Video Game Design/Digital Computer Animation for Game Design

Standards may be added to this document prior to submission but may not be removed from the framework to meet state credit equivalency requirements. Performance assessments may be developed at the local level. In order to earn state approval, performance assessments must be submitted within this framework. **This course is eligible for 1 credit of Geometry.**

Washington Mathematics Standards (Common Core State Standards) support foundational mathematical knowledge and reasoning. While it is important to develop a conceptual understanding of mathematical topics and fluency in numeracy and procedural skills, teachers should also focus on the application of mathematics to career fields to support the three (3) key shifts of CCSS. The Standards for Mathematical Practice develop mathematical habits of mind and are to be modeled and integrated throughout the course. The details about each mathematical standard can be found at Common Core Mathematics Standards.

School District Name	
Course Title: Video Game Design	**Total Framework Hours:** 540
CIP Code: 110803 ☐ Exploratory ☒ Preparatory	**Date Last Modified:** December 31, 2020
Career Cluster: Arts, A/V Technology, and Communications	**Cluster Pathway:** Visual Arts
Course Summary: This course focuses on the software, hardware, and mathematical tools used to represent, display, and manipulate topological, two-dimensional, and three-dimensional objects on a video screen. Students learn to function as computer graphics/video game development specialists. The course includes instruction in graphics software and systems; computer programming; digital multimedia; graphic design and video game design and development; graphics devices, processors, and standards; attributes and transformations; projections; surface identification and rendering; and color theory. Students will also learn concepts in algebra, geometry, and trigonometry as they are introduced to various mathematical concepts related to interactive computer and computer graphic-based applications.	
Eligible for Equivalent Credit in: Math	**Total Number of Units:** 17

Unit 1: Career Planning	**Total Learning Hours for Unit:** 5

Unit Summary:

In this unit, students:

- Complete, discuss, and analyze the results of personality, career interest, and aptitude assessments.
- Explore the career clusters as defined by the U.S. Department of Education and summarize the career opportunities in a cluster of personal interest.
- Create a personal career portfolio including academic, certification, and technical skill requirements; career opportunities; expected wages; necessary skills and aptitudes; and the impact of technology on careers of personal interest.
- Determine academic/training or certification requirements for transition from one learning level to the next and explore opportunities for earning credit/certifications in high school such as Advanced Placement$^®$, tech prep, International Baccalaureate$^®$, college in high school, military, and apprenticeship opportunities.
- Develop and analyze tables, charts, and graphs related to career interests and give an oral presentation regarding the career pathway of their choice.
- Develop an awareness of financial aid, scholarships, and other sources of income to support postsecondary education/training and discuss the impact of effective college and career planning.
- Identify how performance on assessments such as the SAT$^®$, ACT$^®$, ASVAB$^®$, ACT Compass$^®$, and ACCUPLACER$^®$ affect personal academic and career goals.
- Prepare a personal budget reflecting desired lifestyle, and compare and contrast at least three careers of interest in regard to salary expectations and education/training costs.
- Prepare a program of study for at least one career of interest.
- Apply knowledge gained from individual assessment to a set of goals and a career plan.
- Develop strategies to make an effective transition from school to career.
- Identify industry certification opportunities.

Performance Assessments: (Districts to complete for each unit)

Example assessments for this unit include:

- Using career research tools (such as Career Cruising, ASVAB, WOIS), students prepare a report covering their personal interests, aptitudes, and abilities.
- Students cross-reference potential career pathways that appeal to them. The report should include an assessment of students' personal strengths for success in that particular field.

Using a performance rubric, the student will demonstrate proficiency at a level 3 or greater.

- Level 0: No Exposure or Not Completed.
- Level 1: Exposure Only—general information and some elements are shown.
- Level 2: Limited Practice—has practiced job and some elements are complete.
- Level 3: Moderately Skilled—has performed job and most elements are complete.
- Level 4: Skilled—can perform job and all elements are complete.

Leadership Alignment: (Districts to complete for each unit)

Leadership alignment must include a unit specific project/activity that aligns with the 21st Century Leadership Skills.

Example:

- One possible activity is the SkillsUSA Career Readiness Curriculum professionalism lesson *Choose Your Own Identity*.

Industry Standards and/or Competencies:

The Common Career Technical Core Standards - Arts, A/V Technology, and Communications Cluster: A/V Technology & Film Pathway:

ARC05.02 Examine the various organizational structures adopted by groups within the arts, audio-video, technology, and communications field to understand the diversity and variety of functions within the industry.

ARC05.03 Analyze the arts, audio-visual technology and communication industry's economic base in order to demonstrate an understanding of the economic factors influencing the industry as a whole.

ARC05.04 Analyze and summarize evidence of interdependence between the technical and the artistic sides of this career cluster in order to demonstrate an understanding of the systems involved in the cluster.

ARC05.05 Analyze and summarize the formal and informal influences in the abstract and formal structures of business organizations within this cluster to demonstrate an understanding of the influences on holding careers in this field.

ARC06.06 Examine and summarize the life style implications and physical demands required by work activities common in the arts, audio/visual, technology and communications cluster to demonstrate an broad perspective regarding the nature of work in the industry.

ARC09.03 Identify, examine and select career opportunities in one or more arts, AV, technology and communication related career pathways in order to explore career options.

ARC10.01 Demonstrate the use of technical knowledge and skills that relate to pathways in this cluster to allow for mobility among numerous career options within the family of related occupations.

ARC10.02 Summarize knowledge of the systems within various pathways contained in the cluster to keep abreast of new technological advancements and tools important to work in this industry.

ARPA01.01 Examine and summarize career opportunities in audio and video technology and film to build an understanding of opportunities in the pathway.

Aligned Washington State Academic Standards

Washington state standards were not identified for this unit but may be added at the local level.

Unit 2: Personal Success	**Total Learning Hours for Unit:** 5

Unit Summary:

In this unit, students:

- Implement effective study skills for academic success.
- Develop personal goals using SMART (Specific Measurable Attainable Realistic Timely) objectives and strategies.
- Use interpersonal skills to facilitate effective teamwork.
- Use a problem-solving model and critical thinking skills to make informed decisions.
- Use effective time management and goal-setting strategies.

- Effectively use information and communication technology tools.
- Identify skills that can be transferable among a variety of careers.
- Create and complete appropriate documents such as an electronic portfolio, personal résumé, employment application, letter of intent, letter of recommendation, and thank-you letter.
- Complete job search documents, including job applications and W-4 forms.
- Demonstrate proper interview techniques in various situations.

Performance Assessments: (Districts to complete for each unit)

Example assessments for this unit include:
- Students generate a résumé and keep a portfolio of their quality work.
- As students research job openings within a variety of companies, they should compare and contrast their descriptions, duties, and expectations.
- Students prepare responses to standard interview questions and participate in a WOIS assessment or other career research assignment.
- Students prepare a written report on career research using standard MLA format. Students will present their career research orally using media such as PowerPoint, handouts, and video.

