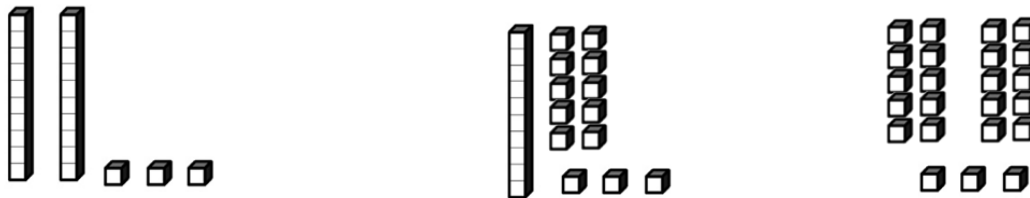


Struggles with regrouping

1. Establish what changes a number and what does not change a number

- A. Ask the students to make the number 23 out of MAB. Then ask, "Is there another way that you could make the same number using different blocks?" Keep going until the students have no more answers, then prompt for more using A1, A2 and A3 beneath.

Possible answers: These answers are all viable mathematically



Prompt for more answers to see what happens by asking, ***Is there another way?*** If no misconceptions come out, ask students if the following options are viable.

- A.1 *Teacher asks, "How about if I spread out all the blocks? Is it still 23?"*



Yes – no misconceptions yet

No - **This child has a misconception that the position of blocks changes the size of numbers**

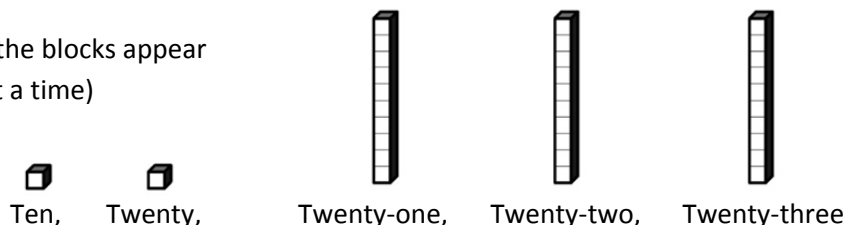
- A.2 *Teacher asks while moving the blocks to demonstrate, "How about if I squish the blocks together? Is it still 23?" "How about if I pile the blocks up? Is it still 23?"*

Yes – no misconceptions yet

No – **This child has a misconception that the position of blocks changes the size of numbers**

- A.3 *Teacher asks while moving the blocks to demonstrate, "How about if I swap the blocks? I'll use the small blocks as the tens and the long blocks as the ones. Is this still 23?" Teacher then places a ones block and says "ten", puts a second ones block and says "twenty", places a tens block and says "twenty-one" etc.*

(make the blocks appear one at a time)



No – no misconceptions

Yes – **This child has a misconception that place value has nothing to do with size, it is just an order for counting**

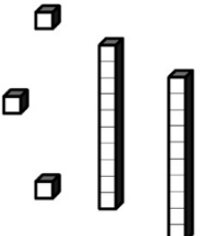
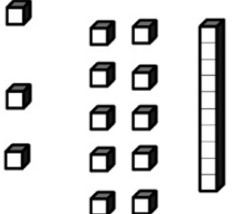
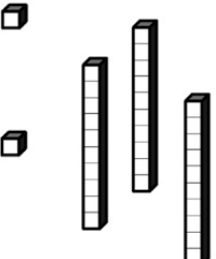
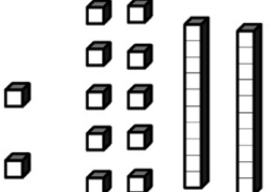
2. Establish that regrouping does not change the number, and examine multiple representations

How many ways could you make the number 63 out of MAB (or bundling sticks)?

Tens	Ones
6	3
5	13
4	23
3	33

These representations are actually all ok, and it is fine to record more than 9 ones in the ones column as long as the student recognises the difference between 10s and 1s. This is a necessary precursor to regrouping.

