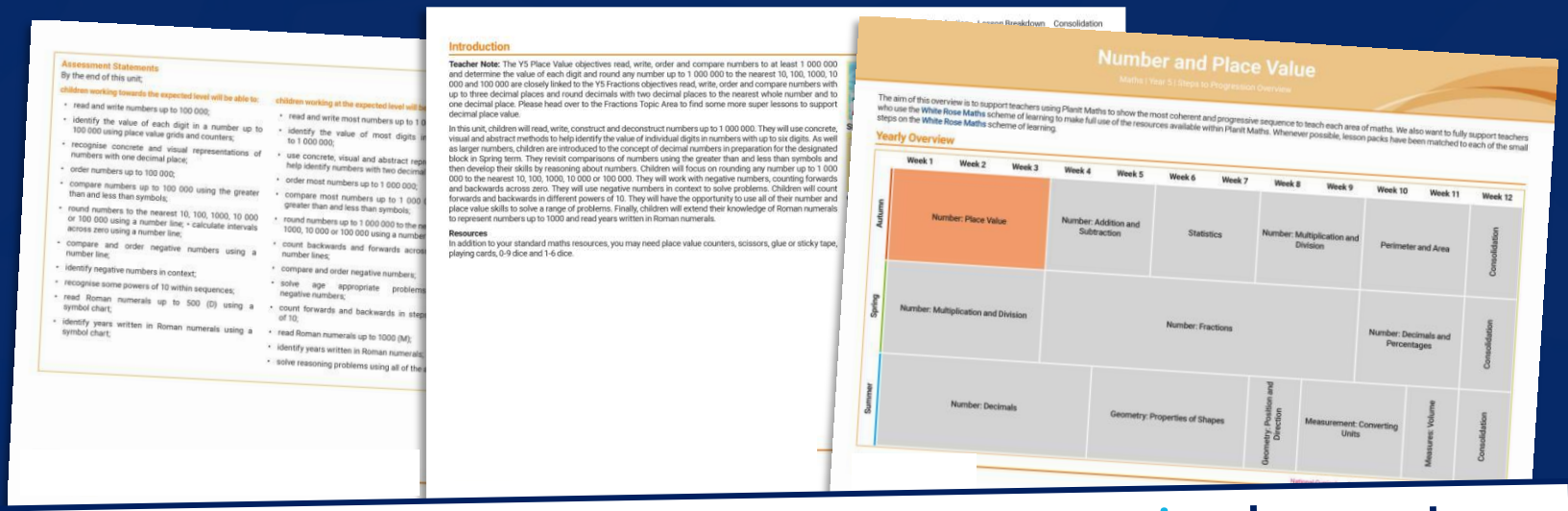
Maths

Number and Place Value

Need a coherently planned sequence of lessons to complement this resource?



See our Number and Place Value Steps to Progression document.

Counting in Powers of Ten

Aim

- To count in steps of powers of ten.

Success Criteria

- I can identify the value of each digit in a number.
- I can identify which digit will change when adding or subtracting a power of 10.
- I can count forwards and backwards in steps of powers of 10.

Remember It

Choose each digit once to complete the number statements.

9	6	7	5	8	3	4	2	0

9	8	7	>	0	4	5	6	>	2	3
0	2	3	<	9	8	7	6	>	4	5
9	8	7	>	0	2	3	4	>	5	6

Powers of 10

Whole Class

What is a power of 10?

Look at this pattern:

$10^1 = 10$
$10^2 = 100$
$10^3 = 1000$

What do you notice?

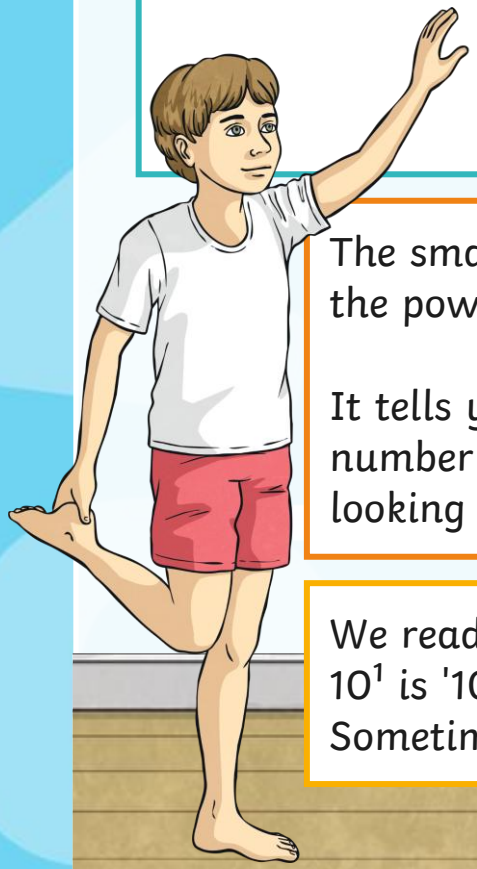
Powers of 10

Whole Class

$10^1 = 10$

$10^2 = 100$

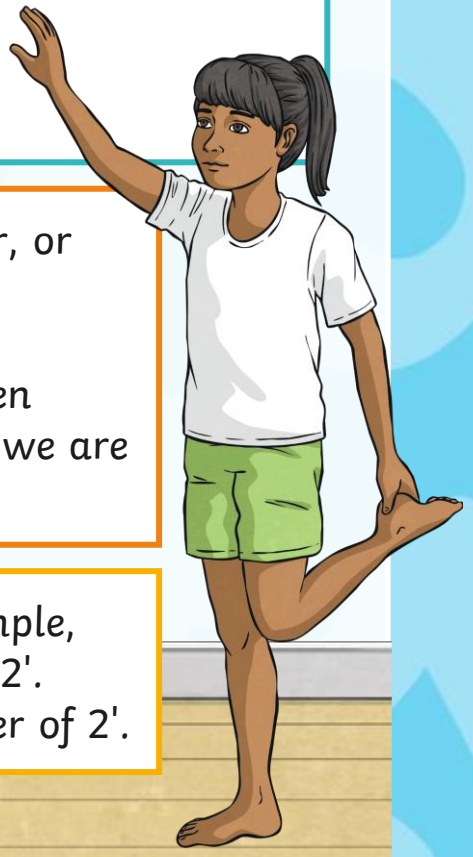
$10^3 = 1000$



The small digit next to each 10 is called the index number, or the power.

It tells you how many times you should multiply the given number by itself - the given number in this case is 10, as we are looking at powers of 10.

We read the calculations as '10 to the power of'. For example, 10^1 is '10 to the power of 1' and 10^2 is '10 to the power of 2'. Sometimes, we say '10 squared' instead of '10 to the power of 2'.

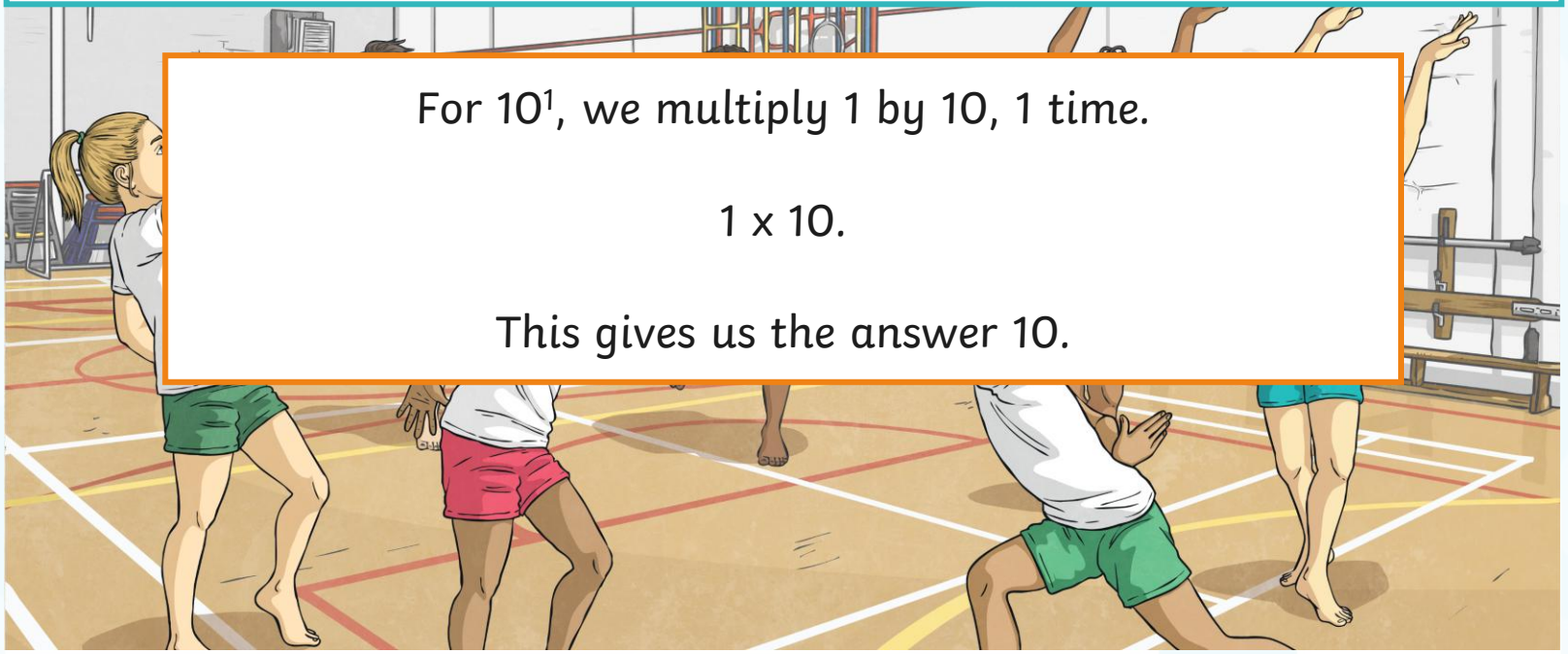


Powers of 10

$10^1 = 10$

$10^2 = 100$

$10^3 = 1000$



For 10^1, we multiply 1 by 10, 1 time.

