Let’s Count On Math™ Number Line System - Grade 2+ Kit

Kit Contents:

Number line pieces:	0 to 10 (1)	11 to 20 (1)	21-30 (1)	31-40 (1)	41-50 (1)
	51-60 (1)	61-70 (1)	71-80 (1)	81-90 (1)	91-100 (1)
Number strips:	“1” (10)	“2” (10)	“3” (10)	“4” (10)	“5” (10)
	“6” (10)	“7” (10)	“8” (10)	“9” (10)	“10” (10)

Negative Integer Kit Contents:

Number line pieces:	–50 to –41 (1)	–40 to –31 (1)	–30 to –21 (1)	–20 to –11 (1)	–10 to –1 (1)
Number strips:	“–1” (10)	“–2” (10)	“–3” (10)	“–4” (10)	“–5” (10)
	“–6” (9)	“–7” (7)	“–8” (6)	“–9” (5)	“–10” (5)

“Integer Basket” magnetic metal plate (1)

Purpose:

To help students develop a deeper understanding of numbers (positive integers) and operations by physically representing and manipulating quantities. The number line system enables students to see patterns, build mathematical relationships, and develop flexible counting strategies that support addition, subtraction, multiplication, division, and later mathematical concepts.

Thinking - encourage students to ask:

1) What are we counting? (Ones? Repeated numbers?)
2) How are we counting? (Adding? Subtracting? Multiplying? Pattern? To make equivalents?)

Using the Number Line System:

1) At carpet time, other whole class, or teaching time: position the parts of the number line you wish to use on the board at an appropriate height. The teacher or students place number tiles below the number line at the dots to demonstrate various math operations.
2) Place number strips below and above the number line to demonstrate that there are multiple ways to arrive at the same value.
3) Sums to a number. Place a number strip on the board and ask students to use other pieces to make that value. Depending on your objectives, limit them to using only two pieces, or allow other combinations.
4) Use as a station during math centres time.
   A. Place number line strips on the board and have them explore quantities on the number line.
   B. Have multiple 10s (or other number) on the board and have several students explore equivalent combinations to 5.
5) With the additional negative integer kit demonstrate negative integer operations.

Free 0-100 number line to print and post in your classroom. See QR code on flip side

Sample Learning Activities:

1) Counting groups - use the number strips to demonstrate addition (and subtraction)
2) Skip counting - place multiple tiles of the same number on the number line. Look at the the boundary markers between the ends of number strips as the markers for reciting multiples.

Find the Counting. Find the Meaning.

3) Demonstrate multiplication - after placing strips for skip counting, write 1, 2, 3, 4, etc. below the number strips. Now recite one 6 is 6, two 6s is 12, three 6s is 18, etc. Or ask, “How much are three 6s equal to?”
4) Model division (2 ways) - For 15 ÷ 3. Start at 15 on the number line.
   a. For partitive division (How many are in each of the 3 groups?) show that 15 shared equally between three groups, each group would get 5 by placing three “5” strips.
   b. For quotitive division (How many groups of 3 are there?) show a “3” strip can be removed five times from 15.
5) Model division with remainders - To model 35 ÷ 6. Start at 35 (or mark that as the starting point on the board and place “6” strips towards zero to show how many 6s can be removed from 35. Show that after five 6s are removed there is still 5 is remaining. As we are dividing by 6, it is 5/6 remaining to be removed.
6) Demonstrate multiples and LCMs for two numbers, e.g., LCM for 4 and 6. Place “4” strips below the number line. Place “6” strips above the number line. Highlight the points where the ends match up.
7) Model “unknown” questions, e.g., A number plus 5 makes 12. What is the number? (Start at 12 and place a 5 tile - see that seven is remaining. Ask what strip would complete the number?)
8) Visually demonstrate the commutative principle for addition and multiplication:
   1) Demonstration of ways to make 5, have students place 1+4 and 2+3 on the board, ask if there are other ways to make 5 using only 2 strips? 4+1 and 3+2. Demonstrate other part-part(-part)-whole combinations
   2) Model 3x4 by placing three “4”s below the number line. Then ask what would represent 4x3, place four “3”s above. They both equal 12 but they are not the same, i.e., they are physically different. (Very much like making change: One $10 bill = 5 Twoonies = two $5 bills = 10 Loonies)
9) Use the number strips to demonstrate that even numbers are symmetrical (split into two equal/even halves) and that odd numbers cannot be symmetrically split using only whole numbers. Demonstrate that 2n+1 (where n is any one of the number strips) will always make an odd number.
10) Use multiples of the same number strip to demonstrate fractions of the whole. Where applicable use larger or smaller strips to model equivalent fractions, e.g., four “3”s below. two “6”s above, six “2”s, and look at fractions of 12 and their equivalents.
11) Show perfect squares - show the 1 tile is a square. Two 2s, three 3s, four 4s, etc. continue to make a square.

Negative Number Line System

Purpose:

The Let’s Count On Math™ Negative Integer Number Line System helps students build conceptual understanding before memorizing rules. By physically moving quantities left and right on the number line, students can see why integer operations work rather than relying on procedures alone. This system turns integer rules into visible physical actions and supports memorization by first developing conceptual reasoning and understanding.

Thinking - encourage students to ask:

1) What are we counting? (e.g., –5s? Repeated numbers?)
2) How are we counting? (In particular, the effect of adding or removing negative values.)

