2nd Grade STEM Outclass Overview 2022 - 2023

This document is designed to provide parents/guardians/community an overview of the curriculum taught in the FBISD classroom. This document supports families in understanding the learning goals for the course, and how students will demonstrate what they know and are able to do. The overview offers suggestions or possibilities to reinforce learning at home.

Included at the end of this document, you will find:

- A glossary of curriculum components
- The content area instructional model
- Parent resources for this content area

To advance to a particular grading period, click on a link below.

- Grading Period 1
- Grading Period 2
- Grading Period 3
- Grading Period 4

Process Standards

The process standards describe ways in which students are expected to engage in the content. The process standards weave the other knowledge and skills together so that students may be successful problem solvers and use knowledge learned efficiently and effectively in daily life.

TA1.B create original products using a variety of resources
TA1.C explore virtual environments, simulations, models, and programming languages to enhance learning
TA2.D select, store, and deliver products using a variety of media, formats, devices, and virtual environments
TA4.C evaluate products prior to final submission
TA5.A adhere to acceptable use policies reflecting appropriate behavior in a digital environment
TA5.B comply with acceptable digital safety rules, fair use guidelines, and copyright laws
TA5.C practice the responsible use of digital information regarding intellectual property, including software, text, images, audio, and video
TA5.A adhere to acceptable use policies reflecting appropriate behavior in a digital environment
TA6.B use appropriate digital tools and resources for designing solutions to problems
M2.1A- apply mathematics to problems arising in everyday life, society, and the workplace
M2.10A- explain that the length of a bar in a bar graph or the number of pictures in a pictograph represents the number of data points for a given category
S2.3A- identify and explain a problem and purpose a task and solution to the problem
M2.1B- use a problem-solving model that incorporates analyzing given information, formulating a plan or strategy, determining a solution, justifying the solution, and evaluating the problem-solving process and the reasonableness of the solution
M2.1C- select tools, including real objects, manipulatives, paper and pencil, and technology as appropriate, and techniques, including mental math, estimation, and number sense as appropriate, to solve problems
M2.10B- organize a collection of data with up to four categories using pictographs and bar graphs with intervals of one or more

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Grading Period 1

Unit 1: Introduction to the STEM Lab

Estimated Date Range: August 10 – October 7
Estimated Time Frame: 4 Class Periods

Unit Overview:
In this unit, students will be introduced to STEM Outclass. They will learn and practice classroom routines, procedures, and safety guidelines. They will review proper use of iPads and how to log-on to the district network. They will review proper use of devices and how to log-on to the district resources, as well as learn how to navigate through a variety of online resources that will be utilized for at home / online learning. Such resources include accessing the district's Learning Management System, Schoology and adding content to a Discussion Board in Schoology. Students will practice skills that allow them to own their learning. Digital Citizenship, internet safety, and lab safety are taught in context with each lesson as requires.

At home connections:

- Discuss ways your child can practice good digital citizenship when online at home.
- Have your child demonstrate how they upload items such as pictures or text to a discussion board in Schoology.

Concepts within Unit #1 Link to TEKS	Success Criteria for this concept
Concept #1: Routines, Procedures and Safety SK.1A	• Follow safe procedures while completing lessons in STEM • Be a positive and helpful team member

Unit 2: Fundamentals of Computational Thinking

Estimated Date Range: August 10 – October 7
Estimated Time Frame: 4 Class Periods

Unit Overview:

In this unit students review computational thinking using algorithms and are introduced to a second type of loop. Algorithms are a sequence of steps used to accomplish a task and solve problems. Students learn the fundamental skills of following directions using algorithms that are applied in everyday life, engineering design projects, coding, and programming projects, as well as digital media.

Students will review directional commands such as diagonal, zig zag, and repeated actions and ordinal directions such as first, second, etc. in order to follow simple steps to accomplish everyday tasks. Using the appropriate terms and following a set of directions, students will apply their knowledge of algorithms to computer programming and the engineering design process to solve problems.

In this unit, students will engage with various online resources that promote using algorithms to solve problems. Second graders continue iteration or loops from first grade. Iteration or loops are a sequence of events that are repeated until conditions are met (or goal is reached).

Second grade will learn “do loops” and continue to use “for loops.” The three types of loops are;

For loops – used for a predetermined sequence of events; the initial value is performed once and a count is taken after each iteration (example: move forward 2, repeat 6 times)
Do loops – used to repeat a sequence until a known condition is met
While loops – used in situations where we do not know how many times the loop is repeated beforehand.

