NORQUEST COLLEGE

Foundational Numeracy

MATH 1525

NORQUEST COLLEGE

Subtraction

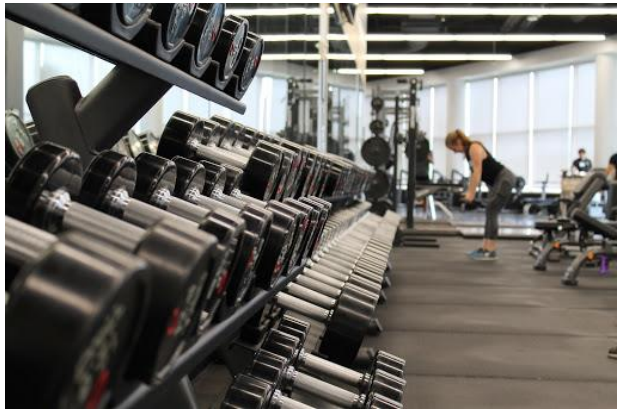
Lesson 4

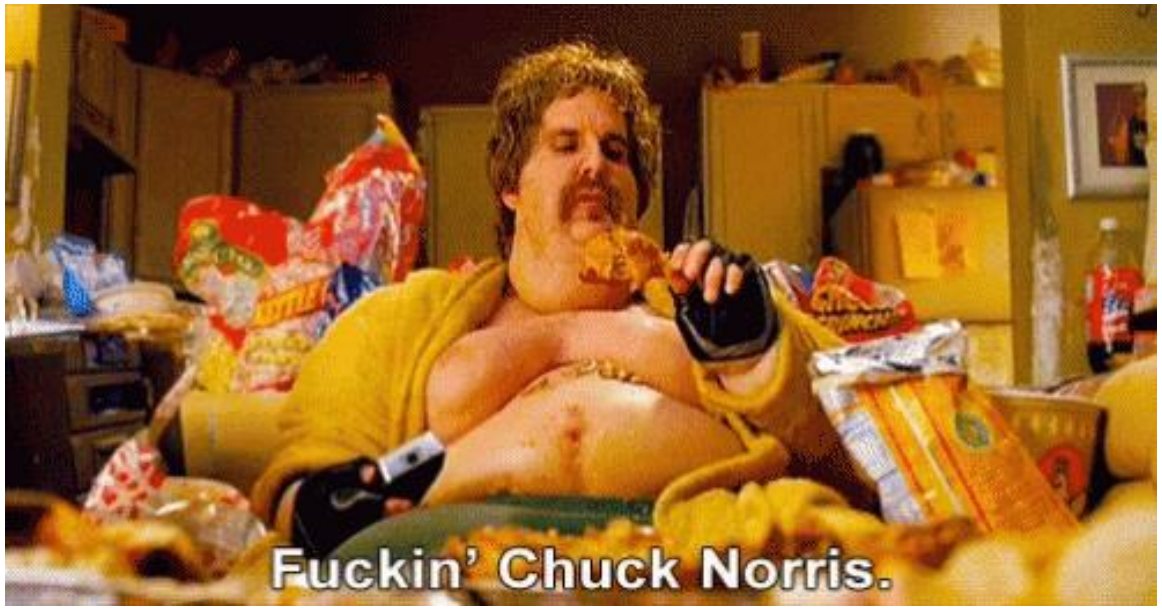
The People of Foundational Literacy:

Robert Kyle Mendoza III

Robert is a data analyst who works for Google at the company's headquarters (The Googleplex) in Santa Clara County, California.

Because of the COVID-19 pandemic and worldwide closures of gyms and rec centers, **Robert** has found it quite difficult to stay active. Working from home, his lack of physical activity and motivation, and the ease of ordering takeout on SkipTheDishes have all contributed to **Robert** gaining a significant amount of unhealthy weight.





The People of Foundational Literacy:

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Robert currently weights **193** lbs. Before the pandemic, he weighed **167** lbs. What is the *difference* between his current weight and his previous weight?

26 lb. difference

Subtraction –

Dictionary

Search for a word

sub·trac·tion

/səbˈtrakSH(ə)n/

noun

the process or skill of taking one number or amount away from another.
"**subtraction** of this figure **from** the total"

- MATHEMATICS
  the process of taking a matrix, vector, or other quantity away from another under specific rules to obtain the difference.

Discuss:
How often do we encounter 'subtraction' in our everyday lives?

Key Terms

- Take away
- Decrease
- Deduct
- Remain/Left
- Difference
- Minus
- How many more?
- Fewer

Standard Form	**8**	**–**	**3**	**=**	**5**
Spoken	*“eight*	*minus*	*three*	*equals*	*five”*
Terms	**minuend**		**subtrahend**		**difference**

Basic subtraction requires that the minuend must always be bigger than the subtrahend…

Ex) $3 - 5 =$ ⃠ Impossible, because you cannot physically take 5 away from something that only had 3 in it originally

Vertical Subtraction

What is it?

- A method of subtracting where the numbers are lined up in columns according to their place value

When do you use it?

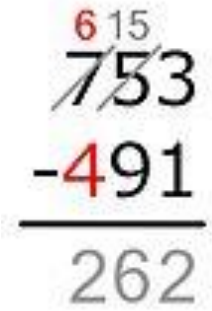
- All the time; it is the most commonly used form of subtraction without the use of technology

Why is it helpful?

- Keeps everything in line and organized
- Shows place value
- Gives you a visual of ***borrowing & regrouping*** from another place value
- Picture Form & Standard Number Form

How do I do it?

1. Arrange numbers vertically (*larger number on top)
2. Line up numbers by place value
3. *Start at the ones place value* at the very right; Subtract



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Robert currently weighs **193** lbs. Before the pandemic, he weighed **167** lbs. What is the *difference* between his current weight and his previous weight?

1) Read the question multiple times to familiarize yourself with what they are asking

2) Collect Evidence & Organize
- Current weight: 183 lbs.
- Previous weight: 167 lbs.
- Key Words: *difference*

"This is a subtraction question."

