



2024 Multimedia—Digital Video Production

Program CIP: 50.0102 — Digital Arts

Direct inquiries to:

Instructional Design Specialist
Research and Curriculum Unit
P.O. Drawer DX
Mississippi State, MS 39762
662.325.2510
helpdesk@rcu.msstate.edu

Program Supervisor
Office of Career and Technical Education
Mississippi Department of Education
P.O. Box 771
Jackson, MS 39205
601.359.3974

Published by:

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

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

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

Table of Contents

Acknowledgments.....	3
Standards.....	5
Preface.....	6
Mississippi Teacher Professional Resources	7
Executive Summary	8
Course Outline	9
Career Pathway Outlook	10
Professional Organizations	13
Using This Document	14
Unit 1: Introduction, Safety, and Orientation	15
Unit 2: Camera Operations/Lenses	16
Unit 3: Audio and Lighting.....	17
Unit 4: Production Stages	18
Unit 5: Video Editing.....	19
Unit 6: Video Publishing and Broadcasting.....	20
Student Competency Profile	21
Appendix A: Industry Standards.....	23
Appendix B: 21st Century Skills	25
Appendix C: College and Career Ready Standards	28
Appendix D: Common Core for State Standards for Mathematics	37
Appendix E: International Society for Technology in Education Standards (ISTE).....	39

Acknowledgments

The Digital Video Production was presented to the Mississippi State Board of Education on February 15, 2024. The following persons were serving on the state board at the time:

Dr. Ray Morgigno, interim state superintendent of education, executive secretary
Mr. Glen V. East, chair
Mr. Matt Miller, vice chair
Dr. Ronnie L. McGehee
Mr. Bill Jacobs
Mr. Mike Pruitt
Mrs. Mary Werner
Dr. Wendi Barrett
Mr. Charlie Frugé, student representative
Ms. Kate Riddle, student representative

The following Mississippi Department of Education (MDE) and RCU managers and specialists assisted in the development of the Digital Video Production:

Wendy Clemons, the associate state superintendent of the MDE Office of Secondary, Professional Development, and Career Technical Education, supported the RCU and teachers throughout the development of the framework and supporting materials.
Brett Robinson, the state director of the MDE Office of Career and Technical Education (CTE), supported the RCU and teachers throughout the development of the framework and supporting materials.
Josh Stanford, the Multimedia program supervisor of the MDE Office of CTE, supported the RCU and teachers throughout the development of the framework and supporting materials.
Betsey Smith, the director of the RCU, supported RCU staff and teachers throughout the development of this framework and supporting materials.
Courtney McCubbins, the curriculum manager of the RCU, supported RCU staff and teachers throughout the development of this framework and supporting materials.
Kyle McDill, a project manager with the RCU, researched and co-authored this framework.
Angie Davis, a project manager with the RCU, researched and co-authored this framework.

Special thanks are extended to the educators who contributed to the development and revision of this framework and supporting materials:

Devin Cooper, Madison County Schools, Canton, MS
Trey Gore, Hinds Community College, Raymond, MS
Sherrie Powell, Calhoun County Career and Technical Center, Calhoun City, MS
Chris Misun, Mississippi State University, Starkville, MS
Teri Gordon, Desoto County Career and Technical Center, Horn Lake, MS

Hayden Embry, Oxford High School, Oxford, MS
Sheri Burrell, Attala Career and Technical Center, Kosciusko, MS
Blaise King, Madison County Schools, Madison MS
Melvin Hodge, Jackson Career Development Center, Jackson, MS
JaMicheal Chambers, Jackson Career Development Center, Jackson, MS
Adam Chance, Clinton High School, Clinton
Debra Martin, Quitman School District, Quitman, MS

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

Rick Moore, Mad Genius
Marsh Nabors, Mad Genius

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 Digital Video Production is aligned to the following standards:

Information Technology Cluster

- Web & Digital Communications Career Pathway (IT-WD)

Arts, A/V Technology & Communications Cluster

- Printing Technology Career Pathway (AR-PRT)
- A/V Technology & Film Career Pathway (AR-AV)
- Visual Arts Career Pathway (AR-VIS)

The standards were extensively researched and reviewed by leaders in the industry, secondary and postsecondary instructors, and university specialists. For each content standard, performance elements representing major topic areas with accompanying performance indicators were developed. Measurements of assessment of the performance elements and performance indicators were developed at the basic, intermediate, and advanced levels. A complete copy of the standards can be accessed careertech.org/career-technical-education/cctc.

