

# LEGO® Education Computer Science Learning Progression



## Coding Express and StoryTales Grade K

## Introduction

LEGO® Education believes that students learn best through play—by actively doing, exploring, and experimenting. This approach empowers them to become creative and engaged lifelong learners, which is essential for success in their future careers and lives.

Read this Introduction to explore ways to use this learning progression and find activities that support your learners.

This learning progression organizes activities in a recommended sequence that supports students' successful learning with LEGO® Education SPIKE™ Essential. For classroom convenience, it also clusters activities that use the same model.

Following the recommended sequence ensures that students build the necessary knowledge and experience for each successive activity. However, you may also choose activities according to your students' needs and prior knowledge/experience.

Some activities are reprinted or modified from published LEGO Education sources. Others are developed especially for these learning progressions.

Each activity

- ☑ contains anticipated timing, topics, relevant standards, learning objectives, and a ready-to-use prompt.
- ☑ is labeled with one or more topics, such as Modifying Programs (computer science), or Narrative Writing (ELA).
- ☑ lists the relevant standards, beginning with the most important standard in the learning.

To find what you need,

- ☑ scan the Topic(s) & Standards column or search with terms like *CSTA*, *ELA*, or *Math*.
- ☑ use the **Key** below to locate activities of different lengths and levels of instructional support.
- ☑ use the **Additional Resources** below to locate more support.


## Key

**1** Numbers show the recommended order in which to use activities.

⌚ Activities that will take approximately 30-45 mins

**LESSON** Longer activities with full lesson support

**PROMPT** Short activities to quickly expand or extend the learning





 Activities that use only bricks and require no hardware/software







⌚⌚ or ⌚⌚⌚ Activities that will take approximately 45-60 mins





**MORE DETAILS** Links that lead to lesson details and teaching support








**Additional Resources on the [LEGO® Education Product Resources Webpage](#) and [LEGO Education Community](#)**


☑ LEGO Education Coding Express [Teacher's Guide](#)







Getting Started with Coding Express				
#	Activity Name	TOPIC(S) and Standards	Objectives Students will	Prompt
1 	<p><b>PROMPT</b> Getting Started- Train, tracks and action bricks</p> 	<p><b>HARDWARE/SOFTWARE</b> <b>CSTA 1A-CS-01</b> Select and operate appropriate software to perform a variety of tasks and recognize that users have different needs and preferences for the technology they use.</p>	<ul style="list-style-type: none"> <li>• Explore and experiment with track pieces</li> <li>• Practice starting and stopping the train</li> <li>• Explore the function of the action bricks</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Demonstrate how to assemble the track.</b> Allow students to explore and experiment with the track pieces.</li> <li>• <b>Introduce the train.</b> Demonstrate how to start and stop the engine, then have students practice.</li> <li>• <b>Position the action bricks.</b> Demonstrate how the action bricks lay on the track. Place an action brick on the track and start the train so it will travel over the action brick. Have students observe what happens.</li> <li>• <b>Allow students time to explore and experiment.</b></li> </ul> <p>DIRECTIONS CAN BE FOUND ON THE CODING EXPRESS GETTING STARTED CARD, STEPS 1-3. CARD IS LOCATED WITHIN THE SET AND ONLINE</p>
2 	<p><b>PROMPT</b> Getting Started- Building Inspiration</p> 	<p><b>HARDWARE/SOFTWARE</b> <b>CSTA 1A-CS-01</b> Select and operate appropriate software to perform a variety of tasks and recognize that users have different needs and preferences for the technology they use.</p> <p><b>CSTA 1A-CS-02</b> Use appropriate terminology in identifying and describing the function of common physical components of computing systems (hardware).</p>	<ul style="list-style-type: none"> <li>• Explore the LEGO bricks and elements with Coding Express</li> <li>• Tell a story using the track, train, action bricks and build scenes from the Building Inspiration cards.</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Share the Building Inspiration Cards with students.</b> Ask them if they have been to any of the places show on the card. Encourage students to work together to build at least three places shown on the building cards.</li> <li>• <b>Put it all together.</b> Have students place their models alongside the track. Have them use the action bricks and train to transport figures to and from the different destinations along the track.</li> <li>• <b>Ask students to identify the function of the external hardware</b> (i.e. train moves on the track and over an action brick; action bricks change the behavior of the train)</li> </ul> <p>DIRECTIONS CAN BE FOUND ON THE CODING EXPRESS GETTING STARTED CARD, STEPS 4-5. CARD IS LOCATED WITHIN THE SET AND ONLINE</p>







