

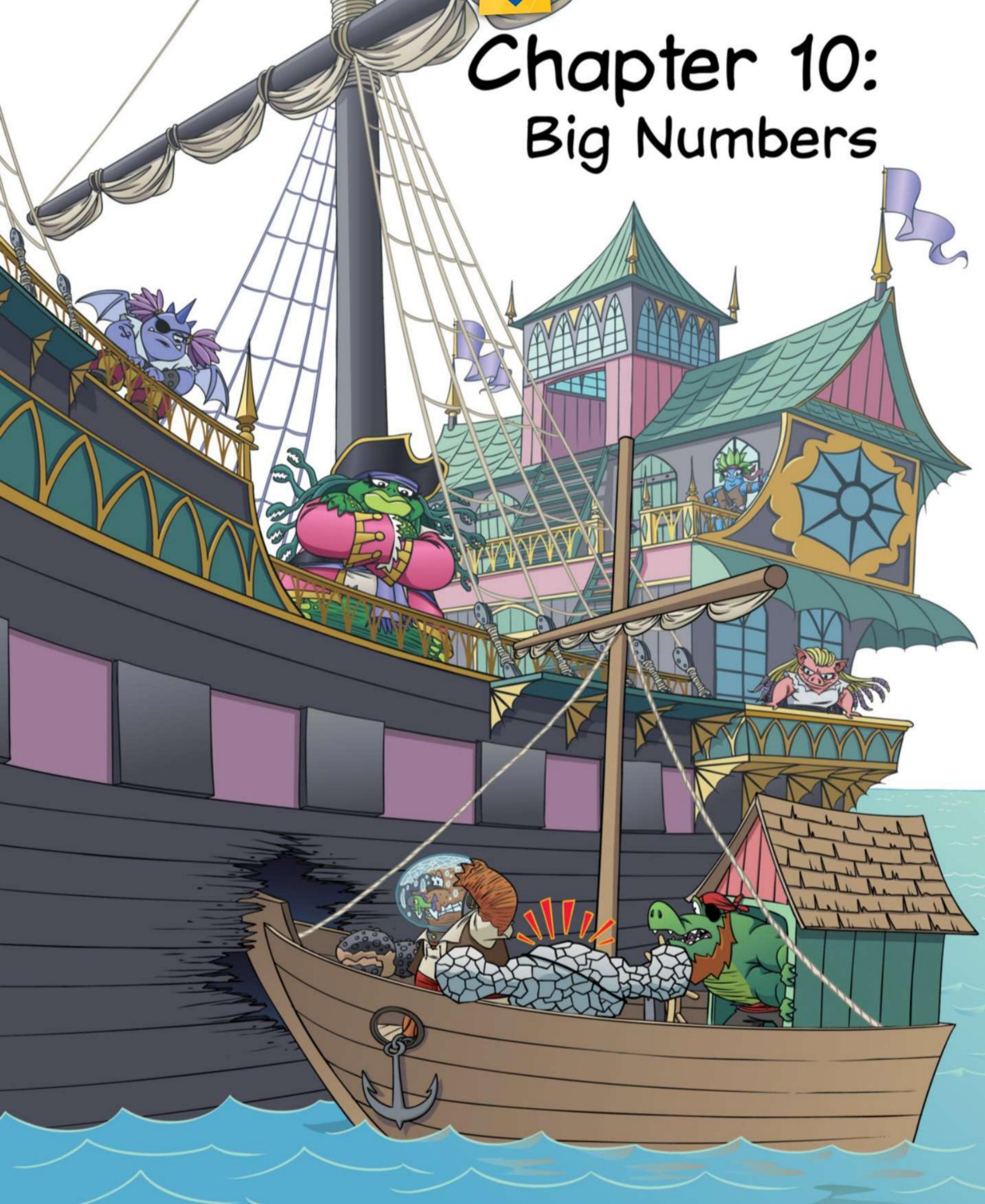
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Chapter 10:

Big Numbers



MATH TEAM

Thousands and Beyond

Today, we're going to start learning about really big numbers.

So far, we've only worked with numbers up to 3 digits long.

What's the largest number we can make with 3 digits?

999.

That's right. Do any of you know what number comes after 999?

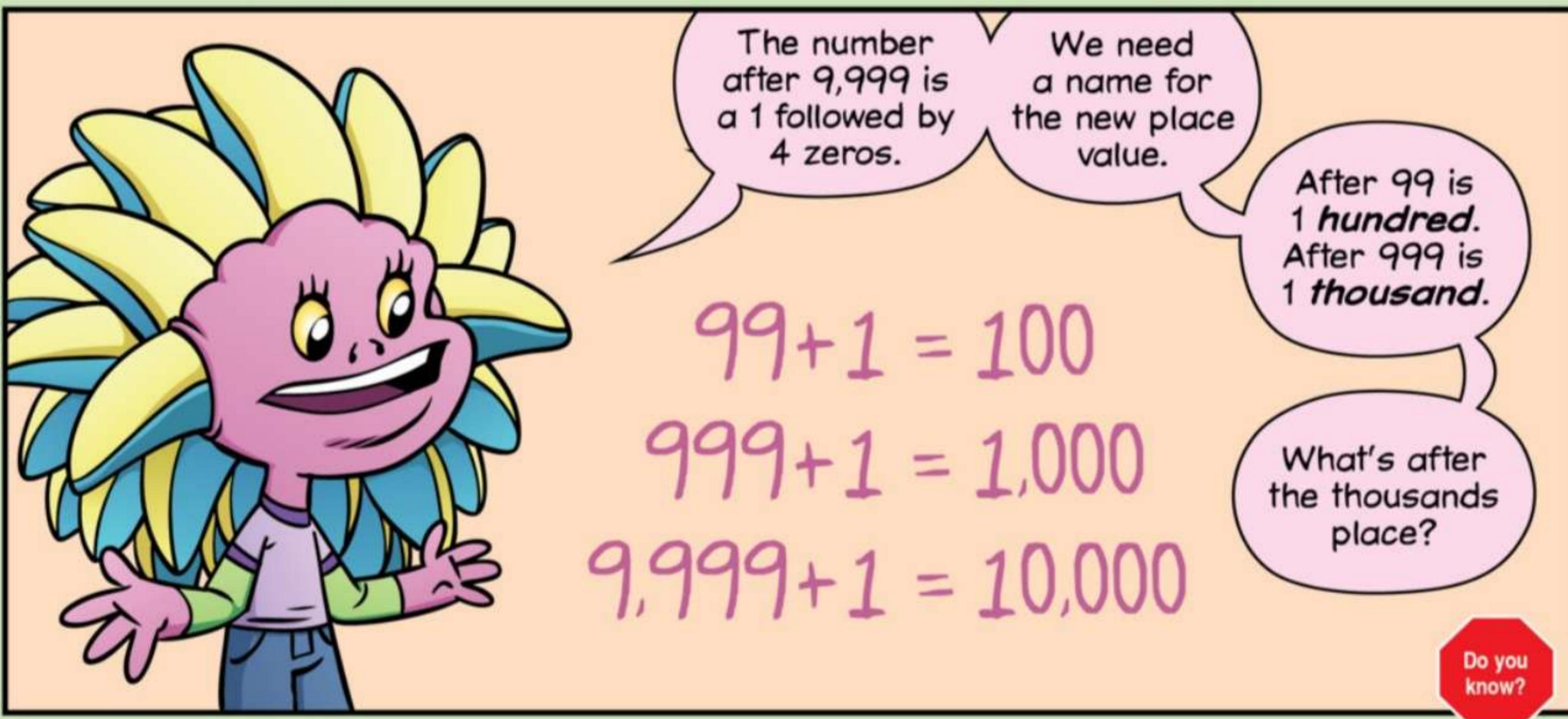
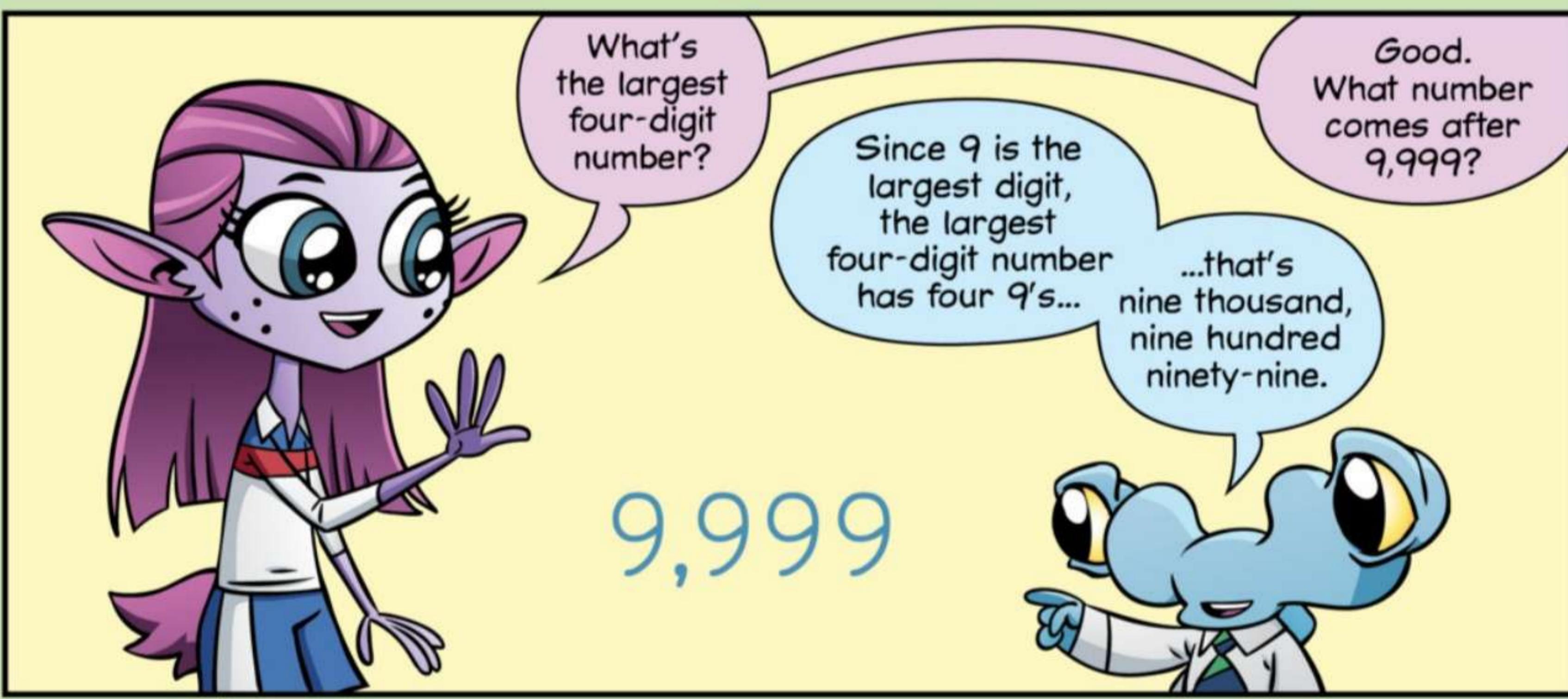
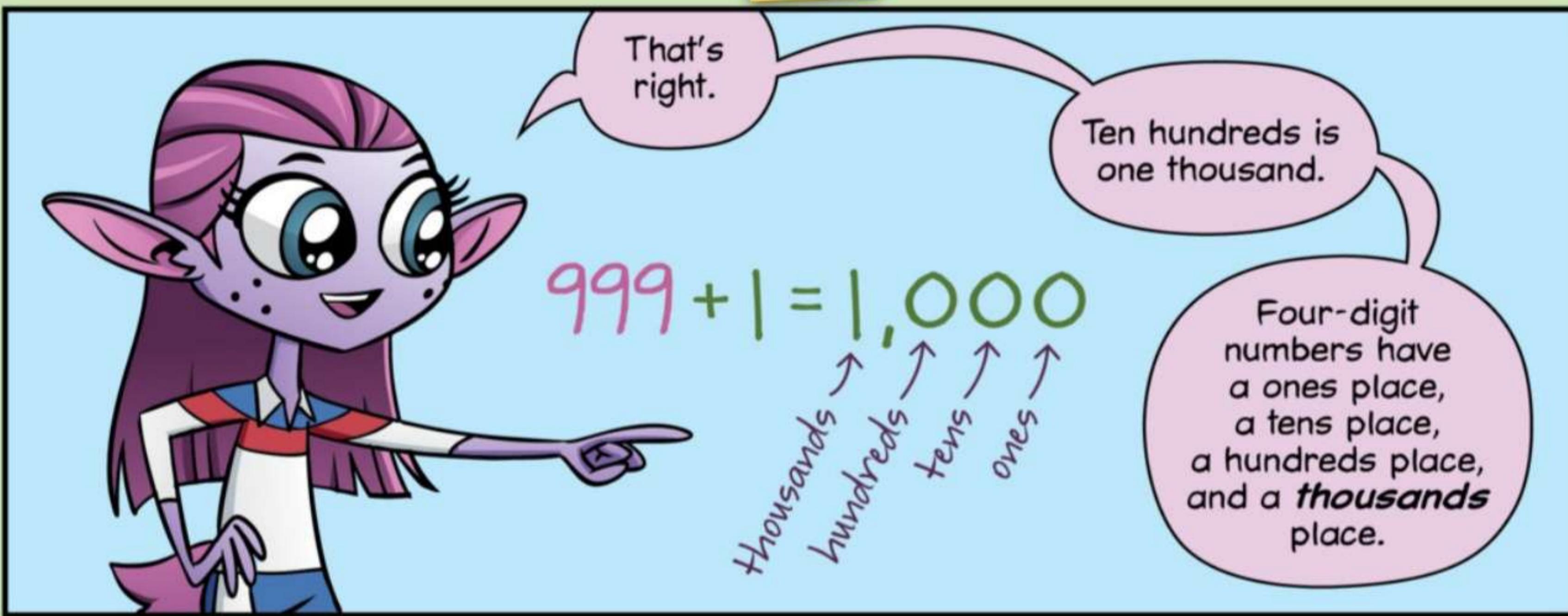
Ten hundred?

That doesn't sound right.

The number after 999 is called "one thousand."

$$999 + 1 = 1,000$$

WHEN WE WRITE NUMBERS THAT HAVE MORE THAN 3 DIGITS, WE USE A COMMA TO SEPARATE GROUPS OF 3 DIGITS. THIS MAKES THE NUMBERS EASIER TO READ.