Using a performance rubric, the student will demonstrate proficiency at a level 3 or greater.
- Level 0: No Exposure or Not Completed.
- Level 1: Exposure Only—general information and some elements are shown.
- Level 2: Limited Practice—has practiced job and some elements are complete.
- Level 3: Moderately Skilled—has performed job and most elements are complete.
- Level 4: Skilled—can perform job and all elements are complete

Leadership Alignment: (Districts to complete for each unit)

Leadership alignment must include a unit specific project/activity that aligns with the 21st Century Leadership Skills.

Example:
- One possible activity is the SkillsUSA Career Readiness Curriculum professionalism lesson *I Believe in Me*.

Industry Standards and/or Competencies:

The Common Career Technical Core Standards - Arts, A/V Technology, and Communications Cluster: A/V Technology & Film Pathway:

ARC10.02 Summarize knowledge of the systems within various pathways contained in the cluster to keep abreast of new technological advancements and tools important to work in this industry

Aligned Washington State Academic Standards
Washington state standards were not identified for this unit but may be added at the local level.

Unit 3: Employability and Entrepreneurship	Total Learning Hours for Unit: 10

Unit Summary:

In this unit, students:
- Demonstrate effective verbal, nonverbal, written, and electronic communication skills.

- Evaluate the impact of positive and negative personal choices, including use of electronic communications such as social networking sites.
- Model characteristics of effective leadership, teamwork, and conflict management.
- Recognize the importance of a healthy lifestyle, including the ability to manage stress.
- Explore and model characteristics necessary for professional success (such as work ethics, integrity, dedication, perseverance, and the ability to interact with a diverse population).
- Complete activities using techniques to manage their projects and time.
- Identify and model appropriate grooming and appearance for the workplace.
- Demonstrate dependability, punctuality, and initiative.
- Research positive interpersonal skills, including respect for diversity.
- Model appropriate business and personal etiquette in the workplace.
- Exhibit productive work habits, ethical practices, and a positive attitude.
- Demonstrate the ability to work with other employees to support the organization and complete assigned tasks.
- Demonstrate willingness to learn and further develop skills.
- Describe the importance of having a positive attitude and techniques that boost morale.
- Show initiative by coming up with unique solutions and taking on extra responsibilities.
- Explain the importance of setting goals and demonstrate the ability to set, reach, and evaluate goals.
- Explain the importance of taking pride in work accomplished and extrinsic and intrinsic motivators that can be used to increase pride.
- Identify how to prioritize work to fulfill responsibilities and meet deadlines.
- Research and compare published workplace policies and procedures.
- Summarize provisions of the Fair Labor Standards Act.
- Describe the consequences of breach of confidentiality.

Performance Assessments: (Districts to complete for each unit)

Example assessments for this unit include:

- Students write short essays on the following topics:
- (1) Work ethic – List the characteristics of a good work ethic, providing examples of what a good work ethic looks like in the workplace, and evaluate your own work ethic in the classroom and/or laboratory;
- (2) Work communications – Provide proper use and content of e-mails, phone calls, face-to-face conversations, text messages, and social networking personal messages to communicate within the workplace; and
- (3) Workplace initiative and responsibility – Examine how to develop the ability to work with limited or no supervision and how an individual can take on more responsibility in the workplace.

 Using a performance rubric, the student will demonstrate proficiency at a level 3 or greater.

- Level 0: No Exposure or Not Completed.
- Level 1: Exposure Only—general information and some elements are shown.
- Level 2: Limited Practice—has practiced job and some elements are complete.
- Level 3: Moderately Skilled—has performed job and most elements are complete.
- Level 4: Skilled—can perform job and all elements are complete.

Leadership Alignment: (Districts to complete for each unit)

Leadership alignment must include a unit specific project/activity that aligns with the 21st Century Leadership Skills.

Example:

- One possible activity is the SkillsUSA Career Readiness Curriculum work ethic lesson *Get it Done*.

Industry Standards and/or Competencies:

The Common Career Technical Core Standards - Arts, A/V Technology, and Communications Cluster: A/V Technology & Film Pathway:

ARC05.02 Examine the various organizational structures adopted by groups within the arts, audio-video, technology, and communications field to understand the diversity and variety of functions within the industry.

ARC05.03 Analyze the arts, audio-visual technology and communication industry's economic base in order to demonstrate an understanding of the economic factors influencing the industry as a whole.

ARC05.05 Analyze and summarize the formal and informal influences in the abstract and formal structures of business organizations within this cluster to demonstrate an understanding of the influences on holding careers in this field.

ARC06.01 Maintain safe and healthful working conditions by completing work tasks in accordance with rights and applicable responsibilities in a arts, audio-visual technology and communications work environment to protect employees' well being.

ARC09.01 Explain written organizational policies, rules and procedures common to careers in arts, AV, technology and communication fields to help employees perform their jobs.

ARC09.03 Identify, examine and select career opportunities in one or more arts, AV, technology and communication related career pathways in order to explore career options.

ARC10.01 Demonstrate the use of technical knowledge and skills that relate to pathways in this cluster to allow for mobility among numerous career options within the family of related occupations.

ARC10.02 Summarize knowledge of the systems within various pathways contained in the cluster to keep abreast of new technological advancements and tools important to work in this industry.

ARPA01.01 Examine and summarize career opportunities in audio and video technology and film to build an understanding of opportunities in the pathway.

Aligned Washington State Academic Standards

Washington state standards were not identified for this unit but may be added at the local level.

Unit 4: Problem Solving	Total Learning Hours for Unit: 25

Unit Summary:

In this unit, students:

- Employ critical thinking skills independently and in teams to solve problems and make decisions.
- Employ critical thinking and interpersonal skills to resolve conflicts.
- Identify and document workplace performance goals and monitor progress toward those goals.
- Conduct technical research to gather information necessary for decision making.
- Explain the importance and dynamics of individual and teamwork approaches to problem solving.

- Describe methods of researching and validating reliable information relevant to the problem.
- Explain strategies used to formulate ideas, proposals, and solutions to problems.
- Select potential solutions based on reasoned criteria.
- Implement and evaluate solutions.

Performance Assessments: (Districts to complete for each unit)

Example assessments for this unit include:
- Students choose a topic and write a tutorial.
- Students draw an assembly sequence diagram for a product using animation skills (e.g., IKEA product assembly directions in pictures without text).

Using a performance rubric, the student will demonstrate proficiency at a level 3 or greater.
- Level 0: No Exposure or Not Completed.
- Level 1: Exposure Only—general information and some elements are shown.
- Level 2: Limited Practice—has practiced job and some elements are complete.
- Level 3: Moderately Skilled—has performed job and most elements are complete.
- Level 4: Skilled—can perform job and all elements are complete.

Leadership Alignment: (Districts to complete for each unit)

Leadership alignment must include a unit specific project/activity that aligns with the 21st Century Leadership Skills.

Example:
- One possible activity is the SkillsUSA Career Readiness Curriculum decision-making lesson *Making Informed Decisions*.

Industry Standards and/or Competencies:

Industry standards were not identified for this unit but may be added at the local level.

Aligned Washington State Academic Standards	
Mathematical Practices	MP1 Make sense of problems and persevere in solving them. MP3 Construct viable arguments and critique the reasoning of others. MP4 Model with mathematics. MP6 Attend to precision.

