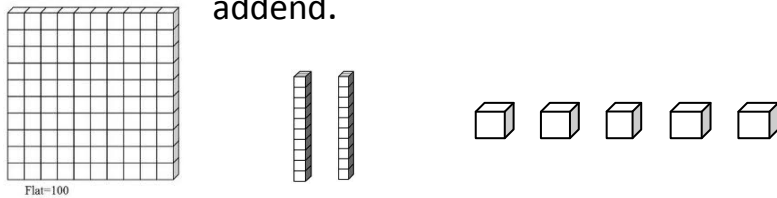


3-Digit Addition Strategies

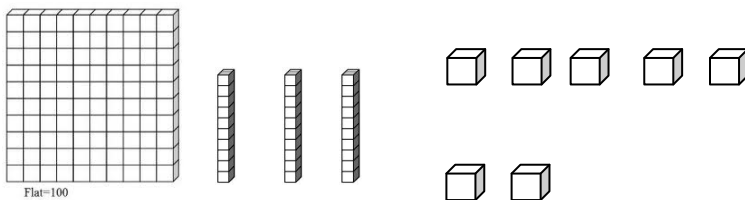
Below are the strategies the students are expected to use with addition of 3-digit numbers in the Common Core for Mathematics. These strategies are used with and without composing (regrouping) numbers into different forms of the same value.

Base Ten Place Value Blocks: These are concrete tools that every student has access to manipulate and model place value groups of hundreds, tens, and ones.

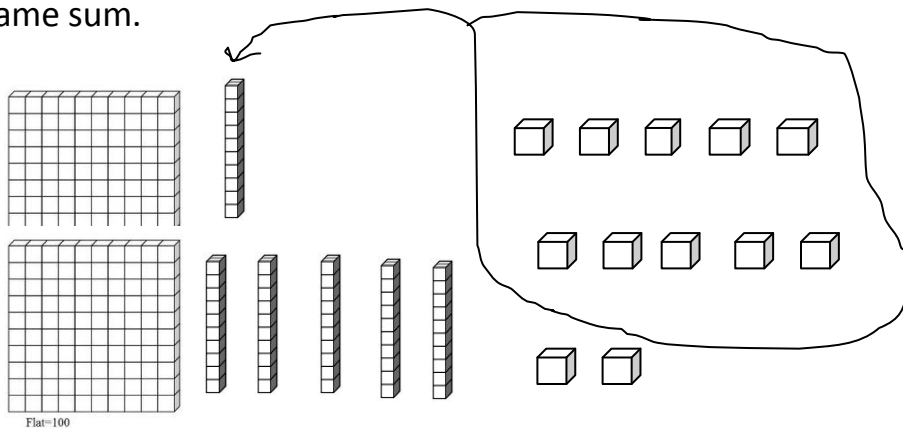
To find the sum of $125 + 137 = ?$ Use 1 hundred 2 tens 5 ones to model the first addend.



Then use 1 hundred 3 tens 7 ones to model the second addend.



Next, check to see if any regroupings (composing) are needed. In this case, only a regroup of 10 ones for 1 unit of ten is necessary. Then add all the other like terms together (hundreds and hundreds, tens and tens, ones and ones). It does not matter the order in which the units are added together, it will still result in the same sum.

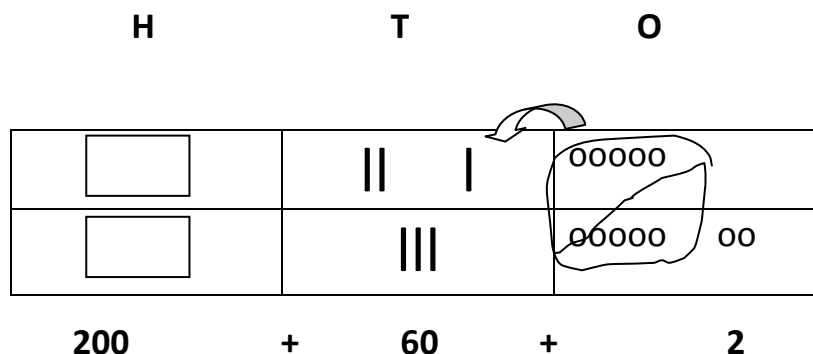


Count the values of the base ten blocks to get the total sum.