1 x 10.

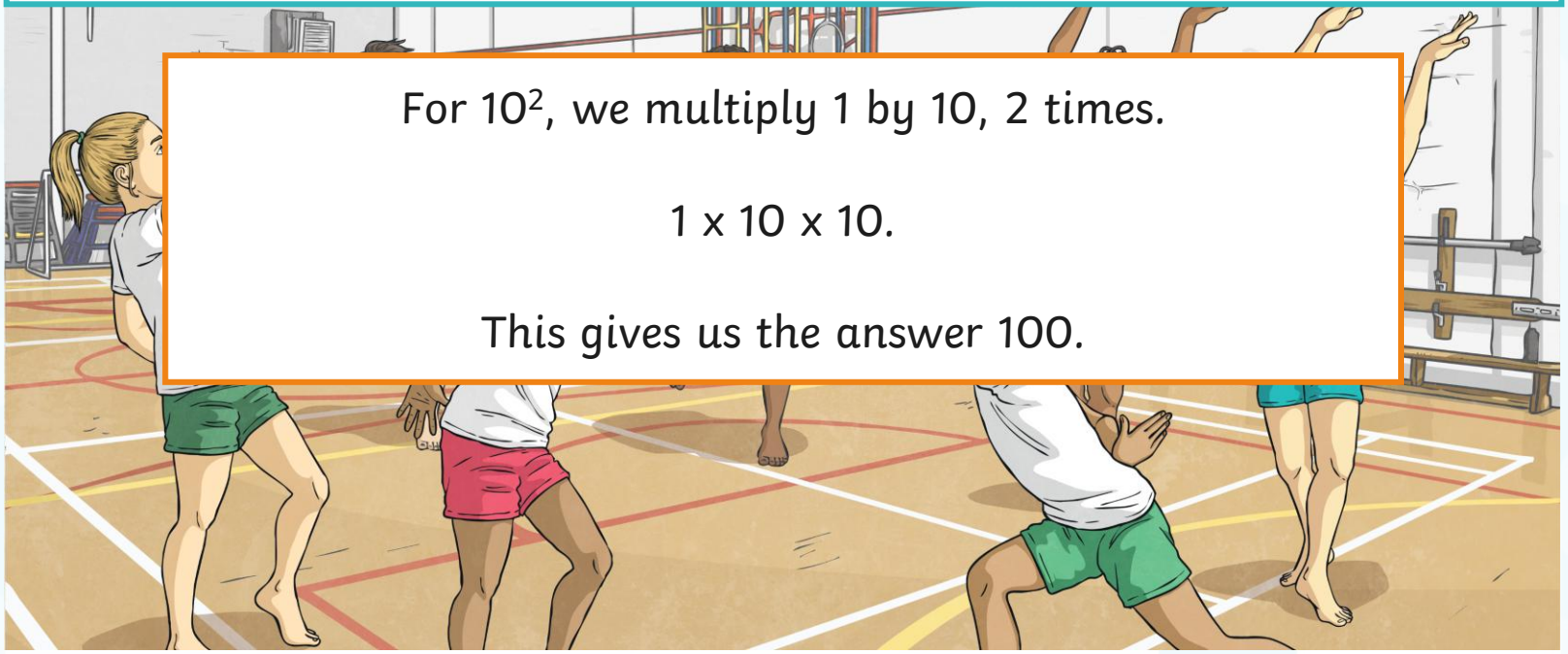
This gives us the answer 10.

Powers of 10

$10^1 = 10$

$10^2 = 100$

$10^3 = 1000$



For 10^2, we multiply 1 by 10, 2 times.

1 x 10 x 10.

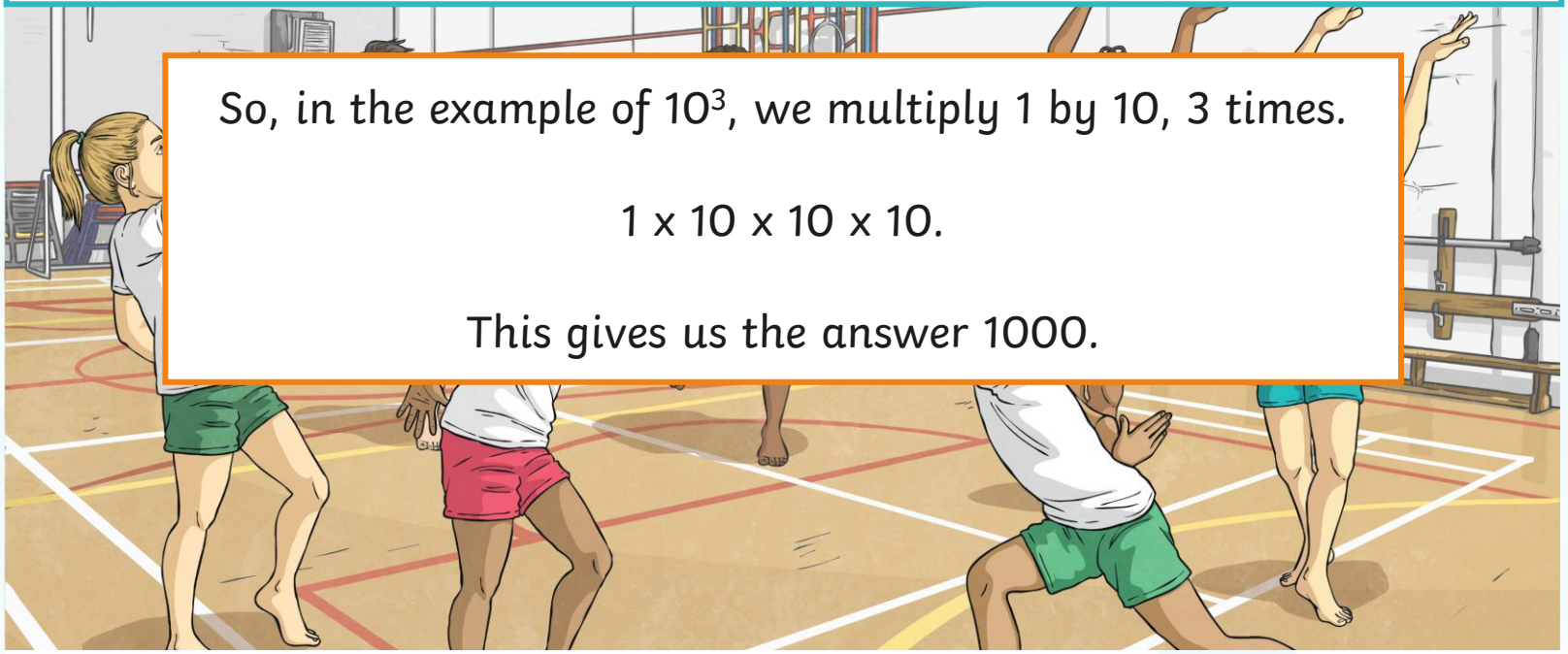
This gives us the answer 100.

Powers of 10

$10^1 = 10$

$10^2 = 100$

$10^3 = 1000$



So, in the example of 10^3, we multiply 1 by 10, 3 times.

1 x 10 x 10 x 10.

This gives us the answer 1000.

