Unit #6: Algorithms

Content Area: **Template**
Course(s):
Time Period:
Length:
Status: **Published**

State Mandated Topics Addressed in this Unit

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N/A	N/A

Unit #6: Algorithms

Learning Objectives

- Artists explore the boundaries of how efficiently computers can solve problems.
- Artists will explore Algorithms, Debugging, Syntax, Variables and Key Computer Science Concepts
- Artists will see some connections between mathematics and computer science.
- Artists will understand that certain algorithms have limitations.
- Artists will understand the challenges and benefits of parallel and distributed computing.
- Artists will understand the importance of efficiency in code.
- Artists will understand the similarities and differences of Binary and Linear search.

Essential Skills

- Calculate the speedup of a parallel solution to a problem
- Compare the efficiency of Linear Search and Binary Search
- Describe the benefits and challenges of parallel and distributed computing.
- Determine if an algorithm runs in unreasonable time.
- Develop a heuristic to solve a problem.
- Distinguish between decision problems and optimization problems.
- Explain how both formal mathematical reasoning and informal measurement can be used to determine an algorithms efficiency
- Explain that some algorithms may look or operate differently but still solve the same problem.
- Explain that some problems may look different but be similar or look similar but be different.
- Explain the difference between problems that run in a reasonable time and those that do not
- Explain the difference between sequential, parallel, and distributed computing.

- Explain the existence of undecidable problems
- Explain the formal definitions of a problem, an algorithm, sequencing, selection, and iteration.
- Students will be able to define and explain the key computer science concepts of algorithms, debugging, syntax, and variables, and apply them to solve simple programming problems.
- Use Binary Search to determine if a number is in a list
- Use Linear Search to determine if a number is in a list

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.
CS.9-12.8.1.12.AP.6	Create artifacts by using procedures within a program, combinations of data and procedures, or independent but interrelated programs.
CS.9-12.8.2.12.NT.1	Explain how different groups can contribute to the overall design of a product.
CS.9-12.8.2.12.NT.2	Redesign an existing product to improve form or function.

Instructional Tasks/Activities

- Classroom Discussions
- Debugging
- Exploration/Investigation/App Lab - Design Mode Activities
- Formative Assessments
- Journaling
- Ozaria/Code Combat Application
- Pair Programming
- Peer Feedback
- Worksheets

Assessment Procedure

- Classroom Total Participation Technique
- Classwork
- DBQ

- electronic active responders
- Essay
- Exit Ticket/Entrance Ticket/Do Now
- identify the error problems
- Journal / Student Reflection
- Kahoot
- Other named in lesson
- Peer Review
- Performance
- Problem Correction
- Project
- Quiz
- response and analysis questions
- Rubric
- Teacher Collected Data
- Test
- Worksheet

Recommended Technology Activities

- App Lab
- Appropriate Content Specific Online Resource
- Gimkit
- GoGuardian
- Google Classroom
- Google Docs
- Google Slides
- Google Slides
- Kahoot
- MagicSchool AI
- Other- Specified in Lesson
- Ozaria/Code Combat
- Quiziz
- Screencastify
- Traveling Salesman
- widgets

Accommodations & Modifications & Differentiation

Accommodations and Modifications should be used to meet individual needs. Their IEP and 504 plans should

be used in addition to the following suggestions.

Gifted and Talented

- Compare & Contrast
- Conferencing
- Debates
- Jigsaw
- Peer Partner Learning
- Problem Solving
- Structured Controversy
- Think, Pair, Share
- Tutorial Groups

Instruction/Materials

- alter format of materials (type/highlight, etc.)
- color code materials
- eliminate answers
- extended time
- extended time
- large print
- modified quiz
- modified test
- Modify Assignments as Needed
- Modify/Repeat/Model directions
- necessary assignments only
- Other (specify in plans)
- other- named in lesson
- provide assistance and cues for transitions
- provide daily assignment list
- read class materials orally
- reduce work load
- shorten assignments
- study guide/outline
- utilize multi-sensory modes to reinforce instruction

Environment

- alter physical room environment
- assign peer tutors/work buddies/note takers
- assign preferential seating
- individualized instruction/small group
- modify student schedule (Describe)
- other- please specify in plans
- provide desktop list/formula

Honors Modifications

Resources

- code.org