or larger ideas; actively incorporate others into the discussion; and clarify, verify, or challenge ideas and conclusions.

SL.9.1d Respond thoughtfully to diverse perspectives, summarize points of agreement and disagreement, and, when warranted, qualify or justify their own views and understanding and make new connections in light of the evidence and reasoning presented.

SL.9.2 Integrate multiple sources of information presented in diverse media or formats (e.g., visually, quantitatively, orally) evaluating the credibility and accuracy of each source.

SL.9.3 Evaluate a speaker's point of view, reasoning, and use of evidence and rhetoric, identifying any fallacious reasoning or exaggerated or distorted evidence.

Presentation of Knowledge and Ideas

SL.9.4 Present information, findings, and supporting evidence clearly, concisely, and logically such that listeners can follow the line of reasoning and the organization, development, substance, and style are appropriate to purpose, audience, and task.

College and Career Readiness English I

SL.9.5 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.9.6 Adapt speech to a variety of contexts and tasks, demonstrating command of formal English when indicated or appropriate. (See grades 9–10 Language standards 1 and 3 for specific expectations.)

College and Career Readiness English I

Language

Conventions of Standard English

L.9.1 Demonstrate command of the conventions of standard English grammar and usage when writing or speaking.

L.9.1a Use parallel structure.*

L.9.1b Use various types of phrases (noun, verb, adjectival, adverbial, participial, prepositional, absolute) and clauses (independent, dependent; noun, relative, adverbial) to convey specific meanings and add variety and interest to writing or presentations.

L.9.2 Demonstrate command of the conventions of standard English capitalization, punctuation, and spelling when writing.

L.9.2a Use a semicolon (and perhaps a conjunctive adverb) to link two or more closely related independent clauses.

L.9.2b Use a colon to introduce a list or quotation.

L.9.2c Spell correctly

Knowledge of Language

L.9.3 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.

L.9.3a Write and edit work so that it conforms to the guidelines in a style manual (e.g., MLA Handbook, Turabian's Manual for Writers) appropriate for the discipline and writing type.

Vocabulary Acquisition and Use

L.9.4 Determine or clarify the meaning of unknown and multiple-meaning words and phrases based on grades 9–10 reading and content, choosing flexibly from a range of strategies.
L.9.4a 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.
L.9.4b Identify and correctly use patterns of word changes that indicate different meanings or parts of speech (e.g., analyze, analysis, analytical; advocate, advocacy).

College and Career Readiness English I

L.9.4c 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, or its etymology.
L.9.4d 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.9.5 Demonstrate understanding of figurative language, word relationships, and nuances in word meanings.
L.9.5a Interpret figures of speech (e.g., euphemism, oxymoron) in context and analyze their role in the text.
L.9.5b Analyze nuances in the meaning of words with similar denotations.
L.9.6 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.

College and Career Readiness English II

Range of Reading and Level of Text Complexity

RL.10.10 By the end of grade 10, read and comprehend literature, including stories, dramas, and poems, at the high end of the grades 9–10 text complexity band independently and proficiently.

Grades 9-10: Literacy in History/SS

Reading in History/Social Studies Key Ideas and Details

RH.9-10.1 Cite specific textual evidence to support analysis of primary and secondary sources, attending to such features as the date and origin of the information.
RH.9-10.2 Determine the central ideas or information of a primary or secondary source; provide an accurate summary of how key events or ideas develop over the course of the text.
RH.9-10.3 Analyze in detail a series of events described in a text; determine whether earlier events caused later ones or simply preceded them.

Craft and Structure

RH.9-10.4 Determine the meaning of words and phrases as they are used in a text, including vocabulary describing political, social, or economic aspects of history/social science.
RH.9-10.5 Analyze how a text uses structure to emphasize key points or advance an explanation or analysis.
RH.9-10.6 Compare the point of view of two or more authors for how they treat the same or similar topics, including which details they include and emphasize in their respective accounts.

Integration of Knowledge and Ideas

RH.9-10.7 Integrate quantitative or technical analysis (e.g., charts, research data) with qualitative analysis in print or digital text.
RH.9-10.8 Assess the extent to which the reasoning and evidence in a text support the author's claims.
RH.9-10.9 Compare and contrast treatments of the same topic in several primary and secondary sources.

