NORQUEST COLLEGE

Foundational Numeracy

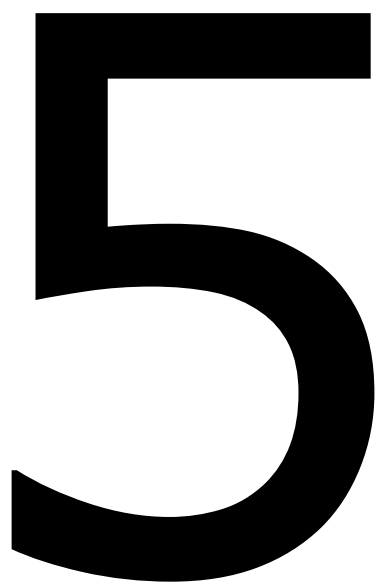
MATH 1525

NORQUEST COLLEGE

The Number System: Place Value

Lesson 1

What do you see?

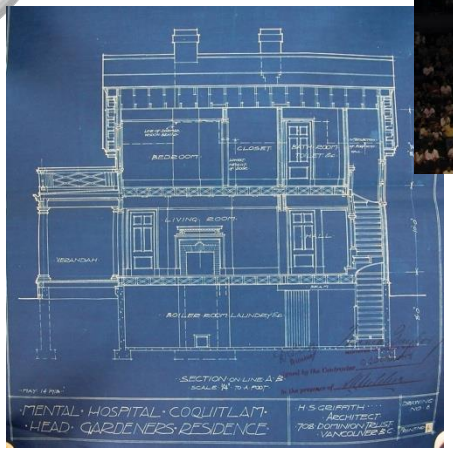


This Photo by Unknown Author is licensed under CC BY-NC

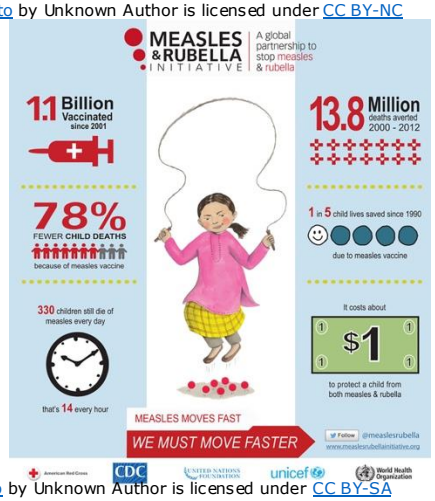
This Photo by Unknown Author is licensed under CC BY

This Photo by Unknown Author is licensed under CC BY-NC

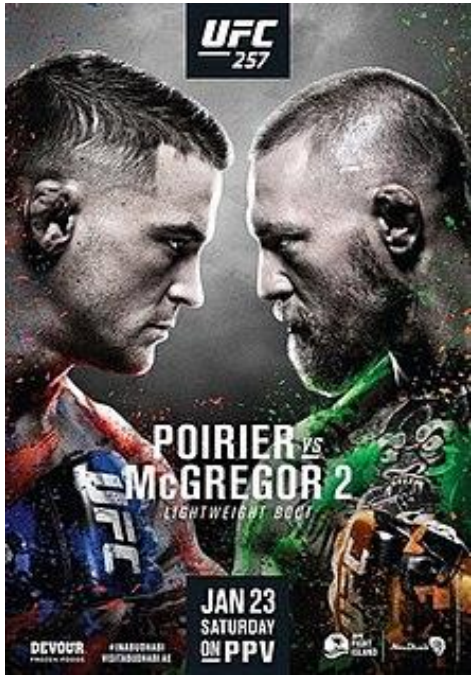
This Photo by Unknown Author is licensed under CC BY-SA



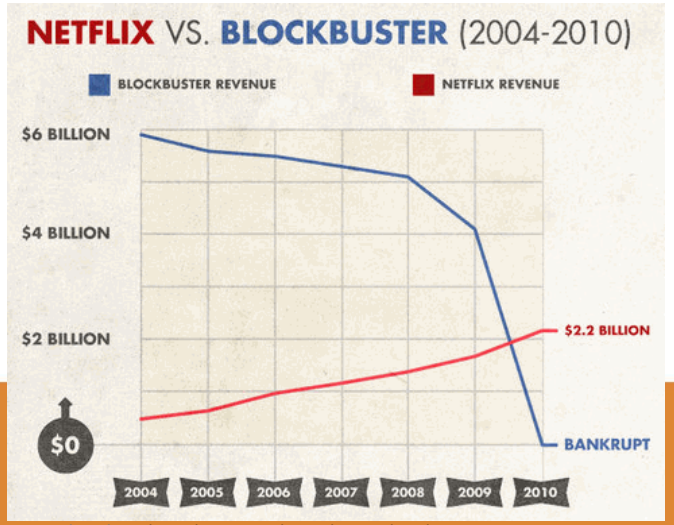
This Photo by Unknown Author is licensed under CC BY-SA



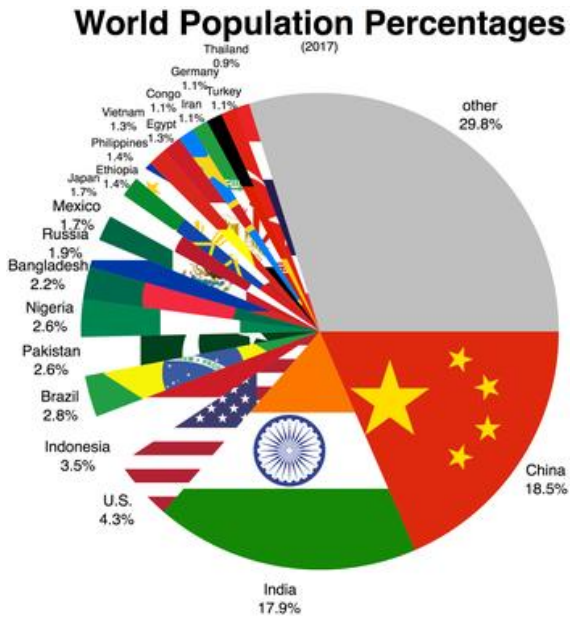
This Photo by Unknown Author is licensed under CC BY-SA



This Photo by Unknown Author is licensed under CC BY-SA



This Photo by Unknown Author is licensed under CC BY-SA-NC



This Photo by Unknown Author is licensed under CC BY-SA

This Photo by Unknown Author is licensed under CC BY

NORQUEST COLLEGE

What are numbers?

- A number is a mathematical object used to:
  - Count
  - Measure
  - Label

- Can be represented by symbols called *digits*
  - Ex) The digit "**5**" is a symbol that represents the number five)

- Most commonly used numbering system: **Decimal (Base10) System**
  - **Digits being used: 0, 1, 2, 3, 4, 5, 6, 7, 8, 9**

- Numbers help humans make better sense of the world
  - Why?
  - How?
    - Through **numeracy**: the ability, confidence, and willingness to engage with "math" in order to make informed decisions in *all* aspects of daily-life

COUNT: Apple vs Samsung (2020)

Apple Inc.

Headquarters: Cupertino, California

- **206,000,000** units sold worldwide in 2020
  - **16%** of ALL phones sold in 2020 were Apple iPhones

The Samsung Group

Headquarters: Seoul, South Korea

- **267,000,000** units sold worldwide in 2020
  - **21%** of ALL phones sold in 2020 were Samsung phones

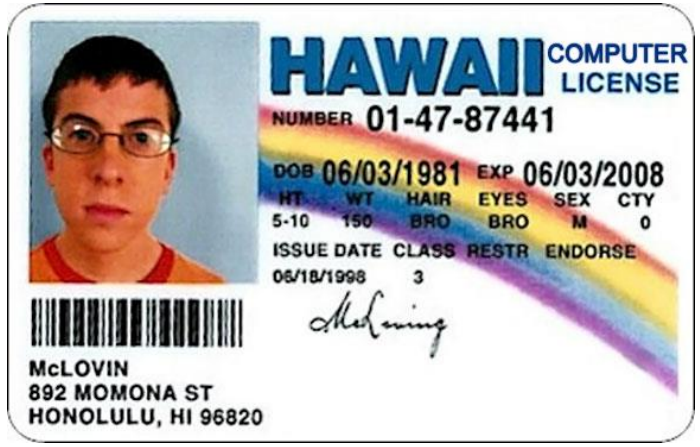
MEASURE: NETFLIX and Chill?

