

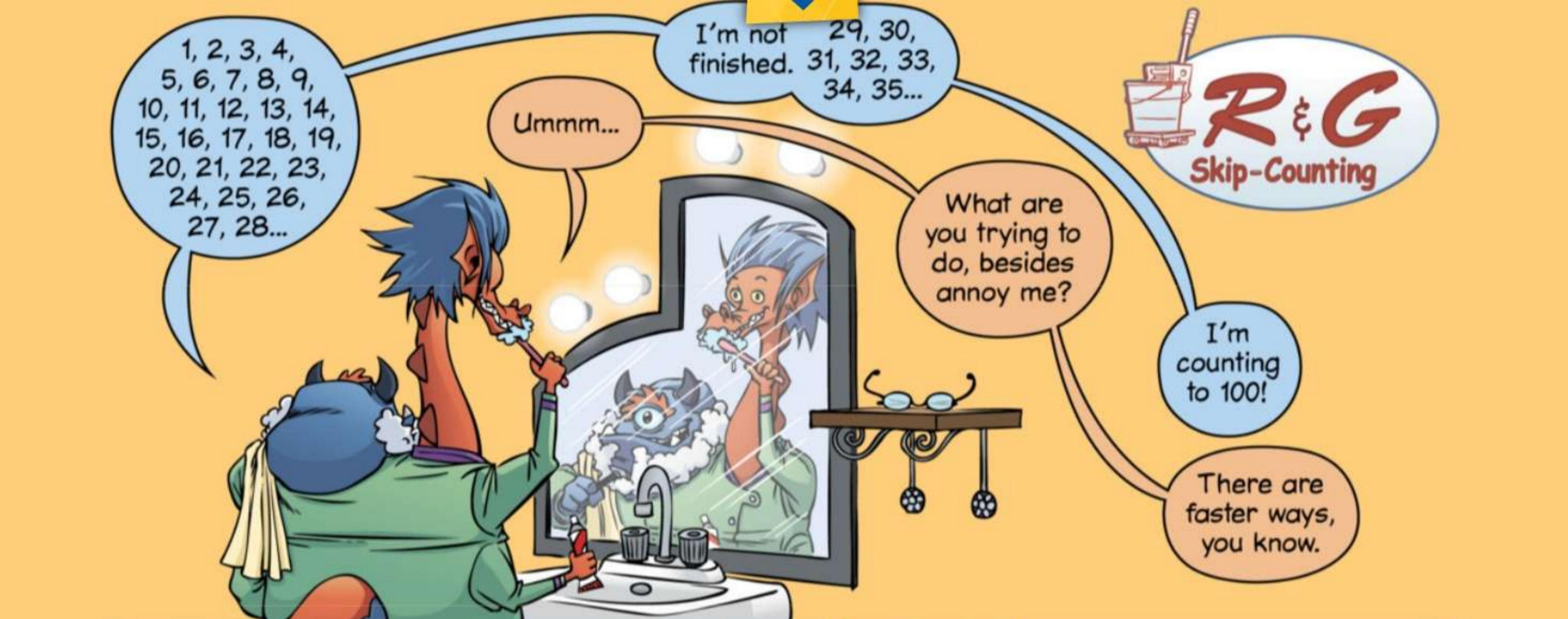
# Contents: Chapter 2

Click the Play List tab in the top-left to view a recommended reading/practice sequence.

	<b>Skip-Counting</b> How fast can you count to 100?	44-49
	<b>Hundred Charts</b> What patterns can you find while skip-counting on a 100 chart?	50-55
	<b>Balance</b> What is the largest number of grams that cannot be balanced using only 5 and 6-gram weights?	56-64
	<b>The 100 Game</b> Can you land on 100 before the other players?	65

# Chapter 2: Skip-Counting





# R & G Skip-Counting

1, 2, 3, 4,  
5, 6, 7, 8, 9,  
10, 11, 12, 13, 14,  
15, 16, 17, 18, 19,  
20, 21, 22, 23,  
24, 25, 26,  
27, 28...

I'm not finished.  
29, 30,  
31, 32, 33,  
34, 35...

Ummm...

What are you trying to do, besides annoy me?

I'm counting to 100!

There are faster ways, you know.

36, 37,  
38--

5, 10, 15,  
20, 25, 30, 35,  
40, 45, 50, 55, 60,  
65, 70, 75, 80, 85,  
90, 95, 100.  
All done!

But?!

Do you like what I did there?

You **skipped** most of the numbers!

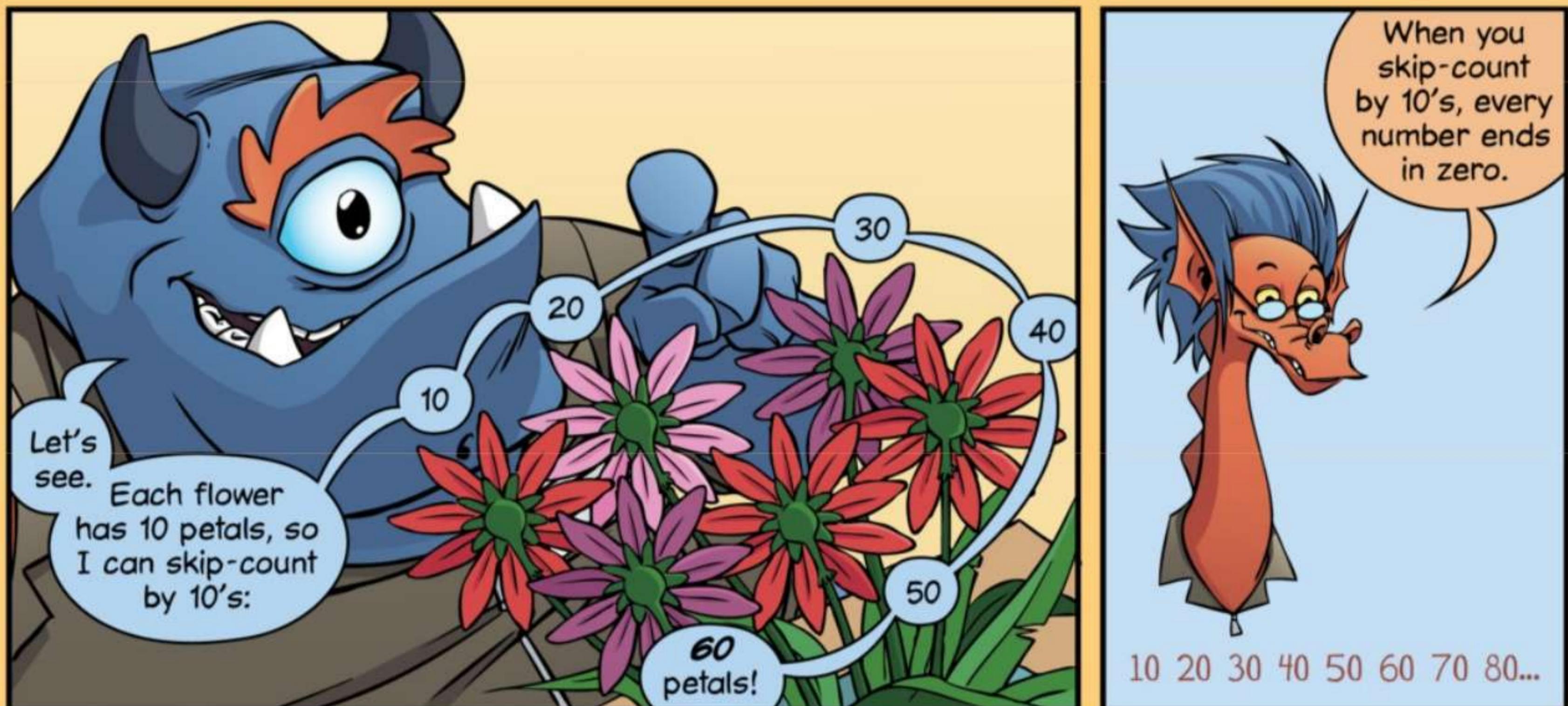
Of course!  
It's called  
**skip-counting**.

I was  
counting by  
fives.

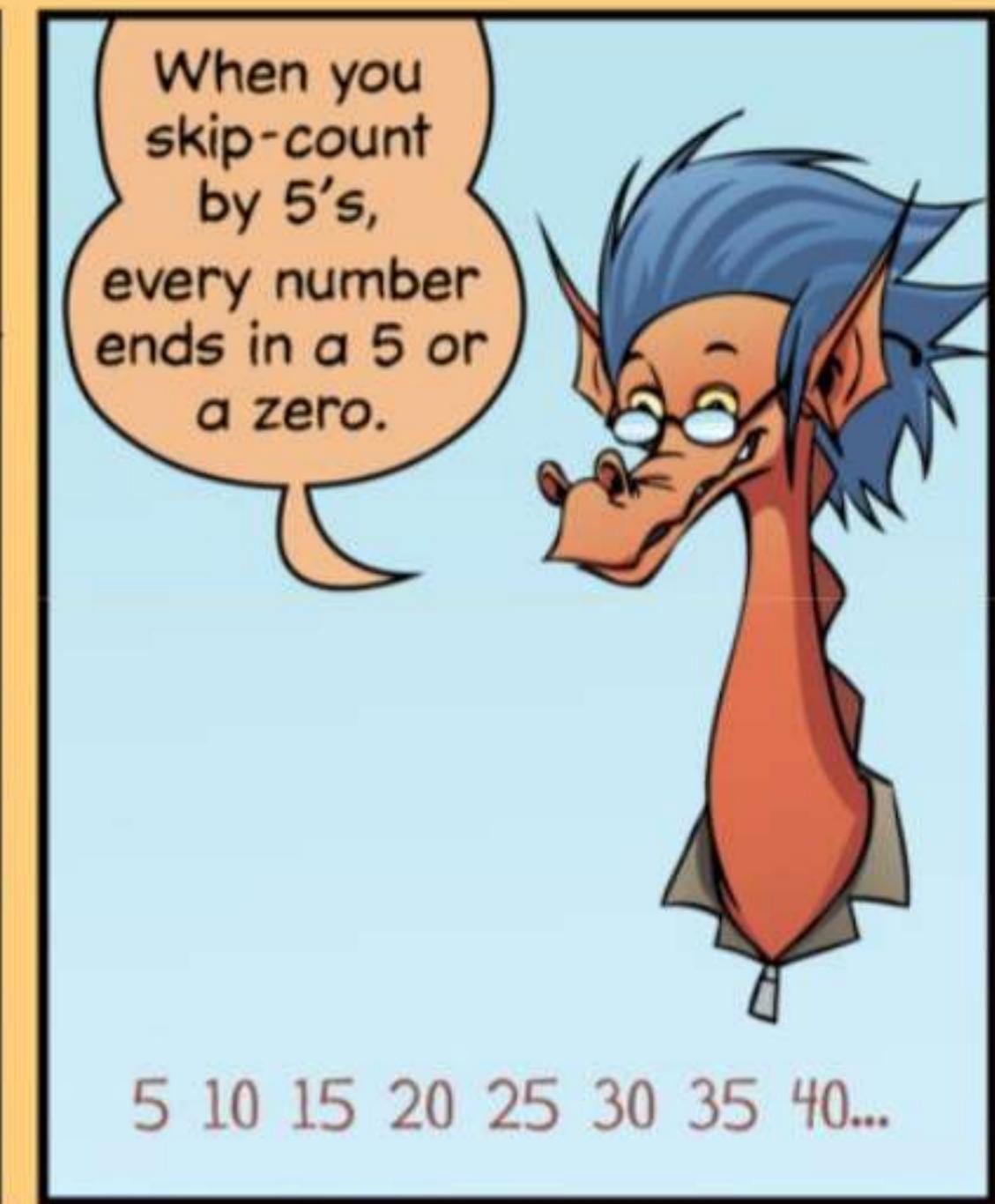
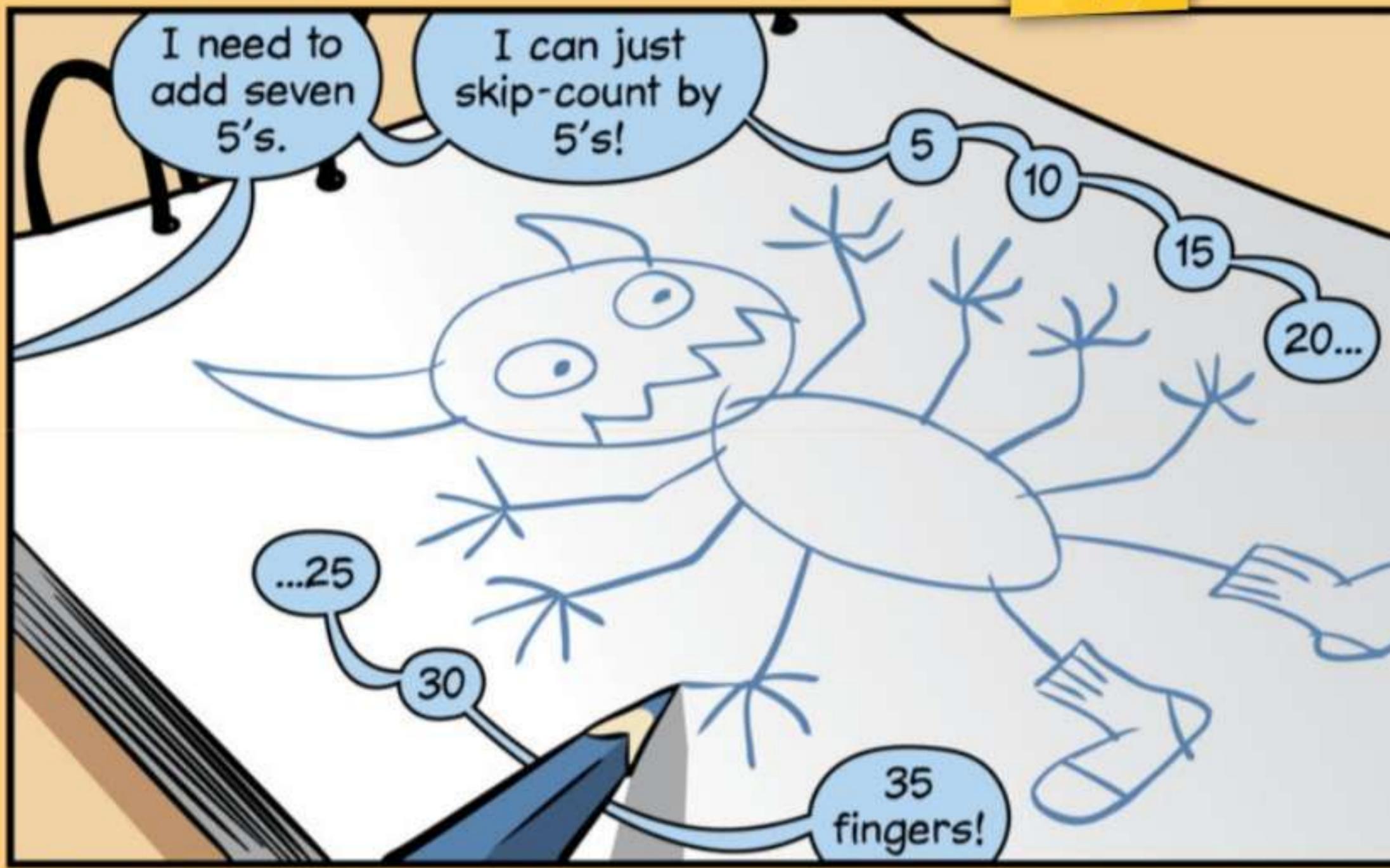
But you  
skipped some  
of the best  
numbers!