Unit 5: Health and Safety	**Total Learning Hours for Unit:** 15

Unit Summary:

In this unit, students:
- Describe personal and job site safety rules and regulations that maintain safe and healthy work environments.
- Explain emergency procedures to follow in response to workplace accidents.
- Create a disaster and/or emergency response plan.
- Identify and apply OSHA and other health and safety regulations that apply to specific tasks and jobs in the occupational area.
- Identify and apply EPA and other environmental protection regulations that apply to specific tasks and jobs in the occupational area.
- Identify and apply Right-To-Know (Hazard Communication Policy) and other communicative regulations that apply to specific tasks and

- jobs in the occupational area.
- Explain procedures for documenting and reporting hazards to appropriate authorities.
- List penalties for noncompliance with appropriate health and safety regulations.
- Identify contact information for appropriate health and safety agencies and resources.
- Create a systematic safety program that would achieve OSHA compliance and promote a safe working environment.
- Illustrate a safe environment for students in printing.
- Identify, describe, and demonstrate the effective use of Material Safety Data Sheets (MSDS).
- Read chemical, product, and equipment labels to determine appropriate health and safety considerations.
- Identify, describe, and demonstrate personal, shop, and job site safety practices and procedures.
- Demonstrate safe dress and use of relevant safety gear and personal protective equipment (PPE) including wrist rests, adjustable workspaces and equipment, gloves, boots, earplugs, eye protection, and breathing apparatus.
- Illustrate appropriate safe body mechanics, including proper lifting techniques and ergonomics.
- Locate emergency equipment in the lab, shop, and/or classroom, including (where appropriate) eyewash stations, shower facilities, sinks, fire extinguishers, fire blankets, telephone, master power switches, and emergency exits.
- Demonstrate the safe use, storage, and maintenance of every piece of equipment in the lab, shop, and classroom.
- Describe safety practices and procedures to be followed when working with and around electricity.
- Illustrate proper handling and storage practices, including working with hazardous materials, disposal, and recycling.
- Demonstrate proper workspace cleaning procedures.
- Illustrate first aid procedures for potential injuries and other health concerns in the occupational area.
- Describe the importance of emergency preparedness and an emergency action plan.
- Illustrate procedures used to handle emergency situations and accidents, including identification, reporting, response, evacuation plans, and follow-up procedures.
- Identify practices used to avoid accidents.
- Identify and describe fire protection, precautions, and response procedures.
- Discuss the role of the individual and the company/organization in ensuring workplace safety.
- Discuss ways to identify and prevent workplace/school violence.

Performance Assessments: (Districts to complete for each unit)

Example assessments for this unit include:

- Working in teams, students develop and conduct a comprehensive work environment assessment of the classroom.
- Students use WISHA/OSHA standards and other available environmental guidelines (lighting, noise, keyboards, etc.) to develop the assessment instrument. The assessment will include a written report that outlines the standards that were satisfied and suggestions for improvement.
- Students create design projects according to set criteria, including environmental, safety, health, and other requirements/restrictions. They will do requisite research and mathematical computations in designing their projects. Students submit written and/or oral presentations of their final design projects. Projects will be assessed in terms of environmental, physical, and other needs and restrictions. The instructor will conduct day-to-day observations of students using proper ergonomic considerations at their workstations.

Using a performance rubric, the student will demonstrate proficiency at a level 3 or greater.

- Level 0: No Exposure or Not Completed.
- Level 1: Exposure Only—general information and some elements are shown.
- Level 2: Limited Practice—has practiced job and some elements are complete.
- Level 3: Moderately Skilled—has performed job and most elements are complete.
- Level 4: Skilled—can perform job and all elements are complete.

Leadership Alignment: (Districts to complete for each unit)

Leadership alignment must include a unit specific project/activity that aligns with the 21st Century Leadership Skills.

Example:

- One possible activity is the SkillsUSA Career Readiness Curriculum planning, organizing, and management lesson *Planning to Plan*.

Industry Standards and/or Competencies:

The Common Career Technical Core Standards - Arts, A/V Technology, and Communications Cluster: A/V Technology & Film Pathway:

ARC06.01 Maintain safe and healthful working conditions by completing work tasks in accordance with rights and applicable responsibilities in an arts, audio-visual technology and communications work environment to protect employees' well being.

ARC06.02 Assess and control methods to reduce sources of office and worksite accident hazards common in the arts, audio-visual technology and communications industry in order to promote a safe and accident free working environment.

ARC06.03 Examine and summarize the responsibilities various entities have for promoting a safe and healthy work environment in order to understanding the roles involved in maintaining acceptable conditions in the arts, technology and communications field.

ARC06.05 Apply safety procedures in operating equipment commonly used within the career pathways involved in this cluster to demonstrate a broad understanding of important safety practices.

ARC06.07 Demonstrate personal safety habits and procedures while on work-related assignments in various locations beyond the business site to ensure personal safety and well-being.

Aligned Washington State Academic Standards
Washington state standards were not identified for this unit but may be added at the local level.

Unit 6: Teamwork and Cooperation	**Total Learning Hours for Unit:** 15

Unit Summary:

In this unit, students:

- Employ leadership skills to accomplish organizational goals and objectives.
- Establish and maintain effective working relationships with others in order to accomplish objectives and tasks.
- Conduct and participate in meetings to accomplish work tasks.
- Employ mentoring skills to inspire and teach others.
- Cooperate rather than compete with team members.
- Seek suggestions, opinions, and information from team members.
- Listen to and consider the ideas of team members.

- Support group decisions even if not in total agreement.
- Communicate changes or problems to team members.
- Treat everybody with respect and understanding
- Employ mentoring skills to inspire and teach others.

Performance Assessments: (Districts to complete for each unit)

Example assessments for this unit include:

- Assuming the role of a game design team member working with a potential client, students work on a project (agreed upon by the team and the instructor) that will include the standard procedures for working with clients. For the purpose of this project, the "client" could be the instructor, advisory committee members, parents, etc. The group project should require students to use such leadership skills as goal setting, advocacy, communication, and/or parliamentary procedure to ensure the success of the project. Peer assessment shall be an integral component of the project.

Using a performance rubric, the student will demonstrate proficiency at a level 3 or greater.

- Level 0: No Exposure or Not Completed.
- Level 1: Exposure Only—general information and some elements are shown.
- Level 2: Limited Practice—has practiced job and some elements are complete.
- Level 3: Moderately Skilled—has performed job and most elements are complete.
- Level 4: Skilled—can perform job and all elements are complete.

Leadership Alignment: (Districts to complete for each unit)

Leadership alignment must include a unit specific project/activity that aligns with the 21st Century Leadership Skills.
Example:

- One possible activity is the SkillsUSA Career Readiness Curriculum teamwork lesson *Leading and Following*.

Industry Standards and/or Competencies:

Industry standards were not identified for this unit but may be added at the local level.

Aligned Washington State Academic Standards

Mathematical Practices	MP3 Construct viable arguments and critique the reasoning of others.

Unit 7: Ethics and Legal Responsibilities	**Total Learning Hours for Unit:** 20

Unit Summary:

In this unit, students:

- Evaluate and justify decisions based on ethical reasoning.
- Evaluate alternative responses to workplace situations based on employer policies and personal, professional, ethical, and legal responsibilities.
- Identify and explain personal and long-term consequences of unethical or illegal behaviors in the workplace.
- Interpret and explain written organizational policies and procedures.
- Collaborate with classmates in researching or reviewing an Acceptable Use Policy.
- Conduct an Internet search (optional).