Range of Reading and Level of Text Complexity

RH.9-10.10 By the end of grade 10, read and comprehend history/social studies texts in the grades 9-10 text complexity band independently and proficiently.

Grades 9-10: Literacy in Science and Technical Subjects

Reading in Science and Technical Subjects Key Ideas and Details

RST.9-10.1 Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions.

RST.9-10.2 Determine the central ideas or conclusions of a text; trace the text's explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text.

RST.9-10.3 Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text.

Craft and Structure

RST.9-10.4 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 9-10 texts and topics.

RST.9-10.5 Analyze the structure of the relationships among concepts in a text, including relationships among key terms (e.g., force, friction, reaction force, energy).

RST.9-10.6 Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, defining the question the author seeks to address.

Integration of Knowledge and Ideas

RST.9-10.7 Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words.

RST.9-10.8 Assess the extent to which the reasoning and evidence in a text support the author's claim or a recommendation for solving a scientific or technical problem.

RST.9-10.9 Compare and contrast findings presented in a text to those from other sources (including their own experiments), noting when the findings support or contradict previous explanations or accounts

Range of Reading and Level of Text Complexity

RST.9-10.10 By the end of grade 10, read and comprehend science/technical texts in the grades 9-10 text complexity band independently and proficiently.

Grades 9-10: Writing in History/SS, Science, and Technical Subjects

Writing Text Types and Purposes

WHST.9-10.1 Write arguments focused on discipline-specific content.

WHST.9-10.1a Introduce precise claim(s), distinguish the claim(s) from alternate or opposing claims, and create an organization that establishes clear relationships among the claim(s), counterclaims, reasons, and evidence.

WHST.9-10.1b Develop claim(s) and counterclaims fairly, supplying data and evidence for each while pointing out the strengths and limitations of both claim(s) and counterclaims in a discipline-appropriate form and in a manner that anticipates the audience's knowledge level and concerns.

WHST.9-10.1c Use words, phrases, and clauses 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.

WHST.9-10.1d Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing.

WHST.9-10.1e Provide a concluding statement or section that follows from or supports the argument presented.

WHST.9-10.2 Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes.

WHST.9-10.2a Introduce a topic and organize ideas, concepts, and information to make important connections and distinctions; include formatting (e.g., headings), graphics (e.g., figures, tables), and multimedia when useful to aiding comprehension.

WHST.9-10.2b Develop the topic with well-chosen, relevant, and sufficient facts, extended definitions, concrete details, quotations, or other information and examples appropriate to the audience's knowledge of the topic.

Grades 9-10

Writing in History/SS, Science, and Technical Subjects

WHST.9-10.2c Use varied transitions and sentence structures to link the major sections of the text, create cohesion, and clarify the relationships among ideas and concepts.

WHST.9-10.2d Use precise language and domain-specific vocabulary to manage the complexity of the topic and convey a style appropriate to the discipline and context as well as to the expertise of likely readers.

WHST.9-10.2e Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing.

WHST.9-10.2f 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).

WHST.9-10.3 Not Applicable

Production and Distribution of Writing

WHST.9-10.4 Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.

WHST.9-10.5 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.9-10.6 Use technology, including the Internet, to produce, publish, and update individual or shared writing products, taking advantage of technology's capacity to link to other information and to display information flexibly and dynamically.

Research to Build and Present Knowledge

WHST.9-10.7 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.9-10.8 Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the usefulness of each source in answering the research question; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and following a standard format for citation.

WHST.9-10.9 Draw evidence from informational texts to support analysis, reflection, and research.

Grades 9-10

Writing in History/SS, Science, and Technical Subjects

Range of Writing

WHST.9-10.10 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.

English III

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 a 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.

English III

Reading Informational Text Key Ideas and Details

Rl.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

Rl.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).

Rl.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.

Rl.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

Rl.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.

Rl.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).

Rl.11.9 Analyze seventeenth , eighteenth , and nineteenth-century foundational U.S. documents of historical and literary significance (including Thom 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

Rl.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.

English III

Writing

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

W.11.1a 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.

W.11.1b 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.

W.11.1c 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.

W.11.1d Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing.

W.11.1e 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.

W.11.2a 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.

English III

W.11.2b 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.

W.11.2c 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.

