

Materials Needed:

- Assortment of Lego bricks (various sizes, especially basic bricks like 2x2, 2x4, 1x2, etc.)
- A flat Lego baseplate (optional, but helpful)
- Paper or notebook
- Pencil
- Ruler (optional)

Let's Build with Geometry!

Hey Lego Master! Did you know that every time you snap bricks together, you're secretly using geometry? Geometry is the part of math that studies shapes, sizes, and spaces. Today, we're going to explore some cool geometry ideas using our favorite building blocks!

Part 1: Perimeter - The Edges!

Perimeter is the total distance around the outside edge of a flat shape. Think of it like building a fence around a Lego garden.

Activity 1: Perimeter Practice

1. Take a few Lego bricks and build a simple flat rectangle on your baseplate or table.
2. Let's count the 'studs' along the outside edges. A 'stud' is one of those little bumps on top of a Lego brick. Let's say one stud length is our unit.
3. Count the studs along the length of your rectangle. Count the studs along the width.
4. The perimeter is $(\text{Length} + \text{Width}) \times 2$. For example, if your rectangle is 4 studs long and 3 studs wide, the perimeter is $(4 + 3) \times 2 = 7 \times 2 = 14$ stud lengths.
5. Try building shapes with these perimeters: 10 studs, 16 studs, 24 studs. Can you make different shapes with the same perimeter?

Part 2: Area - The Surface!

Area is the amount of flat space a shape covers. Think of it as how many 1x1 Lego bricks it would take to completely cover the top of your shape.

Activity 2: Area Architects

1. Build another flat rectangle with Legos.
2. To find the area, we multiply the length (in studs) by the width (in studs). If your rectangle is 4 studs long and 3 studs wide, the area is $4 \times 3 = 12$ square studs. You can check this by covering it with 1x1 bricks (if you have them) or by counting the total studs on the surface.
3. Build a shape with an area of 16 square studs.
4. Build a different shape with an area of 20 square studs.
5. Can you build a shape that has a perimeter of 18 studs AND an area of 20 square studs? (Hint: Think 5 studs x 4 studs).

Part 3: Volume - The Space Inside!

Volume is the amount of space a 3D object takes up. Think of it as how many Lego bricks it takes to build the whole structure, not just the flat top.

Activity 3: Volume Voyagers

1. Let's use a standard 2x2 Lego brick as our basic unit of volume.
2. Build a simple rectangular prism (like a box) using Lego bricks. Make sure it's solid or imagine it's solid.
3. Count how many studs long it is (Length), how many studs wide it is (Width), and how many bricks high it is (Height).
4. To find the volume, multiply Length x Width x Height. For example, if your structure is 4 studs long, 2 studs wide, and 3 bricks high, the volume is $4 \times 2 \times 3 = 24$ 'cubic bricks' (or calculate total studs used if easier). A simpler way for Legos: Count the total number of 1x1 equivalent bricks used, or calculate total studs volume (Length_studs * Width_studs * Height_studs_equivalent). Let's count total 2x2 bricks used if you built it with only those. If you built a 2-stud x 2-stud base (which is one 2x2 brick) and made it 3 bricks high, you used three 2x2 bricks. The volume is 3 '2x2 brick units'.
5. Let's standardize: We can think of volume as the total number of studs enclosed. For a 4-stud long, 2-stud wide, 3-bricks high structure: The base has $4 \times 2 = 8$ studs. If it's 3 standard bricks high, the volume is roughly $8 \text{ studs/layer} \times 3 \text{ layers} = 24$ 'stud-layer' units. A true mathematical volume would require precise unit dimensions. For simplicity today, let's count the total number of 1x1 equivalent studs used to build it solid. A 2x4 brick is equivalent to eight 1x1 bricks.
6. Build a structure using exactly twelve 2x2 Lego bricks. What are its dimensions (Length, Width, Height in bricks)? Can you build different shapes with the same volume?
7. Build a structure with a volume of approximately 30 'stud-layer' units.

Challenge Build!

Design and build a Lego house (it can be simple!). Then, calculate:

- The perimeter of its base.
- The area of its base.
- The approximate volume of the main part of the house (count the bricks or estimate using $L \times W \times H$).

Write down your calculations in your notebook. Great job exploring geometry with Legos today!