- Understand the responsibilities of Internet use (using the Internet efficiently and ethically for work, identifying the risks of posting personal and work information on the internet, social networking sites, job search sites, taking measures to avoid Internet security risks such as viruses and malware).
- Discuss legal issues associated with locating and retrieving information from the Internet.
- Understand Acceptable Use Policy, Copyright, and Fair Use Laws.
- Conduct research on the Internet and correctly identify and cite sources in a bibliography.
- Use information from electronic communication sources.
- Understand End User License Agreements (EULA).
- Understand intellectual property rights.

Performance Assessments: (Districts to complete for each unit)

Example assessments for this unit include:
- Working in teams, students develop a problem concerning ethical and legal standards in a field related to video game design. Problems selected will require instructor approval. Once the problem has been identified, the teams conduct research and then develop a group report. The report, which will be presented to the class, will include description of the problem, legal findings, and solutions. Possible problem areas include handicapped access, safety standards, design failure, ecology concerns, workers' rights and responsibilities, employers' rights and responsibilities, ergonomics, etc.

Using a performance rubric, the student will demonstrate proficiency at a level 3 or greater.
- Level 0: No Exposure or Not Completed.
- Level 1: Exposure Only-general information and some elements are shown.
- Level 2: Limited Practice-has practiced job and some elements are complete.
- Level 3: Moderately Skilled-has performed job and most elements are complete.
- Level 4: Skilled-can perform job and all elements are complete.

Leadership Alignment: (Districts to complete for each unit)

Leadership alignment must include a unit specific project/activity that aligns with the 21st Century Leadership Skills.
Example:
- One possible activity is the SkillsUSA Career Readiness Curriculum responsibility lesson *Personal Well Being*.

Industry Standards and/or Competencies:

ARC08.01 Exhibit ethical conduct in writing, creating, printing, broadcasting, and performing to uphold high standards for behavior in the industry.
ARC08.02 Analyze and apply laws affecting arts, technology and communication enterprises to maintain up-to-date compliance with key regulations influencing the industry.

Aligned Washington State Academic Standards
Washington state standards were not identified for this unit but may be added at the local level.

Unit 8: Time Management	**Total Learning Hours for Unit:** 10
Unit Summary:	

In this unit, students:
- Demonstrate the ability to select goal-relevant activities, rank them, allocate time, and prepare and follow schedules.
- Use or prepare budgets, make forecasts, keep records, and make adjustments to meet objectives.
- Demonstrate the ability to acquire, store, allocate, and use materials or space efficiently.
- Display knowledge of the efficient use of human resources.

Performance Assessments: (Districts to complete for each unit)

Example assessments for this unit include:
- Student is expected to attend class on time, dress appropriately, be ready to work and manage assignments, submitting them before the due date using a Virtual Learning Environment.

Using a performance rubric, the student will demonstrate proficiency at a level 3 or greater.
- Level 0: No Exposure or Not Completed.
- Level 1: Exposure Only general information and some elements are shown.
- Level 2: Limited Practice—has practiced job and some elements are complete.
- Level 3: Moderately Skilled—has performed job and most elements are complete.
- Level 4: Skilled—can perform job and all elements are complete.

Leadership Alignment: (Districts to complete for each unit)

Leadership alignment must include a unit specific project/activity that aligns with the 21st Century Leadership Skills.

Example:
- One possible activity is the SkillsUSA Career Readiness Curriculum planning, organizing, and management lesson *Managing a Plan*.

Industry Standards and/or Competencies:

Industry standards were not identified for this unit but may be added at the local level.

Aligned Washington State Academic Standards
Washington state standards were not identified for this unit but may be added at the local level.

Unit 9: Computer Foundation Skills	Total Learning Hours for Unit: 15

Unit Summary:

In this unit, students will:
- Learn remedial computer knowledge. Students will be comfortable working in, saving, and retrieving files, accessing network folders in a Windows OS environment.
- Develop baseline mathematical skills. All students must demonstrate a solid ability to think algebraically.
- Develop art and design skills. Students must be willing to express themselves in traditional and electronic visual media.
- Reinforce safety knowledge. Students will demonstrate an ability to work safely with computers including correct ergonomics and respect for electronic machinery

Performance Assessments: (Districts to complete for each unit)

Example assessments for this unit include:

- Students compete worksheets about various projects discovering pieces of equipment used in game development and animation.

Using a performance rubric, the student demonstrates proficiency at a level 3 or greater.

- Level 0: No Exposure or Not Completed.
- Level 1: Exposure Only—general information and some elements are shown.
- Level 2: Limited Practice—has practiced job and some elements are complete.
- Level 3: Moderately Skilled—has performed job and most elements are complete.
- Level 4: Skilled—can perform job and all elements are complete.

Leadership Alignment: (Districts to complete for each unit)

Leadership alignment must include a unit specific project/activity that aligns with the 21st Century Leadership Skills.

Example:

- One possible activity is the SkillsUSA Career Readiness Curriculum communications lesson *Message is Clear*.

Industry Standards and/or Competencies:

Industry standards were not identified for this unit but may be added at the local level.

Aligned Washington State Academic Standards
Washington state standards were not identified for this unit but may be added at the local level.

Unit 10: Computer Science and Applied Programming	**Total Learning Hours for Unit:** 90

Unit Summary:

In this unit, students will learn about:

- Vocabulary related to computers
- Intro to programming languages
- Intro to problem solving/UML/flowcharting/pseudo-code
- Types of variables
- Data types
- Operators and operands
- Statements
- Expressions
- Integrated Development Environment
- Flow control
- Functions and function calls
- Functions with arguments
- Input and output

- Pointers
- Algorithmic reasoning
- Behaviors
- State machine
- Object-oriented programming (abstraction, encapsulation)
- Classes and objects
- Inheritance
- Polymorphism
- Operator overloading
- Pointers to objects
- Structures
- One-dimensional arrays
- Two-dimensional arrays
- File saving and loading
- Bubble-sort algorithm
- Binary-search algorithm
- Binary maps
- Friend functions
- Virtual functions
- Templates
- Dynamic arrays
- Linked lists
- Stack
- Push and pop
- Memory allocation
- Advanced data structures
- Algorithm analysis

Performance Assessments: (Districts to complete for each unit)

Example assessments for this unit include:

- Students demonstrate their programming knowledge by successfully completing multiple, progressive game programs using the practices from this unit.

Using a performance rubric, the student will demonstrate proficiency at a level 3 or greater.

- Level 0: No Exposure or Not Completed.
- Level 1: Exposure Only—general information and some elements are shown.
- Level 2: Limited Practice—has practiced job and some elements are complete.
- Level 3: Moderately Skilled—has performed job and most elements are complete.

	• Level 4: Skilled—can perform job and all elements are complete.

Leadership Alignment: (Districts to complete for each unit)

Leadership alignment must include a unit specific project/activity that aligns with the 21st Century Leadership Skills.

