Base Ten Dual Number Line

Guide & Activities

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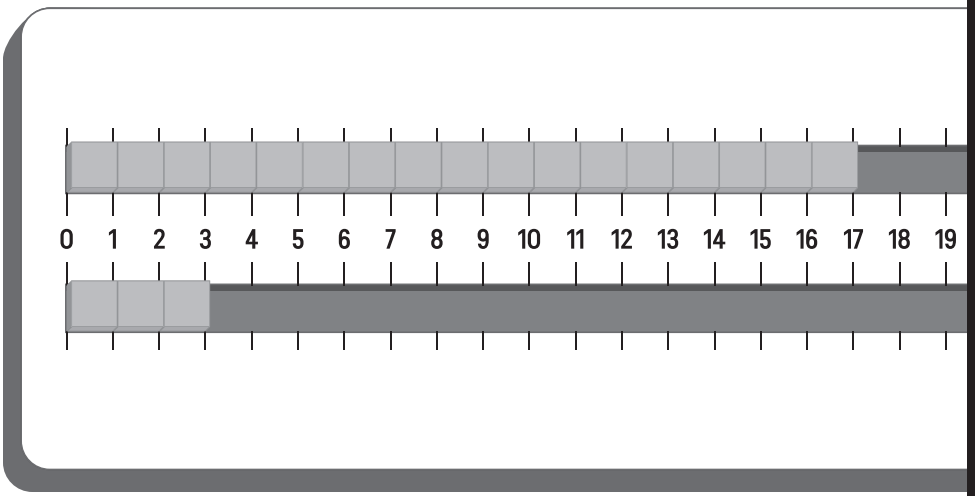

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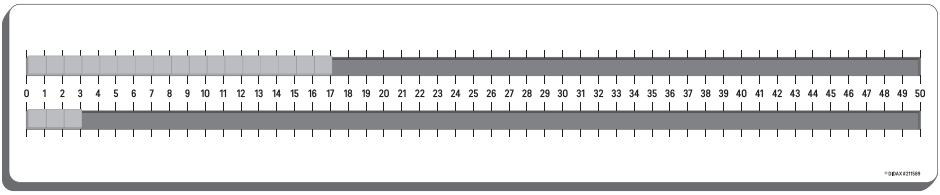


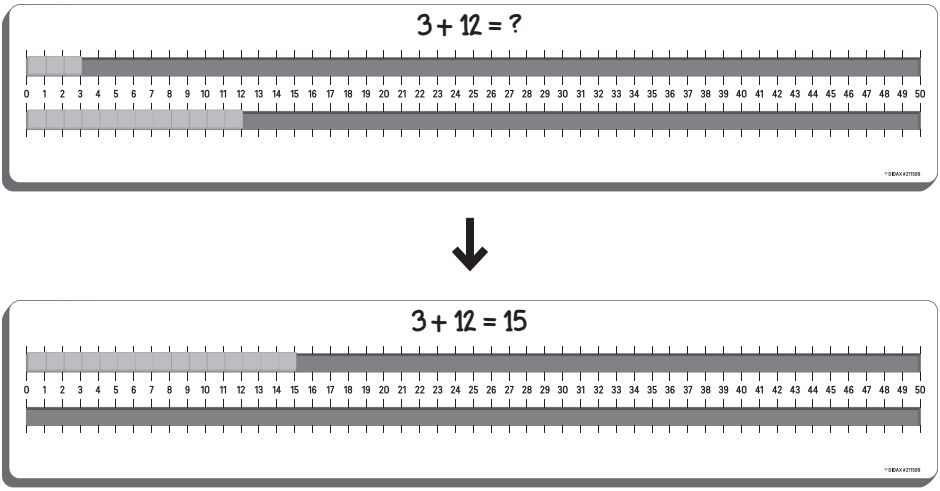
This tool is designed to be used with standard 1-centimeter base ten blocks (units and rods of 10) to enable students to compare numbers, solve problems, and confirm estimation. The dual channels to hold the base ten blocks provide an opportunity for students to make effective use of mathematical models and to look for and make use of structure as recommended by the Common Core State Standards (CCSS).

If students are unfamiliar with base ten blocks, start by asking them to line up ten units and compare them to a rod. You may want to explain that they can exchange ten units for a rod or they can exchange a rod for ten units as they use the material.

Addition and Subtraction

Activity One

(1.OA.A.1) Use addition and subtraction within 20 to solve word problems involving situations of adding to, taking from, putting together, taking apart, and comparing, with unknowns in all positions, e.g., by using objects, drawings, and equations with a symbol for the unknown number to represent the problem.



