Visual Art: Creative

Coding

Department of Equity, Curriculum and Instruction

Revised: July 2022

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Montclair Public Schools

Course Title: Creative Coding **Curriculum Area**: VPA **Credits:** 2.5

Course Pre-Requisites: NONE

2022 Curriculum Writers:

Dan Gerdes

Introduction

The Montclair Public Schools believes in celebrating the rich history of our magnet school system while ensuring consistent, high quality instruction for all learners. The Visual Arts curriculum is built upon this belief by incorporating the New Jersey Core Curriculum Visual Arts Grade Level Standards within the components of a balanced literacy framework. This approach provides all students with equitable access to the same learning goals while allowing teachers the flexibility to adapt to the needs of their learners.

The School of Visual and Performing Arts at Montclair High School offers a major course of study and training in one or more of the Fine and Performing Arts. The school provides its students with an exposure to the arts in a challenging and professional atmosphere where individual commitment and responsibility to group are paramount. All courses offered by the School of Visual and Performing Arts are available to all students of Montclair High School as electives.

Creative Coding is a semester-long digital art course for high school students using the open source Javascript library p5.js. By understanding how code can be a medium for creative expression, students will learn the fundamentals of computer science while designing and prototyping interactive projects that run on a browser. Additionally, students will learn how HTML/CSS elements can interact with p5.js to fully take advantage of developing content for a browser.

Visual and Performing Arts

Throughout time, the arts have served as a distinctive vehicle for self-discovery and a means of understanding the world in which we live. As the state of New Jersey continues to transform public education to meet the needs of a changing world and the 21st century workforce, capitalizing on the unique ability of the arts to develop creativity, critical thinking, and innovation skills is critical to the success of our students. The arts infuse our lives with meaning on nearly all levels—generating significant creative and intellectual capital. They inspire creative and critical thinking and encourage acceptance of diversity. A well-designed sequential arts program promotes responsible decision making, enhances self-awareness, builds self-esteem and self-management skills, and helps students build relationship and collaboration skills; all of which are essential to prepare New Jersey students for post-secondary success.

The New Jersey Student Learning Standards – Visual and Performing Arts are designed to promote lifelong artistic literacy and fluency and are guided by the mission and vision statements that follow.

Mission

To empower students to develop creative and critical thinking, social-emotional competencies, and intellectual and expressive abilities that will allow them to become active, contributing members of a global society.

Vision

All students will have equitable access to a quality, arts education that leads to artistic literacy and fluency in the artistic practices of the five art disciplines as a mechanism for:

- Performing, presenting or producing, as artistically literate individuals, by expressing and realizing creative ideas and implementing essential technical skills and cognitive abilities significant to many aspects of life and work in the 21st century;
- Responding to artistic ideas and work with personal meaning and cognizance of the ability of the arts to address universal themes, including climate change;
- Creating new artistic work reflective of a variety of ethnic, racial, and cultural perspectives; and
- Connecting and evaluating how the arts convey meaning through all arts and non-arts disciplines and contexts of our global society.

The New Jersey Student Learning Standards for Visual and Performing Arts (NJSLS-VPA) describe the expectations for literacy and fluency in five artistic disciplines: dance, music, theater, visual arts, and media arts. Each artistic discipline has independent skills, knowledge, and content. However, as a field, the arts are interdependent, connected, and inclusive. The NJSLS-VPA are designed to guide the delivery of arts education in the classroom with new ways of thinking, learning, and creating. The vision of all students having equitable access to a quality arts education is only achieved when the five arts disciplines are offered continuously throughout the K–12 spectrum.

Spirit and Intent

The NJSLS-VPA reflect the National Core Arts Standards and emphasize the process-oriented nature of the arts and arts learning by:

- Defining artistic literacy through a set of overarching philosophical foundations and lifelong goals that clarify long-term expectations for arts learning;
- Placing artistic processes and anchor standards at the forefront of the work;
- Identifying creative artistic practices as the bridge for the application of the artistic processes and anchor standards across all learning; and
- Specifying enduring understandings and essential questions that provide conceptual through lines and articulate value and meaning within and across the arts discipline.

The development of artistic literacy is dependent on creating an environment in which students are encouraged to independently and collaboratively imagine, investigate, construct, and reflect. Philosophically speaking, the arts serve to communicate ideas, as an opportunity for creative personal realization, to connect and reflect culture and history, and as a means to well-being and a mechanism for problem solving universal, global issues including climate change.