- Netflix added nearly **26,000,000** paid subscribers in early 2020
- Disney+ added nearly **25,000,000** paid subscribers in early 2020

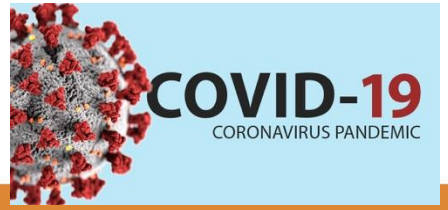
Class Discussion

1. Why was Netflix and Disney+ able to attract so many new customers in 2020?
    - What can this information be used for?

LABEL: Why do we label with numbers?

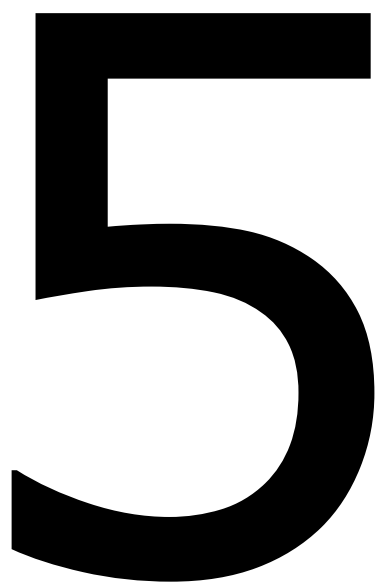


An ISBN is an **International Standard Book Number**



NORQUEST COLLEGE

What do you see?



What do you see?

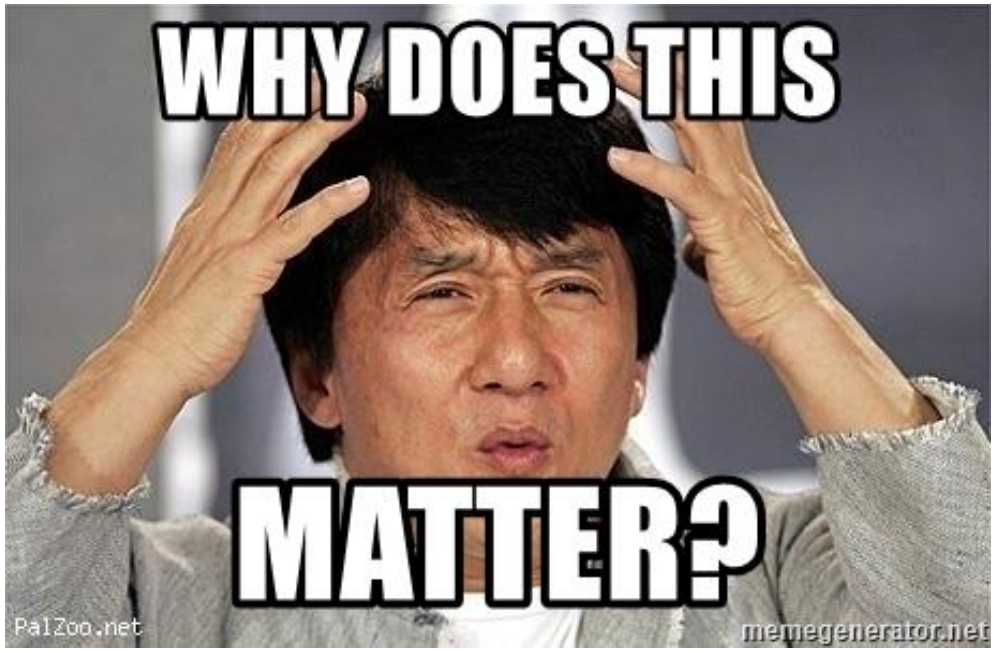
What do you see?

What do you see?

What do you see?

5,388

Class Discussion:



- Do order & placement matter? Why or why not?

What do you see?

5,388

Do the 8s above represent the same *value*?

PLACE VALUE

- The *position* of each digit in an entire number determines its **place value**
- Place value gives more <u>meaning</u> and <u>context</u> to the digits within the #

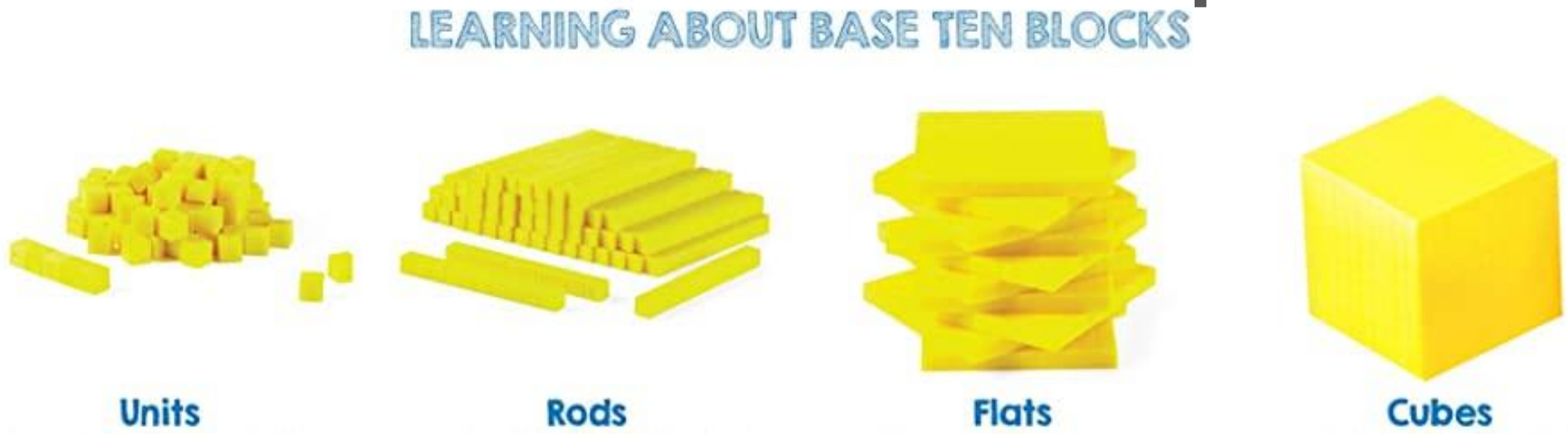
Periods:	**Billions**			**Millions**			**Thousands**			**Ones**		
PLACE VALUE:	Hundred-billions	Ten-billions	Billions	Hundred-millions	Ten-millions	Millions	Hundred-thousands	Ten-Thousands	Thousands	Hundreds	Tens	Ones
Example:												

Why is Place Value important?

Place Value allows us to:

- Determine the value of any digit within a number
- Convert **Standard Form** numbers to
  - **Picture Form** (Base-10 Blocks)
  - **Expanded Form**
  - **Word Form**
- Successfully perform operations ($+, -, \times, \div$) on these numbers
- Understand the reason why $500 > 50 > 5$

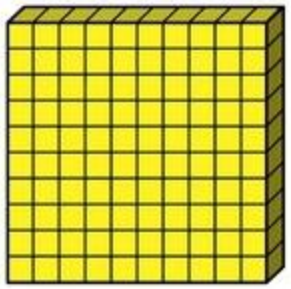
PLACE VALUE: Picture Form & Expanded Form



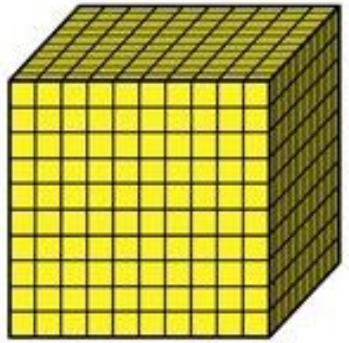
1

10

100



1000



Place Value Builds Number Sense

243

Standard Form

- Standard Form is the actual number

243

Word Form

- How you would recite/say the word
- DO NOT use "and"

"Two hundred forty three"

Expanded Form

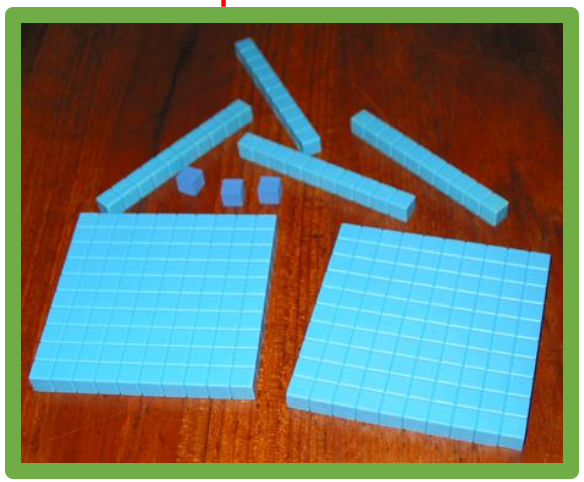
- Show the **value** of *each* digit within the number
  - In this example, we have 3 digits. Therefore, we will have 3 values in expanded form

