

Station Setup Guide

Category: **Low-Tech Making**

Level 2: **Amplification**



TEACHER WELCOME: This one-page setup guide provides basic instructions on how to arrange your room for three different student-led maker stations. You will divide your class into three groups to allow each one to work in one of the three different station areas.

Important: Each station will hold four students. For larger classes, set up two of each station.

SETUP INSTRUCTIONS: Print student guides, one per student. Recommended group size is four students per station.

Find three distinct areas of your room to set up stations. Dedicate one area to the Strawbees and Makedo station(s), the second to K'NEX, and Strictly Briks, and the final area to creativity with littleBits. Station-specific setup instructions are listed below.

Provide adequate room at each station for a group of four to write, design, and build. Typically, two tables pushed together will be large enough for each station setup. Also, provide a central location for craft supplies and tools.

STATION 1	STATION 2	STATION 3
<p>Build a _____</p> <p>PLATFORM: Strawbees and Makedo</p> <p>MATERIALS NEEDED:</p> <ul style="list-style-type: none">• Strawbees®• Makedo®• Cardboard boxes (various sizes)• Scissors• Pencils and crayons• Student guides, journals, or notebooks (one per student)• Device with Internet access• A camera (optional) <p>STATION SETUP:</p> <ol style="list-style-type: none">1. Place materials at the station.2. Provide access to the Internet to view tutorials: Strawbees: https://www.youtube.com/watch?v=GGK9NTbdijo Makedo: https://www.youtube.com/user/makedoTV	<p>Mr. Maker: 24th Floor</p> <p>PLATFORM: K'NEX and Strictly Briks</p> <p>MATERIALS NEEDED:</p> <ul style="list-style-type: none">• K'NEX®• Strictly Briks®• Vocabulary words• Craft supplies• Student guides, journals, or notebooks (one per student)• Device with Internet access <p>STATION SETUP:</p> <ol style="list-style-type: none">1. Place materials at the station.2. Copy Mr. Maker's letter and place at station.3. Review these resources: http://knexeducation.co.uk/resources/ https://en.wikipedia.org/wiki/Window_cleaner	<p>littleBits Artbot</p> <p>PLATFORM: littleBits</p> <p>MATERIALS NEEDED:</p> <ul style="list-style-type: none">• littleBits™ STEAM Student Set• Rubber bands (30)• Craft supplies• Blank sheets of paper• Student guides, journals, or notebooks (one per student)• Device with Internet access <p>STATION SETUP:</p> <ol style="list-style-type: none">1. Place materials at the station.

FOR THE TEACHER: Station Setup Guide

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Tips:

- Walk around the room and ask students what they are doing and learning. Ensure that students are using their student guides as an aid while moving through the exploration process.
- Help support students by listening to their conversations, testing their understanding, and challenging their thinking as they create.
- There is no right or wrong way to explore! Allow students to create what they want and how they want.
- Help students troubleshoot minor problems they may be experiencing. If you find a student who is excelling, ask them to help their peers as time allows.
- Play instrumental music to help with classroom noise. Play music with a quicker beat during cleanup time.

For additional information, ideas, and class setup instructions, please see full teacher guides.

Student Name:

Activity Title: **Mr. Maker: 24th Floor**

Platform: K'NEX and Strictly Briks

The Challenge: What will you create to clean Mr. Maker's 24th-story windows successfully?



Plan

- Read the letter from Mr. Maker—found at your station or at the end of this student guide.
- What is Mr. Maker asking you to solve or do? What challenges might you expect in this mission?
- Watch the video “Window Cleaners on the Empire State Building”: <https://youtu.be/d8Qe07A7DFw>
- Individually, make a quick sketch of your window-cleaning device.

Sketch your idea here:

Large sketch area with a diagonal watermark reading 'SAMPLE'.

Pick

- Look up the following vocabulary words and make sure you know what they mean:
 - *Anchor*
 - *Descend*
 - *Suspended scaffolding*
- Make a list of materials you might use for your build. Then, gather the materials you need.

Parts list:

Parts list area with horizontal dotted lines for writing.

Explore

- Before you build, answer the following questions:

What is Mr. Maker asking us to solve or do?

What challenges might we expect in this mission?

Create

- Use the materials you gathered to create your window-cleaning device.
- Feel free to adapt and modify your design as you build.
- Don't forget to review the vocabulary words.
- Use the vocabulary words to label your drawing.

