04 Lists and Return Values

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

General Overview, Course Description or Course Philosophy

Introduction to Python is a semester course that introduces students to fundamental concepts of programming with an emphasis on helping students develop logical thinking and problem-solving skills. This course focuses on a fun and engaging approach to learning programming through visual problems requiring students to investigate and explore while honing their mastery of the topics. This course utilizes graphical problems that allow for multiple solutions and provides visual cues while debugging. Students will engage not only independently but will work collaboratively to accomplish creative tasks.

In this unit, students will learn how to link functions together using returns and a new data structure; lists. Students will explore how lists are mutable, heterogeneous data types and are stored in an ordered sequence. Students will expand their knowledge of methods to include iterating over strings and how to list methods can be used to manipulate and search a list.

OBJECTIVES, ESSENTIAL QUESTIONS, ENDURING UNDERSTANDINGS

Objectives

- Students will be able to use the world properties to create and add objects to a list variable.
- Students will be able to access and manipulate lists.
- Students will be able to use loops to traverse a list of objects to alter attributes of the objects
- Students will be able to generate and test code that incorporates a list search
- Students will be able to randomly select an item in a list to complete a specific set of instructions.
- Students will be able to link functions together using returns.

Essential Questions

- How is the way data is organized and stored affect reliability, accessibility, privacy, and speed?
- Why are organization structures important to programming?

- Why is passing information out of a function important to reliable and efficient programs?
- Do computer programs, like humans, communicate responses to themselves? How would this help solve problems?

Enduring Understanding

- The organization of items/data eliminates time spent writing a program.
- Programmers can organize data using a list.
- Parameters are necessary when lists contain objects that are to perform an action.
- Returning information from functions

CONTENT AREA STANDARDS

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.DA.2	Describe the trade-offs in how and where data is organized and stored.
	Individuals evaluate and select algorithms based on performance, reusability, and ease of implementation.
	Programmers choose data structures to manage program complexity based on functionality, storage, and performance trade-offs.
	Individuals select digital tools and design automated processes to collect, transform, generalize, simplify, and present large data sets in different ways to influence how other people interpret and understand the underlying information.

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

MA.K-12.3	Construct viable arguments and critique the reasoning of others.
PFL.9.1.K12.P.5	Utilize critical thinking to make sense of problems and persevere in solving them.
PFL.9.1.K12.P.8	Use technology to enhance productivity increase collaboration and communicate effectively.
MA.K-12.5	Use appropriate tools strategically.
LA.K-12.NJSLSA.R7	Integrate and evaluate content presented in diverse media and formats, including visually and quantitatively, as well as in words.
MA.K-12.6	Attend to precision.
MA.K-12.7	Look for and make use of structure.
MA.K-12.8	Look for and express regularity in repeated reasoning.
LA.K-12.NJSLSA.W7	Conduct short as well as more sustained research projects, utilizing an inquiry-based research process, based on focused questions, demonstrating understanding of the subject under investigation.
LA.K-12.NJSLSA.SL1	Prepare for and participate effectively in a range of conversations and collaborations with

LA.K-12.NJSLSA.SL2	Integrate and evaluate information presented in diverse media and formats, including visually, quantitatively, and orally.
LA.K-12.NJSLSA.SL4	Present information, findings, and supporting evidence such that listeners can follow the line of reasoning and the organization, development, and style are appropriate to task, purpose, and audience.
LA.K-12.NJSLSA.SL5	Make strategic use of digital media and visual displays of data to express information and enhance understanding of presentations.

STUDENT LEARNING TARGETS

Declarative Knowledge

Students will understand that:

- Lists can store anything
- Lists store information in a specific order
- Returns immediately end a function and give back information
- Functions can only return one piece of data

Procedural Knowledge

Students will be able to:

- Create a list
- Apply algorithms to alter and search a list
- Use a list to store and recall information
- Use a loop to traverse a list
- Use returns to give information back out of a function
- Explain the purpose of returning a value from a function.
- Create functions that return values.
- Create programs that call functions with return values and use the return values to solve a higher-order problem.

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.