Powers of 10

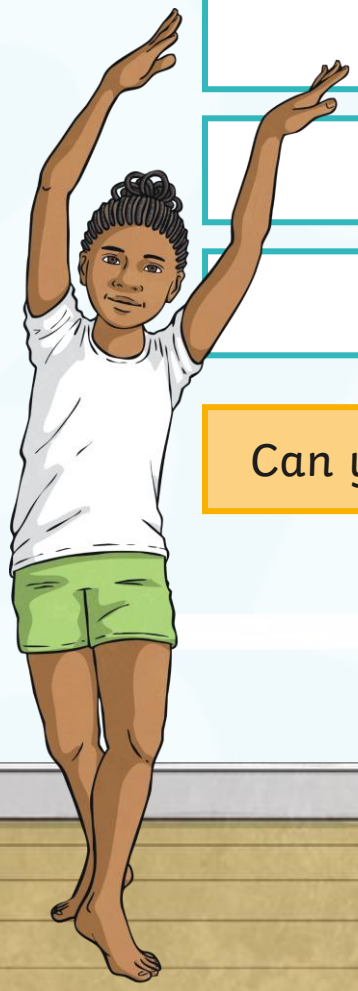
Whole Class

$10^1 = 1 \times 10 = 10$

$10^2 = 1 \times 10 \times 10 = 100$

$10^3 = 1 \times 10 \times 10 \times 10 = 1000$

Can you follow this pattern to find 10^4, 10^5 and 10^6?



Powers of 10

When each power increases by one, the total amount is ten times the size of the last number. When a number is ten times the size, it moves one place to the left on a place value grid.

	Millions	Hundred thousands	Ten thousands	Thousands	Hundreds	Tens	Ones
10^1						1	0
10^2					1	0	0
10^3				1	0	0	0
10^4			1	0	0	0	0
10^5		1	0	0	0	0	0
10^6	1	0	0	0	0	0	0

Adding and Subtracting

Whole Class

When we add or subtract different powers of 10, we start by identifying the correct digit in the number.

Let's look at an example.

Add 1000 to 45 689.

We need to identify the digit in the thousands place, because we are adding 1000.

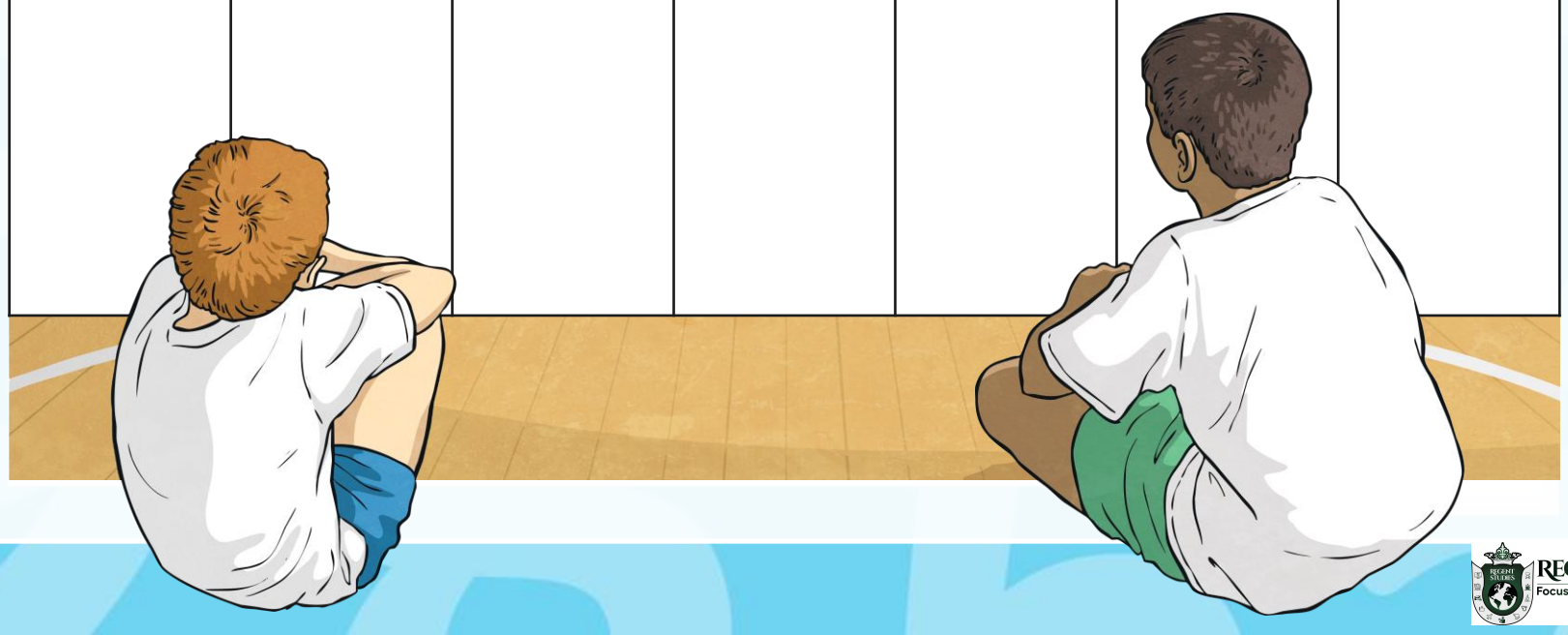
Which digit is in the thousands place in **45 689**?

Adding and Subtracting

Whole Class

By using a place value grid, we can check which digit is in the thousands place.

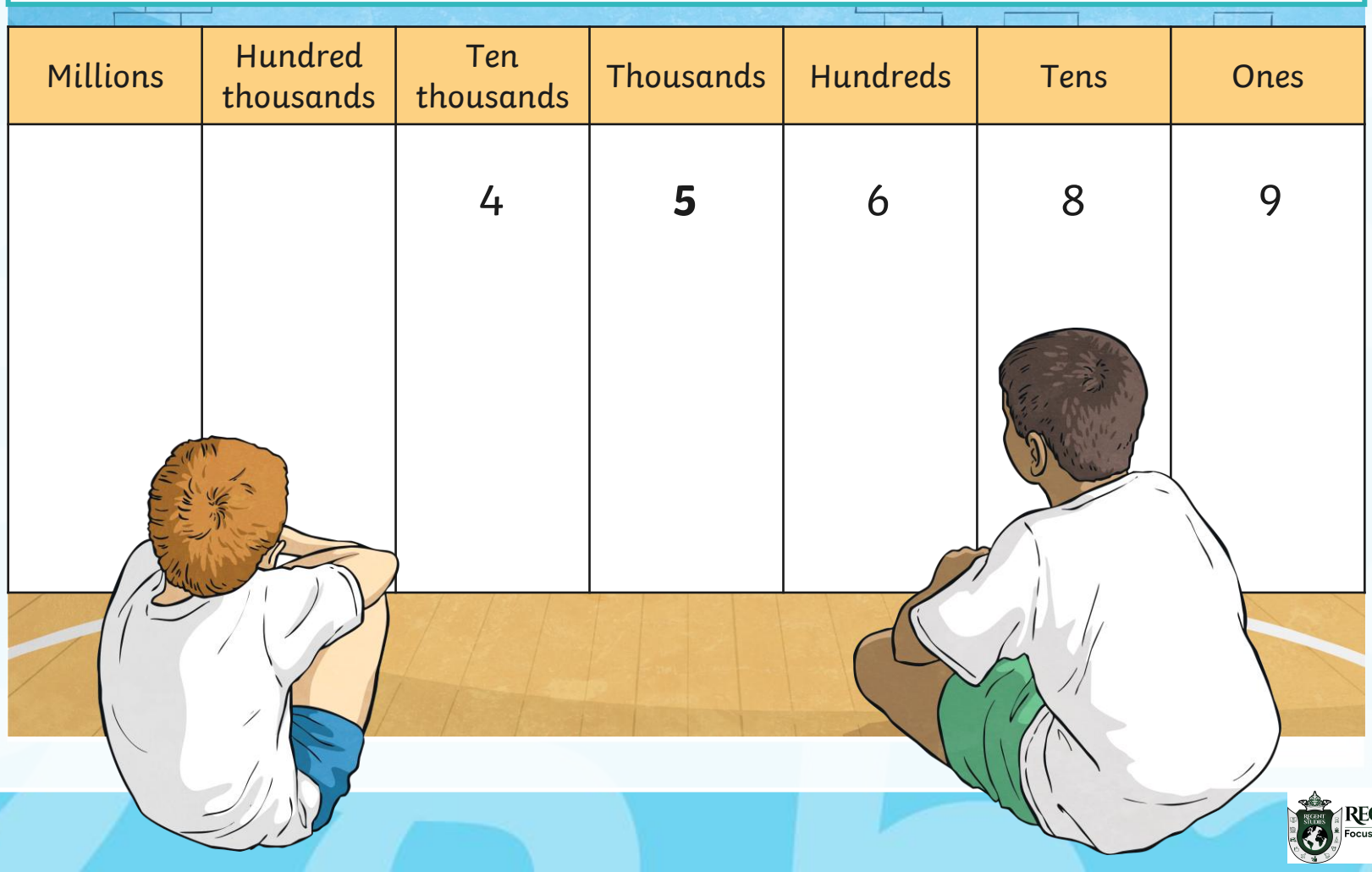
Millions	Hundred thousands	Ten thousands	Thousands	Hundreds	Tens	Ones
		4	5	6	8	9



Adding and Subtracting

In 45 689, the 5 is in the thousands place.