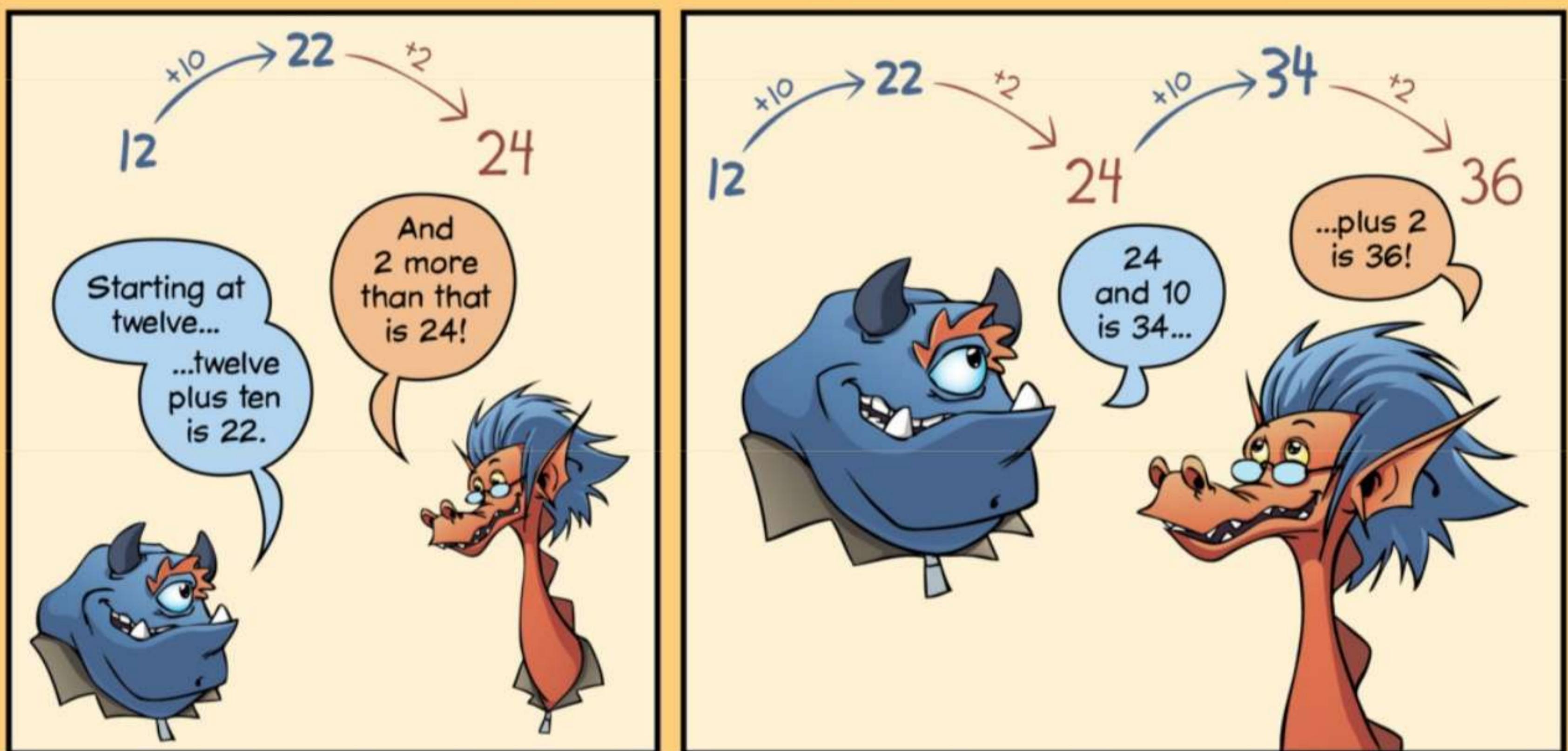
Which ones?

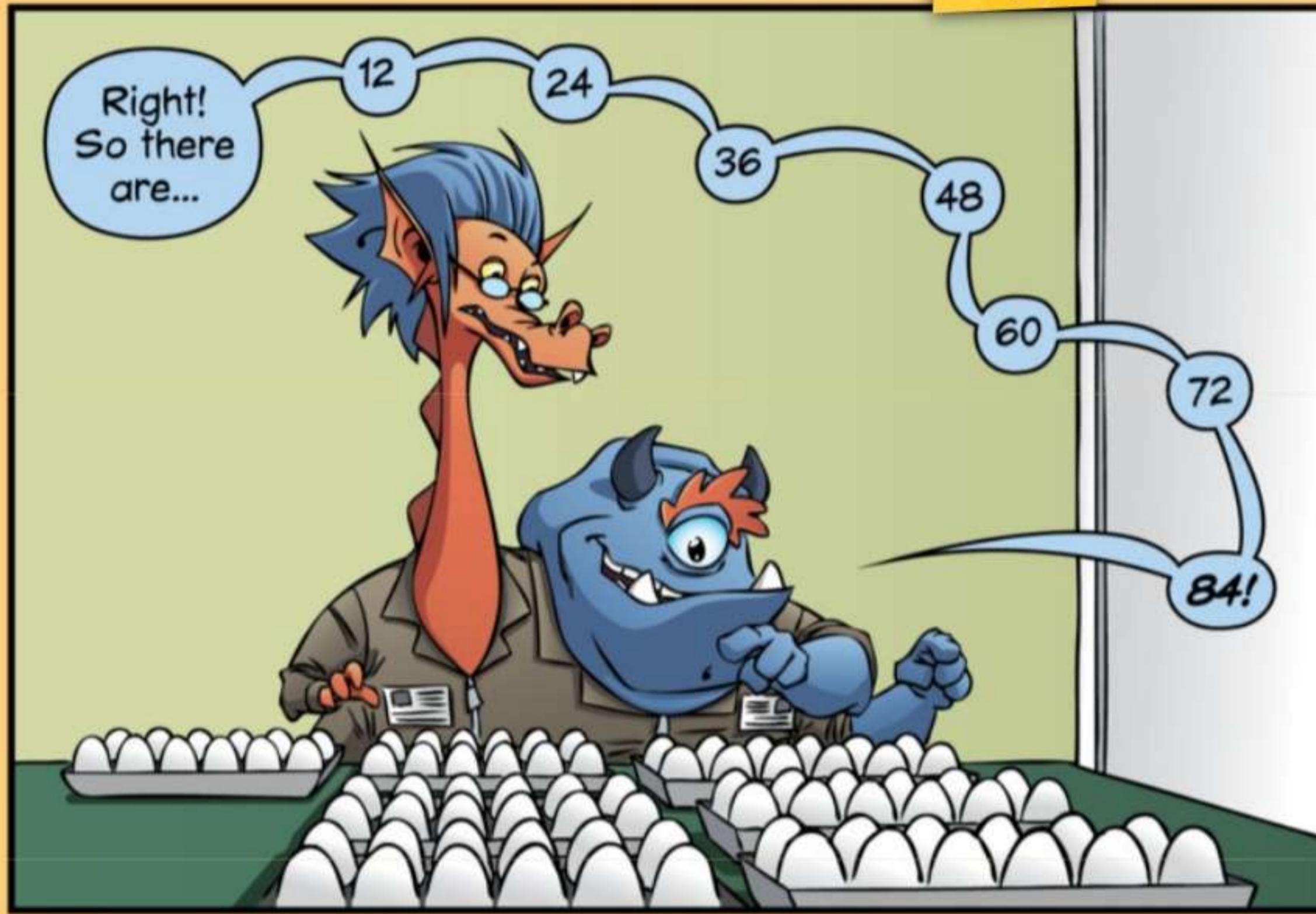
You  
skipped  
42!







