Supporting Year 7 Learners Experiencing Difficulties with Mathematics

Guidance Handbook

Contents

Introduction

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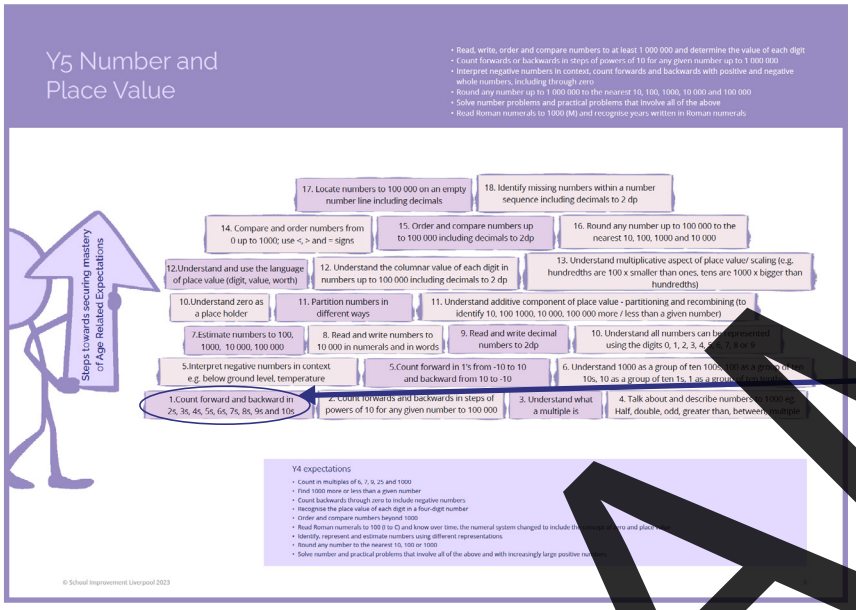
The Mathematics Research Review by Ofsted in 2021 highlighted the wide attainment gap between low and high achievers in England, and the Mathematics Subject Report in 2023 states that whilst there have been ***'notable improvements in mathematics education in recent years… pupils who are learning mathematics more slowly than their peers frequently receive a mathematics education that does not meet their needs'.***

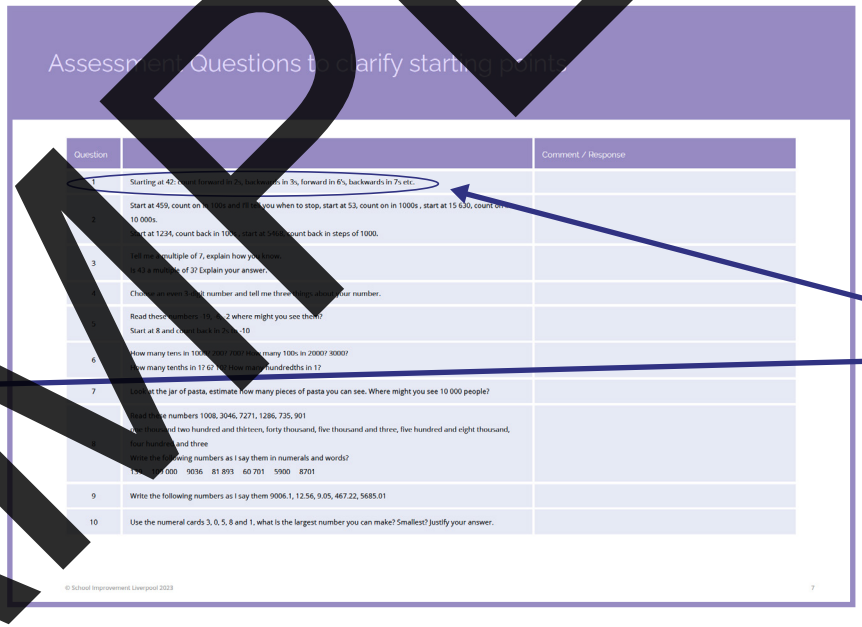
The mathematics national curriculum states, ***'Decisions about progression should be based on the security of pupils' understanding and their readiness to progress to the next stage. Those who are not sufficiently fluent should consolidate their understanding, including through additional practice, before moving on'.***

This support package contains SIL resources organised to support diagnostic assessment of place value, accurate identification of gaps in prior learning and ideas for pre-teaching or intervention to enable learners to secure the knowledge and understanding needed to progress to the next stage.