3) Build your equation
- Vertical Subtraction
- *Larger number on top

4) Solve

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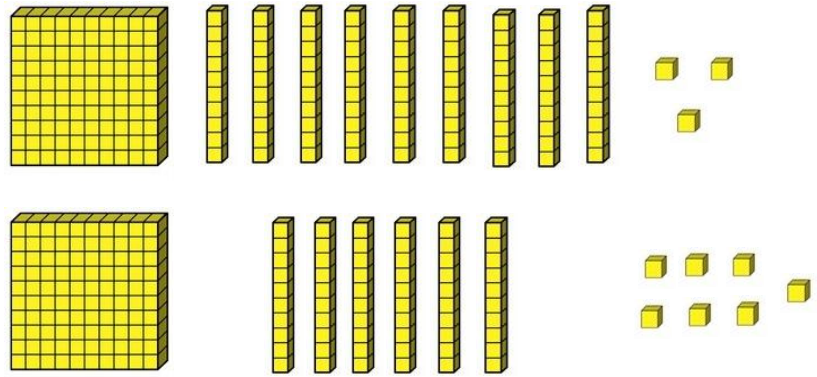
PICTURE FORM



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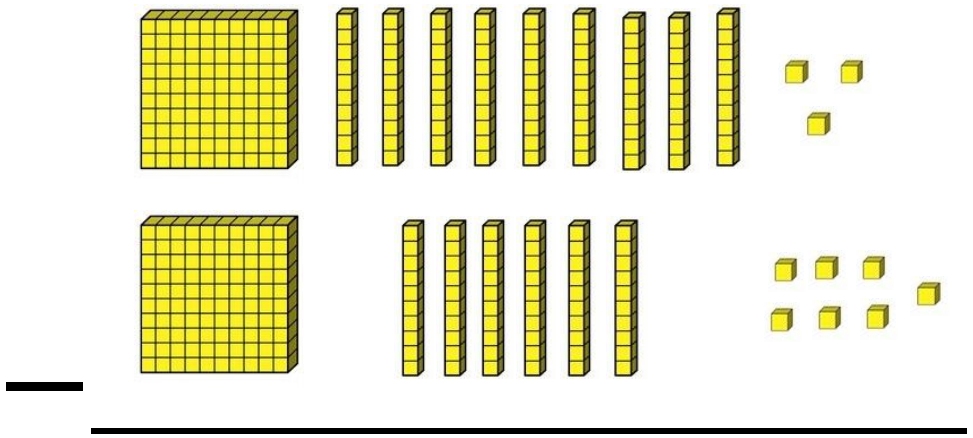

- Even though we put the larger number on **top**, the actual digits that make up that number might still be smaller than the digits that make up the number on the **bottom**
- Currently, we cannot take away (7) from (3)
- Whenever a situation like this occurs, we have to **borrow** from the place value directly to the left of the current place value we are working on

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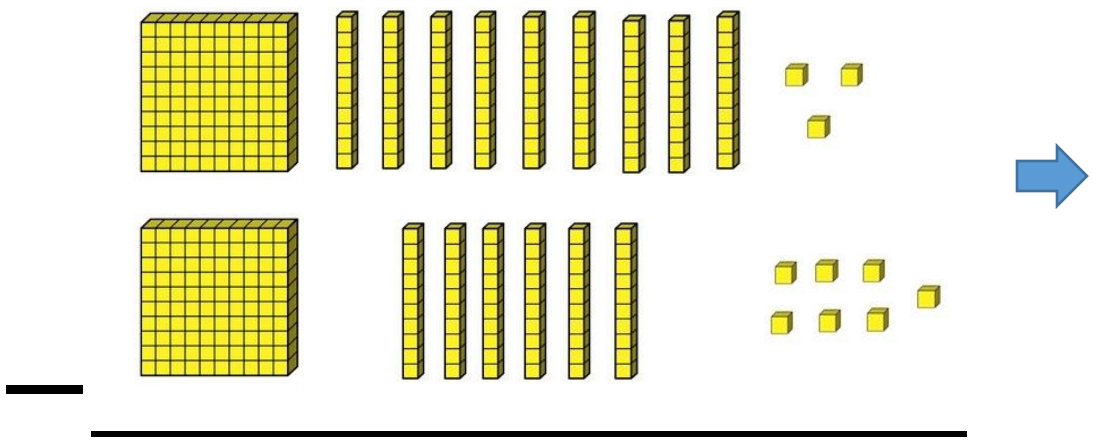

- We are working on the <u>ones</u> place value, and have determined that we cannot take away (7) from (3).
  - We have to borrow from the place value directly to the left of our current place value to make the subtraction possible. In this situation, we will borrow a | from the <u>tens</u> place value

$3 - 7 =$ not possible 👎

$13 - 7 =$ possible 👍

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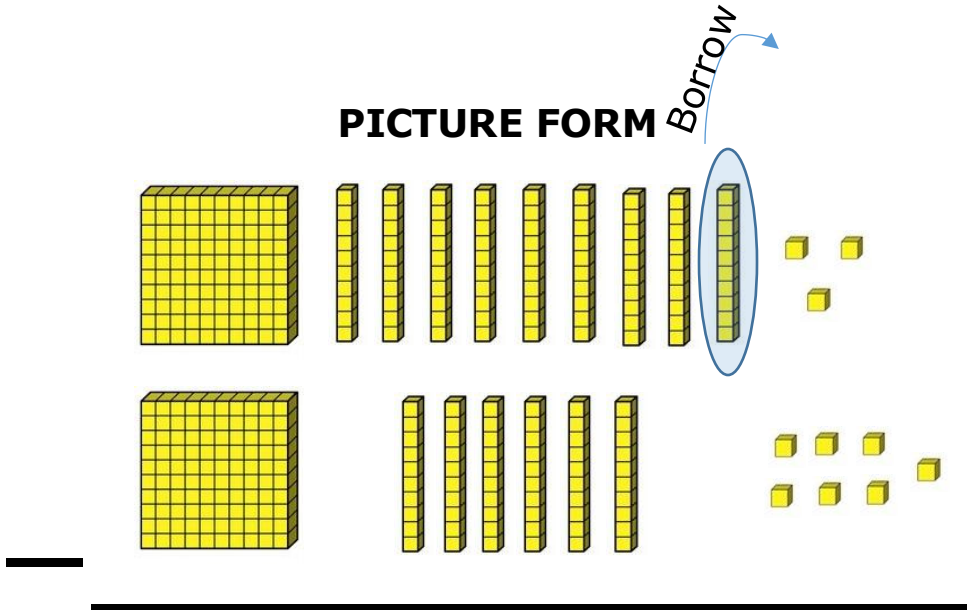

