

Year 6 Autumn 1

Unit 1: Place Value

Lesson 7: Find 0.001, 0.01, 0.1, 1, 10, 100, 1,000, 10,000 and 100,000 more or less than a given number up to 10,000,000

Lesson Objectives:

Find powers of 10 more and less.

Lesson Focus:

This lesson revisits previous learning in the unit around identifying numbers represented in different ways and exchange when finding different powers of 10 more and less. Children will represent numbers using counters on a place value chart as well as abstract numerals. From these representations, they will recognise the value of each digit and then be able to identify powers of 10 more and less. They will apply their understanding of the base 10 number system for when exchange or regrouping is required. The children will recognise which digits always change, which digits always stay the same and which digits might change when increasing/decreasing a number by a power of 10. This lesson leads into the next lesson on describing and extending number sequences.

Starter (No more than 10 minutes)

Multiply whole numbers and numbers with up to three decimal places by 10, 100 or 1,000

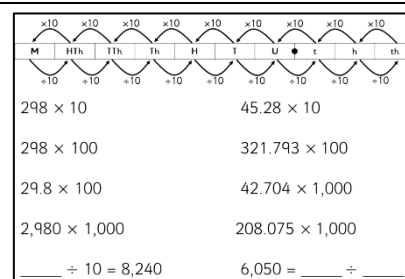
Show page 1 of the SMART Notebook file.

- *What does the diagram show at the top?*

That the place value column to the left of any is 10 times greater in value. That the place value column to the right of any is one tenth the value.

Ask children to work down the left-hand calculations, writing their answers on their whiteboards. Mark these together (addressing any issues) before asking the children to complete the calculations on the right on their whiteboards.

Children may need reminding/showing that multiplying by 1,000 is the same as multiplying by 10 then by ten again (equivalent to $\times 100$) then multiplying by 10 again because ten 100s is equal to 1,000.



Initial Problem

Show page 2 of the SMART Notebook file with the initial problem. Read the prompts and question together.

Kim's number is 100 less than Ben's number.
Ali's number is 100,000 more than Tom's number.
Ben's number is 10,000 less than Ali's number.
Tom's number is 1 more than 599,999

What is each child's number?



Take feedback of children's responses and encourage children to identify that exchange is needed. The Guided Learning will explain this.

Scaffold

Whose number can you work out first? Tom's number

What is Tom's number? 600,000

Whose number is related to Tom's? Ali's number is 100,000 more than Tom's number.

Etc.

Extension

If the relationships between the numbers stayed the same and Ali's number was 809,010, what would the numbers for the other children be?

Misconception/lack of fluency

Setting up 599,999 using place value counters on the ten frame place value chart can effectively illustrate that by adding 1, a group of 10 ones is made which can be exchanged for one 10. This makes a group of 10 tens and so on.

Guided Learning

Show page 3 of the SMART Notebook file which is the Initial Problem with a table to help organise the thinking.

- *What number is given in the problem?* 599,999

Write this in the top row of the table.

- *Whose number can be easily worked out?* Tom's because it is 1 more than 599,999 which is 600,000

Move the screen shade down to reveal the next row with a picture of Tom on the left.

If necessary, ask children to make 599,999 using counters on their ten frame place value charts and then add 1 to the ones ten frame and work through the exchanges to complete the number.

Write 600,000 in the row showing Tom's number.

- *Whose number can we identify next? How do you know?* Ali's number is 100,000 more than Tom's number.

- *What is Ali's number?* 100,000 more than 600,000 is 700,000

Again, if necessary use the counters on the children's place value charts to illustrate this.

Write 700,000 in the row showing Ali's number.

- *Whose number can we identify next? How do you know?* Ben's number is 10,000 less than Ali's number.

- *What is Ben's number?* 10,000 less than 700,000 is 690,000

Again, if necessary use the counters on the children's place value charts to illustrate this.

Write 690,000 in the row showing Ben's number.

- *How is Kim's number related to anyone else's?* Kim's number is 100 less than Ben's number. Ben's number is 690,000 so Kim's number must be 689,900

Again, if necessary use the counters on the children's place value charts to illustrate this.

Write 689,900 in the row showing Kim's number.

Kim's number is 100 less than Ben's number.
 Ali's number is 100,000 more than Tom's number.
 Ben's number is 10,000 less than Ali's number.
 Tom's number is 1 more than 599,999

hundreds of thousands	tens of thousands	thousands	hundreds	tens	ones

Kim's number is 100 less than Ben's number.
 Ali's number is 100,000 more than Tom's number.
 Ben's number is 10,000 less than Ali's number.
 Tom's number is 1 more than 599,999

hundreds of thousands	tens of thousands	thousands	hundreds	tens	ones
5	9	9	9	9	9
6	0	0	0	0	0
7	0	0	0	0	0
6	9	0	0	0	0
6	8	9	9	0	0

millions	hundreds of thousands	thousands	units of thousands	hundreds	ones
units of millions					units
•	•••••	•••		••••	•••

What number is represented here?
 Write it on your place value chart.

millions	hundreds of thousands	thousands	units of thousands	hundreds	ones
units of millions					units
•	•••••	•••		••••	•••
2	9	4	0	5	2 4

What number is represented here?
 Write it on your place value chart.