Within the broad lifetime goal of preparing artistically literate individuals, learning experiences that engage students with a variety of artistic media, symbols, and metaphors for the purpose of creating and performing in ways that express and communicate their own ideas are essential. Additionally, to become artistically literate, students need opportunities to respond to the arts through analyzing and interpreting the artistic communications of others. (More examples that illustrate the philosophical foundations and lifelong goals that are the underpinnings of the NJSLS-VPA can be found in the Supplemental Materials section.)

Descriptors for High School Proficiency Levels

At the high school level (grades 9–12), all students are required to complete five credits in Visual and Performing Arts as part of the course requirements to receive a high school diploma (N.J.A.C. 6A:8-5.1). Because students' experiences and course offerings at the middle and high school levels may vary, the new grade 9–12 standards are described in three levels of proficiency. The three levels—proficient, accomplished, and advanced—are flexible enough to accommodate varying degrees of achievement by students during high school, including those who build on their K–8 foundation by pursuing deeper engagement in one arts discipline, as well as those who explore a wide range of artistic pursuits and experiences at the high school level.

Proficient	Accomplished	Advanced
Students at the proficient level have developed the foundational technical and expressive skills and understandings in an art form necessary to solve assigned problems or prepare assigned repertoire for presentation; make appropriate choices with some support; and may be prepared for active engagement in their community. They understand the art form to be an important form of personal realization and well-being, and make connections between the art form, history, culture and other learning.	Students at the accomplished level are, with minimal assistance, able to identify or solve arts problems based on their interests or for a particular purpose; conduct research to inform artistic decisions; and create and refine arts performances, products, or presentations that demonstrate technical proficiency and personal communication and expression. They use the art form for personal realization and well-being and have the necessary skills for and interest in participation in arts activity beyond the school environment.	Students at the advanced level independently identify challenging arts problems based on their interests or for specific purposes and bring creativity and insight to finding artistic solutions. They are facile in using at least one art form as an effective avenue for personal communication, demonstrating a higher level of technical and expressive proficiency characteristic of honors or college level work. As arts learners, they exploit their personal strengths and apply strategies to overcome personal challenges. They are capable of taking a leadership role in arts activity within and beyond the school environment.
A level of achievement attainable by most students who complete a high school level course in the arts (or equivalent) beyond the foundation of quality K–8 instruction.	A level of achievement attainable by most students who complete a rigorous sequence of high-school level courses (or equivalent) beyond the proficient level.	A level and scope of achievement that significantly exceeds the accomplished level. Achievement at this level is indisputably rigorous and substantially expands students' knowledge, skills, and understandings beyond the expectations articulated for accomplished achievement.

**For the purpose of this section and in the interest of brevity, only the "Proficient" performance expectations have been listed below. For more information on differentiation, please refer to specific instructional units.*

CREATING

Anchor Standard 1: Generating and conceptualizing ideas.

Enduring Understandings: Media arts use a variety of sources such as imagination and creative processes to inspire and transform concepts and ideas into artistic expression.

Essential Questions: How do media artists generate ideas and formulate artistic intent? How does collaboration expand and affect the creative process? How can creative risks be encouraged?

Practice: Conceive

Performance Expectations:

- 1.2.12prof.Cr1a: Formulate multiple ideas using generative methods to develop artistic goals and solve problems in media arts creation processes.
- 1.2.12prof.Cr1b: Organize and design artistic ideas for media arts productions.
- 1.2.12prof.Cr1c: Critique plans, prototypes and production processes considering purposeful and expressive intent.
- 1.2.12prof.Cr1d: Apply aesthetic criteria in developing, refining and proposing media arts artwork.

Anchor Standard 2: Organizing and developing ideas.

Enduring Understanding: Media artists plan, organize and develop creative ideas that can effectively realize the artistic intent and communicate meaning.

Essential Questions: How do media artists work? How do media artists and designers determine whether a particular direction in their work would be effective? How do media artists learn from trial and error?

Practice: Develop

Performance Expectations:

- 1.2.12prof.Cr2a: Organize and design artistic ideas for media arts productions.
- 1.2.12prof.Cr2b: Critique plans, prototypes and production processes considering purposeful and expressive intent.
- 1.2.12prof.Cr2c: Apply aesthetic criteria in developing, refining and proposing media arts artwork.

Anchor Standard 3: Refining and completing products.

Enduring Understanding: The forming, integration and refinement of aesthetic components, principles and processes create purpose, meaning and artistic quality in media artworks.

Essential Questions: How can an artist construct a media artwork that conveys purpose, meaning and artistic quality? How do media artists improve/refine their work?

Practice: Construct

Performance Expectations:

- 1.2.12prof.Cr3a: Understand the deliberate choices in organizing and integrating content, stylistic conventions, and media arts principles such as emphasis and tone.
- 1.2.12prof.Cr3b: Refine and modify media artworks, emphasizing aesthetic quality and intentionally accentuating stylistic elements to reflect an understanding of personal goals and preferences.