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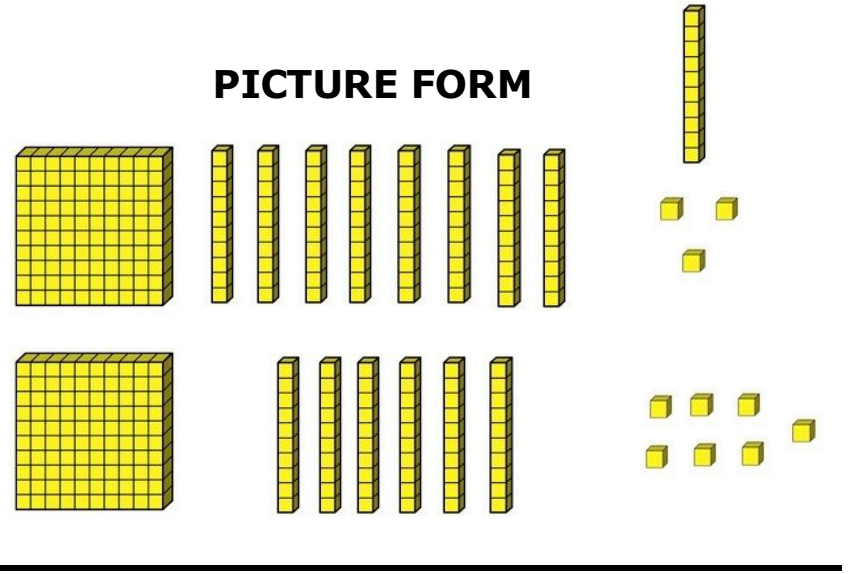

After we borrow a ( ), we must **regroup**

them into ones (split them up into 's)

Why???

BECAUSE WE ARE IN THE ONES PLACE VALUE

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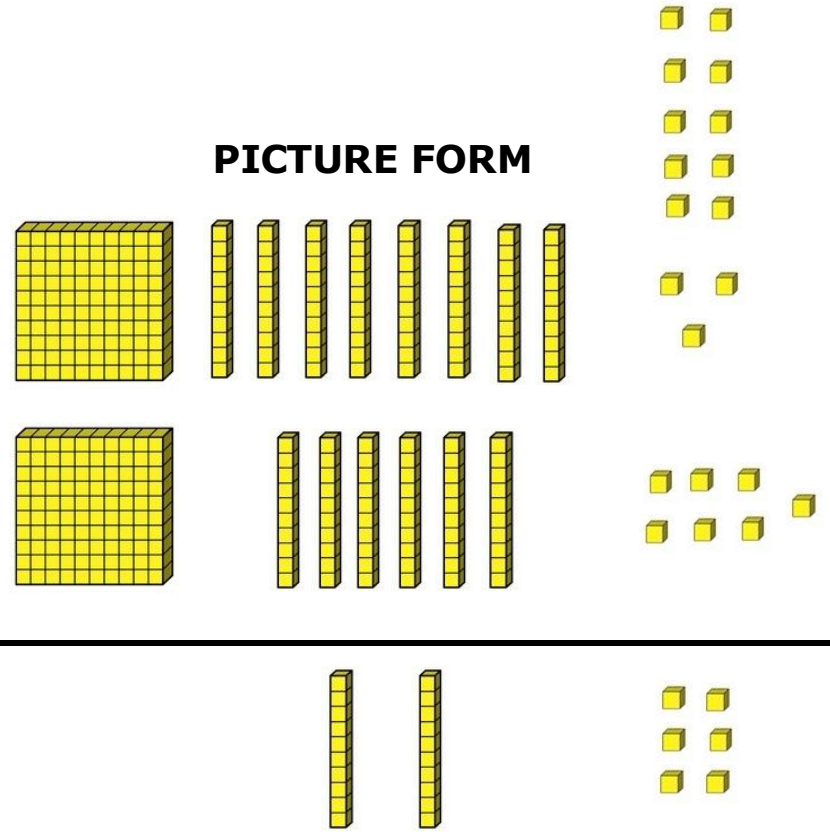


STANDARD NUMBER FORM

$$\begin{array}{r} {\scriptstyle 8}\ {\scriptstyle 13} \\ 1\,\not{9}\,\not{3} \\ -\ 1\,6\,7 \\ \hline 2\,6 \end{array}$$

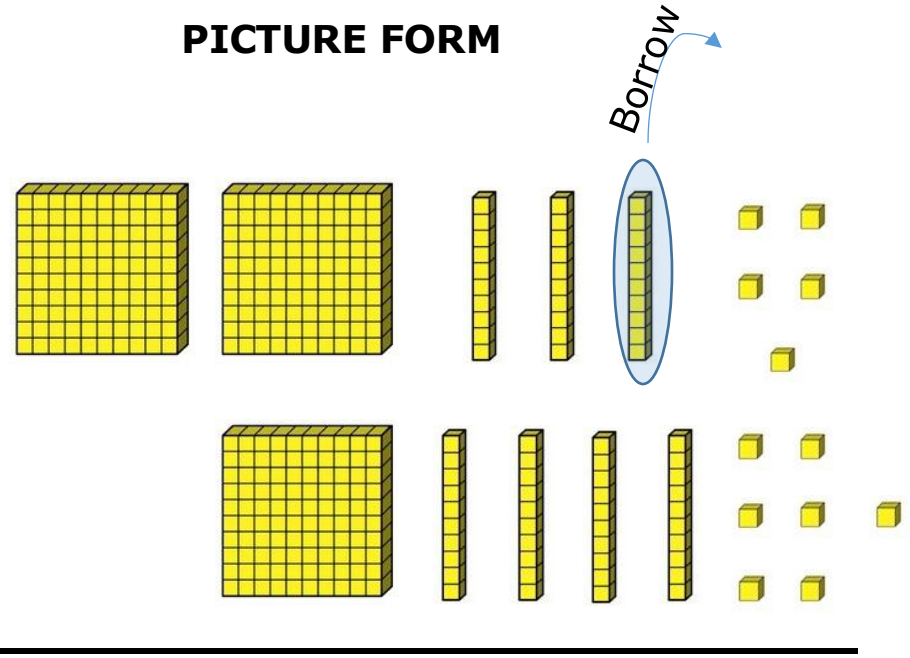
The difference between his current weight and previous weight before the pandemic is 26 lbs.

