Grade, Subject/Course: 2nd Grade STEAM	
Integrated Units: building, design challenges, coding & robotics, design process	**__X__ Essential _____ Important _____ Compact**
Big Idea: Effort and hard work lead to success. Everyone can imagine, design, create, and make. Code can be built to complete tasks and control robots.	color-coded unit standards collaboration & 4 C's design challenges & building design process coding & robotics

PA Core Content Standards/Anchors (or National Standards):

PA STEELS (Science, Technology & Engineering, and Environmental Literacy & Sustainability) Standards:

- 3.5.K-2.B Describe qualities of everyday products.
- 3.5.K-2.G Explain the tools and techniques that people use to help them do things.
- 3.5.K-2.I Compare simple technologies to evaluate their impacts.
- 3.5.K-2.J Design new technologies that could improve their daily lives.
- 3.5.K-2.K Safely use tools to complete tasks.
- 3.5.K-2.M Demonstrate essential skills of the engineering design process.
- 3.5.K-2.N Analyze how things work.
- 3.5.K-2.O Illustrate that there are different solutions to a design and that none are perfect.
- 3.5.K-2.P Discuss that all designs have different characteristics that can be described.
- 3.5.K-2.Q Apply skills necessary for making in design.
- 3.5.K-2.S Apply design concepts, principles, and processes through play and exploration.
- 3.5.K-2.T Demonstrate that designs have requirements.
- 3.5.K-2.U Explain that design is a response to wants and needs.
- 3.5.K-2.V Explain that materials are selected for use because they possess desirable properties and characteristics.
- 3.5.K-2.W Apply concepts and skills from technology and engineering activities that reinforce content and skills across multiple content areas.
- 3.5.K-2.X Develop a plan in order to complete a task.
- 3.5.K-2.AA Demonstrate that creating can be done by anyone.
- 3.5.K-2.CC Discuss the roles of scientists, engineers, technologists, and others who work with technology.
- 3.5.K-2.DD Collaborate effectively as a member of a team.

PA Academic Standards for BCIT (Business, Computer, and Information Technology):

- 15.3.2.J: Reproduce active listening techniques modeled by familiar adults.
- 15.3.2.M: With prompting and support, demonstrate proper etiquette while using technology.
- 15.3.2.N: Identify positive work habits in the classroom.
- 15.4.2.B: Demonstrate responsible use of technology and equipment.

CSTA (Computer Science Teachers Association) Standards:

- 1A-CS-03 Describe basic hardware and software problems using accurate terminology.
- 1A-AP-08 Model daily processes by creating and following algorithms (sets of step-by-step instructions) to complete tasks.
- 1A-AP-09 Model the way programs store and manipulate data by using numbers or other symbols to represent information.
- 1A-AP-10 Develop programs with sequences and simple loops, to express ideas or address a problem.

- 1A-AP-11 Decompose (break down) the steps needed to solve a problem into a precise sequence of instructions.
- 1A-AP-12 Develop plans that describe a program's sequence of events, goals, and expected outcomes.
- 1A-AP-14 Debug (identify and fix) errors in an algorithm or program that includes sequences and simple loops.
- 1A-AP-15 Using correct terminology, describe steps taken and choices made during the iterative process of program development.

Interdisciplinary Standards:

PA Standards:

- ELA CC.1.5.2.A: Participate in collaborative conversations with peers and adults in small and larger groups.
- ELA CC.1.5.2.E: Produce complete sentences when appropriate to task and situation in order to provide requested detail or clarification.
- ELA CC.1.4.2.W: Recall information from experiences or gather information from provided sources to answer a question.
- Math CC.2.2.3.A.4: Solve problems involving the four operations, identify and explain patterns in arithmetic. *(3rd Grade standard)*
- Math CC.2.3.2.A.1: Analyze and draw two- and three-dimensional shapes based on their attributes.

