QUEST

Course Level: Elementary

Grade: 4

Time/Credit: 40 minutes per week

Development Date: August 2026

School Board Approval:

Central Bucks School District
20 Welden Drive
Doylestown, PA 18901

Table of Contents

Central Bucks School District
Teaching and Learning Principles

1. QUEST is a process through which students discover how math, science, reading, writing, social studies, and the arts are a daily part of their lives.

Therefore, we will design lesson plans that require students to apply and integrate the content of our elementary curriculum to solve real world, unpredictable challenges.

2. We are preparing students to be complex thinkers, self-directed learners, effective communicators, responsible citizens, collaborative workers, and quality producers.

Therefore, we will design lesson plans that require students to use skills in critical and creative thinking, communication, and collaboration to explore questions about issues in their natural world and community.

3. Learning takes place when new information is linked with existing knowledge in meaningful ways.

Therefore, it is a priority to ensure students understand why they are learning the content. We will begin instruction with an anticipatory set that demonstrates relevancy to students' lives, scaffold instruction to build on existing knowledge, and close lessons with activities that reinforce the connection and relevancy of the material.

4. Learning involves connecting to the present, the past, and the possibilities of the future.

Therefore, we will make relevant connections to the real world and provide opportunities for students to understand how the present connects to the past and affects the future.

5. The learning of complex subject matter is most effective when it is an intentional process of constructing meaning from information and experience.

Therefore, we will help students activate prior knowledge, connect old and new information, and use what they have learned in authentic situations.

6. Process and product are equally important in the learning process.

Therefore, self-reflection and self-assessment will be modeled, and opportunities for self-evaluation and prompt, meaningful feedback will be provided. Our students will receive regular and specific feedback related to progress against standards and timely opportunities to use the feedback to re-do and improve.

7. Technology should be an integral part of the student's experience, enhancing learning and the ability to express ideas.

Therefore, we will model and encourage the use of technology as a tool for instruction, research, application, collaboration, and communication.

8. Research shows active learning is essential.

Therefore, we will design tasks that require students to research, analyze, investigate, solve problems, make decisions, and create products.

9. Learning is social. Our learning is closely associated with our connection with others.

Therefore, we will provide opportunities for students to build relationships with and among each other by facilitating discussions, building empathy, and fostering a climate of intrinsic motivation.

10. Relevance is essential to teaching and learning.

Therefore, learning will include real world exposure, cross-curricular connections, and high interest materials.

11. Learning is most effective when differences in learners' prior knowledge, interests, and strengths are accommodated.

Therefore, we will differentiate instruction and assessment to accommodate different learning styles and educational needs.

12. To maximize learning, students need multiple opportunities to practice and take risks.

Therefore, we will provide a supportive environment based on self-discovery and the respectful exchange of ideas.

13. Motivation influences learning.

Therefore, we will inspire students' curiosity with novel, rigorous, and relevant tasks that provide personal choice and control.

14. Formative assessment is vital for learning.

Therefore, we will create a variety of differentiated assessments that measure knowledge, application of skills, process and product, self-evaluation, and growth.

Central Bucks School District
Enduring Understandings

Students will understand that:

Critical Thinking

- Effective critical thinkers identify and ask significant questions that clarify various points of view and lead to better solutions.
- Effective critical thinkers effectively analyze and evaluate evidence, arguments, claims, and beliefs to make sensible decisions.
- Effective critical thinkers solve different kinds of unfamiliar problems in both conventional and innovative ways.
- Effective critical thinkers reflect critically on learning experiences and processes.
- Effective critical thinkers use digital tools to plan and conduct research, manage projects, solve problems, and make informed decisions.

Communication

- Effective communicators articulate thoughts and ideas using oral, written, and nonverbal communication skills in a variety of forms and contexts.
- Effective communicators understand that communication is an exchange between the sender and the receiver.
- Effective communicators adjust delivery skills to purpose, audience, and occasion.
- Effective communicators select appropriate media and technologies to enhance presentations.