W.11.2d Use precise language, domain-specific vocabulary, and techniques such as metaphor, simile, and analogy to manage the complexity of the topic.

W.11.2e Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing.

W.11.2f 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 technique, well-chosen details, and well-structured event sequences.

W.11.3a 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.

W.11.3b Use narrative techniques, such as dialogue, pacing, description, reflection, and multiple plot lines, to develop experiences, events, and/or characters.

W.11.3c 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).

W.11.3d Use precise words and phrases, telling details, and sensory language to convey a vivid picture of the experiences, events, setting, and/or characters.

W.11.3e 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.)

English III

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.)
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.
W.11.9a 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").
W.11.9b 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.

English III
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.
SL11.1a 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.
SL.11.1b Work with peers to promote civil, democratic discussions and decision making, set clear goals and deadlines, and establish individual roles as needed.
SL.11.1c 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.
SL.11.1d 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.

English III

SL11.5 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.)

English III
Language
Conventions of Standard English

L.11.1a Apply the understanding that usage is a matter of convention, can change over time, and is sometimes contested.
L.11.1b 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.11.2a Observe hyphenation conventions.
L.11.3a 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.
L.11.4b Identify and correctly use patterns of word changes that indicate different meanings or parts of speech (e.g., conceive, conception, conceivable).

English IV
Range of Reading and Level of Text Complexity

RL.12.10 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.

Grades 11–12: Literacy in History/SS
Reading in History/Social Studies Key Ideas and Details

RH.11–12.1 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.11–12.2 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.11–12.3 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.11–12.4 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.11–12.5 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.11–12.6 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.11–12.7 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.11–12.8 Evaluate an author's premises, claims, and evidence by corroborating or challenging them with other information.
RH.11–12.9 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.11–12.10 By the end of grade 12, read and comprehend history/social studies texts in the grades 11–CCR text complexity band independently and proficiently.

Grades 11-12: Literacy in Science and Technical Subjects

Reading in Science and Technical Subjects Key Ideas and Details

RST. 11-12.1 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.11-12.2 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.11-12.3 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.11-12.4 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.11-12.5 Analyze how the text structures information or ideas into categories or hierarchies, demonstrating understanding of the information or ideas.

RST.11-12.6 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.

RST.11-12.7 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.11-12.8 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.11-12.9 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.11-12.10 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.

Grades 11-12: Writing I History/SS, Science and Technical Subjects

Writing

Text Types and Purposes

WHST.11-12.1a 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.

WHST.11-12.1b 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.

WHST.11-12.1c 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.

WHST.11-12.2a 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.

Grades 11-12: Writing I History/SS, Science and Technical Subjects

WHST.11-12.2d 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.

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~~Production and Distribution of Writing~~

~~WHST.11-12.6 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.~~

~~WHST.11-12.8 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.~~

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Appendix D: College and Career Ready Standards

Mathematics Standards

Number and Quantity

Reason quantitatively and use unites to solve problems

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.*

Algebra

Analyze and solve linear equations and pairs of simultaneous linear equations

8.EE.8 Analyze and solve pairs of simultaneous linear equations.

a. Understand that solutions to a system of two linear equations in two variables correspond to points of intersection of their graphs, because points of intersection satisfy both equations simultaneously.

b. Solve systems of two linear equations in two variables algebraically, and estimate solutions by graphing the equations. Solve simple cases by inspection. For example, $3x + 2y = 5$ and $3x + 2y = 6$ have no solution because $3x + 2y$ cannot simultaneously be 5 and 6.

c. Solve real-world and mathematical problems leading to two linear equations in two variables. For example, given coordinates for two pairs of points, determine whether the line through the first pair of points intersects the line through the second pair.

Interpret the structure of expressions

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

a. Interpret parts of an expression, such as terms, factors, and coefficients.

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

c. Use the properties of exponents to transform expressions for exponential functions. For example the expression $1.15t$ can be rewritten as $[1.151/12] 12t \approx 1.01212t$ to reveal the approximate equivalent monthly interest rate if the annual rate is 15%.

Creating equations that describe numbers or relationships

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 non-viable 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.*

Solve equations and inequalities in one variable

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

Solve systems of equations

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.