Do you know?

The place value after the thousands place is called the ten thousands place.



10,000

Ten thousands
Thousands
Hundreds
Tens
Ones

So, the number after 9,999 is called...



...ten thousand.

Since hundreds come after tens...

...do hundred thousands come after ten thousands?



100,000

Hundred thousands
Ten thousands
Thousands
Hundreds
Tens
Ones

Yep.

A 1 followed by 5 zeros is one hundred thousand.



100,000 is a pretty big number.

There are 86,400 seconds in one day.

So, even if you could say one number every second, it would take more than a day to count to 100,000.



86,400 IS READ "EIGHTY-SIX THOUSAND, FOUR HUNDRED."



We can count by thousands all the way up to nine hundred ninety-nine thousand.

999,000

↑ ↑ ↑ ↑ ↑ ↑
hundred thousands ten thousands thousands hundreds tens ones

I see.

The first three digits of a six-digit number tell you how many thousands it has.



Exactly.



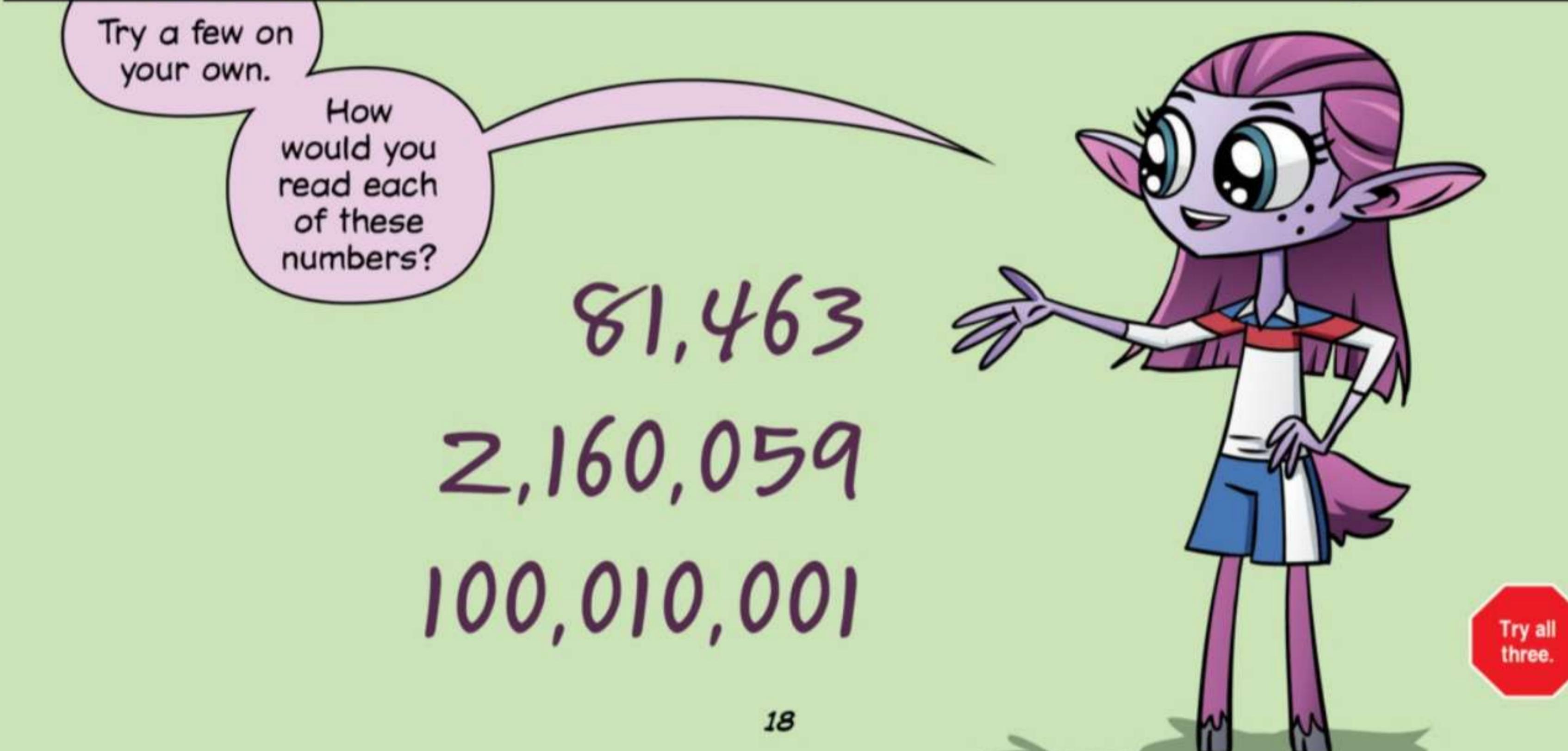
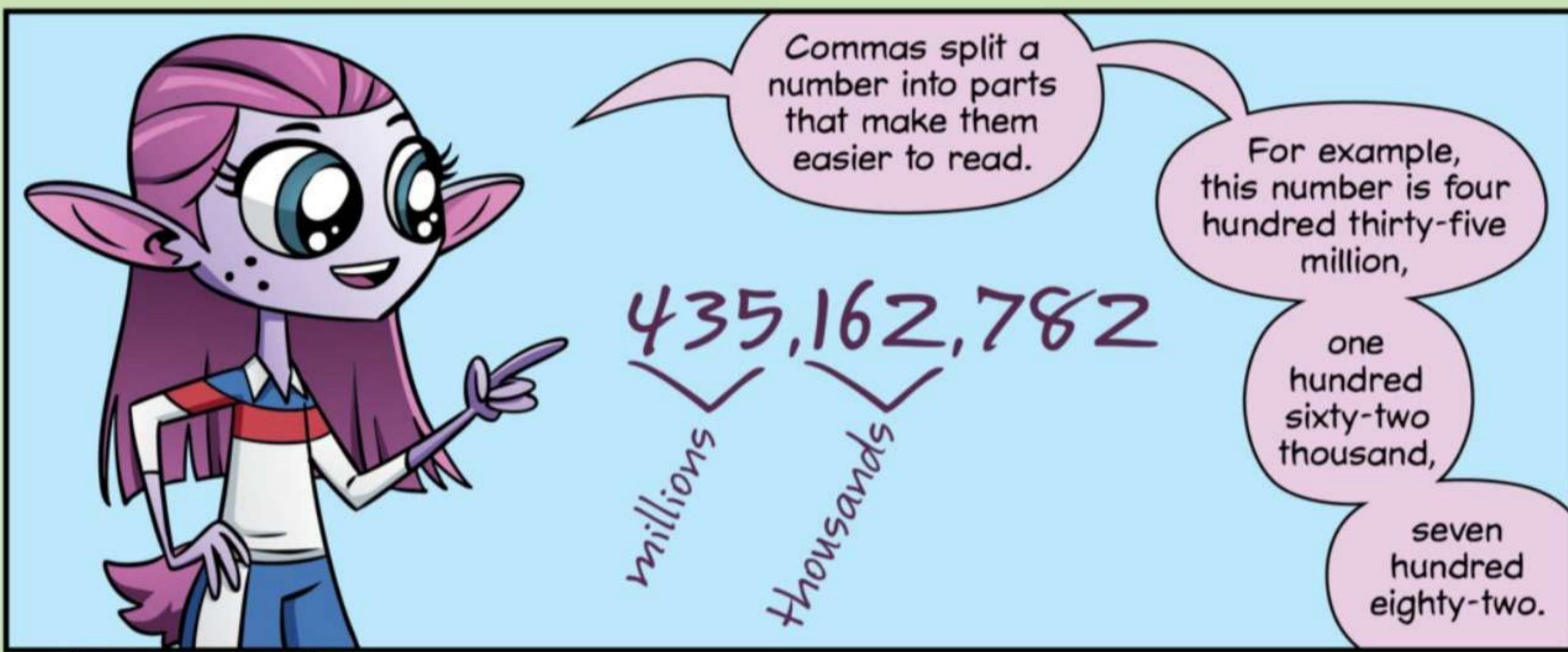
A thousand thousands is called 1 million!

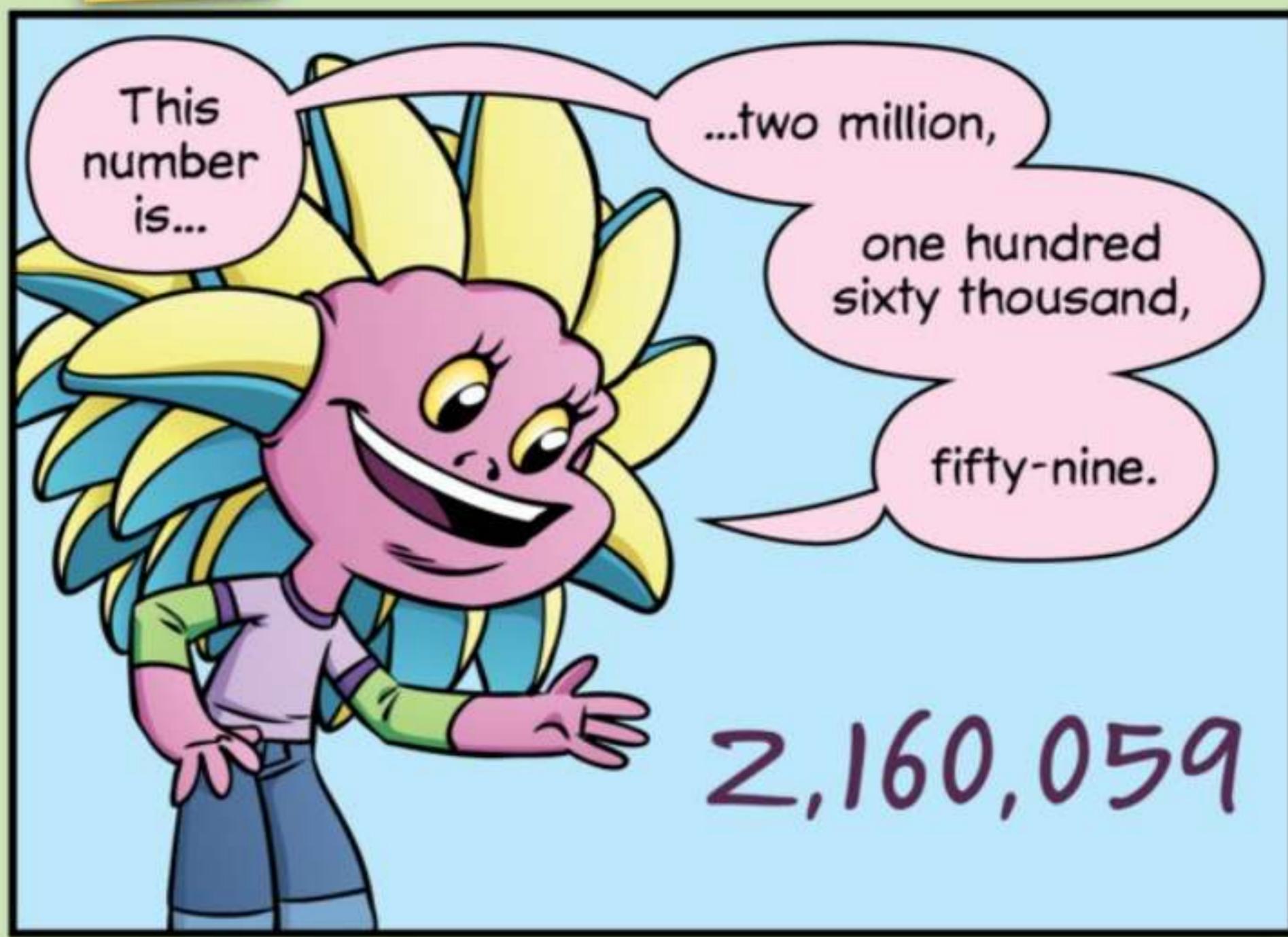
You got it!



1,000,000
"one million"