International Society for Technology in Education Standards (ISTE)

Reprinted with permission from *ISTE Standards for Students* (2016). All rights reserved. Permission does not constitute an endorsement by ISTE (iste.org).

College- and Career-Readiness Standards

College- and career-readiness 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-Readiness Standards (MCCRS) to provide a consistent, clear understanding of what students are expected to learn and so teachers and parents know what they need to do to help them.

mdek12.org/oae/college-and-career-readiness-standards

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.

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, contact the RCU at 662.325.2510 or helpdesk@rcu.msstate.edu.

Executive Summary

Pathway Description

The Digital Video Production is a one-credit course within the Arts, A/V Technology & Communications pathway that equips students with hands-on experience in the video production process, from initial concept to final broadcast. Covering camera techniques, audio and lighting, and post-production editing, the curriculum prepares students for the technical and creative aspects of video creation, while learning to refine visuals and sound, manage production stages, and finalize content for various platforms. The program culminates with skills in live and digital broadcasting, ensuring students are ready to engage audiences and meet industry standards in the multimedia landscape.

Grade Level and Class Size Recommendations

It is recommended that students enter this program as freshman. Exceptions to this are a district-level decision based on class size, enrollment numbers, student maturity, and CTE delivery method. This is a hands-on, lab- or shop-based course. Therefore, a maximum of 15 students is recommended per class with only one class with the teacher at a time.

Student Prerequisites

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 high school-level math (last course taken or the instructor can specify the level of math instruction needed)
 3. Instructor approval and Test of Adult Basic Education (TABE) reading score (eighth grade or higher)
- or**
1. TABE reading and math 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.

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 training sessions provided, please contact the RCU at 662.325.2510 or helpdesk@rcu.msstate.edu.

Course Outline

Option 1—One 1-Carnegie Unit Course

This curriculum consists of one 1-credit course.

Digital Video Production—Course Code: **Insert number here**

Unit	Unit Title	Hours
1	Introduction, Safety, and Orientation	10
2	Camera Operations/Lenses	25
3	Audio and Lighting	25
4	Production Stages	30
5	Video Editing	30
6	Video Publishing and Broadcasting	20
Total		140

Career Pathway Outlook

Overview

The Digital Video Production curriculum, integral to the arts, A/V technology, and communications cluster, offers applied instruction aligning with Mississippi’s community and junior college programs. It emphasizes foundational design and creativity, leveraging diverse platforms for artistic expression. This course nurtures essential 21st-century design skills and digital citizenship. Geared towards careers in broadcasting, graphic design, media, and more, it includes layout creation, product illustration, and software training in CAD and desktop publishing. This pathway prepares students for advanced courses like digital design and video production, leading to opportunities in advertising, publishing, motion picture, and design services. It also positions students well for associate degrees and higher education, catering to careers ranging from technical writing to executive roles in multimedia-related fields.

Needs of the Future Workforce

The U.S. Bureau of Labor Statistics forecasts a steady growth in arts and design occupations from 2022 to 2032, mirroring the average across all fields. Annually, approximately 95,800 new openings are expected due to growth and turnover. As of May 2022, the average wage in these fields was \$51,150, surpassing the median for all jobs. In 2021, the majority of fine and performing arts graduates specialized in commercial art, graphic design, and fine arts. A significant 64% of these graduates found roles in related fields. Notably, in Mississippi, graphic design ranks third in employment within this cluster. Art director roles, needing a bachelor's degree, are projected to grow by 6% from 2022 to 2023, outpacing graphic designers and managers at 3%. High-earning positions like art directors, special effects artists, and animators average around \$100,000 nationally, while fashion and industrial designers earn about \$75,000, and interior and graphic designers approximately \$60,000. For detailed data on current and future multimedia core-related jobs, consult Table 1. 1.

Table 1.1: Current and Projected Occupation Report

Description	Jobs, 2014	Projected Jobs, 2024	Change (Number)	Change (Percent)	Average Hourly Earnings, 2023
Arts, Design, Entertainment, Sports, and Media Occupation	12,100	12,730	630	5.2%	\$25.44
Graphic Designers	1,160	1,190	30	2.6%	\$22.19
Audio and Video Technicians	230	280	50	21.7%	\$21.70
Actors	50	70	20	40%	\$40.12
Producers and Directors	280	290	10	3.6%	\$29.21

Source: Mississippi Department of Employment Security; mdes.ms.gov (2023).