Using the Number Line System:

1) Position the parts of the positive and negative number line you wish to use on the board at an appropriate height. The teacher or students place number tiles below the number line at the dots to demonstrate various math operations. The red arrows on the negative strips indicate the strips are placed in the leftward direction.
2) Use the “Integer Basket” with the black pointer marker placed at “0”. Insert negative or positive integers onto the metal plate and move the “Basket” to the proper spot on the number line.
3) Establish the concept of “zero pairs”. Place a –4 in the basket, move the basket to negative 4. Then place a +4 into the basket and move back to zero. Next ask what happens if we place both –4 and +4 into the basket at the same time, the result is no movement, i.e., a “zero pair."
4) Use as a station during math centres time. Place number line strips on the board and have them explore quantities on the number line or give students numeric questions to model on the number line or vice versa.

Summary of Key Mathematical Ideas:
Larger values are farther right
Greater magnitude means farther from zero
Adding positive values moves right
Removing positive values moves left
Adding negative values moves left
Removing negative values moves right
Zero pairs have no net effect

Sample Learning Activities:

1) Highlight that the red arrows and number orientation of the negative number strips indicates placement in the left direction.

2) Compare quantities: Place two number strips (positive or negative) on the number line. Emphasize that the larger value is always farther to the right on the number line. For example, –5 is greater than –8, because –5 is farther to the right. However, –8 has the greater magnitude (absolute value) because it is farther from zero. Magnitude describes size without regard to direction. Magnitude is an important principle to establish for understanding results of addition questions.

3) Use the number strips to demonstrate addition (and subtraction later on) of integers as the net result (based on magnitudes) of moving left and/or right. Examples:

Demonstrate	(–5) + (–6)	(–7) + (+10)	(–8) + (+6)
	(–5) moves left 5	(–7) moves left 7	(–8) moves left 8
	(–6) moves left 6	(+10) moves right 10	(+6) moves right 6
Emphasize:	Only leftward movement (–)	Larger (+) magnitude	Larger (–) magnitude
	Result: –11	Result: 3	Result: –2

4) Demonstrate why the “add the opposite” rule for subtracting integers works using the **<u>integer basket</u>**.

Demonstrate	(–6) – (+8)	(5) – (–10)	(–4) – (–9)
	(–6) moves left 6	(5) moves right 5	(–4) moves left 4
	Insert (–8) & (+8) zero pair	Insert (–10) & (+10) zero pair	Insert (–9) & (+9) zero pair
	Remove the (+8)	Remove the (–10)	Remove the (–9)
	Observe that (–8) remains	Observe that (+10) remains	Observe that (+9) remains
	Move left 8 spaces	Move right 10 spaces	Move right 9 spaces
	Result: –14	Result: +15	Result: 5
Same as:	(–6) + (–8)	(5) + (+10)	(–4) + (+9)

Emphasize that most people have an easier time mentally performing with addition rather than subtraction which is why we do “add the opposite” to make questions simpler to deal with.

5) Skip counting - place multiples of the same negative tile on the number line to demonstrate that repeated addition of negative quantities results in leftward movement. Demonstrate 5(-6) results in -30.

6) Discover why (–) x (–) = (+).

   a) Example (–) x (–): Start the integer basket at zero. Place five of “zero pairs” of (-3) and (+3) into the basket to show the basket remains at zero. Ask: What can (–4) x (–3) mean? Answer: Remove four (-3) from the basket. See that a net +12 is the result.

   b) Example (–) x (+): Use the same zero pairs as in a). Ask: What can (–2) x (+3) mean? Answer: Remove two (+3) from the basket. See that the net result is negative 6.

   <u>Note</u>: Emphasize to students that it is critical to use accurate language for the multiplication rule. **Do NOT** say “a negative ***<u>and</u>*** a negative results in a positive.” We have already established that (–) + (–) results in left, left movement which is a (–) answer. **DO say** “a negative ***<u>times</u>*** a negative results in a positive.”

7) Model that 4 x (–5) and (–4) x (5) should have the same result.

   a) 4 x (–5) Place four (–5) strips above the number line to show –20 as the result.

   b) (–4) x (5) Below the number line place the integer basket. Put four zero pairs (–5)+(5) into the basket. Remove four (5) strips to show that the result is net –20.

8) Demonstrate integer division, examples:

   1) <u>Quotitive model</u> (–24) ÷ (–6) Start at (–24) and show how many (–6) can be directly removed from (–24). 4 of them. (If needed demonstrate that division with positive numbers also ends at zero if there are no remainders.)

   2) <u>Partitive model</u> (–16) ÷ 4 Draw an arrow pointing at (–16). We want to split (divide) it into 4 parts. That requires four (–4) strips, hence (–16) ÷ 4 = (–4)

9) Model simple “unknown” questions.

   a) $x + 5 = 9$ Place a 5 strip above the number line. Mark +9 below. What is needed to get from the (+5) to (+9)? Answer +4. Then demonstrate algebraically.

   b) $x + 5 = -9$ Place a 5 strip above the number line. Mark –9 below. What is needed to get from the (+5) to (–9)? Answer –14. Then demonstrate algebraically.

Website: **<u>www.LetsCountOnMath.com</u>**	**YouTube:** **@LetsCountOnMath**
Lesson ideas, classroom resources, printable materials, and product information.	Short demonstrations, teaching tips, and classroom activities covering many K-12 learning outcomes.