243

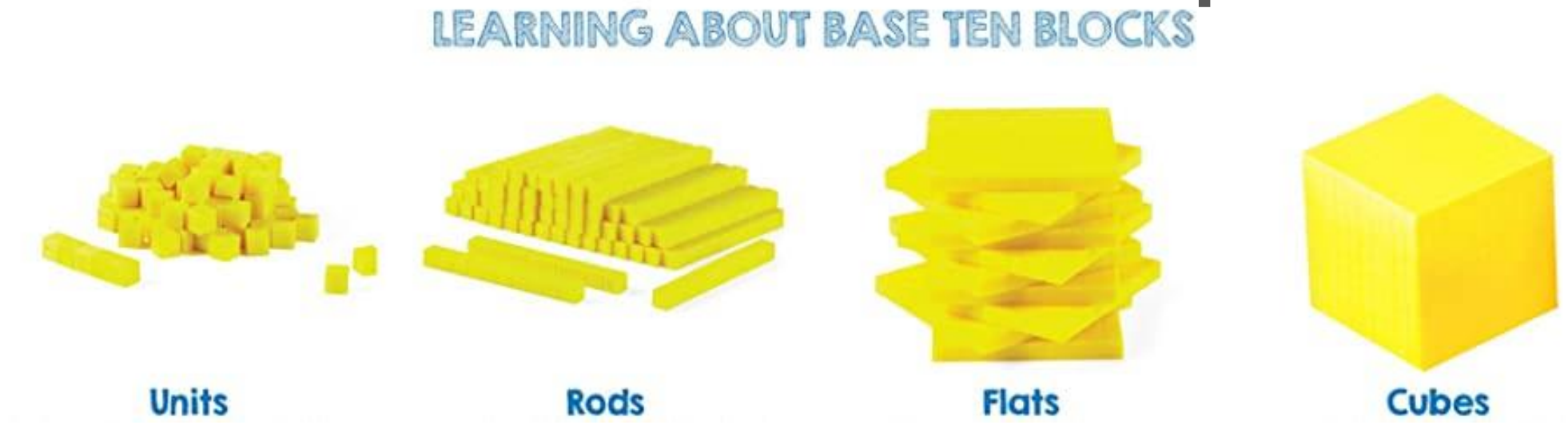
$$200 + 40 + 3 = 243$$

Picture Form

- Most commonly shown through math 'manipulatives'

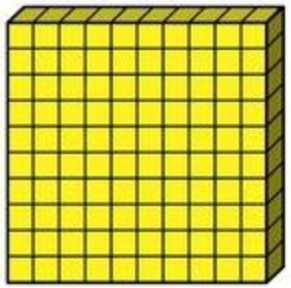


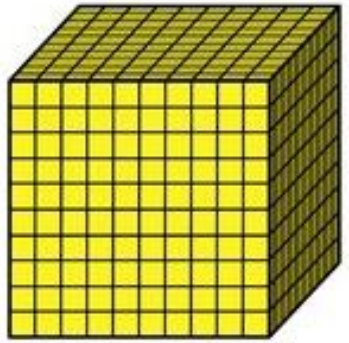
PLACE VALUE: Picture Form & Expanded Form



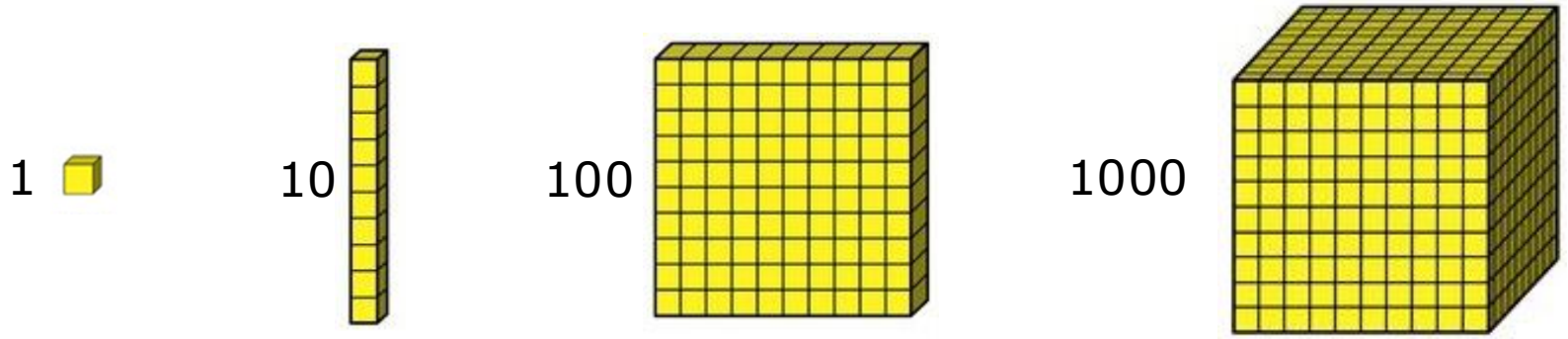
1 

10 

100 

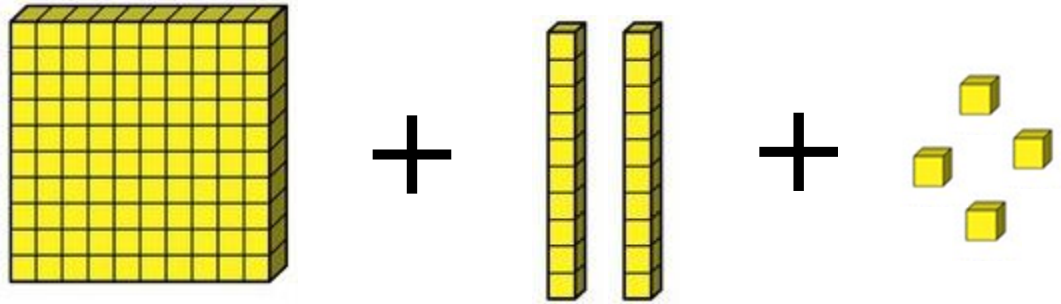
1000 

PLACE VALUE: Picture Form & Expanded Form



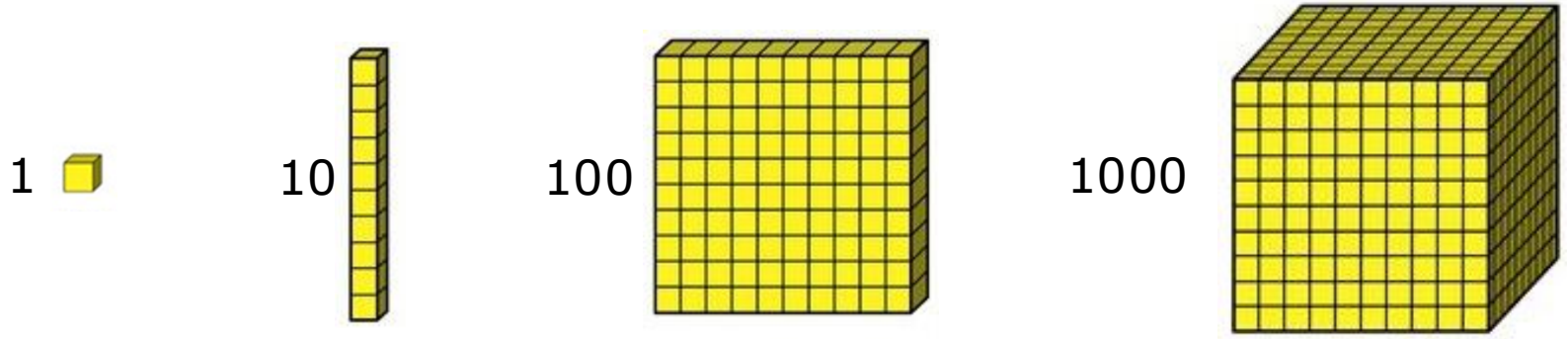
Use Base-10 blocks to represent the following number:

124



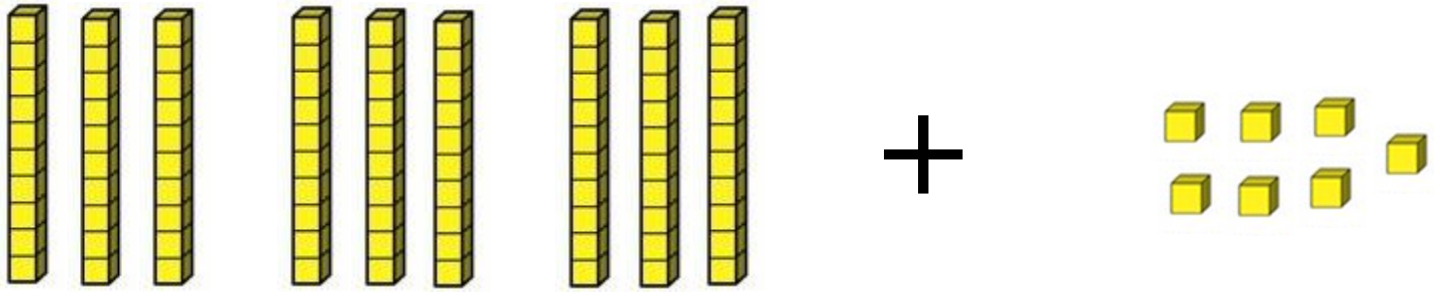
Expanded Form: $100 + 20 + 4 = 124$

PLACE VALUE: Picture Form & Expanded Form



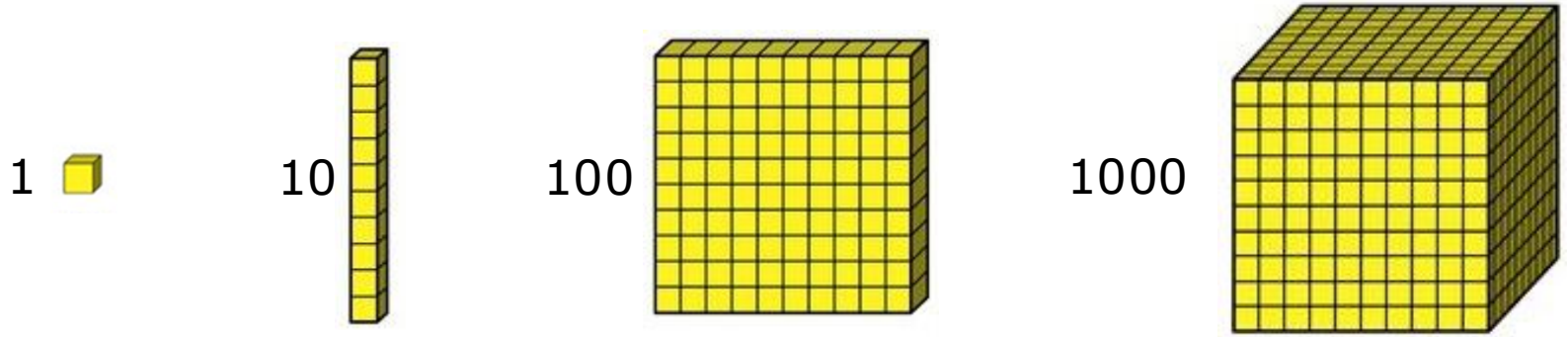
Use Base-10 blocks to represent the following number:

97



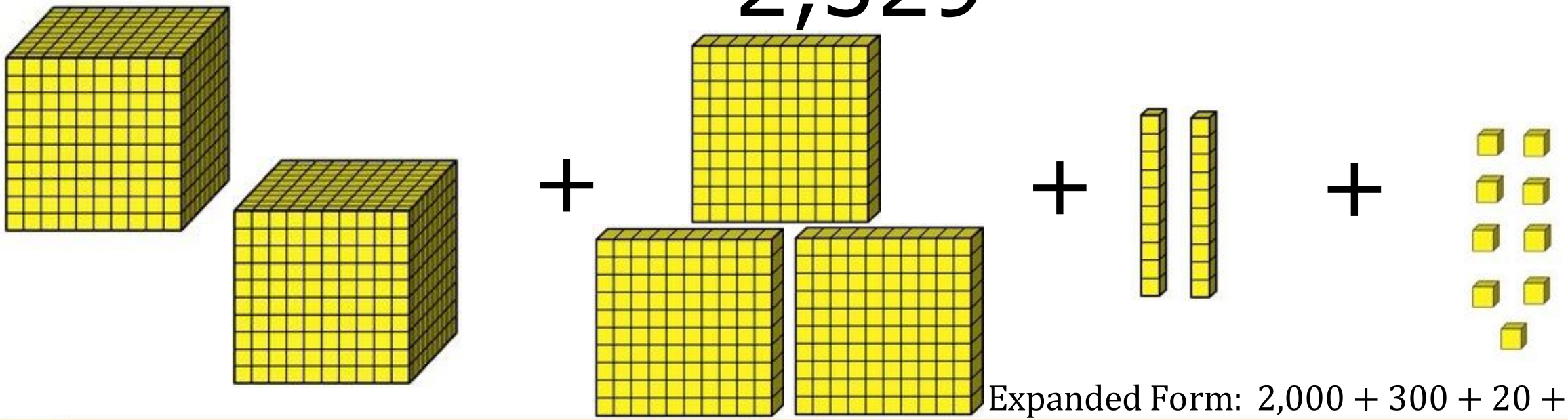
Expanded Form: $90 + 7 = 97$

PLACE VALUE: Picture Form & Expanded Form



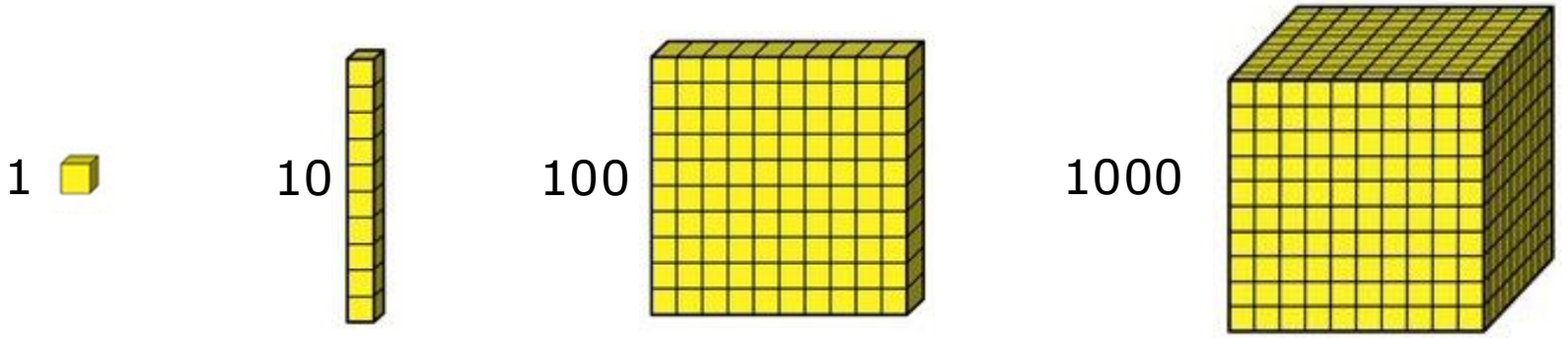
Use Base-10 blocks to represent the following number:

2,329

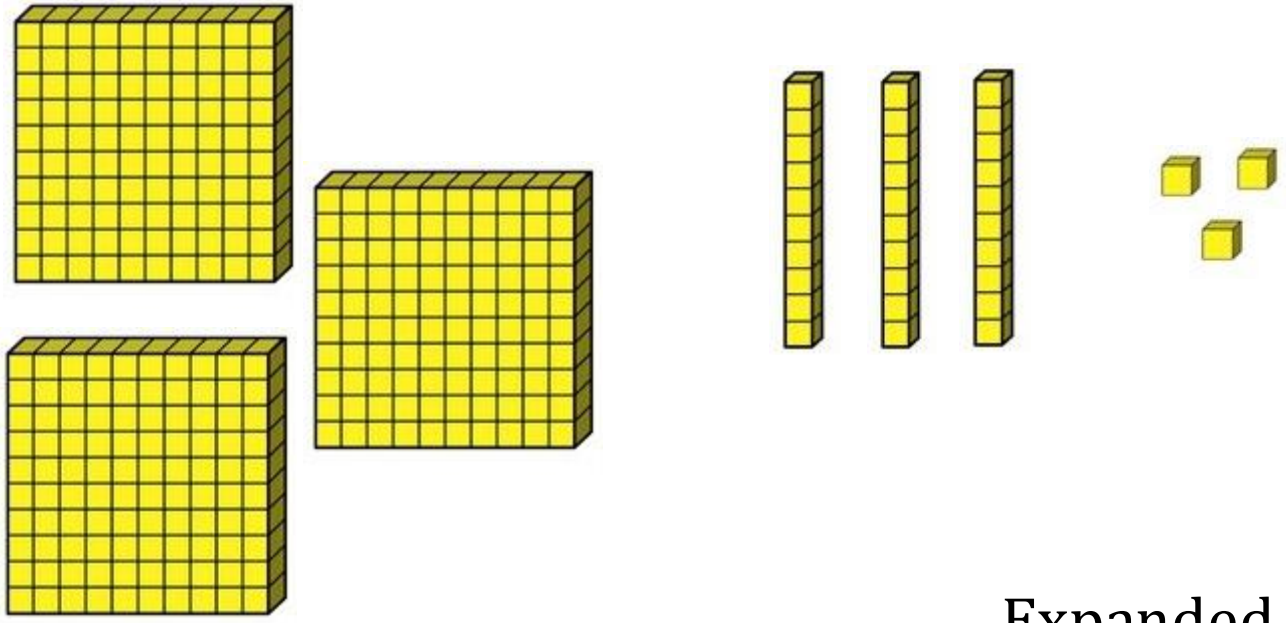


Expanded Form: $2{,}000 + 300 + 20 + 9 = 2{,}329$

PLACE VALUE: Picture Form & Expanded Form



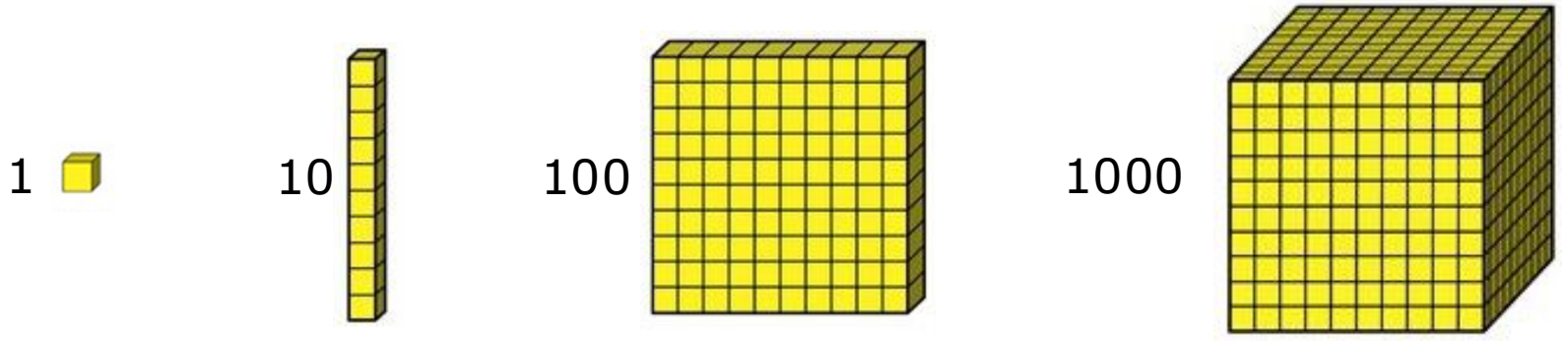
What number do the following Base-10 blocks represent?



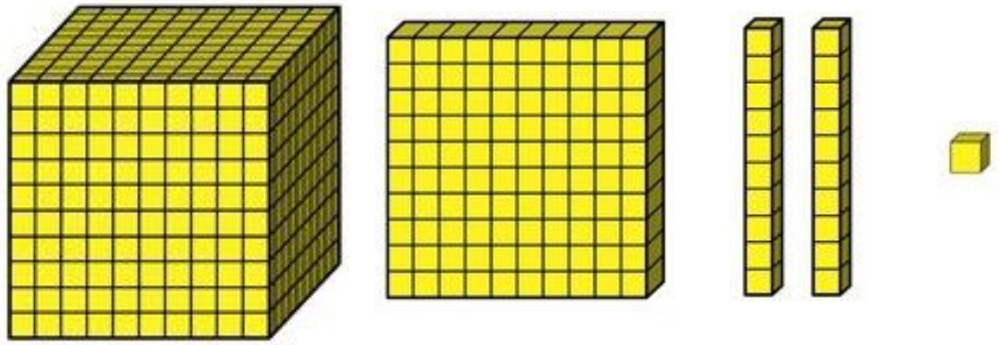
=333

Expanded Form: $300 + 30 + 3 = 333$

PLACE VALUE: Picture Form & Expanded Form



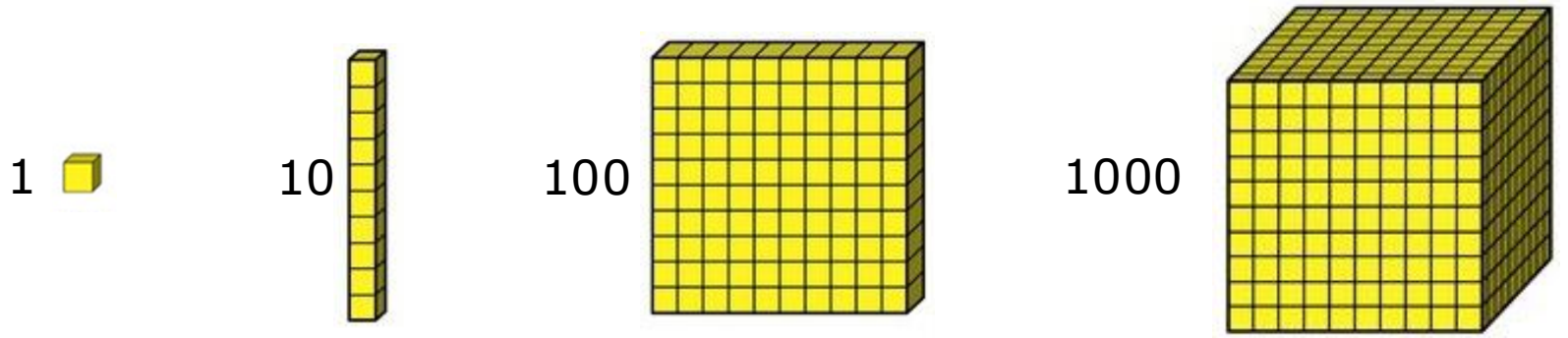
What number do the following Base-10 blocks represent?



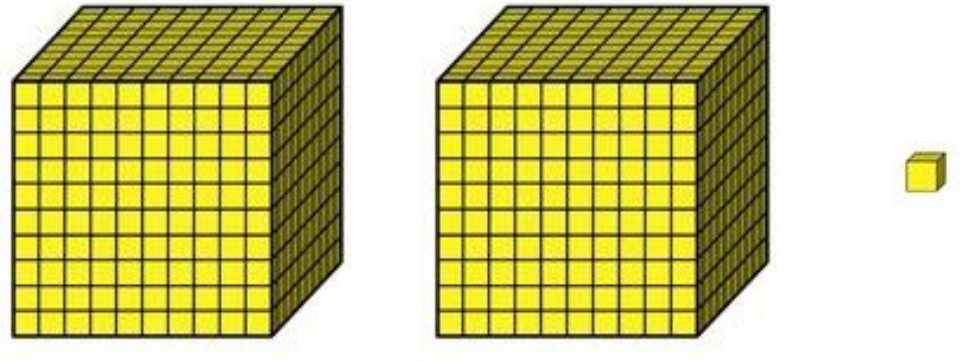
=1,121

Expanded Form: $1000 + 100 + 20 + 1 = 1{,}121$

PLACE VALUE: Picture Form & Expanded Form



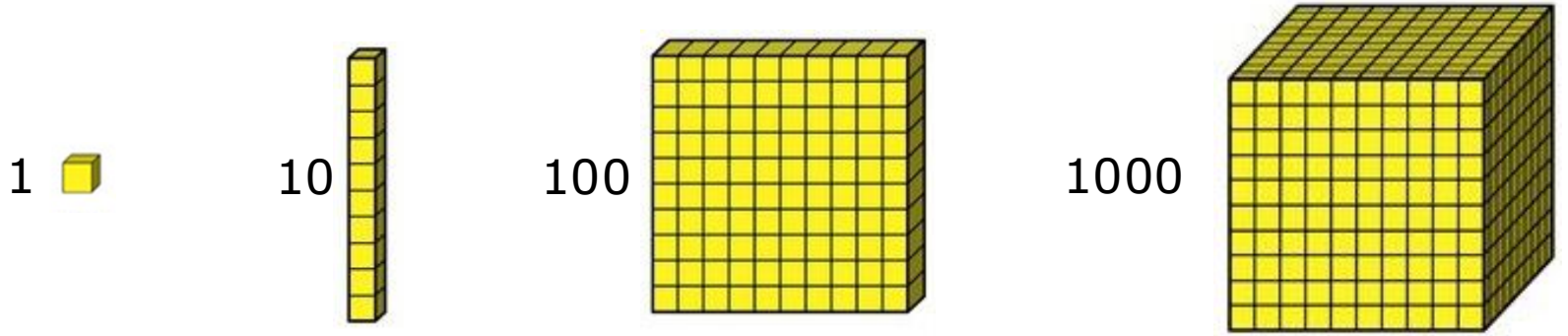
What number do the following Base-10 blocks represent?