Millions	Hundred thousands	Ten thousands	Thousands	Hundreds	Tens	Ones
		4	**5**	6	8	9



Adding and Subtracting

Whole Class

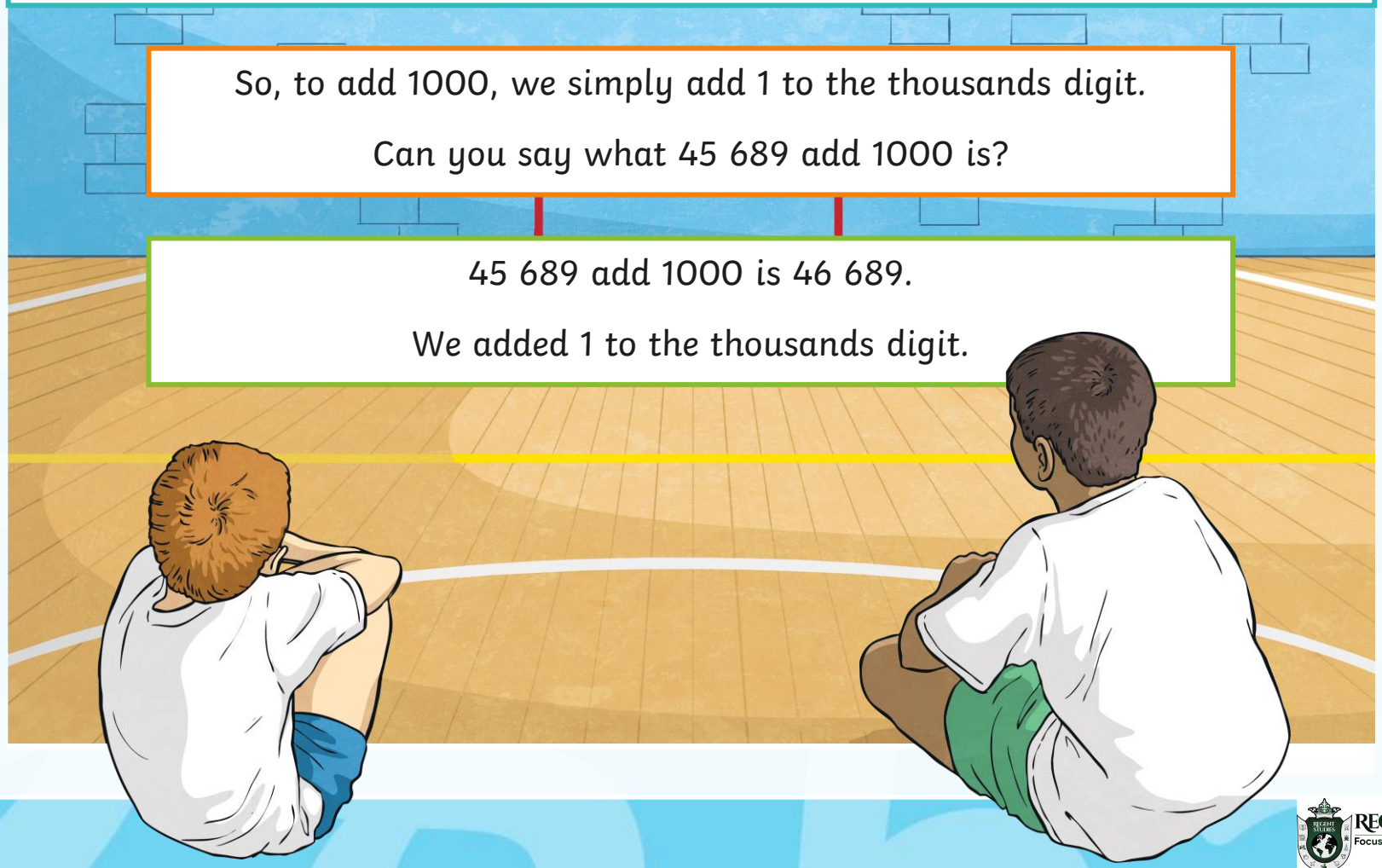
In 45 689, the 5 is in the thousands place.

So, to add 1000, we simply add 1 to the thousands digit.

Can you say what 45 689 add 1000 is?

45 689 add 1000 is 46 689.

We added 1 to the thousands digit.



Adding and Subtracting

Now let's look at this example:

Subtract 100 from 456 721.

First, we identify the digit in the hundreds place.

Millions	Hundred thousands	Ten thousands	Thousands	Hundreds	Tens	Ones
	4	5	6	7	2	1

Adding and Subtracting

Now let's look at this example:

Subtract 100 from 456 721.

We can see that the 7 is in the hundreds place.

Millions	Hundred thousands	Ten thousands	Thousands	Hundreds	Tens	Ones
	4	5	6	**7**	2	1

Adding and Subtracting

Now let's look at this example:

Subtract 100 from 456 721.

We just need to subtract 1 from the hundreds digit.

Millions	Hundred thousands	Ten thousands	Thousands	Hundreds	Tens	Ones
	4	5	6	**7**	2	1

Adding and Subtracting

Whole Class

Now let's look at this example:

Subtract 100 from 456 721.

So the answer to this calculation is 456 621.

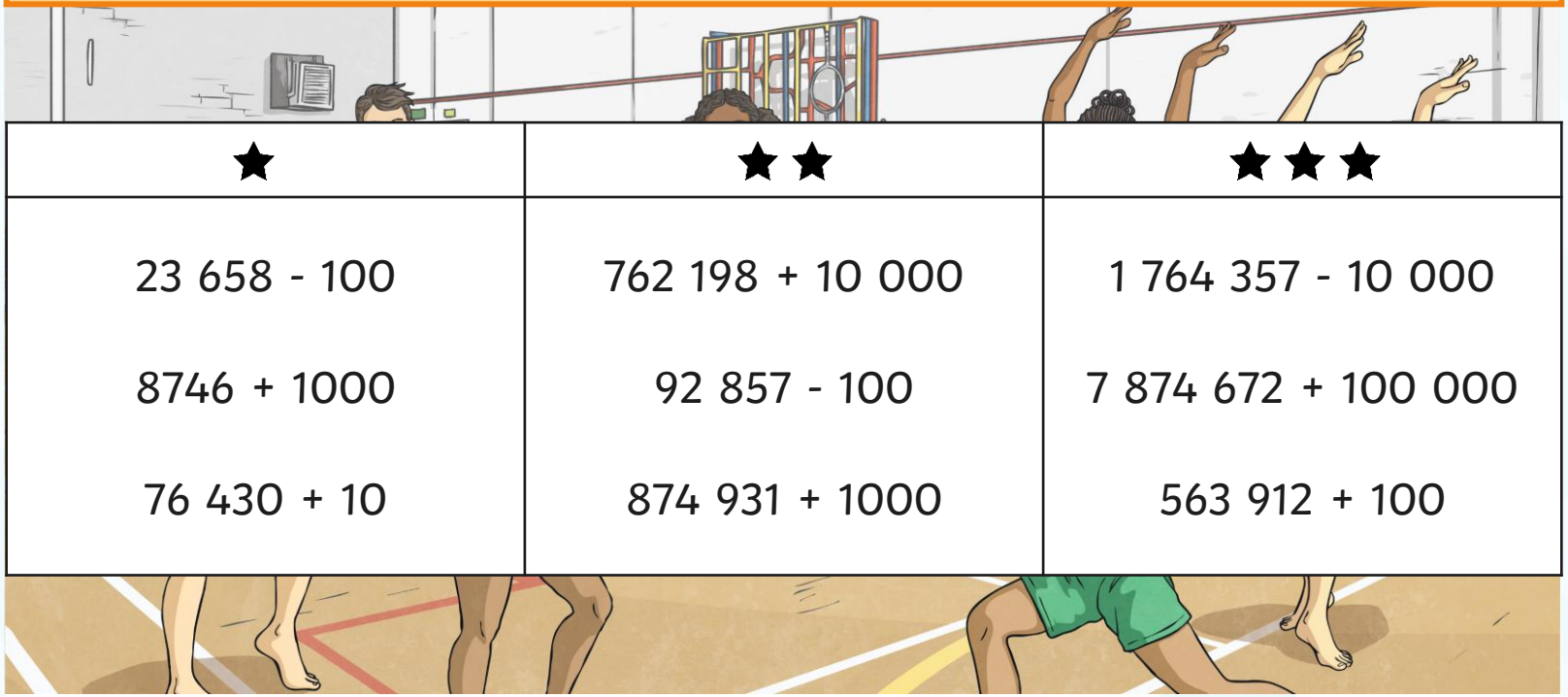
Millions	Hundred thousands	Ten thousands	Thousands	Hundreds	Tens	Ones
	4	5	6	**6**	2	1

Adding and Subtracting

Whole Class

The table below shows calculations involving adding and subtracting powers of 10.