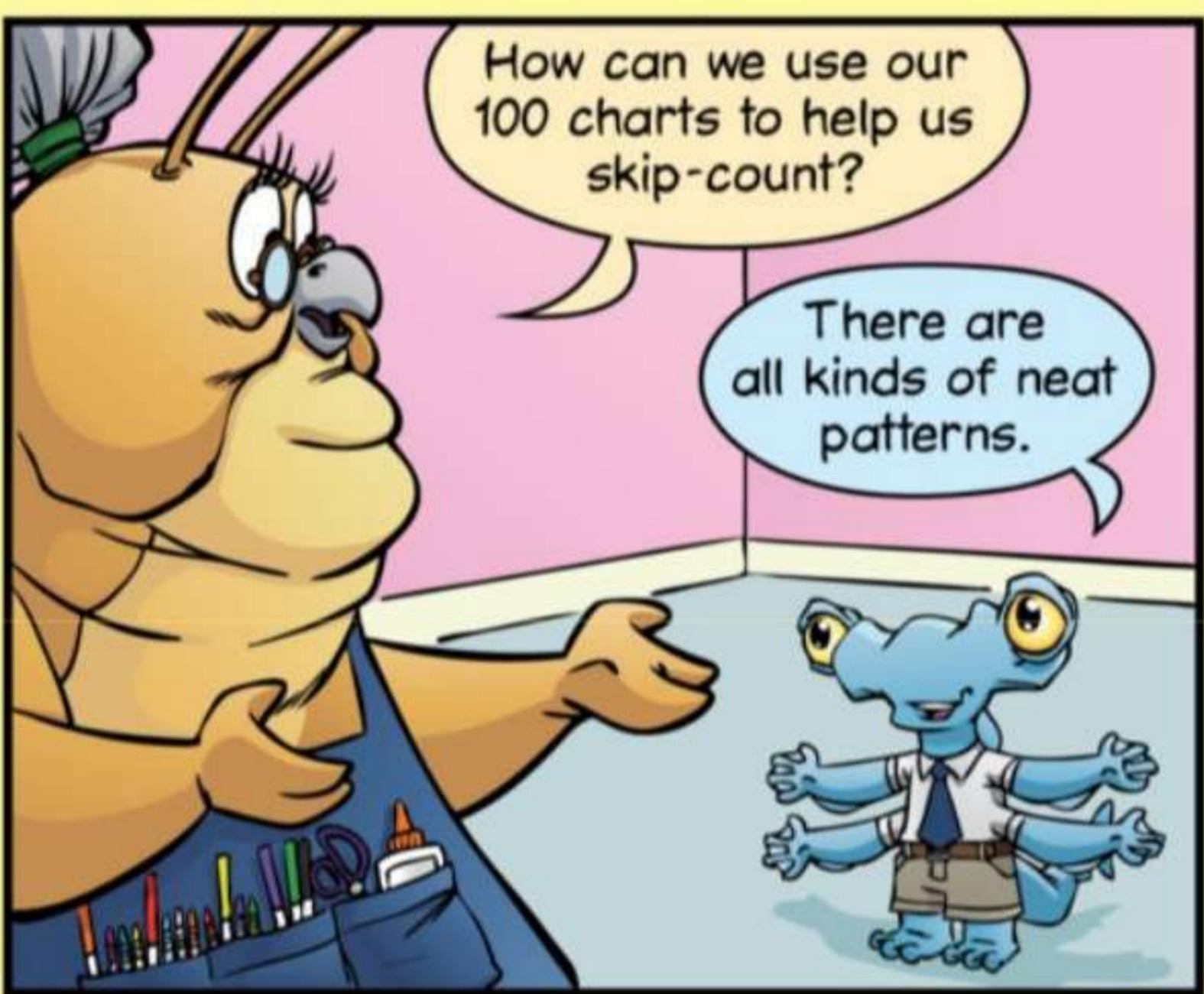






# Ms. Q Hundred Charts



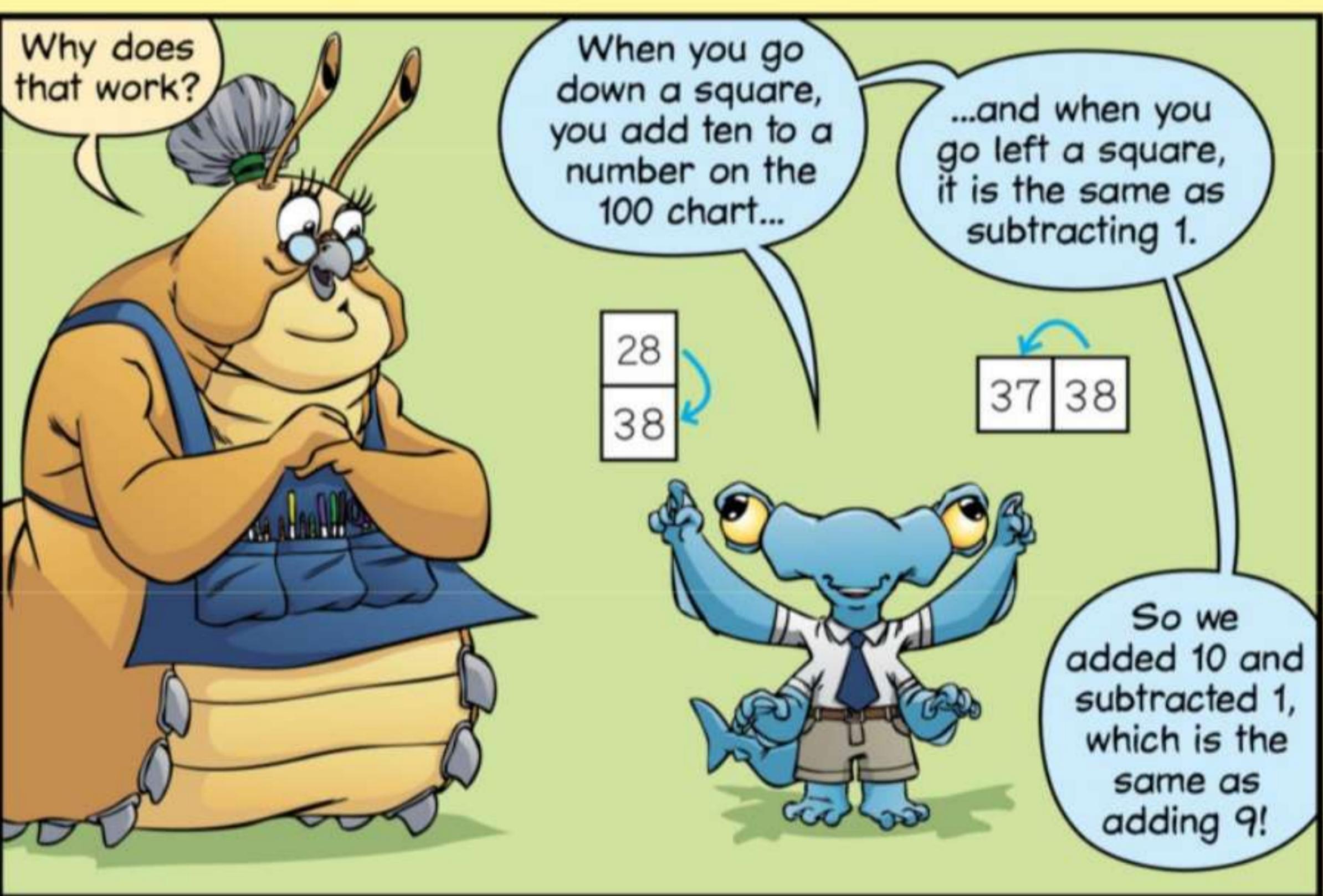


1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

And if you want to add 9 to a number on the 100 chart, you can go down a square and left a square.

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100



What pattern do we get when we use a yellow marker to color all of the numbers we use to skip-count by 2's?



You can just color straight down every other column.

Try it!



1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

Stripes!

Perfect! Now, take a blue marker and color all of the numbers you use to skip-count by 3's.

What do you notice?



Diagonals!



1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

My 6's were already green!

Wonderful!