PRODUCING

Anchor Standard 4: Selecting, analyzing, and interpreting work.

Enduring Understanding: Media artists integrate various media and content to develop complex, unified artworks through a process of creation and communication.

Essential Questions: How are complex media arts experiences constructed? At what point is a work considered "complete"?

Practice: Practice

Performance Expectations:

- 1.2.12prof.Pr4a: Integrate various arts, media arts forms and content into unified media arts productions, considering the reaction and interaction of the audience, such as experiential design.

Anchor Standard 5: Developing and refining techniques and models or steps needed to create products.

Enduring Understanding: Media artists require a range of skills and abilities to creatively solve problems.

Essential Questions: How are creativity and innovation developed within and through media arts productions? How do media artists use various tools and techniques?

Practice: Integrate

Performance Expectations:

- 1.2.12prof.Pr5a: Demonstrate progression in artistic, design, technical, and soft skills, as a result of selecting and fulfilling specified roles in the production of a variety of media artworks.
- 1.2.12prof.Pr5b: Develop and refine creativity and adaptability, such as design thinking and risk taking, in addressing identified challenges and constraints within and through media arts productions.
- 1.2.12prof.Pr5c: Demonstrate adaptation and innovation through the combination of tools, techniques and content to communicate intent in the production of media artworks.

Anchor Standard 6: Conveying meaning through art.

Enduring Understanding: Media artists present, share and distribute media artworks through various social, cultural, and political

contexts.

Essential Questions: How does time, place, audience, and context affect presenting or performing choices for media artworks? How can presenting or sharing media artworks in a public format help a media artist learn and grow? Why do various venues exist for presenting, sharing, or distributing media artworks?

Practice: Present

Performance Expectations:

- 1.2.12prof.Pr6a: Design the presentation and distribution of collections of media artworks, considering combinations of artworks, formats and audiences.
- 1.2.12prof.Pr6b: Evaluate the benefits and impacts at the personal, local and social level from presenting media artworks, such as benefits to self and others.

RESPONDING

Anchor Standard 7: Perceiving and analyzing products.

Enduring Understandings: An artist's appreciation of media artworks is influenced by their interests, experiences, understandings, and purposes. Identifying the qualities and characteristics of media artworks improves the individual's aesthetic and empathetic awareness.

Essential Questions: How do we analyze and react to media artworks? How do media artworks function to convey meaning and influence audience experience?

Practice: Perceive

- 1.2.12prof.Re7a: Analyze the qualities of and relationships between the components, style and preferences communicated by

media artworks and artists.

- 1.2.12prof.Re7b: Analyze how a variety of media artworks affect audience experience and create intention through multimodal perception when addressing global issues including climate change.

Anchor Standard 8: Interpreting intent and meaning.

Enduring Understandings: Interpretation and appreciation of an artwork and its media require consideration of form, context and personal experience. Analysis of media artworks provides clues to their expressive intent.

Essential Questions: How do people relate to and interpret media artworks? How can the viewer "read" a work of art as text? How does knowing and using arts vocabulary help us understand and interpret works of art?

Practice: Interpret

Performance Expectations:

- 1.2.12prof.Re8a: Analyze the intent, meaning and perception of a variety of media artworks, focusing on personal and cultural contexts and detecting bias, opinion and stereotypes.

Anchor Standard 9: Applying criteria to evaluate products.

Enduring Understanding: Evaluation and critique are vital components of experiencing, appreciating and producing media artworks.

Essential Questions: How and why do we value and judge media artworks? When and how should we evaluate and critique media artworks to improve them? How is a personal preference different from an evaluation?

Practice: Evaluate

Performance Expectations:

● 1.2.12prof.Re9a: Evaluate media art works and production processes at decisive stages, using identified criteria and considering context and artistic goals.

CONNECTING

Anchor Standard 10: Synthesizing and relating knowledge and personal experiences to create products.

Enduring Understanding: Through creating media artworks, people make meaning by investigating and developing awareness of culture and experiences.

Essential Questions: How does engaging in creating media artworks enrich people's lives? How does making media artworks attune people to their surroundings? How do media artworks contribute to an awareness and understanding of our lives and communities?

Practice: Synthesize

Performance Expectations:

- 1.2.12prof.Cn10a: Access, evaluate and integrate personal and external resources to inform the creation of original media artworks, such as experiences, interests and cultural experiences.
- 1.2.12prof.Cn10b: Explain and demonstrate the use of media artworks to expand meaning and knowledge, and create cultural experiences such as learning and sharing through online environments.