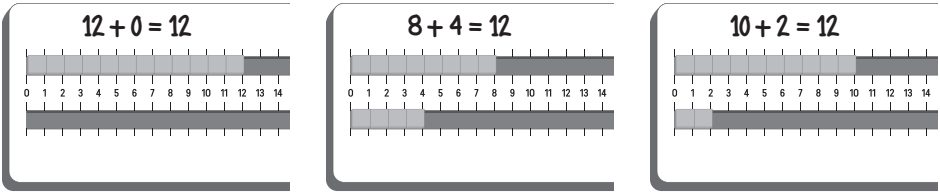
Present the following word problem. “I have three donuts and I am going to buy 12 more. How many donuts will I have?

Have the students illustrate the problem by showing the number line with 3 units in the top channel and one rod and 2 units in the bottom. They can then move the cubes from the bottom channel next to the cubes in the top channel to see that the total is 15.

Activity Two

(1.OA.B.3) Apply properties of operations as strategies to add and subtract. Examples: If 8 + 3 = 11 is known, then 3 + 8 = 11 is also known. (Commutative property of addition.) To add 2 + 6 + 4, the second two numbers can be added to make a ten, so 2 + 6 + 4 = 2 + 10 = 12. (Associative property of addition.)

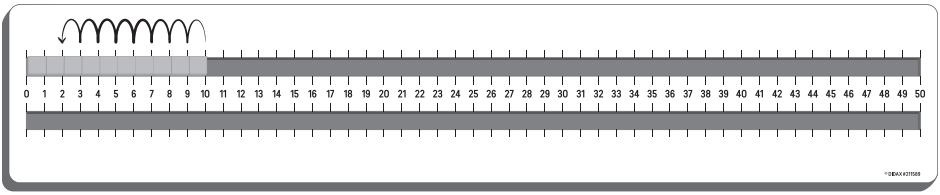
Examples:



The dual number line is invaluable for this activity. Ask the student to pick up 12 cubes and use the number line to find all the combinations of two numbers that total 12. You can also ask them to exchange ten units for a rod as necessary.

Activity Three

(1.OA.B.4) Understand subtraction as an unknown-addend problem. For example, subtract 10 – 8 by finding the number that makes 10 when added to 8.



Ask the students to use the top channel of the number line to find the answer to the problem 10 – 8.

Have the students place a rod of ten in the top channel. Next have them use a dry-erase marker to take 8 "hops" back to land on 2. They can then exchange the rod of ten for 2 cubes.

Activity Four

(1.NBT.B.2.A) 10 can be thought of as a bundle of ten ones — called a "ten."

Ask the students to put a ten-rod in the top channel and ten units in the bottom. They can then compare the two to see how they are the same amount.

Activity Five

(1.NBT.B.2.B) The numbers from 11 to 19 are composed of a ten and one, two, three, four, five, six, seven, eight, or nine ones.

Ask the students to use the top channel only to show how adding a unit to a rod creates the numbers 11 to 19.

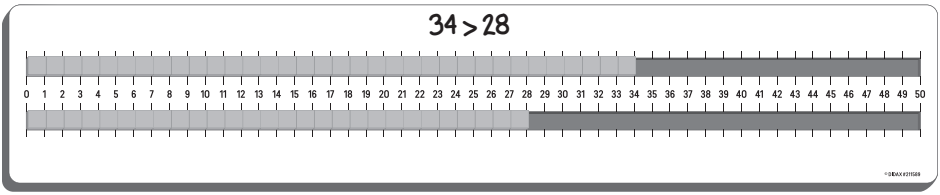
Activity Six

(1.NBT.B.2.C) The numbers 10, 20, 30, 40, 50, 60, 70, 80, 90 refer to one, two, three, four, five, six, seven, eight, or nine tens (and 0 ones).

Ask the students to use the top channel of the number line to show how each rod of ten makes 10, 20, 30, 40 and 50.

Activity Seven

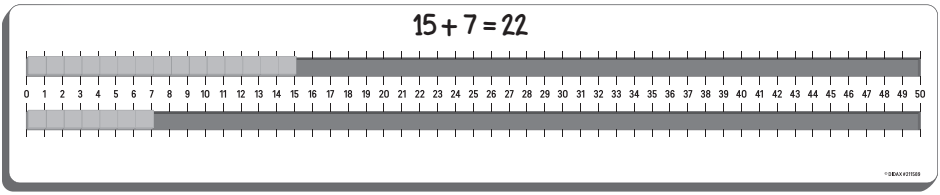
(1.NBT.3) Compare two two-digit numbers based on meanings of the tens and ones digits, recording the results of comparisons with the symbols >, =, and <.