Perkins V Requirements and Academic Infusion

The Digital Video Production curriculum meets Perkins V requirements of introducing students to and preparing them for high-skill, high-wage occupations within an arts, a/v technology and communications field. It also offers students a program of study, including secondary, postsecondary, and institutions of higher learning courses, that will further prepare them for arts,

a/v technology and communications- related 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 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 Digital Video Production 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' background, emotional health, and circumstances, for example—create unique learners. By providing various teaching and assessment strategies, students with various learning preferences can have more opportunities 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 Digital Video Production curriculum SkillsUSA, TSA, MECA and FBLA are examples of student organizations. Student organizations provide participants and members with growth opportunities and competitive events. They also open the doors to the world of multimedia careers and scholarship opportunities.

Cooperative Learning

Cooperative learning can help students understand topics when independent learning cannot. Therefore, you will see several opportunities in the Digital Video Production 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 Digital Video Production curriculum provides opportunities for students to work together and help each other complete complex tasks. There are many field experiences within the Digital Video Production curriculum that will allow and encourage collaboration with professionals currently in the Multimedia field.

Work-Based Learning

Work-based learning is an extension of understanding competencies taught in the Digital Video Production classroom. This curriculum is designed in a way that necessitates active involvement by the students in the community around them and the global environment. These real-world connections and applications link all types of students to knowledge, skills, and professional dispositions. Work-based learning should encompass ongoing and increasingly more complex involvement with local companies and multimedia industry professionals. Thus, supervised collaboration and immersion into the multimedia industry around the students are keys to students' success, knowledge, and skills development.

Professional Organizations

Association for Career and Technical Education (ACTE)

acteonline.org

Future Business Leaders of America (FBLA)

fbla-pbl.org

Mississippi Association for Career and Technical Education (MSACTE)

mississippiacte.com

Mississippi Educational Computing Association (MECA)

ms-meca.org

SkillsUSA

skillsusa.org

Technology Student Association (TSA)

tsaweb.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

All teachers should request to be added to the Canvas Resource Guide for their course. For questions or 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. This material will greatly enhance the learning experiences of students. If the Multimedia - Digital Video Production program is using a national certification, work-based learning, or another measure of accountability that aligns with Perkins V as a quality indicator, this material could very well be assessed 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: Introduction, Safety, and Orientation

Competencies and Suggested Objectives	
1. Identify course expectations, school policies, program policies, safety procedures, and jobs related to Digital Video Production. ^{DOK1}	
a. Identify course expectations, school policies, and program policies related to Digital Video Production.	
b. Apply safety procedures in the classroom, lab, and for all equipment.	
c. Explore career opportunities related to the multimedia industry.	
2. Explore 21 st century skills in relation to the classroom environment. ^{DOK1}	
a. Identify potential influences that shape personality development, including personality traits, heredity, and environment.	
b. Develop a report on how personality traits affect teamwork and leadership skills.	
c. Develop effective leadership, decision-making, and communication skills.	
d. Create a working résumé with a portfolio and continue to update throughout the course.	
e. Describe the purpose of student organizations as it relates to personality, leadership, and teamwork development.	
3. Identify legal requirements for participation in the occupation. ^{DOK1}	
a. Describe ways to avoid legal liability problems in the occupation.	
b. Discuss digital citizenship.	

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 entering the shop for lab simulations and projects. This test should be documented in each student's file.

Unit 2: Camera Operations/Lenses

Competencies and Suggested Objectives
1. Investigate the principles of shot composition. ^{DOK3} a. Apply the Rule of Thirds in shot composition to enhance visual balance.
2. Analyze the impact of movements, angles, and framing in video production. ^{DOK3} a. Utilize directional movements to convey specific emotions in video production. b. Differentiate between various camera angles and their uses in video production. c. Select appropriate framing techniques for different scenes to enhance visual storytelling.
3. Evaluate camera functions and their impact on video quality. ^{DOK3} a. Recall and adjust camera settings such as: <ul style="list-style-type: none">• ISO• F-Stop/Aperture/Iris• Frame Rate• Aspect Ratio• White Balance• Shutter Speed

Unit 3: Audio and Lighting

Competencies and Suggested Objectives
1. Classify different types of microphones and cables and their uses in audio recording. ^{DOK2} a. Demonstrate proper handling of microphones and cables to ensure audio quality.
2. Synthesize audio elements through mixing to achieve desired sound quality. ^{DOK4}
3. Design and implement lighting setups for video production. ^{DOK4} a. Recognize and use different types of lighting in video production. b. Identify and use different lighting tools and technology. c. Design lighting composition to create desired effects. d. Understand and apply different lighting effects. e. Construct lighting compositions to create specific moods or effects.