Students will apply their knowledge of algorithms to computer programming and the engineering design process to solve problems with a culminating project that allows students to solve a problem by engineering and programming the Bee Bot to his charger. The math and science concepts of the properties of matter (S2.5A) and data collection (M2.10A) are embedded in the project.

At home connections:

- Have your child create a set of directions from getting one place to another. For example: Start in the kitchen – take 5 steps forward – turn right – enter the living room.
- Review directional words such as up, down, left, right, forward, backward with your child.

Concepts within Unit # 2 Link to TEKS	**Success Criteria for this concept**
Concept #1: Using Algorithms to Solve Problems TAK.4A	• Students can follow a list of steps using algorithms • Students can create a list of steps to reach a goal • Create algorithms for a variety of products • Use the Engineering Design Process to solve problems

Grading Period 2

Unit 3: Applying Computational Thinking with Algorithms

Estimated Date Range: October 11 – December 16
Estimated Time Frame: 8 Class Periods

Unit Overview:

Students will continue to develop the skills of following directions using algorithms that are applied in everyday life, engineering design projects, coding and programming projects as well as digital media.
2nd grade students will continue to build on computational thinking to solve problems, but in this grading period, students will be able to use algorithms to solve multi-step problems. Multi-step problems in coding / computer science are problems that will require more than one solution (coding block, algorithms, etc.) for it to function. In this unit, students will also apply the concept of decomposition (breaking down a problem into smaller, more manageable parts) within creating algorithms and the Engineering Design Process. A common way of decomposing problems regardless of they are coding based or not is to start with then end in mind and, work backwards on the smaller tasks that make up the larger problem. Students will also be able to explain how a program (coding or EDP) functions by interpreting their algorithms both to peers and teacher.
2nd Graders will continue to practice iterations. As mentioned from the previous unit, iterations are loops which are a sequence of events that are repeated until conditions are met, or the goal is reached. Examples of "for loop" blocks that will be explored in this unit are:

- *Repeat - an action in which a sprite moves a fixed number of times.*
  - *Ex: A ball moves a certain number of times within the use of a repeat block.*
  - *Ex: A BeeBot turning right 5 times.*
  - *Ex: A sprite in Scratch Jr repeating an action*
- *Forever - an action in which a sprite's action continues forever*
  - *Ex: A ball rolling back and forth within an animation.*
  - *Ex: A Lego WeDo fan rotating forever until stopped by student.*
  -

Students will also continue to build their debugging skills as they are working through algorithms and engaging in the EDP. Debugging is defined as, "finding and fixing problems in an algorithm or program."
In addition to the coding concepts, the idea of algorithms to solve multi-step problems is used in the Engineering Design Process. For example, the steps of the EDP can be thought of as individual algorithms. In this unit students will build structures that solve real-life problems.
Throughout the course of this unit, students will conduct observational investigations by conducting observational investigations. Students will demonstrate and record the ways that objects can move such as in a straight line, zig zag, up and down, back, and forth, round and round, and fast and slow.
Students will need to identify known and unknown information as well as what needs to be known regarding a problem and explain the steps to solve the problem. As a reminder, the EDP is our reinforcement of following steps to solve a problem. (ie: algorithms)
The science concept of Science 1.6C- d*emonstrate and record the ways that objects can move such as in a straight line, zig zag, up and down, back and forth, round and round, and fast and slow* and Math 2.10B- *organize a collection of data with up to four categories using pictographs and bar graphs with intervals of one or more* is the context in which the EDP will be used.

At home connections:

- Provide opportunities for your child to solve any given problem in a variety of ways.
- Have your child explain something using sequences. For example, making a sandwich: First you take the bread, then put mustard on it, then put deli meats on it, etc.

Concepts within Unit # 3 **Link to TEKS**	**Success Criteria for this concept**
Concept #1: Using Algorithms to Solve Multi-Step Problems TA4.A, S1.6D	• Explain how a program functions • Debug algorithms as necessary • Use numbers on motion blocks to reduce the number of blocks needed

	• Use the repeat and repeat forever blocks to repeat forever blocks to make a program repeat.
Concept #2: Building and Testing Structures TA4.A, S1.6D	• Use the engineering design process to identify and solve problems

Glossary of Curriculum Components

Overview– The content in this document provides an overview of the pacing and concepts covered in a subject for the year.

TEKS – Texas Essential Knowledge and Skills (TEKS) are the state standards for what students should know and be able to do.

Unit Overview – The unit overview provides a brief description of the concepts covered in each unit.