Ask the students to compare 34 and 28 using the blocks and two channels of the number line. They can then record their findings using the appropriate symbols. Repeat with other numbers below 50.

Activity Eight

(2.OA.A.1) Use addition and subtraction within 100 to solve one- and two-step word problems involving situations of adding to, taking from, putting together, taking apart, and comparing, with unknowns in all positions, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem.



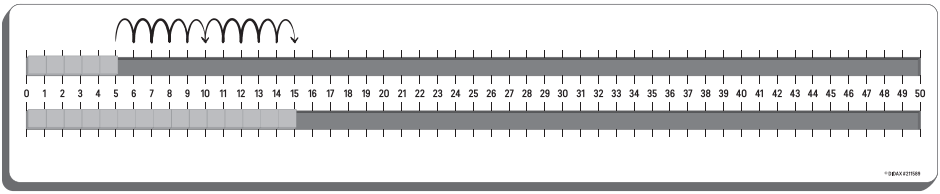
Present the following word problem: "There are 15 chairs in Ms. Davis' classroom, just enough for all her students. If 7 new students are added to her class, how many chairs will be needed in all?"

The students can illustrate the problem by showing the number line with one rod and 5 units in the top channel and 7 units on the bottom. They can then move the cubes from the bottom channel next to the cubes in the top channel for a total of 22. The students can exchange ten of the loose cubes for a rod of ten as necessary.

Multiplication and Division

Activity One

(3.OA.A.1) Interpret products of whole numbers, e.g., interpret 5 × 7 as the total number of objects in 5 groups of 7 objects each. For example, describe a context in which a total number of objects can be expressed as 5 × 7.

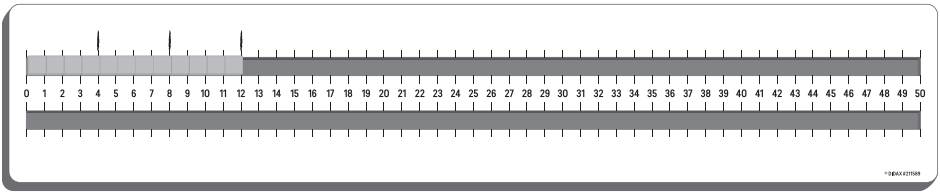


Present the following word problem: How many steps would you need to take in all if the room is five steps across and you walk across the room three times?

The students can start by putting 5 cubes in the top channel of the number line to represent walking across the room once. Next they can use a dry-erase marker to take 5 hops to represent walking across the room a second time. Finally, they can take 5 more hops to represent walking across the room a third time. Additionally, the students can make 3 groups of 5 cubes to represent crossing the room three times and add them together in the bottom channel to get the total number of steps.

Activity Two

(3.OA.A.2) Interpret whole-number quotients of whole numbers, e.g., interpret 56 ÷ 8 as the number of objects in each share when 56 objects are partitioned equally into 8 shares, or as a number of shares when 56 objects are partitioned into equal shares of 8 objects each. For example, describe a context in which a number of shares or a number of groups can be expressed as 56 ÷ 8.

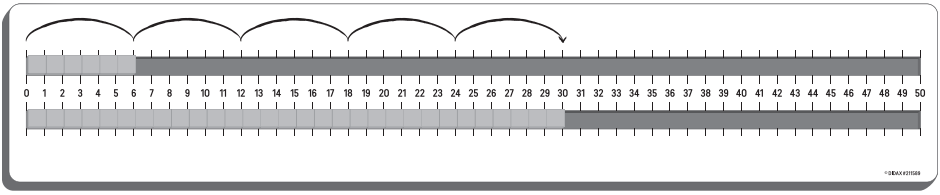


Present the following word problem: If 12 cookies were shared equally between 3 students, how many cookies would each student get?

Have the students place 12 cubes in the top channel to represent the 12 cookies. Next have them use a dry-erase marker to divide the 12 cubes into 3 equal segments.

Activity Three

(3.OA.A.4) Determine the unknown whole number in a multiplication or division equation relating three whole numbers. For example, determine the unknown number that makes the equation true in each of the equations 8 × ? = 48, 5 = ? ÷ 3, 6 × 6 = ?



Present the following word problem: There are a total of 30 students in the class. The teacher separates the students into equal groups of 6 students. How many groups are there?

Have the students place 3 rods of ten in the bottom channel to represent the 30 students. Next have them count out 6 cubes to represent one group and have them place the cubes in the top channel. Using a dry-erase marker, have them skip-count by 6 to see how many groups there are in all.