

Year 6 Autumn 1

Unit 1: Place Value

Lesson 1: Identify, represent and partition numbers up to 10,000,000

Lesson Objectives:

Identify, represent and partition numbers up to 10,000,000, and understand equivalence between place value columns.

Lesson Focus:

Children build on their understanding of the base 10 number system by extending it into seven digits. The millions column will be introduced and related to the hundreds of thousands column. This will be done visually alongside the abstract representation of place value columns. Another important feature of this lesson is the patterning within the place value columns. Children will learn to appreciate that there is a repeating pattern of units, tens and hundreds. The first three whole number columns are units, tens and hundreds of ones – the base 10 representation is a one cube, so the unit is ones. The next three place value columns are units, tens and hundreds of thousands – the base 10 representation is a thousand cube, so the unit here is thousands. This repeating pattern of units, tens and hundreds continues into millions, billions, trillions and so on (though only units of millions in this lesson). The children will also appreciate the equivalence between place value columns e.g. 70,000 = 70 thousands or 700 hundreds or 7,000 tens etc.

Starter (No more than 10 minutes)

Count on in powers of ten from any number up to six-digits.

Show slide 1 of the SMART Notebook file and provide children with the resource sheet.

- *What number is written here?*

Twenty seven thousand four hundred and eighty-eight.

- *How do you write this number in the place value columns?*

Start in the tens of thousands (TTh) column with the digit 2 because this represents 20,000 and continue with each subsequent digit in the adjacent columns.

Write this in the top row of the table. Children to do this on their sheet.

Count on in hundreds from 27,488 down the table.

When the children have finished, model the answers on the slide for the children to check.

Ask:

- *When counting in hundreds, which digits: stay the same? Always change? Sometimes change?*

Agree that the tens and ones digits stay the same when counting in hundreds.

The hundreds digit always changes when counting in hundreds.

The thousands digit sometimes changes when counting in hundreds. The tens of thousands could also change.

Remove the screen shade and repeat for counting in thousands from 387,300

Agree that the digits representing columns less than the counting step stay the same. The digit of the counting step always changes. Digits representing columns greater than the counting step sometimes change.

Count on from 27,488 in hundreds					
HTh	TTh	Th	H	T	U

Initial Problem

Kim places one counter on a place value chart.
What could the value of the counter be?



millions		thousands			ones	
units of millions	hundreds of thousands	tens of thousands	units of thousands	hundreds	tens	units

Show slide 2 with the initial problem and ensure children have a place value chart and counters available.

Scaffold

What is the value of the counter if it is in the ones place?... tens? Etc.
What happens to the value as the counter moves from right to left?

Extension

How many of the previous column(s) would be equal to where the counter is now? 1 hundred = 10 tens or 100 ones

Misconception

Children may not understand the equivalence between different place value columns beyond those that are adjacent. If 10 tens is equal to 1 hundred, and 10 hundreds is equal to 1 thousand, then 100 tens must be equal to 1 thousand. One of the later slides will exemplify this.

Take feedback of children's responses. The Guided Learning will begin with a discussion of the base 10 equipment and what the representations for tens of thousands, hundreds of thousands and millions might look like as well as the relationships between place value columns.

Guided Learning 1

Show page 3 of the SMART Notebook file.

- *What can you see here?*

Base 10 equipment for hundreds, tens and ones/units.

- *What piece of base 10 equipment comes next? What column is this? Why?*

Thousands cube because ten hundreds is equal to 1 thousand.

Move the screen shade across to reveal the thousands cube.

- *What column is next? What would the base 10 equipment look like?*

Tens of thousands. It will be a 'stick' of ten one thousands cubes.

Move the screen shade to reveal this image.

- *What column is next? What would the base 10 equipment look like?*

Hundreds of thousands. It will be a 'flat square' of ten ten thousands 'sticks'.

Move the screen shade to reveal this image.

- *What column is next? What would the base 10 equipment look like?*

How do the previous images help?