Unit: Introduction to Sequencing				
#	Activity Name	Topic(s) and Standards	Objectives Students will	Prompt
3 	<b>LESSON</b> <b>Memory Game</b> 	<b>SEQUENCING</b> <b>CSTA 1A.AP.10</b> Develop programs with sequences and simple loops, to express ideas or address a problem.  <b>COMPUTATIONAL THINKING</b> <b>CSTA 1A.AP.11</b> Decompose (break down) the steps needed to solve a problem into a precise sequence of instructions.	<ul style="list-style-type: none"> <li>Understand that a sequence has an order (1,2,3).</li> <li>Recall or recreate a simple sequence of bricks shown from memory.</li> </ul>	Lesson 1 Unit: <a href="#">Introduction to Sequencing</a>
4 	<b>LESSON</b> <b>First Trip</b> 	<b>ALGORITHMS</b> <b>CSTA 1A-AP-08</b> Model daily processes by creating and following algorithms (sets of step-by-step instructions) to complete tasks.  <b>LESSON EXTENSION (ELA)</b> <b>CCSS.ELA-LITERACY.SL.K.1</b> Participate in collaborative conversations with diverse partners about kindergarten topics and texts with peers and adults in small and larger groups	<ul style="list-style-type: none"> <li>Understand the function of action bricks.</li> <li>Understand how to use the different types of bricks.</li> <li>Use action bricks to complete tasks</li> </ul>	Lesson 2 Unit: <a href="#">Introduction to Sequencing</a>
5 	<b>LESSON</b> <b>Train Sound</b> 	<b>COMPUTATIONAL THINKING</b> <b>CSTA 1A-AP-11</b> Decompose (break down) the steps needed to solve a problem into a precise sequence of instructions.  <b>LITERACY EXTENSION</b> <b>CCSS.ELA-LITERACY.L.K.5.A</b> Sort common objects into categories (e.g., shapes, foods) to gain a sense of the concepts the categories represent.	<ul style="list-style-type: none"> <li>Understand the function of action bricks.</li> <li>Use action bricks to complete tasks.</li> <li>Define the train's journey (sequencing)</li> </ul>	Lesson 3 Unit: <a href="#">Introduction to Sequencing</a>

<p>6</p> 	<p><b>LESSON</b> Are You Sleeping, Brother John</p>	<p><b>SEQUENCING</b> <b>CSTA K-2 1A.AP.10</b> Develop programs with sequences of commands and simple loops, to express ideas or address a problem.</p> <p><b>COMPUTATIONAL THINKING</b> <b>CSTA 1A.AP.11</b> Decompose (breakdown) the steps needed to solve a problem into a precise sequence of instructions.</p> <p><b>DEBUGGING</b> <b>CSTA 1A.AP.14</b> Debug (identify and fix) errors in an algorithm or program that includes sequences and simple loops.</p>	<ul style="list-style-type: none"> <li>• Fix problems in a sequence of steps</li> <li>• Break a problem into small tasks</li> </ul>	<p>Lesson 4 Unit: <a href="#">Introduction to Sequencing</a> Note: this lesson uses the Coding Express App</p>
<p>7</p>  	<p><b>LESSON</b> Trip to See Animals</p> 	<p><b>SEQUENCING</b> <b>CSTA 1A.AP.10</b> Develop programs with sequences and simple loops, to express ideas or address a problem.</p> <p><b>COMPUTATIONAL THINKING</b> <b>CSTA 1A.AP.11</b> Decompose (break down) the steps needed to solve a problem into a precise sequence of instructions.</p>	<ul style="list-style-type: none"> <li>• Break down a problem into small tasks.</li> <li>• Describe the train's journey through a place with animals.</li> <li>• Explain that the train is only following the directions given.</li> </ul>	<p>Lesson 5 Unit: <a href="#">Introduction to Sequencing</a></p>