Collaboration

- Effective collaborators exercise flexibility and willingness to be helpful in making necessary compromises to accomplish a common goal.
- Effective collaborators assume shared responsibility for collaborative work, and value the individual contributions made by each team member.
- Effective collaborators are active, critical, and responsible listeners.
- Effective collaborators recognize that communication is essential to understanding themselves and others.
- Effective collaborators use digital media and environments to communicate and work collaboratively, including at a distance, to support individual learning and contribute to the learning of others.

Creative Thinking

- Effective creative thinkers elaborate, refine, analyze, and evaluate original ideas to improve and maximize creative efforts.
- Effective creative thinkers demonstrate originality and inventiveness in work and understand the real-world limits to adopting new ideas.
- Effective creative thinkers view failure as an opportunity to learn and understand that creativity and innovation are part of a long-term, cyclical process of small successes and frequent mistakes.
- Effective creative thinkers act on creative ideas to make a tangible and useful contribution.
- Effective creative thinkers demonstrate creative thinking, construct knowledge, and develop innovative products and processes using technology.

Research

- Effective researchers begin with essential guiding questions.
- Effective researchers understand that the research process is inherently circular and includes the planning, gathering, analyzing, organizing, synthesizing, and evaluating of information.
- Effective researchers select appropriate resources and evaluate information based on accuracy, validity, authority, and relevance.
- Effective researchers draw conclusions, create meaning, and construct new knowledge.
- Effective researchers use information and technology ethically and responsibly to enhance their understanding and present their findings.
- Effective researchers apply research skills to authentic, real-world issues and contexts.
- Effective researchers apply digital tools to gather, evaluate, and use information.

Science and Engineering

- Science is the search for understanding the natural world, and facts, principles, theories and laws that have been verified by the scientific community and are used to explain and predict natural phenomena and events.
- Engineering is the application of science and mathematics to define real world problems and design solutions.
- Both effective scientists and engineers ask questions and define problems.
- Both effective scientists and engineers develop and use models.
- Both effective scientists and engineers plan and carry out investigations.
- Both effective scientists and engineers analyze and interpret data
- Both effective scientists and engineers use mathematics and computational thinking.
- Both effective scientists and engineers construct explanations and design solutions.
- Both effective scientists and engineers engage in argument from evidence.
- Both effective scientists and engineers obtain, evaluate, and communicate information.

Central Bucks School District
Essential Questions

Critical Thinking

- What does it mean to think critically?
- Why is it important to think critically?
- How do effective critical thinkers approach a problem?
- How do effective critical thinkers use conventional and innovative ways to solve unfamiliar problems?
- Why do effective critical thinkers reflect on their learning experiences and processes?
- How do effective critical thinkers use digital tools to plan and conduct research, manage projects, solve problems, and make informed decisions?

Communication

- What is communication?
- Why is effective communication important?
- How do effective communicators articulate thoughts and ideas using oral, written, and nonverbal communication skills in a variety of forms and contexts?
- How do effective communicators adjust delivery skills to purpose, audience, and occasion?
- Why is it important to use appropriate media and technologies to enhance presentations?

Collaboration

- What does it mean to collaborate?
- What are the characteristics of an effective collaborator?
- How do effective collaborators listen?
- How do effective collaborators communicate?
- How do effective collaborators use digital media and environments to communicate and work collaboratively, including at a distance, to support individual learning and contribute to the learning of others?

Creative Thinking

- What does it mean to think creatively?
- Why is it important to think creatively?
- Why is it important to consider real world limits when developing new ideas?
- How can failure be used as an opportunity to learn?
- How do effective creative thinkers demonstrate creative thinking, construct knowledge, and develop innovative products and processes using technology?

Research

- What is the value of research?
- What can be discovered or created through research?
- What makes an effective researcher?
- How do effective researchers apply research skills to authentic, real-world issues and contexts?
- How do effective researchers apply digital tools to gather, evaluate, and use information?

Science and Engineering

- What is the difference between science and engineering?
- What skills do scientists use to explore and understand our world?
- What skills do engineers use to define real world problems and design solutions?

Central Bucks School District – Course of Study Overview
QUEST

Desired Results

Course Description:

QUEST is an interdisciplinary approach to learning where rigorous academic concepts are coupled with real world challenges that allow students to apply 21st century skills to become informed citizens and life-long learners. Each unit of study is built around a real-world challenge that ties directly to classroom instruction and requires students to apply cross-curricular skills. Further, the curriculum is heavily focused on teaching students how to use and incorporate technology in new ways.