$$100 + 100 + 10 + 10 + 10 + 10 + 10 + 10 + 1 + 1 = 262 \quad (200 + 60 + 2 = 262)$$

Place Value Proof Drawings: This is a strategy requires students to represent the place value blocks with a quick drawing. The student uses a box to represent 100, a line to represent 10, and a circle to represent 1. A place value chart is used to keep the proof drawing organized.

To solve $125+137 = ?$, First draw 1 hundred 2 tens 5 ones to model the first addend and then draw 1 hundred 3 tens 7 ones to model the second addend.



Look to see if any regroupings are needed. In this case, only a regroup of 10 ones for 1 unit of ten is necessary. So a group of 10 ones are circled and then an arrow drawn over to tens place value to show the even exchange traded for 1 unit of ten.

Then add the other like terms together (hundreds and hundreds, tens and tens, ones and ones). Count the values of the proof drawings to get the total sum.

$$200 + 60 + 2 = 262$$

Expanded Method of Addition: For this show all totals strategy requires students use numbers instead of a drawing to show the addition by breaking apart the numbers into the values of each digit within the place value system.

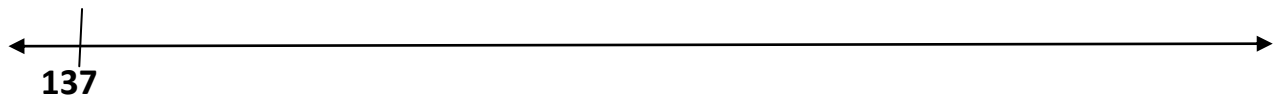
To solve $125+ 137=?$ Decompose the number 125 into its expanded form which is $100+ 20+5$. Next decompose the number 137 into its expanded form which is $100+30+7$.

Next add the like terms together (hundreds and hundreds, tens and tens, ones and ones) $100+100 = 200$; add $20+30 = 50$; and add $5+7 =12$. The final equation is one that can be solved using mental math $200+50+12 = 262$.

$$\begin{array}{r}
 125 = 100 + 20 + 5 \\
 + 137 = 100 + 30 + 7 \\
 \hline
 200 + 50 + 12 = 262
 \end{array}$$

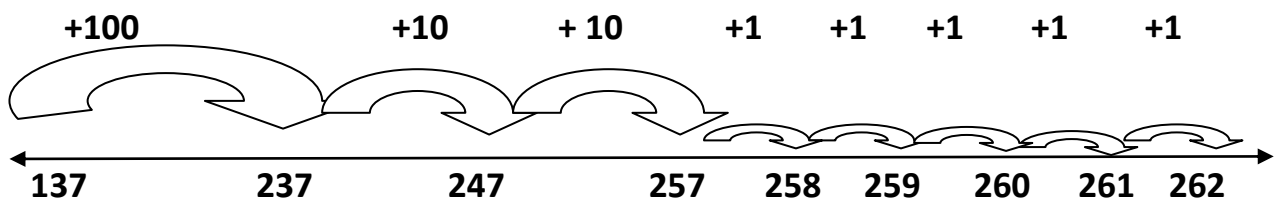
Number Line It is easier to first start adding on the number line with the larger addend. So for the equation $125+137=?$, that would be 137. It does not matter the order of addends in which we start adding first, it will result in the same sum.

Next draw a horizontal line and put the number 137 at the beginning of it. Students should know since they will be adding on the number line they will be moving to the right.