Vertical Subtraction

Use Picture Form and Standard Number Form to represent the vertical subtraction of the following:

$$235 - 147$$

PICTURE FORM



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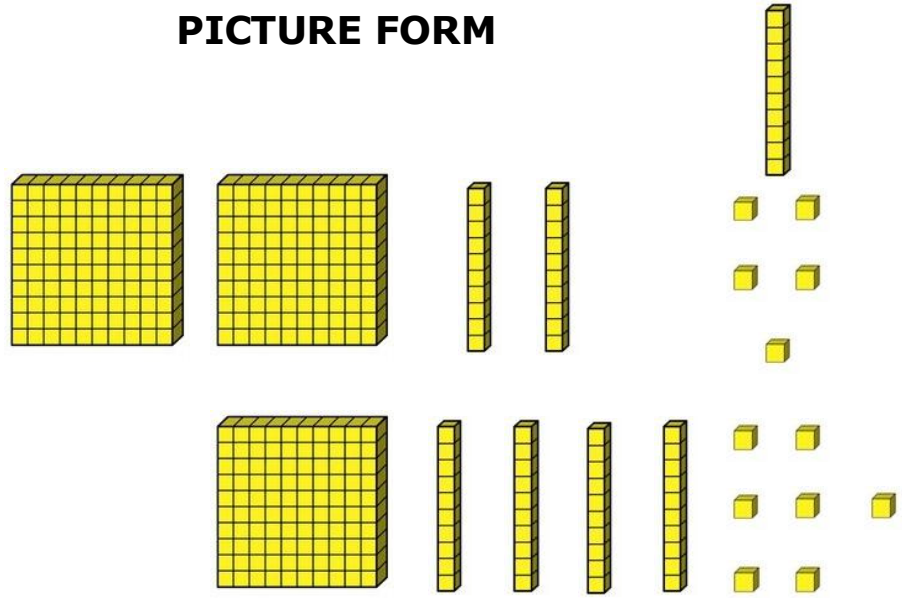

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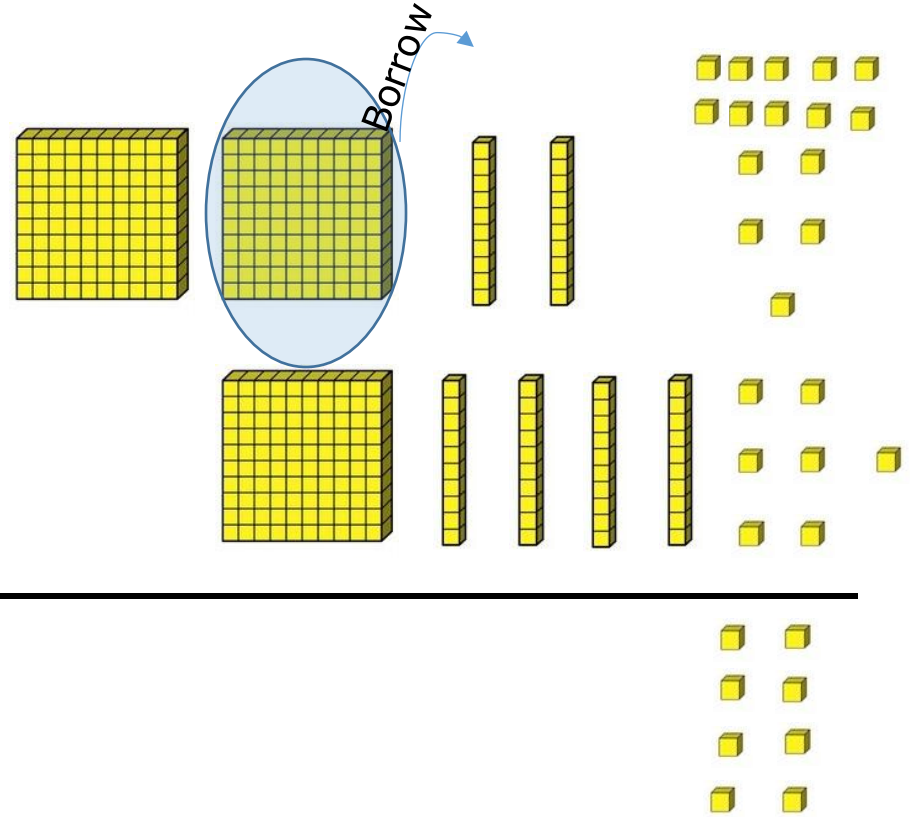

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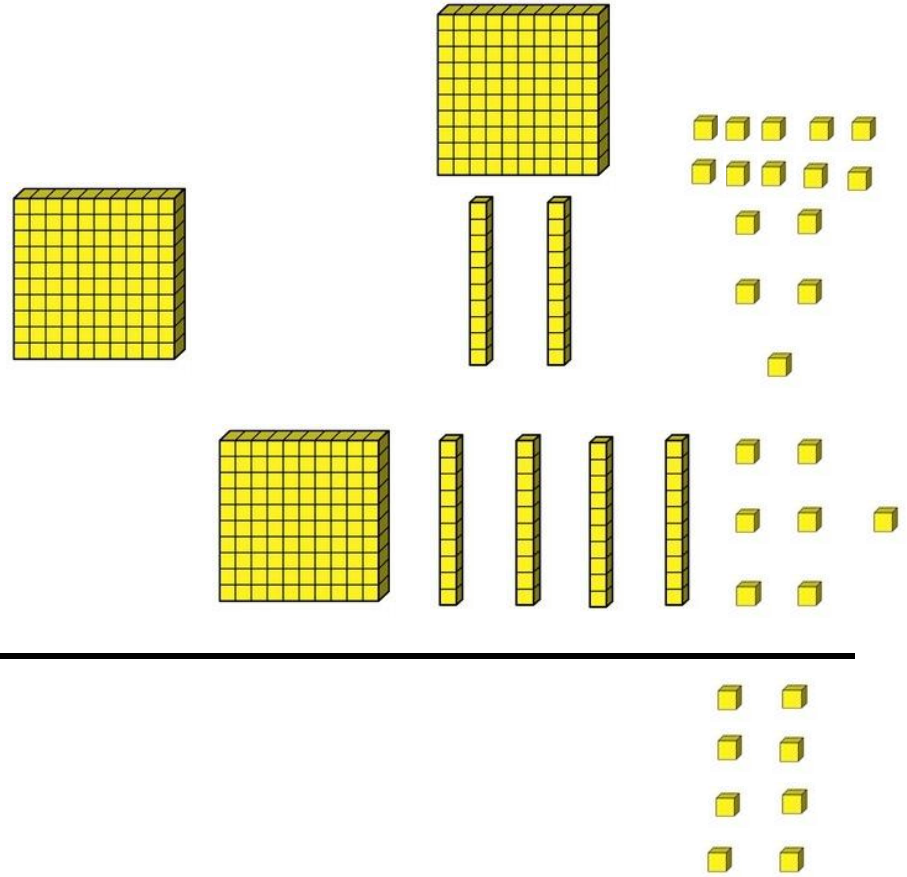