Match different representations with two-digit numbers, including checking for simple reversal

	23	Twenty-three	
	32	Thirty-two	

This can be extended to three digits:

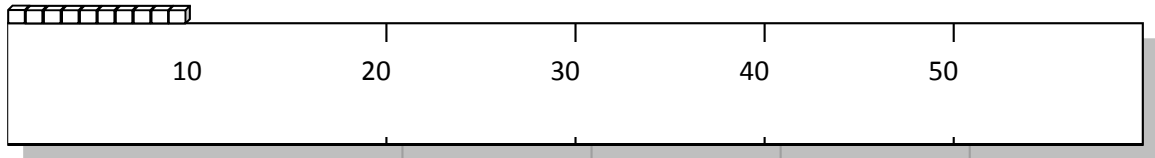
Which of these representations is not equal to 284?

Hundreds blocks	Tens blocks	Ones blocks
2	8	4
1	18	4
1	17	14
2	0	84
2	1	74
2	80	4

3. Use joining as a way of introducing addition with regrouping to establish patterns prior to introducing the algorithms

Try to add two numbers that would require regrouping using the following:

- a. Use a ruler to add MAB instead of a place value chart. Line up all the blocks along the ruler to find the answer then work backwards to determine what happened.



- b. Use tens frames to represent both numbers and add together. Place counters into physical tens frames (e.g. tea light candle containers work well) to add the numbers. This helps represent the “make tens” concept.

37 + 25

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c. Use two-line algorithms initially to record the changes

Regrouping is a way of reorganising numbers. The following picture and sum show what regrouping is. Look at how the numbers are being reorganised and explain it.

Question: $25 + 37$

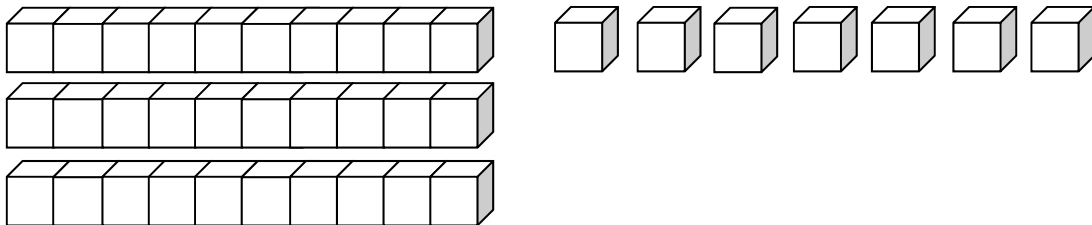
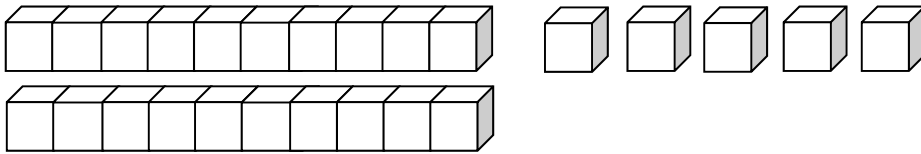
$$\begin{array}{r}
 25 \\
 + 37 \\
 \hline
 12 \\
 \hline
 50 \\
 \hline
 62
 \end{array}$$

Where did the 12 come from?

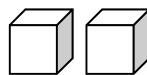
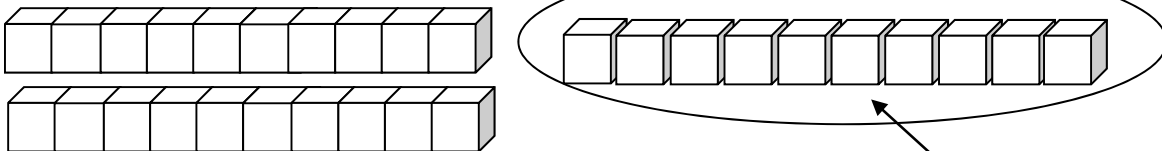
Where did the 50 come from?

Where did the 62 come from?

Drawing MAB that show 25 and 37:



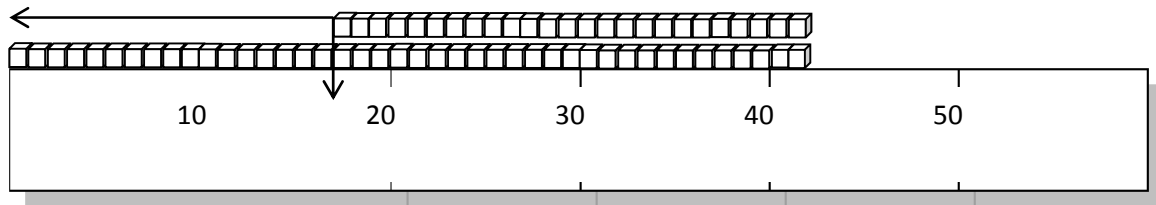
How I regrouped to make 62:



Where did this 10 come from? Explain how the ones were reorganised.