Anchor Standard 11: Relating artistic ideas and works within societal, cultural and historical contexts to deepen understanding.

Enduring Understanding: Understanding connections to varied contexts and daily life enhances a media artist's work.

Essential Questions: How does art help us understand the lives of people of different times, places, and cultures? How is art used to impact the views of a society? How does art mirror aspects of life? How do the other arts, disciplines, contexts, and daily life inform

the creation, performance and response to media arts?

Practice: Relate

Performance Expectations:

● 1.2.12prof.Cn11a: Demonstrate and explain how media artworks and ideas relate to various contexts, purposes, and values (e.g., social trends, power, equality, personal/cultural identity).

● 1.2.12prof.Cn11b: Critically evaluate and effectively interact with legal, technological, systemic, and vocational contexts of media arts, considering ethics, media literacy, social media, virtual worlds, and digital identity.

National Visual Art Standards

- VA:Cr1: Use multiple approaches to begin creative endeavors.
- VA:Cr2.1: Engage in making a work of design without having a preconceived plan.
- VA:Cr7.1: Evaluate the effectiveness of images to influence ideas, feelings and behaviors of specific audiences.
- VA:Cr8.1: Analyze differing interpretations of an artwork or collection of works in order to select and defend a plausible critical analysis.
- VA:Cr10.1: Document the process of developing ideas from early stages to fully elaborated ideas.
- VA:Cr10.1.IIa: Utilize inquiry methods of observation, research, and experimentation to explore unfamiliar subjects through art making.
- VA:Re.7.1.Ia: Hypothesize ways in which art influences perception and understanding of human experiences.
- VA:Re.7.2.Ia: Analyze how one's understanding of the world is affected by experiencing visual imagery.
- VA:Re.7.2.IIa: Evaluate the effectiveness of an image or images to influence ideas, feelings, and behaviors of…
- VA:Re8.1.IIa: Identify types of contextual information useful in the process of constructing interpretations of an artwork or collection of works.

Overview	Concept/Theme	Knowledge	Standards	Art-Related Skills
Unit 1	**IU-1: Drawing, Variables, Random** **IU-2: Respond & Draw**	*All* of the technology that we use has been created, designed and distributed by human beings. While many people tend to be primarily passive *consumers* of technology, we can also learn to become *creators* of technology. Technology can be leveraged by digital artists as a powerful means of self-expression.	NJSLS: • 1.2.12prof.Cr1a-d • 1.2.12prof.Cr2a • 1.2.12prof.Cr3a-b • 1.2.12prof.Pr5a-c • 1.2.12prof.Pr6a-b • 1.2.12prof.Re7a-b • 1.2.12prof.Re8a • 1.2.12prof.Re9a • 1.2.12prof.Cn10a • 1.2.12prof.Cn11a NVAS: • VA:Cr1 • VA:Cr2VA:Cr10 • VA:Re.7.1.Ia • VA:Re.7.2.Ia • VA:Re.7.2.IIa • VA:Re8.1 • VA:Re.7.2.Ia	• Generate multiple ideas • Draw using shapes and abstraction • Draw using algorithms • Develop an awareness of the formal role points, lines, and planes play in art and design through the use of visual aids and class discussion; • Develop an awareness of the physical properties of color and color's expressive role in digital works of art and software development • Create drawing tools, and develop an understanding that the creation of tools can be expressive in itself • Understand that the fast succession of still frames allows for the illusion of motion • Understand linear

				transformations of the coordinate plane
Unit 2	**IU-3: Loops, Arrays, Media** **IU-4: Motion && Animation**	*All* of the technology that we use has been created, designed and distributed by human beings. While many people tend to be primarily passive *consumers* of technology, we can also learn to become *creators* of technology. Technology can be leveraged by digital artists as a powerful means of self-expression.	NJSLS: ● 1.2.12prof.Cr1a-d ● 1.2.12prof.Cr2a ● 1.2.12prof.Cr3a-b ● 1.2.12prof.Pr5a-c ● 1.2.12prof.Pr6a-b ● 1.2.12prof.Re7a-b ● 1.2.12prof.Re8a ● 1.2.12prof.Re9a ● 1.2.12prof.Cn10a ● 1.2.12prof.Cn11a NVAS: ● VA:Cr1 ● VA:Cr2VA:Cr10 ● VA:Re.7.1.Ia ● VA:Re.7.2.Ia ● VA:Re.7.2.IIa ● VA:Re8.1.IIa	• Use patterns to express an idea • Apply the concept of iteration to work of media art • Understand how the illusion of motion is created
Suggested Open	● Virtual museums online ● Posters and reproductions of artwork	● Artist and Art Movement videos and DVDs ● Current art publications	● Field trips and guest speakers are integrated into the Visual Arts	● All trips and speakers are relevant to course content. The Visual Arts staff is

Educational Resources	• Youtube videos to supplement instruction or show technique not possible in classroom setting	• Artist biographies • Internet resources	curriculum at MHS to introduce students to the arts opportunities outside of the academic environment.	committed to enriching both students' arts experiences and the curriculum through visits to New Jersey and New York museums and galleries, as well as utilizing the resources of the Montclair Arts community.