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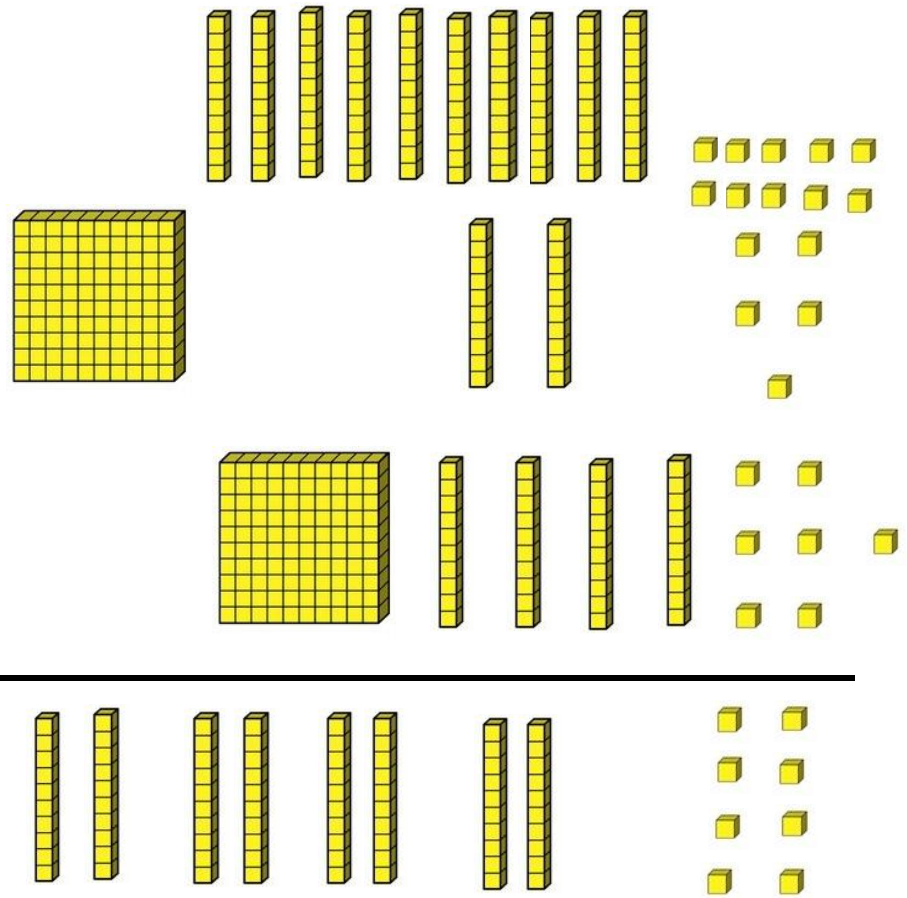

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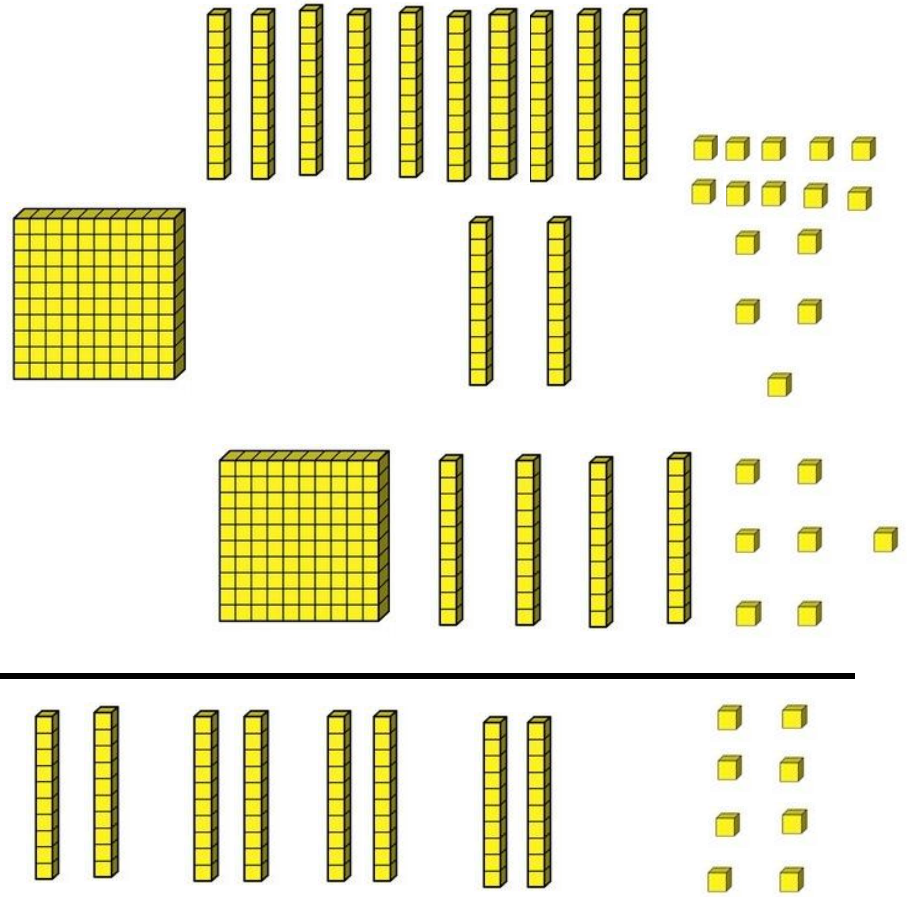

PICTURE FORM

1 12 15

~~2~~ ~~3~~ ~~5~~

1 4 7

—

8 8

Vertical Subtraction

Use Picture Form and Standard Number Form to represent the vertical subtraction of the following:

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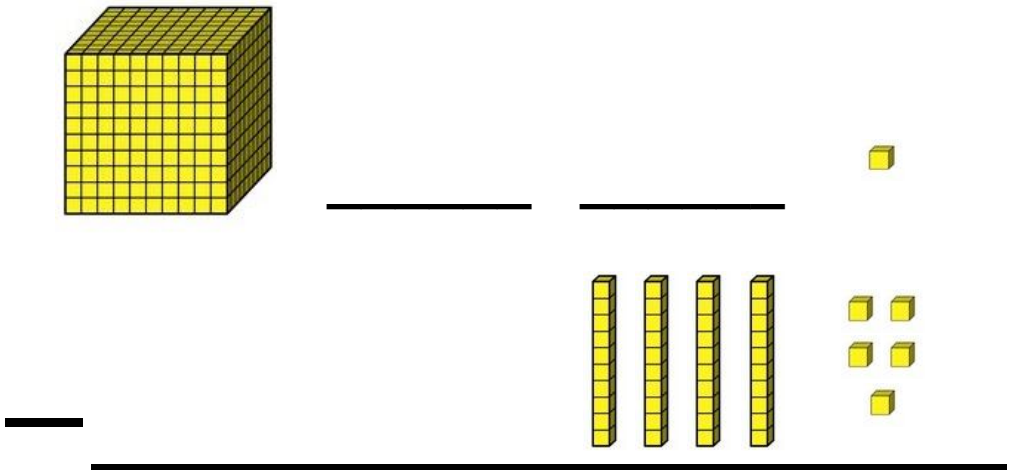


$$1001 - 45$$

Class Discussion:
What differences do you notice between this this example and the previous examples?