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Represent and solve equations and inequalities graphically

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

Define, evaluate, and compare functions

8.F.1 Understand that a function is a rule that assigns to each input exactly one output. The graph of a function is the set of ordered pairs consisting of an input and the corresponding output. 1

8.F.2 Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). For example, given a linear function represented by a table of values and a linear function represented by an algebraic expression, determine which function has the greater rate of change.

8.F.3 Interpret the equation y = mx + b as defining a linear function, whose graph is a straight line; give examples of functions that are not linear. For example, the function A = s2 giving the area of a square as a function of its side length is not linear because its graph contains the points (1,1), (2,4) and (3,9), which are not on a straight line.

Use functions to model relationships between quantities

8.F.4 Construct a function to model a linear relationship between two quantities. Determine the rate of change and initial value of the function from a description of a relationship or from two (x, y) values, including reading these from a table or from a graph. Interpret the rate of change and initial value of a linear function in terms of the situation it models, and in terms of its graph or a table of values.

8.F.5 Describe qualitatively the functional relationship between two quantities by analyzing a graph (e.g., where the function is increasing or decreasing, linear or nonlinear). Sketch a graph that exhibits the qualitative features of a function that has been described verbally.

Understand the concept of a function and use function notation

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 ≥ 1.

Interpret functions that arise in applications in terms of the context

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.* Analyze functions using different representations Supporting

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.* a. Graph linear and quadratic functions and show intercepts, maxima, and minima.

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.

Build a function that models a relationship between two quantities

F-BF.1 Write a function that describes a relationship between two quantities.* a. Determine an explicit expression, a recursive process, or steps for calculation from a context.

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.*

Construct and compare linear, quadratic, and exponential models and solve problems

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

a. Prove that linear functions grow by equal differences over equal intervals and that exponential functions grow by equal factors over equal intervals.

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

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.* Interpret expressions for functions in terms of the situation they model Supporting

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

Geometry

Understand and apply the Pythagorean Theorem

8.G.6 Explain a proof of the Pythagorean Theorem and its converse.

8.G.7 Apply the Pythagorean Theorem to determine unknown side lengths in right triangles in real-world and mathematical problems in two and three dimensions.

8.G.8 Apply the Pythagorean Theorem to find the distance between two points in a coordinate system.

Experiment with transformations in the plane

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.

Understand congruence in terms of rigid motions

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.

Prove geometric theorems

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.

Statistics and Probability

Investigate patterns of association in bivariate data

8.SP.1 Construct and interpret scatter plots for bivariate measurement data to investigate patterns of association between two quantities. Describe patterns such as clustering, outliers, positive or negative association, linear association, and nonlinear association.

8.SP.2 Know that straight lines are widely used to model relationships between two quantitative variables. For scatter plots that suggest a linear association, informally fit a straight line, and informally assess the model fit by judging the closeness of the data points to the line.

8.SP.3 Use the equation of a linear model to solve problems in the context of bivariate measurement data, interpreting the slope and intercept. For example, in a linear model for a biology experiment, interpret a slope of 1.5 cm/hr as meaning that an additional hour of sunlight each day is associated with an additional 1.5 cm in mature plant height.

8.SP.4 Understand that patterns of association can also be seen in bivariate categorical data by displaying frequencies and relative frequencies in a two-way table. Construct and interpret a two-way table summarizing data on two categorical variables collected from the same subjects. Use relative frequencies calculated for rows or columns to describe possible association between the two variables. For example, collect data from students in your class on whether or not they have a curfew on school nights and whether or not they have assigned chores at home. Is there evidence that those who have a curfew also tend to have chores?

Summarize, represent, and interpret data on a single count or measurement variable

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).*

Summarize, represent, and interpret data on two categorical and quantitative variables

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.*

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.

c. Fit a linear function for a scatter plot that suggests a linear association.

Interpret linear models

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.*

Algebra I

Number and Quantity

Use properties of rational and irrational numbers

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.

Reason quantitatively and use units to solve problems

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.*

Algebra

Interpret the structure of expressions

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

a. Interpret parts of an expression, such as terms, factors, and coefficients.

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 Use the structure of an expression to identify ways to rewrite it. For example, see x4 − y 4 as (x2) 2 − (y2) 2 thus recognizing it as a difference of squares that can be factored as (x2 − y 2) (x2 + y2).