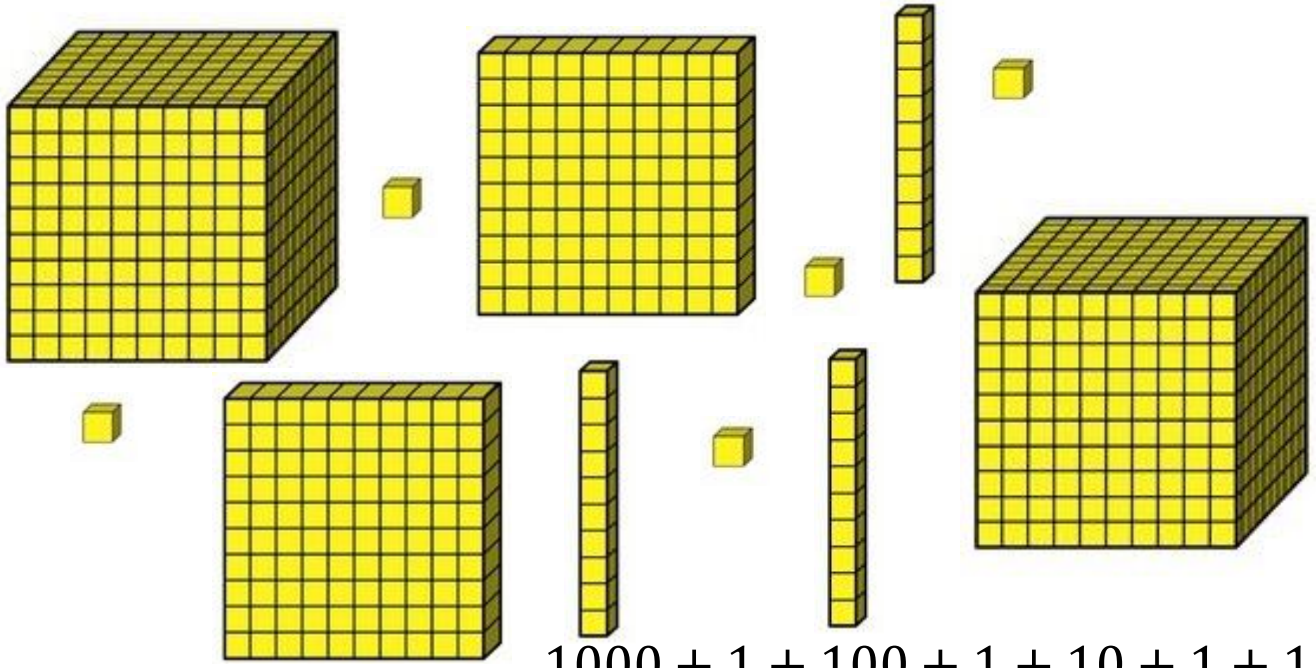
Expanded Form: $2{,}000 + 1 = 2001$

Why are there 0's ?

PLACE VALUE: Picture Form & Expanded Form



What number do the following Base-10 blocks represent?

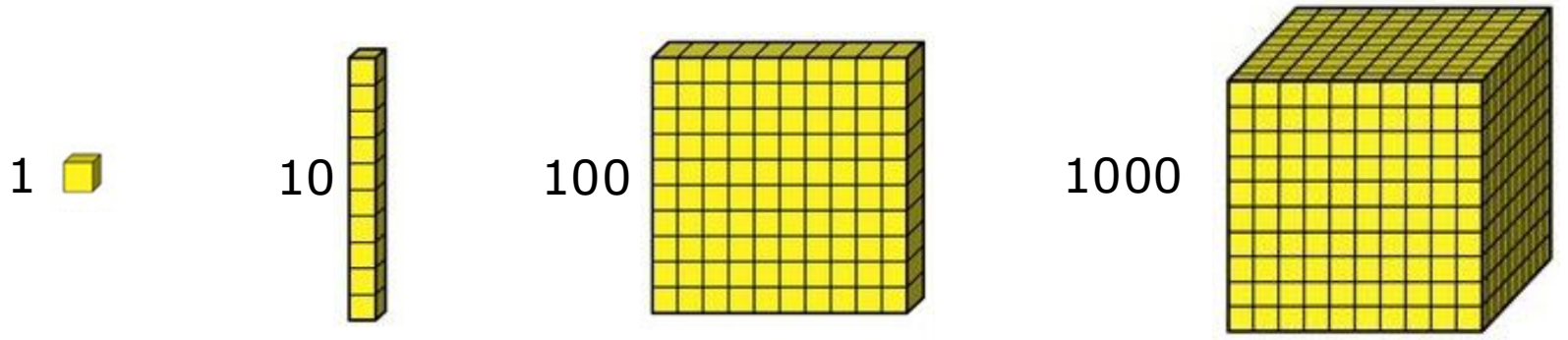


=2,235

$$2000 + 200 + 30 + 5 = 2{,}235$$

$$1000 + 1 + 100 + 1 + 10 + 1 + 1 + 100 + 10 + 1 + 10 + 1000 = 2{,}235$$

PLACE VALUE: Picture Form



What would come next?

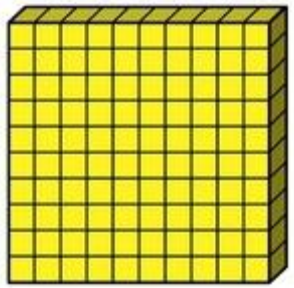
…And after that?

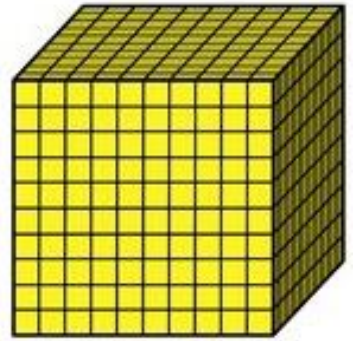
10,000 100,000 1,000,000 10,000,000

PLACE VALUE: Picture Form

1 

10 

100 

1000 

WHAT IS THE PATTERN?

- Each ‘set’ is 10x larger than the previous set
  - Or simply, you attach a 0 to the next number/set
  - The digits 0-9 are used
    - *Exceeding 9 in any position initiates counting in the next highest position*

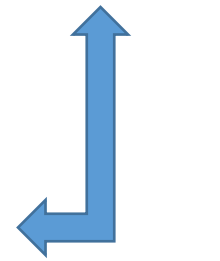
10,000 100,000 1,000,000 10,000,000

PLACE VALUE: Standard Form & Word Form

Periods:	Billions			Millions			Thousands			Ones		
PLACE VALUE:	Hundred-billions	Ten-billions	Billions	Hundred-millions	Ten-millions	Millions	Hundred-thousands	Ten-Thousands	Thousands	Hundreds	Tens	Ones
Example:												

PLACE VALUE: Standard Form & Word Form

Periods:	Billions			Millions			Thousands			Ones		
PLACE VALUE:	Hundred-billions	Ten-billions	Billions	Hundred-millions	Ten-millions	Millions	Hundred-thousands	Ten-Thousands	Thousands	Hundreds	Tens	Ones
Example:												



- When writing numbers in **Standard Form**, we typically use commas to separate the number into groups of (3) digits
  - Ex) 1000000 vs 1,000,000

Each group of 3 forms a **period**
- Ones
- Thousands
- Millions
- Billions

The period you're in dictates how you will write/say it

PLACE VALUE: Standard Form & Word Form

1,245

Periods:	Billions			Millions			Thousands			Ones		
PLACE VALUE:	Hundred-billions	Ten-billions	Billions	Hundred-millions	Ten-millions	Millions	Hundred-thousands	Ten-Thousands	Thousands	Hundreds	Tens	Ones
Example:									1	2	4	5

"one **thousand**, two hundred forty five"