Choose 2 of the calculations and solve them.
You can use a place value chart to identify the correct digit.

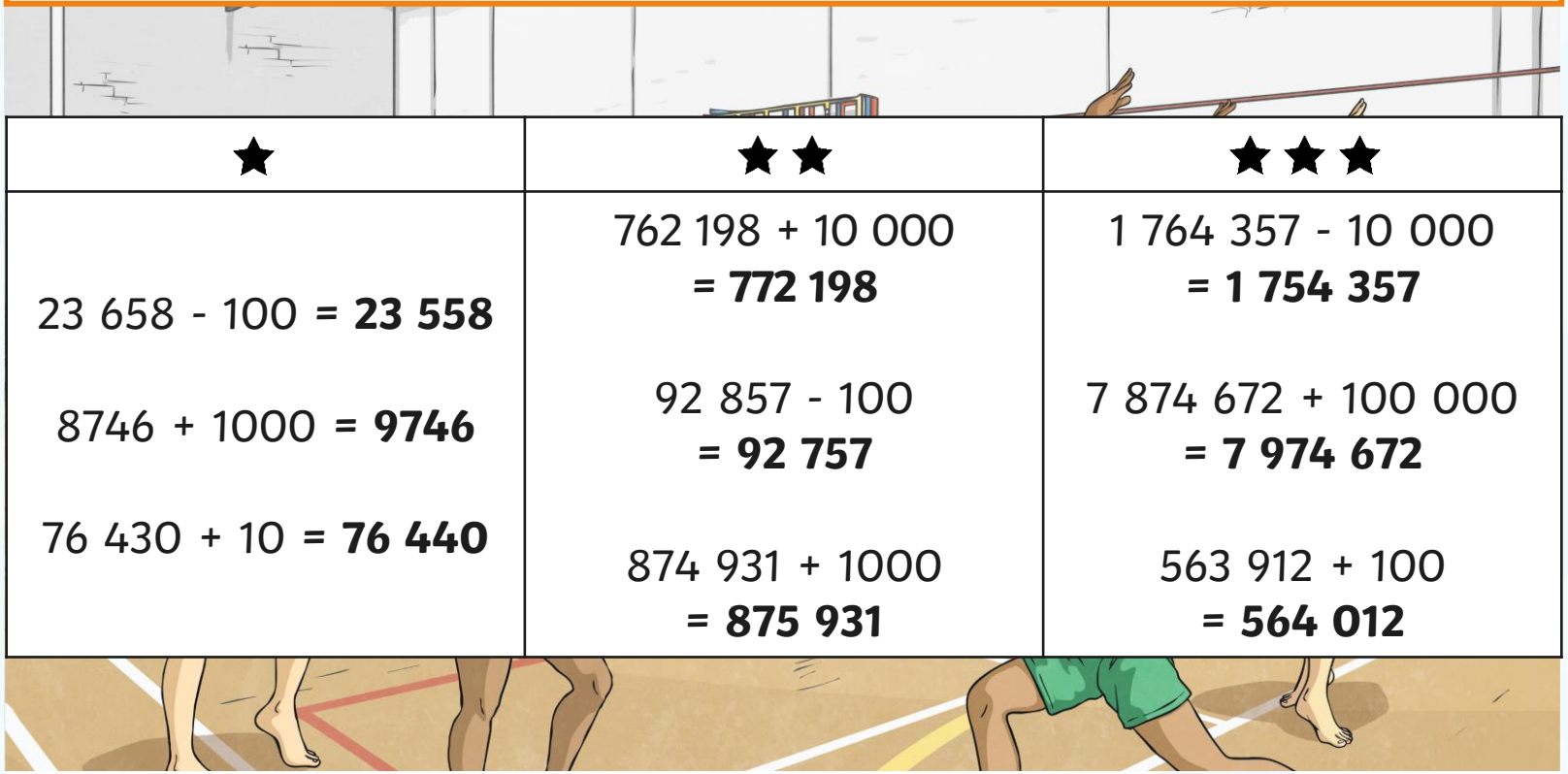


★	★★	★★★
23 658 - 100	762 198 + 10 000	1 764 357 - 10 000
8746 + 1000	92 857 - 100	7 874 672 + 100 000
76 430 + 10	874 931 + 1000	563 912 + 100

Adding and Subtracting

Whole Class

Check your answers.
How did you get on?



★	★★	★★★
23 658 - 100 = **23 558** 8746 + 1000 = **9746** 76 430 + 10 = **76 440**	762 198 + 10 000 = **772 198** 92 857 - 100 = **92 757** 874 931 + 1000 = **875 931**	1 764 357 - 10 000 = **1 754 357** 7 874 672 + 100 000 = **7 974 672** 563 912 + 100 = **564 012**

Forwards and Backwards

We can use our understanding of adding and subtracting powers of 10 in order to count in steps of powers of 10.

Let's use one of the examples from the table we just worked with:
76 430 + 10 = 76 440

We can continue adding 10 to 76 440 to count on in steps of 10.
Can you find the next three numbers if we continue to count on in 10s?

If we continue to count forwards in steps of 10, the next three numbers are: **76 450, 76 460 and 76 470.**

Forwards and Backwards

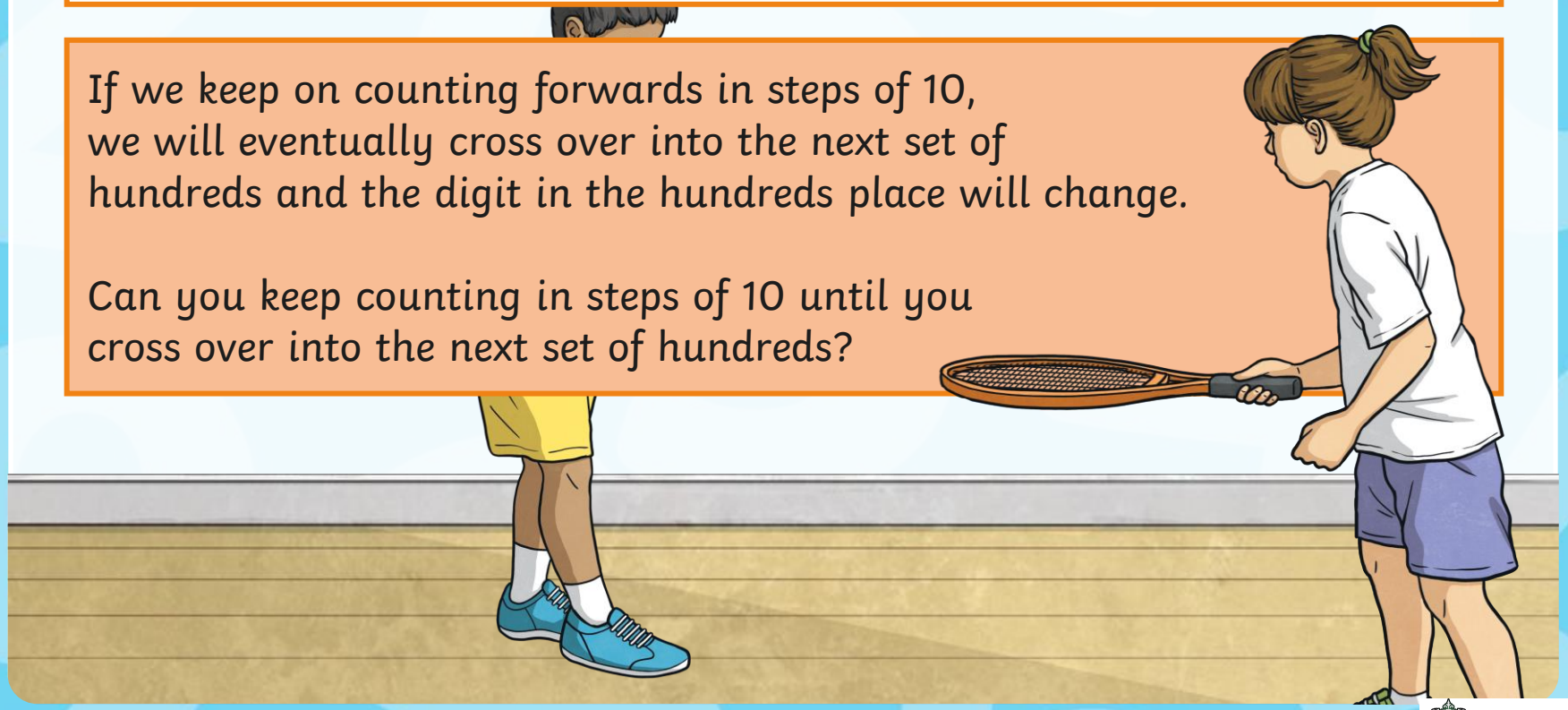
Whole Class

76 4**3**0, 76 4**4**0, 76 4**5**0, 76 4**6**0, 76 4**7**0...

So far we have just changed the digit in the tens place.

