LEARNING RESOURCES®

LER 3551/3552

Ages 6+ | Grades 1+

brights!™ Base Ten

Base Ten Blocks establish concepts related to the base ten number system. Each component is a multiple of the next larger component by a factor of 10. Use these blocks to help students understand place value in written numerals, make models of all operations with whole numbers and decimals, and demonstrate geometric concepts of area, volume, and metric measurement. The following examples show some effective ways to use the blocks in your classroom.

Place Value

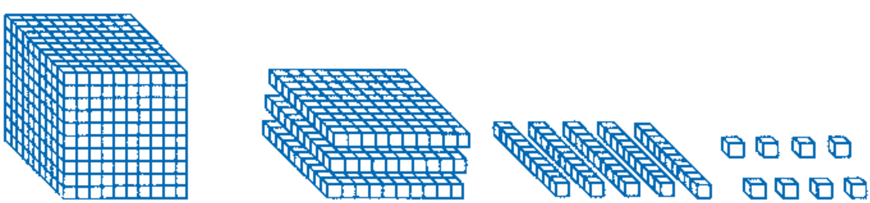
To reinforce place value, have students try to solve the following example problems.

Example:

"Build a tower using one cube, 11 flats, 15 rods, and 13 units. Now, build a same-size tower using as few pieces as possible." Instruct students to regroup ten smaller pieces for one piece of the next size: 2 cubes, 2 flats, 6 rods, 3 units.

After solving the example problem, students should build and record base ten numerals, such as the following example:

1358 may be expressed as:



Th	H	T	O
1	3	5	8

Students should also have an understanding of the following equivalences:

10 units are equivalent to 1 rod
10 rods are equivalent to 1 flat
10 flats are equivalent to 1 cube

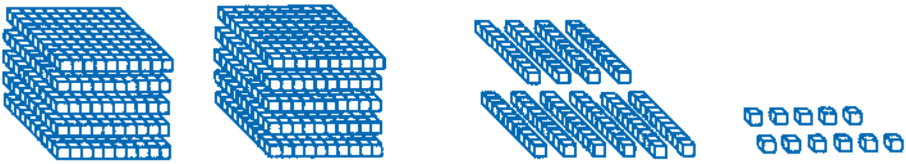
⚠ WARNING:
CHOKING HAZARD - Small parts.
Not for children under 3 years.

Addition

Have students build the following to reinforce three-digit addition with regrouping:

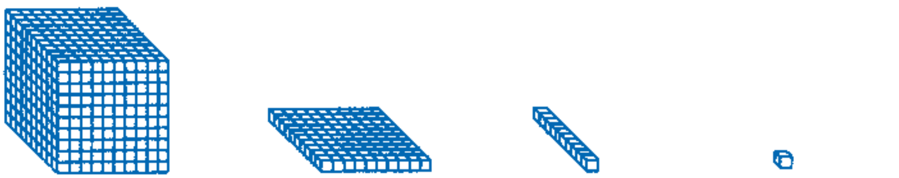
Build 276 (2 flats, 7 rods, 6 units)
Build 835 (8 flats, 3 rods, 5 units)

Combine first the units, then the rods, and then the flats:



10 flats 10 rods 11 units

Exchange smaller pieces for larger pieces whenever possible:



1 cube 1 flat 1 rod 1 unit

record:

Th	H	T	O
	2	7	6
+	8	3	5
1	1	1	1

Subtraction

Example A:

Top row:	**3 cubes**	**4 flats**	**8 rods**	**7 units**
Second row:	**1 cube**	**2 flats**	**6 rods**	**4 units**

Ask a student to take away from the top row as many as he or she sees in the second row. This second row should not be touched, only viewed. Such a rule will become more important as you solve problems involving regrouping.

Subtraction with regrouping should only be handled by children who have grown familiar with the equivalences among the pieces.

Example B:

Top row:	**3 cubes**	**2 flats**	**2 rods**	**3 units**
Second row:	**1 cube**	**7 flats**	**6 rods**	**9 units**

Ask a student to take away from the top row as many as he or she sees in the second row. Remind the student that the second row should not be touched.

Encourage students to follow these regrouping steps:

1. You cannot take 9 units from 3, so exchange 1 rod for 10 more units. Then, take 9 units, leaving 4.
2. You now have 1 rod. But you cannot take away 6 rods from 1 rod, so exchange 1 flat for 10 rods. Now, take 6 rods from 11 rods, leaving 5 rods.
3. You cannot take 7 flats from 1 flat, so exchange 1 cube for 10 flats. Then, take away 7 flats from this pile of 11 flats, leaving 4 flats.
4. Finally, take 1 cube from the 2 cubes, leaving 1 cube.

To record, a child might write:

	Th	H	T	O
Top row:	3	2	2	3
Second row:	1	7	6	9
Remainder in top row:	1	4	5	4

It is often helpful for students to view subtraction as the inverse of addition. Adding pieces to one row to match a first row can provide experience in regrouping.

Example C:

Top row: 3 cubes
Second row: 1 cube 8 flats 9 rods 7 units

Ask students, "How much larger is the top row than the second row? That is, how much must you add to the second row to get to the top row?"

By thinking of this problem in terms of adding to the second row, students will take the following steps:

1. Three more units will give 1 more rod. (3 units)
2. Now you have 10 rods, which make 1 more flat. (0 rods)
3. Now you have 9 flats, so you need 1 more to make a cube. (1 flat)
4. Finally, you need 1 more cube to have 3 cubes. (1 cube)

In all you need 1 cube, 1 flat, and 3 units to make the second row match the top row.

Record this problem as the child proceeds step by step:

	Th	H	T	O
Top row:	3	0	0	0
Second row:	1	8	9	7
Remainder in top row:	1	1	0	3

Multiplication/Division

Since multiplication is repeated addition, and division the inverse of multiplication, these operations are demonstrated much like addition of equals. For example, 3 x 37 would be shown as 3 sets of 3 rods and 7 units. Then the trading would proceed as before until the arrangement would be 1 flat, 1 rod, and 1 unit.

To illustrate division, ask students to put 264 (2 flats, 6 rods, and 4 units) into 2 equal sets, 3 equal sets, 4 equal sets, and so on.

In each case, it is important to associate the model with the written algorithm.

Decimals

Decimals may be introduced by simply redefining the unit. For example, if the block is assigned a value of 1, the rod = 10, flat = 100, and cube = 1,000. But if the rod is assigned the value of 1, the flat becomes 10, the cube 100, and the unit 1/10.

Geometry

Since the unit block measures 1 centimeter on each edge or 1 cubic centimeter, the blocks lend themselves nicely to metric measurement. The cube, for example, measures 10 cm x 10 cm, or 1,000 cubic decimeters.

Also, by building various solids with the blocks, students can explore volume and surface area.

ATENCIÓN: PELIGRO DE ASFIXIA.
Piezas pequeñas. No se recomienda para menores de 3 años.
ATTENTION: RISQUE D'ÉTOUFFEMENT.
Petites pièces. Interdit aux enfants en dessous de 3 ans.
ACHTUNG: ERSTICKUNGSGEFAHR.
Kleine Teile. Nicht geeignet für Kinder unter 3 Jahren.

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