Next, look at the other addend which for this problem is 125 and break it apart based on place value to add in groups on the number line. The number 125 is composed of 1 hundred, 2 tens, 5 ones.

On the number line, start at 137 and show a jump forward of 100 then two jumps forward of 10 and finally five jumps forward of 1. The resulting number stopped on is **262** which is the sum of $137 + 125$.



There are multiple ways to show the mental addition on a number line. For more information and examples with number lines see link below:

<https://www.det.nsw.edu.au/eppcontent/glossary/app/resource/factsheet/4008.pdf>

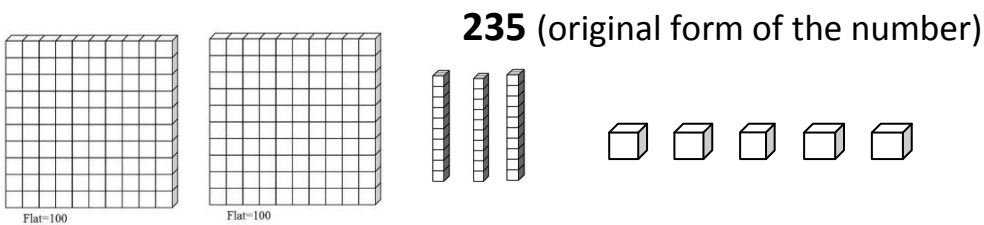
2.NBT.7 Add and subtract within 1000, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; Relate the strategy to a written method. Understand that in adding or subtracting three –digit numbers, one adds or subtracts hundreds and hundreds, tens and tens, and ones and ones; and sometimes it is necessary to compose or decompose tens or hundreds.

3-Digit Subtraction Strategies

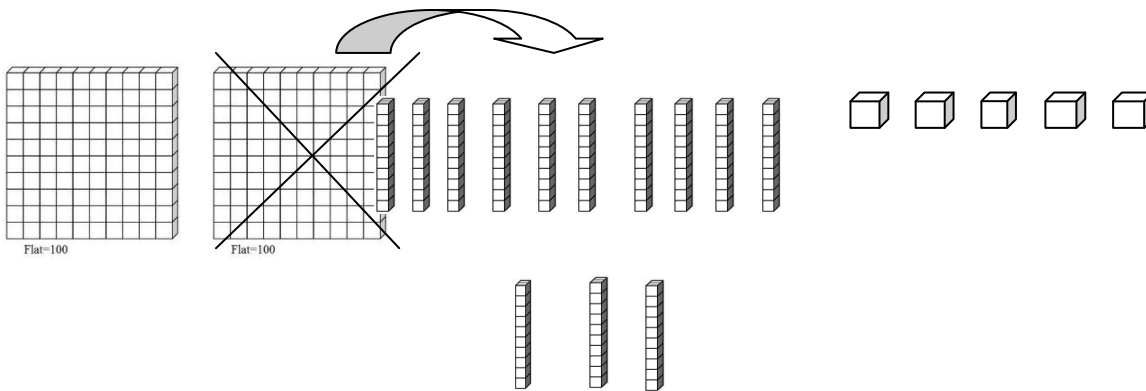
Below are the strategies the students are expected to use with subtraction of 3-digit numbers in the Common Core for Mathematics. These strategies are used with and without decomposing (ungrouping) numbers into different forms of the same value.

Base Ten Place Value Blocks: These are concrete tools that every student has access to manipulate and show groups of hundreds, tens, and ones.

To find the difference of $235-172=?$, use 2 hundreds 3 tens 5 ones to model the first number. The second number does not need to be modeled in a subtraction problem with base ten blocks since that is the amount to minus from the larger number.