If we keep on counting forwards in steps of 10,
we will eventually cross over into the next set of
hundreds and the digit in the hundreds place will change.

Can you keep counting in steps of 10 until you
cross over into the next set of hundreds?



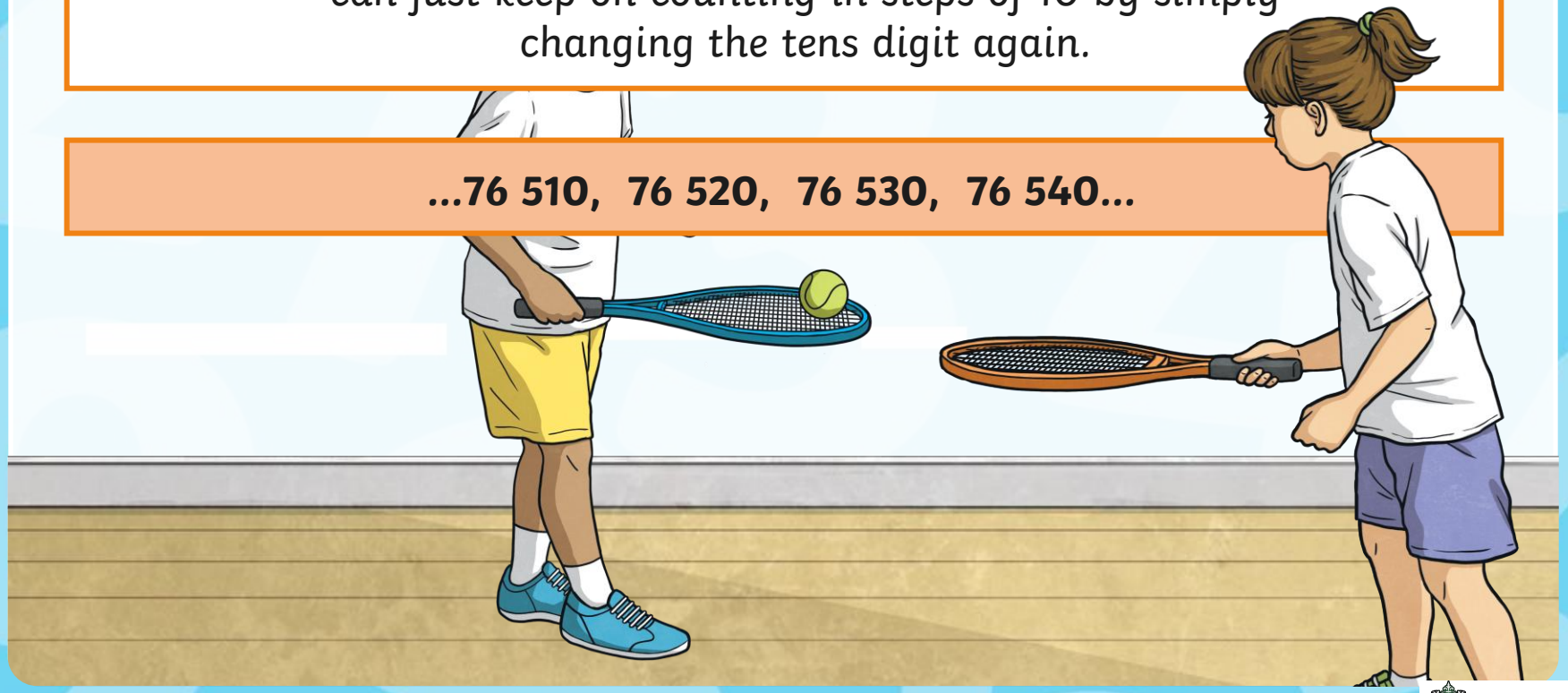
Forwards and Backwards

Whole Class

76 430, 76 440, 76 450, 76 460, 76 470, **76 480, 76 490, 76 500...**

Once we have crossed over into the next set of hundreds, we can just keep on counting in steps of 10 by simply changing the tens digit again.

...76 510, 76 520, 76 530, 76 540...



Forwards and Backwards

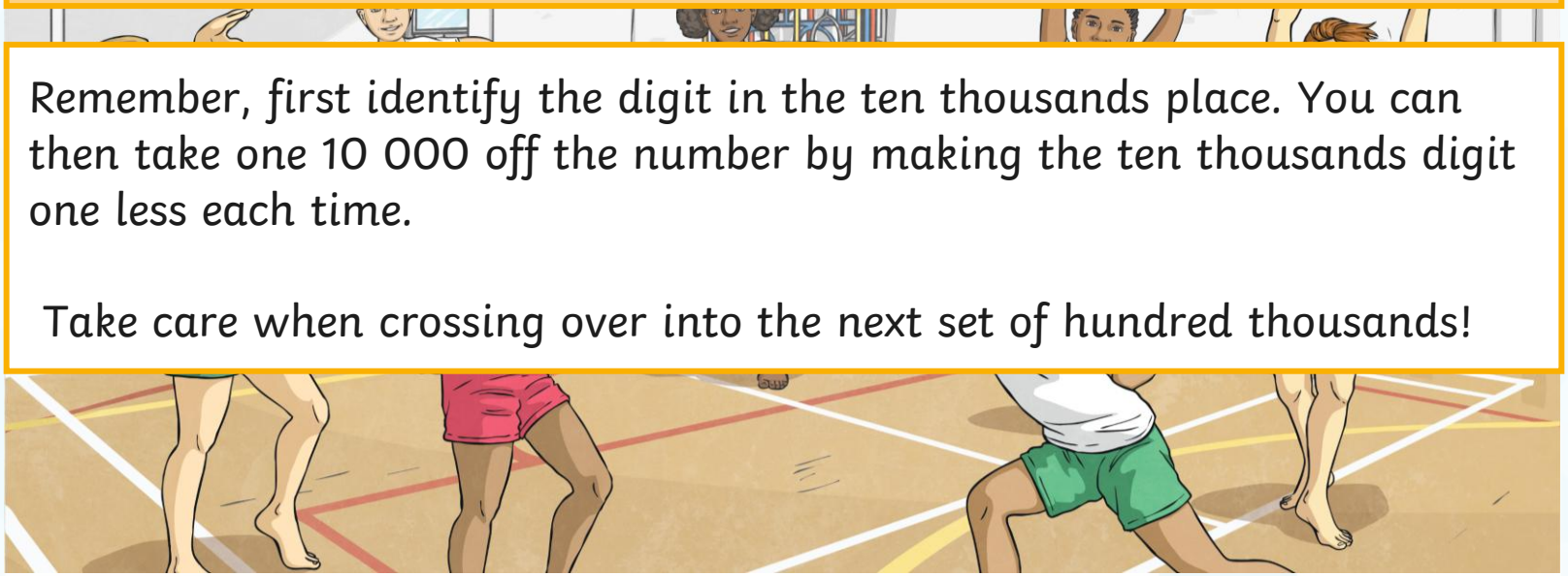
This process is just the same when we count backwards in steps of powers of 10.

Let's try this one:

Starting at 586 271, count backwards in steps of 10 000.

Remember, first identify the digit in the ten thousands place. You can then take one 10 000 off the number by making the ten thousands digit one less each time.

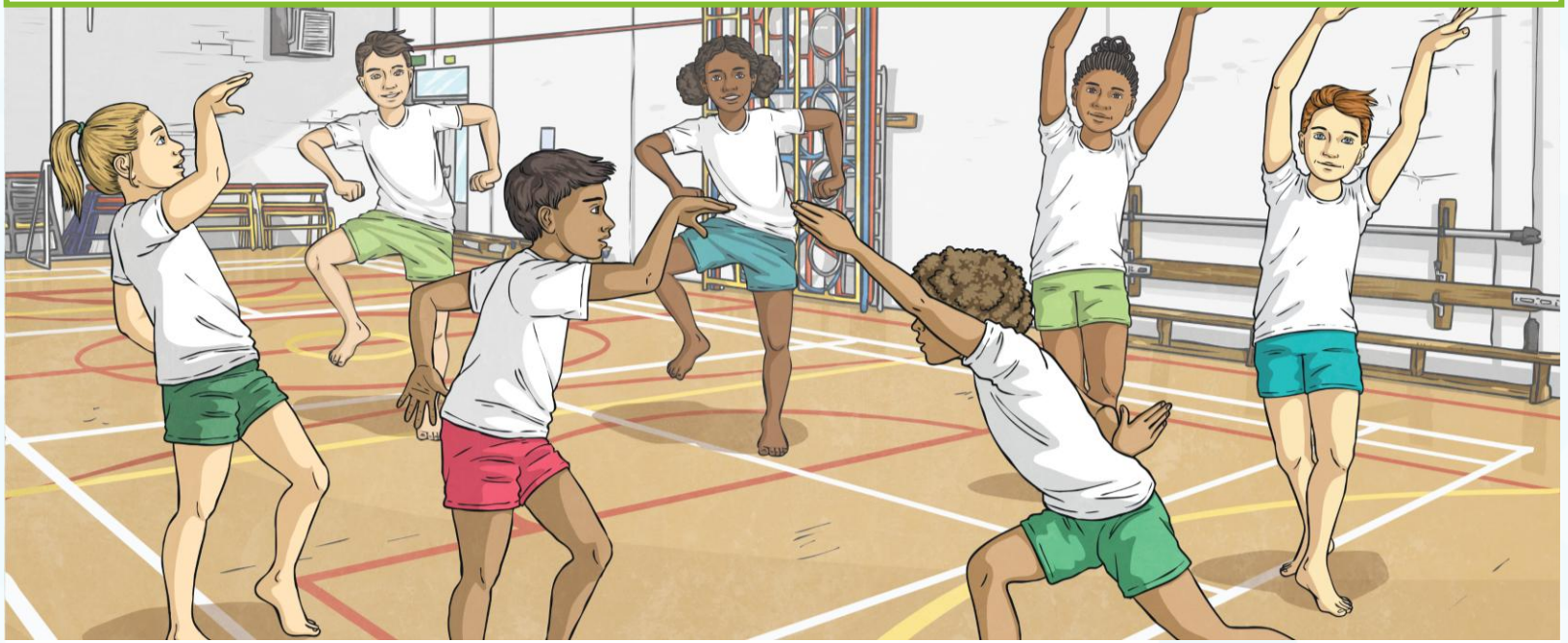
Take care when crossing over into the next set of hundred thousands!