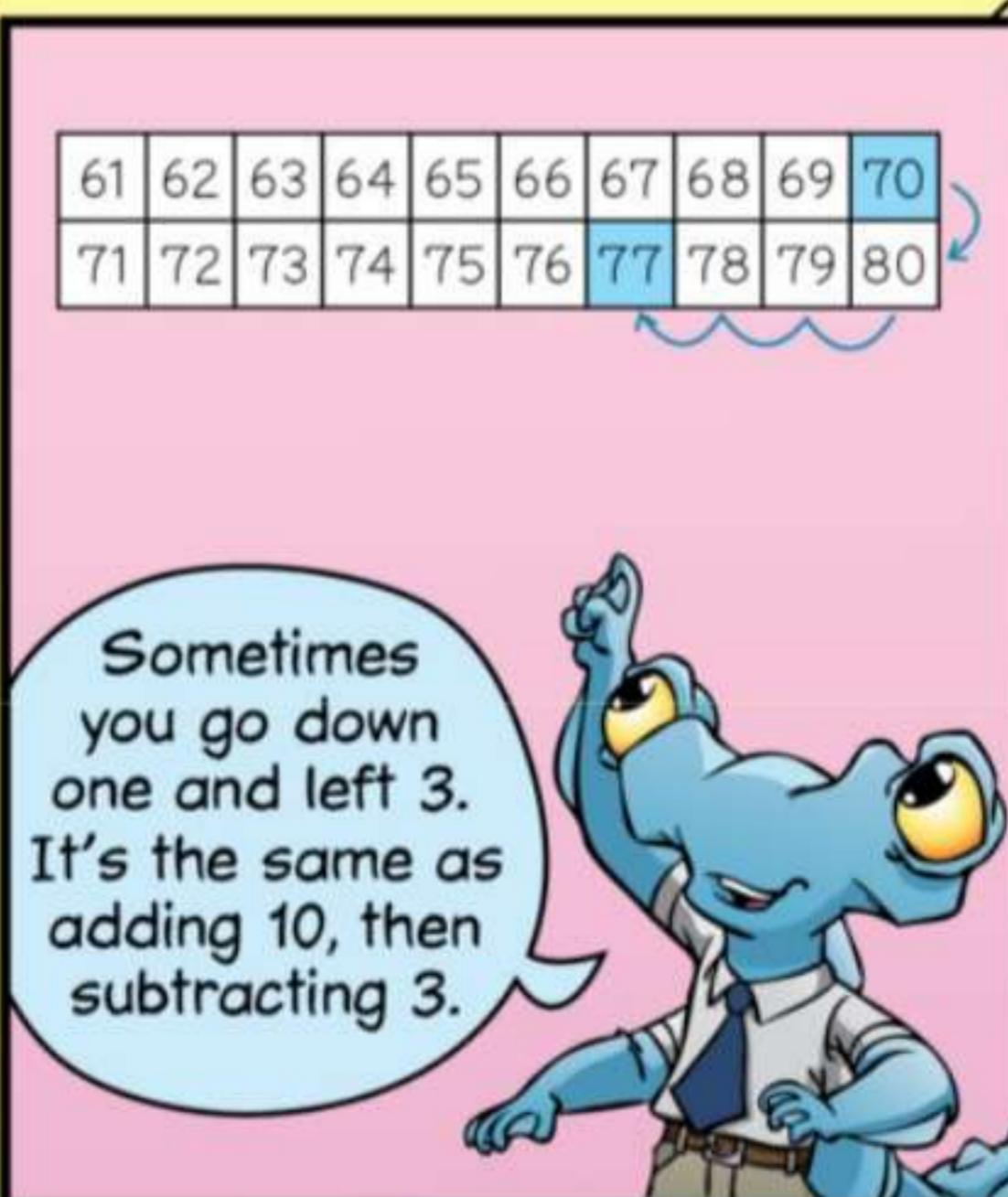
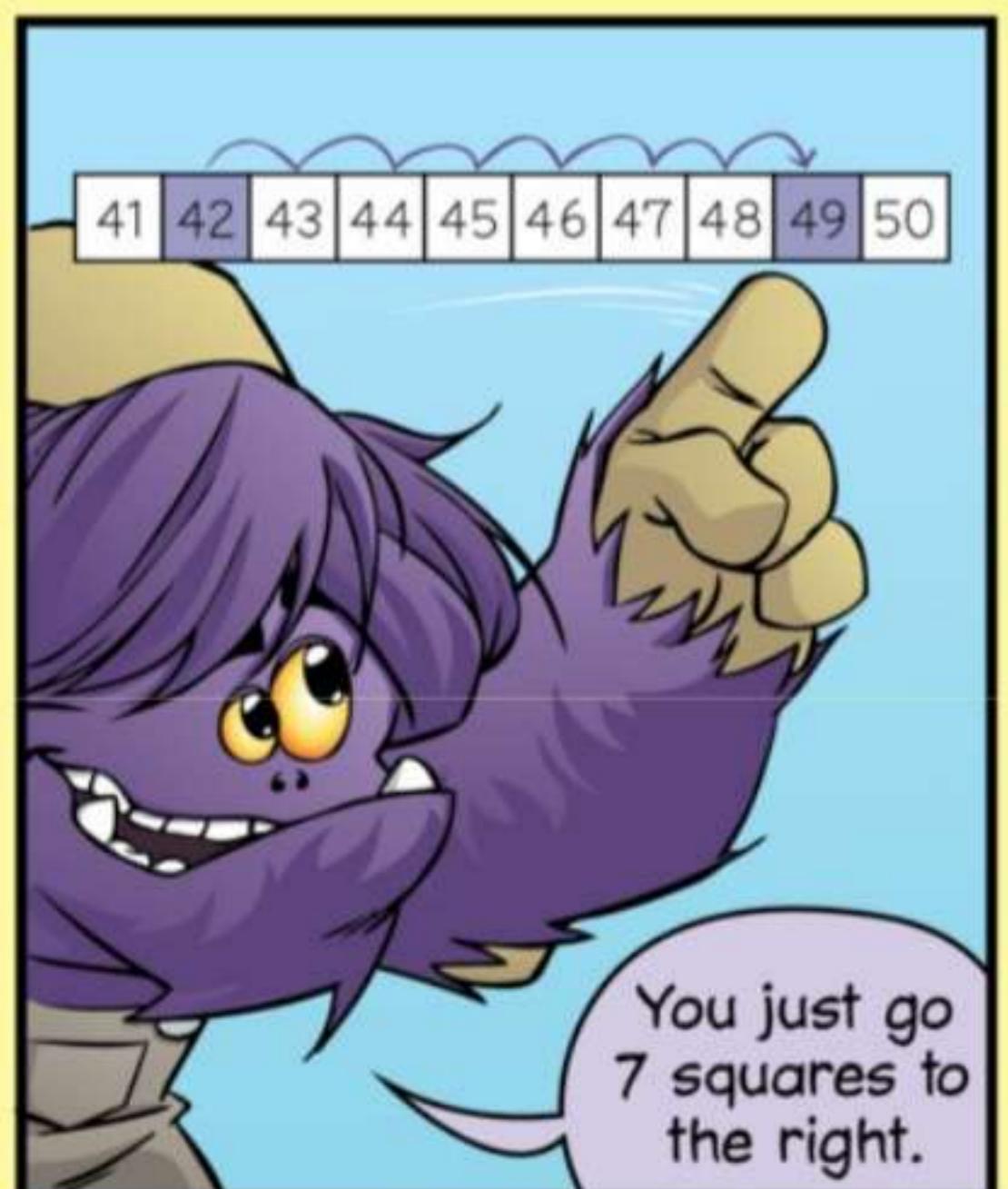
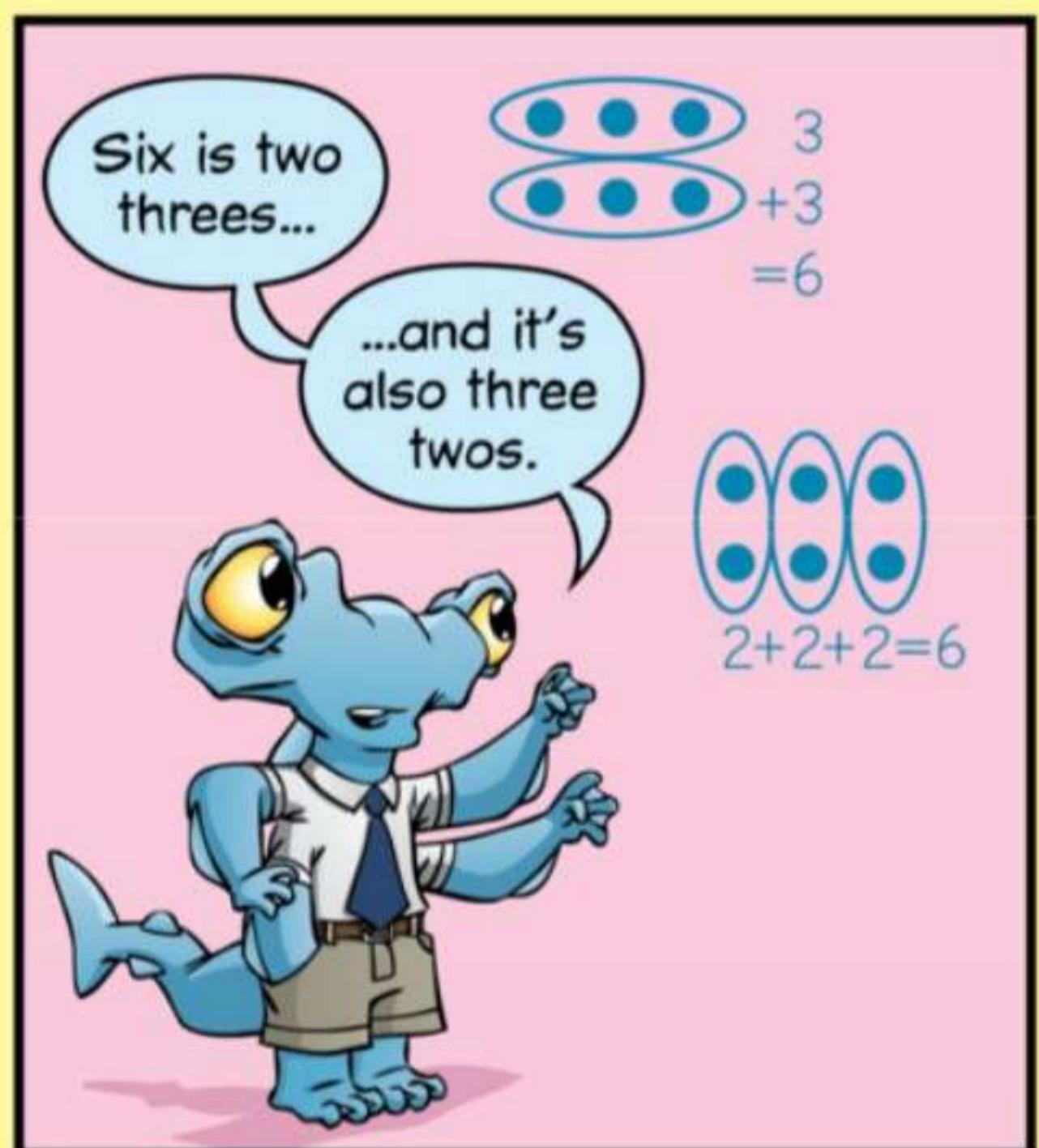
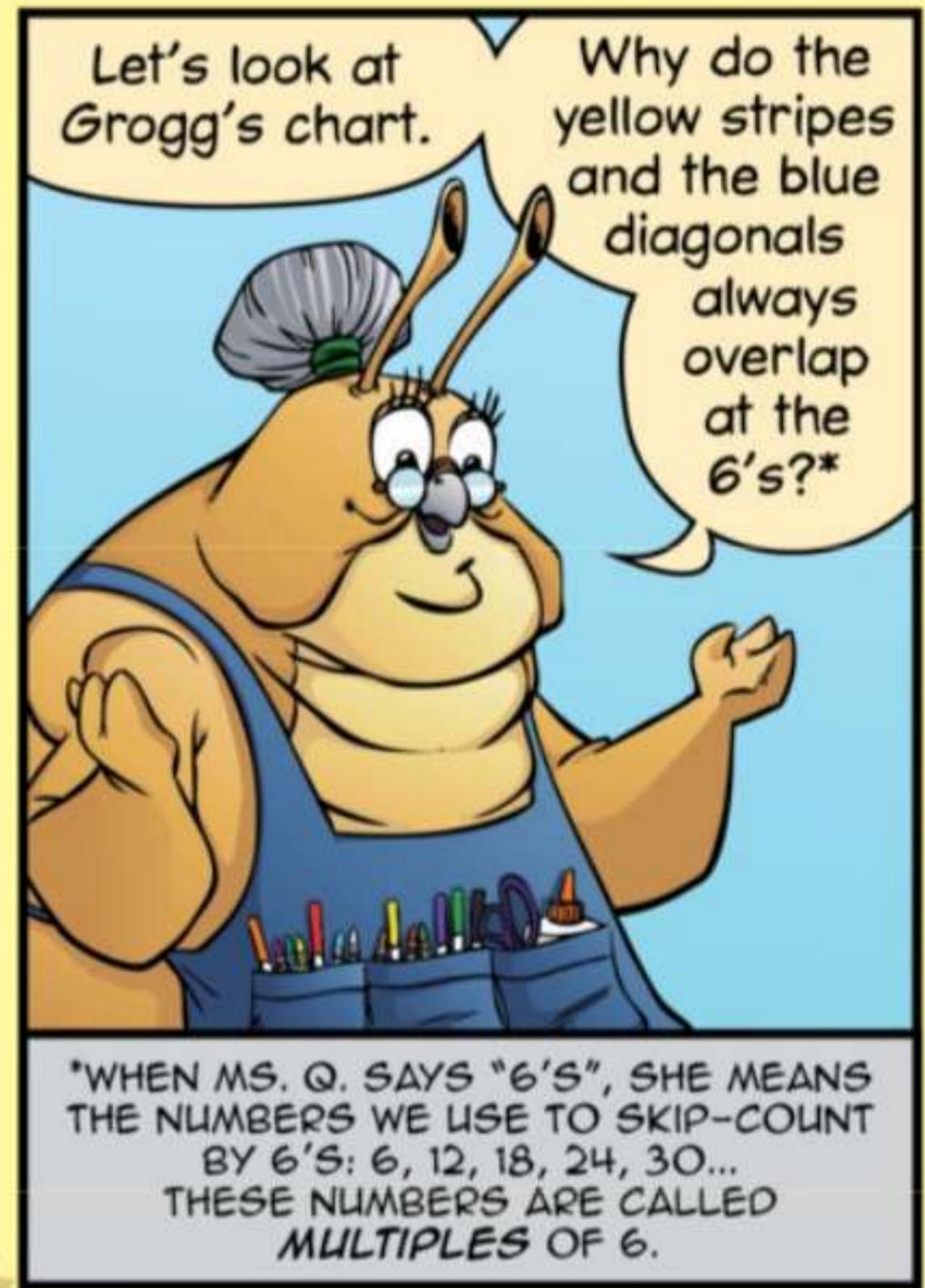
Now, use a green marker to color all of the numbers you use to skip-count by 6's.

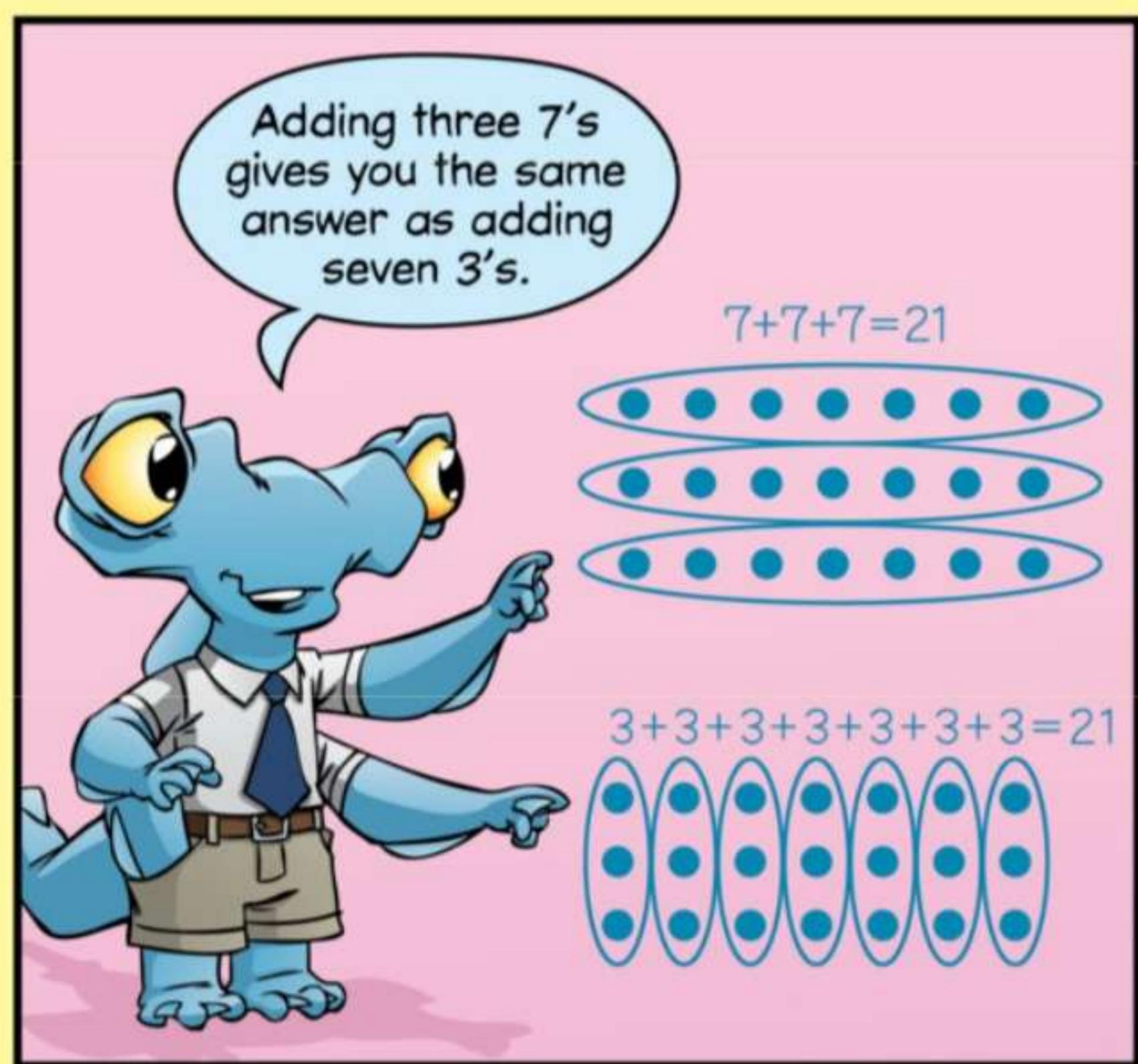
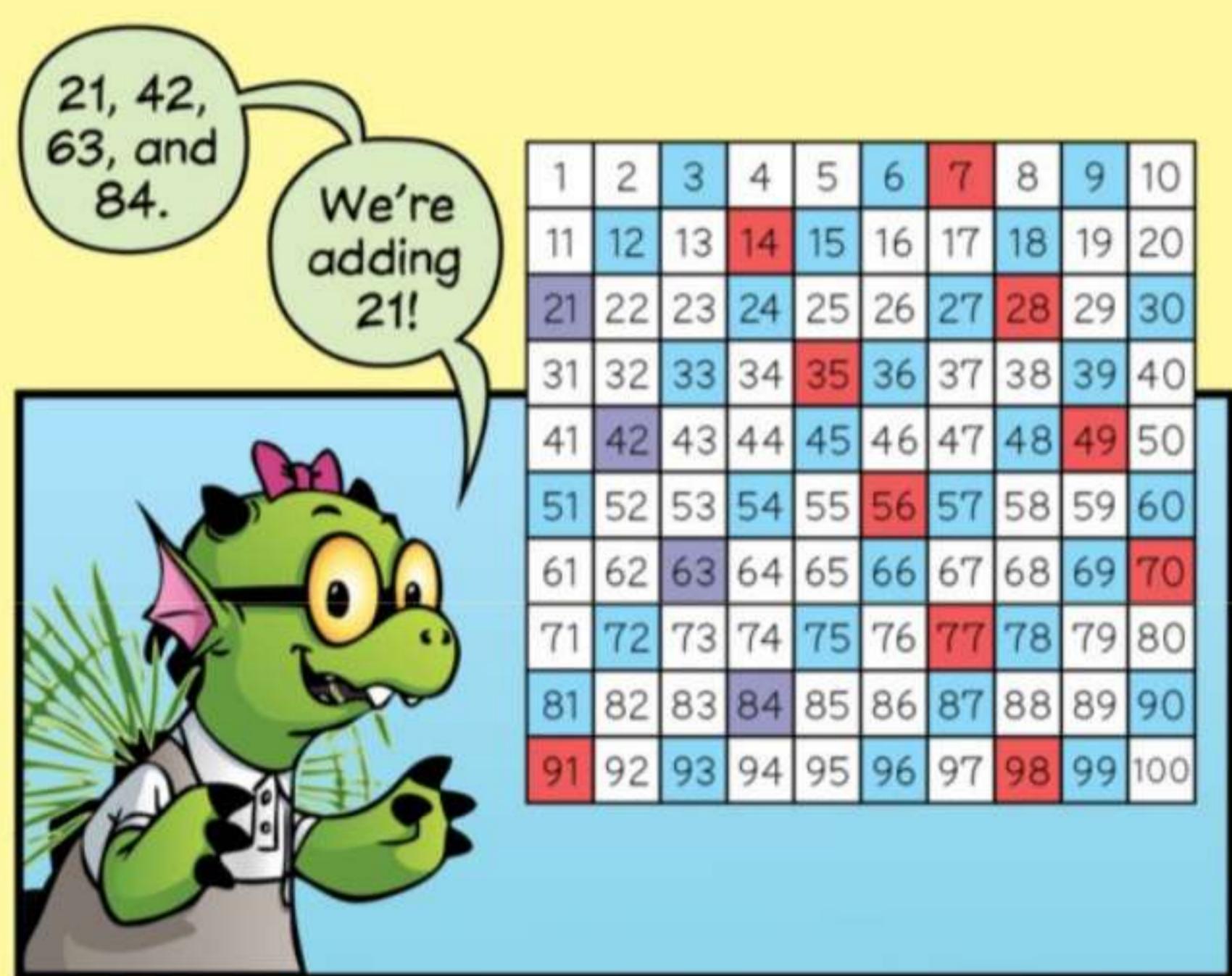
You get this pattern.