The materials were developed to support learners to meet the '***Ready to Progress***' Criteria detailed in the 2020 DfE Mathematical Guidance from the DfE and the National Centre for Excellence in Teaching Mathematics (NCETM). This resource also contains links to related free Y7 ***Checkpoint*** materials produced by the NCETM.

This guidance also includes the Y3 - Y6 steps towards mastery of place value and linked diagnostic assessment materials from our '[Planning for Deep Learning- Securing the Small Steps needed for Mastery in Maths]' document.





Question 1 refers to the learning intention in Step 1.

In this example, if the majority of children are unable to count forwards and backwards in certain steps, then this would inform planning for the whole class. If a small number of children are struggling with this concept, then this could inform pre-teaching or intervention.

Please note that whilst the steps are not necessarily hierarchical, there is an expectation that the earlier steps are secured first.

Supporting Understanding of Place Value

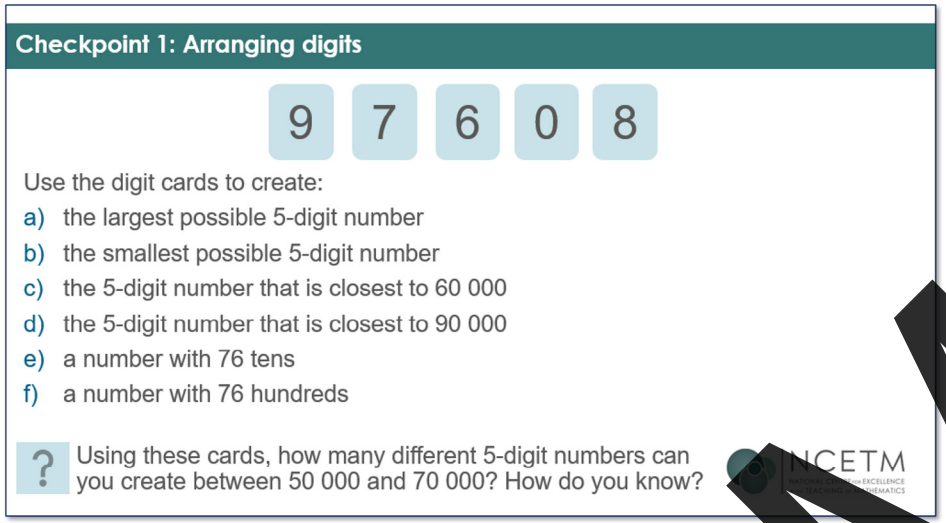
The NCETM has produced diagnostic classroom activities called ***'Checkpoints'*** to support the assessment of your students' progress towards the end of Key Stage 3 expectations.

Understanding place value in integers:

In Key Stage 3, pupils need to be able to:

- Be able to say any number and understand where it fits in the number system, i.e. an ordered list of numbers and on a number line.
- Know the general structure of the place-value system is based on powers of ten and begin to see how this naturally extends to decimals.
- Progress beyond recalling place-value column headings when answering questions, such as, 'What does the 8 represent in 43 872?', appreciating that 43 872 has 438 hundreds and, later, that 43 872 is, in fact, 438.72 hundreds or 438.72 × 100.
- Have a deep understanding of place value to understand two further ideas developed in Key Stage 3 which require rounding to a number of decimal places or significant figures and interpreting and writing numbers in standard form.