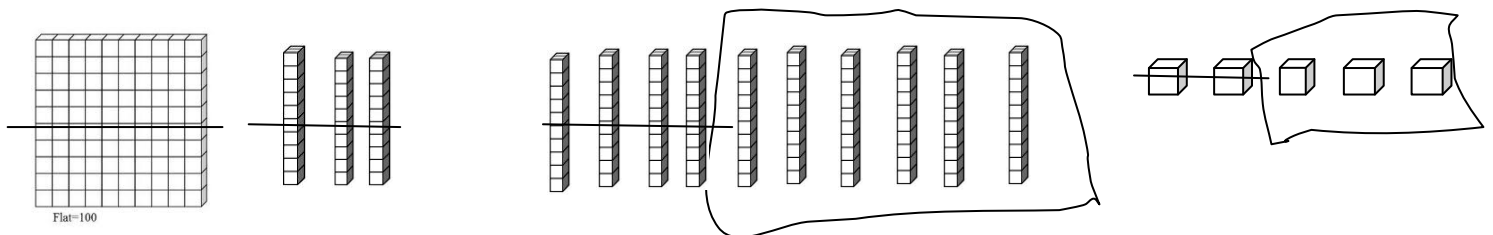


Then check to see if any ungroupings are needed. In this case, it is necessary to ungroup the hundreds block for an even exchange (trade) of 10 tens in order to have enough tens in the number form to subtract 172.



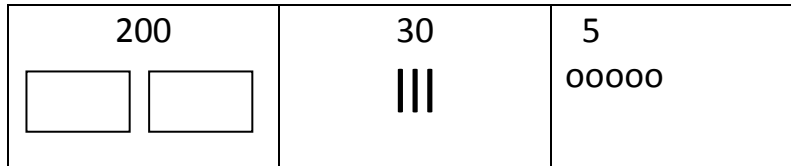
235 (same value, different form of the number)

Finally subtract the like terms (hundreds and hundreds, tens and tens, ones and ones) by drawing a horizontal line to show the part to minus. In the problem $235-172$, the result of what is left is the difference, **63**.

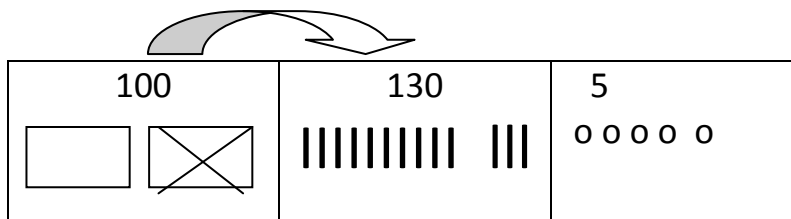


Place Value Proof Drawings: This is a strategy requires students to represent the place value blocks with a quick drawing. The student uses a box to represent 100, a line to represent 10, and a circle to represent 1. A place value chart is used to keep the proof drawing organized.

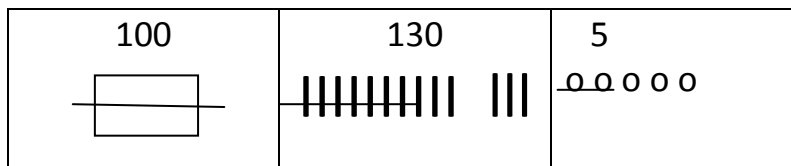
To solve $235-172 = ?$, Draw 2 hundreds 3 tens 5 ones to model only the first number. The second number does not need to be modeled in a subtraction problem.



Then check to see if any ungroupings are needed. In this case, it is necessary to ungroup the hundreds block for an even exchange (trade) of 10 tens in order to have enough tens in the number form to subtract 172.



Finally subtract the like terms (hundreds and hundreds, tens and tens, ones and ones) by drawing a horizontal line to show the part to minus(172). In the problem $235-172$, the result of what is left is the difference, **63**.



Expanded Method of Subtraction: This break apart strategy requires students use numbers instead of a drawing to show the subtraction by decomposing the numbers into the values of each digit within the place value system.

To solve $235-172=?$ Decompose the number 235 into its expanded form which is $200+30+5$. Next decompose the number 172 into its expanded form which is $100+70+2$.