1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100









# The Lab

## BALANCE

This is a balance scale. It is used to compare weights.

I can place an object that I want to weigh on one side, and balance it with these weights on the other side.

Before today's lesson, I weighed some things.

This elefinch weighs 90 grams. How many of these 10-gram weights will it take to balance him?



We just skip-count by 10's up to 90...

...10, 20, 30, 40, 50, 60, 70, 80, 90. That makes **nine** 10-gram weights.



Good! Now, you can't always get the scale to balance if all you have are 10-gram weights.

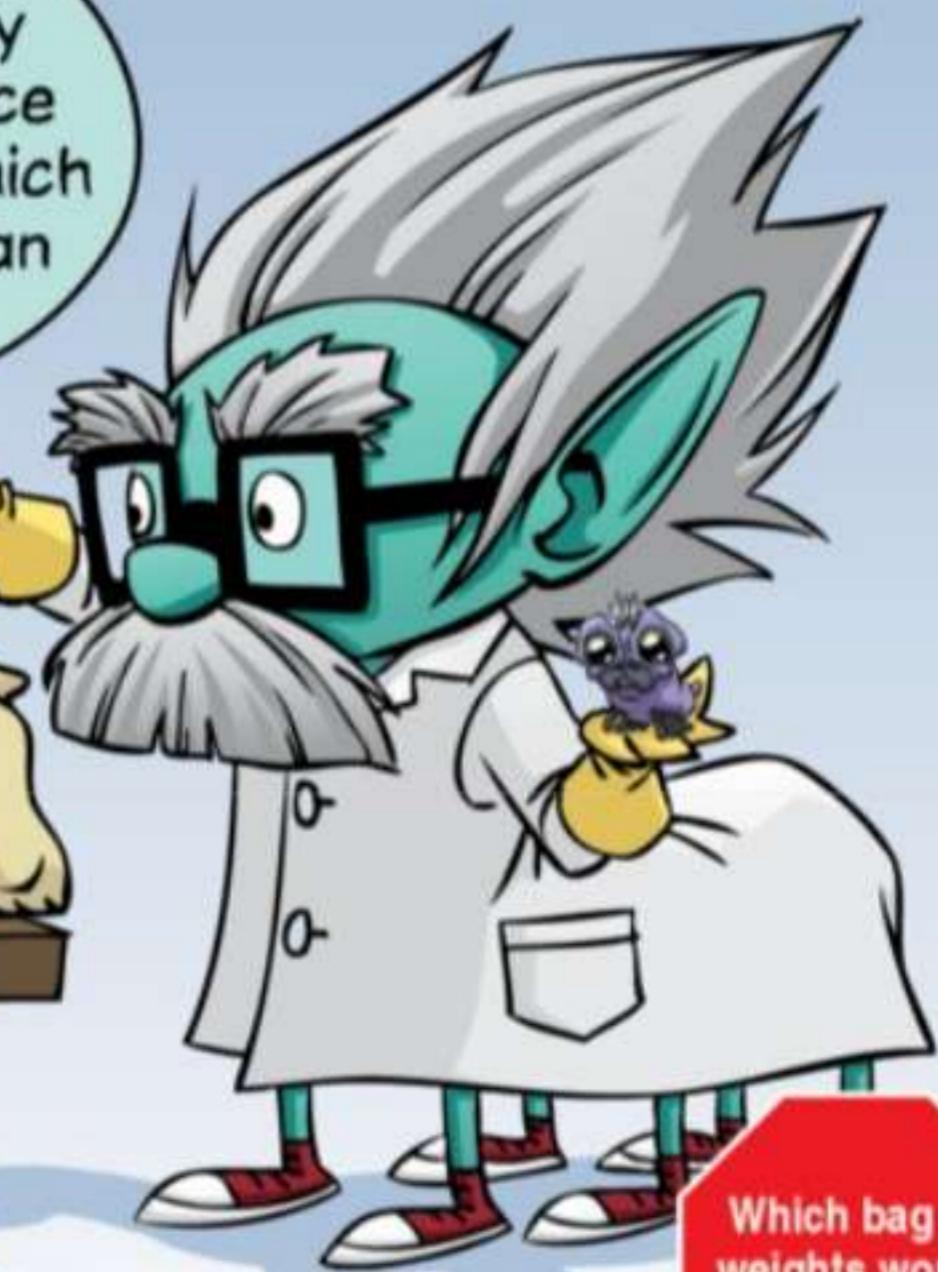
What is the problem with only using 10-gram weights?



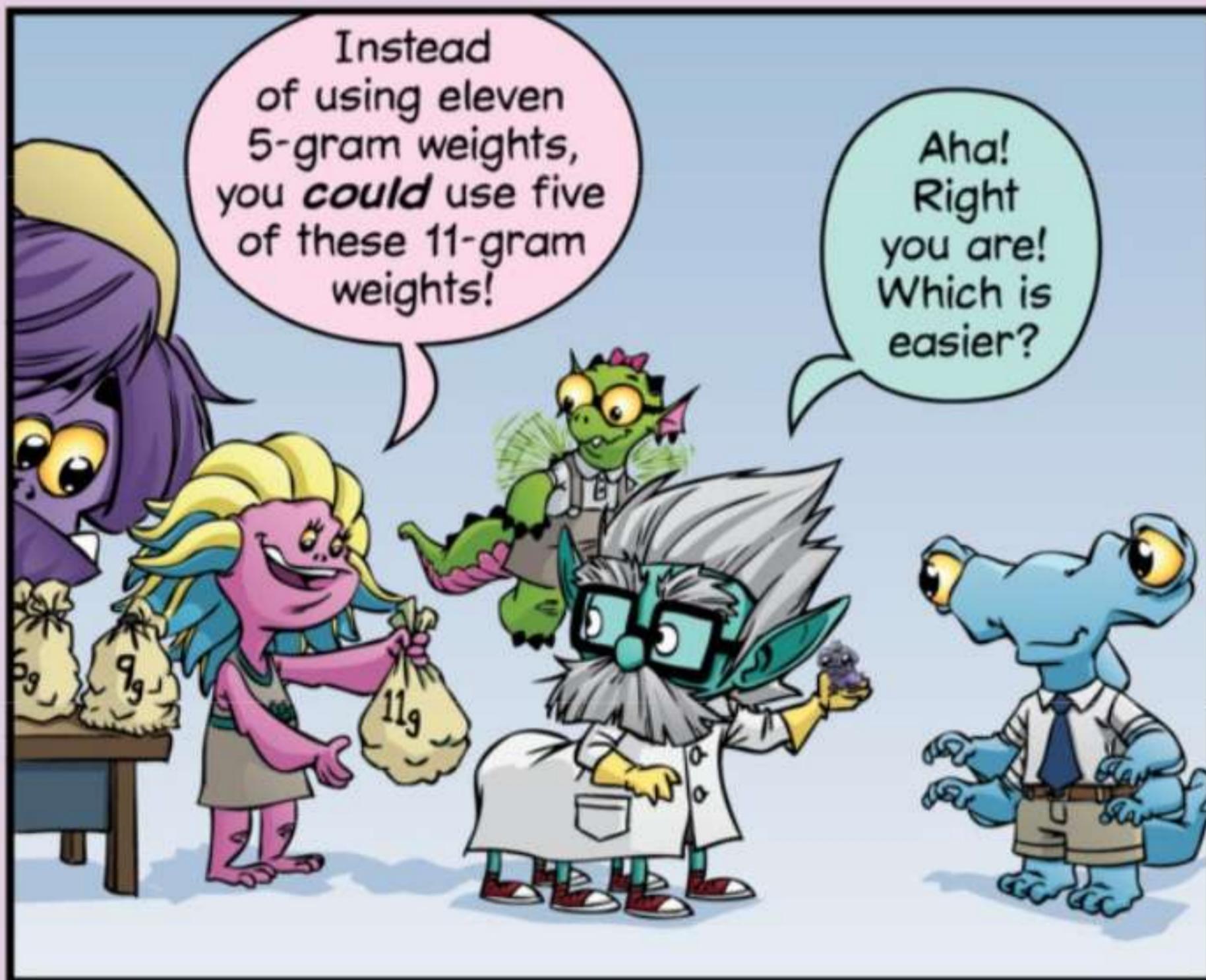
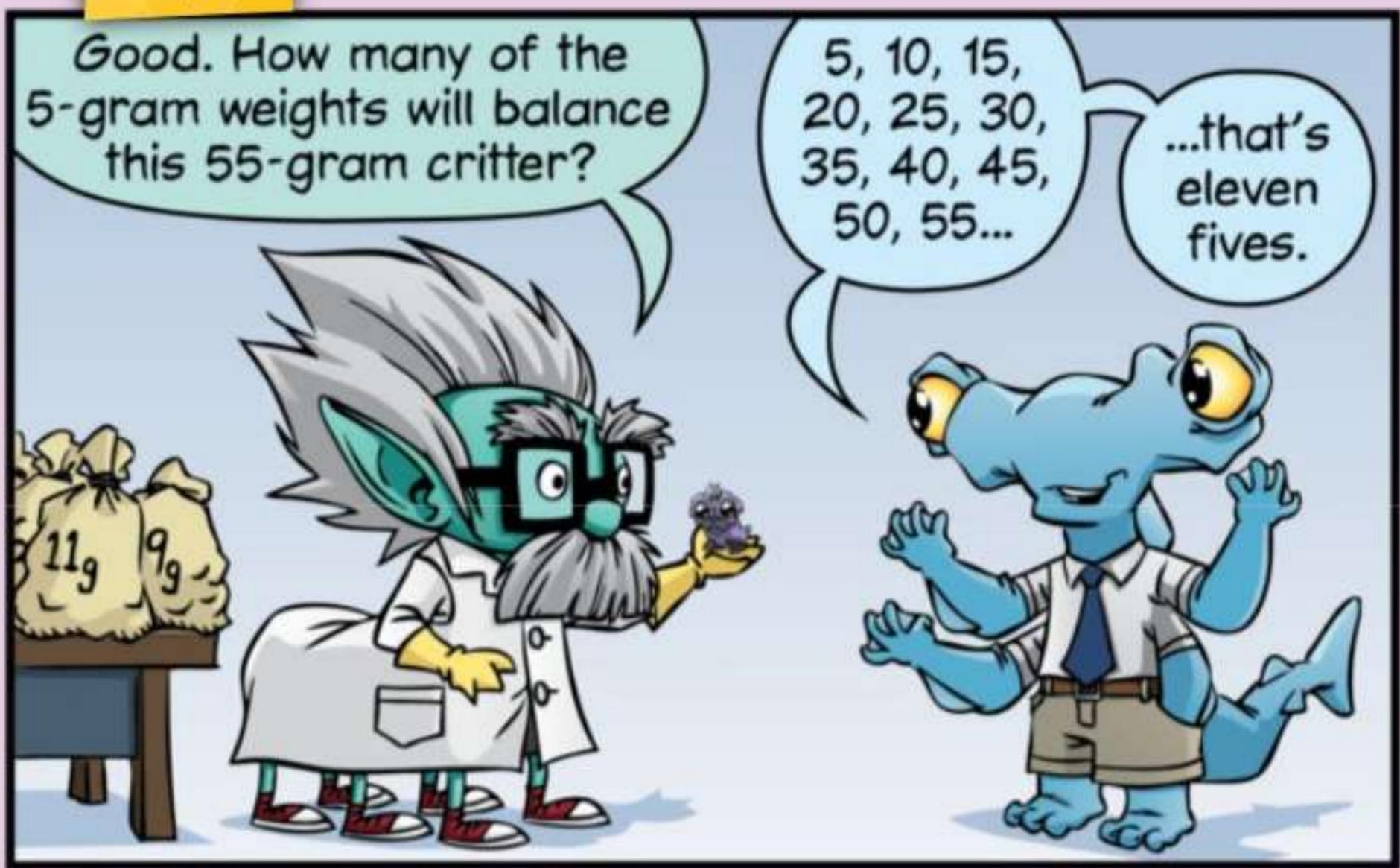
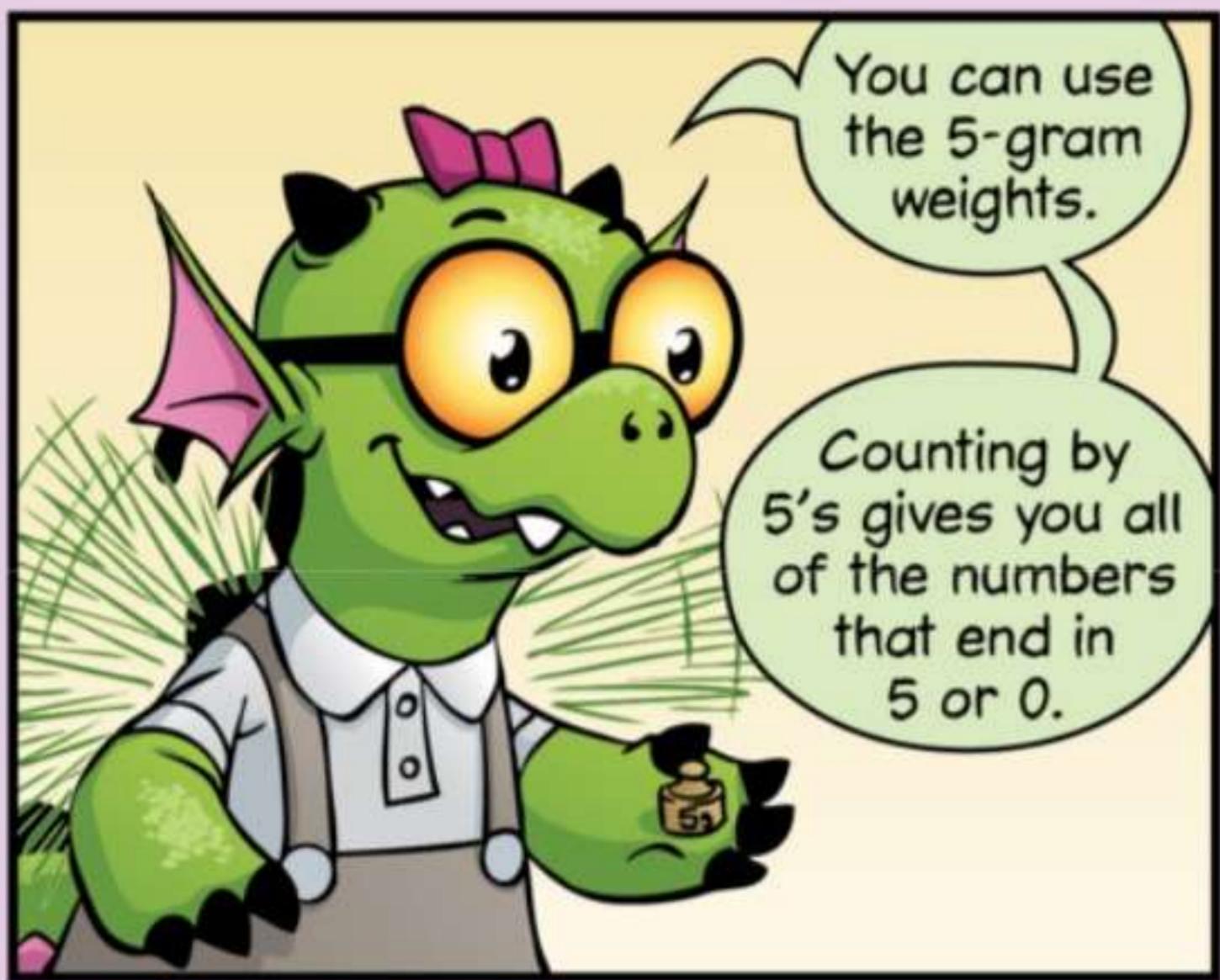
You can only balance objects with weights that end in 0: 10, 20, 30...