Unit: Sequencing with Stories using LEGO Education StoryTales				
#	Activity Name	TOPIC(s) and Standards	Objectives Students will	Prompt
9 	<b>LESSON</b> <b>The Princess and the Pea</b> 	<b>LITERACY</b> <b>CCSS.ELA-LITERACY.RL.K.2</b> With prompting and support, retell familiar stories, including key details. <b>SEQUENCING</b> <b>CSTA K-2 1A.AP.10</b> Develop programs with sequences of commands and simple loops, to express ideas or address a problem.	<ul style="list-style-type: none"> <li>Practice recalling and retelling the end of a story.</li> <li>Learn about sequence of events: beginning, middle, and end</li> </ul>	LEGO Education Story Tales <a href="#">Lesson The Princess and the Pea</a>
10 	<b>LESSON</b> <b>Out of Order Story: The Princess and the Pea Extension</b> 	<b>DEBUGGING</b> <b>CSTA 1A.AP.14</b> Debug (identify and fix) errors in an algorithm or program that includes sequences and simple loops. <b>LITERACY</b> <b>CCSS.ELA-LITERACY.RL.K.2</b> With prompting and support, retell familiar stories, including key details.	<ul style="list-style-type: none"> <li>Find mistakes in the order of a familiar story.</li> <li>Rearrange the story parts to put the story in the correct sequence.</li> </ul>	Lesson 2 Unit Sequencing with Stories
11 	<b>LESSON</b> <b>The Three Billy Goats Gruff</b> 	<b>LITERACY</b> <b>CCSS.ELA-LITERACY.RL.K.2</b> With prompting and support, retell familiar stories, including key details. <b>SEQUENCING</b> <b>CSTA K-2 1A.AP.10</b> Develop programs with sequences of commands and simple loops, to express ideas or address a problem.	<ul style="list-style-type: none"> <li>Practice recalling and retelling a story</li> <li>Learn about sequence of events</li> </ul>	LEGO Education StoryTales Lesson <a href="#">The Three Billy Goats Gruff</a>
12 	<b>LESSON</b> <b>Pseudo-code Goats: The Three Billy Goats</b>	<b>COMPUTATIONAL THINKING</b> <b>CSTA 1A.AP.11</b> Decompose (break down) the steps needed to solve a problem into a precise sequence of instructions.	<ul style="list-style-type: none"> <li>Decompose the story of The Three Billy Goats Gruff into a set of simple steps.</li> </ul>	Lesson 3 Unit Sequencing with Stories




	<b>Gruff Extension</b> 	<b>LITERACY</b> <b>CCSS.ELA-LITERACY.RL.K.2</b> With prompting and support, retell familiar stories, including key details.		
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<b>Unit: Introduction to Looping</b>				
#	Activity Name	TOPIC(s) & Standards	Objectives Students will	Prompt
<b>13</b> 	<b>LESSON</b> <b>Up, Down, Around Again!</b> 	<b>SEQUENCING AND LOOPING</b> <b>CSTA K-2 1A.AP.10</b> Develop programs with sequences of commands and simple loops, to express ideas or address a problem.	<ul style="list-style-type: none"> <li>• Understand that loop means to complete the steps again in the same order.</li> <li>• Perform an assigned movement based on the color of a brick.</li> </ul>	Lesson 1 Unit: <a href="#">Introduction to Looping</a>
<b>14</b> 	<b>LESSON</b> <b>O-Shaped Track</b> 	<b>SEQUENCING AND LOOPING</b> <b>CSTA K-2 1A.AP.10</b> Develop programs with sequences of commands and simple loops, to express ideas or address a problem. <b>LITERACY EXTENSION</b> <b>CCSS.ELA-LITERACY.SL.K.4</b> Describe familiar people, places, things, and events and, with prompting and support, provide additional detail.	<ul style="list-style-type: none"> <li>• Understand use of the O-shaped track for repeating sequences.</li> <li>• Be able to compare different train shapes and their uses.</li> </ul>	Lesson 2 Unit: <a href="#">Introduction to Looping</a>
<b>15</b> 	<b>LESSON</b> <b>Animal Concert</b>	<b>SEQUENCING AND LOOPING</b> <b>CSTA K-2 1A.AP.10</b> Develop programs with sequences of commands and simple loops, to express ideas or address a problem. <b>LITERACY EXTENSION</b> <b>CCSS.ELA-LITERACY.SL.K.6</b> Speak audibly and express thoughts, feelings, and ideas clearly.	<ul style="list-style-type: none"> <li>• Understand that the action bricks' behavior can be changed using the app.</li> <li>• Be able to recognize different animal sounds.</li> <li>• Be able to compose a simple melody using digital tools.</li> </ul>	Lesson 3 Unit: <a href="#">Introduction to Looping</a> Note: this lesson uses the Coding Express App <a href="#">Link to lesson version not requiring app</a>
<b>16</b> 	<b>LESSON</b> <b>The Never Ending Story</b>	<b>SEQUENCING AND LOOPING</b> <b>CSTA K-2 1A.AP.10</b> Develop programs with sequences of commands and	<ul style="list-style-type: none"> <li>• Create and program a story that repeats.</li> <li>• Debug errors in their program as needed.</li> </ul>	Lesson 4 Unit: <a href="#">Introduction to Looping</a>