Grade 4 QUEST Course Description:

Fourth grade QUEST students will be given opportunities to explore the concepts of the engineering design process and 21st century skills. Units of study connect directly to the Grade 3 and Grade 4 curriculums in science, mathematics, social studies, reading, writing, health, and art. Units will continue to expand upon prior QUEST experiences by utilizing a variety of tools to solve real-world problems. Students will navigate Office 365 to collaborate virtually, deepen their understanding of program code and its capabilities to create a final product, and explore video editing, filming, and publishing capabilities using editing software.

Acceptable Evidence.

Assignments, Performance Tasks, Projects, Tests, etc.:

- Informal and Formal Critiques of 21st Century Skills, specifically creativity, collaboration, and communication
- Engineering products (solutions to real-world problems)
- Student Presentations

QUEST 4th Grade – Pacing Guide

<table>
<tr><th>Content</th><th>Days</th></tr>
<tr><td colspan="2">Unit 1 -</td></tr>
<tr><td colspan="2">QUEST Introductory Lesson- Tower of Power
Lesson 1: Introduce Tower Challenge
Lesson 2: Create, Test, and Improve Towers
Lesson 3: Reflect and Review the 4Cs.
Gravity Cars/ Video Creation and Editing Project
Lesson 1: Introduction to the Gravity Cars Unit. Imagine a design for a car.
Lesson 2: Ask and Imagine Part 1- Gravity Car Build
Lesson 3: Imagine and Plan- WeVideo Project
Lesson 4: Ask and Imagine Part 2- Gravity Car Build
Lessons 5 (2 days): Fabrication- Fab Maker Studio and Silhouette Cutter
Lesson 6: WeVideo Introduction
Lesson 7 (2 days): Fabrication- Tinkercad and 3D Printing
Lesson 8: Plan and Create- Gravity Car Build
Lesson 9 (2-3 days): Create, Test, and Improve
Lesson 10: Share- Gravity Car Race Day
Lesson 11 (2-3 days): Share- WeVideo Project</td><td>18-20 days</td></tr>
<tr><td colspan="2">Unit 2 -</td></tr>
<tr><td colspan="2">Coding and Robotics
QUEST teachers may choose from the following coding menu to address standards and student outcomes.</td><td rowspan="4">5-9 days</td></tr>
<tr><td>Option 1- Finch Robots
Lesson 1: Finch’s First Day
Lesson 2: Tower of Terror
Lesson 3 (2 days): Jousting Challenge
Lesson 4: (2 days): Maze Runner
Lesson 5: Drawing
Lesson 6: Dance Party</td><td>Option 2- Make Code Arcade
Lesson 1: Save the Baby Dinos
Lesson 2: Whack the Mole
Lesson 3: Burstin’ Balloons
Lesson 4: Monster Truck Racer
Lesson 5: Save the Galaxy
Lesson 6: 80’s Rockstar Maze
Lesson 7: Chase the Pizza
Lesson 8 (2 days): Makey Makey Game Controllers</td></tr>
<tr><td>Option 3- Indi Robots
Lesson 1: Meet Indi
Lesson 2: Coding Challenge Cards
Lesson 3: Debugging Challenge Cards
Lesson 4: Creating Challenges
Lesson 5 (2 days): Indi Out on the Town
Lesson 6 (2 days): Road Trip with Indi</td><td>Option 4- Code.org Elementary Game Design
Lesson 1: Game Design
Lesson 2: Variables as Score
Lesson 3: Environment and Players
Lesson 4: Game Jam Day 1
Lesson 5: Game Jam Day 2</td></tr>
<tr><td>Option 5- Code.org Maker with Micro:bit
Lesson 1: Dance Party Unplugged
Lesson 2: Dance Party
Lesson 3: Designing for Accessibility
Lesson 4: Meet your Micro:bit
Lesson 5: Sensory Toy with Micro:bit
Lesson 6: Conditional Cards</td><td>Option 6 – Scratch Storytelling
Lesson 1: Getting Started with Scratch
Lesson 2: Characters, Setting, and Dialogue
Lesson 3: Movement
Lesson 4: Interactive Stories and Sound
Lesson 5 (4 days): Create Your Own Story
Lesson 6: Reflect and Share</td></tr>
</table>