Unit 4: Production Stages

Competencies and Suggested Objectives
1. Investigate the principles and processes of pre-production. ^{DOK3} a. Identify and differentiate between various roles and responsibilities in pre-production, such as scriptwriting, storyboarding, and budgeting. b. Develop a comprehensive production schedule and resource plan.
2. Analyze the principles and processes of production. ^{DOK3} a. Identify and understand various roles and responsibilities during production. b. Manage on-set operations and troubleshoot production issues.
3. Evaluate the principles and processes of post-production. ^{DOK3} a. Distinguish between various roles and responsibilities in post-production, such as editing, sound design, and color grading. b. Critique the final product for quality and consistency.

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 entering the shop for lab simulations and projects. This test should be documented in each student's file.

Note: This unit will be ongoing throughout the year. Time allotted for this unit will be distributed over the entire year.

Unit 5: Video Editing

Competencies and Suggested Objectives	
1. Implement keyframing techniques in video editing. ^{DOK3}	
a. Use keyframing to create dynamic motion in video sequences.	
b. Apply keyframing to transform visual elements over time.	
2. Synthesize effects and transitions in video editing. ^{DOK4}	
a. Apply effects to enhance visual storytelling.	
b. Use transitions to guide viewer attention and pacing.	
3. Design and modify text and titles in video editing. ^{DOK3}	
a. Create text elements to provide information and enhance viewer engagement.	
b. Modify titles to align with the overall aesthetic of the video.	
4. Perform advanced color correction in video editing. ^{DOK3}	
a. Apply color correction techniques to improve visual aesthetics.	
b. Use color grading to influence mood and style.	
5. Organize and manage media during the editing process. ^{DOK2}	
a. Implement a media management system to ensure efficient workflows.	
b. Maintain data integrity throughout the editing process.	

Unit 6: Video Publishing and Broadcasting

Competencies and Suggested Objectives
1. Finalize and prepare video content for distribution. ^{DOK2} <ol style="list-style-type: none">Outline the steps for finalizing video projects for distribution.Compare different video file formats and their uses (e.g., MP4, MOV, AVI).Demonstrate compression techniques to balance quality and file size.
2. Understand and identify broadcast standards and practices. ^{DOK3} <ol style="list-style-type: none">Explain the importance of adhering to broadcast standards.Identify the requirements for different broadcasting platforms (e.g., TV, online, mobile).Discuss the legal considerations for broadcasting content.
3. Prepare videos for live broadcasting and pre-recorded content. ^{DOK3} <ol style="list-style-type: none">Differentiate between live broadcasting and pre-recorded content preparation.Demonstrate how to set up a video for live streaming.Discuss the technical checks required before broadcasting live content.
4. Broadcast content on various platforms. ^{DOK3} <ol style="list-style-type: none">Compare the methods for publishing videos on various platforms (e.g., YouTube, Twitch, traditional TV).Analyze the impact of platform choice on audience reach and engagement.Apply best practices for titling, tagging, and describing videos for optimal discoverability.
5. Engage with audiences and feedback. ^{DOK2} <ol style="list-style-type: none">Discuss the role of audience feedback in video publishing.Utilize social media and other tools (e.g., X (formerly Twitter) Q&A sessions, Instagram stories, Facebook live) to engage with audiences and promote content.Evaluate viewer statistics and feedback to inform future video projects.
6. Integrate artificial intelligence (AI) into video publishing and broadcasting. ^{DOK 2} <ol style="list-style-type: none">Evaluate AI technologies for optimizing video content distribution on platforms like YouTube, Twitch, and traditional television.Analyze the use of AI in enhancing tasks in video broadcasting such as tagging, titling, and description generation for optimal discoverability.

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: Introduction, Safety, and Orientation	
	1. Identify course expectations, school policies, program policies, safety procedures, and jobs related to Digital Video Production.
	2. Explore 21 st century skills in relation to the classroom environment.
	3. Identify legal requirements for participation in the occupation.
Unit 2: Camera Operations/Lenses	
	1. Investigate the principles of shot composition.
	2. Analyze the impact of movements, angles, and framing in video production.
	3. Evaluate camera functions and their impact on video quality.
Unit 3: Audio and Lighting	
	1. Classify different types of microphones and cables and their uses in audio recording.
	2. Synthesize audio elements through mixing to achieve desired sound quality.
	3. Design and implement lighting setups for video production.
Unit 4: Production Stages	
	1. Investigate the principles and processes of pre-production.
	2. Analyze the principles and processes of production.
	3. Evaluate the principles and processes of post-production.
Unit 5: Video Editing	
	1. Implement keyframing techniques in video editing.
	2. Synthesize effects and transitions in video editing.
	3. Design and modify text and titles in video editing.
	4. Perform advanced color correction in video editing.
	5. Organize and manage media during the editing process.
Unit 6: Video Publishing and Broadcasting	
	1. Finalize and prepare video content for distribution.