Montclair Public Schools Instructional Unit

Content:	Visual Art: Creative Coding			**Grade:**	9-12
Marking Period	Semester	**Unit Title:**	IU-1: Drawing, Variables, Random IU-2: Respond & Draw	**Pacing:**	Approx. 10 Weeks

Overview

Big Ideas:

- Code as a creative and expressive medium
- The concept of creating design systems: programmatically defining ranges for positions, dimensions, and colors, by using variables, randomness, and repetition
- Drawing as collaboration between designer and system
- Interactive systems: programming visual systems that change over time and respond to user inputs
- Interaction design: defining the interactions between user and system
- Designing tools for creative expression

Essential Questions:

- What is creative coding?
- How can code be used as a creative and expressive medium?
- How do the parameters of function affect positioning on the canvas?
- How can we use shape functions to create images?
- How can I create custom variables to hold values in my p5.js projects?
- How can we use the random function to generate different designs?
- How do computers mix colors?
- How can I represent colors in a mode other than RGB?
- How can we add conditional statements to make our programs interactive?
- How can we write multiple conditions to our code?
- How can we make logical operators more interactive?
- How can control flow allow for user interactions?
- How can I use built-in variables to create a program that lets the user draw?
- How can the map function help me control a range of values?

- How can I use mouse clicks in p5.js?
- How can I allow keys to control elements of my program?

Enduring Understandings: The basics of computation are execution flow, function calls and variables. The basics of 2D computer graphics involve drawing on a canvas, the coordinate system, calling drawing functions, setting colors in different color spaces. The application of variables, repetition and randomness can be used together to create parametric drawings. We can create our own drawing tools, and the creation of those tools can be expressive in itself. The fast succession of still frames allows for the illusion of motion and for the system to respond to user clicks, hovers, and key presses. Linear transformations of the coordinate plane include scaling, translating and rotating which can be achieved using one single variable (map function).

NJSLS & NVAS

Standards	Student Learning Objectives	Critical Knowledge and Skills	Depth of Knowledge
NJSLS: • 1.2.12prof.Cr1a-d • 1.2.12prof.Cr2a • 1.2.12prof.Cr3a-b • 1.2.12prof.Pr5a-c • 1.2.12prof.Pr6a-b • 1.2.12prof.Re7a-b • 1.2.12prof.Re8a • 1.2.12prof.Re9a • 1.2.12prof.Cn10a • 1.2.12prof.Cn11a NVAS: • VA:Cr1 • VA:Cr2VA:Cr10 • VA:Re.7.1.Ia • VA:Re.7.2	• SWBAT create an account on https://alpha.editor.p5js.org/signup • SWBAT explain what p5.js is • SWBAT describe things you can create on p5.js • SWBAT understand the p5 canvas coordinate system • SWBAT understand the p5 canvas coordinate system • SWBAT consult the p5 reference for documentation • SWBAT use width and height • SWBAT use mouseX and mouseY to	Students will explore the big ideas of computer science such as abstraction, algorithms, and programming. Students will learn how to apply these concepts by working on creative projects that introduce algorithm design, human-computer interaction design, conditionals, loops, functions, and object- oriented programming. The projects in the curriculum cover a number of topics such as computer graphics, web app design, interactive design, animation, and data.	Level 2: Skills & Concepts Level 3: Strategic Thinking Level 4: Extended Thinking

	move a shape • SWBAT use system variables as parameters for functions. • SWBAT create a line and point • SWBAT change the grayscale value of a canvas • SWBAT use lines to create a rectangle or a house • SWBAT use layering to create images • SWBAT create rectangles using the rect() function • SWBAT create ellipses using the ellipse() function • SWBAT understand the concept of layering to create images using multiple shape functions • SWBAT identify repeated values in their code and use variables in their place. • SWBAT create and implement custom variables • SWBAT use random() to generate different positioning, sizing and grayscale fill		