Lesson 7: If/Else with Bees Lesson 8: Simple Door Alarm Coding with Micro:bit		
Option 7- Scratch- Physical Computing with Makey Makey Lesson 1: Set Up and Test Lesson 2: Makey Secret Code Lesson 3: Foil Piano Lesson 4: Art Comes Alive Lesson 5 (4 days): Create Your Own Unique Project Lesson 6: Reflect and Share		
Unit 3 – (Optional)		
Biomedical Engineering-Assistive Technology Lesson 1: What Is Empathy? Lesson 2: Facing Physical Challenges with Character Strength Lesson 3: Assistive Technology Lesson 4: Introduction to Makey Makey Lesson 5: Makey Makey - Conductors and Insulators Lesson 6: Imagine - Assistive Technology Lesson 7: Plan - Assistive Technology Lesson 8 (3 days) - Create, Test, Improve- Assistive Technology Lesson 9: Share finished products.		11 days
Unit 4- Digital Literacy		
Lesson 1: **Digital Citizenship-** Group Chat Dynamics- Apply strategies for being supportive in group digital spaces. Lesson 2: **AI Literacy-** Can Machines Really Learn?- Learn how machines become intelligent. Lesson 3: **AI Literacy-** What Is an Algorithm?- Learn what an algorithm is and be able to write their own algorithm.		3 days

NOTE: Additional remediation in standards/content from the grade level (or previous grade level) where the student completes this course will be provided for students when the teacher determines a student has not yet mastered that content. Enrichment opportunities will also be provided to meet the needs of students that acquire an understanding of the content faster than their class peers.

Required Texts and Software

Trade Books used within the curriculum include but are not limited to:

- *Going Places* by Peter and Paul Reynolds

Software

- Office 365
- WeVideo
- Tinkercad

- Scratch
- Code.org
- Fab Maker Studio
- Birdblox App
- Make Code

Hardware

- 3D Printer
- Silhouette Cutter
- Finch Robots
- Indi Robots
- Micro:bits
- Makey Makey Circuit Boards

Central Bucks School District – Course of Study – QUEST
Unit 1 – Gravity Cars/ Video Creation and Editing

Desired Results:

Essential Questions:

- How does an engineer design, create, and demonstrate a project within specific constraints?
- How can we effectively collaborate and communicate with others?
- How can we use the design process to produce a video?

Enduring Understandings:

Students will understand that…

- Understand and demonstrate the steps of the engineering and scientific process.
- Video production requires the use of the design process.

Knowledge:

Students will know…

- Vocabulary: aerodynamic, drag, energy efficient, force, friction, gravity, lift, motion, refine, thrust, vary
- The steps of the engineering process.
- The steps to create a gravity car using specific constraints.
- How to create and edit a video production.

Skills:

Students will be able to…

- Follow the engineering design process to design, create, and test a gravity car.
- Use a budget to purchase materials.
- Communicate and collaborate with a team.
- Use technology to create and produce a video showing the design process.
- Present results to a group.

Standards:

<u>Priority:</u>

<u>STEELS Standards</u>

3.2.4.A- Use evidence to construct an explanation relating the speed of an object to the energy of that object.
3.5.3-5.C- Follow directions to complete a technological task.
3.5.3-5.F Classify resources used to create technologies as either renewable or nonrenewable.
3.5.3-5.I- Design solutions by safely using tools, materials, and skills.
3.5.3-5.M- Demonstrate essential skills of the engineering design process.
3.5.3-5.N- Identify why a product or system is not working properly.
3.5.3-5.O- Describe requirements of designing or making a product or system.
3.5.3-5.P -Evaluate the strengths and weaknesses of existing design solutions, including their own solutions.
3.5.3-5.Q- Practice successful design skills.
3.5.3-5.R Apply tools, techniques, and materials in a safe manner as part of the design process.
3.5.3-5.S- Illustrate that there are multiple approaches to design.
3.5.3-5.T- Apply universal principles and elements of design.
3.5.3-5.U -Evaluate designs based on criteria, constraints, and standards.
3.5.3-5.BB- Illustrate how, when parts of a system are missing, it may not work as planned.
3.5.3-5.DD- Demonstrate how simple technologies are often combined to form more complex systems.