	2.	Understand and identify broadcast standards and practices.
	3.	Prepare videos for live broadcasting and pre-recorded content.
	4.	Broadcast content on various platforms.
	5.	Engage with audiences and feedback.
	6.	Integrate artificial intelligence (AI) into video publishing and broadcasting

Appendix A: Industry Standards

	Units	1	2	3	4	5	6
Standards							
WDC1		X	X	X	X	X	X
WDC2		X	X	X	X	X	X
WDC3		X	X	X	X	X	X
WDC4		X	X	X	X	X	X
WDC5							
WDC6		X	X	X	X	X	X
WDC7		X	X	X	X	X	X
WDC8		X	X	X	X	X	X
WDC9		X	X	X	X	X	X
WDC10		X	X	X	X	X	X
PRT1		X		X		X	X
PRT2				X	X	X	X
PRT3				X	X	X	
AVT1		X			X	X	X
AVT2					X		X
AVT3		X	X	X		X	
AVT4		X		X	X		
VIS1		X	X	X		X	X
VIS2			X		X	X	X

Information Technology Career Cluster™ (IT)

WDC Web & Digital Communications Career Pathway

1. Analyze customer requirements to design and develop a Web or digital communication product.
2. Apply the design and development process to produce user-focused Web and digital communications solutions.
3. Write product specifications that define the scope of work aligned to customer requirements.
4. Demonstrate the effective use of tools for digital communication production, development and project management.
5. Develop, administer and maintain Web applications.
6. Design, create and publish a digital communication product based on customer needs.
7. Evaluate the functionality of a digital communication product using industry accepted techniques and metrics.
8. Implement quality assurance processes to deliver quality digital communication products and services.
9. Perform maintenance and customer support functions for digital communication products.
10. Comply with intellectual property laws, copyright laws and ethical practices when creating Web/digital communications.

Arts, A/V Technology & Communications Career Cluster™ (AR)

PRT Printing Technology Career Pathway

1. Manage the printing process, including customer service and sales, scheduling, production and quality control.
2. Demonstrate the production of various print, multimedia or digital media products.
3. Perform finishing and distribution operations related to the printing process.

AV A/V Technology & Film Career Pathway

1. Describe the history, terminology, occupations and value of audio, video and film technology.
2. Demonstrate the use of basic tools and equipment used in audio, video and film production.
3. Demonstrate technical support skills for audio, video and/or film productions.
4. Design an audio, video and/or film production.

VIS Visual Arts Career Pathway

1. Describe the history and evolution of the visual arts and its role in and impact on society.
2. Analyze how the application of visual arts elements and principles of design communicate and express ideas.
3. Analyze and create two and three-dimensional visual art forms using various media.

Appendix B: 21st Century Skills

	Units	1	2	3	4	5	6
Standards							
CS1		X	X	X	X	X	X
CS2		X	X	X	X	X	X
CS3		X	X	X	X	X	X
CS4							
CS5		X	X	X	X	X	X
CS6		X	X	X	X	X	X
CS7		X	X	X	X	X	X
CS8		X	X	X	X	X	X
CS9		X	X	X	X	X	X
CS10		X	X	X	X	X	X
CS11		X	X	X	X	X	X
CS12		X	X	X	X	X	X
CS13		X	X	X	X	X	X
CS14		X	X	X	X	X	X
CS15		X	X	X	X	X	X
CS16		V					

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
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 C: College and Career Ready Standards

