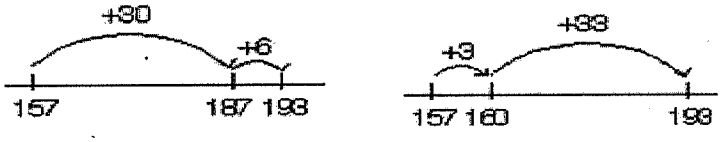
Open Number Lines

The open number line allows students to see the variety of ways that the same question can be solved.

For example, to solve 157 + 36 one student may begin at 157, add 30, then 6 while another may start at 157 and break the 36 into 3 and 33. This turns the question into the problem of adding 33 to 160.



Writing equations horizontally forces students to look at and think about the numerals, whereas written vertically students tend to immediately turn to the procedures, often abandoning reason.

Column Addition

What is it?

In the column-addition algorithm, vertical lines are drawn to separate ones, tens, hundreds, and so on. Once columns have been created, the usual place-value convention that each place must have only one digit can be broken without confusion. The digits in each column are then added, beginning in any column. Finally, any necessary trades are made, again starting in any column.

When do I use it?

Students will use this algorithm when adding two- and three- digit numbers.

Example:

Example:

	Tens	Ones
	4	4
+	3	9
	7	13

Step 1: Add the digits in each column

	Tens	Ones
Final Answer	8	3

Step 2: Regroup if necessary

Milestones:

When the students are able to regroup without writing the number in the column, they are ready to move on to the traditional place value algorithm.

Partial Sums

What is it?

This algorithm calculates partial sums, working with one place- value column at a time, and then adds all the partial sums to find the total. The partial sums can be found in any order, but working from left to right is often the student preference.

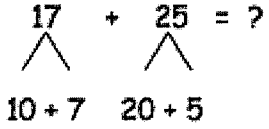
Partial-sums addition is the algorithm most similar to addition with base-10 blocks.

When do I use it?

Students will use this strategy when adding two or more two- or three-digit numbers.

One of the purposes of this algorithm is to help children think flexibly about numbers.

Example:



- Add the 10s — 10 + 20 = 30
- Add the 1s — 7 + 5 = 12
- Add the partial sums — 30 + 12 = 42

So, 17 + 25 = 42

Milestones:

If the students are increasing their efficiency and not needing every part/step written out for accuracy, they are ready to extend their thinking to partial-partial sums.

Shifting

What is it?

Systemically breaking a number apart.

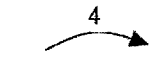
When do I use it?

Students use this strategy when trying to determine how to break up a number for easier computation.

Example:

For example, if children are using shifting to solve 37 + 56, they may take 4 from the 37 and add it to the 56 to get a friendly number.

Take 4 from 37
And put it with
the 56 to make 60.
Now you have
33 and 60.



~~37~~ + 56

33 + 60 = 93

or

37 and 60 is 97.
That's 4 extra,
So it's 93.

37 + 60 = 97
97 - 4 = 93

Milestones:

If students can consistently see numbers flexibly and group in ways to make addition easier, they are ready to extend their thinking to partial sums.

Making 10

What is it?

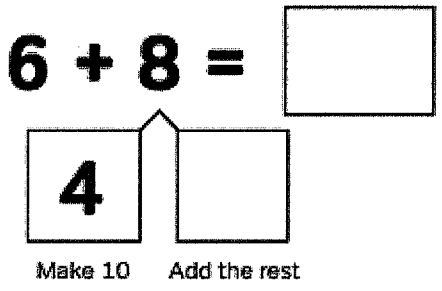
Students are given a number and can state the number needed to make 10.

When do I use it?

Students will use this strategy to find complements of 10.

Example:

For example, if the teacher says 4, the students would respond with "6" because 4 + 6 = 10.



Milestones:

If students can consistently and quickly give the complements of 10 for any given number, they are ready to extend their thinking to making 10s, 100, and 100s, as well as beginning to use partial sums.

Counting All

What is it?

Students use manipulatives to represent addition problems. They will use one-to-one correspondence to count all of the objects in the collection.

When do I use it?

Students use this strategy to find sums of beginning addition problems.

Example:

Students might have an arrangement of manipulatives grouped in a set of 3 and a set of 4. They would count all of the objects to find the sum of 3 + 4.

Milestones:

If students exhibit either of the following characteristics, they are ready to move on to Counting On.

Students begin skip counting when counting objects. (i.e. counting by 2s or 5s instead of by 1s).

Students begin grouping objects and start with the number of the group they've made when they begin counting.