Acceptable Evidence:

Performance Tasks – Students will design, build, test, and demonstrate a gravity car. They will create, edit, and produce a video that highlights the design process and the 4Cs.

Real-World Challenge-
The energy use and pollution associated with transportation is one of the largest issues facing society today. By building energy-efficient cars, engineers can lower the negative impacts that cars have on the environment and ultimately help improve our lives. The energy efficiency of a car is affected by a variety of factors, including size, aerodynamics, weight, and the rolling resistance of the wheels. Engineers must know all about these factors to design better cars. The real-world challenge is- **"Can you design a car that will roll down a track at the fastest possible speed while capturing the engineering design process in a video production?"**

Acceptable evidence of learning other than Performance Tasks:
Teacher observation, anecdotal notes, student self-reflection (collaboration skills), journal entries/exit tickets.

Suggested Learning Experiences and Instruction

Learning Experiences:

- Students will review the 4 Cs of 21st century learning.
- Students will join a collaborative WeVideo project.
- Students will understand the parts of the challenge.
- Students will create 3D models of cars, thinking about shape and design.
- Students will follow the steps of the engineering design process.
- Students will work collaboratively to plan a video project that highlights the 4 Cs and shows the process of creating a gravity car.
- Students will learn about the need for energy-efficient cars and describe their characteristics.
- Students will imagine and sketch an idea for a gravity car.
- Students will take pictures and videos to add to their gravity cars video project.
- Students will use Fab Maker studio and the Silhouette cutter to create 3D objects.
- Students will learn how to use the features of WeVideo to create an introduction to their video project.
- Students will utilize the tutorials in Tinkercad to learn the basics of CAD.
- Students will use the 3D printer as an option for fabricating parts for their gravity car.
- Students will use collaboration and communication to share their ideas and make one team design for a gravity car.
- Students will work collaboratively to create, test, and improve a gravity car.
- Students will collect data on speed and distance as they race their gravity car down a ramp.
- Students will work collaboratively to create and edit a video project highlighting the 4 Cs.
- Students will share their finished video projects. They will offer and receive feedback on the 4 Cs videos.

Instructional Strategies:
Direct Instruction (.59), Class Discussion (.82), Cooperative vs. Individualistic Learning (.55), Problem Solving Teaching (.67)

Differentiation/Intervention/Enrichment Options:

- Assign specific roles and responsibilities during collaborative group work to draw upon students' strengths.
- Use alternative materials to allow for differentiation.

For Language Development:

- Utilize picture cards and other visual supports to reinforce vocabulary.
- Use translation features when presenting information digitally.

Central Bucks School District – Course of Study – QUEST
Unit 2 – Coding and Robotics

Desired Results:

Essential Questions:
• How does language evolve?
• How do coded commands instruct a computer?
• Is there only one way to write code?
• Why do engineers make changes to their design?
• How can technology be used in a different way?

Enduring Understandings:
Students will understand that…
• Language evolves by adapting to technology and needs.
• Code is a language that helps people communicate with computers.
• Coded commands provide sequential directions for a task.
• Codes can be written in many ways depending on the technology and task.
• Using feedback from the machine, engineers change or improve their design.
• Technology can be used to create and communicate ideas.

Knowledge:
Students will know…
- Vocabulary: conditionals, data, debug, events, loops, program, randomness, sequences, variables
- How to break down code into a specific sequence.
- Engineers utilize code to direct technology.
- Code is the language of computers.
- How to use technology to represent information.
- Feedback can be used to change or improve a design.
- The appropriate vocabulary to communicate ideas in a collaborative group.

Skills:
Students will be able to…
- Use computer science to create programs and manipulate robots.
- Create programs that use sequencing, loops, and conditionals.
- Use the engineering design process to write code.
- Collaborate and communicate effectively with others.