Forwards and Backwards

How did you do?

5**8**6 271, 5**7**6 271, 5**6**6 271, 5**5**6 271, 5**4**6 271, 5**3**6 271,
5**2**6 271, 5**1**6 271, 5**0**6 271, **49**6 271, 4**8**6 271...



Which Power of 10?

Look at each of these sequences. Can you identify in which power of 10 each sequence is counting forwards or backwards?

5 784, 5 884, 5 984, 6 084, 6 184, 6 284...

234 681, 224 681, 214 681, 204 681, 194 681, 184 681...

89 635, 89 625, 89 615, 89 605, 89 595, 89 585, 89 575...

3 226 764, 3 326 764, 3 426 764, 3 526 764, 3 626 764, 3 726 764...

Which Power of 10?

Did you identify the correct direction and power of 10 for each sequence?

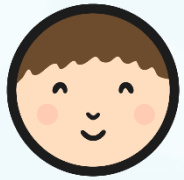
5 **7**84, 5 **8**84, 5 **9**84, **6 0**84, 6 **1**84, 6 **2**84…
Forwards in 100s.

2**3**4 681, 2**2**4 681, 2**1**4 681, 2**0**4 681, **19**4 681, 1**8**4 681…
Backwards in 10 000s.

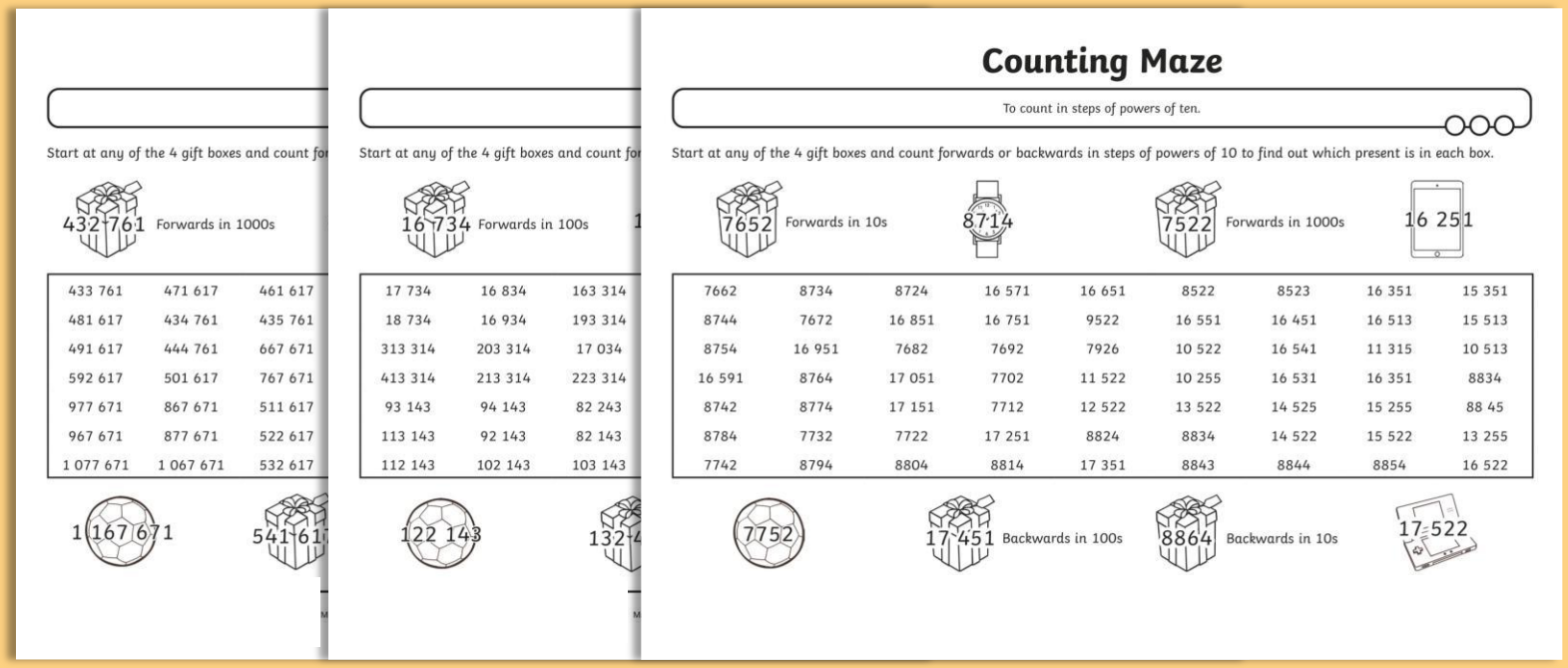
89 6**3**5, 89 6**2**5, 89 6**1**5, 89 6**0**5, 89 **59**5, 89 5**8**5, 89 5**7**5…
Backwards in 10s.

3 **2**26 764, 3 **3**26 764, 3 **4**26 764, 3 **5**26 764, 3 **6**26 764, 3 **7**26 764…
Forwards in 100 000s.

Counting Maze



Move through the maze on your **Counting Maze Activity Sheet** by counting forwards and backwards in steps of powers of 10.



Counting Maze

To count in steps of powers of ten.

Start at any of the 4 gift boxes and count forwards or backwards in steps of powers of 10 to find out which present is in each box.

7662	8734	8724	16 571	16 651	8522	8523	16 351	15 351
8744	7672	16 851	16 751	9522	16 551	16 451	16 513	15 513
8754	16 951	7682	7692	7926	10 522	16 541	11 315	10 513
16 591	8764	17 051	7702	11 522	10 255	16 531	16 351	8834
8742	8774	17 151	7712	12 522	13 522	14 525	15 255	88 45
8784	7732	7722	17 251	8824	8834	14 522	15 522	13 255
7742	8794	8804	8814	17 351	8843	8844	8854	16 522

7652 Forwards in 10s

8714

7522 Forwards in 1000s

16 251

7752

17 451 Backwards in 100s

8864 Backwards in 10s

17 522

Start at any of the 4 gift boxes and count for

16 734 Forwards in 100s

17 734	16 834	163 314
18 734	16 934	193 314
313 314	203 314	17 034
413 314	213 314	223 314
93 143	94 143	82 243
113 143	92 143	82 143
112 143	102 143	103 143

