

01 Drawing

Content Area: **Math**
Course(s):
Time Period: **Semester**
Length: **1 Week**
Status: **Published**

General Overview, Course Description or Course Philosophy

The course is designed to give students an introduction to the programming language python and develop abstraction skills. Students will have the opportunity to foster their ability to develop and apply computational problem-solving skills. This course utilizes graphical problems that allow for multiple solutions and provides visual cues while debugging. Students will design creative solutions to address real-world problems. Students will engage not only independently but will work collaboratively to navigate the dynamic digital landscape.

In this unit, students will be introduced to representing objects on a canvas. Students will alter properties such as location, size, and color to create simple pictures while exploring problem-solving strategies and abstraction. Students will work towards breaking down a complicated image using abstraction to recreate it using simple objects.

OBJECTIVES, ESSENTIAL QUESTIONS, ENDURING UNDERSTANDINGS

Objectives

- Students will be able to use basic python commands to draw shapes with different colors and sizes.
- Students will be able to represent a complex image using geometric shapes and colors.
- Students will be able to fill in a chart to explain their abstraction process.
- Students will be able to critique their own program for opportunities for improvement.

Essential Questions

- Why are algorithms essential to programming?
- How can programs be used for creative expression?
- How can computing extend traditional forms of human expression and experience?
- How are systems of interacting modules necessary for the management of complex tasks?
- How does the role of coordinate geometry assist in performing complicated tasks in Python?

Enduring Understanding

- A variety of abstractions built upon binary sequences can be used to represent all digital data.
- String variables are different than numeric variables; there are times when you need to convert a string variable to a numeric variable so as to perform mathematical operations.

CONTENT AREA STANDARDS

CS.9-12.8.1.12.AP.1	Design algorithms to solve computational problems using a combination of original and existing algorithms.
CS.9-12.8.1.12.AP.2	Create generalized computational solutions using collections instead of repeatedly using simple variables.
CS.9-12.8.1.12.AP.3	Select and combine control structures for a specific application based upon performance and readability, and identify trade-offs to justify the choice.
CS.9-12.8.1.12.AP.4	Design and iteratively develop computational artifacts for practical intent, personal expression, or to address a societal issue.
CS.9-12.8.1.12.AP.5	Decompose problems into smaller components through systematic analysis, using constructs such as procedures, modules, and/or objects.

RELATED STANDARDS (Technology, 21st Century Life & Careers, ELA Companion Standards are Required)

LA.K-12.NJSLSA.L1	Demonstrate command of the conventions of standard English grammar and usage when writing or speaking.
LA.K-12.NJSLSA.L2	Demonstrate command of the conventions of standard English capitalization, punctuation, and spelling when writing.
LA.K-12.NJSLSA.SL1	Prepare for and participate effectively in a range of conversations and collaborations with diverse partners, building on others' ideas and expressing their own clearly and persuasively.
LA.K-12.NJSLSA.SL6	Adapt speech to a variety of contexts and communicative tasks, demonstrating command of formal English when indicated or appropriate.
MA.G-MG.A.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).
MA.K-12.1	Make sense of problems and persevere in solving them.
MA.K-12.2	Reason abstractly and quantitatively.
MA.K-12.3	Construct viable arguments and critique the reasoning of others.
MA.K-12.6	Attend to precision.
PFL.9.1.K12.P.4	Demonstrate creativity and innovation.

STUDENT LEARNING TARGETS

Declarative Knowledge

Students will understand that:

- Shapes can be drawn using position parameters and size parameters
- Parameters can be required or optional
- Colors can be accessed by name or by RGB values

Procedural Knowledge

Students will be able to:

- Draw simple shapes
- Color shapes
- Create an piece of art using simple shapes and color

EVIDENCE OF LEARNING

Formative Assessments

- Checkpoints in each section
- Guided Practice
- Independent Practice
- Checklists
- Class Discussion
- Exit Tickets
- Rubrics
- Teacher Observation
- Exit/Entrance Tickets

Summative Assessments

- End of Unit Assessment
- End of Unit Creative Task

RESOURCES (Instructional, Supplemental, Intervention Materials)

[Example Creative Tasks](#)

INTERDISCIPLINARY CONNECTIONS

Interdisciplinary connections are frequently addressed through examples and practice problems whereby creating solutions that draw from cultures around the world, athletics, mathematics and geography. Examples can be found in topic specific examples, practice exercises, guided projects and digital resources.

ACCOMMODATIONS & MODIFICATIONS FOR SUBGROUPS

See link to Accommodations & Modifications document in course folder.