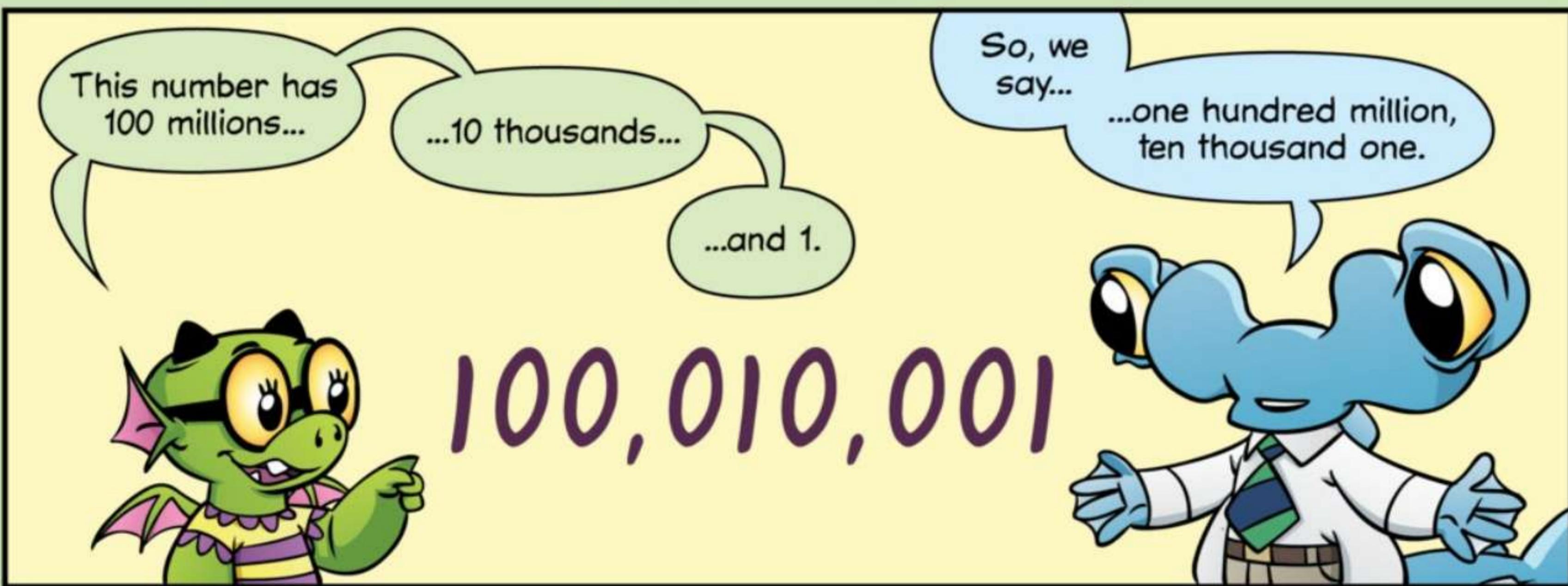




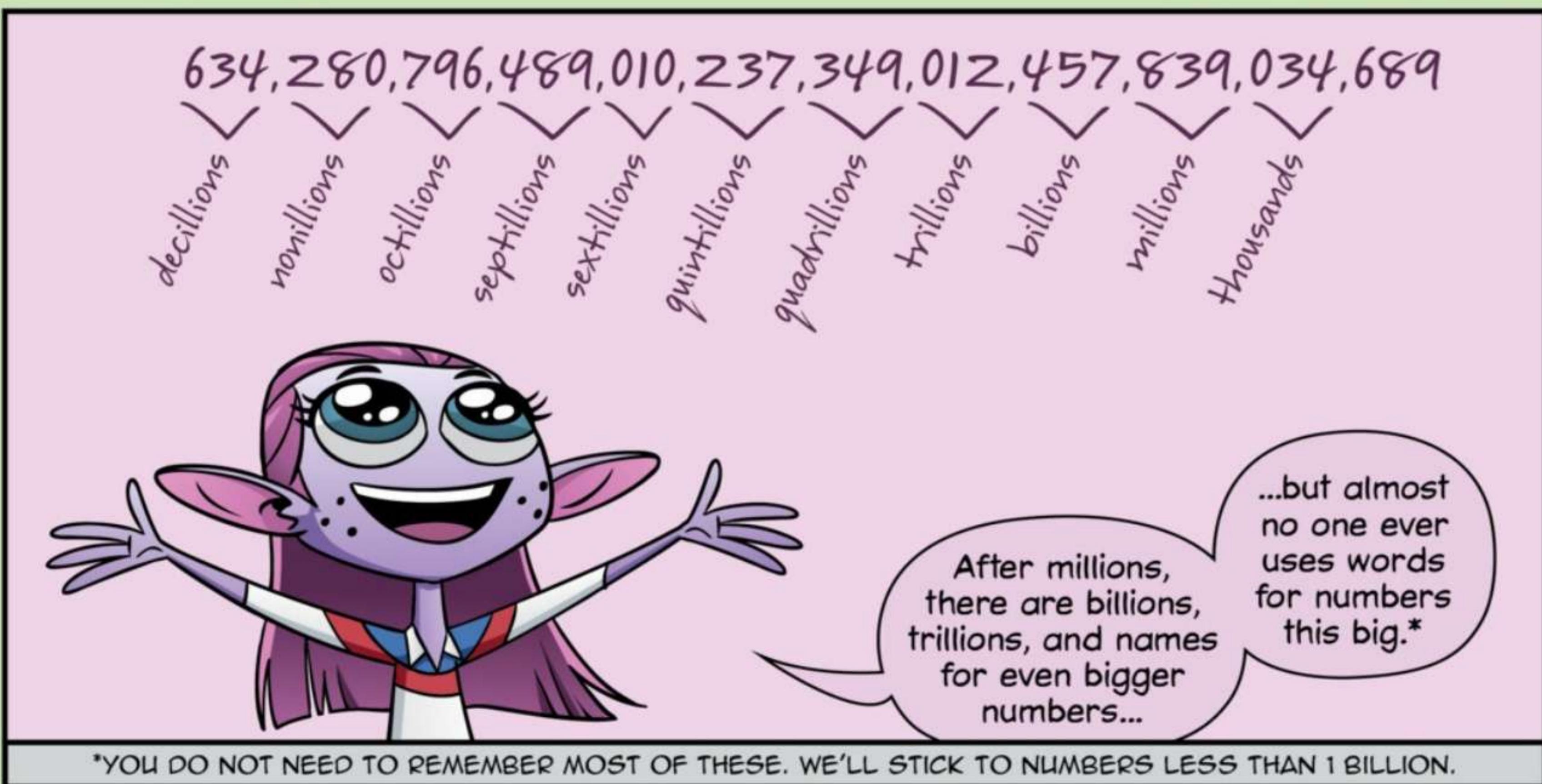


81,463

2,160,059



100,010,001



*YOU DO NOT NEED TO REMEMBER MOST OF THESE. WE'LL STICK TO NUMBERS LESS THAN 1 BILLION.



How tall is a stack of pennies?

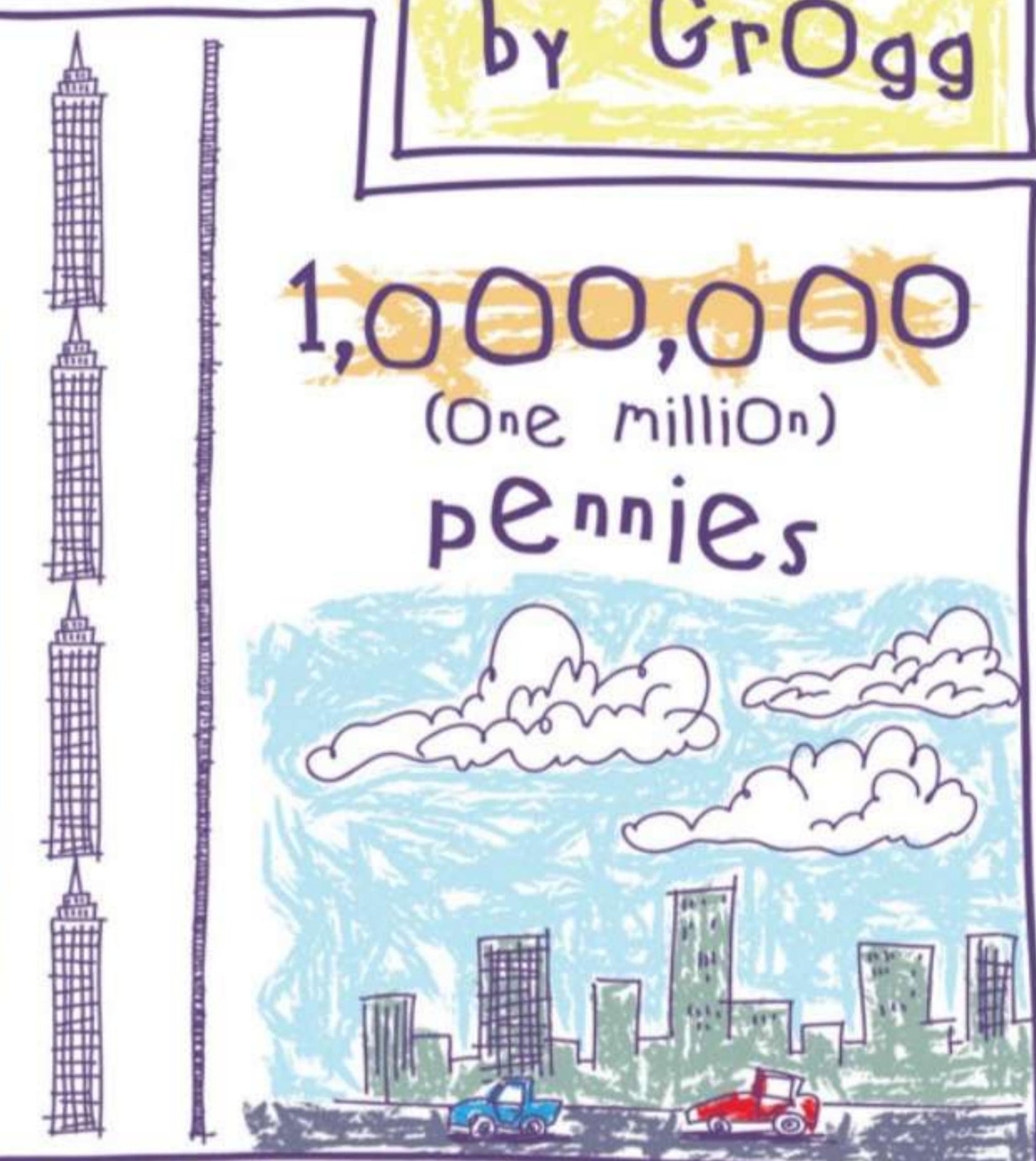
by GrOgg

1,000
(One thousand)
pennies



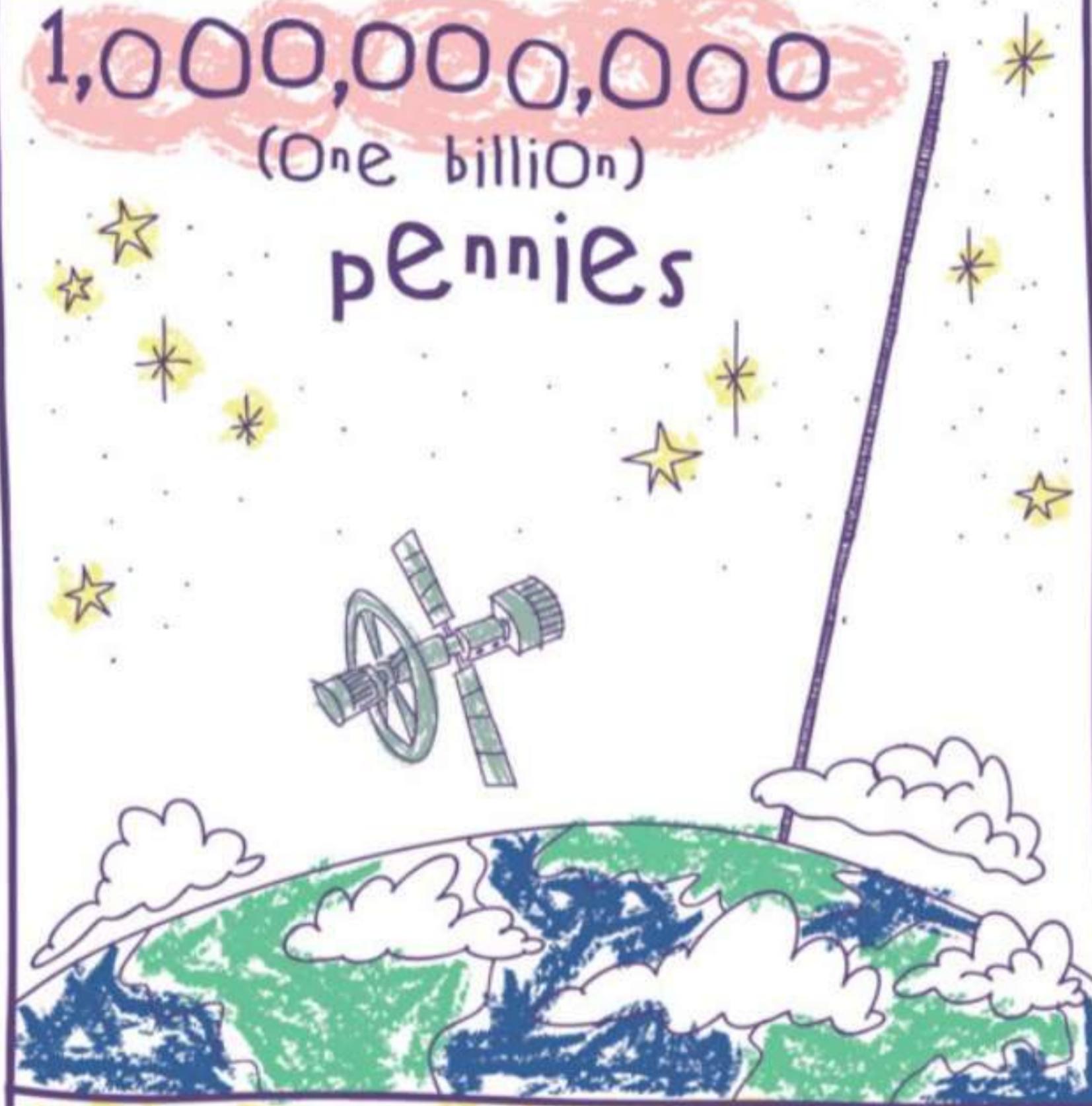
a little taller than me

1,000,000
(One million)
pennies



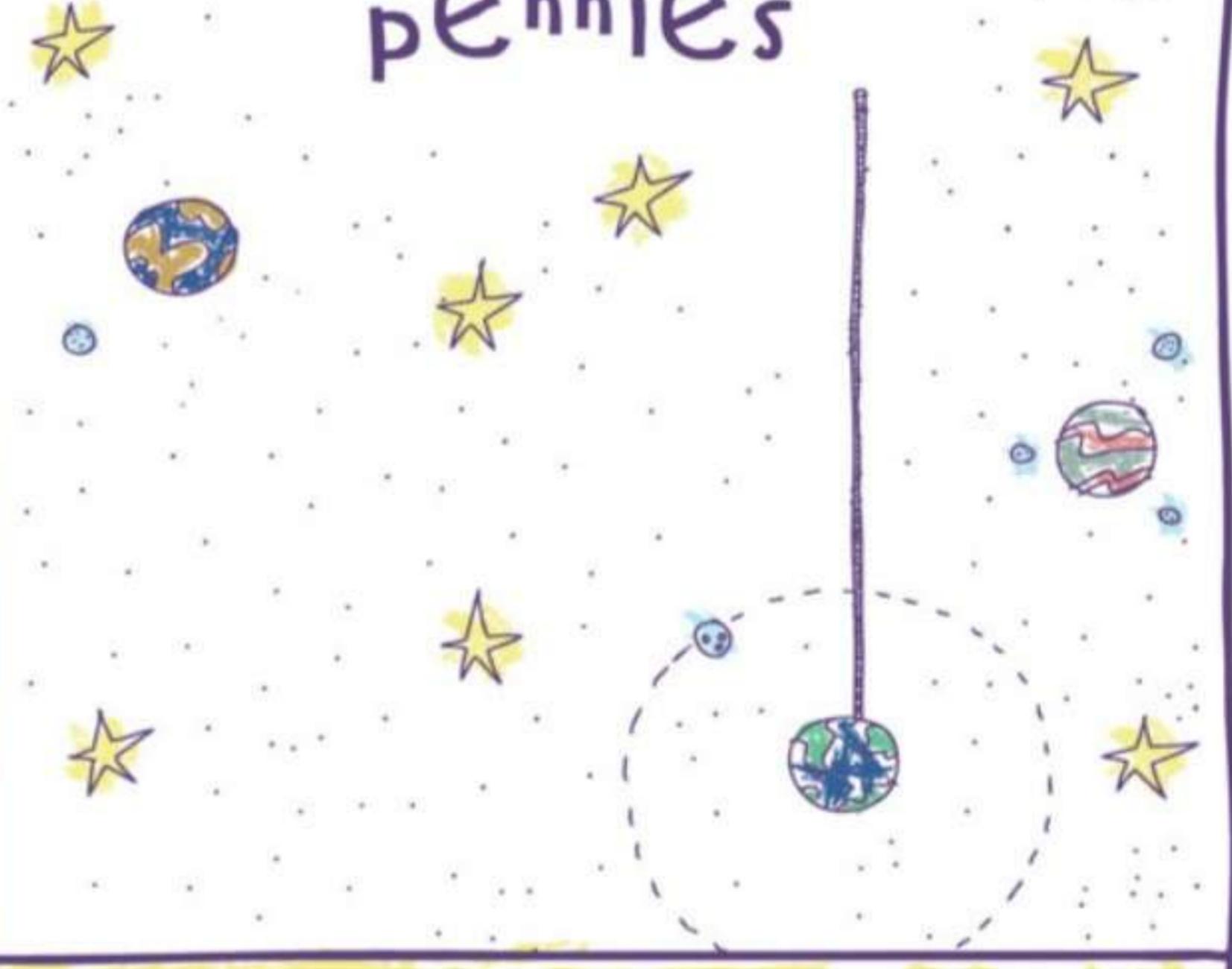
taller than four huge skyscrapers

1,000,000,000
(One billion)
pennies



about 4 times as high as the space station

1,000,000,000,000
(One trillion)
pennies



Waaaaay past the moon



$$70 + 10$$

$$186 + 10$$

$$395 + 10$$



We usually just increase its tens digit by 1.