Standards:
Priority:
CSTA Standards
1B-AP-08- Compare and refine multiple algorithms for the same task and determine which is the most appropriate.
1B-AP-09- Create programs that use variables to store and modify data.
1B-AP-10- Create programs that include sequences, events, loops, and conditionals.
1B-AP-11- Decompose (break down) problems into smaller, manageable subproblems to facilitate the program development process.
1B-AP-12- Modify, remix, or incorporate portions of an existing program into one's own work, to develop something new or add more advanced features.
1B-AP-15- Test and debug (identify and fix errors) a program or algorithm to ensure it runs as intended.
1B-AP-16- Take on varying roles, with teacher guidance, when collaborating with peers during the design, implementation, and review stages of program development.

Acceptable Evidence:

Performance Tasks – Students will use coding and robotics tools and applications such as Finch robots, Indi robots, Make Code, Code.org, and Scratch to develop computer programs.

Acceptable evidence of learning other than Performance Tasks:
Teacher observation, anecdotal notes, student self-reflection (collaboration skills), journal entries/exit tickets.

Suggested Learning Experiences and Instruction

Learning Experiences:

- Students will write code to program a robot to perform tasks.
- Students will code their own minigame-style activity using Make Code Arcade.
- Students will program a Makey Makey circuit board using Make Code and/or Scratch.
- Students will design a custom-made video game using Code.org.
- Students will program a Micro:bit using Code.org.
- Students will write a program that tells a story using Scratch.
- Students will follow the steps of the engineering design process while writing and testing code.
- Students will share their finished projects with their peers and will give and receive feedback.

Instructional Strategies:
Direct Instruction (.59), Class Discussion (.82), Cooperative vs. Individualistic Learning (.55), Problem Solving Teaching (.67)

Differentiation/Intervention/Enrichment Options:

- Assign specific roles and responsibilities during collaborative group work to draw upon students' strengths.
- Use alternative materials to allow for differentiation.

For Language Development:

- Utilize picture cards and other visual supports to reinforce vocabulary.
- Use translation features when presenting information digitally.

Central Bucks School District – Course of Study – QUEST
Unit 3 – Biomedical Engineering- Assistive Technology (Optional)

Desired Results:

Essential Questions:

- How does an assistive device help someone in real life?
- How does a biomedical engineer design, create, and improve an assistive device to fit a person's needs?
- What is the importance of the character strengths of grit, resiliency, and determination?

Enduring Understandings:

Students will understand that…

- Physical limitations cause some people to have to perform tasks in different ways.
- Grit, resiliency, and determination are important character strengths that help us overcome obstacles and difficult situations.
- Assistive/adaptive devices allow people with physical disabilities to gain more freedom.
- Biomedical engineers rely on feedback from clients to improve their designs.

Knowledge:

Students will know…

- Vocabulary: assistive technology, biomedical engineering, client, determination, grit, resiliency
- The need for and importance of biomedical engineering.
- The steps of the engineering process.
- The steps to create assistive technology.
- That technology can be used to communicate information.
- Examples of grit, resiliency, and determination.

Skills:

Students will be able to…

- Follow the engineering design process to plan, test, and improve an assistive device for a specific client.
- Communicate and collaborate with a team.
- Share the finished product.

Standards:

<u>Priority:</u>

<u>STEELS Standards</u>

- 3.5.3-5.D- Predict how certain aspects of their daily lives would be different without given technologies.
- 3.5.3-5.I- Design solutions by safely using tools, materials, and skills.
- 3.5.3-5.J- Explain how technologies are developed or adapted when individual or societal needs and wants change.
- 3.5.3-5.K- Judge technologies to determine the best one to use to complete a given task or meet a need.
- 3.5.3-5.L- Demonstrate how tools and machines extend human capabilities, such as holding, lifting, carrying, fastening, separating, and computing.
- 3.5.3-5.M- Demonstrate essential skills of the engineering design process.
- 3.5.3-5.N- Identify why a product or system is not working properly.
- 3.5.3-5.O- Describe requirements of designing or making a product or system.
- 3.5.3-5.P -Evaluate the strengths and weaknesses of existing design solutions, including their own solutions.
- 3.5.3-5.Q- Practice successful design skills.
- 3.5.3-5.R- Apply tools, techniques, and materials in a safe manner as part of the design process.
- 3.5.3-5.S- Illustrate that there are multiple approaches to design.