Write expressions in equivalent forms to solve problems

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. Factor a quadratic expression to reveal the zeros of the function it defines.

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

c. Use the properties of exponents to transform expressions for exponential functions. For example the expression 1.15t can be rewritten as [1.151/12] 12t ≈ 1.01212t to reveal the approximate equivalent monthly interest rate if the annual rate is 15%.

Algebra I

Perform arithmetic operations on polynomials

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.

Understand the relationship between zeros and factors of polynomials

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.

Create equations that describe numbers or relationships

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 non-viable 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.*

Understand solving equations as a process of reasoning and explain the reasoning

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.

Solve equations and inequalities in one variable

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. 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.

b. Solve quadratic equations by inspection (e.g., for x 2 = 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 ± bi for real numbers a and b.

Algebra I

Solve systems of equations

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.

Represent and solve equations and inequalities graphically

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

Understand the concept of a function and use function notation

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 ≥ 1

Interpret functions that arise in applications in terms of the context

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.*

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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.*

Algebra I

Analyze functions using different representations

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.*

a. Graph linear and quadratic functions and show intercepts, maxima, and minima.

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

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

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.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. B

Build a function that models a relationship between two quantities

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

a. Determine an explicit expression, a recursive process, or steps for calculation from a context.

Build new functions from existing functions

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

Construct and compare linear, quadratic, and exponential models and solve problems

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

a. Prove that linear functions grow by equal differences over equal intervals and that exponential functions grow by equal factors over equal intervals.

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

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.*

Algebra I

Interpret expressions for functions in terms of the situation they model

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

Statistics and Probability *

Summarize, represent, and interpret data on a single count or measurement variable

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).*

Summarize, represent, and interpret data on two categorical and quantitative variables

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.*

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.

b. Informally assess the fit of a function by plotting and analyzing residuals.

c. Fit a linear function for a scatter plot that suggests a linear association.

Interpret linear models

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.*

Geometry Course

Geometry

Experiment with transformations in the plane

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.

Understand congruence in terms of rigid motions

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.

Prove geometric theorems

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.

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~~Geometry Course~~

~~Make geometric constructions~~

~~G-CO.12 Make formal geometric constructions with a variety of tools and methods (compass and straightedge, string, reflective devices, paper folding, dynamic geometric software, etc.). 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.~~

~~Understand similarity in terms of similarity transformations~~

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

~~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.~~

~~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.~~

~~Prove theorems involving similarity~~

~~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.~~

~~Define trigonometric ratios and solve problems involving right triangles~~

~~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.*~~

~~Understand and apply theorems about 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.~~

~~Find arc lengths and areas of sectors of circles~~

~~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.~~

~~Translate between the geometric description and the equation for a conic section A~~

~~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.~~

~~Use coordinates to prove simple geometric theorems algebraically~~

~~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.*

Explain volume formulas and use them to solve problems

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.3 Use volume formulas for cylinders, pyramids, cones, and spheres to solve problems.*

Visualize relationships between two-dimensional and three-dimensional objects

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.

Apply geometric concepts in modeling situations

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).*

Algebra II

Number and Quantity

Extend the properties of exponents to rational exponents

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. For example, we define 51/3 to be the cube root of 5 because we want [51/3] 3 = 5(1/3) 3 to hold, so [51/3] 3 must equal 5.

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

Reason quantitatively and use units to solve problems

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

Perform arithmetic operations with complex numbers

N-CN.1 Know there is a complex number i such that i 2 = −1, and every complex number has the form a + bi with a and b real.

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

Use complex numbers in polynomial identities and equations

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

Algebra

Interpret the structure of expressions

A-SSE.2 Use the structure of an expression to identify ways to rewrite it. For example, see x4 − y 4 as (x2) 2 − (y2) 2, thus recognizing it as a difference of squares that can be factored as (x2 − y 2) (x2 + y2).

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Write expressions in equivalent forms to solve problems

A-SSE.3 Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression.* c. Use the properties of exponents to transform expressions for exponential functions. For example the expression 1.15t can be rewritten as [1.151/12] 12t ≈ 1.01212t to reveal the approximate equivalent monthly interest rate if the annual rate is 15%.

Algebra II

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.*

Understand the relationship between zeros and factors of 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.