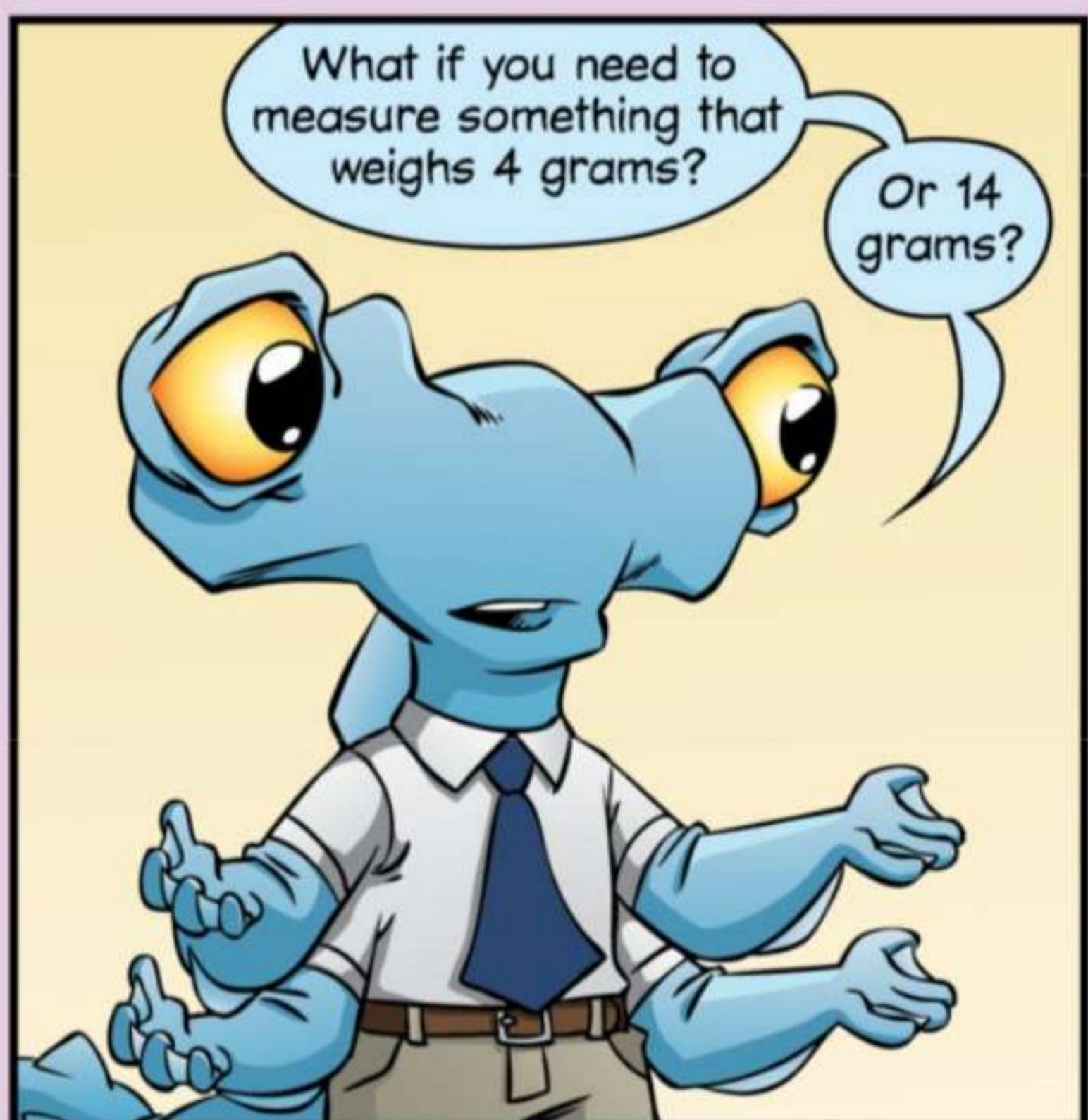
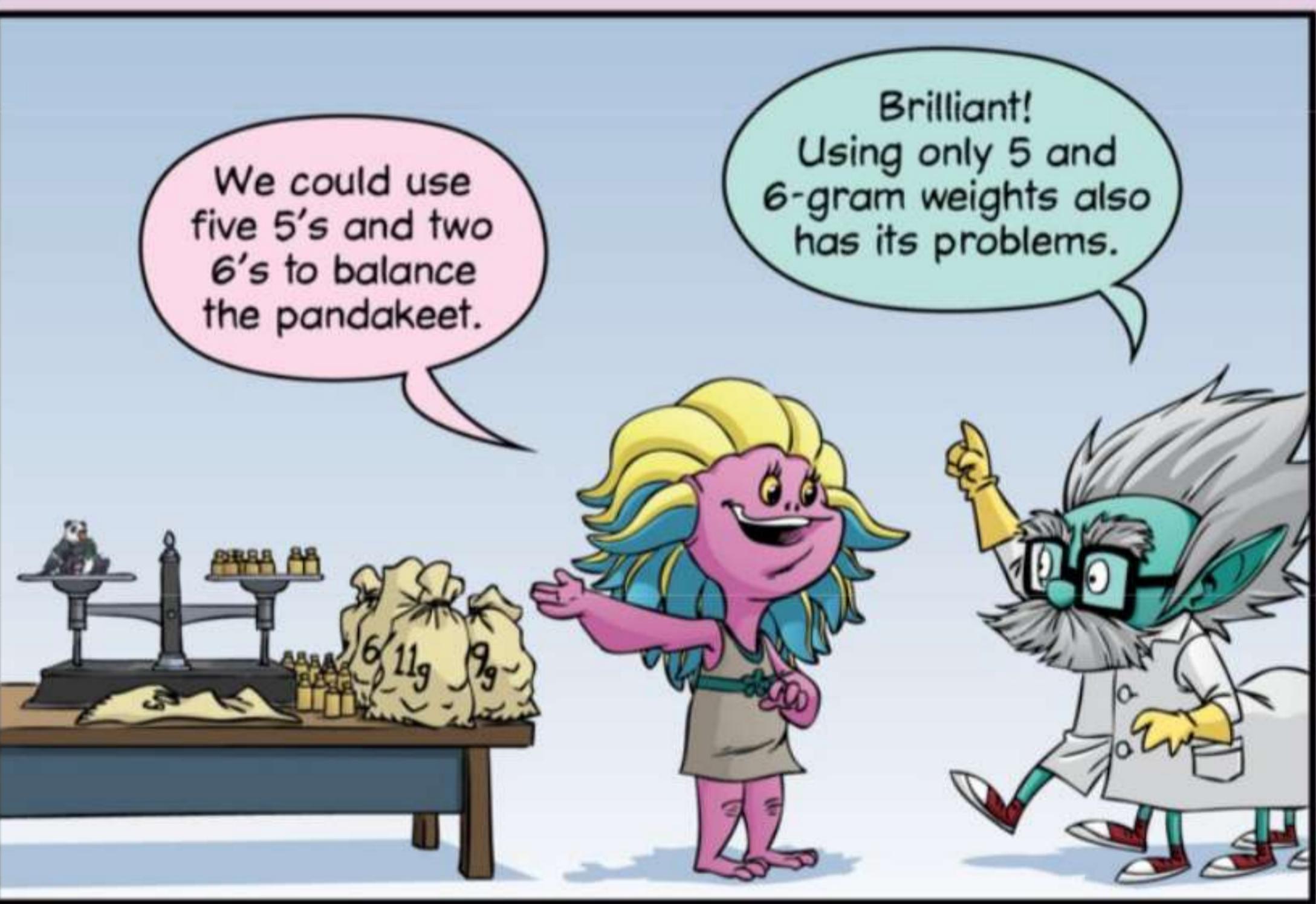
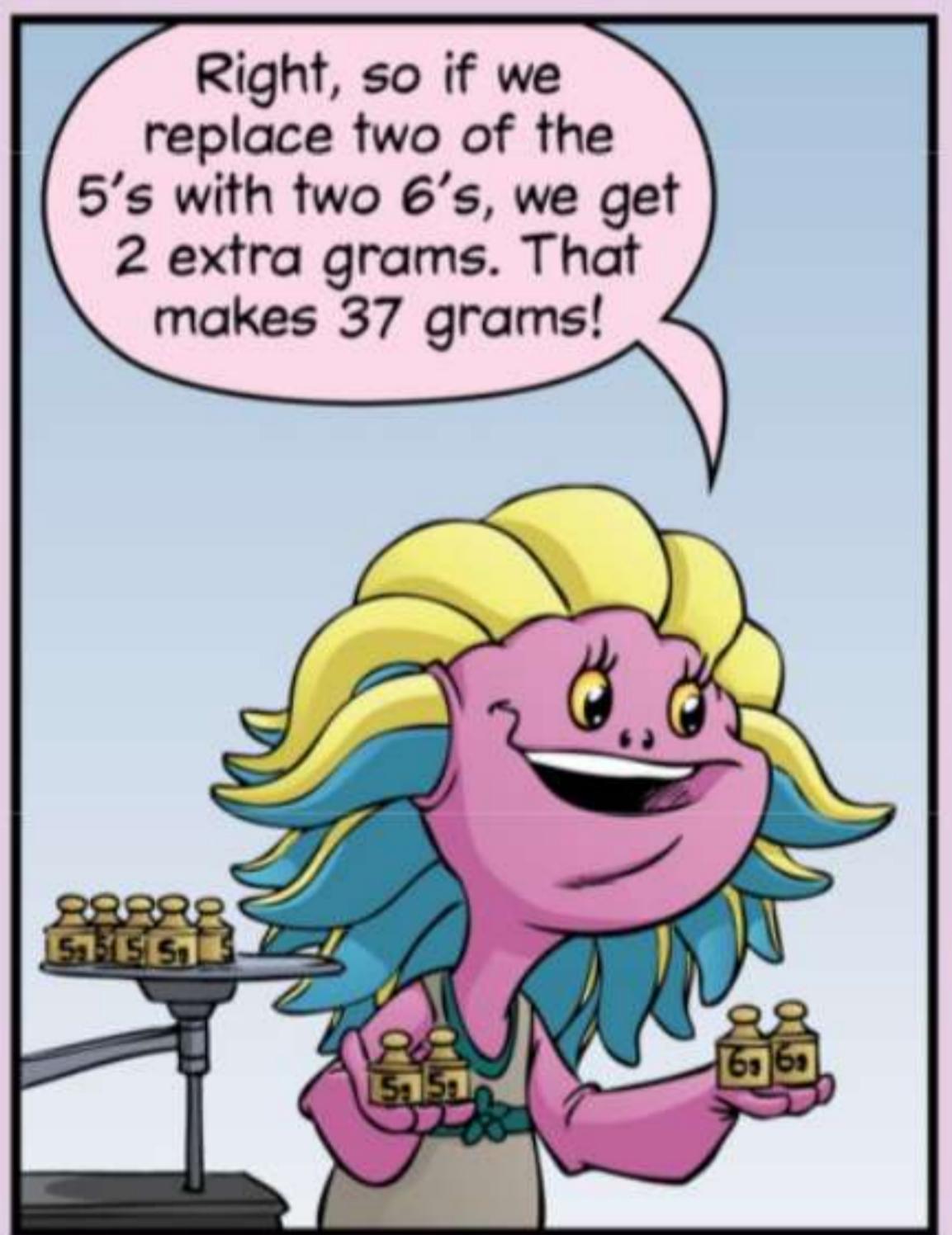
...you can't balance something that weighs 55 grams if all you have are 10-gram weights.

