

Lesson 2

Amusement Park Gateway



Objectives:

The students will demonstrate the ability to:

- ✓ Use sequential thinking to design programs to control LEDs on a model. *(Science and Technology)*
- ✓ Communicate ideas and outline programs by maintaining a STEM Journal. *(Science, Technology, Engineering, and Mathematics)*
- ✓ Compute fluently to solve addition and multiplication problems. *(Engineering and Mathematics)*
- ✓ Identify and describe geometric shapes and patterns *(Engineering and Mathematics)*

The first step for students is to open the SCE for the Amusement Park Gateway. Once students have opened the Discover Control Software they should click the Connect SCE icon at the top of the screen. A file dialogue box will appear. Instruct students to open the Gateway SCE. The Gateway image will appear on the screen with a small tool bar. Describe each of the buttons on the tool bar (labels will appear as you pass the cursor over the buttons). Ask students to click on the button with the upper case 'I' (instruction) and they will see the following text appear to guide their exploration.

Requirements:

For this activity you are required to:

1. Make daily entries in your STEM Journal. *(Teacher Note: Help students to realize the importance of keeping records and journaling. Inform students of the materials they must include in their STEM Journals.)*
2. List the K'NEXions Chart for all Challenge Activities your team completes. *(Teacher Note: If you are using the simplified Program Presentation Sheet, the K'NEXions Chart will be at the top of that sheet. If not, a template page for K'NEXions Charts has been provided.)*
3. List and describe the steps in your programs. Keep a record of changes you made to programs as you improved them. *(Teacher Note: The simplified Program Presentation Sheet will help students with limited writing skills to describe their program in a graphic as well as a written form. Students with better writing skills can list and describe their programs directly in their STEM Journals.)*
4. Include all calculations, charts, and graphs you prepare in your STEM Journal.

Context:

Your design team has been selected to plan, construct, program and operate the attractions for an amusement park in your community. Your first project is to add excitement to the park gateway that will welcome park visitors.

Follow directions, plan carefully, and complete the activities that have been outlined for this task.

Good Luck!

Construction:

Use the instructions to build the amusement park Gateway model. *(Engineering)*

Ensure that all of the electronic components have been plugged into the K'NEX Control Box before you begin work.

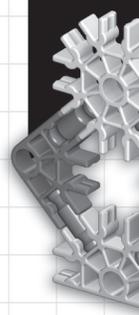
(The K'NEXions Chart outlines the placement of the LEDs for the Learning Tasks in this lesson. The students will find this information in graphic form in the building instructions.)

K'NEXions Chart

K'NEX Amusement Park Gateway

Output	Device
1	LED # 1
2	LED # 2
3	
4	
A	
B	





Learning Tasks:

Complete these learning tasks using both the K'NEX Amusement Park Gateway SCE on the computer and the K'NEX Amusement Park Gateway model and Control Box.

(Teacher Note: Encourage students to complete these learning tasks using the SCE on the computer before they program the Control Box to operate the LEDs on the model.)

Light the Gateway to the amusement park using the Control Box and the LEDs.

1. * **Use the Control Box to write a program that makes one of the LEDs blink in an interesting pattern. Allow the Control Box to repeat your pattern several times.**
(Science, Technology, and Mathematics)
2. * **Use the Control Box to write a program that makes the other LED blink in a different pattern. Allow the Control Box to repeat the pattern several times.**
(Science, Technology, and Mathematics)

Challenge Activities:

Keep daily notes in your STEM Journal and include all of the programs you write.

(Teacher Note: Remind students that the output devices may need to be plugged into different locations on the Control Box for Challenge Activities.)

1. * **Part 1 - Propose a name for the amusement park and attach a sign and other graphics of your design to the K'NEX Amusement Park Gateway.**
 - a. The sign will include the name of the park.
 - b. The sign and graphics will be colorful.
 - c. Use the Control box to flash the LEDs.
 - d. Part 2 - Prepare a back for the K'NEX Gateway that thanks visitors for coming and welcomes them back for another visit in the future.
(Science, Technology, and Engineering)
2. ** **Use the Control Box to make the pair of LEDs blink in a pattern using one red and one green LED. Allow the Control Box to repeat your pattern several times.**
(Science, Technology, and Mathematics)
3. ** **Use the Control Box to make both LEDs blink red and green in a pattern. Allow the Control Box to repeat your pattern several times.**
(Science, Technology, and Mathematics)
4. * **Refer to the building instructions for the Amusement Park Gateway and the Cost per Piece Chart provided by your teacher. Calculate the cost of the materials that are used to build the K'NEX Amusement Park Gateway.**
 - a. Make a data chart for this activity in your STEM Journal and include all of your calculations
 - b. Place your answer on the board in the spot indicated by your teacher.
(Teacher Note: Set aside space on the white board or chalk board for each team to list their cost of materials so that the costs are visible to the entire class.)
- How do your results compare with other groups who have completed the challenge? If answers vary, devise and implement a plan to check your work.
(Teacher Note: Provide time for the teams to compare their answers and to correct any differences. The Cost Per Piece Chart has been provided in an editable format allowing you to assign costs to the K'NEX Pieces that are appropriate for the students you are working with.)
(Science, Engineering, and Mathematics)
5. ** **Complete the activity above using a spreadsheet program to organize the data, compute the costs, and calculate the total cost of the materials used to build the K'NEX Amusement Park Gateway.**
(Science, Technology, Engineering, and Mathematics)
6. * **List the different geometric shapes that you can identify on the K'NEX Amusement Park Gateway model.**
 - a. How many of each shape do you see in the model?
 - b. Draw a table that lists the shapes you found in the left column and the number of each shape in the right column.
(Engineering and Mathematics)
7. ** **Triangular shapes used in construction are stronger than square or rectangular shapes. Write a paragraph to explain why it is important to use triangles in this model and a real amusement park entrance gate.**
(Engineering and Mathematics)