Sometimes, we have to regroup.

$$70 + 10 = 80$$

$$186 + 10 = 196$$

$$395 + 10 = 405$$



That's right.

How would you add 1,000 to a number?

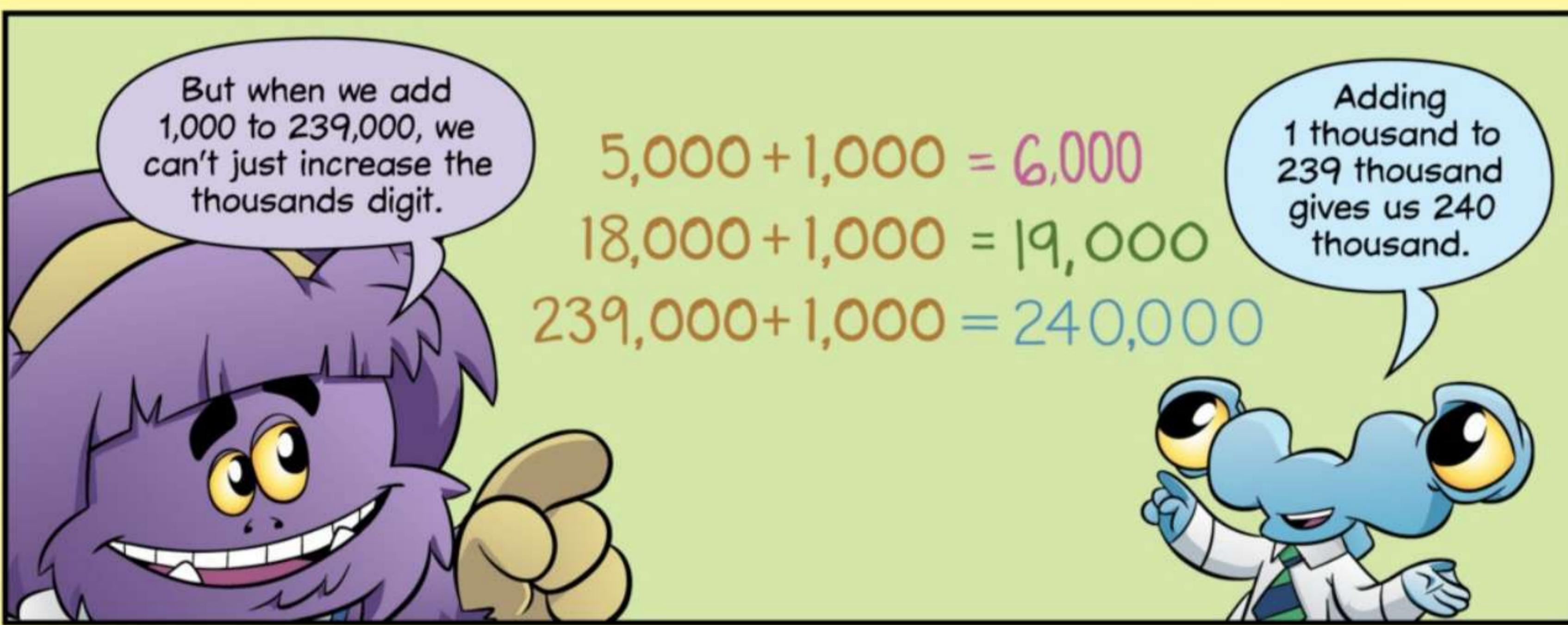
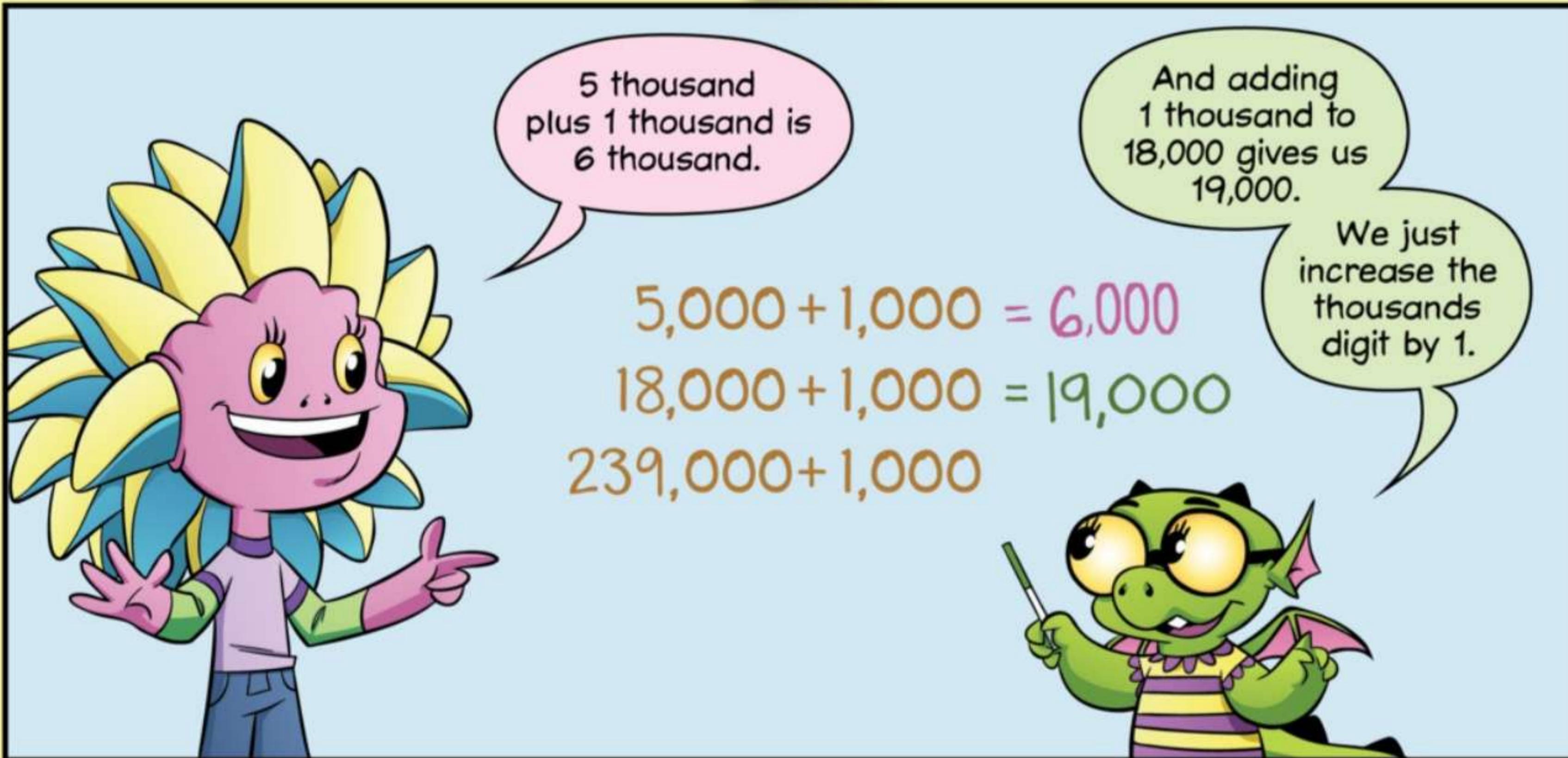
$$5,000 + 1,000$$

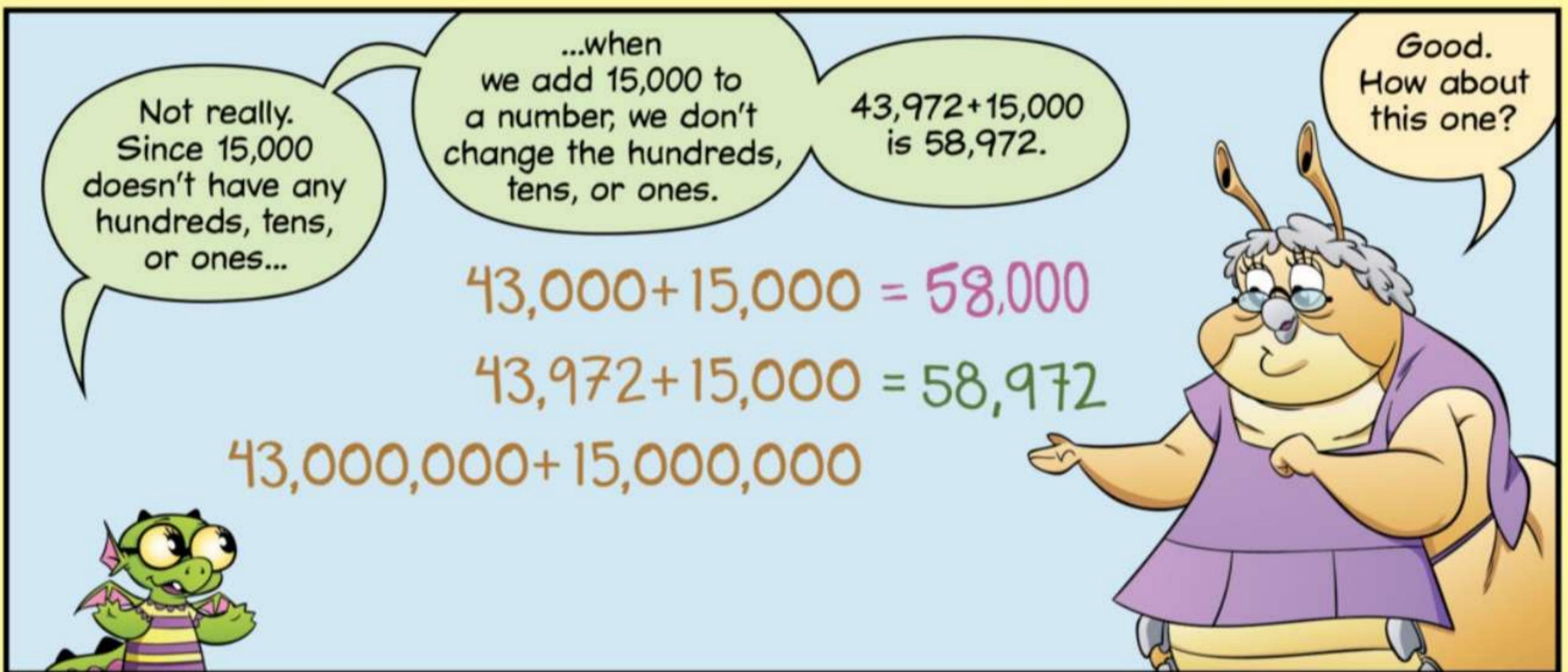
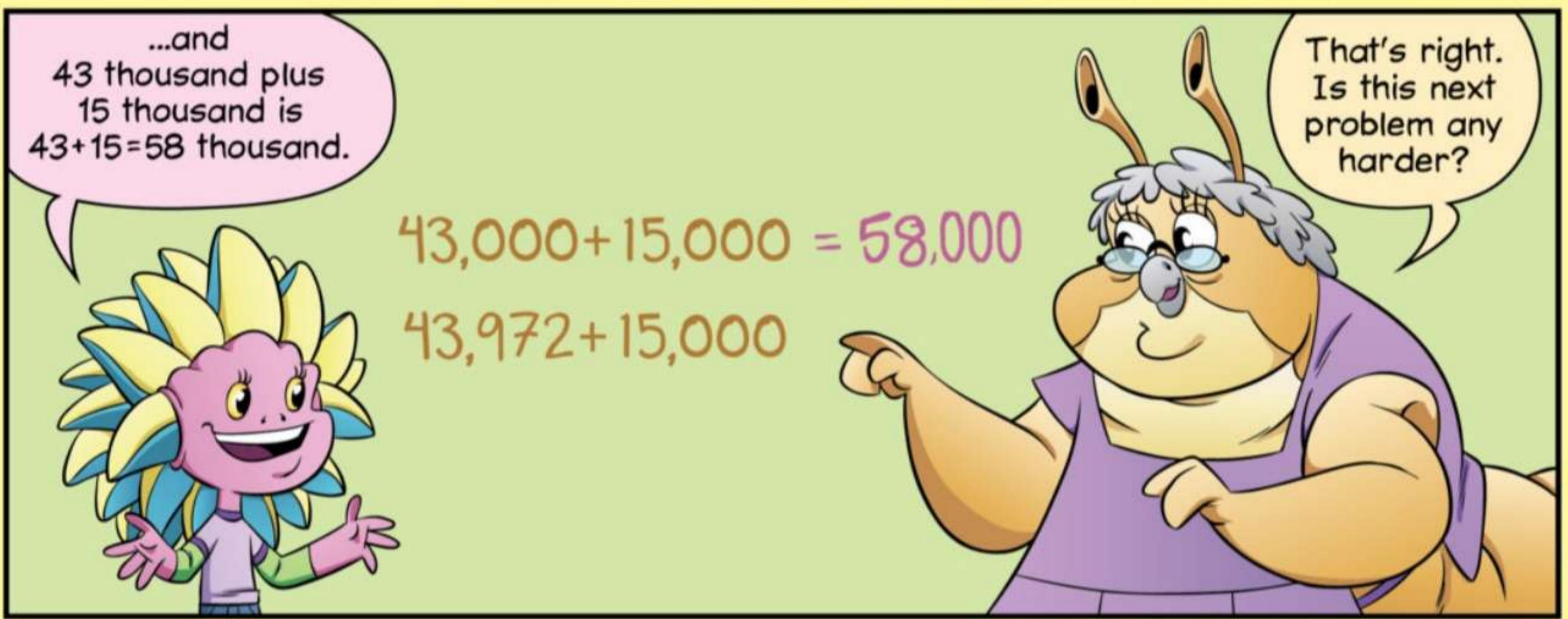
$$18,000 + 1,000$$