	Units	1	2	3	4	5	6
Standards							
RI.11.1.		X	X	X	X	X	X
RI.11.2.		X	X	X	X	X	X
RI.11.3.		X	X	X	X	X	X
RI.11.4.		X	X	X	X	X	X
RI.11.5.		X	X	X	X	X	X
RI.11.6.		X	X	X	X	X	X
RI.11.7.		X	X	X	X	X	X
RI.11.8.		X	X	X	X	X	X
RI.11.9.							
RI.11.10.		X	X	X	X	X	X
W.11.1.		X	X	X	X	X	X
W.11.2.		X	X	X	X	X	X
W.11.3.		X	X	X	X	X	X
W.11.4.		X	X	X	X	X	X
W.11.5.		X	X	X	X	X	X
W.11.6.		X	X	X	X	X	X
W.11.7.		X	X	X	X	X	X
W.11.8.		X	X	X	X	X	X
W.11.9.		X	X	X	X	X	X
W.11.10.		X	X	X	X	X	X
SL.11.1.		X	X	X	X	X	X
SL.11.2.		X	X	X	X	X	X
SL.11.3.		X	X	X	X	X	X
SL.11.4.		X	X	X	X	X	X
SL.11.5.		X	X	X	X	X	X
SL.11.6.							
L.11.1.		X	X	X	X	X	X
L.11.2.		X	X	X	X	X	X
L.11.3.							
L.11.4.		X	X	X	X	X	X
L.11.5.		X	X	X	X	X	X
L.11.6.		X	X	X	X	X	X
RST.11.1.		X	X	X	X	X	X
RST.11.2.		X	X	X	X	X	X
RST.11.3.		X	X	X	X	X	X
RST.11.4.		X	X	X	X	X	X
RST.11.5.		X	X	X	X	X	X
RST.11.6.		X	X	X	X	X	X
RST.11.7.		X	X	X	X	X	X
RST.11.8.							
RST.11.9.		X	X	X	X	X	X
RST.11.10.							
WHST.11.1.							
WHST.11.2.		X	X	X	X	X	X
WHST.11.3.							
WHST.11.4.		X	X	X	X	X	X
WHST.11.5.		X	X	X	X	X	X
WHST.11.6.		X	X	X	X	X	X
WHST.11.7.		X	X	X	X	X	X
WHST.11.8.		X	X	X	X	X	X
WHST.11.9.							
WHST.11.10.							

Reading Standards for Informational Text (11-12) - College and Career Readiness Anchor
Standards for Informational Text
RI.11 Key Ideas and Details

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

RI.11 Craft and Structure

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).
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.
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.

RI.11 Integration of Knowledge and Ideas

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

RI.11 Range of Reading and Level of Text Complexity

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

College and Career Readiness Anchor Standards for Writing

W.11 Text Types and Purposes

1. Write arguments to support claims in an analysis of substantive topics or texts, using valid reasoning and relevant and sufficient evidence.
 - a. Introduce precise, knowledgeable claim(s), establish the significance of the claim(s), distinguish the claim(s) from alternate or opposing claims, and create

- an organization that logically sequences claim(s), counterclaims, reasons, and evidence.
- b. Develop claim(s) and counterclaims fairly and thoroughly, supplying the most relevant evidence for each while pointing out the strengths and limitations of both in a manner that anticipates the audience's knowledge level, concerns, values, and possible biases.
 - c. Use words, phrases, and clauses as well as varied syntax to link the major sections of the text, create cohesion, and clarify the relationships between claim(s) and reasons, between reasons and evidence, and between claim(s) and counterclaims.
 - d. Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing.
 - e. Provide a concluding statement or section that follows from and supports the argument presented.
2. Write informative/explanatory texts to examine and convey complex ideas, concepts, and information clearly and accurately through the effective selection, organization, and analysis of content.
- a. Introduce a topic; organize complex ideas, concepts, and information so that each new element builds on that which precedes it to create a unified whole; include formatting (e.g., headings), graphics (e.g., figures, tables), and multimedia when useful to aiding comprehension.
 - b. Develop the topic thoroughly by selecting the most significant and relevant facts, extended definitions, concrete details, quotations, or other information and examples appropriate to the audience's knowledge of the topic.
 - c. Use appropriate and varied transitions and syntax to link the major sections of the text, create cohesion, and clarify the relationships among complex ideas and concepts.
 - d. Use precise language, domain-specific vocabulary, and techniques such as metaphor, simile, and analogy to manage the complexity of the topic.
 - e. Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing.
 - f. Provide a concluding statement or section that follows from and supports the information or explanation presented (e.g., articulating implications or the significance of the topic).
3. Write narratives to develop real or imagined experiences or events using effective technique, well-chosen details, and well-structured event sequences.
- a. Engage and orient the reader by setting out a problem, situation, or observation and its significance, establishing one or multiple point(s) of view, and introducing a narrator and/or characters; create a smooth progression of experiences or events.
 - b. Use narrative techniques, such as dialogue, pacing, description, reflection, and multiple plot lines, to develop experiences, events, and/or characters.
 - c. Use a variety of techniques to sequence events so that they build on one another to create a coherent whole and build toward a particular tone and outcome (e.g., a sense of mystery, suspense, growth, or resolution).

