GEORGIA | PEACH STATE PATHWAYS

Career, Technical, & Agricultural Education

BUSINESS & COMPUTER SCIENCE

PATHWAY: Computing

COURSE: Beginning Programming

UNIT: 4- Limits of Computing

INTRODUCTION

Annotation: Topics in this unit include time related limits of computing and the limits of computing as a result of programming complexity. Methods include discussion, lecture, self-reflection, peer assessment and independent work time. Technology will be used to present information, conduct research and as a productivity tool.

Grade(s):

x	9th
X	10th
x	11th
x	12th

Time: 3 weeks

Author: Jason Naile

Additional Author(s):

Students with Disabilities:

For students with disabilities, the instructor should refer to the student's IEP to be sure that the accommodations specified are being provided. Instructors should also familiarize themselves with the provisions of Behavior Intervention Plans that may be part of a student's IEP. Frequent consultation with a student's special education instructor will be beneficial in providing appropriate differentiation.

FOCUS STANDARDS

GPS Focus Standards:

BCS-BP-13 Students will discuss limits on computing as a result of programming complexity.
a. Determine the number of steps that a program will take to execute.
b. Compare and contrast the speed of different algorithms.
c. Identify the possible impact on a business when a computer programmer leaves a company.

BCS-BP-14 Students will identify time-related limits to computing.
a. Define polynomial time as it relates to computing.
b. Define exponential time as it relates to computing.

GPS Academic Standards:

ELA11W3 The student uses research and technology to support writing.

ELA11LSV1 The student participates in student-to-teacher, student-to-student, and group verbal interactions.

National Standards:

UNDERSTANDINGS & GOALS

Enduring Understandings:

- **As a result of this unit, students should understand the limits of computing due to time issues and programming complexity. Students should also understand what causes these limits to be imposed on computing. Students will also be able to explain how algorithms are measured in terms of speed.**

Essential Questions:

- What are polynomial time and exponential time?
- What are the time-related limits of computing?
- How many steps are needed to execute a program?
- How many speeds are there for algorithms?

Knowledge from this Unit:

- Students will be able to explain polynomial time and exponential time as they relate to computing.
- Students will identify time-related limits to computing.
- Students will be able to determine how many steps are needed to execute a program.
- Students will be able to compare and contrast the speed of algorithms.
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Skills from this Unit:

- Students will use proper research techniques.
- Students will write using technology.

ASSESSMENT(S)

Assessment Method Type: Select one or more of the following. Please consider the type(s) of differentiated instruction you will be using in the classroom.

____ Pre-test
____ Objective assessment - multiple-choice, true- false, etc.
__ Quizzes/Tests
__ Unit test
____ Group project
____ Individual project
_X_ Self-assessment - May include practice quizzes, games, simulations, checklists, etc.
_x_ Self-check rubrics
_x_ Self-check during writing/planning process
__ Journal reflections on concepts, personal experiences and impact on one's life
__ Reflect on evaluations of work from teachers, business partners, and competition judges
__ Academic prompts
__ Practice quizzes/tests
____ Subjective assessment/Informal observations
__ Essay tests
__ Observe students working with partners
__ Observe students role playing
_X_ Peer-assessment
_x_ Peer editing & commentary of products/projects/presentations using rubrics
_x_ Peer editing and/or critiquing
____ Dialogue and Discussion
__ Student/teacher conferences
__ Partner and small group discussions
__ Whole group discussions
__ Interaction with/feedback from community members/speakers and business partners
____ Constructed Responses
__ Chart good reading/writing/listening/speaking habits
__ Application of skills to real-life situations/scenarios
____ Post-test

Assessment(s) Title: **Self Evaluation**

Assessment(s) Description/Directions: After a rough draft has been written, students should conduct a self assessment using the rubric attached.

Additionally, students could also exchange papers and grade their peers' papers. Again, this should occur after the rough draft has been written.