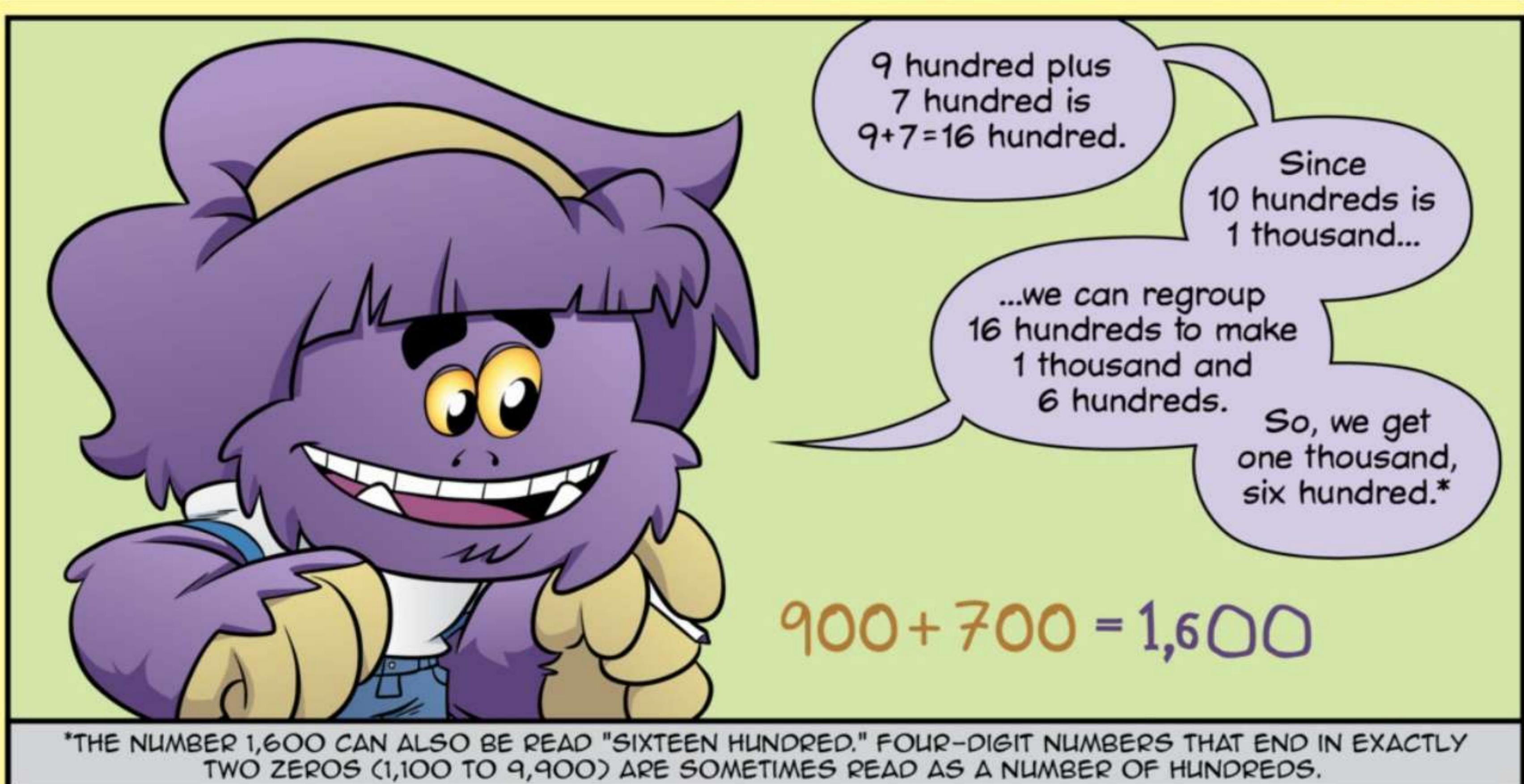
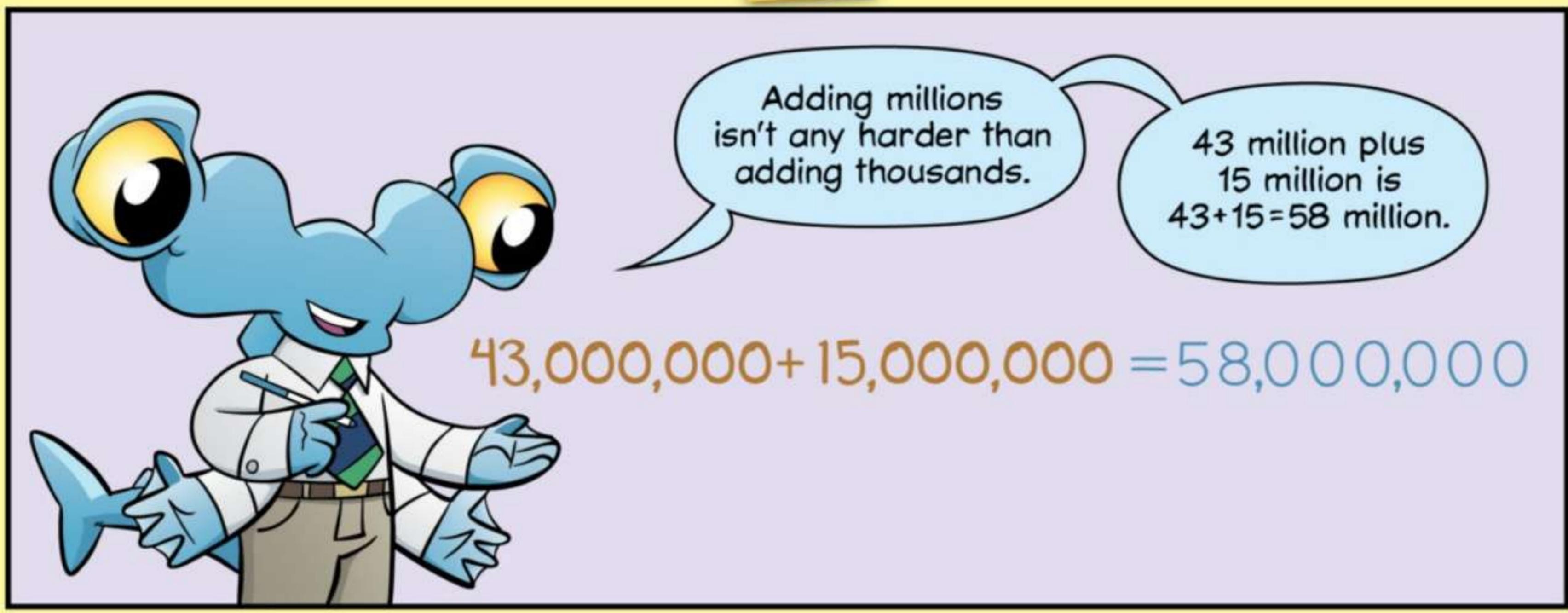
$$239,000 + 1,000$$

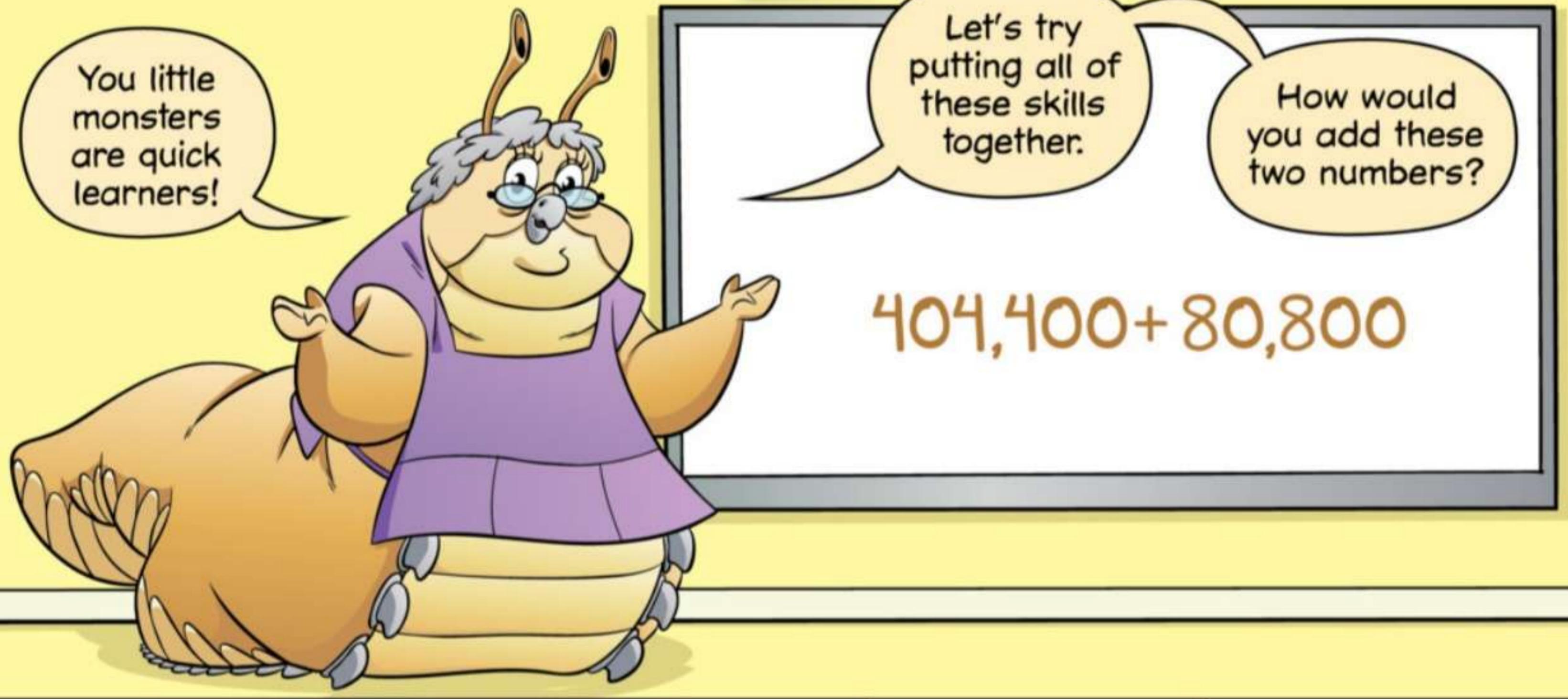


Try all three.