Draw a picture of your creation here:



LEVEL 2

Mr. Maker: 24th Floor | Student Activity Guide

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Reflect

Answer these questions. Please be thoughtful and thorough in your responses. For more writing space, write on the back of your student guide or in a notebook.



LEVEL 2

I am still wondering about ...

- 1.
- 2.
- 3.

List other ideas you could have tried:

Choose at least two questions from each section to answer.

Engineering questions

- What was your most significant victory today?
- What was difficult about today's challenge?
- What other materials would be helpful for this challenge? Why?

Teamwork questions

- What was your team's biggest strength today?
- What was your team's biggest weakness?
- How could your team work better during a future challenge?
- What did you contribute today?
- How could you be a better teammate next time?

Engineering reflections:

Teamwork reflections:



LEVEL 2

Mr. Maker's Mission
Maker Tax Services
9875 Ivy Way Heights

Hello Makers,

Your creativity is inspiring! Thank you for creating a design that cleaned the window to my office. I loved watching those ducks waddle into the water. I've got great news for you: our company is doing so well we had to move to a different building, but, unfortunately, the windows here are dirty too. There are multiple windows, and we are on a higher floor! Can you help me?

Together will you please plan, design, and create something that will help solve my problem?

Here are a couple of items to think about as you begin the design process:

- My office is on the 24th floor.
- There is a parking garage that is 14 stories below my office window.
- There are multiple windows.
- The rooftop deck appears to have some anchors.
- I love pastrami and Swiss cheese sandwiches.

Thank you, Makers! I can't wait to see your designs! I am so excited to see clearly out my window again.

Yours Truly,

Mr. Maker

Student Activity Guide

Mr. Maker: 24th Floor

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Teacher Guide

Mr. Maker: 24th Floor

Activity Challenge Statement:

What will you create to clean Mr. Maker's 24th-story windows successfully?

This activity challenges students to develop a real-world solution to Mr. Maker's problem: dirty windows on a high-rise building. Students will research historical solutions to similar challenges and consider how they might utilize, modify, or adjust these solutions to best address Mr. Maker's window-cleaning needs. This process will increase students' proficiency in using K'NEX and Strictly Briks as building platforms.

As you begin, keep in mind that students may not find the perfect solution to the problem and that is fine. The goal of this activity is to get your students exposed to the making process, which includes failures that lead to modification and success. Support them in this process by encouraging them to innovate.

Students should use the student guides or journals to capture their process and ideas and record key vocabulary words.

Getting Started

- Review these resources before leading the activity:
K'NEX lesson resource page: <http://knexeducation.co.uk/resources/>
Strictly Briks resource blog: <http://strictlybriks.com/blog/strictly-briks-stackable-baseplates/>
"Window Cleaner": https://en.wikipedia.org/wiki/Window_cleaner
- Make copies of the student guides for students or have them record in their journals or notebooks.
- Promote collaboration by handing out cards with different shapes or numbers (playing cards work well) and form groups based on color, numbers, or shape/suit.
 - If you need some collaborative group structure ideas, go to: <https://www.cte.cornell.edu/teaching-ideas/engaging-students/collaborative-learning.html>
- Before class, print out the following vocabulary words in a large font so students can use them to label their designs: *anchor, descend, suspended scaffolding*. Alternatively, write the words on the board and ask students to copy them down on sticky notes or note cards (one word per sticky note) for use during the activity.
- It is helpful to have students plan before picking out materials. Remind students that their plans may change if they discover better ideas.
- Play instrumental music to help with classroom noise. Play music with a quicker beat during cleanup time.

Plan

- Gather students on the floor in front of chart paper, a marker board, or a smart board and introduce them to this activity.

Anticipatory Set

- Read the letter from Mr. Maker found at the end of this guide.
- Pose the questions: What is Mr. Maker asking us to solve/do? What challenges might we expect in this mission?

CATEGORY:
Low-Tech Making

PLATFORM:
K'NEX and Strictly Briks

LEVEL 2: AMPLIFICATION
To amplify their sense of the possibilities of a building platform, students will create projects using design instructions from manufacturers and expert users. Students will be shown example projects (see resources under "Anticipatory Set") and asked to choose one to make on their own. Students will also consider modifications and improvements to the design.