Example:

- One possible activity is the SkillsUSA Career Readiness Curriculum teamwork lesson *Leading and Following*. The communication lesson *Putting Your Best Communication Forward* is also relevant.

Industry Standards and/or Competencies:

Industry standards were not identified for this unit but may be added at the local level.

Aligned Washington State Academic Standards	
Mathematics: Common Core	HS.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. HS.N.Q.2 Define appropriate quantities for the purpose of descriptive modeling. HS.N.Q.3 Choose a level of accuracy appropriate to limitations on measurement when reporting quantities. HS.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). HS.N.VM.2 (+) Find the components of a vector by subtracting the coordinates of an initial point from the coordinates of a terminal point. HS.N.VM.3 (+) Solve problems involving velocity and other quantities that can be represented by vectors. HS.N.VM.4 (+) Add and subtract vectors. HS.N.VM.4a 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. HS.N.VM.4b Given two vectors in magnitude and direction form, determine the magnitude and direction of their sum. HS.N.VM.4c 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. HS.N.VM.5 (+) Multiply a vector by a scalar. HS.N.VM.5a 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). HS.N.VM.5b Compute the magnitude of a scalar multiple cv using $\|\|cv\|\| = \|c\|v$. Compute the direction of cv knowing that when $\|c\|v \neq 0$, the direction of cv is either along v (for c > 0) or against v (for c < 0). HS.N.VM.6 (+) Use matrices to represent and manipulate data, e.g., to represent payoffs or incidence relationships in a network.

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

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

HS.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.

HS.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.

HS.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.

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

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

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

HS.A.SSE.1b Interpret complicated expressions by viewing one or more of their parts as a single entity.

HS.A.SSE.2 Use the structure of an expression to identify ways to rewrite it.

HS.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.

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

HS.A.CED.3 Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or nonviable options in a modeling context.

HS.A.CED.4 Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations.

HS.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).

HS.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.

HS.F.IF.3 Recognize that sequences are functions, sometimes defined recursively, whose domain is a subset of the integers.

HS.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.

HS.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).

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

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

HS.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.

HS.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).*

HS.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).*

HS.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).*

HS.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").

HS.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.

HS.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.

HS.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

HS.S.CP.5 Recognize and explain the concepts of conditional probability and independence in everyday language and everyday situations.

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

HS.S.MD.5a Find the expected payoff for a game of chance.

HS.S.MD.5b Evaluate and compare strategies on the basis of expected values.

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

HS.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).

Mathematical Practices	MP1 Make sense of problems and persevere in solving them. MP2 Reason abstractly and quantitatively. MP3 Construct viable arguments and critique the reasoning of others. MP4 Model with mathematics. MP5 Use appropriate tools strategically. MP6 Attend to precision. MP7 Look for and make use of structure. MP8 Look for and express regularity in repeated reasoning.

Unit 11: Applied Mathematics Concepts	**Total Learning Hours for Unit:** 90

Unit Summary:

In this unit, competencies include:

- Vocabulary
- Understanding that mathematics is embedded in all video games
- Integers
- Decimals
- Fractions
- Functions and transformations
- Graphing functions
- A video game use for linear systems
- A video game use for systems of linear equations
- A video game use for quadratic equations
- Number systems
- Logic gates
- Introduction to trigonometry
- Trigonometric functions
- Trigonometric functions on right triangles
- Trigonometric identities
- Vectors
- Vector types
- Reflection as math
- Position coordinate systems
- Polar coordinates
- Graphing conic sections
- Exponentials/logarithms (link to number systems)

- Series
- Matrices
- Determinant function
- Transformations of a matrix
- Parametric equations
- Complex and imaginary numbers (arithmetic and graphing)

Performance Assessments: (Districts to complete for each unit)

Example assessments for this unit include:

- Students implement the mathematics principles in simulations of real-world situations. As they complete video games and animation projects, students solve math problems related to game design and animation.

Using a performance rubric, the student will demonstrate proficiency at a level 3 or greater.

- Level 0: No Exposure or Not Completed.
- Level 1: Exposure Only—general information and some elements are shown.
- Level 2: Limited Practice—has practiced job and some elements are complete.
- Level 3: Moderately Skilled—has performed job and most elements are complete.
- Level 4: Skilled—can perform job and all elements are complete.

Leadership Alignment: (Districts to complete for each unit)

Leadership alignment must include a unit specific project/activity that aligns with the 21st Century Leadership Skills.

Example:

- Two possible activities are the SkillsUSA Career Readiness Curriculum self-motivation lesson *Attitude is Everything* and the leadership lesson *The Connection*

Industry Standards and/or Competencies:

Industry standards were not identified for this unit but may be added at the local level.

Aligned Washington State Academic Standards

Mathematics: Common Core	HS.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. HS.N.Q.2 Define appropriate quantities for the purpose of descriptive modeling. HS.N.Q.3 Choose a level of accuracy appropriate to limitations on measurement when reporting quantities. HS.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). HS.N.VM.2 (+) Find the components of a vector by subtracting the coordinates of an initial point from the coordinates of a terminal point. HS.N.VM.3 (+) Solve problems involving velocity and other quantities that can be represented by vectors. HS.N.VM.4 (+) Add and subtract vectors.

	HS.N.VM.4a 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. HS.N.VM.4b Given two vectors in magnitude and direction form, determine the magnitude and direction of their sum. HS.N.VM.4c 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. HS.N.VM.5 (+) Multiply a vector by a scalar. HS.N.VM.5a 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). HS.N.VM.5b Compute the magnitude of a scalar multiple cv using $\|cv\| = \|c\|v$. Compute the direction of cv knowing that when $\|c\|v \neq 0$, the direction of cv is either along v (for c > 0) or against v (for c < 0). HS.N.VM.6 (+) Use matrices to represent and manipulate data, e.g., to represent payoffs or incidence relationships in a network. HS.N.VM.8 (+) Add, subtract, and multiply matrices of appropriate dimensions. HS.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. HS.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. HS.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. HS.N.VM.12 (+) Work with 2 × 2 matrices as a transformations of the plane, and interpret the absolute value of the determinant in terms of area. HS.A.SSE.1 Interpret expressions that represent a quantity in terms of its context.* HS.A.SSE.1a Interpret parts of an expression, such as terms, factors, and coefficients. HS.A.SSE.1b Interpret complicated expressions by viewing one or more of their parts as a single entity. HS.A.SSE.2 Use the structure of an expression to identify ways to rewrite it. HS.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. HS.A.CED.2 Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales. HS.A.CED.3 Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or nonviable options in a modeling context. HS.A.CED.4 Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations.

	HS.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).
	HS.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.
	HS.F.IF.3 Recognize that sequences are functions, sometimes defined recursively, whose domain is a subset of the integers.
	HS.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.*
	HS.F.IF.5 Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes.
	HS.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.*
	HS.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.
	HS.F.BF.4 Find inverse functions.
	HS.F.BF.4a 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.
	HS.F.BF.4b (+) Verify by composition that one function is the inverse of another.
	HS.F.BF.4c (+) Read values of an inverse function from a graph or a table, given that the function has an inverse.
	HS.F.BF.4d (+) Produce an invertible function from a non-invertible function by restricting the domain.
	HS.F.BF.5 (+) Understand the inverse relationship between exponents and logarithms and use this relationship to solve problems involving logarithms and exponents.
	HS.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.
	HS.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).