We cannot borrow from nothing (0). So, we have to borrow where we can. The only other possible place value to borrow from is the thousands.

At this point, we know that we cannot subtract 5 from 1, but do know that we can subtract 5 from 11. How can we make a 10?

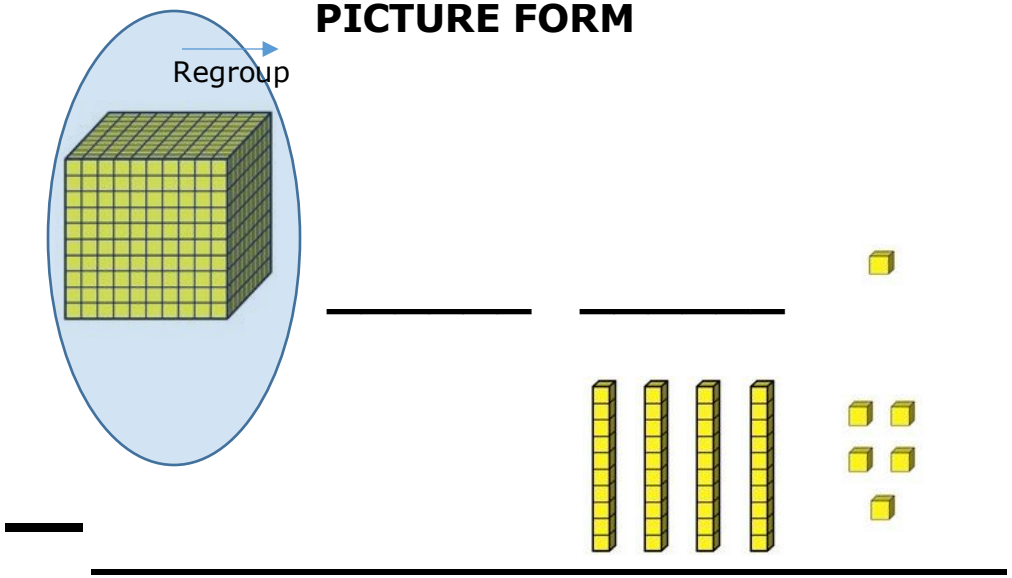
We will need to **regroup** by representing our numbers in slightly different ways. (Base-10 is key!)

Vertical Subtraction

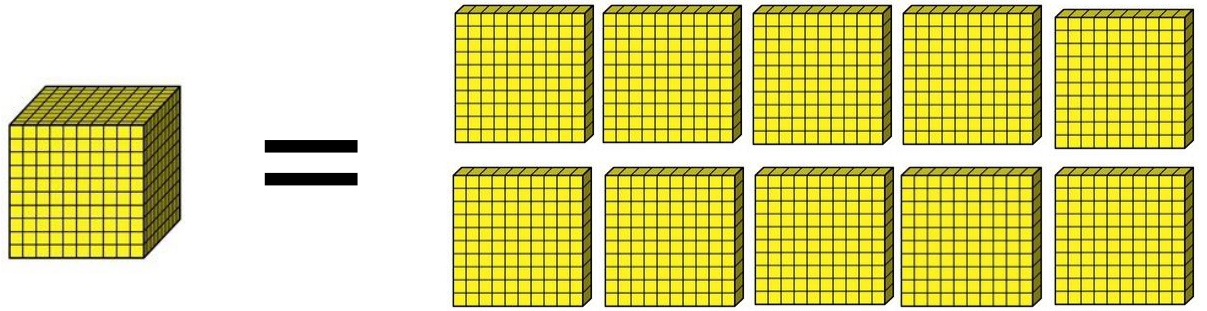
Use Picture Form and Standard Number Form to represent the vertical subtraction of the following:

PICTURE FORM

$$1001 - 45$$



1) Start by regrouping the 1000 into (10) 100's



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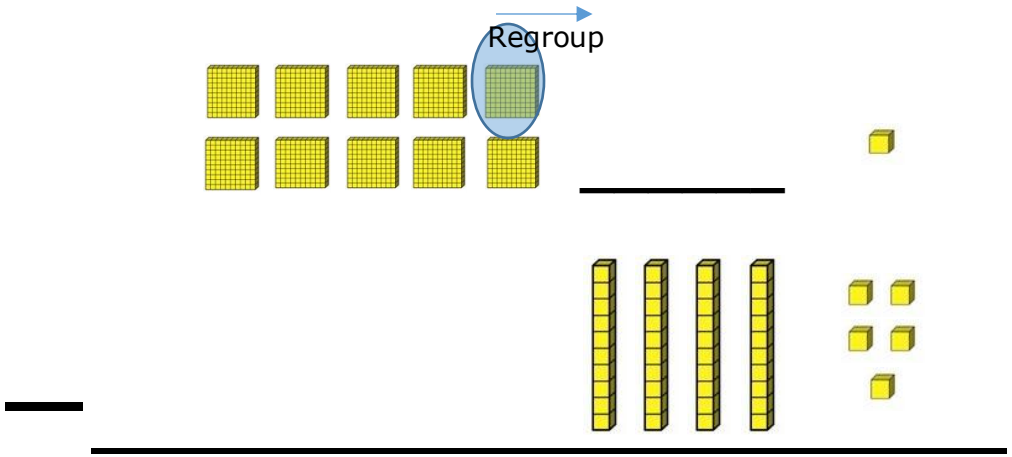
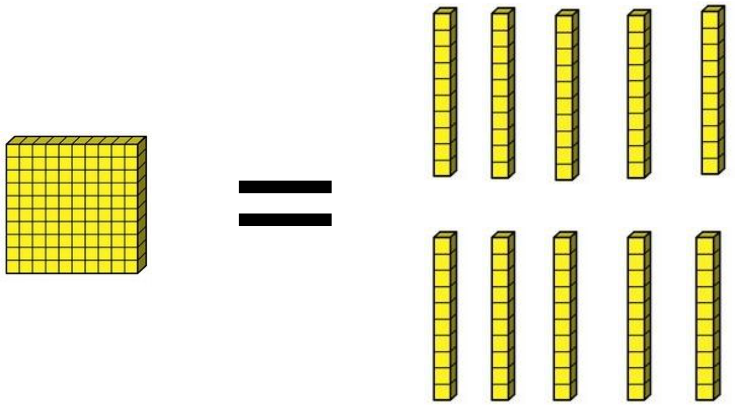