What number is 10,000 more?

Show page 4 of the teaching tool.

Read the question and instruction.

Check that children have written the number correctly before asking some children to say it before saying it together as a class.

Write the number on the page.

Move the screen shade down to reveal the first question:

- *What is 10,000 more?*

Children to show on their place value charts or whiteboards.

Move the counter next to the question into the correct place in the chart to illustrate that the new number is 2,940,524 and change the number written.

- *What digit changed?* Tens of thousands digit changed.

- *What digits stayed the same?* All the other digits stayed the same.

Change the number back to the original by removing the extra 10,000 counter and changing the digit 4 back to 3.

Remove the screen shade to reveal the next question.

- *What number is 100 less?*

Children to show on their place value charts or whiteboards.

Remove one of the hundreds counters to illustrate that the new number is 2,930,424 and change the number written.

- *What digit changed?* Hundreds digit changed.

- *What digits stayed the same?* All the other digits stayed the same.

Repeat this modelling for slide 5.

Slide 5 requires exchange of 10 hundreds of thousands for 1 million and also 1 tens of thousands for 10 thousands.

- If we add one more counter into the hundreds of thousands place, how many hundreds of thousands will there be? There will be 10 hundreds of thousands.

- What can 10 hundreds of thousands be exchanged for? 10 hundreds of thousands is equal to 1 million.

- Write on your whiteboard the number that is 100,000 more than this number?

Agree that the answer is 3,030,524 and model moving the 9 counters out into the space on the slide next to the counter by the question, thereby showing ten counters together.

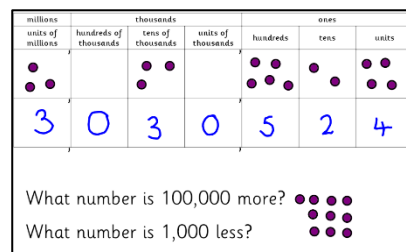
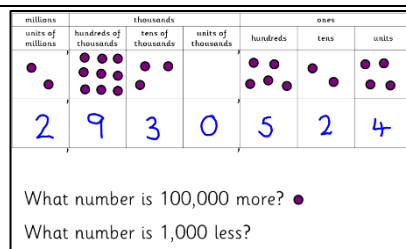
- What are these 10 hundreds of thousands counters equal to? 1 million.

Move a new counter from the original counter by the question to show 3 counters in the millions place.

Erase the 2 and 9 digits and write the correct digits to show the number represented.

- What digits changed? Hundreds of thousands and millions digits changed.

- What digits stayed the same? All the other digits stayed the same.



Change the number back to the original 2,930,524 by changing the digits and moving the 9 counters back into the hundreds of thousands place.

- What number is 1,000 less? How can you remove 1,000 when there are no thousands in that place?

Discuss and agree that 1 ten thousand needs to be exchanged for 10 thousands in order for 1 thousand to be removed/subtracted.

- What number is 1,000 less than 2,930,524? Show me on your whiteboards.

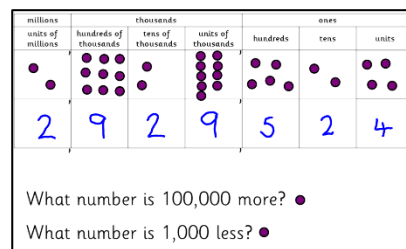
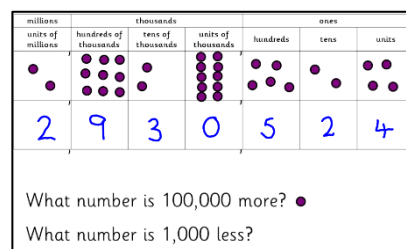
Share answers and then model on the board exchanging 1 ten thousand by moving one of these counters into the thousands place. Add to this using the counter next to the first question until there are 10 counters in the thousands place.

- Have we subtracted 1,000 yet? No, we have just exchanged.

Move one of these counters out of the chart into the space next to the second question.

- What number is now shown? 2,929,524

Change the relevant digits to show the new number.



Repeat this modelling for page 6.

Page 7 is set up if more practice is required.

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

Guided Learning Task 1 (Fill in the blanks.)

a) What number is here? (Write it in the place value chart below the counters.)

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

b) What number is 100 more? _____

c) What number is 1,000 less? _____

d) What number is 100,000 more? _____

e) What number is here? (Write it in the place value chart below the counters.)