Concept – A subtopic of the main topic of the unit.

Success Criteria—a description of what it looks like to be successful in this concept.

Competency—Standards-Based Grading communicates students' understanding of the Texas Essentials Knowledge and Skills (TEKS). Using the TEKS, teachers developed grade-level competencies to communicate student progress in the Standards-Based gradebook. The competencies are the same for each grade-level content area (i.e. 1st grade math) across the district. Teachers report students' progress on the competencies using learning progressions.

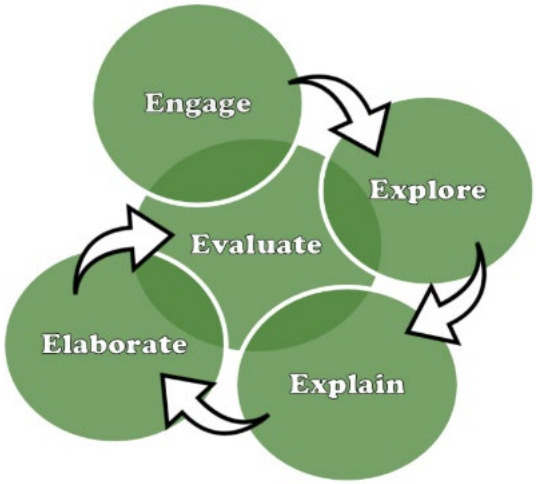
Parent Resources

The following resources provide parents with ideas to support students' understanding. For sites that are password protected, your child will receive log-in information through their campus.

Resource	How it supports parents and students
Code.org Course C	Code.org is a resource that students use throughout the year. This specific course is geared for 2nd Graders. Click on the link to access the lessons.
Scratch Jr	Scratch Jr is a free downloadable app that students use throughout the year. Scratch Jr helps students engage with the foundational of block-based programming in a user-friendly way. The linked resource takes the user to a variety of activities that can be work on using Scratch Jr.
Engineering Design Process	Students will engage in using the Engineering Design Process when solving problems, working through building, and testing structures. The link provided shares information on the various stages of the Engineering Design Process.

Instructional Model

The structures, guidelines or model in which students engage in a particular content that ensures understanding of that content.



STEM Outclass uses the 5E Instructional model.

Engage: Teachers start the learning process by involving students in making connections between their past and present learning experience.

Explore: The teacher guides students as they perform hand-on investigations where scientific practices and process skills are used to ask questions, observe, predict, illustrate, and record.
Explain: The teacher guides students as they discuss the discoveries, they made during the Explore activity. Students will also make explicit connections between the Engage and Explore activities as well as the learning intentions of the concept.
Elaborate: Students apply what they have learned so far to new experiences in order to develop, extend, connect, and deepen their understanding. Students will also engage in alternative explorations and contrast new facts with prior knowledge.
Evaluate: Students reflect on the evidence provided of the new understandings of the concepts.

Grading Period 3

Unit 4: Exploring Patterns

Estimated Date Range: January 5 – March 10
Estimated Time Frame: 8 Class Periods

Unit Overview:

In this unit, students will continue to develop their skills of using algorithms. However, in addition to solving multi-step problems with algorithms, students will now observe and identify patterns within their algorithms. Patterns in algorithms can either be either seen physically based on the movement of the sprite or it can be observed by the types of algorithms that are being used. Students will be able to look for patterns in addition to solving multi-step problems by interacting with Scratch Jr or Lego WeDo. In Second Grade, students will be creating and modifying a variety of animations.

The specific programming skill that students will be learning while working with algorithms is Event Handling. Event Handling is a routine that deals with a specific event which allows a programmer to write code that will be executed when the event occurs. For example:

- An action happening when a button is pressed
- an action happening when a letter or number is put into a textbox.
- New action happens when a character is finishing an existing action.

As students continue to engage with using a variety of tools, they will need to be exposed to a variety of ways on how to select, store and share their products on devices. This could be as simple as saving and retrieving information, sharing a reflection out via a Schoology Discussion Board, or using Flipgrid to talk about progress on a project.
As the unit progresses, students will transition their learning from observing patterns in algorithms to observing patterns in weather and seasons. Students will engage in the Engineering Design Process to address solutions to problems that are presented by the various changes in weather (rain, snow, ice, wind) and seasons.
The science concept of Science 2.8B- *identify the importance of weather and seasonal information to make choices in clothing, activities, and transportation* and Math 2.10B- *organize a collection of data with up to four categories using pictographs and bar graphs with intervals of one or more* is the context in which the EDP will be used.