2) Regroup 100 into (10) 10's



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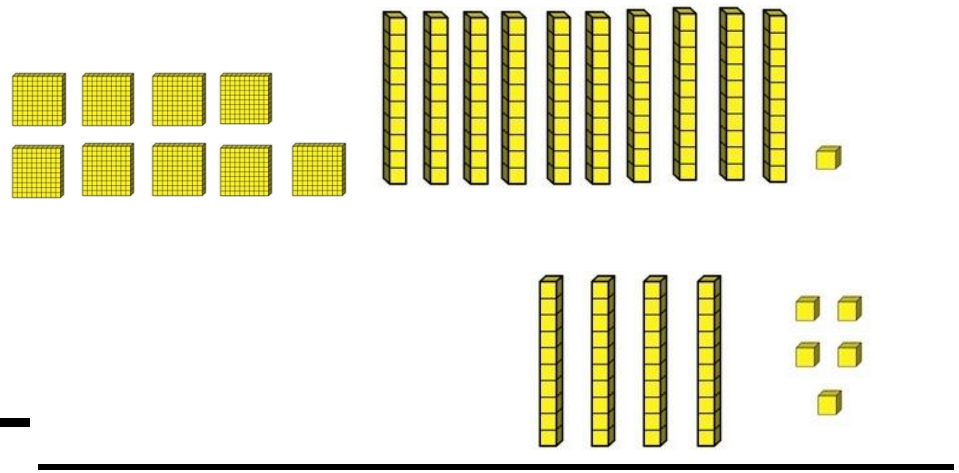

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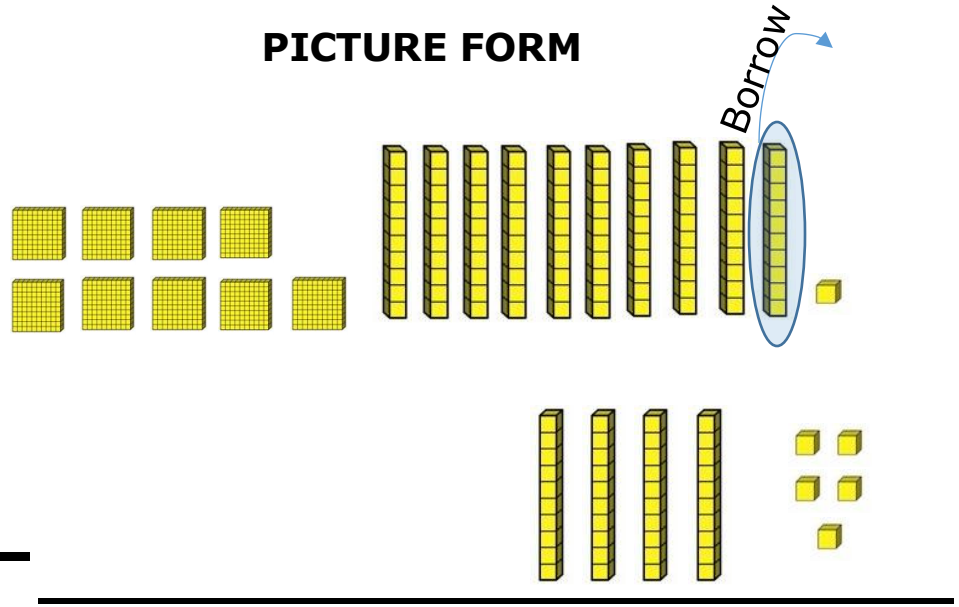


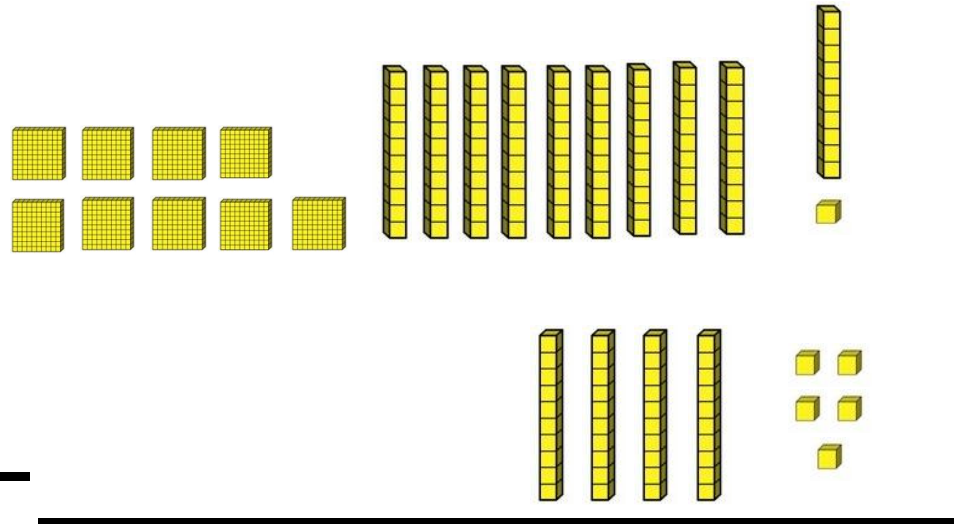
$$1001 - 45$$

3) Now, we are able to borrow a (10) from the tens Place value.

