Algorithms and Computers [Unplugged Lesson]

Content Area: Computers and Coding
Course(s): STEM/Coding
Time Period: MP1
Length: 2-3 Periods
Status:

Big Idea

Computers are everywhere- robots are on the rise. But what is a computer? And what makes a machine a robot?
Students will gain perspective on the capacity and capabilities of the machines around them.
Students will develop an understanding of coding, autonomy, and the ipso/ipmo model of computing devices.
Students will understand foundational computing terms.
Students will practice/learn math skills as they relate to functions, conditionals, and sequence.

Enduring Understanding

Students will understand: how to identify a machine as a computer; how to identify and read basic computer codes; how to process an algorithm; how functions work in math and everyday life; the relationship between inputs and outputs; the role and importance of conditionals in computing/coding.

Skills

SWBAT identify the components of a computer or computing device.
SWBAT differentiate between devices based on their components and capabilities.
SWBAT process basic functions and store outputs in a table.
SWBAT create functions and conditionals for programming.
SWBAT work cooperatively with a partner or in a small group.

Standards

ISTE 1d	Students understand the fundamental concepts of technology operations, demonstrate the ability to choose, use and troubleshoot current technologies and are able to transfer their knowledge to explore emerging technologies.
ISTE 3d	Students build knowledge by actively exploring real-world issues and problems, developing ideas and theories and pursuing answers and solutions.
ISTE 5a, 5c, 5d	Students formulate problem definitions suited for technology-assisted methods such as data analysis, abstract models and algorithmic thinking in exploring and finding solutions. Students break problems into component parts, extract key information, and develop descriptive models to understand complex systems or facilitate problem-solving. Students understand how automation works and use algorithmic thinking to develop a sequence of steps to create and test automated solutions.
ISTE 6c	Students communicate complex ideas clearly and effectively by creating or using a variety of digital objects such as visualizations, models or simulations.

Assessments

Classwork/Formative Assessment

- Students will create a "blog post" on their websites with 3 statements answering the following questions:
    - What is a computer (ipmo components)?
    - What is an algorithm (how does sequence affect code)?
    - What is a robot (how is it different from a RC car, drone, or video game)?
- Students will participate in a cooperative group to "play" the algorithm game with functions and conditionals created by the instructor. Students will fill roles appropriately and foster the generation of an artifact of learning (table).
- Students will create an original algorithm and conditional and create a table with 3 iterations of inputs and outputs.

Project

- Students will post their group work and individual findings on their websites.

Resources/Instructional Materials

MakeCode Activity: Algorithms and Crazy Conditionals

Laminated/Card Stock "function" cards
Laminated/Card Stock "conditoinal" cards
" " Scratch Extension Activity cards

Modifications

- Individual accommodations per IEP
- Additional support // Peer-tutoring placement
- Adapting lessons to meet various learning styles
- Struggling students may use a calculator
- Students will be given scaffolded definitions for terms
- Enrichment students will swap tables with other students and try to figure out their functions

Integration of 21st Century Skills

Focus on the development of 21st Century Content Skills:

- Global awareness

Focus on the Development of Learning and Thinking Skills:

- Critical Thinking and Problem Solving Skills
- Communication Skills
- Creativity and Innovation Skills
- Collaboration Skills
- Contextual Learning Skills

Focus on the Development of Life Skills:

- Accountability
- Personal Productivity
- Personal Responsibility
- People Skills

- Self Direction

Interdisciplinary Connections

- Academic and Technical Rigor - Projects are designed to address key learning standards identified by the school or district.
- Authenticity - Projects use a real world context (e.g., community problems) and address issues that matter to the students.
- Applied Learning - Projects engage students in solving problems calling for competencies expected in high-performance work organizations (e.g.,teamwork, problem-solving, communication, etc.).
- Active Exploration - Projects extend beyond the classroom by connecting to community explorations.
- Adult Connections - Projects connect students with the wider community.
- Assessment Practices - Projects involve students in regular, performance-based exhibitions and assessments of their work; evaluation criteria reflect personal, school, and real-world standards of performance.