Essential Questions:

- How does my mindset impact learning and success?
- How does collaborating with others impact learning and success?
- How does failing impact learning?
- Why is it important to be inquisitive?
- How are asking questions, gathering information, and observing helpful when thinking about problems?
- How can I use materials and tools to build and create?
- How can technology improve life?
- How are the steps of the design process used?
- What makes a quality design?
- How can I use technology correctly and responsibly?
- How can I build code to complete a task?
- How and where is coding used in the world?

Understandings:

Students will know that

- effort and hard work lead to success.
- collaborating with a team increases success.
- failure is an opportunity to learn and to make improvements.
- Everyone can imagine, design, create, and make.
- Following the steps of the design process can make a quality design.
- Code can be built to complete tasks and control robots.

Knowledge:

- Effort and hard work lead to success.
- Collaboration increases learning and success.
- Persistence is necessary to work through challenges.
- Design is a creative process.
- Everyone can create and design solutions to problems.
- Tools and techniques can be used to create and to complete tasks.
- Different materials are useful for different purposes.
- Technology and inventions improve life.
- The steps of the engineering and design process are ask, research, imagine, plan, create, test, and improve.
- Asking questions and making observations helps gather information.
- Using your imagination and creating a plan help create a design.
- Testing and making improvements to a design can make it better.

Do/Skills:

Students will be able to

- improve their skills with effort and practice.
- collaborate with others when building, creating, and using the design process.
- be persistent and keep trying even when something is difficult.
- build and create through play and exploration.
- create unique and interesting designs.
- select and use appropriate tools and materials to create.
- explain ways that technology and inventions have improved life.
- identify technology as a way of inventing tools and techniques to solve problems.
- construct an object using the design process.
- ask questions.
- research ideas.
- use their imagination to create a plan for a design.
- create a unique design.
- determine if a design works properly and if it can be improved.

- Rules and procedures are followed for the safe and proper use of devices.
- Digital devices have many parts and functions.
- Code is the basis of all technology.
- Problem-solving is necessary to build and debug code.
- Robotic devices are controlled by code and make tasks easier.
- Robotic devices contribute to society in numerous and varied ways.
- Many careers use technology and coding skills.

- show perseverance when using the design process.
- follow rules and procedures for the proper use of devices.
- identify parts and functions of digital devices.
- choose and place commands to construct an algorithm.
- use problem-solving skills to build and debug code.
- identify uses of robotic devices in the real world.
- identify careers that use technology and/or coding.

Vocabulary:

- *STEAM* - science, technology, engineering, the arts, math
- *growth mindset* - I can improve and be more successful with hard work and learning.
- *critical thinking* - making connections and decisions about information and explaining them
- *collaborate* -working with others
- *creativity* - use of the imagination to make something
- *communicate* - sharing information or ideas with others
- *design process* - steps to follow when working on a project or solving a problem
- *improve* - make better
- *define* - to describe something
- *design* - a plan for building or creating
- *build* - make by putting parts together
- *instructions* - detailed information telling how something should be done
- *test* - check for correctness or for something to work properly
- *app* - a program designed for a specific purpose
- *code* - instructions to tell a computer what to do
- *algorithm* - a list of steps to finish a task
- *program* - an list of steps that can be completed by a machine
- *persistence* - trying again and again, even when something is difficult
- *sequence* - a set of instructions in a specific order
- *run program* - telling the computer to complete a program
- *bug* - an error in a program
- *debugging* - finding and fixing problems in a program
- *drag and drop* - click to select an object, hold, move, and release
- *workspace* - the place where commands are put together
- *toolbox* - a group of choices of commands to write a program

Core Resources:

- building materials (magnet blocks, wooden plank tiles, gears sets, marble runs, imagination playground, etc.)
- robots (Sphero, indi car, ozobot, etc.)
- iPad apps (Sphero, Lego WeDo, Imagination Playground)
- recycled materials (boxes, containers, caps, lids, packaging materials, etc.)

Supplemental Resources:

- robot how-to videos (youtube)
- screen recordings (original recording)

Common Assessment(s):

- coding robots to complete tasks/challenges
- building challenges
- use of the design process