

# Build-A-City

## Objective and Background

Urban Lego city development is an activity in which students will be given the opportunity to design and build a mock city out of Legos. Each student will be given an Urban Lego city Workbook in which the guidelines of the activity are detailed, a grid to plan the city is provided, and multiple take-home exercises are available. The activity and exercises have been designed to teach students the fundamental challenges of city planning and maintenance that our country is experiencing today. They emphasize the importance and values that different resources have to a modern day city planner while encouraging students to realize the potential of Science, Technology, Engineering, and Mathematics (STEM) careers. This is accomplished by challenging the students to overcome the main problem that they will encounter while building their city; there is not enough space on their baseplate to situate all of their structures. This can occur during an urban explosion; the buildings overtake the farmland and the city is no longer able to support its immense population.

While this is a real problem, there are many others as well. The aspects of decaying water and electrical systems and overwhelmed roadways and municipal facilities will be ones that we mention in order to increase awareness among the students. As a result, multiple aspects of this activity relate to principles in the fields of STEM. The students will be required to work cooperatively as members of a team, develop a strategy prior to the implementation of the design, and manage resources. It is important to cultivate these skills in all people, but especially those who are around ten to twelve years old, as is the case with this project. At that age, children are beginning to solve their own problems and develop an insatiable inquisitiveness. Our intentions with this activity are to excite kids about all the available options in math, science, and engineering. Teaching them to cooperate, strategize, and prioritize will advance their capabilities in the STEM fields.

## Materials and Costs

Item	Supplier	Item No.	Quantity	Unit Price	Total
Workbook	Teacher		4	0	0
Writing Utensil for City Planning	Student		1/person	0	0
Post-it Notes	Office Supply Store	MMM6714AU	1	\$2.05	2.05
Bricks & More Builders of Tomorrow Set	LEGO (via Amazon)	6177	4	\$29.99	\$119.96
Green Baseplate (10" x 10")	LEGO (via Amazon)	626	4	\$4.99	\$19.96
				<b>TOTAL</b>	<b>\$139.92</b>

# Step-by-Step Instructions

## Phase 1: Introduction of the Activity

An important part of how students will learn the technical material in this activity comes in the introduction of the activity. Since the technique of teaching the students in this activity can be a little abstract, the person guiding the activity is integral in making sure the students' minds are guided in the right direction.

1. Split the students up into teams of 3 or 4 depending on amount of students.

2. Play the introductory video (2 min).

Note: While the students are watching the video, progress to next step for a more fluid transition.

3. Pass out the Workbook.

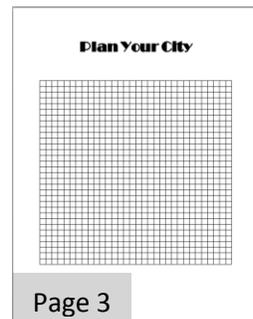
4. Turn to Page 1 (along with the students) of the Workbook and read it aloud to the students.



5. Turn to Page 2 (along with the students) of the Workbook and tell them that this is the scoring sheet for the city that they build. Tell them that they are to build the city with the goal of getting the highest amount of points possible. Also, tell them that they will have to plan and strategize on how they will build their city, and be sure to stress the importance that this is a team activity, not an individual one.



6. Turn to Page 3 (along with the students) of the Workbook and tell them to begin to design their city. This should take no more than a few minutes.



7. Pass out Legos and Post-it notes to the groups.

Note: It is crucial that this is done only right before the building phase of this activity. If you pass out the Legos before this stage then students may become distracted and disrupt others during the introduction.

## Phase 2: Building of the Lego City

There is little that the instructor of this activity is to be doing during this stage of the activity since this is more for the students to build and show their creativity. However, what the instructor does in this part is absolutely crucial, and is very important if the students are to make the mental connections that this activity is designed to make.

1. Allow the students to begin building their cities (20 - 30 min). Have them label their building with the Post-it notes so they can visually see the layout of the city.
  - Carefully monitor uneven distribution of tasks – help divide up tasks in a constructive manner
  - Make sure the activity is fun and informative for all students
2. As students are building, walk around to each team and ask questions. Some suggestions may be:
  - Why do you think high story buildings are better than short story buildings?
  - When the students have reached a point that they are running out of space on their board, ask them about this.
    - Why is this a problem?
    - How can this be fixed? etc.
  - Later in the exercise when students are close to finishing, prompt them to evaluate their Lego supply and city design.
    - How many pieces do you have left and what kind are they? (The more desirable pieces for making buildings will be in short supply.)
    - How could you have designed your city to more efficiently use space?
3. Announce when there is one minute of building time left and prompt students to finish their last building. Once the time for building has elapsed, collect students' cities.
4. With each group, calculate—while taking into account their building strategy—and record their city's score based off of the criteria on page 2 of the Workbook.

## Phase 3: Discussion

The point of this phase is to tie in the questions you asked the students in the construction phase to real life situations. Once again, it is imperative that the instructor is effective in guiding the discussion so that the students may learn what this activity is meant to teach.

1. Lead the students in a discussion about the activity. Talking points may include but are not limited to:
  - What problems did you have with the size limit of your city? Did you have problems fitting all of your buildings on the baseplate?
    - Hopefully they will answer yes to both of these questions. Once they answer this question, ask the following questions:

- How does this relate to a real city? What effects arise from this problem? How can this problem be dealt with?
    - They could answer this question by saying actual cities are running out of space for building. Some effects include not being able to supply enough resources to the overpopulated town or running out of space for people to live. This is important because the majority of jobs are located in cities so people need to live there in order to work. To fix this problem the cities could purchase more land, but remind the students that this often results in using up valuable farmland that is used to feed the citizens of the city. The answer that the students should be guided towards is that the cities should start building upwards to get more use out of the land they already have.
  - Did you have any problems finding the Legos you wanted to use towards the end?
    - Once again, the students should answer yes to this question. Draw an analogy between a real city and their Lego city. Since their Lego city was getting larger, it was using up all of the Lego blocks that were useful. Tell the students that real cities have this problem because as the city gets larger, they use more resources. When cities keep using up the same resources, it becomes increasingly difficult to find more of them.
2. Once the discussion is finished, inform the students that the Workbook is for them to keep and fill out on their own time.
  3. End the activity.