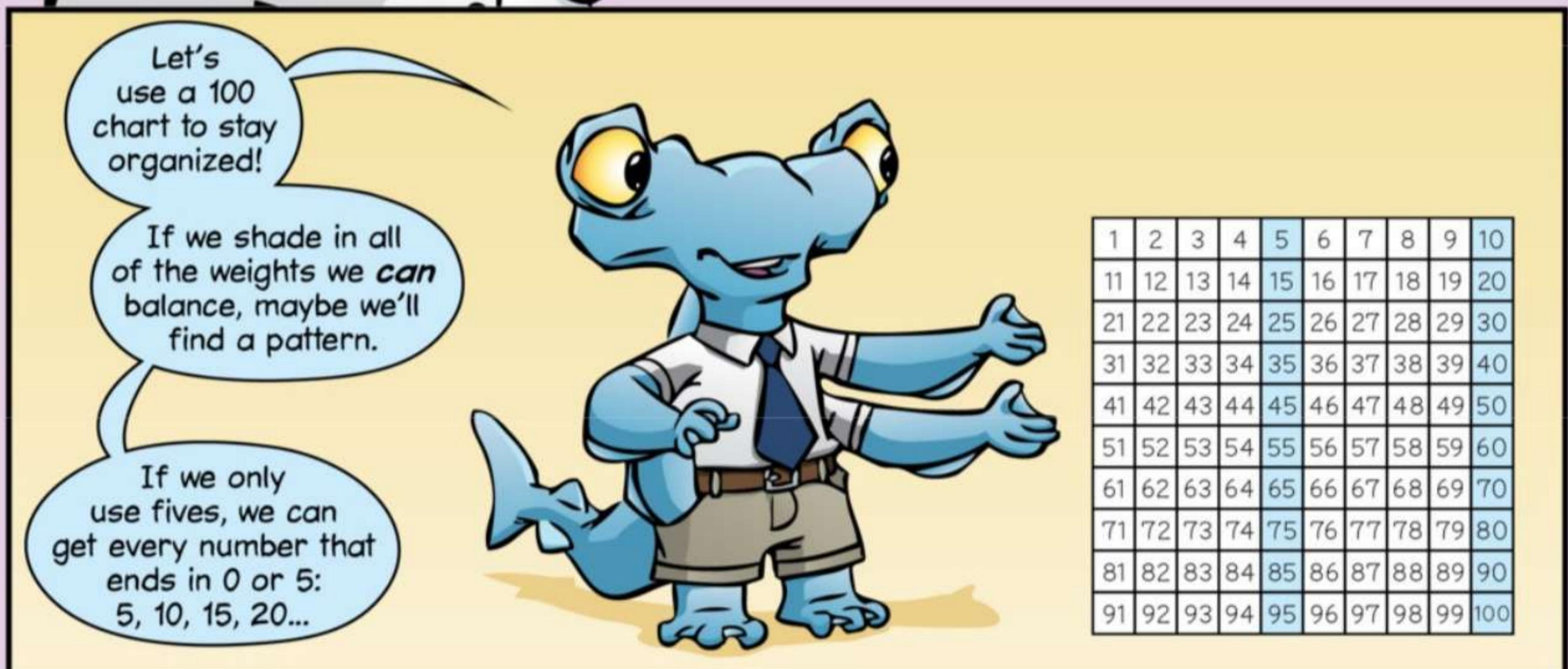
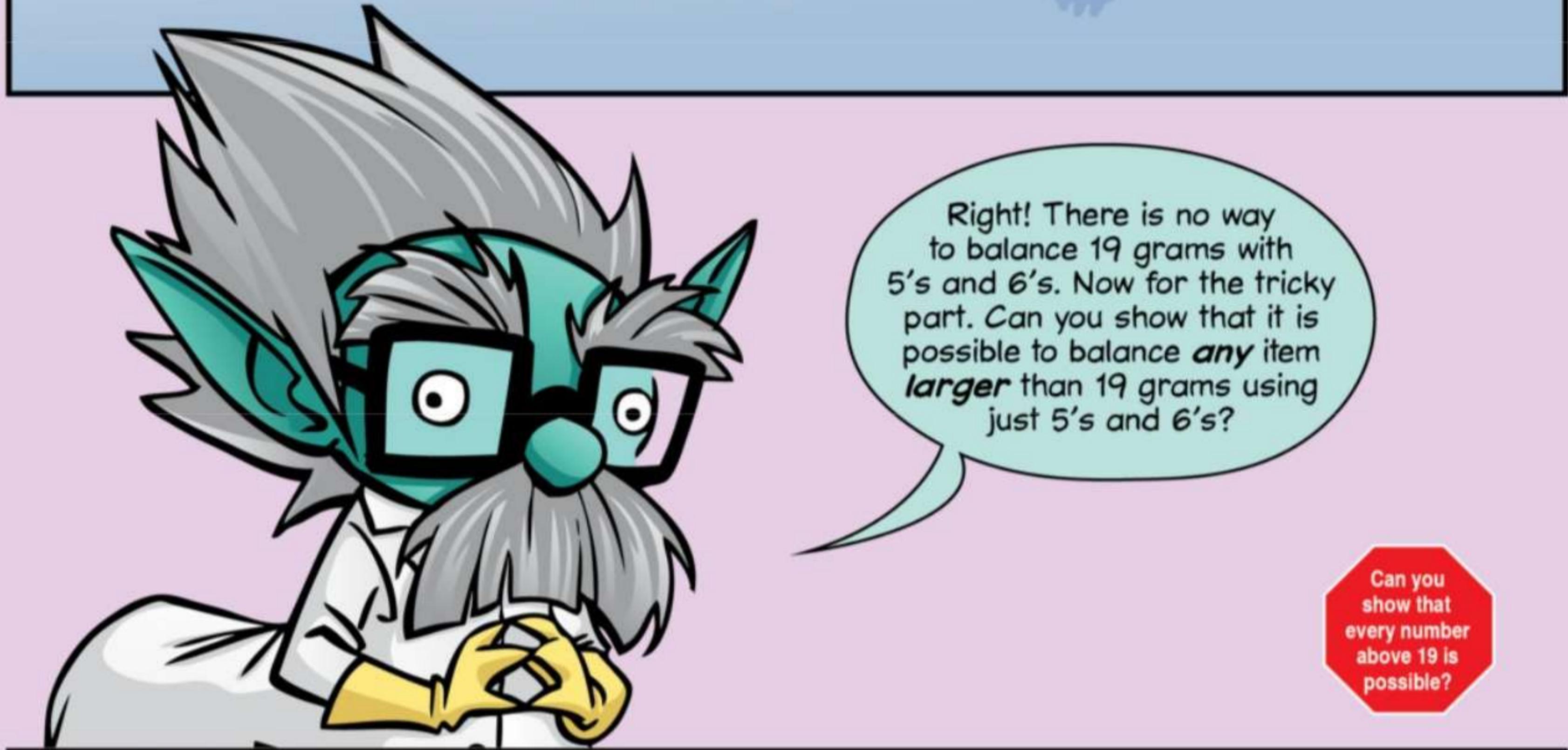
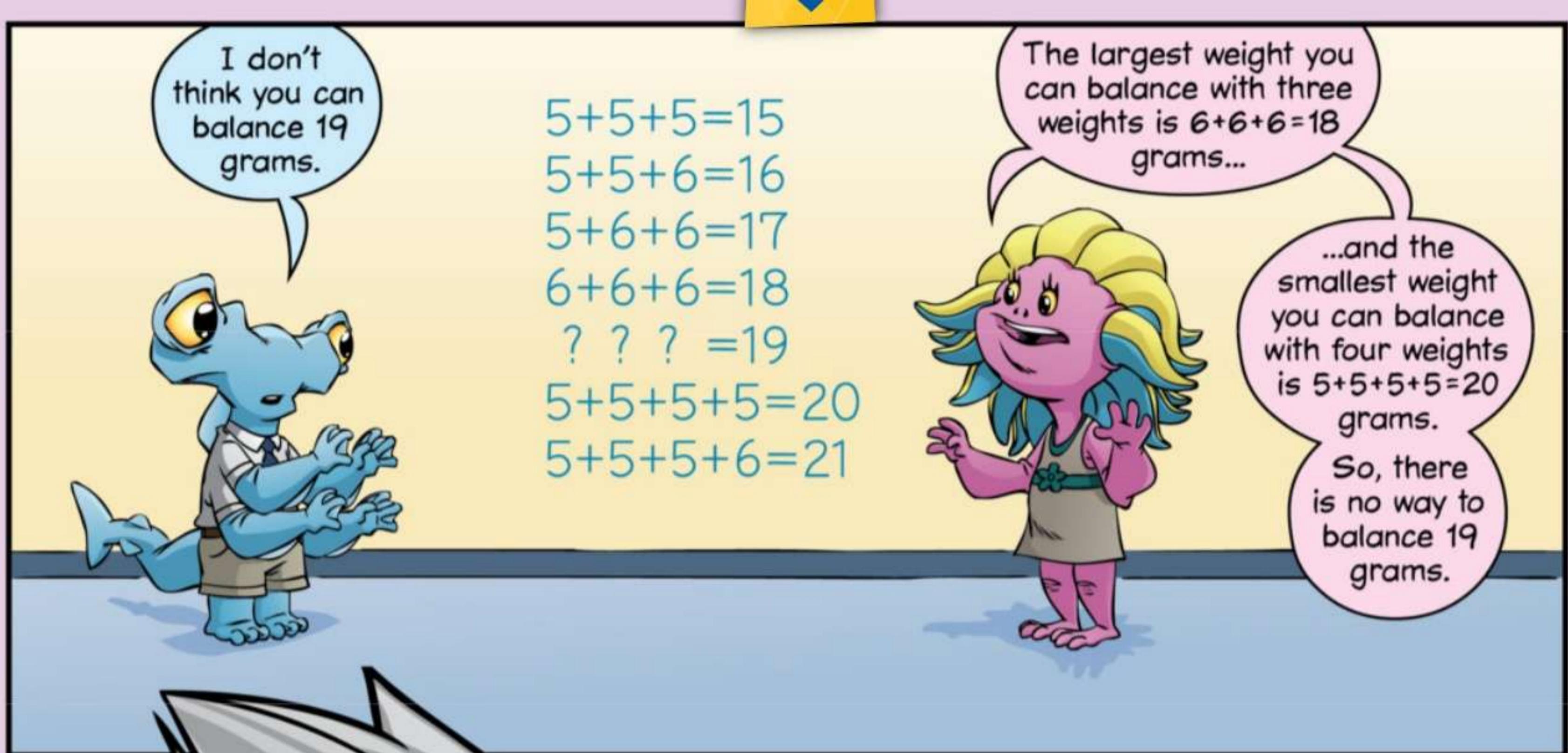
That's right! This octapug weighs exactly 55 grams. We cannot balance him with 10-gram weights. Which of these sacks of weights can I use to balance him?