Use polynomial identities to solve problems

A-APR.4 Prove polynomial identities and use them to describe numerical relationships. For example, the polynomial identity (x2 + y2) 2 = (x2 – y 2) 2 + (2xy)2 can be used to generate Pythagorean triples.

Rewrite rational expressions

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.

Create equations that describe numbers or relationships

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.*

Understand solving equations as a process of reasoning and explain the reasoning

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.

Solve equations and inequalities in one variable

A-REI.4 Solve quadratic equations in one variable. b. Solve quadratic equations by inspection (e.g., for x 2 = 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 ± bi for real numbers a and b.

Algebra II

Solve systems of equations

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.

Represent and solve equations and inequalities graphically

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.*

Functions

Understand the concept of a function and use function notation

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 $n \geq 1$.

Interpret functions that arise in applications in terms of the context

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.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.*

Analyze functions using different representations

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.*

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

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

Algebra II

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

b. Use the properties of exponents to interpret expressions for exponential functions. For example, identify percent rate of change in functions such as $y = (1.02)t$, $y = (0.97)t$, $y = (1.01)12t$, $y = (1.2)t/10$, and classify them as representing exponential growth and decay.

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.

Build a function that models a relationship between two quantities

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

a. Determine an explicit expression, a recursive process, or steps for calculation from a context.

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

Build new functions from existing functions

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. 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. For example, $f(x) = 2x^3$ or $f(x) = (x+1)/(x-1)$ for $x \neq 1$.

Construct and compare linear, quadratic, and exponential models and solve problems

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.4 For exponential models, express as a logarithm the solution to $abct = d$ where a, c, and d are numbers and the base b is 2, 10, or e; evaluate the logarithm using technology.*

Interpret expressions for functions in terms of the situation they model

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

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Algebra II

Extend the domain of trigonometric functions using the unit circle

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.

Model periodic phenomena with trigonometric functions

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

Prove and apply trigonometric identities

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

Geometry

Translate between the geometric description and the equation for a conic section

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

Statistics and Probability

Summarize, represent, and interpret data on a single count or measurement variable

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.*

Summarize, represent, and interpret data on two categorical and quantitative variables

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

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.

Algebra II

Understand and evaluate random processes underlying statistical experiments

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?*

Make inferences and justify conclusions from sample surveys, experiments, and observational studies

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.*

Understand independence and conditional probability and use them to interpret data

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.*

Use the rules of probability to compute probabilities of compound events in a uniform probability model

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.*

Integrated Mathematics

Number and Quantity

Reason quantitatively and use units to solve problems

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.*

Algebra

Interpret the structure of expressions

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

a. Interpret parts of an expression, such as terms, factors, and coefficients.

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.

Write expressions in equivalent forms to solve problems

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

c. Use the properties of exponents to transform expressions for exponential functions. For example the expression 1.15t can be rewritten as [1.151/12] 12t ≈ 1.01212t to reveal the approximate equivalent monthly interest rate if the annual rate is 15%.

Create equations that describe numbers or relationships

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 non-viable 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.*

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Integrated Mathematics I

Solve equations and inequalities in one variable

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

Solve systems of equations

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.

Represent and solve equations and inequalities graphically

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

Understand the concept of a function and use function notation

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 $n \geq 1$.

Interpret functions that arise in applications in terms of the context

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.*

Integrated Mathematics I

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.*

Analyze functions using different representations

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.*

a. Graph linear and quadratic functions and show intercepts, maxima, and minima.

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.

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Build a function that models a relationship between two quantities

F-BF.1 Write a function that describes a relationship between two quantities.* a. Determine an explicit expression, a recursive process, or steps for calculation from a context.

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.*

Construct and compare linear, quadratic, and exponential models and solve problems

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

a. Prove that linear functions grow by equal differences over equal intervals and that exponential functions grow by equal factors over equal intervals.

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

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.*

Interpret expressions for functions in terms of the situation they model

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

Integrated Mathematics I

Geometry

Experiment with transformations in the plane

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.

Understand congruence in terms of rigid motions

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.

Prove geometric theorems

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.

Integrated Mathematics I
Statistics and Probability
Summarize, represent, and interpret data on a single count or measurement variable

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).*

Summarize, represent, and interpret data on two categorical and quantitative variables

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.*
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.
c. Fit a linear function for a scatter plot that suggests a linear association.