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

W.11 Production and Distribution of Writing

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

W.11 Research to Build and Present Knowledge

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.
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.
9. Draw evidence from literary or informational texts to support analysis, reflection, and research.
 - a. Apply grades 11–12 Reading standards to literature (e.g., “Demonstrate knowledge of eighteenth-, nineteenth- and early-twentieth-century foundational works of American literature, including how two or more texts from the same period treat similar themes or topics”).
 - b. Apply grades 11–12 Reading standards to literary nonfiction (e.g., “Delineate and evaluate the reasoning in seminal U.S. texts, including the application of constitutional principles and use of legal reasoning [e.g., in U.S. Supreme Court Case majority opinions and dissents] and the premises, purposes, and arguments in works of public advocacy [e.g., The Federalist, presidential addresses]”).

W.11 Range of Writing

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

College and Career Readiness Anchor Standards for Speaking and Listening

SL.11 Comprehension and Collaboration

1. Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grades 11–12 topics, texts, and issues, building on others’ ideas and expressing their own clearly and persuasively.
 - a. Come to discussions prepared, having read and researched material under study; explicitly draw on that preparation by referring to evidence from texts and other research on the topic or issue to stimulate a thoughtful, well-reasoned exchange of ideas.
 - b. Work with peers to promote civil, democratic discussions and decision-making, set clear goals and deadlines, and establish individual roles as needed.
 - c. Propel conversations by posing and responding to questions that probe reasoning and evidence; ensure a hearing for a full range of positions on a topic or issue; clarify, verify, or challenge ideas and conclusions; and promote divergent and creative perspectives.
 - d. Respond thoughtfully to diverse perspectives; synthesize comments, claims, and evidence made on all sides of an issue; resolve contradictions when possible; and determine what additional information or research is required to deepen the investigation or complete the task.
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.
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.

SL.11 Presentation of Knowledge and Ideas

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.
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.
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 on page 54 for specific expectations.)

College and Career Readiness Anchor Standards for Language

L.11 Conventions of Standard English

1. Demonstrate command of the conventions of standard English grammar and usage when writing or speaking.
 - a. Apply the understanding that usage is a matter of convention, can change over time, and is sometimes contested.

- b. Resolve issues of complex or contested usage, consulting references (e.g., Merriam-Webster’s Dictionary of English Usage, Garner’s Modern American Usage) as needed.
- 2. Demonstrate command of the conventions of standard English capitalization, punctuation, and spelling when writing.
 - a. Observe hyphenation conventions.
 - b. Spell correctly.

L.11 Knowledge of Language

- 3. Apply knowledge of language to understand how language functions in different contexts, to make effective choices for meaning or style, and to comprehend more fully when reading or listening.
 - a. Vary syntax for effect, consulting references (e.g., Tufte’s Artful Sentences) for guidance as needed; apply an understanding of syntax to the study of complex texts when reading.

L.11 Vocabulary Acquisition and Use

- 4. Determine or clarify the meaning of unknown and multiple-meaning words and phrases based on grades 11–12 reading and content, choosing flexibly from a range of strategies.
 - a. Use context (e.g., the overall meaning of a sentence, paragraph, or text; a word’s position or function in a sentence) as a clue to the meaning of a word or phrase.
 - b. Identify and correctly use patterns of word changes that indicate different meanings or parts of speech (e.g., conceive, conception, conceivable).
 - c. Consult general and specialized reference materials (e.g., dictionaries, glossaries, thesauruses), both print and digital, to find the pronunciation of a word or determine or clarify its precise meaning, its part of speech, its etymology, or its standard usage.
 - d. Verify the preliminary determination of the meaning of a word or phrase (e.g., by checking the inferred meaning in context or in a dictionary).
- 5. Demonstrate understanding of figurative language, word relationships, and nuances in word meanings.
 - a. Interpret figures of speech (e.g., hyperbole, paradox) in context and analyze their role in the text.
 - b. Analyze nuances in the meaning of words with similar denotations.
- 6. Acquire and use accurately general academic and domain-specific words and phrases, sufficient for reading, writing, speaking, and listening at the college and career readiness level; demonstrate independence in gathering vocabulary knowledge when considering a word or phrase important to comprehension or expression.