	• SWBAT assign random() to a function • SWBAT use random() in the correct scope • SWBAT use system variables • SWBAT use custom variables SWBAT utilize random() function • SWBAT create a digital image for an audience • SWBAT defend and validate their creations • SWBAT describe the process by which computers mix colors (additive mixing) • SWBAT use fill() to change the color of shapes in RGB color mode. • SWBAT explain and utilize the HSB color mode. • SWBAT understand the differences between RGB and HSB color modes. • SWBAT create an abstract representation of a mood or theme using p5.js • SWBAT create triangles • SWBAT create quadrilaterals		

	• SWBAT create arcs • SWBAT create shapes defined by their vertices • SWBAT use width and height • SWBAT use mouseX and mouseY to move a shape • SWBAT use system variables as parameters for functions. • SWBAT use an if-then statement • SWBAT create conditional statements (event handlers) • SWBAT use an Else statement • SWBAT use an else-if statement • SWBAT create compound conditional statements • SWBAT understand how moving background out of the draw() function allows the user to draw. • SWBAT utilize pmouseX and pmouseY to create something that draws. • SWBAT use the map function to control color.		

	• SWBAT utilize pmouseX and pmouseY to create something that draws. • SWBAT Use key presses to control elements of their programs • SWBAT use conditionals to define a reactive rectangular button. • SWBAT use *mouseIsPressed* to create mouse click reactions. • SWBAT Create compound conditional statements • SWBAT create an drawing application with button and key press reactions that allows the user to draw with the mouse		

Instructional Plan

Formative Assessment Plan	Summative Assessment Plan
Ongoing Journaling in Sketchbook Class Discussions Class Participation Self-Evaluation	Rubrics for Assignments and Projects Group Critique Self-Evaluation Quizzes and Tests
Texts	**Supplementary Resources**
N/A	*The Processing Foundation*

	The Coding Train *Intro to P5 Learning playlist*

Instructional Best Practices and Exemplars

- *National Art Education Association*
- *Art Educators of New Jersey*
- *Designing Effective Rubrics*
- *Creating Meaningful Rubrics*
- Do-Now question is related to the lesson. It can be used as memory recall for refocus, a personal reflection to link with prior knowledge, writing to reflect on "what worked and what didn't," or documenting procedures.
- KWL
- Pair-and-share
- Print color copies of tools or masterworks for students to glue into journals

DIFFERENTIATION			
Special Education	**ELL**	**Intervention**	**Acceleration**
• Modify and accommodate as listed in student's IEP or 504 plan • Prioritize instruction • Teach thoroughly • Utilize wait-time • Ensure directions are clear and concise • Utilize probing and clarifying questions • Ask higher order questions equitably • Support instruction with scaffolding • Model (provide step by step instructions) use of learning strategies • Provide extended time for practice and review of learning strategies • Identify, categorize, and teach words critical to understanding instructional texts • Utilize multiple approaches to monitor student understanding • Create rubrics to develop assessments • Vary assessments • Assign peer assisted reading • Assign peer tutoring • Provide individual help to all students • Create opportunities for/Monitor peer collaboration • Monitor student progress frequently • Utilize flexible/cooperative grouping based on instructional goals • Create lesson reminder sheets • Prioritize and chunk lengthy assignments	• Get to know student • Set high expectations • Learn/Utilize/Display some words in student's heritage language • Allow electronic translator • Reword, repeat, and clarify directions • Determine student knowledge and level of understanding • Research instruction that best matches student need • Utilize ongoing informal assessments • Refer to NJDOE resources • Refer to NJDOE resources • NJDOE ELL Support Descriptions		• Follow district G&T Plan for identified students • Process should be modified: higher order thinking skills, open-ended thinking, discovery • Utilize project-based learning for greater depth of knowledge • Utilize exploratory connections to higher grade concepts • Contents should be modified: abstraction, complexity, variety, organization • Products should be modified: real world problems, audiences, deadlines, evaluation, transformations • Learning environment should be modified: student-centered learning, independence, openness, complexity, groups varied

• Utilize assistive technology, when appropriate • Provide ongoing, effective, specific feedback • Model/Utilize graphic organizers • Provide leveled reading materials • Utilize visual aids and props (flashcards, pictures, symbols) when possible • Utilize a multi-sensory approach to new topics • NJDOE Resources			

CROSS CURRICULAR RESOURCES
The Amistad Commission's Virtual Curriculum: http://www.njamistadcurriculum.net/
NJ Commission on Holocaust Education: https://www.nj.gov/education/holocaust/
NJSLS Diversity, Equity and Inclusion Educational Resources: https://www.nj.gov/education/standards/dei/samples/index.shtml