At home connections:

- Provide opportunities for your child to recognize how weather information informs daily decisions including clothing and activities.
- Work with your child to identify multi-step problems and how to solve such as making cupcakes.

Concepts within Unit # 4 Link to TEKS	Success Criteria for this concept
Concept #1: Making Predictions Using Patterns TA2.D, S2.8B	• Create a presentation that displays my knowledge of about what to wear, what activities to do, and what transportation to use based on seasonal data. • Sync my robot to an iPad and complete puzzles • Obtain my Dash Driver's License
Concept #2: Building and Testing Structures TA2.D, S2.8B	• Use the steps of the EDP to create a solution to a problem.

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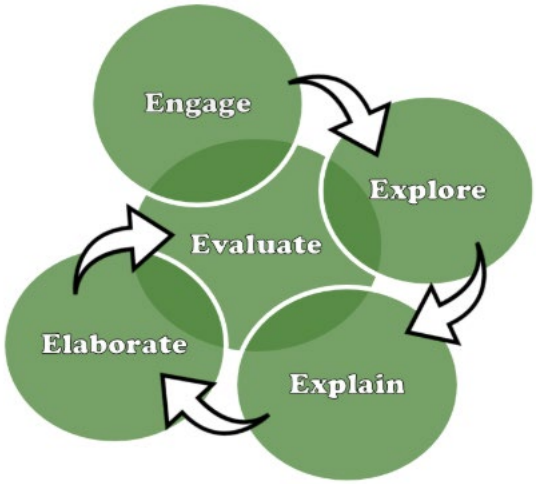

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Grading Period 4

Unit 5: Designing and Building Original Programs

Estimated Date Range: March 20 – May 25
Estimated Time Frame: 7 Class Periods

Unit Overview:

In this unit, 2nd Grade students will continue to develop their skills of using algorithms. Up until now, students have learned how basic algorithms work, have had opportunities to work with physical / handheld coding tools, and began to solve problems using algorithms. As the year progressed, students were introduced to decomposing problems into smaller, more manageable parts.

In this unit, students will collect, analyze, and represent data that they find on their own and be able to use a coding tool as an output.

Examples of collecting, analyzing, and representing data effectively include:

- Surveying classroom to see what their favorite sport is and use Scratch Jr as a presentation tool.
- Collecting information about weather (ie: high temperatures) and using Scratch Jr as a tool to represent the data.
- Using pictures to represent data (ie: Picturing Data from PlayLabs/Code.org)

As the unit progresses, students will have the opportunity investigate the following science concepts under Science 2.9B - identify factors in the environment, including temperature and precipitation, that affect growth and behavior such as migration, hibernation, and dormancy of living things.

- Environmental factors that can affect the growth and behavior of living things.
- Dormancy in plants can be caused by decreased rainfall, temperature changes, or changes in daylight hours.
- Migration and dormancy, or hibernation, in animals can be caused by changes in temperature, precipitation, or daylight hours.

Students will utilize the Engineering Design Process during this unit to solve environmental issues that occur in the natural world.

At home connections:

- Provide opportunities for your child to recognize how basic algorithms are used in our daily lives.
- Work with your child to identify environmental factors that can affect living things.

Concepts within Unit # 4 **Link to TEKS**	**Success Criteria for this concept**
Concept #1: Creating Original Programs TA1.A, S2.9B	• Create a program using online programming tools such as Scratch Jr. To solve problems.
Concept #2: Environmental Solutions TA1.A, S2.9B	• Use the steps of the EDP to create a solution to a problem.

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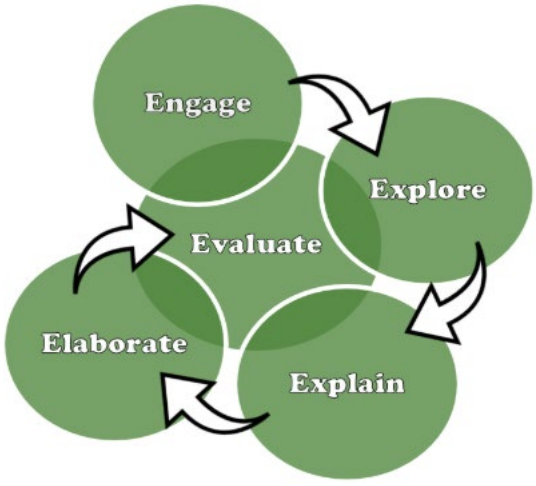

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