PLACE VALUE: Standard Form & Word Form

21,245

Periods:	Billions			Millions			Thousands			Ones		
PLACE VALUE:	Hundred-billions	Ten-billions	Billions	Hundred-millions	Ten-millions	Millions	Hundred-thousands	Ten-Thousands	Thousands	Hundreds	Tens	Ones
Example:								2	1	2	4	5

"Twenty one **thousand**, two hundred forty five"

PLACE VALUE: Standard Form & Word Form

421,245

Periods:	Billions			Millions			Thousands			Ones		
PLACE VALUE:	Hundred-billions	Ten-billions	Billions	Hundred-millions	Ten-millions	Millions	Hundred-thousands	Ten-Thousands	Thousands	Hundreds	Tens	Ones
Example:							4	2	1	2	4	5

"Four hundred twenty one **thousand**, two hundred forty five"

PLACE VALUE: Standard Form & Word Form

23,421,245

Periods:	Billions			Millions			Thousands			Ones		
PLACE VALUE:	Hundred-billions	Ten-billions	Billions	Hundred-millions	Ten-millions	Millions	Hundred-thousands	Ten-Thousands	Thousands	Hundreds	Tens	Ones
Example:					2	3	4	2	1	2	4	5

"Twenty three **million**, four hundred twenty one **thousand**, two hundred forty five"

PLACE VALUE: Standard Form & Word Form

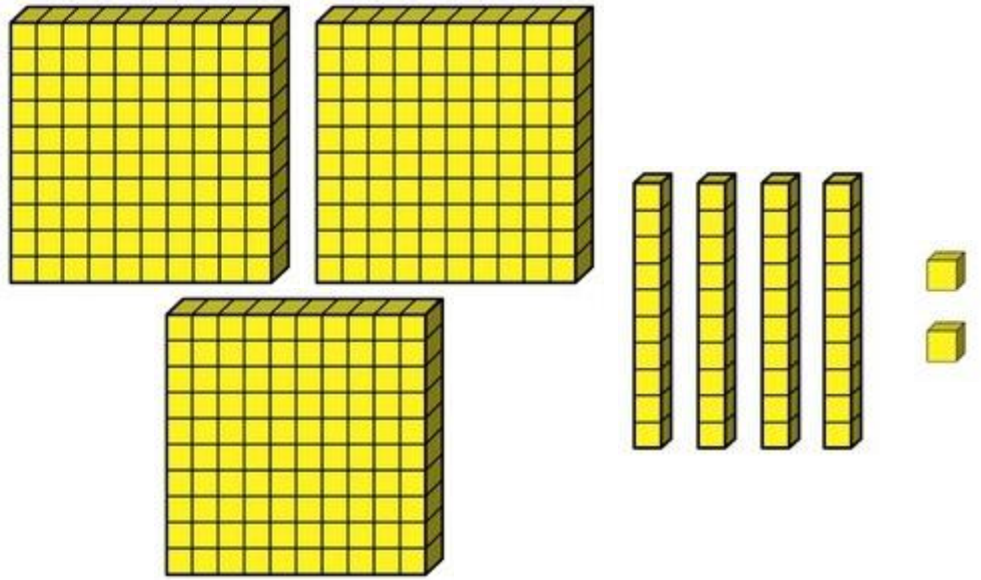
3,823,421,245

Periods:	Billions			Millions			Thousands			Ones		
PLACE VALUE:	Hundred-billions	Ten-billions	Billions	Hundred-millions	Ten-millions	Millions	Hundred-thousands	Ten-Thousands	Thousands	Hundreds	Tens	Ones
Example:			3	8	2	3	4	2	1	2	4	5

"Three **billion**, eight hundred twenty three **million**, four hundred twenty one **thousand**, two hundred forty five"

342

Picture Form



Expanded Form

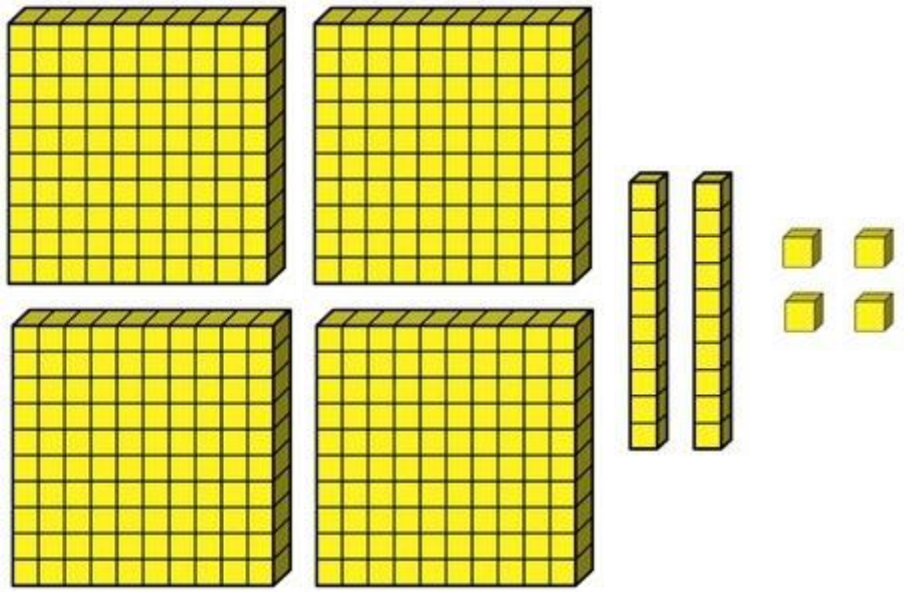
$$300 + 40 + 2 = 342$$

Word Form

"Three hundred forty two"

424

Picture Form



Expanded Form

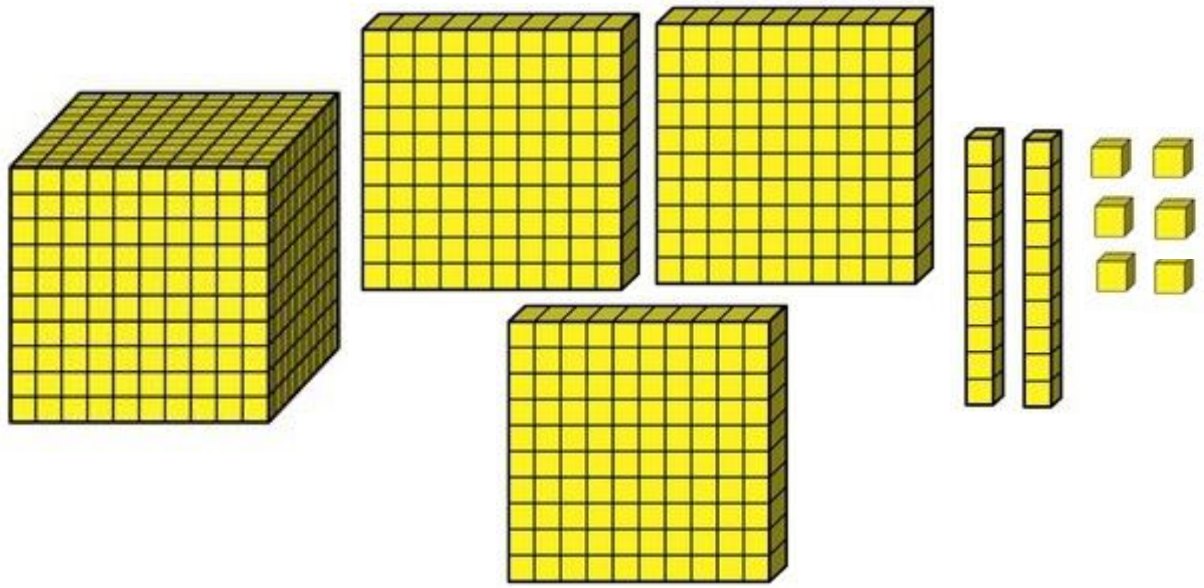
$$400 + 20 + 4 = 424$$

Word Form

"Four hundred twenty four"

1,326

Picture Form



Expanded Form

$$1{,}000 + 300 + 20 + 6 = 1{,}326$$

Word Form

"One thousand, three hundred twenty six"

12,123

Picture Form

This could take awhile…

Expanded Form

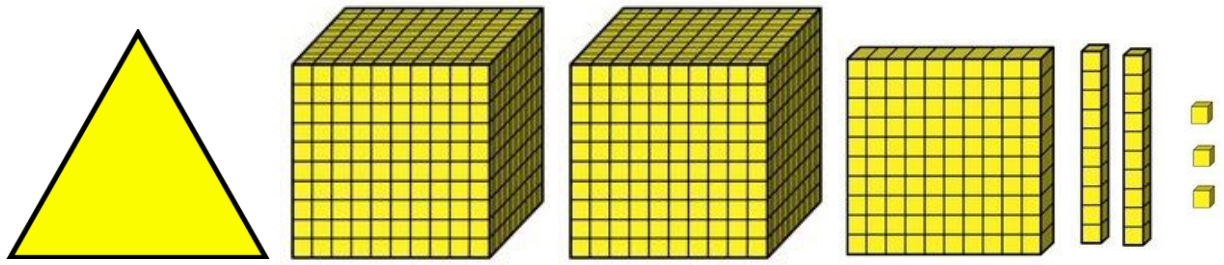
$$10{,}000 + 2{,}000 + 100 + 20 + 3 = 12{,}123$$

Word Form

"Twelve thousand, one hundred twenty three"

12,123

Picture Form



WHY?