ALIGNMENT TO 21st CENTURY SKILLS AND TECHNOLOGY	
21st Century/ Interdisciplinary Themes: Bold all that apply	**21st Century Skills: Bold all that apply**
Global Awareness **Financial, Economic, Business and Entrepreneurial Literacy** **Civic Literacy** **Environmental Literacy**	**Creativity & Innovation** **Critical Thinking & Problem Solving** **Communication & Collaboration** **Media Literacy**

Health Literacy	**Information Literacy** **Information, Communication & Technology** **Life & Career Skills**

Technology Infusion
College and Career Readiness Anchor Standards for Speaking and Listening 6-12 #5
Evidence of Student Learning
● Common benchmark ● DRA continuum ● Evaluation rubrics ● Self-reflections ● Teacher-student conferences ● Running records ● Students' published pieces ● Unit tests ● Quizzes

Montclair Public Schools Instructional Unit

Content:	Visual Art: Creative Coding			**Grade:**	9-12
Marking Period	Semester	**Unit Title:**	IU-3: Loops, Arrays, Media IU-4: Motion & Animation	**Pacing:**	Approx. 10 Weeks

Overview

Big Ideas:

- Code as a creative and expressive medium
- The concept of creating design systems: programmatically defining ranges for positions, dimensions, and colors, by using variables, randomness, and repetition
- Drawing as collaboration between designer and system
- Interactive systems: programming visual systems that change over time and respond to user inputs
- Interaction design: defining the interactions between user and system
- Designing tools for creative expression

Essential Questions:

- How can we use iteration to abstract artwork?
- How can sounds, images, and fonts can be combined and manipulated with code?
- How can I apply math and computation expressively to create motion graphics?
- How can I move a shape on the x-axis?
- How can I make objects move in different directions?
- How can I make objects rotate?
- How can I draw with trigonometric functions in p5?

Enduring Understandings: The basics of computation are execution flow, function calls and variables. The basics of 2D computer graphics involve drawing on a canvas, the coordinate system, calling drawing functions, setting colors in different color spaces. The application of variables, repetition and randomness can be used together to create parametric drawings. We can create our own drawing tools, and that the creation of tools can be expressive in itself. The fast succession of still frames allows for the illusion of motion and for the system to respond to user clicks, hovers, and key presses. Linear transformations of the coordinate plane include scaling, translating and rotating which can be achieved using one single variable (map function).

NJSLS & NVAS

Standards	Student Learning Objectives	Critical Knowledge and Skills	Depth of Knowledge
NJSLS: ● 1.2.12prof.Cr1a ● 1.2.12prof.Cr1b ● 1.2.12prof.Cr1d ● 1.2.12prof.Cr2a ● 1.2.12prof.Cr3a-b ● 1.2.12prof.Pr5a-c NVAS: ● VA:Cr1 ● VA:Cr2 ● VA:Cr10	• SWBAT explain how the components of the while loops are essential to efficiency • SWBAT create while loops • SWBAT use while loops to generate multiple shapes • SWBAT explain how the components of the for loops are essential to efficiency • SWBAT create for loops • SWBAT use for loops to generate multiple shapes • SWBAT explain the difference between while and for loops • SWBAT change the values of x in the for loops to generate different images • SWBAT use for loops to increment color change • SWBAT nest two for loops	Students will explore the big ideas of computer science such as abstraction, algorithms, and programming. Students will learn how to apply these concepts by working on creative projects that introduce algorithm design, human-computer interaction design, conditionals, loops, functions, and object- oriented programming. The projects in the curriculum cover a number of topics such as computer graphics, web app design, interactive design, animation, and data.	Level 2: Skills & Concepts Level 3: Strategic Thinking Level 4: Extended Thinking

	• SWBAT create a grid of shapes • SWBAT explain how an array can be used instead of multiple variables • SWBAT create arrays • SWBAT retrieve information from arrays • SWBAT explain how the random() function serves to return a random number • SWBAT explain how the floor() function returns the input, rounded down • SWBAT use the combination of random() and floor() to select random elements from arrays • SWBAT explain how a loop can be used to iterate through an array • SWBAT retrieve information from arrays using for loops • SWBAT identify image file types to use in their program • SWBAT use the preload function to load images from local and web-based files		

	• SWBAT add images to their canvas, position, and resize. • SWBAT use an array to store images • SWBAT understand the basics of machine learning • SWBAT create a program that will select and identify an image using MobileNet • SWBAT use a for loop to draw multiple instances of an image • SWBAT use tint to alter the appearance of an image • SWBAT apply basic typographic principles when adding text to their programs • SWBAT add custom fonts from websites like Google Fonts to their programs • SWBAT create and style text in p5.js • SWBAT search for Creative Commons license sound files and add them to a p5 project. • SWBAT create Sounds using p5.js • SWBAT identify file types		

	• SWBAT load and play a sound file in a p5 sketch. • SWBAT write key conditionals • SWBAT use push and pop to apply transformations to the canvas • SWBAT transform an entire drawing. • SWBAT transform some of its elements. • SWBAT use rotate(). • SWBAT rotate the canvas. • SWBAT apply a rotation to one or more elements. • SWBAT call sin() to create values in p5 • SWBAT use sin() to create cyclical motion with map() or by multiplying values. • SWBAT showcase their understanding of animation and motion (including incrementing variables, transformations, sine/cosine) based on Unit 4 lessons in a culminating final project. • SWBAT integrate programming skills from the duration of the year into an animated greeting card project.		

