



A HANDS-ON MATH MODULE

Building LEGO City

Multiplication & Arrays Through Architecture



6 LESSONS

60-75 MINUTES

STANDARD 4.C.2

Module Goal



Using multiplication and arrays to understand how architects design buildings.

GRADE-LEVEL CONNECTION

This module is one path toward a broader classroom goal: building fluency and confidence with multiplication through concrete, visual, and real-world models.

STANDARD

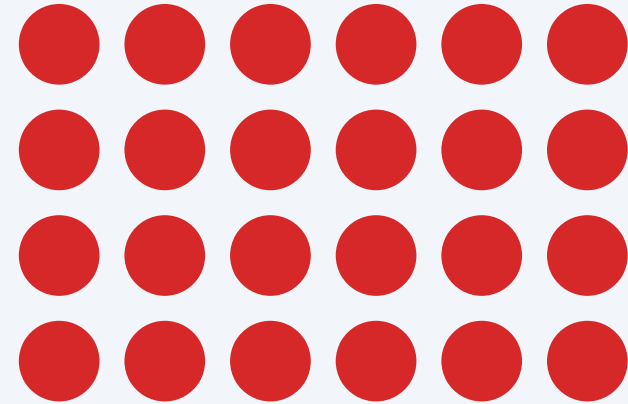
4.C.2

Computation

Multiply a whole number of up to four digits by a one-digit whole number, and multiply two two-digit numbers, using strategies based on place value and the properties of operations. Describe the strategy and explain the reasoning.

Why Arrays? Why LEGO?

- Builders arrange bricks in rows and columns — rectangular arrays that model multiplication directly (4 rows $\times$ 6 studs = 24 connection points)
- The commutative property shows up naturally: a 3 $\times$ 8 base plate covers the same area as an 8 $\times$ 3 plate, though each fits a different purpose
- Scaling a design (one 6 $\times$ 10 house $\rightarrow$ three identical houses) mirrors how architects and planners estimate materials



$$4 \times 6 = 24$$

4 rows $\times$ 6 studs per row



LESSON IDEA

Building Blocks & Smart Shopping

- **Launch the problem** “Order too few bricks, construction stops. Too many, you waste money.”
- **Model together** Calculate a 6×8 base as a class, then extend to multiple floors
- **Build within budget** Students sketch on grid paper and construct within a brick budget (e.g., 80 bricks)
- **Circulate & discuss** “What multiplication helped you figure out how many bricks you needed?”
- **Preview what's next** A whole street of buildings — today's math scales up to a city



LESSON IDEA

Welcome to City Planning School

- **Notice the pattern** How buildings line up and streets form grids in students' own neighborhoods
- **Meet the career** City planners decide where buildings, parks, and roads go
- **Count the studs** Rows $\times$ columns on a base plate — discover the total quickly
- **Record the equation** Student thinking becomes multiplication sentences on the board
- **Sketch & share** A building footprint (6×4 , 8×5) with its matching equation, shared in pairs

Arrays All Around Us



Egg Cartons



Apartment Windows



Parking Lots



Orchards



Solar Panels



Stadium Seating

Farmers, engineers, and architects all use arrays to maximize space and simplify counting.

Challenge: build three different arrays that each equal 24 squares — 4×6 , 3×8 , and 2×12 .

The Project: Design & Build a LEGO City

Apply multiplication, arrays, and spatial reasoning to design and construct a collaborative LEGO city.



PHASE 1

Explore

Discover arrays in real-world STEM contexts through hands-on exploration



PHASE 2

Build

Design and construct an individual structure within a brick budget



PHASE 3

Collaborate

Combine buildings into neighborhood districts and present to the class

Timeline at a Glance



Group Structure Legend

- Individual — skill-building & personal structure
- Partner — brief peer feedback during Lessons 1–4
- Group (3–4) — combining buildings into districts
- Whole Class — presentations & final city assembly

From Skill to Synthesis

LEARNING PROGRESSION

- 1 Identify arrays in real-world contexts
- 2 Calculate area & introduce volume
- 3 Design an individual blueprint
- 4 Build, estimate materials & explain reasoning
- 5 Combine into districts & present designs



Formative

Observation checklists and exit tickets (Lessons 1–2), blueprint conferencing (Lessons 3–4), and collaboration rubrics (Lessons 5–6).



Summative

Final city council presentations (Lesson 7), plus builder's notebooks documenting sketches, calculations, and reflections across the whole module.



Setting Up for Success

- Sort bricks by size or color; assign roles for distribution and cleanup
- Set clear norms for collaboration — one voice at a time, hands-off until invited, a “freeze” signal for attention
- Budget 5–7 minutes for transitions between discussion and building phases
- Use rotation stations if LEGO sets are limited, so every student has equitable access
- Photograph work at each phase — 3D builds are hard to store, easy to lose as evidence

From studs to skylines — multiplication becomes a tool for real design thinking.