Attachments for Assessment(s):

The Human Genome Project Research Paper

Directions: Write a 3-4 page research paper on *The Human Genome Project.* Begin your paper (1 page) by summarizing the project itself. Next, discuss how *The Human Genome Project* attempts to overcome the limits of computing. Finally, close your paper by stating whether or not you think *The Human Genome Project* (HGP) did indeed overcome the limits of computing. Use our discussion and your research to support your conclusion.

Below are two sites you should use to begin your research:
http://www.genome.gov/10001772

http://www.ornl.gov/sci/techresources/Human_Genome/home.shtml

90-100 (Excellent) The student provides a detailed yet concise summary of HGP. Student provides clear information on how HGP attempts to overcome the limits of computing. Reputable sources are used to support argument. Student make conclusion based on argument. Paper is free of grammatical and spelling errors.	**80-89 (Acceptable)** A sound summary of HGP is given. Student provides sufficient information on HGP's attempt to overcome the limit of computing. Sources are for the most part reliable. Student makes a reliable conclusion. Paper contains limited grammatical and spelling errors.
75-79 (Marginal) Student attempts to provide a summary but does not clearly explain HGP. Some reputable sources are used. A conclusion is made that may or may not be reliable. Paper contains many grammatical and spelling errors.	**70-74(Needs Improvement)** A weak summary of HGP is provided. Only a few reliable sources are provided. The conclusion lack supporting documentation. Paper contains many grammatical and spelling errors.
<70 (Resubmission) Summary is incomplete or not provided. Few sources (reliable or unreliable) are included. Student does not make a reliable conclusion. Paper contains many grammatical and spelling errors.	

Comments:

Web Resources:

http://www.genome.gov/10001772

http://www.ornl.gov/sci/techresources/Human_Genome/home.shtml

Web Resource Title: Human Genome Project

Web Resource Description: Two websites from with information on the Human Genome Project.

LEARNING EXPERIENCES

Instructional planning: Include lessons, activities and other learning experiences in this section with a brief description of the activities to ensure student acquisition of the knowledge and skills addressed in the standards. Complete the sequence of instruction for each lesson/task in the unit.

Sequence of Instruction

1. Identify the Standards. Standards should be posted in the classroom for each lesson.

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2. Review Essential Questions.

- What are polynomial time and exponential time?
- What are the time-related limits of computing?
- How many steps are needed to execute a program?
- How many speeds are there for algorithms?

3. Identify and review the unit vocabulary.

4. Assessment Activity.

Sequence of Instruction and Learning:

Week 1: Measuring Algorithms

Week 2: Limits of Computing

Week 3: Completion of Unit Performance Task (Research Paper)

Attachments for Learning Experiences: Please list.

Notes & Reflections:

CULMINATING PERFORMANCE TASK (Optional)

Culminating Unit Performance Task Title: **Human Genome Project Research Paper**

Culminating Unit Performance Task Description/Directions/Differentiated Instruction:

Students will conduct research and write a paper on how *The Human Genome Project* attempts to overcome the limits of computing.

Attachments for Culminating Performance Task:

The Human Genome Project Research Paper

Directions: Write a 3-4 page research paper on *The Human Genome Project.* Begin your paper (1 page) by summarizing the project itself. Next, discuss how *The Human Genome Project* attempts to overcome the limits of computing. Finally, close your paper by stating whether or not you think *The Human Genome Project* (HGP) did indeed overcome the limits of computing. Use our discussion and your research to support your conclusion.

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Comments:

UNIT RESOURCES

Web Resources:

Attachment(s):

Materials & Equipment:

Computer

Internet connection

Microsoft PowerPoint & Word

Network storage space

Magazines, Journals (optional)

What 21st Century Technology was used in this unit:

X	Slide Show Software		Graphing Software	X	Audio File(s)
X	Interactive Whiteboard		Calculator		Graphic Organizer
	Student Response System	X	Desktop Publishing	X	Image File(s)
	Web Design Software		Blog	X	Video
	Animation Software		Wiki		Electronic Game or Puzzle Maker
	Email	X	Website		