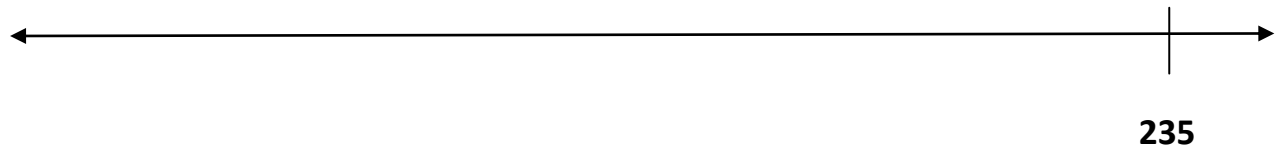
Then subtract the like terms together (hundreds and hundreds, tens and tens, ones and ones) $100-100 = 0$; $130-70 = 60$; $5 - 2 = 3$. The final equation is one that can be solved using mental math.

$$\begin{array}{r|l}
 235 = \cancel{200} & \cancel{30} & 5 \\
 - 172 = 100 & 70 & 2 \\
 \hline
 & &
 \end{array}$$

$$60 + 3 = 63$$

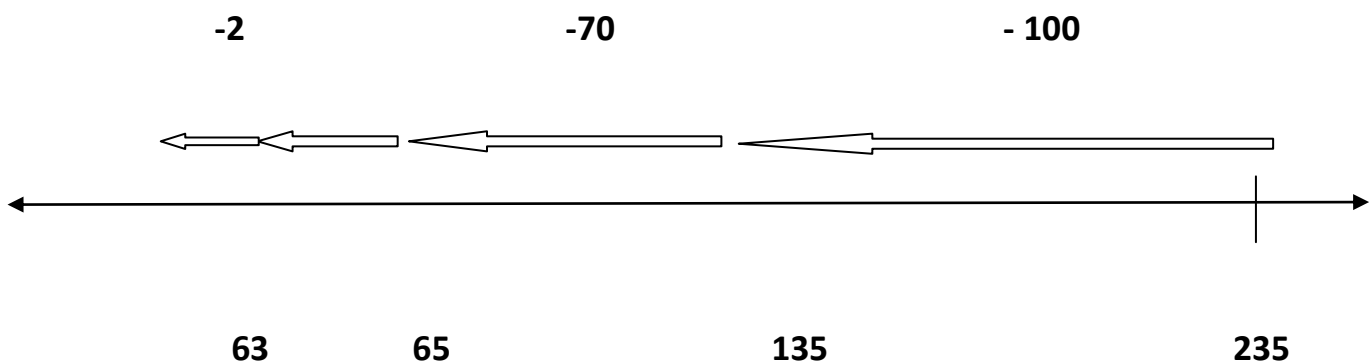
Number Line First start with the largest number and then break apart the second number in parts based on place value. So for the equation $235 - 172 = ?$, begin with placing 235 on the number line and then break apart 172.

Draw a horizontal line and put the number 235 at the end of it. Students should know since they will be subtracting on the number line they will be moving to the left.



Then break apart the number 172 based on place value to subtract in groups on the number line. The number 172 is decomposed into 1 hundred, 7 tens, 2 ones.

On the number line, start at 235 and show a jump backwards of 100 then seven jumps backwards of 10 (which is 70) and finally two jumps backward of 1 (which is 2). The resulting number stopped on is **63** which is the difference from $235 - 172$.



There are multiple ways to show the mental subtraction on a number line. For more information and examples with number lines see link below:

<https://www.det.nsw.edu.au/eppcontent/glossary/app/resource/factsheet/4008.pdf>

2.NBT.7 Add and subtract within 1000, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; Relate the strategy to a written method. Understand that in adding or subtracting three –digit numbers, one adds or subtracts hundreds and hundreds, tens and tens, and ones and ones; and sometimes it is necessary to compose or decompose tens or hundreds.