Millions. It will be a cube of ten hundreds of thousands 'flat squares'.

Move the screen shade to reveal this image.

- *What patterns can you see in the place value columns?*

HTU repeats from the ones to the thousands.

- *What comes after/to the left of any 'hundreds' column? Ones or units column.*

- *What are the 'units' of the new column? Millions.*

Write U millions on the slide.

Show slide 4 with the seven place value columns and the counter.

- *What is the value of the counter? How do you know?*

1 because it is in the ones place.

Write 1 at the bottom of the ones column.

Move the counter into the tens column.

- *What is the value of the counter? How do you know?*

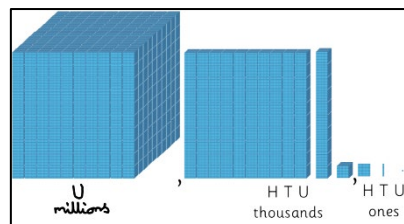
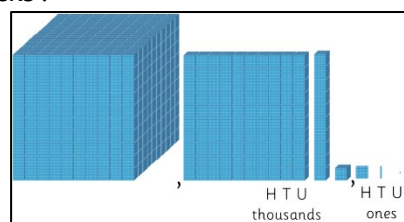
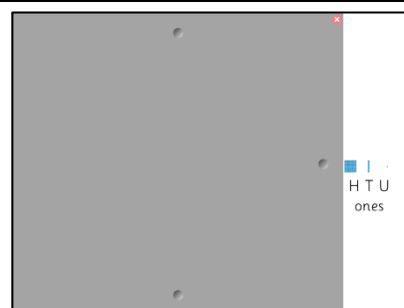
10 because it is in the tens place.

Rub out the 1 in the ones place and write 1 at the bottom of the tens column.

- *How many ones can you see? None so write 0 at the bottom of the ones column.*

Move the screen shade to the line between the ones and tens column.

There is 1 ten (indicate the digit 1 and the title of the column).



millions	thousands			ones		
units of millions	hundreds of thousands	tens of thousands	units of thousands	hundreds	tens	units
						●

millions	thousands			ones		
units of millions	hundreds of thousands	tens of thousands	units of thousands	hundreds	tens	units
					1	0

1 ten is equal to (move the screen shade back to the right) 10 ones (indicate the 10 written at the bottom and the title of the ones column).

Repeat for each column:

- move the counter and identify its value
- write the value in the spaces and the corresponding zeros
- move the screen shade to the boundary between the columns
- identify the equivalence between the columns.

For example, 100,000 = 10 ten thousands or 100 thousands or 1,000 hundreds or 10,000 tens or 100,000 ones.

Show slide 5.

- What number is shown here? Show me on your whiteboards.

2,416,373 Write this on the slide.

- How can the commas help us to say the number?

Two million (first comma), four hundred and sixteen thousand (second comma), three hundred and seventy-three.

Say it together, indicating the commas to help separate the millions, thousands and ones.

- What is the value of the digit 6? Six thousand.
- Which digit has a value of four hundred thousand? 4 in the hundreds of thousands column.
- What digit is in the millions place? What is its value? 2 is in the millions place and is worth two million.

Repeat with slide 6 where the number has zero as a place holder.

Slide 7 is available to provide further practice should the children need it.

Show slide 8 which gives the number in digits.

- What number is this? Two million, four hundred and fifteen thousand, four hundred and sixty-one.