	HS.G.CO.3 Given a rectangle, parallelogram, trapezoid, or regular polygon, describe the rotations and reflections that carry it onto itself. HS.G.CO.4 Develop definitions of rotations, reflections, and translations in terms of angles, circles, perpendicular lines, parallel lines, and line segments. HS.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. HS.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. HS.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).* HS.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).* HS.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).* HS.S.IC.3 Recognize the purposes of and differences among sample surveys, experiments, and observational studies; explain how randomization relates to each. HS.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. HS.S.IC.5 Use data from a randomized experiment to compare two treatments; use simulations to decide if differences between parameters are significant. HS.S.IC.6 Evaluate reports based on data. HS.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"). HS.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. HS.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. HS.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 HS.S.CP.5 Recognize and explain the concepts of conditional probability and independence in everyday language and everyday situations.

	HS.S.MD.5 (+) Weigh the possible outcomes of a decision by assigning probabilities to payoff values and finding expected values. HS.S.MD.5a Find the expected payoff for a game of chance. HS.S.MD.5b Evaluate and compare strategies on the basis of expected values. HS.S.MD.6 (+) Use probabilities to make fair decisions (e.g., drawing by lots, using a random number generator). HS.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).
Mathematical Practices	MP1 Make sense of problems and persevere in solving them. MP2 Reason abstractly and quantitatively. MP3 Construct viable arguments and critique the reasoning of others. MP4 Model with mathematics. MP5 Use appropriate tools strategically. MP6 Attend to precision. MP7 Look for and make use of structure. MP8 Look for and express regularity in repeated reasoning.

Unit 12: Art and Design	**Total Learning Hours for Unit:** 45

Unit Summary:

In this unit, students will learn about:

- C-3.0 vocabulary
- Art/design elements
- Art/design principles
- Color theory
- Intro to 2D drawing application
- Anatomy of motion
- Keyframing and tweening
- Image file types
- Research
- Advanced 2D graphics (e.g., using Photoshop)
- The design process
- Golden rectangles
- Psychology of color
- Character design
- Introduction to 3D modeling and animation application
- 3D primitives and modeling

- 3D spline modeling
- 3D grouping
- 3D textures
- Gestalt theory

Performance Assessments: (Districts to complete for each unit)

Example assessments for this unit include:
- Students create original art assets for their games while applying the fundamentals of art design.
- Students' artwork communicates appropriately and effectively to the designated audience.

Using a performance rubric, the student will demonstrate proficiency at a level 3 or greater.
- Level 0: No Exposure or Not Completed.
- Level 1: Exposure Only—general information and some elements are shown.
- Level 2: Limited Practice—has practiced job and some elements are complete.
- Level 3: Moderately Skilled—has performed job and most elements are complete.
- Level 4: Skilled—can perform job and all elements are complete.

Leadership Alignment: (Districts to complete for each unit)

Leadership alignment must include a unit specific project/activity that aligns with the 21st Century Leadership Skills.

Example:
- One possible activity is the SkillsUSA Career Readiness Curriculum teamwork lesson *Cooperation, Get the Job Done*.

Industry Standards and/or Competencies:

Industry standards were not identified for this unit but may be added at the local level.

Aligned Washington State Academic Standards

Mathematics: Common Core	HS.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).*
	HS.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).*
	HS.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).*
Mathematical Practices	Practice 6: Attend to precision.

Unit 13: Game Design Concepts	**Total Learning Hours for Unit:** 90

Unit Summary:

In this unit, students will learn about:
- History of computer and video game industry
- Definition of computer game
- Entertainment value
- Computer game development process

- Computer game development team
- Computer game platforms
- Computer game engine and tools
- Scripting
- Game genres
- Character design, including enemies
- Story proposal
- Design presentation
- Requirements analysis
- Production of art assets
- Game user interface (GUI) design
- AI design
- Sound and music
- Game design document
- Technical design document
- Digital prototyping process
- Playability
- Measuring and handling player feedback
- Cultural sensitivity and appreciation
- Localization

Performance Assessments: (Districts to complete for each unit)

Example assessments for this unit include:

- Students present their game designs and thinking to teachers, peers, and groups. Their presentation demonstrates an understanding of the design process. Future iterations of the design process will demonstrate that students have grown in their understanding.
- Students use the computer game development process in teams to create at least two games of different genres using the competencies from this unit (listed above) and present them to the class and the instructor for final grade based on industry standards.

Using a performance rubric, the student will demonstrate proficiency at a level 3 or greater.

- Level 0: No Exposure or Not Completed.
- Level 1: Exposure Only—general information and some elements are shown.
- Level 2: Limited Practice—has practiced job and some elements are complete.
- Level 3: Moderately Skilled—has performed job and most elements are complete.
- Level 4: Skilled—can perform job and all elements are complete.

Leadership Alignment: (Districts to complete for each unit)

Leadership alignment must include a unit specific project/activity that aligns with the 21st Century Leadership Skills.

Example: • Two possible activities are the SkillsUSA Career Readiness Curriculum teamwork lesson *Capitalizing on Strengths* and integrity lesson *To Be or Not to Be*.	

Industry Standards and/or Competencies:
Industry standards were not identified for this unit but may be added at the local level.

Aligned Washington State Academic Standards	
Mathematics: Common Core	HS.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. HS.N.Q.2 Define appropriate quantities for the purpose of descriptive modeling. HS.N.Q.3 Choose a level of accuracy appropriate to limitations on measurement when reporting quantities. HS.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. HS.A.CED.2 Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales. HS.A.CED.3 Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or nonviable options in a modeling context. HS.A.CED.4 Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations. HS.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). HS.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. HS.F.IF.3 Recognize that sequences are functions, sometimes defined recursively, whose domain is a subset of the integers. HS.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. HS.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). HS.G.CO.3 Given a rectangle, parallelogram, trapezoid, or regular polygon, describe the rotations and reflections that carry it onto itself.

	HS.G.CO.4 Develop definitions of rotations, reflections, and translations in terms of angles, circles, perpendicular lines, parallel lines, and line segments. HS.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. HS.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"). HS.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. HS.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. HS.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 HS.S.CP.5 Recognize and explain the concepts of conditional probability and independence in everyday language and everyday situations. HS.S.MD.5 (+) Weigh the possible outcomes of a decision by assigning probabilities to payoff values and finding expected values. HS.S.MD.5a Find the expected payoff for a game of chance. HS.S.MD.5b Evaluate and compare strategies on the basis of expected values. HS.S.MD.6 (+) Use probabilities to make fair decisions (e.g., drawing by lots, using a random number generator). HS.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).
Mathematical Practices	MP1 Make sense of problems and persevere in solving them. MP2 Reason abstractly and quantitatively. MP3 Construct viable arguments and critique the reasoning of others. MP4 Model with mathematics. MP5 Use appropriate tools strategically. MP6 Attend to precision. MP7 Look for and make use of structure. MP8 Look for and express regularity in repeated reasoning.