Vertical Subtraction

Use Picture Form and Standard Number Form to represent the vertical subtraction of the following:

PICTURE FORM



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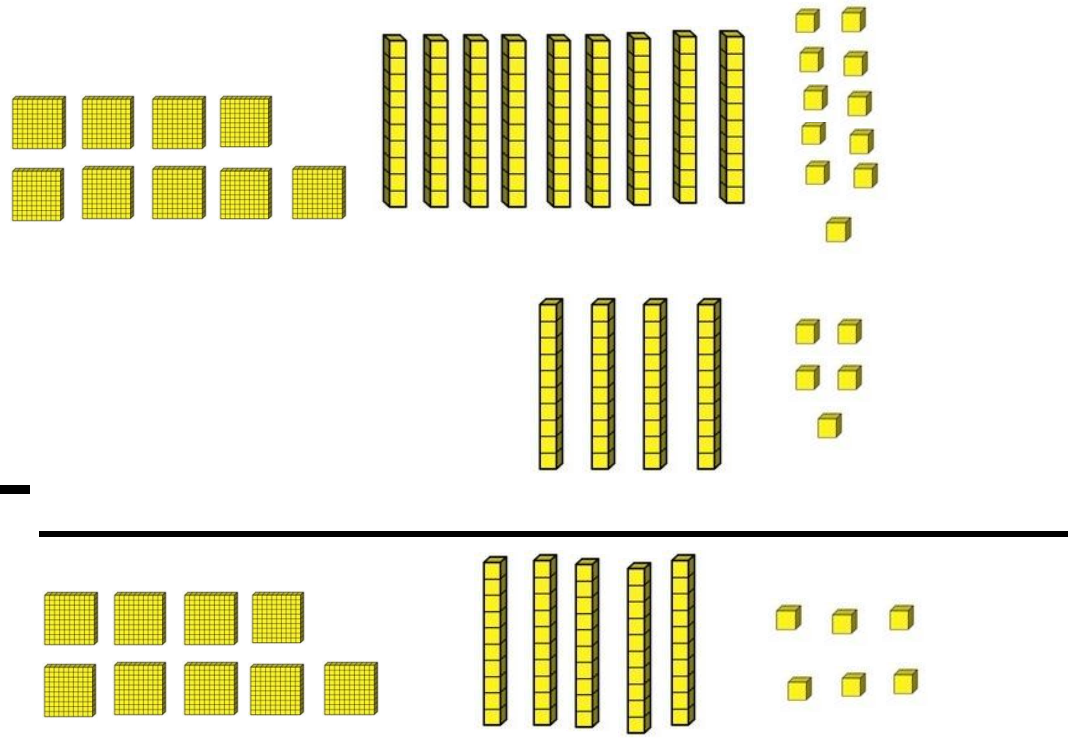

4) Subtract

Vertical Subtraction

Use Picture Form and Standard Number Form to represent the vertical subtraction of the following:

$$1001 - 45$$

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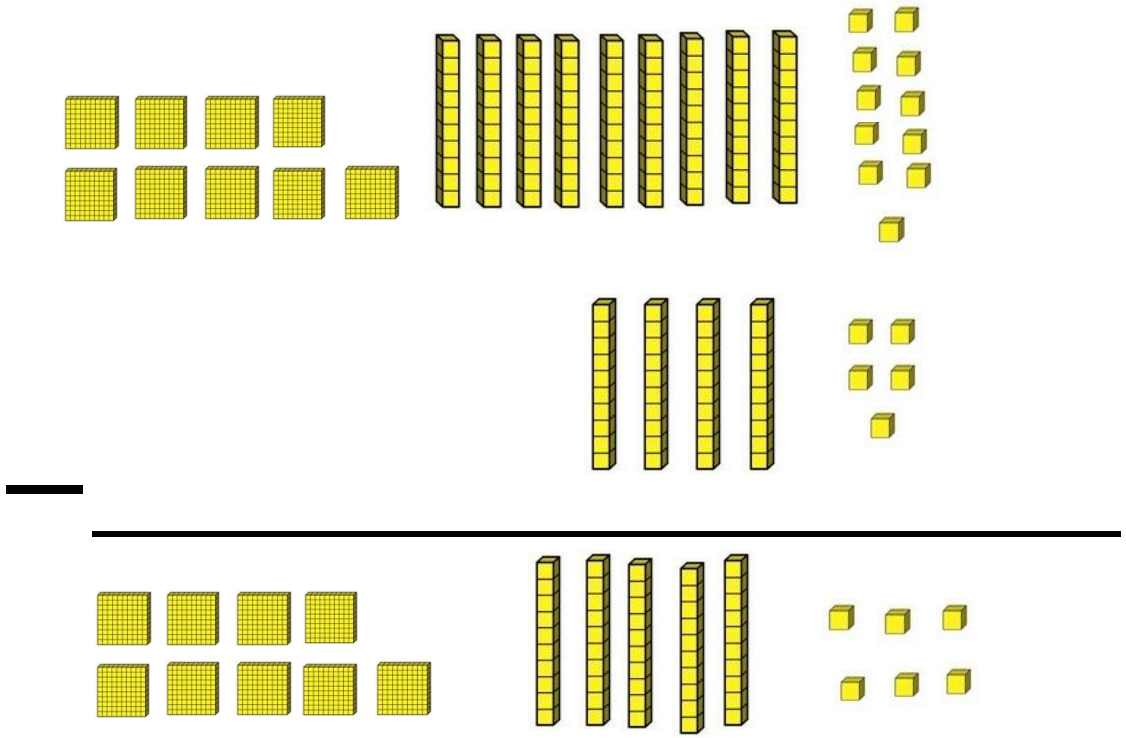

STANDARD NUMBER FORM

$$\begin{array}{r} {\scriptstyle 0\ \ 9\ \ 9\ \ 11} \\ \not{1}\not{0}\not{0}\not{1} \\ -\ \ 45 \\ \hline 956 \end{array}$$

Verifying Your Answer - Subtraction

Standard Form	**8**	**–**	**3**	**=**	**5**
Spoken	*"eight*	*minus*	*three*	*equals*	*five"*
Terms	**minuend**		**subtrahend**		**difference**

To verify your answer, simply add the **difference** and the **subtrahend**:

difference + subtrahend

- If the answer matches to the original **minuend**, you have verified your answer 👍
- If the answer is different than the original minuend, you made a mistake 👎

Vertical Subtraction + Verify

Perform vertical subtraction on the following using Standard Number Form. Then, VERIFY your answer.

$$20{,}009 - 472$$

$$\begin{array}{r} {\scriptstyle 1\ \ 9\ \ 9\ \ 10} \\ 20{,}009 \\ -\quad 472 \\ \hline 19\,537 \end{array}$$

Verify:

$$\begin{array}{r} {\scriptstyle 1\ \ 1\ \ 1} \\ 19\,537 \\ +\quad 472 \\ \hline 20\,009 \end{array} \checkmark$$