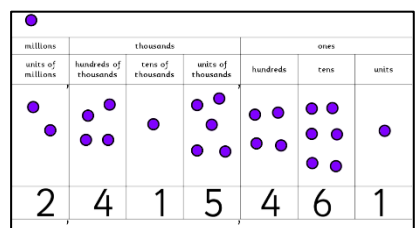
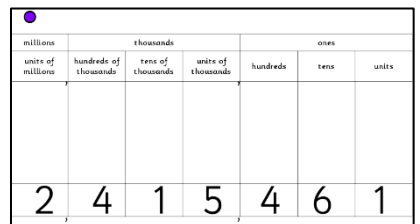
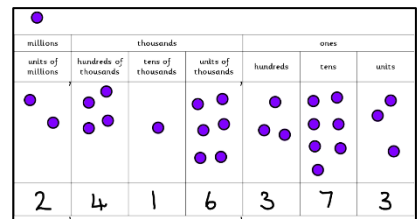
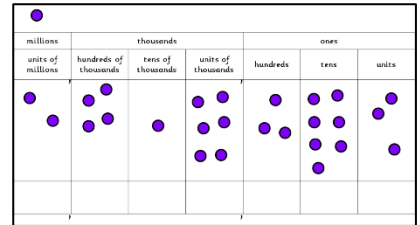
Make the number with counters on your place value charts.

Model on the slide once the children have shown it on their tables, counting in the correct step size as each counter is moved into position from the cloned purple counter at the top.

- What is the value of the two 4 digits? Four hundred thousand and four hundred.
- What digit is in the tens of thousands column and what is it worth? 1 and it is worth ten thousand.

Repeat with page 9 where the number has zero as a place holder.

Page 10 is available to provide further practice should the children need it.



Ask children to complete **Guided Learning Task 1** (fill in the blanks).

Guided Learning Task 1 (Write the number shown by the counters then fill in the blanks.)

a)

b) The digit 5 is in the place.

c) The digit is in the hundreds of thousands place.

d) The digit 4 has a value of .

e) The digit has a value of 60,000.

f) Write this number in words: 2,370,210

Children should use their own counters and chart if needed.

Extension:

- What seven-digit numbers can be made with only three place value counters? Find five different numbers.

Children may start with the largest number they can make which is 3,000,000 and then work systematically moving one counter into ever smaller place value columns: 2,100,000; 2,010,000; 2,001,000 etc.

For each number ask children to say it.

Show slide 12 and ask the children to work in pairs and identify/say the number shown.

Take answers and agree that the number is

Six million, one hundred and ninety three thousand, five hundred and eight. Say this together.

- *Make the number using your place value arrow cards.*

Check children's arrow cards before removing the screen shade to reveal them on the page.

- *What is the value of the digit 9? How can the arrow cards help?*

The digit 9 has a value of 90,000. Say this together.

Remove the 9 from the arrow cards to prove it.

Replace the 90,000 arrow card into the number and repeat with other digits.

Show slide 13 and read the question. Ensure children make the number using their arrow cards.

- *What is the number when these parts are combined?*

Seven million, eight hundred and one thousand, and eighty-four.

Say the number together, supporting children by indicating the commas indicating the separation between millions and thousands and thousands and ones.

Show page 14 with the part whole model.

- *What number will be created when these parts are combined?*

Children to show on their whiteboards (and use their arrow cards if necessary).

Agree that the number is **seven million, six hundred and eighty two thousand five hundred and thirty nine.**

Move the parts into the whole to check before reading the number together.

Repeat with the next slide in which the same number will be made but the parts are in a different order.

- *Which part should we put into the whole first?* The greatest value part: millions.

Repeat until the number is made.

- *What do you notice about this number?* It is the same as the previous page, but the parts were in a different order.

Repeat with slide 16 in which the number has 0 as a place holder.

Ask children to complete **Guided Learning Task 2** (represent the number in different ways).

Guided Learning Task 2 (Represent 5,402,611 using the arrow cards and counters in the chart.)

millions	thousands	ones				
units of millions	hundreds of thousands	tens of thousands	units of thousands	hundreds	tens	units
5	4	0	2	6	1	1

g)

h) What number is made from these parts?
 $2,000 + 7,000,000 + 600,000 + 5 =$

Children should use their own counters but only if needed.