Interpret linear models

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.*

Integrated Mathematics I
Number and Quantity
Extend the properties of exponents to rational exponents

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. For example, we define 51/3 to be the cube root of 5 because we want [51/3] 3 = 5(1/3) 3 to hold, so [51/3] 3 must equal 5.
N-RN.2 Rewrite expressions involving radicals and rational exponents using the properties of exponents.

Use properties of rational and irrational numbers

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.

Reason quantitatively and use units to solve problems

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

Perform arithmetic operations with complex numbers

N-CN.1 Know there is a complex number i such that i 2 = −1, and every complex number has the form a + bi with a and b real.
N-CN.2 Use the relation i 2 = −1 and the commutative, associative, and distributive properties to add, subtract, and multiply complex numbers.

Use complex numbers in polynomial identities and equations

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

~~Algebra~~

~~Interpret the structure of expressions~~

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

~~Integrated Mathematics II~~

~~A-SSE.2 Use the structure of an expression to identify ways to rewrite it. For example, see x4 − y 4 as (x2) 2 − (y2) 2, thus recognizing it as a difference of squares that can be factored as (x2 − y 2) (x2 + y2).~~

~~Write expressions in equivalent forms to solve problems~~

~~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. Factor a quadratic expression to reveal the zeros of the function it defines.~~

~~b. Complete the square in a quadratic expression to reveal the maximum or minimum value of the function it defines.~~

~~Perform arithmetic operations on polynomials~~

~~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.~~

~~Create equations that describe numbers or relationships~~

~~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.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.*~~

~~Understand solving equations as a process of reasoning and explain the reasoning M~~

~~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.~~

~~Solve equations and inequalities in one variable~~

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

~~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.~~

~~b. Solve quadratic equations by inspection (e.g., for x 2 = 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 ± bi for real numbers a and b.~~

~~Solve systems of equations~~

~~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.~~

~~Functions~~

~~Interpret functions that arise in applications in terms of the context M~~

~~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.*

Analyze functions using different representations

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.*

a. Graph linear and quadratic functions and show intercepts, maxima, and minima.

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

c. 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.

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.

b. Use the properties of exponents to interpret expressions for exponential functions. For example, identify percent rate of change in functions such as $y = (1.02)t$, $y = (0.97)t$, $y = (1.01)12t$, $y = (1.2)t/10$, and classify them as representing exponential growth and decay.

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.

Integrated Mathematics II

Build a function that models a relationship between two quantities

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

a. Determine an explicit expression, a recursive process, or steps for calculation from a context.

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.

Build new functions from existing functions

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.

Geometry

Understand similarity in terms of similarity transformations

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

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.

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.

Prove theorems using similarity

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.

Define trigonometric ratios and solve problems involving right triangles

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.

Integrated Mathematics II

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

Explain volume formulas and use them to solve problems

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.3 Use volume formulas for cylinders, pyramids, cones, and spheres to solve problems.*

Statistics and Probability*

Summarize, represent, and interpret data on two categorical and quantitative variables

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

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.

b. Informally assess the fit of a function by plotting and analyzing residuals.

Understand independence and conditional probability and use them to interpret data

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.

Integrated Mathematics II

Use the rules of probability to compute probabilities of compound events in a uniform probability model

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.*

Integrated Mathematics III

Number and Quantity

Reason quantitatively and use units to solve problems

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

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Algebra

Interpret the structure of expressions

A-SSE.2 Use the structure of an expression to identify ways to rewrite it. For example, see x4 − y 4 as (x2) 2 − (y2) 2 , thus recognizing it as a difference of squares that can be factored as (x2 − y 2)(x2 + y2).

Write expressions in equivalent forms to solve problems

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.*

Understand the relationship between zeros and factors of 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.

Use polynomial identities to solve problems

A-APR.4 Prove polynomial identities and use them to describe numerical relationships. For example, the polynomial identity (x2 + y2) 2 = (x2 − y 2) 2 + (2xy)2 can be used to generate Pythagorean triples.

Rewrite rational expressions

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.

Integrated Mathematics III

Create equations that describe numbers or relationships

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.*

Understand solving equations as a process of reasoning and explain the reasoning

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.