- 3.5.3-5.T- Apply universal principles and elements of design.
- 3.5.3-5.U -Evaluate designs based on criteria, constraints, and standards.
- 3.5.3-5.V- Interpret how good design improves the human condition.
- 3.5.3-5.Z- Create a new product that improves someone's life
- 3.5.3-5.BB- Illustrate how, when parts of a system are missing, it may not work as planned.
- 3.5.3-5.DD- Demonstrate how simple technologies are often combined to form more complex systems.

Acceptable Evidence:

Performance Tasks –

- Students will gain an understanding of the need for assistive technology.
- Students will learn about how the body works and about the field of biomedical engineering.
- Students will create an assistive device for a specific client.
- Students will test their assistive device for strength, durability, longevity, lifelikeness, and comfort.
- Students will define and provide examples of grit, resiliency, and determination.

Real-World Challenge-

The human body is an impressive piece of machinery. Each part has a unique function that when put together with the others allows us to live. Unfortunately, many people require assistive technology to help a body part function effectively. Fortunately, scientists have used their understanding of human anatomy and the mechanics of physics to create assistive devices. These scientists are continually improving the strength, durability, longevity, and lifelikeness of assistive devices so people can lead full lives. The real-world challenge is- **"Can you use the engineering design process and the 4C's (collaboration, creativity, communication and critical thinking) to create an assistive device that meets the needs of a specific client?"**

Acceptable evidence of learning other than Performance Tasks:

Teacher observation, anecdotal notes, student self-reflection (collaboration skills), journal entries/exit tickets.

Suggested Learning Experiences and Instruction

Learning Experiences:

- Students will explain the difference between kindness and empathy.
- Students will create happy notes to give to others or post around the school to demonstrate empathy.
- Students will complete tasks without the use of their thumbs and rate the level of difficulty of the task.
- Students will be able to define the words grit, resiliency, and determination.
- Students will read articles and watch videos to identify examples of grit, resiliency, and determination.
- Students will explain what assistive technology is.
- Students will be able to give examples of low tech, mid tech, and high-tech assistive devices.
- Students will play the game Disruptus to generate ideas of how you can take an item and improve upon it.
- Students will create individual client cards so that the designer knows what needs they are meeting.
- Students will explore with the Makey Makey circuit board.
- Students will test materials using the Makey Makey circuit board to see if they are conductors or insulators.
- Students will understand the real-world challenge.
- Students will plan as a team to imagine what their adaptive device will do and plan the materials they will need.
- Students will use materials to create their adaptive device.
- Students will test their device and make improvements as needed.
- Students will test the device to make sure it meets the real-world challenge and the needs of their client.

- Students will be able to share their assistive technology and how it helped their client.

Instructional Strategies:
Direct Instruction (.59), Class Discussion (.82), Cooperative vs. Individualistic Learning (.55), Problem Solving Teaching (.67)

Differentiation/Intervention/Enrichment Options:

- Assign specific roles and responsibilities during collaborative group work to draw upon students' strengths.
- Use alternative materials to allow for differentiation.

For Language Development:

- Utilize picture cards and other visual supports to reinforce vocabulary.
- Use translation features when presenting information digitally.

Central Bucks School District – QUEST – Grade 4
Unit 4– Digital Literacy

Desired Results:

Essential Questions:

- How can I be a good friend in online group conversations?
- What makes group chats different from one-on-one conversations?
- How do my words and actions affect others in a group chat?
- What can I do when someone feels left out, embarrassed, or hurt in a group conversation?
- How can bystanders help create positive and inclusive digital spaces?
- Why is it important to consider different perspectives and feelings in online groups?
- How do machines learn to recognize patterns and make decisions?
- What is a dataset, and why is it important for artificial intelligence?
- How do people use past experiences to make predictions?
- In what ways is machine learning similar to and different from human learning?
- How can the data used to train AI systems affect the fairness and accuracy of their predictions?
- What responsibility do humans have when creating and training AI systems?
- What is an algorithm, and how does it help solve problems?
- How do algorithms affect our daily lives?
- Why must instructions be clear and specific when communicating with computers?
- How can different algorithms achieve the same goal?
- What is debugging, and why is it an important part of problem-solving?
- How do algorithms help computers and AI systems make decisions?