Securing Progression in Place Value



Checkpoint 1: Arranging digits

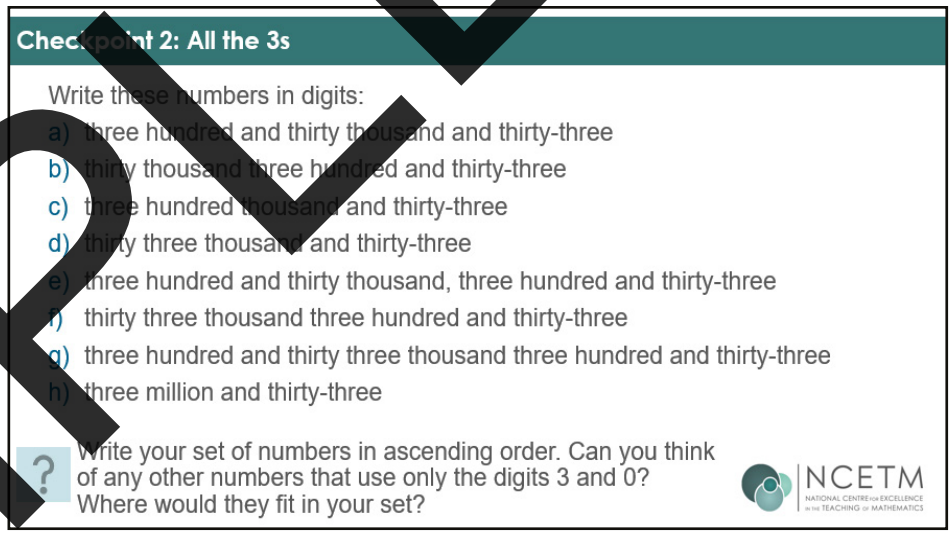
9 7 6 0 8

Use the digit cards to create:

a) the largest possible 5-digit number
b) the smallest possible 5-digit number
c) the 5-digit number that is closest to 60 000
d) the 5-digit number that is closest to 90 000
e) a number with 76 tens
f) a number with 76 hundreds

? Using these cards, how many different 5-digit numbers can you create between 50 000 and 70 000? How do you know?

NCETM



Checkpoint 2: All the 3s

Write these numbers in digits:

a) three hundred and thirty thousand and thirty-three
b) thirty thousand three hundred and thirty-three
c) three hundred thousand and thirty-three
d) thirty three thousand and thirty-three
e) three hundred and thirty thousand, three hundred and thirty-three
f) thirty three thousand three hundred and thirty-three
g) three hundred and thirty three thousand three hundred and thirty-three
h) three million and thirty-three

? Write your set of numbers in ascending order. Can you think of any other numbers that use only the digits 3 and 0? Where would they fit in your set?