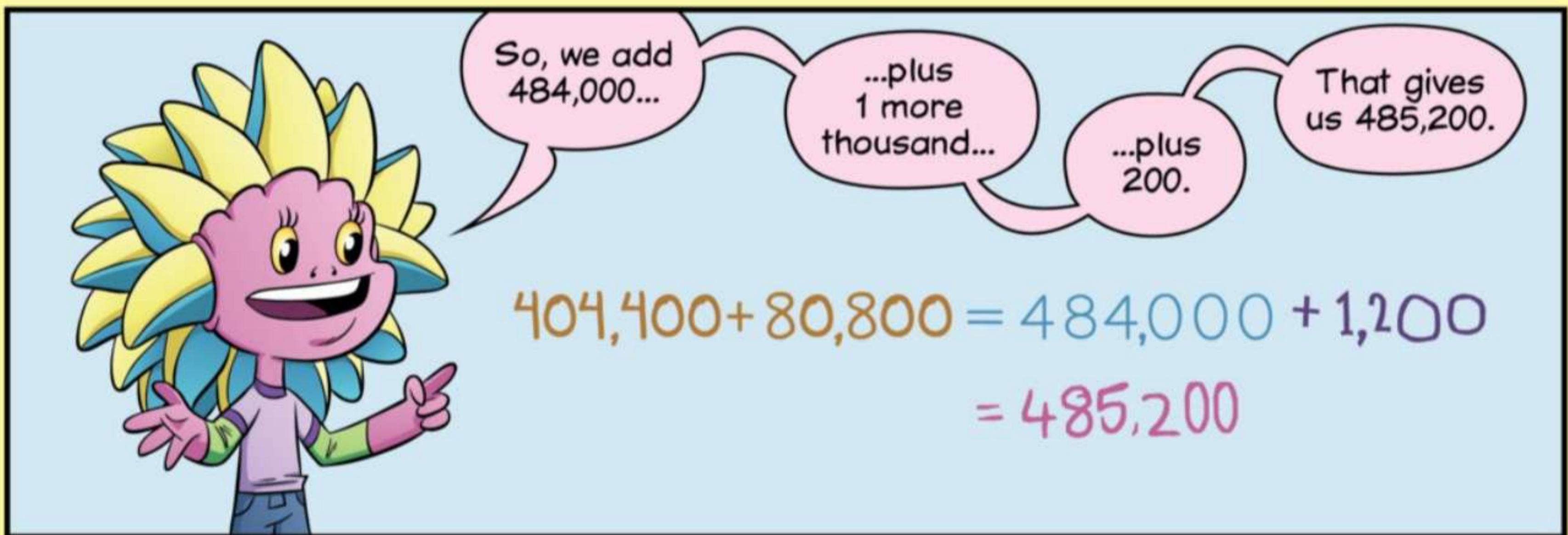




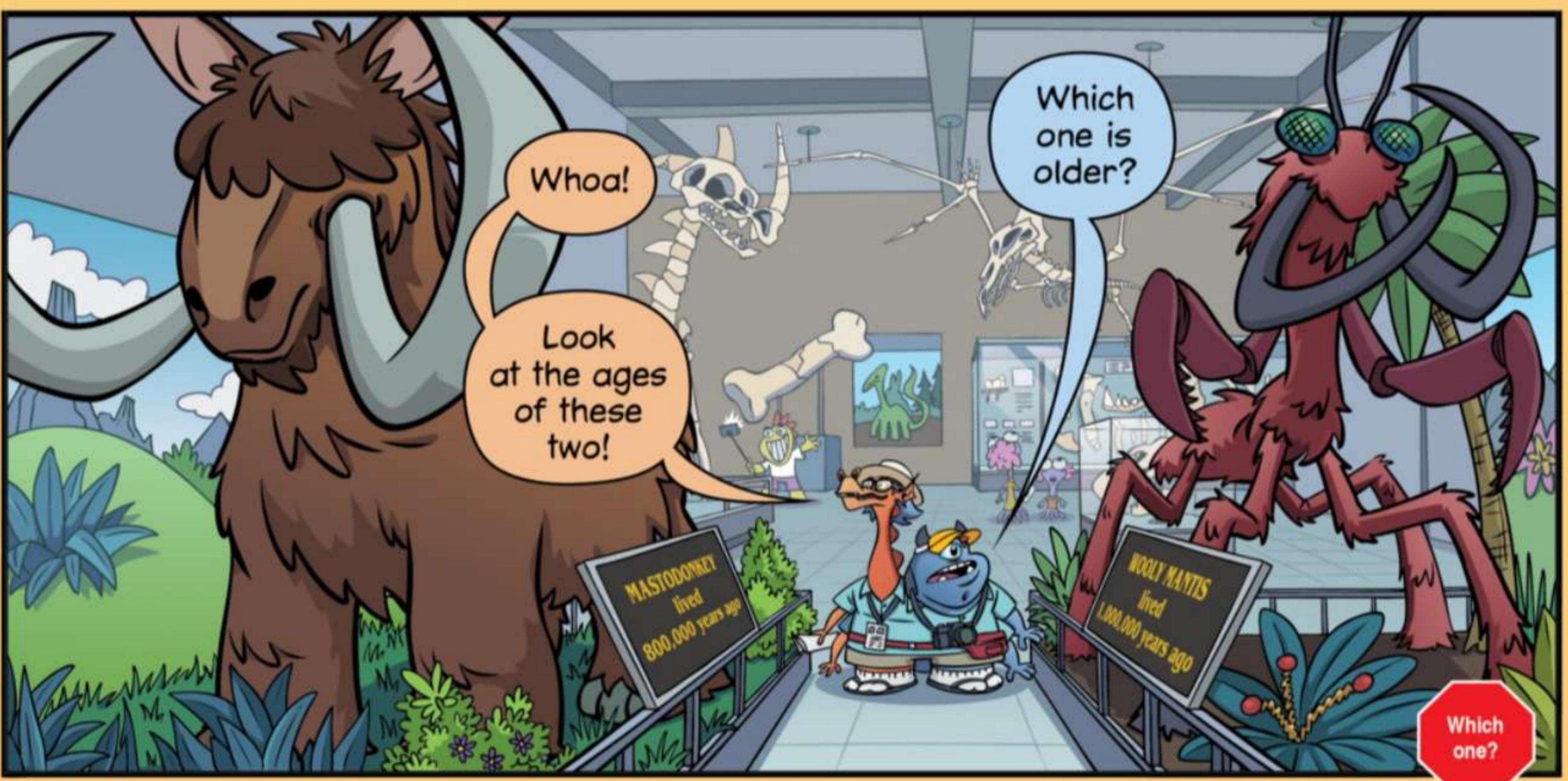




$$404,400 + 80,800$$







1 million is 1,000 thousands.

800,000 is 800 thousands.

So, 1,000,000 is greater than 800,000.

The Wooly Mantis is older.

Wooly Mantis MastodonKey
1,000,000 > 800,000

Yep.

When we compare two whole numbers, the one with more digits is always bigger.

Every 7-digit whole number is at least 1,000,000.

And every 6-digit whole number is less than 1,000,000.

Look, more creatures!

ANCIENT ANIMAL AGES



Stegoseahorse

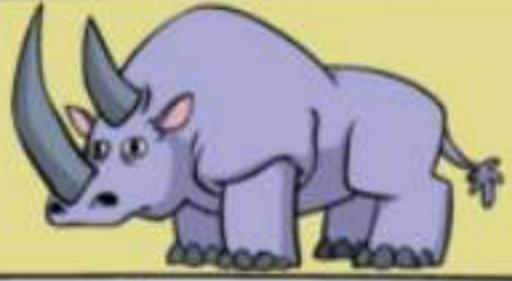


Triceratortoise



Brontostorkus

Some of these are even older than the Wooly Mantis!



Rhinosaurus

9,500,000 years

105,000,000 years

950,000 years

9,800,000 years

200,000,000 years

Let's try putting them in order from oldest to youngest.

Can you put the ages in order?

It's easier to order the numbers if we line up their digits by place value.

200 million is more than 105 million.

Those two are the biggest.

Then, nine million **800** thousand is more than nine million **500** thousand.

Finally, there's 950,000.



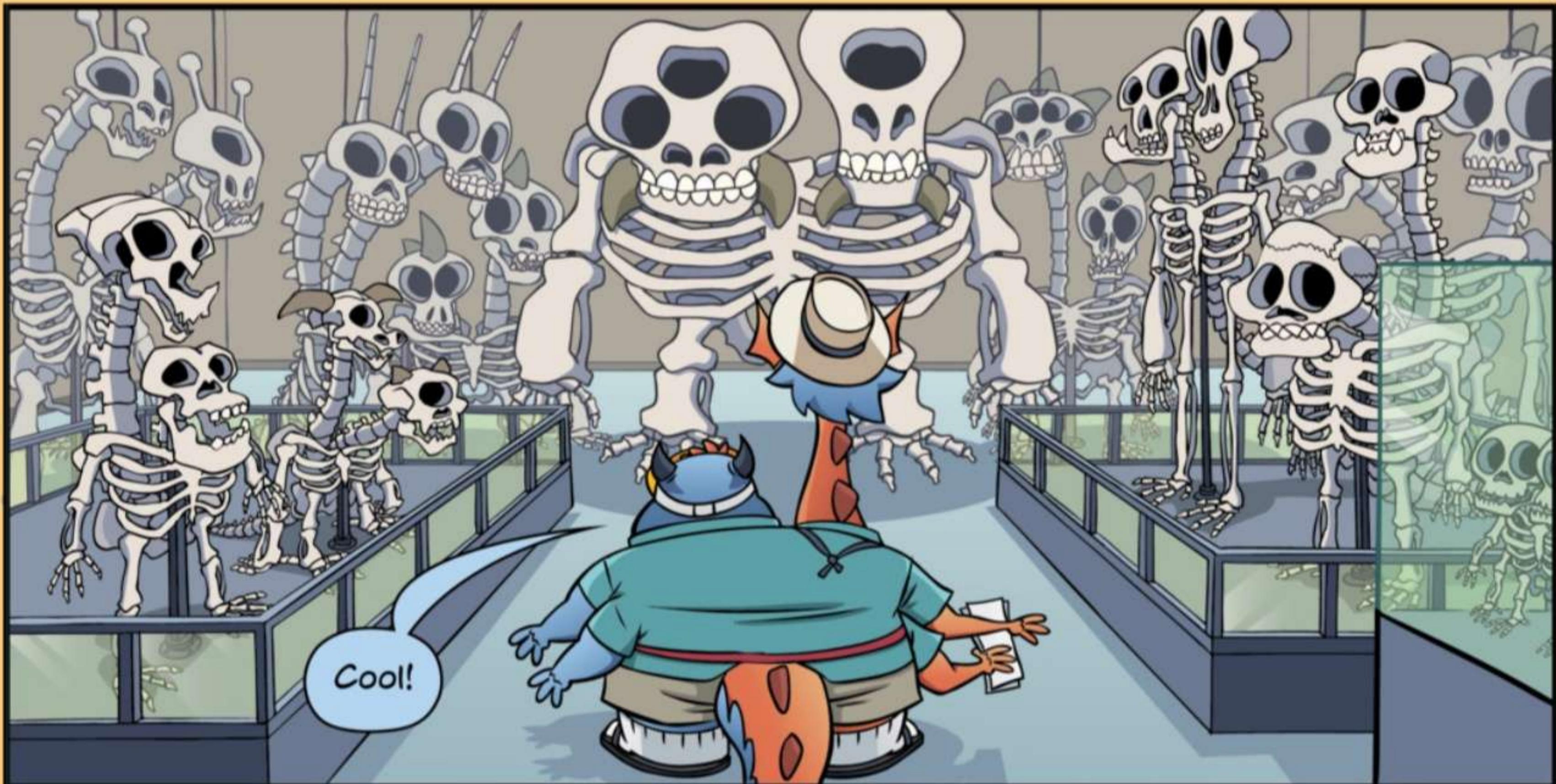
Brontostorkus: 200,000,000 years

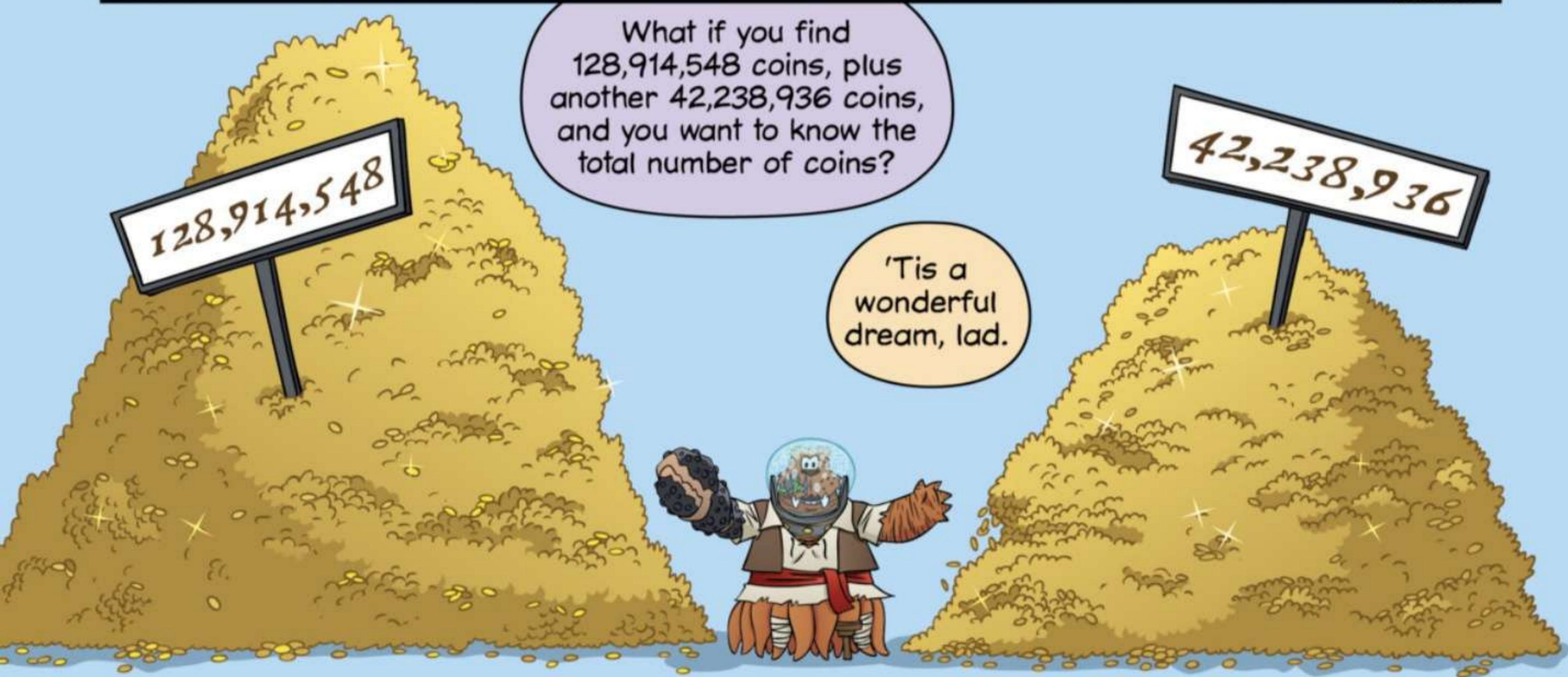
Rhinosaurus: 105,000,000 years

Velocirabbit: 9,800,000 years

Stegoseahorse: 9,500,000 years

Triceratortoise: 950,000 years





When you don't need an exact answer, you can estimate.

'Tis especially useful when dealin' with big numbers.

For example, to estimate this sum, you could just add the millions.

$$128,914,548 + 42,238,936$$



Since $128+42$ equals 170...

...128 million plus 42 million equals 170 million.

Aye. The sum o' these two numbers be about 170 million.

$$128,914,548 + 42,238,936 \approx 170,000,000$$



THE \approx SYMBOL MEANS "IS CLOSE TO." IT IS USED TO SHOW THAT TWO AMOUNTS ARE CLOSE TO EQUAL.

But, when you estimated...

...you left out over 900,000 coins from the big pile...

...and over 200,000 coins from the small pile.