Extension:

- *What is the smallest number of parts that a seven-digit number can have? Explain your thinking.*

This is to confirm that seven-digit numbers do not have to be composed of seven parts, unless all of the parts less than the millions place are represented by parts all worth zero.

millions	thousands	ones				
units of millions	hundreds of thousands	tens of thousands	units of thousands	hundreds	tens	units
6	1	9	3	5	0	8

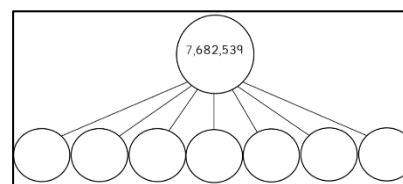
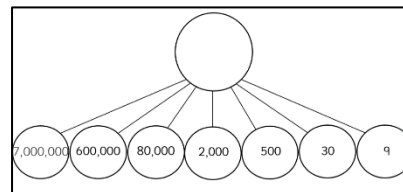
millions	thousands	ones				
units of millions	hundreds of thousands	tens of thousands	units of thousands	hundreds	tens	units
6	1	9	3	5	0	8
6,103,508						
90,000						

What number would be made by combining these parts?
Show it on your table using your resources.

80	7,000,000	
800,000		4
1,000		

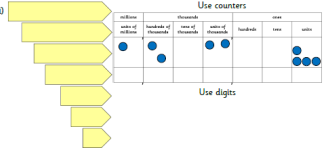
What number would be made by combining these parts?
Show it on your table using your resources.

7,801,084

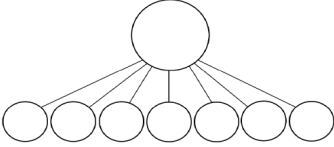


Independent Learning

Independent Learning Tasks
Change each representation so that it shows three million, two hundred and six thousand one hundred and forty-seven.

0 

j) Partition 8,490,240 using the part-whole diagram.



Fill in the blanks to make the equations correct:

k) $3,000 + 2,000,000 + 90,000 + 5 + 700 = \underline{\hspace{2cm}}$
 $0 \dots 5 \dots 0, 1 \dots = 80 + 3,000,000 + 60,000 + \dots + \dots$

m) Write three different 7-digit numbers you can make with 10 counters on place value columns.

The first question combines elements from both Guided Learning parts. The initial number is written using words with a blank starting point for the arrow cards and the place value chart for numerals. The place value chart for counters is partially completed with children having to complete it. The number also has zero as a place holder, so one of the arrow cards could be left blank.

In question j, the representation is the part-whole model, again with zero as a place holder but in two places.

Question k is purely abstract with the parts not in the correct order. Question l is similar although elements of the whole number and the parts need to be identified.

Question m requires different reasoning, where 10 counters are used to make three different seven-digit numbers. This requires children to understand that at least one counter must be used in the millions column for each number.

Deeper Learning

Show page 20 of the SMART Notebook file and read the instruction. The intention of the question is for children to identify from the clues the digits that are certain and the possibilities for the other digits. The first clue to look at is that ☆ sums to 14 so b must be 2

☆ is **2,222,222**

△ is a multiple of 5 so d must be 5

* sums to 22. If b is 2 and d is 5, then a and c must be 3 and 4 or 4 and 3 so e must be 1

⊕ is the greatest and has a in the greatest place value column so a must be 4 and c must be 3

⊕ is **4,421,453**

△ is **4,235,115**

□ is **2,122,222**

* is **4,421,353**

In the 7-digit numbers below the letters a to e stand for the digits 1 to 5. Use the clues to work out each number.

- ⊕ a,abe,adc
- ☆ b,bbb,bbb
- △ a,bcd,eed
- b,ebb,bbb
- * a,abe,cde

- ☆ and □ have a difference of 100,000
- ⊕ is the greatest
- △ is a multiple of 5
- ☆ sums to 14
- * sums to 22

Key Outcomes

Children understand the equivalence between place value columns.

Children can identify and represent seven-digit numbers using counters, a place value chart, the part-whole model and arrow cards.

Resources

Starter task sheet (one per child).

Counters.

Place value chart.

Arrow cards.

Children's task sheets.