Unit 14: Computer Concepts	**Total Learning Hours for Unit:** 20

Unit Summary:

In this unit, students will:
- Identify internal computer parts, peripherals, and mobile technology.
- Contrast and compare different models of a PC (low, medium, and high priced).
- Research the "short cut" or "hot keys" in software applications.
- Understand the basics of different operating systems.
- Review Internet search basics.
- Identify sources of help with computer hardware or with software issues that arise from time to time.
- Employ proper social media and email etiquette.
- Use file maintenance, backup, and security to safeguard student work.
- Read and understand computer user agreements, including their legal implications.
- Understand copyright and intellectual property protection.

Performance Assessments: (Districts to complete for each unit)

Example assessments for this unit include:
- Student write a research paper with a partner about the history of computers, or another related topic.
- Students demonstrate their understanding of computers by preparing a poster board for presentation to the class.

Using a performance rubric, the student will demonstrate proficiency at a level 3 or greater.
- Level 0: No Exposure or Not Completed.
- Level 1: Exposure Only—general information and some elements are shown.
- Level 2: Limited Practice—has practiced job and some elements are complete.
- Level 3: Moderately Skilled—has performed job and most elements are complete.
- Level 4: Skilled—can perform job and all elements are complete.

Leadership Alignment: (Districts to complete for each unit)

Leadership alignment must include a unit specific project/activity that aligns with the 21st Century Leadership Skills.

Example:
- One possible activity is the SkillsUSA Career Readiness Curriculum multicultural sensitivity and awareness lesson *Fostering Diversit*

Industry Standards and/or Competencies:

The Common Career Technical Core Standards - Arts, A/V Technology, and Communications Cluster: A/V Technology & Film Pathway:

ARC05.01 Analyze and summarize the history and evolution of the arts, audio-video technology, and communications field to understand the current place the field holds within society and the economy.

ARC06.04 Examine and summarize safety related problems that may result from working with electrical circuits used in this cluster to demonstrate a broad understanding of health and safety concerns.

ARC06.06 Examine and summarize the life style implications and physical demands required by work activities common in the arts, audio/visual, technology and communications cluster to demonstrate a broad perspective regarding the nature of work in the industry.

ARC06.07 Demonstrate personal safety habits and procedures while on work-related assignments in various locations beyond the business site to ensure personal safety and well-being.

ARC10.01 Demonstrate the use of technical knowledge and skills that relate to pathways in this cluster to allow for mobility among numerous career options within the family of related occupations. ARC10.02 Summarize knowledge of the systems within various pathways contained in the cluster to keep abreast of new technological advancements and tools important to work in this industry.

Aligned Washington State Academic Standards

Mathematical Practices	MP2 Reason abstractly and quantitatively. MP5 Use appropriate tools strategically. MP7 Look for and make use of structure. MP8 Look for and express regularity in repeated reasoning.

Unit 15: Animation Theory	**Total Learning Hours for Unit:** 45

Unit Summary:

In this unit, students will:

- Become familiar with the following art elements and principles:
  – Form versus content
  – Inserting shots and cutaways
  – Defining composition
  – Static composition
  – Dynamic composition
  – Clearly establishing objectives
  – Single center of interest
  – Shifting the center of interest
  – Leading the subject
  – Rule of thirds
  – S-curve
  – Maintaining tonal balance
  – Balance mass
  – Concrete and abstract art
  – Framing the central subject matter
  – Conveying meaning through colors and tones
  – Controlling the number of prime objects
  – Balancing complexity and order
  – Movement and meaning
- Learn about the following key concepts:
  – Color and value theory
  – Design principles and visual storytelling

- Basic art history
- Art appreciation
- Using source references
- Timing, spacing, and placement
- Observational drawing (drawing from life, rather than from pictures or screen-based imagery)
- Gain experience with the following animation principles:
  - Differences between 2D, 3D, and other forms of animation
  - Key frames, breakdown positions, and in-betweens
- Learn the fundamentals of gesture drawing:
  - Fast and slow poses of sequential action via live model
  - Keeping an animator's sketchbook and observing life outside the classroom

Performance Assessments: (Districts to complete for each unit)

Example assessments for this unit include:

- Students complete a series of worksheets on competencies listed above and produce an animation incorporating art elements and principles, color and value, and design principles in 2D and 3D.
- Students present their animation for peer evaluation and feedback and final product to instructor who will score according to industry standards.

Using a performance rubric, the student will demonstrate proficiency at a level 3 or greater.

- Level 0: No Exposure or Not Completed.
- Level 1: Exposure Only—general information and some elements are shown.
- Level 2: Limited Practice—has practiced job and some elements are complete.
- Level 3: Moderately Skilled—has performed job and most elements are complete.
- Level 4: Skilled—can perform job and all elements are complete.

Leadership Alignment: (Districts to complete for each unit)

Leadership alignment must include a unit specific project/activity that aligns with the 21st Century Leadership Skills.
Example:

- One possible activity is the SkillsUSA Career Readiness Curriculum leadership lesson *Opening the Door*.

Industry Standards and/or Competencies:

The Common Career Technical Core Standards - Arts, A/V Technology, and Communications Cluster: A/V Technology & Film Pathway:

ARC05.01 Analyze and summarize the history and evolution of the arts, audio-video technology, and communications field to understand the current place the field holds within society and the economy.

ARC05.02 Examine the various organizational structures adopted by groups within the arts, audio-video, technology, and communications field to understand the diversity and variety of functions within the industry.

ARC05.04 Analyze and summarize evidence of interdependence between the technical and the artistic sides of this career cluster in order to demonstrate an understanding of the systems involved in the cluster.

ARC08.01 Exhibit ethical conduct in writing, creating, printing, broadcasting, and performing to uphold high standards for behavior in the industry.

Aligned Washington State Academic Standards

Mathematics: Common Core	HS.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. HS.N.Q.2 Define appropriate quantities for the purpose of descriptive modeling. HS.N.Q.3 Choose a level of accuracy appropriate to limitations on measurement when reporting quantities. HS.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. HS.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). HS.G.CO.3 Given a rectangle, parallelogram, trapezoid, or regular polygon, describe the rotations and reflections that carry it onto itself. HS.G.CO.4 Develop definitions of rotations, reflections, and translations in terms of angles, circles, perpendicular lines, parallel lines, and line segments. HS.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. HS.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. HS.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. HS.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. HS.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. HS.G.CO.13 Construct an equilateral triangle, a square, and a regular hexagon inscribed in a circle. HS.G.SRT.1 Verify experimentally the properties of dilations given by a center and a scale factor: HS.G.SRT.1a 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. HS.G.SRT.1b The dilation of a line segment is longer or shorter in the ratio given by the scale factor.

	HS.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. HS.G.SRT.3 Use the properties of similarity transformations to establish the AA criterion for two triangles to be similar. HS.G.C.1 Prove that all circles are similar. HS.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. HS.G.C.3 Construct the inscribed and circumscribed circles of a triangle, and prove properties of angles for a quadrilateral inscribed in a circle. HS.G.C.4 (+) Construct a tangent line from a point outside a given circle to the circle. Find arc lengtHS. and areas of sectors of circles HS.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. HS.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).* HS.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).* HS.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).*
Mathematical Practices	MP1 Make sense of problems and persevere in solving them. MP2 Reason abstractly and quantitatively. MP3 Construct viable arguments and critique the reasoning of others. MP4 Model with mathematics. MP5 Use appropriate tools strategically. MP6 Attend to precision. MP7 Look for and make use of structure. MP8 Look for and express regularity in repeated reasoning.