		<p>simple loops, to express ideas or address a problem.</p> <p><b>DEBUGGING</b></p> <p><b>CSTA 1A.AP.14</b> Debug (identify and fix) errors in an algorithm or program that includes sequences and simple loops.</p>		
<b>Unit: Advancing with Coding</b>				
#	Activity Name	TOPIC(s) & Standards	Objectives Students will	Prompt
17 	<p><b>LESSON</b></p> <p><b>How Does it Work?</b></p> 	<p><b>HARDWARE AND SOFTWARE</b></p> <p><b>CSTA 1A.CS-02</b> Use appropriate terminology in identifying and describing the function of common physical components of computing systems (hardware).</p> <p><b>CSTA 1A.CS.03</b> Describe basic hardware and software problems using accurate terminology.</p>	<ul style="list-style-type: none"> <li>• Explain the functions of hardware in Coding Express.</li> <li>• Explain the functions of software in Coding Express</li> </ul>	Lesson 1 Unit: <a href="#">Advancing with Coding</a>
18 	<p><b>LESSON</b></p> <p><b>Y Shaped Track</b></p> 	<p><b>SEQUENCES</b></p> <p><b>CSTA 1A-AP-10</b> Develop programs with sequences and simple loops, to express ideas or address a problem.</p> <p><b>LITERACY EXTENSION</b></p> <p><b>CCSS.ELA-LITERACY.SL.K.4</b> Describe familiar people, places, things, and events and, with prompting and support, provide additional detail.</p>	<ul style="list-style-type: none"> <li>• Understand that the Y-shaped track provides options.</li> <li>• Design and optimize solutions.</li> <li>• Be able to compare different train track shapes and their uses (i.e., sequencing, looping and conditional statements)</li> </ul>	Lesson 2 Unit: <a href="#">Advancing with Coding</a>
19 	<p><b>LESSON</b></p> <p><b>Journey-Trouble on the Road</b></p>	<p><b>SEQUENCES</b></p> <p><b>CSTA 1A-AP-10</b> Develop programs with sequences and simple loops, to express ideas or address a problem.</p> <p><b>LITERACY EXTENSION</b></p> <p><b>CCSS.ELA-LITERACY.SL.K.5</b> Add drawings or other visual displays to descriptions as desired to provide additional detail</p>	<ul style="list-style-type: none"> <li>• Understand that the action bricks' behavior can be changed using the app.</li> <li>• Understand various traffic signs.</li> <li>• Be able to solve common problems on the road</li> </ul>	Lesson 3 Unit: <a href="#">Advancing with Coding</a> Note: this lesson uses the Coding Express App <a href="#">Link to lesson version not requiring app</a>