122 143

Start at any of the 4 gift boxes and count for

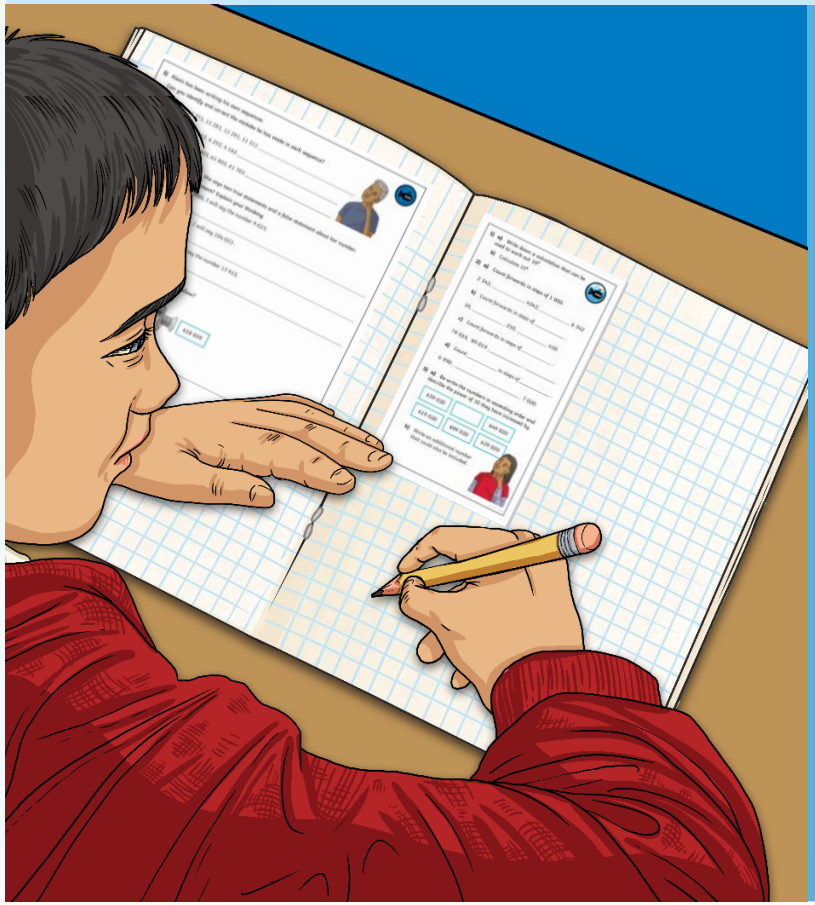
432 761 Forwards in 1000s

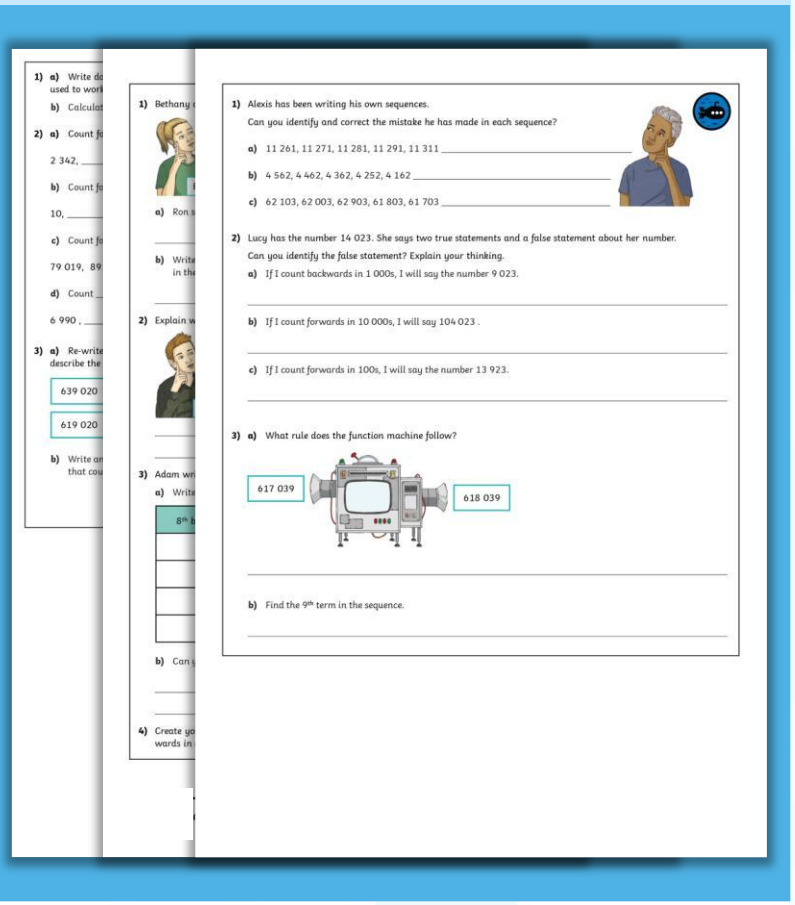
433 761	471 617	461 617
481 617	434 761	435 761
491 617	444 761	667 671
592 617	501 617	767 671
977 671	867 671	511 617
967 671	877 671	522 617
1 077 671	1 067 671	532 617

1 167 671

Diving into Mastery

Dive in by completing your own activity!





1) Alexis has been writing his own sequences.
Can you identify and correct the mistake he has made in each sequence?

a) 11 261, 11 271, 11 281, 11 291, 11 311 _____

b) 4 562, 4 462, 4 362, 4 252, 4 162 _____

c) 62 103, 62 003, 62 903, 61 803, 61 703 _____

2) Lucy has the number 14 023. She says two true statements and a false statement about her number.
Can you identify the false statement? Explain your thinking.

a) If I count backwards in 1 000s, I will say the number 9 023.

b) If I count forwards in 10 000s, I will say 104 023 .

c) If I count forwards in 100s, I will say the number 13 923.

3) a) What rule does the function machine follow?

617 039 → 618 039

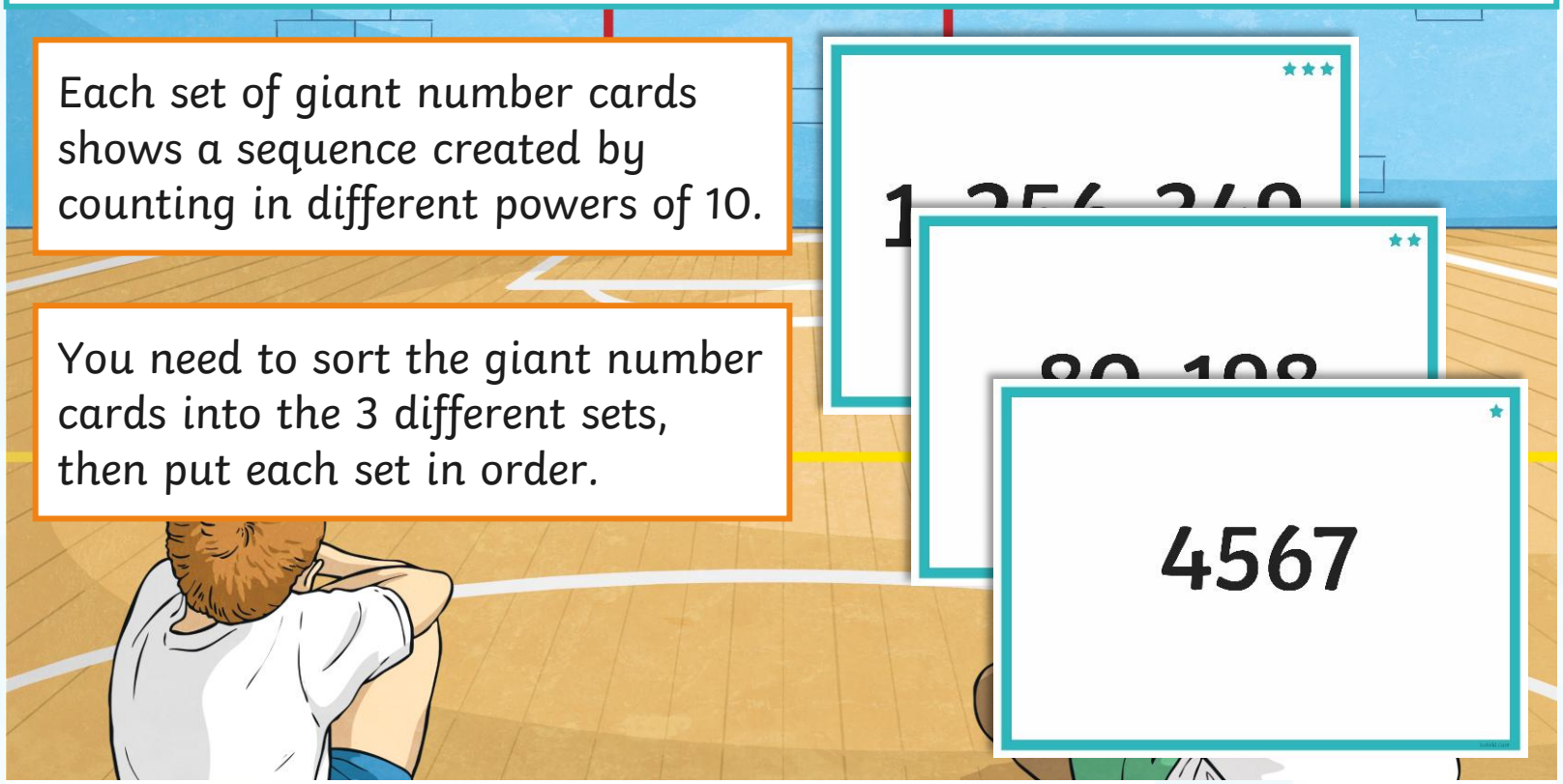
b) Find the 9th term in the sequence.

Giant Number Order

Your group has got 3 sets of **Giant Number Cards**.
Unfortunately, the 3 sets are all messed up!

Each set of giant number cards shows a sequence created by counting in different powers of 10.

You need to sort the giant number cards into the 3 different sets, then put each set in order.



Aim

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