Unit 16: Storyboarding and Preproduction	**Total Learning Hours for Unit:** 30

Unit Summary:
In this unit, students will:
- Learn to set milestones, establish a budget, and schedule deadlines.
- Research and design a character.
- Design concept art for a storyboard.

- Create a storyboard and develop a simple animatic that gives a sense of the story timeline.
- Develop a shot list, including such elements as staging, layout, reading, and a rehearsal schedule.
- Learn how to deal with location logistics and clearances, including release forms.
- Learn about cutaway shots and jump cuts.
- Consider different aspects of camera shots: fields, frames, and camera angles.
- Apply art elements and principles.
- Learn how to color scripts (for film productions with multiple scenes).
- Learn about the production pipeline, with a required 30% of production time spent in preproduction.
- Gain exposure to audio tracks and timing.
- Record a scratch (guide) track on which to base animatic timings.

Performance Assessments: (Districts to complete for each unit)

Example assessments for this unit include:
- Students demonstrate that they can practically apply the unit concepts by creating a preproduction notebook. Their ultimate project is to create a video introduction or trailer for one of the game designs that they developed previously.

Using a performance rubric, the student will demonstrate proficiency at a level 3 or greater.
- Level 0: No Exposure or Not Completed.
- Level 1: Exposure Only—general information and some elements are shown.
- Level 2: Limited Practice—has practiced job and some elements are complete.
- Level 3: Moderately Skilled—has performed job and most elements are complete.
- Level 4: Skilled—can perform job and all elements are complete.

Leadership Alignment: (Districts to complete for each unit)

Leadership alignment must include a unit specific project/activity that aligns with the 21st Century Leadership Skills.
Example:
- One possible activity is the SkillsUSA Career Readiness Curriculum responsibility lesson *You Can Count On Me.*

Industry Standards and/or Competencies:

ARC05.02 Examine the various organizational structures adopted by groups within the arts, audio-video, technology, and communications field to understand the diversity and variety of functions within the industry.

ARC05.04 Analyze and summarize evidence of interdependence between the technical and the artistic sides of this career cluster in order to demonstrate an understanding of the systems involved in the cluster.

Aligned Washington State Academic Standards

Mathematics: Common Core	HS.G.C.1 Prove that all circles are similar. HS.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. HS.G.C.3 Construct the inscribed and circumscribed circles of a triangle, and prove properties of angles for a quadrilateral inscribed in a circle.

	HS.G.C.4 (+) Construct a tangent line from a point outside a given circle to the circle.
	Find arc lengtHS. and areas of sectors of circles
	HS.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).*
	HS.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).*
	HS.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).*
Mathematical Practices	MP2 Reason abstractly and quantitatively.
	MP3 Construct viable arguments and critique the reasoning of others.
	MP5 Use appropriate tools strategically.
	MP6 Attend to precision.
	MP7 Look for and make use of structure.

Unit 17: Lighting and Meters	**Total Learning Hours for Unit:** 10

Unit Summary:

In this unit, students will:

- Study three-point lighting (key, fill, and back/rim/kicker).
- Become familiar with different types of lighting instruments.
- Learn about the uses of different type of lamps (hard, soft, and natural).
- Understand how to adjust for lighting intensity and color.
- Understand the concept of contrast ratio.
- Learn how to use light meters.

Performance Assessments: (Districts to complete for each unit)

Example assessments for this unit include:

- Students work in pairs to produce three different shots that include different combinations of the unit's competencies. They should present their results to the class and defend their process and product.

Using a performance rubric, the student will demonstrate proficiency at a level 3 or greater.

- Level 0: No Exposure or Not Completed.
- Level 1: Exposure Only—general information and some elements are shown.
- Level 2: Limited Practice—has practiced job and some elements are complete.
- Level 3: Moderately Skilled—has performed job and most elements are complete.
- Level 4: Skilled—can perform job and all elements are complete.

Leadership Alignment: (Districts to complete for each unit)

Leadership alignment must include a unit specific project/activity that aligns with the 21st Century Leadership Skills.

Example:

• One possible activity is the SkillsUSA Career Readiness Curriculum integrity lesson *Accept Responsibility*	

Industry Standards and/or Competencies:

The Common Career Technical Core Standards - Arts, A/V Technology, and Communications Cluster: A/V Technology & Film Pathway:

ARC05.02 Examine the various organizational structures adopted by groups within the arts, audio-video, technology, and communications field to understand the diversity and variety of functions within the industry.

ARC05.04 Analyze and summarize evidence of interdependence between the technical and the artistic sides of this career cluster in order to demonstrate an understanding of the systems involved in the cluster.

ARC06.01 Maintain safe and healthful working conditions by completing work tasks in accordance with rights and applicable responsibilities in a arts, audio-visual technology and communications work environment to protect employees' well being.

ARC06.02 Assess and control methods to reduce sources of office and worksite accident hazards common in the arts, audio-visual technology and communications industry in order to promote a safe and accident free working environment.

ARC06.03 Examine and summarize the responsibilities various entities have for promoting a safe and healthy work environment in order to understanding the roles involved in maintaining acceptable conditions in the arts, technology and communications field.

ARC06.04 Examine and summarize safety related problems that may result from working with electrical circuits used in this cluster to demonstrate a broad understanding of health and safety concerns.

ARC06.05 Apply safety procedures in operating equipment commonly used within the career pathways involved in this cluster to demonstrate a broad understanding of important safety practices.

ARC06.07 Demonstrate personal safety habits and procedures while on work-related assignments in various locations beyond the business site to ensure personal safety and well-being.

ARC09.03 Identify, examine and select career opportunities in one or more arts, AV, technology and communication related career pathways in order to explore career options.

ARC10.01 Demonstrate the use of technical knowledge and skills that relate to pathways in this cluster to allow for mobility among numerous career options within the family of related occupations.

ARC10.02 Summarize knowledge of the systems within various pathways contained in the cluster to keep abreast of new technological advancements and tools important to work in this industry.

Aligned Washington State Academic Standards	
Mathematics: Common Core	HS.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. HS.N.Q.2 Define appropriate quantities for the purpose of descriptive modeling. HS.N.Q.3 Choose a level of accuracy appropriate to limitations on measurement when reporting quantities. HS.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.

	HS.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.
	HS.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.
	HS.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.
	HS.G.SRT.7 Explain and use the relationship between the sine and cosine of complementary angles.
	HS.G.SRT.8 Use trigonometric ratios and the Pythagorean Theorem to solve right triangles in applied problems.*
	HS.S.ID.1 Represent data with plots on the real number line (dot plots, histograms, and box plots).
	HS.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.
	HS.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).
	HS.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.
Mathematical Practices	MP1 Make sense of problems and persevere in solving them.
	MP2 Reason abstractly and quantitatively.
	MP4 Model with mathematics.
	MP5 Use appropriate tools strategically.
	MP6 Attend to precision.
	MP7 Look for and make use of structure.
	MP8 Look for and express regularity in repeated reasoning.