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

RST.11 Key Ideas and Details

- 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.

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.
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.

RST.11 Craft and Structure

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.
5. Analyze how the text structures information or ideas into categories or hierarchies, demonstrating understanding of the information or ideas.
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 Integration of Knowledge and Ideas

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.
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.
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.

RST.11 Range of Reading and Level of Text Complexity

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

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

WHST.11 Text Types and Purposes

1. Write arguments focused on discipline-specific content.
 - a. Introduce precise, knowledgeable claim(s), establish the significance of the claim(s), distinguish the claim(s) from alternate or opposing claims, and create an organization that logically sequences the claim(s), counterclaims, reasons, and evidence.
 - b. Develop claim(s) and counterclaims fairly and thoroughly, supplying the most relevant data and evidence for each while pointing out the strengths and limitations of both claim(s) and counterclaims in a discipline-appropriate form that anticipates the audience’s knowledge level, concerns, values, and possible biases.
 - c. Use words, phrases, and clauses as well as varied syntax to link the major sections of the text, create cohesion, and clarify the relationships between claim(s) and reasons, between reasons and evidence, and between claim(s) and counterclaims.

- d. Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing.
 - e. Provide a concluding statement or section that follows from or supports the argument presented.
2. Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes.
 - a. Introduce a topic and organize complex ideas, concepts, and information so that each new element builds on that which precedes it to create a unified whole; include formatting (e.g., headings), graphics (e.g., figures, tables), and multimedia when useful to aiding comprehension.
 - b. Develop the topic thoroughly by selecting the most significant and relevant facts, extended definitions, concrete details, quotations, or other information and examples appropriate to the audience's knowledge of the topic.
 - c. Use varied transitions and sentence structures to link the major sections of the text, create cohesion, and clarify the relationships among complex ideas and concepts.
 - d. Use precise language, domain-specific vocabulary and techniques such as metaphor, simile, and analogy to manage the complexity of the topic; convey a knowledgeable stance in a style that responds to the discipline and context as well as to the expertise of likely readers.
 - e. Provide a concluding statement or section that follows from and supports the information or explanation provided (e.g., articulating implications or the significance of the topic).
 3. (Not applicable as a separate requirement)

WHST.11 Production and Distribution of Writing

4. Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.
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.
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 Research to Build and Present Knowledge

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.
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.

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

WHST.11 Range of Writing

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.

Appendix D: Common Core for State Standards for Mathematics

	Units	1	2	3	4	5	6
Standards							
N-RN.1.			X	X			X
N-RN.2.			X	X			X
N-RN.3.			X	X			X
N-Q.1.			X	X	X	X	X
N-Q.2.			X	X	X	X	X
N-Q.3.			X	X	X	X	X
A-SSE.1.			X	X	X	X	X
A-SSE.2.			X	X	X	X	X
A-SSE.3.			X	X	X	X	X
A-SSE.4.			X	X	X	X	X

Mathematics (High School) - Number and Quantity

The Real Number System (N-RN)

1. Explain how the definition of the meaning of rational exponents follows from extending the properties of integer exponents to those values, allowing for a notation for radicals in terms of rational exponents.
2. Rewrite expressions involving radicals and rational exponents using the properties of exponents.
3. Explain why the sum or product of two rational numbers is rational; that the sum of a rational number and an irrational number is irrational; and that the product of a nonzero rational number and an irrational number is irrational.

Quantities (N-Q)

1. Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays.
2. Define appropriate quantities for the purpose of descriptive modeling.
3. Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.

Algebra

Seeing Structure in 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 .
2. Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression.
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.
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.

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

	Units	1	2	3	4	5	6
Standards							
T1		X	X	X	X	X	X
T2		X	X	X	X	X	X
T3		X	X	X	X	X	X
T4		X	X	X	X	X	X
T5		X	X	X	X	X	X
T6		X	X	X	X	X	X

International Society for Technology in Education Standards (ISTE)

T1 Creativity and Innovation

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

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

T2 Communication and Collaboration

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

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

T3 Research and Information Fluency

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

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

T4 Critical Thinking, Problem Solving, and Decision Making

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

- a. Identify and define authentic problems and significant questions for investigation.
- b. Plan and manage activities to develop a solution or complete a project.
- c. Collect and analyze data to identify solutions and/or make informed decisions.

d. Use multiple processes and diverse perspectives to explore alternative solutions.

T5 Digital Citizenship

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

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

T6 Technology Operations and Concepts

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

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