Represent and solve equations and inequalities graphically

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.*

Interpret functions that arise in applications in terms of the context

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.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.*

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Analyze functions using different representations

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.* c. Graph polynomial functions, identifying zeros when suitable factorizations are available, and showing end behavior. e. Graph exponential and logarithmic functions, showing intercepts and end behavior, and trigonometric functions, showing period, midline, and amplitude.

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.

Build new functions from existing functions

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. 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. For example, f(x) =2x3 or f(x) = (x+1)/(x-1) for x ≠ 1.

Construct and compare linear, quadratic, and exponential models and solve problems

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

Extend the domain of trigonometric functions using the unit circle

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.

Model periodic phenomena with trigonometric functions

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

Prove and apply trigonometric identities

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

Integrated Mathematics III

Geometry

Make geometric constructions

G-CO.12 Make formal geometric constructions with a variety of tools and methods (compass and straightedge, string, reflective devices, paper folding, dynamic geometric software, etc.). 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.

Understand and apply theorems about 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.

Find arc lengths and areas of sectors of circles

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.

Translate between the geometric description and the equation for a conic section

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.

Use coordinates to prove simple geometric theorems algebraically

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, √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).

Integrated Mathematics III

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.*

Visualize relationships between two-dimensional and three-dimensional objects

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.

Apply geometric concepts in modeling situations

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*

Summarize, represent, and interpret data on a single count or measurement variable S

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.*

Summarize, represent, and interpret data on two categorical and quantitative variables

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

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.

b. Informally assess the fit of a function by plotting and analyzing residuals.

Understand and evaluate random processes underlying statistical experiments

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

Integrated Mathematics III

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?*

Make inferences and justify conclusions from sample surveys, experiments, and observational studies

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.*

Advanced Mathematics Plus

Number and Quantity

Perform arithmetic operations with complex numbers

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

Represent complex numbers and their operations on the complex plane

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.

Use complex numbers in polynomial identities and equations

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

Represent and model with vector 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.

Advanced Mathematics Plus

Perform operations on vectors

N-VM.4 Add and subtract vectors.

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.

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

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.

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).

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

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Perform operations on matrices and use matrices in applications

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

Use polynomial identities to solve problems

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.

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Rewrite rational expressions

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.

Solve systems of equations

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).

Functions

Analyze functions using different representations

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.*

d. Graph rational functions, identifying zeros and asymptotes when suitable factorizations are available, and showing end behavior.

Build a function that models a relationship between two quantities

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

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.

Build new functions from existing functions

F-BF.4 Find inverse functions.

b. Verify by composition that one function is the inverse of another.

c. Read values of an inverse function from a graph or a table, given that the function has an inverse.

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.

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Extend the domain of trigonometric functions using the unit circle

F-TF.3 Use special triangles to determine geometrically the values of sine, cosine, tangent for π/3, π/4 and π/6, and use the unit circle to express the values of sine, cosine, and tangent for π − x, π+x, and 2π − 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.

Model periodic phenomena with trigonometric functions

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. *

Prove and apply trigonometric identities

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

Geometry

Apply trigonometry to general triangles

G-SRT.9 Derive the formula A = ½ 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).

Understand and apply theorems about circles

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

Translate between the geometric description and the equation for a conic section

Advanced Mathematics Plus

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.

Explain volume formulas and use them to solve problems

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

Statistics and Probability*

Use the rules of probability to compute probabilities of compound events in a uniform probability 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.*

Calculate expected values and use them to solve problems

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.*

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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?*

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Use probability to evaluate outcomes of decisions

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

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.

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 E: International Society for Technology in Education Standards (ISTE)

ISTE Crosswalk for Early Childhood Education												
	Course	Unit 1	Unit 2	Unit 3	Unit 4	Unit 5	Unit 6	Unit 7	Unit 8	Unit 9	Unit 10	Unit 11
ISTE Standards												
T1			X	X	X	X		X	X	X	X	X
T2		X	X	X	X	X	X	X	X	X	X	X
T3		X	X	X	X	X	X	X	X	X	X	X
T4			X	X	X	X		X	X	X	X	X
T5		X	X	X	X	X	X	X	X	X	X	X
T6		X	X	X	X	X	X	X	X	X	X	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:

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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.