<p>20</p>  	<p><b>LESSON</b> Story Maps</p> 	<p><b>SEQUENCES</b> <b>CSTA 1A-AP-10</b> Develop programs with sequences and simple loops, to express ideas or address a problem.</p> <p><b>PROGRAM DEVELOPMENT</b> <b>CSTA 1A.AP.12</b> Develop plans that describe a program's sequence of events, goals, and expected outcomes.</p>	<ul style="list-style-type: none"> <li>• Develop a story map that describes a program's sequence of events.</li> <li>• Identify actions performed by the train along the track</li> </ul>	<p>Lesson 4 Unit: <a href="#">Advancing with Coding</a></p>
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Additional Lessons				
#	Activity Name	TOPIC(s) & Standards	Objectives Students will	Prompt
<p>21</p> 	<p><b>LESSON</b> Character-Caterpillar</p>	<p><b>VARIABLES</b> <b>CSTA 1A-AP-09</b> Model the way programs store and manipulate data by using numbers or other symbols to represent information.</p> <p><b>LITERACY EXTENSION</b> <b>CCSS.ELA-LITERACY.SL.K.6</b> Speak audibly and express thoughts, feelings, and ideas clearly.</p>	<ul style="list-style-type: none"> <li>• Understand that the action bricks' behavior can be changed using the app.</li> <li>• Recognize and understand different emotions.</li> <li>• Be able to use the app to create stories.</li> </ul>	<p>LEGO Education <a href="#">Coding Express Lesson</a> Note: this lesson uses the Coding Express App <a href="#">Link to lesson version not requiring app</a></p>
<p>22</p> 	<p><b>PROMPT</b> Character-Caterpillar Lesson Extension Activity the Troll</p>	<p><b>VARIABLES</b> <b>CSTA 1A-AP-09</b> Model the way programs store and manipulate data by using numbers or other symbols to represent information.</p> <p><b>LITERACY EXTENSION</b> <b>CCSS.ELA-LITERACY.SL.K.6</b> Speak audibly and express thoughts, feelings, and ideas clearly.</p>	<ul style="list-style-type: none"> <li>• Understand that the action bricks' behavior can be changed using the app.</li> <li>• Recognize and understand different emotions.</li> <li>• Be able to use the app to create stories.</li> </ul>	<p>LEGO Education <a href="#">Coding Express Lesson</a> Note: this lesson uses the Coding Express App</p> <p>Use this lesson's format to create lessons for the Troll in the app.</p> <p>Create your own stories for the characters in the Engage phase and explore more interesting emotions with your kindergartners.</p>
<p>23</p> 	<p><b>PROMPT</b> Character-Caterpillar Lesson Extension</p>	<p><b>VARIABLES</b> <b>CSTA 1A-AP-09</b> Model the way programs store and manipulate data by using numbers or other symbols to represent information.</p>	<ul style="list-style-type: none"> <li>• Understand that the action bricks' behavior can be changed using the app.</li> <li>• Recognize and understand different emotions.</li> </ul>	<p>LEGO Education <a href="#">Coding Express Lesson</a> Note: this lesson uses the Coding Express App Use this lesson's format to create lessons for the Robot in the app.</p>

	<b>Activity the Robot</b>	<p><b>LITERACY EXTENSION</b>  <b>CCSS.ELA-LITERACY.SL.K.6</b> Speak audibly and express thoughts, feelings, and ideas clearly.</p>	<ul style="list-style-type: none"> <li>• Be able to use the app to create stories.</li> </ul>	Create your own stories for the characters in the Engage phase and explore more interesting emotions with your kindergartners.
24 ⌚	<b>LESSON Math-Distance</b>	<p><b>PROGRAM DEVELOPMENT</b>  <b>CSTA 1A.AP.12</b> Develop plans that describe a program's sequence of events, goals, and expected outcomes.</p> <p><b>MATH EXTENSION</b>  <b>CCSS.MATH.CONTENT.K.MD.A.2</b>                  Directly compare two objects with a measurable attribute in common, to see which object has "more of"/"less of" the attribute, and describe the difference. For example, directly compare the heights of two children and describe one child as taller/shorter.</p>	<ul style="list-style-type: none"> <li>• Understand how to measure distance.</li> <li>• Be able to compare distances.</li> <li>• Be able to do simple math</li> </ul>	LEGO Education <a href="#">Coding Express Lesson</a> Note: this lesson uses the Coding Express App <a href="#">Link to lesson version not requiring app</a>
25 ⌚	<b>PROMPT Math-Distance Lesson Extension Longer Distances</b>	<p><b>PROGRAM DEVELOPMENT</b>  <b>CSTA 1A.AP.12</b> Develop plans that describe a program's sequence of events, goals, and expected outcomes.</p> <p><b>MATH EXTENSION</b>  <b>CCSS.MATH.CONTENT.K.MD.A.2</b>                  Directly compare two objects with a measurable attribute in common, to see which object has "more of"/"less of" the attribute, and describe the difference. For example, directly compare the heights of two children and describe one child as taller/shorter.</p>	<ul style="list-style-type: none"> <li>• Understand how to measure distance.</li> <li>• Be able to compare distances.</li> <li>• Be able to do simple math</li> </ul>	LEGO Education <a href="#">Coding Express Lesson</a> Note: this lesson uses the Coding Express App  Use this lesson's format to work with Longer Distances and explore more numbers with your kindergartners!