Which bag of weights would you choose?







And if we use just one 6, we can get all of the bigger numbers that end in 6 or 1 by adding fives:  
6, 11, 16,...



1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

If we start with **two** sixes, that's 12. We can get all of the bigger numbers that end in 2 or 7 by adding fives:  
12, 17, 22, 27...



1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

Three 6's makes 18, and from there we can get all of the bigger numbers that end in 8 or 3:  
18, 23, 28...

That just leaves the numbers that end in 4 or 9!



1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

Right. We can get 24, and all of the larger numbers that end in 4 or 9 if we use **four** sixes!  
24, 29, 34, 39...

So, 19 grams is the largest weight we can't balance!



1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

Wonderful! Using a chart was a great idea! Instead of a standard 100 chart, see what happens if you use a chart with rows of 5 or 6...

1	2	3	4	5	6
7	8	9	10	11	12
13	14	15	16	17	18
19	20	21	22	23	24
25	26	27	28	29	30

1	2	3	4	5
6	7	8	9	10
11	12	13	14	15
16	17	18	19	20
21	22	23	24	25
26	27	28	29	30



...shading in the numbers that **can** be balanced



Bwah Ha Ha!  
Professor Grok is  
gone. I've abducted your  
educator. It's time for  
something much more  
diabolically difficult...

...Brain-Baffling  
Balancing!

Balancing  
ballast with  
5's and 6's  
is terribly  
trivial...

...but balancing  
ballast with 6's  
and 11's is perfectly  
perplexing!

The biggest ballast  
that can't be balanced  
with 6's and 11's is the  
locker number you are  
looking for.

Located in that  
locker is your  
luminous lecturer.  
Find him fast, or  
he'll face...

...Certain  
Suffocation!!!



With 5's and 6's,  
the largest weight we  
can't balance is 19  
grams.

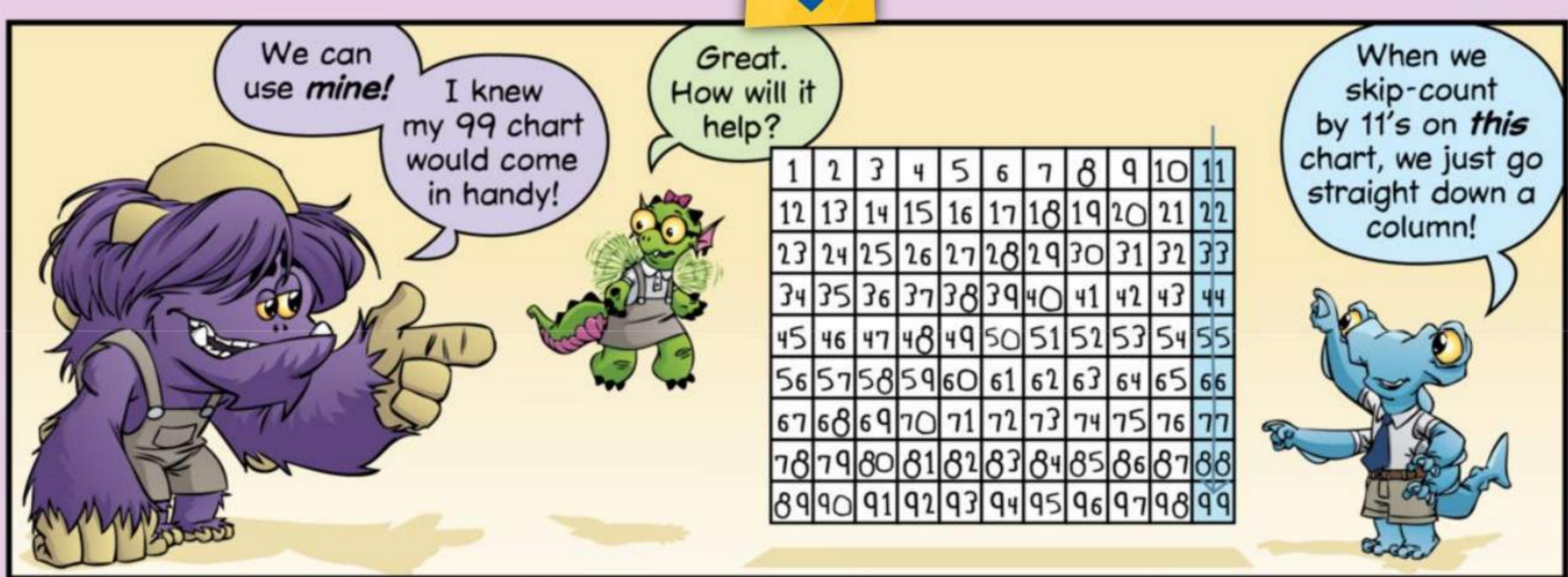
We need to  
find the largest  
weight that can't  
be balanced with  
6's and 11's.

Professor Grok  
said something about  
using rows of 5 or 6 in  
our chart when we were  
adding 5's and 6's.

Maybe our  
chart should  
have rows of  
6 or 11?



Can you find  
the largest number  
that cannot be  
balanced with 6's  
and 11's?



It's like skip-counting by 10's on a regular 100 chart!

On a regular 100 chart, moving down one row is the same as adding 10.

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100



1	2	3	4	5	6	7	8	9	10	11
12	13	14	15	16	17	18	19	20	21	22
23	24	25	26	27	28	29	30	31	32	33
34	35	36	37	38	39	40	41	42	43	44
45	46	47	48	49	50	51	52	53	54	55
56	57	58	59	60	61	62	63	64	65	66
67	68	69	70	71	72	73	74	75	76	77
78	79	80	81	82	83	84	85	86	87	88
89	90	91	92	93	94	95	96	97	98	99



If we shade in all of the weights on the chart that we *can* balance, we can find the largest weight we *can't* balance!

We can start by shading in all the 11's.\*

1	2	3	4	5	6	7	8	9	10	11
12	13	14	15	16	17	18	19	20	21	22
23	24	25	26	27	28	29	30	31	32	33
34	35	36	37	38	39	40	41	42	43	44
45	46	47	48	49	50	51	52	53	54	55
56	57	58	59	60	61	62	63	64	65	66
67	68	69	70	71	72	73	74	75	76	77
78	79	80	81	82	83	84	85	86	87	88
89	90	91	92	93	94	95	96	97	98	99



If we start with one 6, we can shade in 6 and all the numbers below it...

...just by adding 11's!



1	2	3	4	5	6	7	8	9	10	11
12	13	14	15	16	17	18	19	20	21	22
23	24	25	26	27	28	29	30	31	32	33
34	35	36	37	38	39	40	41	42	43	44
45	46	47	48	49	50	51	52	53	54	55
56	57	58	59	60	61	62	63	64	65	66
67	68	69	70	71	72	73	74	75	76	77
78	79	80	81	82	83	84	85	86	87	88
89	90	91	92	93	94	95	96	97	98	99

HERE, "11'S" MEANS THE NUMBERS WE USE TO SKIP-COUNT BY 11'S:  
11, 22, 33, 44... THESE ARE THE MULTIPLES OF 11.

1	2	3	4	5	6	7	8	9	10	11
12	13	14	15	16	17	18	19	20	21	22
23	24	25	26	27	28	29	30	31	32	33
34	35	36	37	38	39	40	41	42	43	44
45	46	47	48	49	50	51	52	53	54	55
56	57	58	59	60	61	62	63	64	65	66
67	68	69	70	71	72	73	74	75	76	77
78	79	80	81	82	83	84	85	86	87	88
89	90	91	92	93	94	95	96	97	98	99

If we start with two 6's we can shade in the 12 and all the numbers below it.



We can keep shading in the 6's...

...6, 12, 18, 24, 30, 36, 42, 48, 54, 60...

1	2	3	4	5	6	7	8	9	10	11
12	13	14	15	16	17	18	19	20	21	22
23	24	25	26	27	28	29	30	31	32	33
34	35	36	37	38	39	40	41	42	43	44
45	46	47	48	49	50	51	52	53	54	55
56	57	58	59	60	61	62	63	64	65	66
67	68	69	70	71	72	73	74	75	76	77
78	79	80	81	82	83	84	85	86	87	88
89	90	91	92	93	94	95	96	97	98	99



...and we can shade in all of the numbers below the 6's.

1	2	3	4	5	6	7	8	9	10	11
12	13	14	15	16	17	18	19	20	21	22
23	24	25	26	27	28	29	30	31	32	33
34	35	36	37	38	39	40	41	42	43	44
45	46	47	48	49	50	51	52	53	54	55
56	57	58	59	60	61	62	63	64	65	66
67	68	69	70	71	72	73	74	75	76	77
78	79	80	81	82	83	84	85	86	87	88
89	90	91	92	93	94	95	96	97	98	99

Because if we can get a number on this chart, we can get any number below it just by adding 11's!



We're done!

We shaded in all of the weights we can balance.

All of the weights from this row down *can* be balanced!

49 is the largest weight that *can't* be balanced!

To locker 49!

1	2	3	4	5	6	7	8	9	10	11
12	13	14	15	16	17	18	19	20	21	22
23	24	25	26	27	28	29	30	31	32	33
34	35	36	37	38	39	40	41	42	43	44
45	46	47	48	49	50	51	52	53	54	55
56	57	58	59	60	61	62	63	64	65	66
67	68	69	70	71	72	73	74	75	76	77
78	79	80	81	82	83	84	85	86	87	88
89	90	91	92	93	94	95	96	97	98	99





# RECESS

## The 100 Game

### How to Play:

Each player places a gamepiece (like a coin or other small item) on the square marked "Start." Players take turns rolling a standard six-sided die. The number rolled gives the number a player may use to skip-count up the hundred chart on his or her turn.

A player may skip ahead up to nine times each turn. For example, if you roll a 5 you may move ahead a maximum of 45 squares by adding 5 nine times. The goal is to be the first player to land on the 100<sup>th</sup> square.

### More Rules:

You may not go over 100. For example, if you are at 97 and you roll a 4, you cannot move.

You may choose not to move after you roll. For example, if you are on 96 and you roll a 3, you may choose not to move. Do you see why it may be better not to move?

Skip-counting by 1 is just counting by 1's. If you roll a 1, you may move ahead up to 9 squares.

### Strategy Hints:

On which square would you prefer to begin your turn:

Square 98 or square 99?

Square 94 or square 95?

Square 70 or square 71?

Think about how many ways there are to win from each of the squares listed above.

Start	1	2	3	4	5	6	7	8	9	10
	11	12	13	14	15	16	17	18	19	20
	21	22	23	24	25	26	27	28	29	30
	31	32	33	34	35	36	37	38	39	40
	41	42	43	44	45	46	47	48	49	50
	51	52	53	54	55	56	57	58	59	60
	61	62	63	64	65	66	67	68	69	70
	71	72	73	74	75	76	77	78	79	80
	81	82	83	84	85	86	87	88	89	90
	91	92	93	94	95	96	97	98	99	Win!