4. Introduce subtraction with regrouping using a number line or pieces of string and a ruler (find the missing addend) then use a simple two-step algorithm

Make the total and one of the terms and line them up on a ruler to find the missing addend. This picture shows what it would look like to subtract 25 from 42, leaving 17



Introduce a two-step process: it doesn't matter if you subtract the tens or the ones first

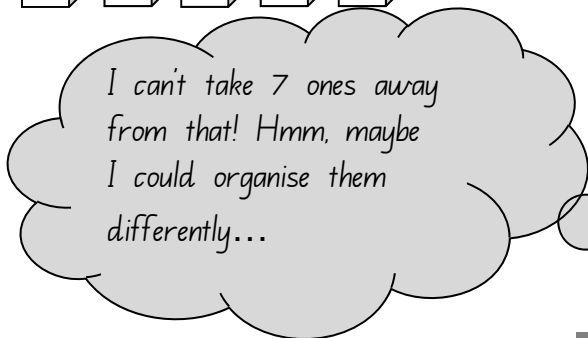
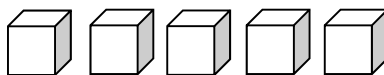
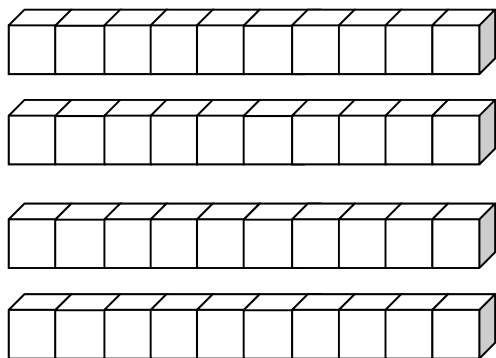
$42 - 25$ (model with MAB)

$42 - 20$ is 22. This bit is easy as we just take off two of the tens blocks.

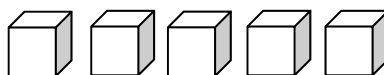
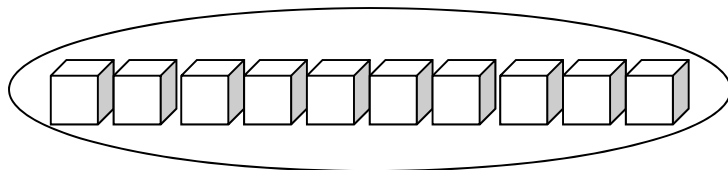
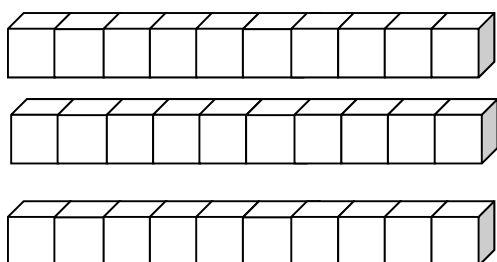
$22 - 5$ This part is tricky. We know the answer is 17 by counting back, but what could we do with the blocks to show that? (Wait for about 2 minutes and they will work out to trade. If not, ask "we can't really just chop them off can we? I wonder if we can use swap some blocks to make it easier?")

Once you have used MAB to work out trading, work backwards to find the algorithm:

Question: $45 - 17$



Regrouping the 45 to make it easier:



Explain how the tens and ones were reorganised to make the question easier to answer:

Now that the trade has been done, take away the 17 by crossing off the blocks.

This is what I write:

$\overset{3}{\cancel{4}}$	$\overset{1}{5}$	Why did the 4 tens change to 3 tens?
$-$	$\begin{array}{r} 17 \\ \hline 28 \end{array}$	

Intervention for kids who are struggling: Use number lines and “adjusting” to get a correct answer then work backwards to figure out how the algorithm works