Instructional Plan	
Formative Assessment Plan	**Summative Assessment Plan**
Ongoing Journaling in Sketchbook Class Discussions Class Participation Self-Evaluation	Rubrics for Assignments and Projects Group Critique Self-Evaluation Quizzes and Tests
Texts	**Supplementary Resources**
N/A	*The Coding Train* *Intro to P5 Learning playlist*
Instructional Best Practices and Exemplars	
• *National Art Education Association* • *Art Educators of New Jersey* • *Designing Effective Rubrics* • *Creating Meaningful Rubrics* • Do-Now question is related to the lesson. It can be used as memory recall for refocus, a personal reflection to link with prior knowledge, writing to reflect on "what worked and what didn't," or documenting procedures. • KWL • Pair-and-share • Print color copies of tools or masterworks for students to glue into journals	

DIFFERENTIATION			
Special Education	**ELL**	**Intervention**	**Acceleration**
• Modify and accommodate as listed in student's IEP or 504 plan • Prioritize instruction • Teach thoroughly • Utilize wait-time • Ensure directions are clear and concise • Utilize probing and clarifying questions • Ask higher order questions equitably • Support instruction with scaffolding • Model (provide step by step instructions) use of learning strategies • Provide extended time for practice and review of learning strategies • Identify, categorize, and teach words critical to understanding instructional texts • Utilize multiple approaches to monitor student understanding • Create rubrics to develop assessments • Vary assessments • Assign peer assisted reading • Assign peer tutoring • Provide individual help to all students • Create opportunities for/Monitor peer collaboration • Monitor student progress frequently • Utilize flexible/cooperative grouping based on instructional goals • Create lesson reminder sheets • Prioritize and chunk lengthy assignments	• Get to know student • Set high expectations • Learn/Utilize/Display some words in student's heritage language • Allow electronic translator • Reword, repeat, and clarify directions • Determine student knowledge and level of understanding • Research instruction that best matches student need • Utilize ongoing informal assessments • Refer to NJDOE resources • Refer to NJDOE resources • NJDOE ELL Support Descriptions		• Follow district G&T Plan for identified students • Process should be modified: higher order thinking skills, open-ended thinking, discovery • Utilize project-based learning for greater depth of knowledge • Utilize exploratory connections to higher grade concepts • Contents should be modified: abstraction, complexity, variety, organization • Products should be modified: real world problems, audiences, deadlines, evaluation, transformations • Learning environment should be modified: student-centered learning, independence, openness, complexity, groups varied

• Utilize assistive technology, when appropriate • Provide ongoing, effective, specific feedback • Model/Utilize graphic organizers • Provide leveled reading materials • Utilize visual aids and props (flashcards, pictures, symbols) when possible • Utilize a multi-sensory approach to new topics • NJDOE Resources			

CROSS CURRICULAR RESOURCES
The Amistad Commission's Virtual Curriculum: http://www.njamistadcurriculum.net/
NJ Commission on Holocaust Education: https://www.nj.gov/education/holocaust/
NJSLS Diversity, Equity and Inclusion Educational Resources: https://www.nj.gov/education/standards/dei/samples/index.shtml

ALIGNMENT TO 21st CENTURY SKILLS AND TECHNOLOGY	
21st Century/ Interdisciplinary Themes: Bold all that apply	**21st Century Skills: Bold all that apply**
Global Awareness **Financial, Economic, Business and Entrepreneurial Literacy** **Civic Literacy** **Environmental Literacy**	**Creativity & Innovation** **Critical Thinking & Problem Solving** **Communication & Collaboration** **Media Literacy**

Health Literacy	**Information Literacy** **Information, Communication & Technology** **Life & Career Skills**

Technology Infusion
College and Career Readiness Anchor Standards for Speaking and Listening 6-12 #5
Evidence of Student Learning
● Common benchmark ● DRA continuum ● Evaluation rubrics ● Self-reflections ● Teacher-student conferences ● Running records ● Students' published pieces ● Unit tests ● Quizzes