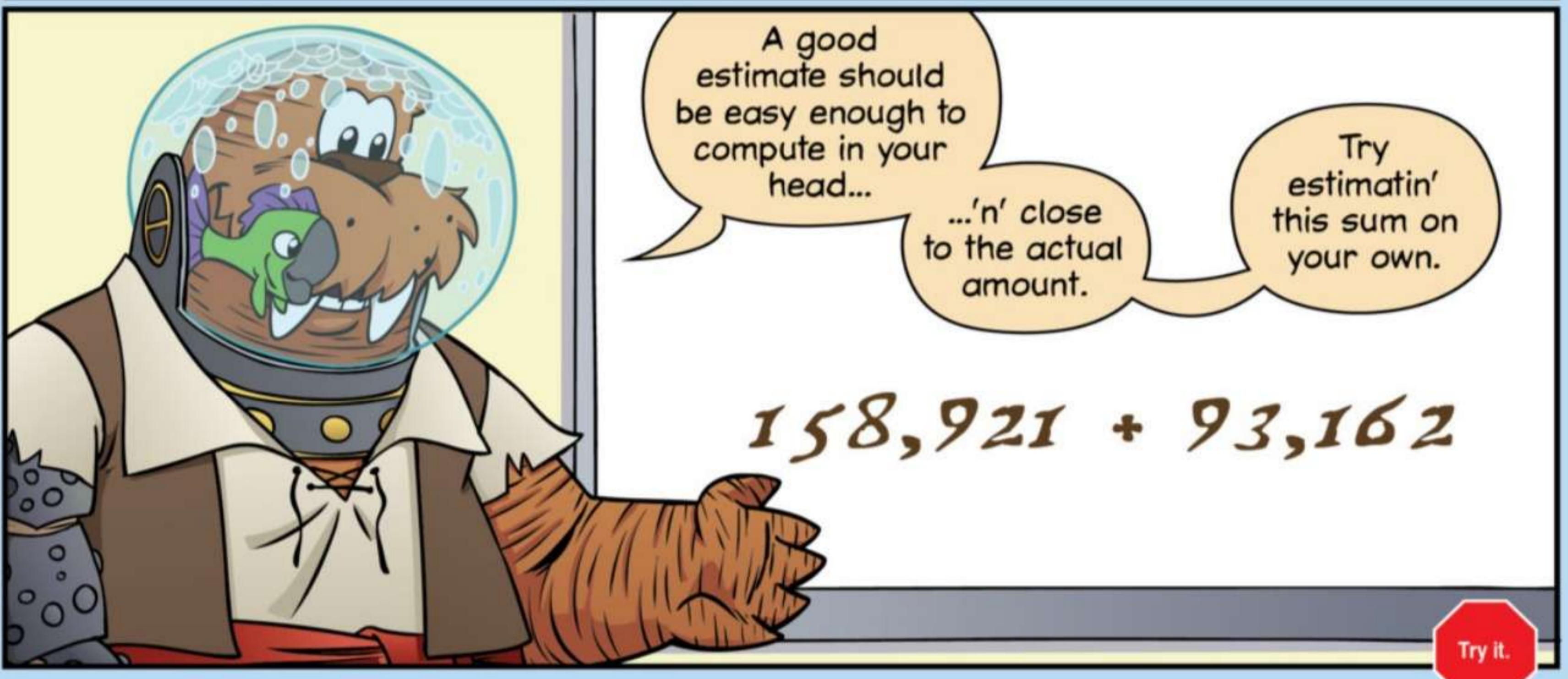
That's over 1 million coins that didn't get added!

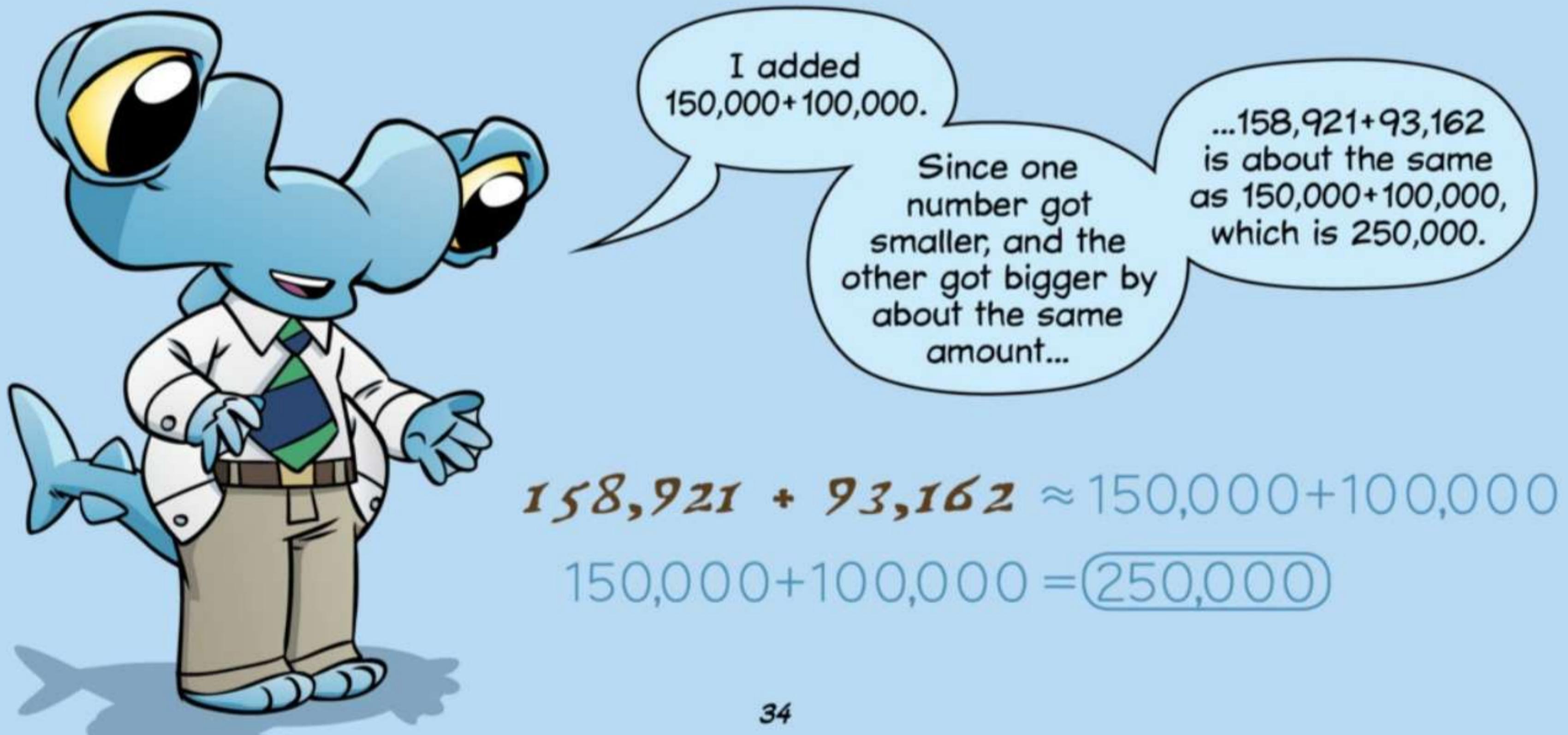
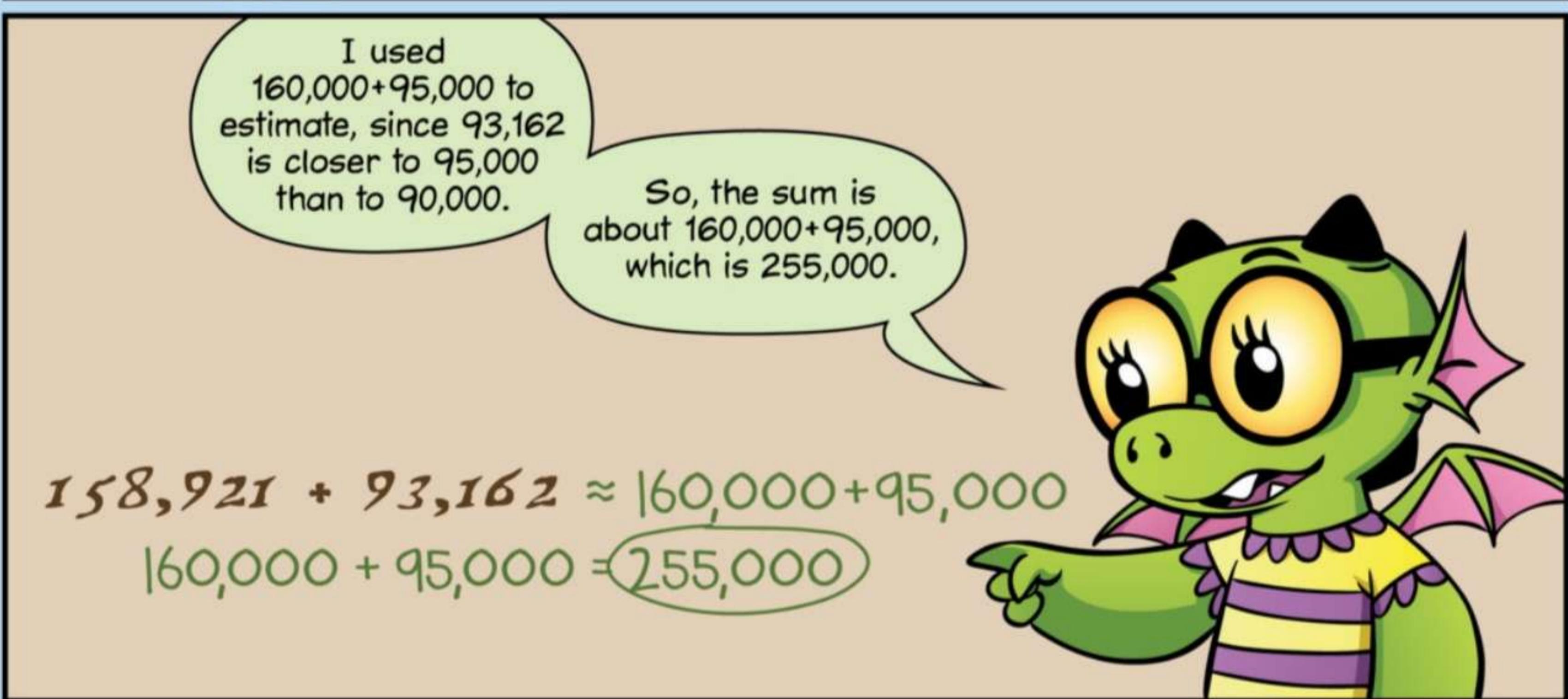
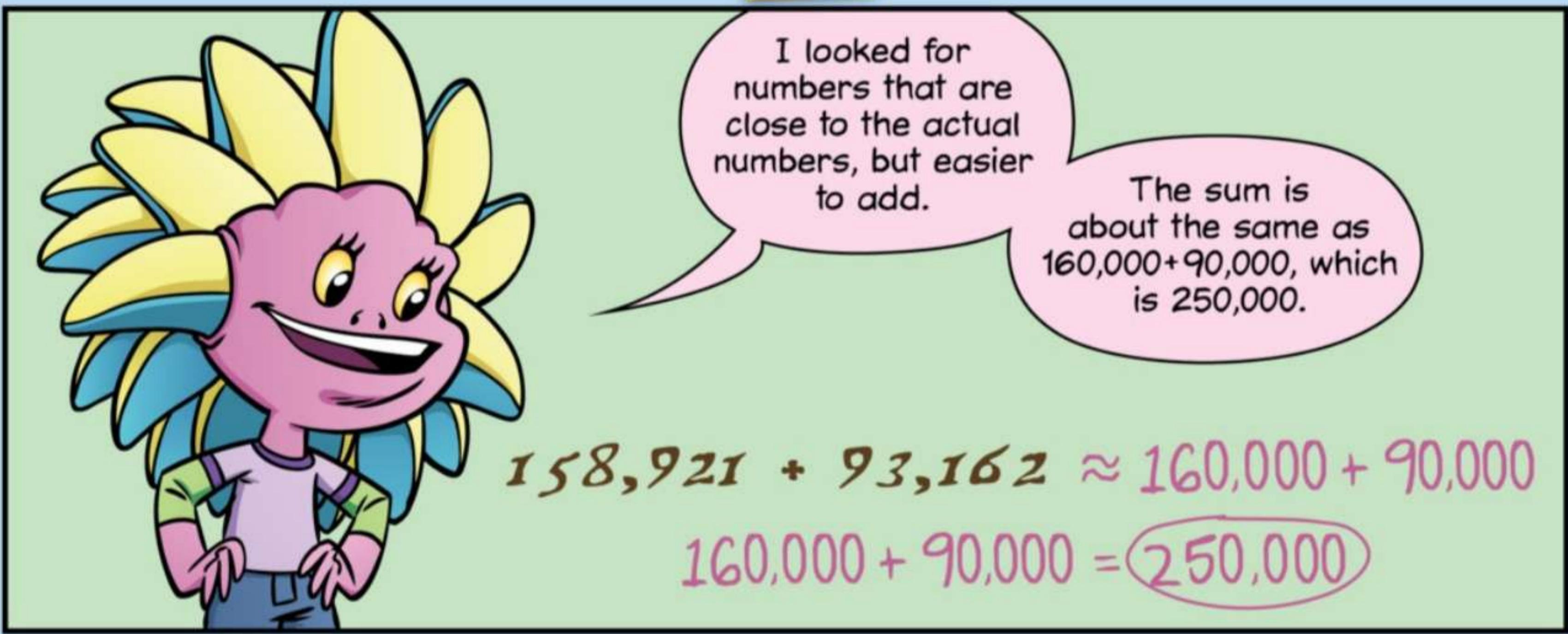


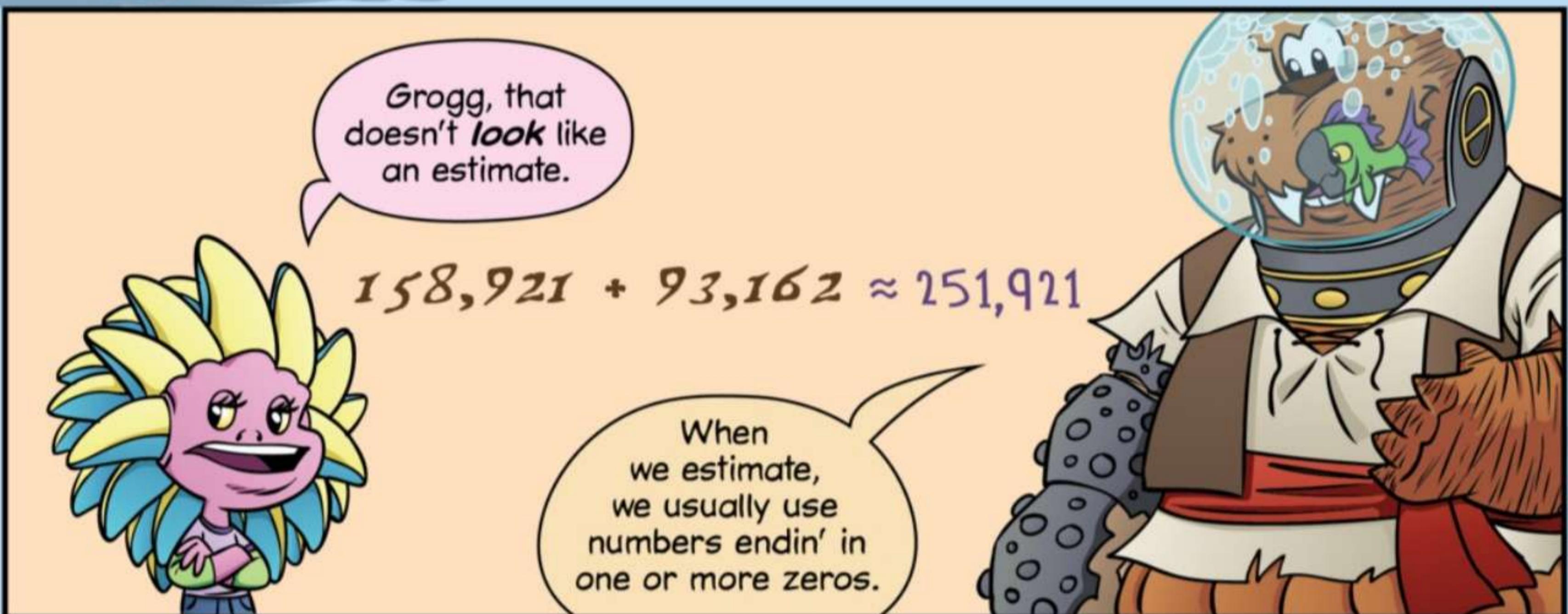
$$128,914,548 + 42,238,936 \approx 170,000,000$$