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

f) What number is 1 more? _____

g) What number is 10,000 less? _____

h) What number is 1,000,000 less? _____

Children should use their place value counters and chart for as long as they need in this task.

Circulate and support as necessary.

Extension:

- 10,000 less than a number is 499,205. What is the number?

Explain how you worked it out.

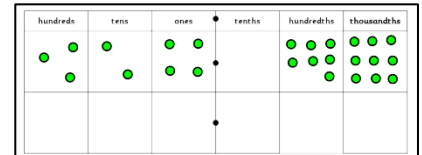
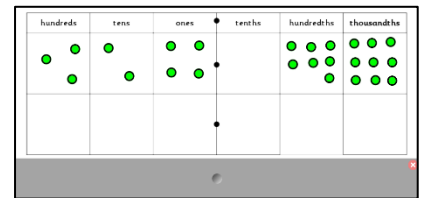
Guided Learning 2 replicates the modelling of Guided Learning 1 but with numbers involving three decimal places.

Show page 9.

- *What is different about this place value chart?* It involves decimals. Use the same approach for these examples, with the children modelling on their place value charts on their tables and modelling on the whiteboard.

This time, there are no counters to use for exchange as children should be encouraged to identify how the digits change without being reliant on the counters.

Repeat for slide 10, and slide 11 is available for further practice if necessary.



What number is represented here?

Write it on your place value chart.

What number is $\frac{1}{100}$ more?

What number is 0.001 more?

What number is 0.1 less?

Ask children to complete **Guided Learning Task 2** (fill in the blanks).

Guided Learning Task 2 (Fill in the blanks.)

3) What number is here? (Write it in the place value chart below the counters.)

4) What number is 0.01 more?

5) What number is $\frac{1}{1000}$ less?

6) What number is one tenth less?

Circulate and support as necessary.

Extension:

- Find three different ways to create the answer of 30.099 by adding or subtracting a different power of 10 (tens, ones, tenths, hundredths, thousandths).

Independent Learning

Independent Learning Tasks

Use this as the starting number for questions m to p.

hundreds	tens	ones	tenths	hundredths	thousandths
4	7	0	2	9	3

m) What number is 1,000,000 less? _____

n) What number is 1,000 more? _____

o) What number is 100 more? _____

p) What number is 10,000 less? _____

Use this as the starting number for questions q to t.

hundreds	tens	ones	tenths	hundredths	thousandths
2	8	0	0	8	9

q) What number is 10 less? _____

r) What number is $\frac{1}{100}$ more? _____

s) What number is 0.001 more? _____

t) What number is one tenth less? _____

u) 1,664,500 is 10,000 more than _____

v) 14,769 is 0.001 less than _____

w) Complete the table

		+100 →	
-0.001 ↓	892.331	992.331	
	892.330		1,042.330

The first four questions replicate Guided Task 1, with question q to t being based on Guided Learning 2.

Variation is provided through questions initially not requiring exchange then exchange being necessary, and also numbers being represented in numerals, words and as fractions.

Questions u and v require inverse thinking.

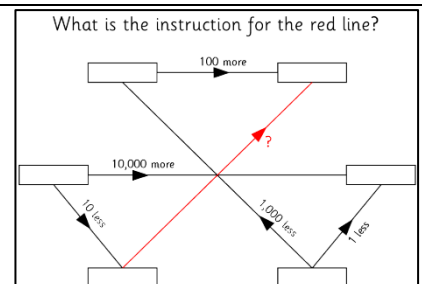
Question w is a previous test question where children need to interpret the table and apply their knowledge of adding (and subtracting) the powers of 10 shown in the table.

Deeper Learning

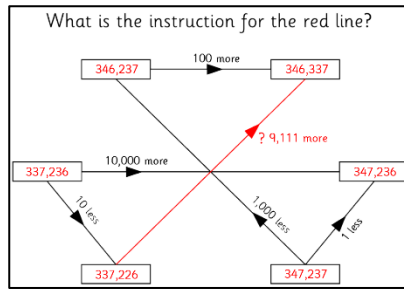
This problem is very open with only limited information provided. It is likely that children will need to start by placing a 5 or 6 digit number in any of the empty boxes and following the instructions to work out the numbers in the other boxes. As the arrows on the lines show the relationship of the two numbers according to the instruction, children will also need to use the inverse of the instructions in some cases.

Once the numbers have been completed for each empty box then the relationship between the two numbers joined by the red line can be deduced by finding the difference between them.

The direction of the arrow points to the greater number of the two and therefore illustrates an instruction involving the word 'more'.



An example is here:



Key Outcomes

Children can find powers of 10 more and less than given numbers.

Resources

Starter Task Sheet (optional)

Ten frame place value chart (optional)

Whiteboards and pens

Place value charts

Children's task sheets copied (one per child)