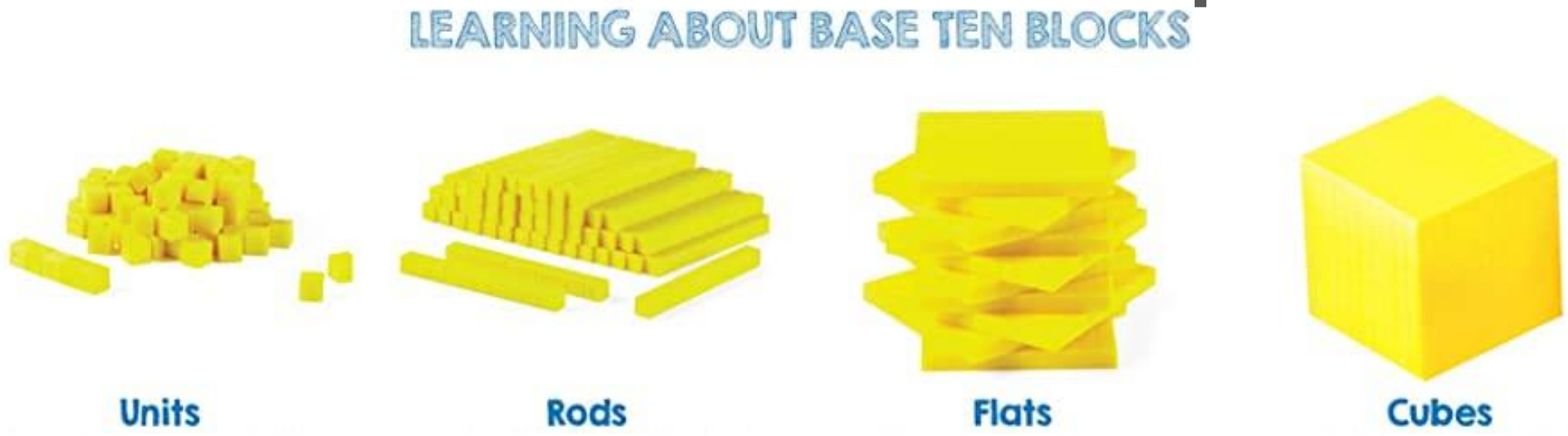
Expanded Form

$$10{,}000 + 2{,}000 + 100 + 20 + 3 = 12{,}123$$

Word Form

"Twelve thousand, one hundred twenty three"

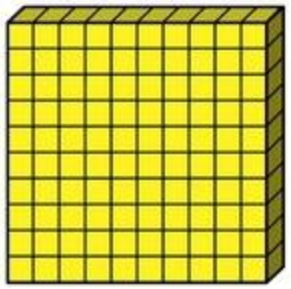
PLACE VALUE: Picture Form & Expanded Form



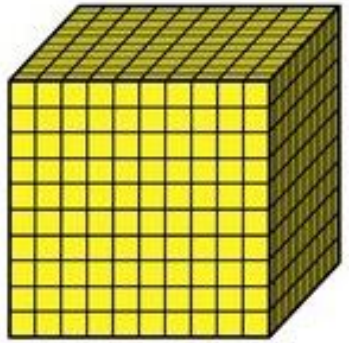
1

10

100

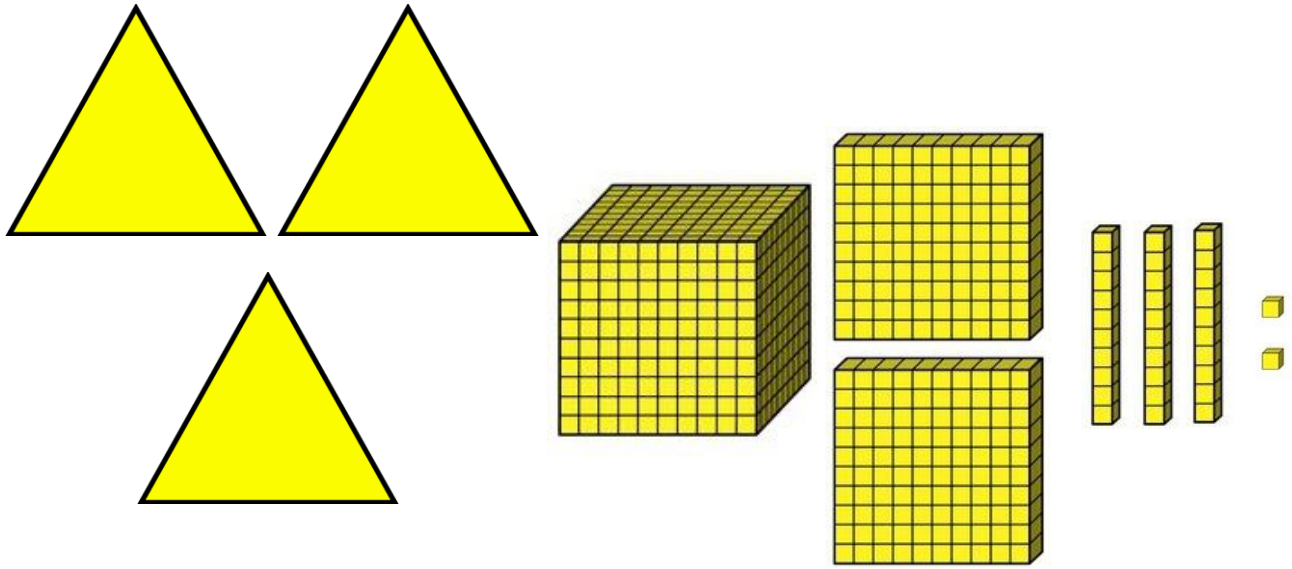


1000



31,232

Picture Form



Expanded Form

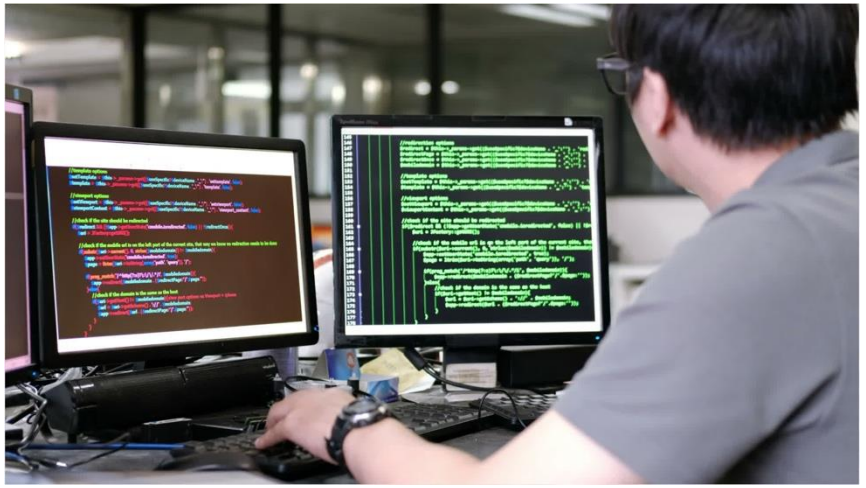
$$30{,}000 + 1{,}000 + 200 + 30 + 2 = 31{,}232$$

Word Form

"Thirty one thousand, two hundred thirty two"

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.

As a data analyst, he is responsible for the retrieval, gathering, and organization of data in order to reach meaningful conclusions and inform decision making.

The People of Foundational Literacy:

Robert Kyle Mendoza III

Robert is currently compiling statistics and data into a report that he needs to present to a team of software engineers. These engineers are looking to improve the functionality of a recently developed app, and **Robert's** research will help aid this effort.

Assignment #1