Enduring Understandings:
Students will understand that…

- Good digital citizens recognize that group chats are shared spaces where everyone can contribute to making others feel valued, included, and supported.
- Artificial intelligence relies on data and algorithms to make predictions and decisions. Humans play a critical role in designing, training, and improving these systems to ensure they function effectively and fairly.

Knowledge:
Students will know…

- Vocabulary: algorithm, bias, bystander, data set, debug, prediction, upstander
- How group chats differ from one-on-one conversations and affect multiple people at the same time.
- How individuals may experience the same online interaction differently.
- The impact that exclusion, teasing, or lack of response can have on others.
- How to apply strategies for supporting peers when someone feels hurt, left out, or embarrassed in a group chat.
- How to practice positive bystander behaviors, including checking in privately, speaking up supportively, and redirecting conversations in helpful ways.
- Artificial Intelligence learns from data.
- Predictions are based on prior knowledge and experience.
- Datasets can contain bias.
- Computers require clear, specific instructions and continuous improvement.

Skills:

Students will be able to…

- Explain how group chat dynamics can affect individuals in different ways.
- Recognize situations in which someone may feel excluded, embarrassed, or hurt in a group chat.
- Analyze the role of bystanders in online group conversations.
- Demonstrate empathy by considering the feelings and perspectives of others in digital spaces.
- Identify and apply strategies for supporting peers in group chats.
- Respond appropriately when they witness unkind or exclusionary behavior online.
- Communicate in ways that help others feel valued, included, and respected.
- Make responsible digital citizenship choices that contribute to positive online communities.
- Explain how machines learn from data.
- Make connections between prior knowledge and predictions.
- Recognize and identify bias in datasets.
- Design and evaluate algorithms.
- Debug and improve instructions.

Standards:

Priority:

STEELS Standards

3.5.3-5.D – Apply a process to solve problems through design, testing, and improvement.

3.5.3-5.G – Use data analysis to identify patterns and make predictions.

3.5.3-5.H – Explain how technologies influence individuals and society.

3.5.3-5.I – Describe how information and communication technologies gather, store, analyze, and communicate information.

Acceptable Evidence:

Performance Tasks – Students will evaluate a group chat scenario, determine how different participants might feel, and select effective strategies to support someone who has been hurt or left out. Students will analyze how an AI system uses data and algorithms to make predictions. They will create a step-by-step algorithm for a simple task.
They will apply their understanding of datasets, predictions, algorithms, and bias to real-world AI tools such as voice assistants, recommendation systems, and facial recognition technologies.

Acceptable evidence of learning other than Performance Tasks:

Formative Assessment

Teacher observation, anecdotal notes, student self-reflection (collaboration skills), design planning sheets, rubrics, exit tickets.

Suggested Learning Experiences and Instruction

Learning Experiences:

- Students will engage in a discussion about group chat dynamics.
- Students will analyze a group chat dynamics scenario and work through reflection questions with a partner.
- Students will identify and apply strategies for supporting peers in group chats.
- Students will engage in a discussion about how machines become "intelligent" and will learn about the three steps of machine learning (data set, learning algorithm, prediction).
- Students will understand the definition of the word algorithm and learn the three main parts of an algorithm (input, steps to change input, output).
- Students will engage in a discussion about how computers use algorithms.
- Students will write and debug an algorithm to program their teacher to move from sitting in a chair to walking to the classroom door.

Instructional Strategies:
Direct Instruction (.59), Class Discussion (.82), Cooperative vs. Individualistic Learning (.55), Problem Solving Teaching (.67)

Differentiation/Intervention/Enrichment Options:

- Assign specific roles and responsibilities during collaborative group work to draw upon students' strengths.
- Use alternative materials to allow for differentiation.

For Language Development:

- Utilize picture cards and other visual supports to reinforce vocabulary.
- Use translation features when presenting information digitally.