Students will work through the following phases:

1. Plan ("What will I make?")
2. Pick ("What will I use?")
3. Explore
4. Create
4. Reflect

TIME:
45 minutes to 1 hour

**PRE-REQ KNOWLEDGE/
SKILLS NEEDED:**

- Knowledge of basic architecture vocabulary
- Basic understanding of K'NEX and Strictly Briks

MATERIALS NEEDED:

- K'NEX®
- Strictly Briks®
- Student guides, journals, or notebooks (one per student)
- Scissors
- Glue sticks
- Index cards
- String or yarn
- Vocabulary words
- Device with Internet access

- Show the video “Window Cleaners on The Empire State Building”: <https://youtu.be/d8Qe07A7DFw>
- Explain to students that they have the option of using two different platforms (K’NEX and Strictly Briks) to aide in their making activity. Students can choose to build with both platforms.
- Introduce the vocabulary words to your students. To provide the opportunity for students to attach their meanings as they create, do not give the definitions of the vocabulary words at this time. Students will have time after they “create” to record these in their journals.

Pick

- Break the class into collaborative groups.
- Ask students to label a page in their journal “Planning Time.”
- Ask students to record which build platform and pieces they plan to use.
- Ask each group to list the parts they need to create their design.
 - Students will need to explain how these elements help solve the problem.
 - Encourage them to think about why they chose these elements for their design.

Explore

- Invite groups to obtain the materials on their parts list.
- As a support, give students the definitions for each vocabulary word for reference or to write on the back of their labels.
 - It is not crucial to use every vocabulary word during the building process. These words are provided to stimulate thinking about concepts regardless of their use in the design.
- As students build, encourage them to redraw the window-washing structure that they are making in their student guides and then have them label the parts of their drawing with the vocabulary words.

Create

- Invite students to begin making.
- Encourage students to work together in their collaborative groups as they create.
- During the creation process, walk around to listen and observe their thoughts and ideas.
- Question students to check their understanding (“What if ____?;” “Where could you ____?;” “Have you thought about ____?”).

Reflect

- Fifteen to twenty minutes before the end of the period, give students a couple of minutes to finish their work. If they are still working on their creation/build, it is not necessary for them to finish.
- Gather students together and have them work on the “Reflect” section in their student guides.
 - Instruct students to capture their creations and ideas in their guides or journals.
- Allow students about 10 minutes of quiet reflection to draw, write about their building process, or record remaining questions.
 - Playing instrumental music will let students know that this is a time for reflection.
 - Pose the question: Have you given Mr. Maker a solution to his problem?
- If students finish early, ask them to add the vocabulary words to their student guides or journals. Students may write definitions of the vocabulary words or label a drawing with them. They could also glue vocabulary words into their journals with a glue stick.

Extension Activities:

- Ask students to write a persuasive letter to Mr. Maker encouraging him to pick their design.
- Ask students to develop a design plan to create a machine that cleans Mr. Maker’s windows safely and protects workers from dangerous conditions. Remind them to include what building platform(s) they would use.
- Research the tallest buildings in the world, examine their construction, and create a builder guide brochure.

What's Next?

Now that your students have completed the second level, what would you like to do next? To extend this activity, you may have your students continue to iterate on their design or have them progress to one of the Low-Tech Making Level 3 design challenges.

Additionally, you may extend this activity by asking your students to think about how they could build a device to clean windows on taller buildings, such as skyscrapers.

- Watch the first two minutes of "Window Cleaning the World's Tallest Building— Supersized Earth": <https://www.youtube.com/watch?v=wcRuXrduj6Q>
- Have students respond to the following questions:
 - How would you have to change your current design to work on skyscrapers?
 - What would you need to learn more about to successfully design a window-cleaning device that could be used on skyscrapers?
- Ask students to draw a variation on what they created or to think of an idea that could utilize their design to solve a problem different than Mr. Maker's dirty windows. Have students share their drawings with the class or in groups.

Mr. Maker's Mission
Maker Tax Services
9875 Ivy Way Heights

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Yours Truly,

Mr. Maker



Cleanup Time:

- Encourage students to work together to clean up to your desired cleanup song.
- Collect journals for the next maker activity.
- To expedite clean-up, label or color-code return bins.

Questions to ask students:

- What was your team's most significant victory today?
- What was difficult about today's challenge?
- What other materials would be helpful for this challenge? Why?