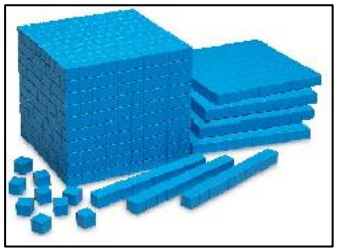
Base 10 Blocks



What are Base 10 Blocks?

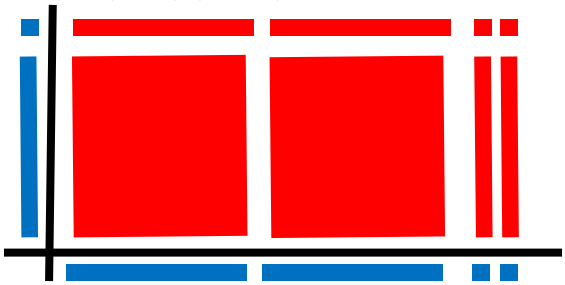
There are four different sizes of base 10 blocks. The smallest blocks, called **units**, are 1 cm^3. The next largest block is a long narrow block that measures 10 cm by 1 cm by 1 cm. These 10-unit pieces are called **rods**. The flat square blocks are 10 cm by 10 cm by 1 cm and are called **flats**. The largest blocks are 10 cm by 10 cm by 10 cm and are called **cubes**. These terms are used to signify the interchangeableness of the pieces in place value.

How do Base 10 Blocks help Students?

The size relationships of the blocks can be used to explore number concepts. Students can explore place value concepts as well as addition, subtraction, multiplication, and division with both whole and decimal numbers. These blocks provide a visual representation and foundation for understanding traditional algorithms. They can also be used to explore perimeter, area, and volume concepts.

Although algebra tiles are a better manipulative to explore algebra, base 10 blocks can be used in single-variable activities. The unit would represent the number. The rod would represent the single variable such as x. The flat would represent the square of the variable such as x^2.

$$(x + 1)(2x + 2) = 2x^2 + 4x + 2$$



How many are recommended?

Students can use the base 10 blocks individually, in pairs, or small groups depending on the activity as well as the concept being explored. A class set of 1000 unit cubes, 200 rods, 120 flats and 10 cubes will allow students to perform a variety of activities. When students are first learning to use base 10 blocks, allow for exploration time. A transparent set is useful for overhead or document camera demonstrations by students(s) or teacher(s).

Sample Activities

1. Use the base 10 blocks to represent the following numbers: 1342, 211.1, 13.28, 2.524
2. How many ways can you represent 43.21, using the blocks?
3. Use any combination of blocks to represent 258. Place your blocks on centimetre grid paper to make a polygon so that there are no empty spaces in the middle. Record the shape and perimeter of the shape. Rearrange the blocks and find the new perimeter. How can you show the shortest perimeter? the longest perimeter?
4. The object of the game is to get closest to *one whole* after 10 rounds. For this game, a flat is equal to *one whole*. Students take turns rolling two numbered cubes in each round and choose how to arrange the digits to make a number less than one. Students then decide whether they add or subtract that number from 1 and can trade blocks for their flat, if necessary. After 10 rounds see which player is closest to *one whole*. Discuss strategies.
5. Solve this problem, using base 10 blocks: A video game company wants to pack their games to send out to stores. The game is the same size as a flat. They have decided to fit 12 games in a box. What are their box size options? Which box would be the most cost efficient box (use the least amount of packaging)?
6. If there are no cubes available, how else can you represent 1000? How many tens is a thousand worth? How do you know?
7. How do you know that 16 hundreds are more than 1000? If you know a number is 36 hundreds, how do you know how many tens it is?

8. Show how to model 4 × 22 with the base 10 blocks. Is there another way to arrange the blocks for the same answer? What do you notice about the two numbers you multiply in your new arrangement? Try it again for 16 × 23.
9. Solve this problem, using base 10 blocks: It cost $120 for 6 people to enter an amusement park. Model how you would determine how much each person would pay to get into the park.
10. Use the base 10 blocks to prove that 0.4 and 0.40 are the same
11. Put the amounts in order from least to greatest: 14.2, 1.42, 0.14, 12.4, 1.24
12. If a cube is a whole, how much is a flat worth? a rod? a unit? two rods? a flat and 4 units?
13. Which is larger 4.2 or 4.12? How do you know?
14. Use the blocks to model the rules as to why $(n+1)(n+1) = n^2 + 2n + 1$.
15. Solve this problem, using base 10 blocks (from EQAO 2007-2008)**:** Josie, Christina, Audrey, and Manny go shopping: Josie spends $\frac{4}{5}$ of her money, Christina spends 75% of her money, Audrey spends 0.68 of her money and Manny spends $\frac{17}{20}$ of his money. Who has the largest percentage of money left?

Recommended Websites

http://nlvm.usu.edu/en/nav/frames_asid_152_g_1_t_1.html?from=topic_t_1.html using base 10 blocks to represent numbers

http://nlvm.usu.edu/en/nav/frames_asid_154_g_1_t_1.html?from=topic_t_1.html addition

http://nlvm.usu.edu/en/nav/frames_asid_155_g_1_t_1.html?from=topic_t_1.html subtraction

http://nlvm.usu.edu/en/nav/frames_asid_264_g_1_t_1.html?from=topic_t_1.html adding and subtracting decimals

http://www.folksemantic.com/visits/104455 adding and subtracting decimals

http://www.susancanthony.com/Resources/base10ideas.html base 10 activities

http://ejad.best.vwh.net/java/b10blocks/description.html#algebra base 10 activities