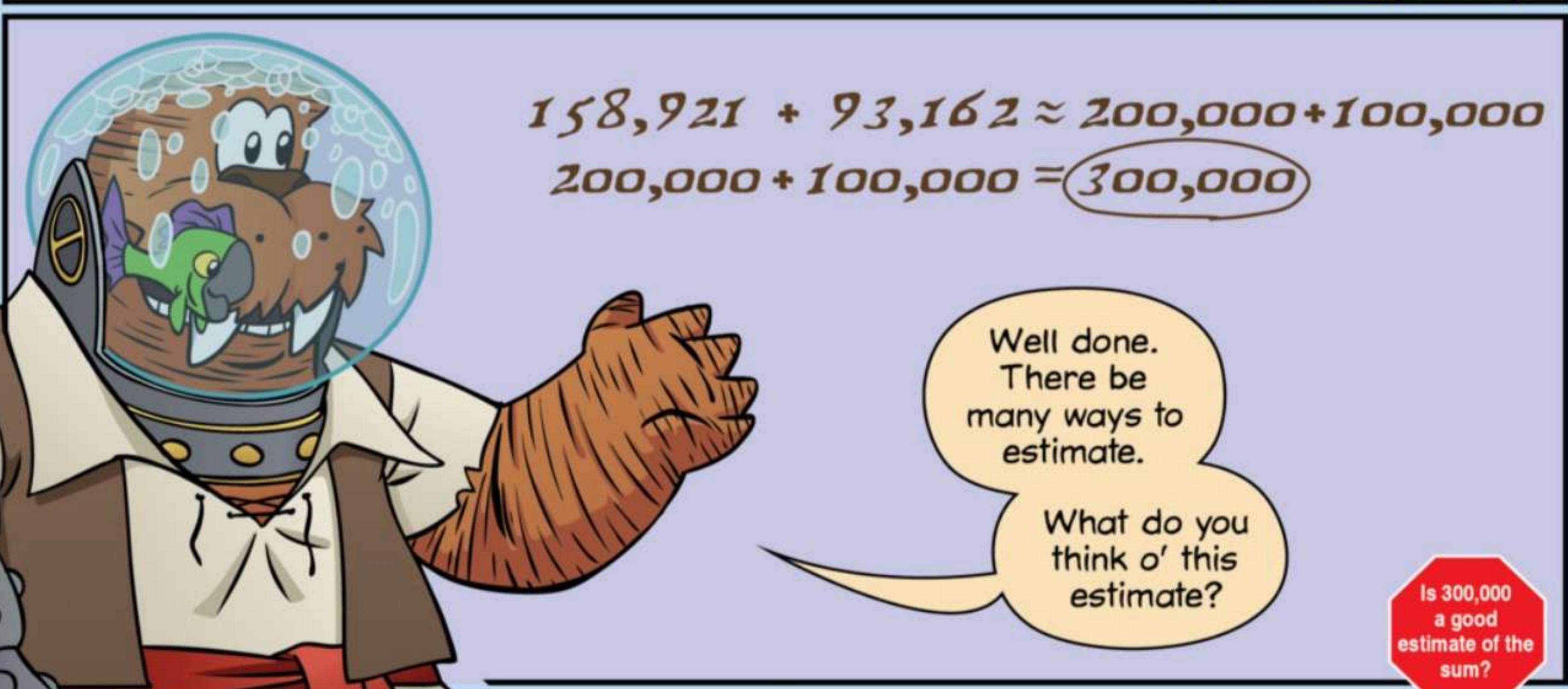
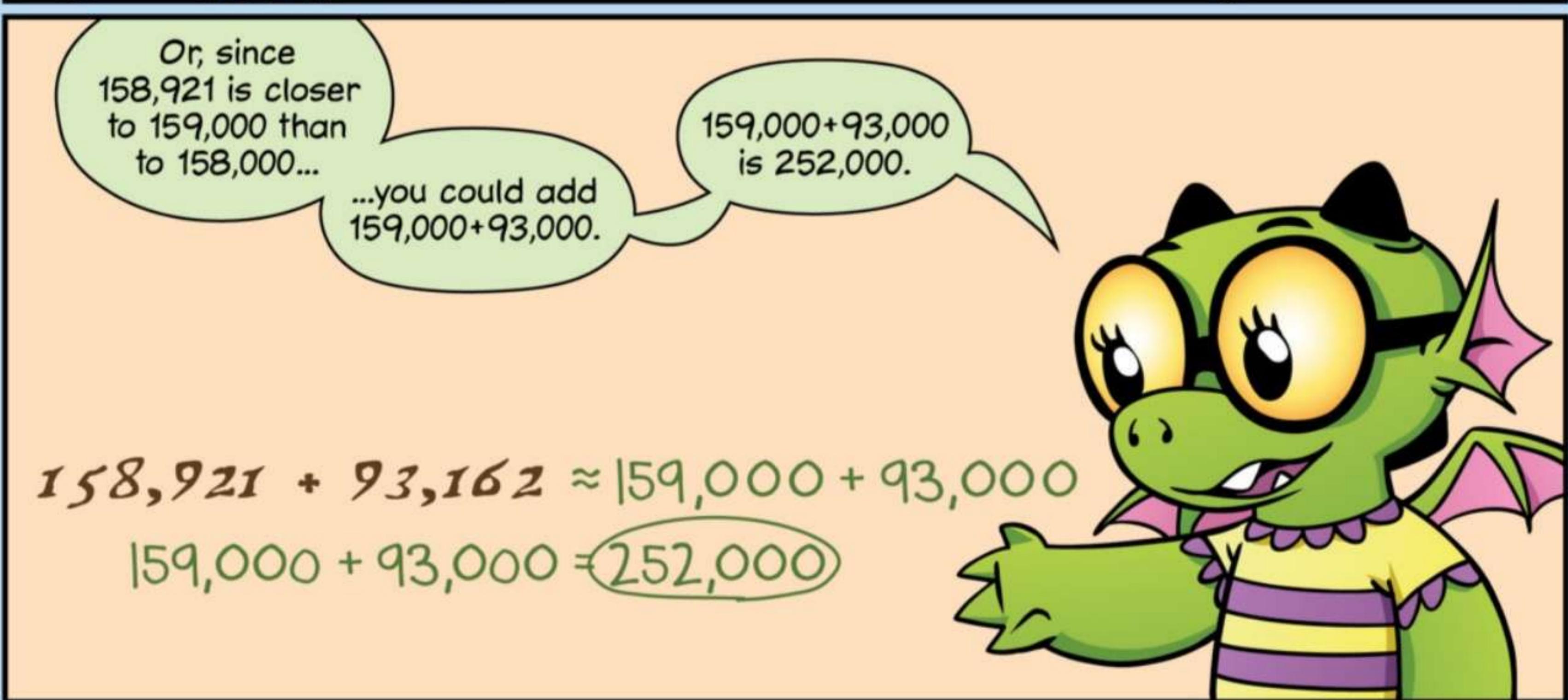
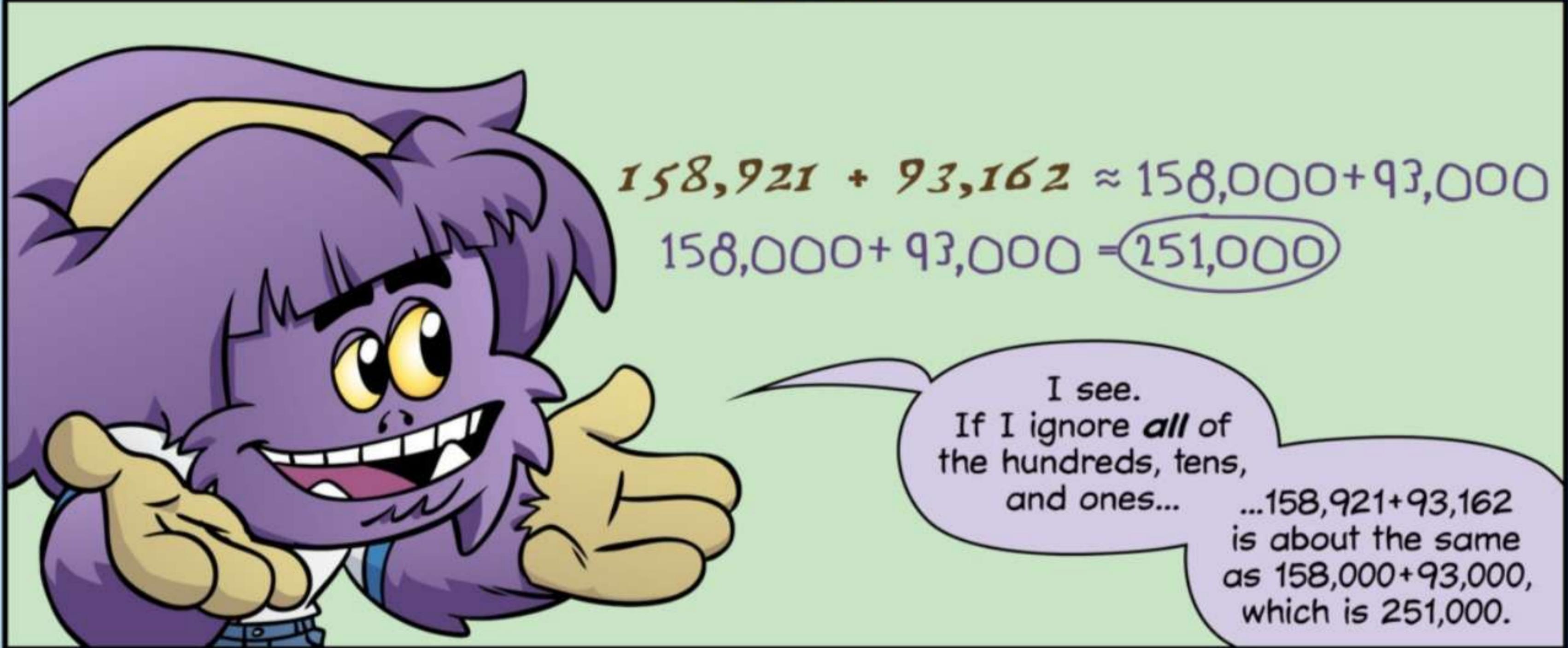


*TO ESTIMATE MEANS TO FIND A NUMBER THAT IS CLOSE TO THE RIGHT AMOUNT. AN ESTIMATE IS THE NUMBER YOU PICK THAT IS CLOSE TO THE RIGHT AMOUNT.



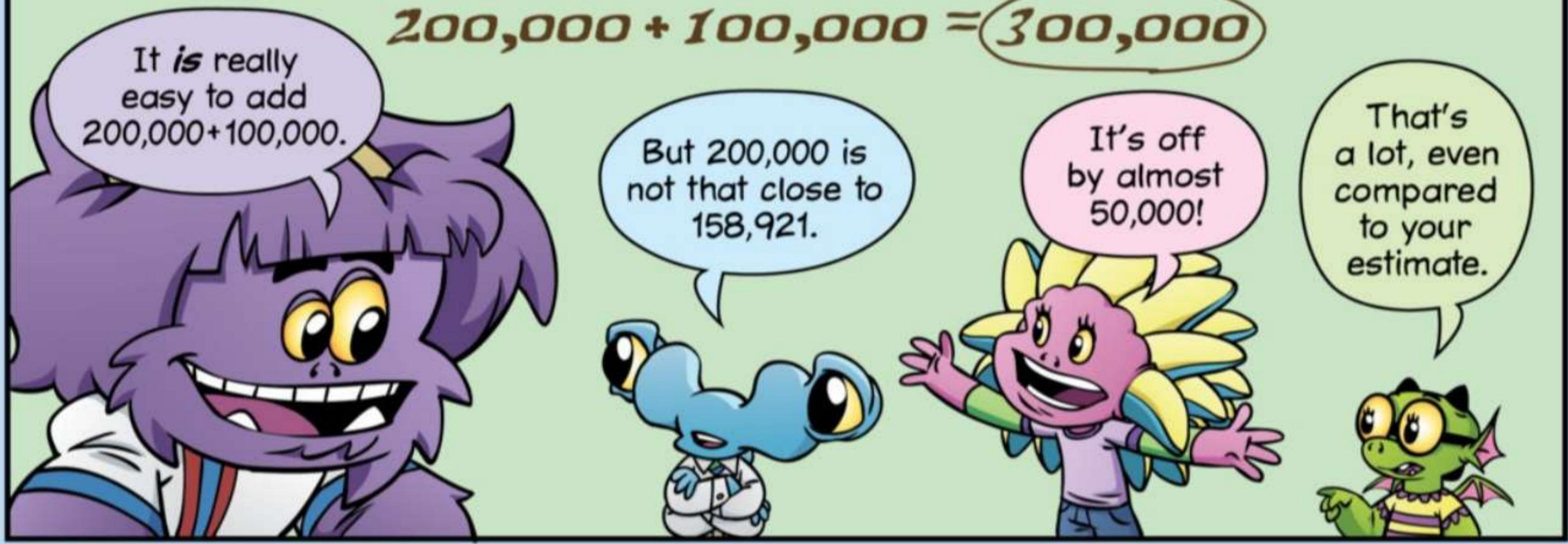






$$158,921 + 93,162 \approx 200,000 + 100,000$$

$$200,000 + 100,000 = 300,000$$





"BAZILLION" AND "GAJILLION" AREN'T NUMBERS, BUT BOTH ARE SILLY WORDS THAT CAN BE USED TO MEAN A VERY LARGE, EXAGGERATED AMOUNT.