NCETM

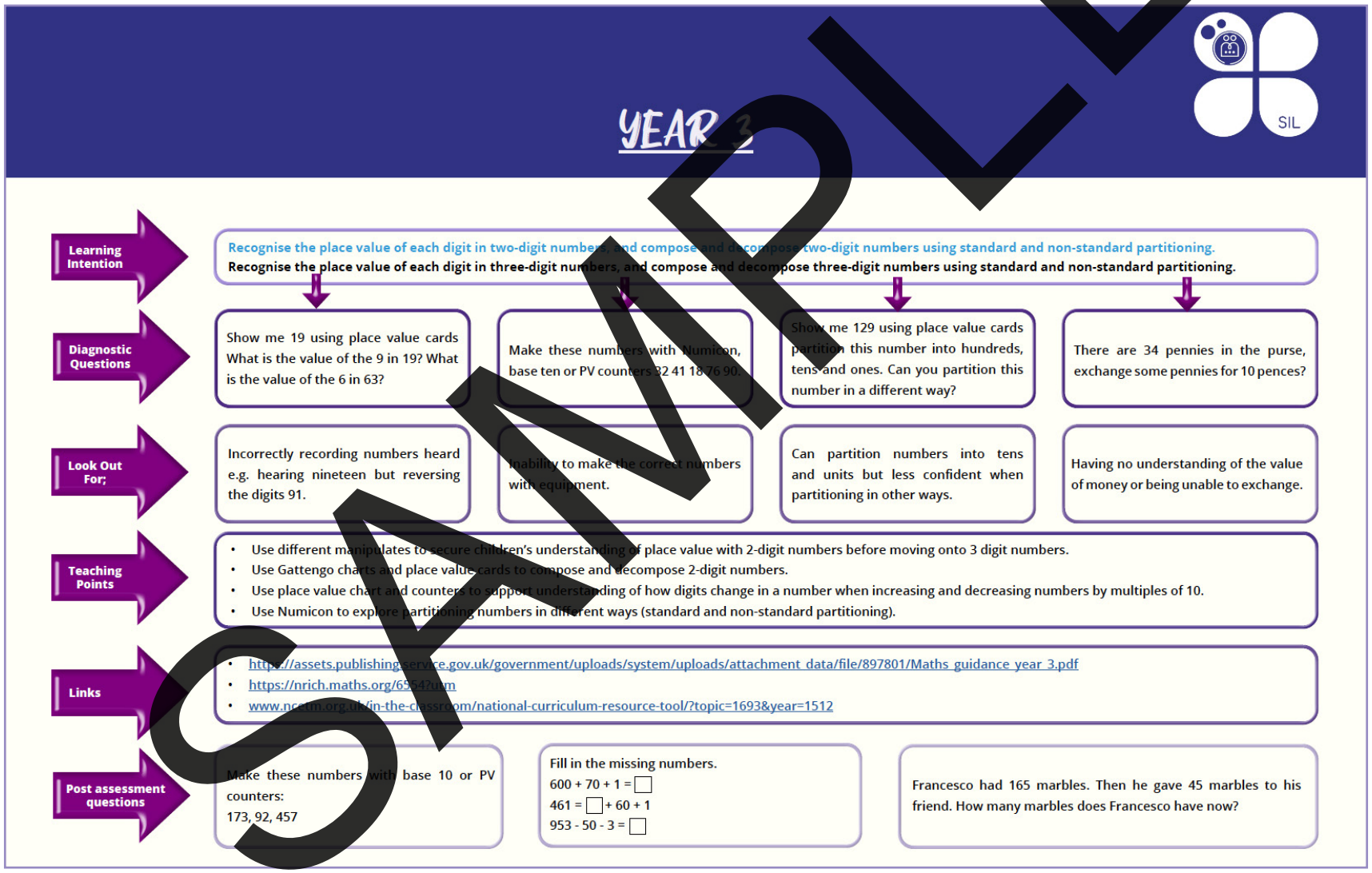
Do the checkpoints reveal your students are experiencing difficulties meeting these expectations?

Use our diagnostic assessments to help you to establish their level of understanding of prior learning and identify misconceptions.

Use the related intervention session, which provides structured, targeted support to help learners overcome these misconceptions.

Can pupils recognise the place value of each digit in a 3-digit number?

Y3 Diagnostic Assessment 2



Year 3: Session 2b

- **Recognise the place value of each digit in three-digit numbers, and compose and decompose three-digit numbers.**

What you need:

Counting objects, ten frames, place value counters, place value chart, place value cards, counting hoop, measuring stick, number lines

Key Vocabulary

Value, worth, digit, hundred, tens, ones, column, 10x greater than/smaller than, more than/less than, most/least, equal to, in between, multiples

Sentence Stems

The digit in the hundreds place is … It has a value of …
The digit in the tens place is … It has a value of …
The digit in the ones place is … It has a value of …

Let's Count

- Count forwards and backwards in multiples of 10 using a number line, counting hoop, measuring stick etc from different starting points.

Focus task

- Make these numbers with base 10 or PV counters: 173, 92, 457 – explain how you have made them.
- Represent the number 342 using place value counters and a part-part-whole model.
- What digit is in the tens place? What is the value of the hundreds digit?
- What does the 2 represent?
- Solve calculations relating to subtraction of any single place-value part from the whole number e.g. 542 – 40 =, 486 – 400 = , 721 – 1 =
- Solve problems in context e.g. There are 365 days in a year. If it rains on 65 days of the year, on how many days does it not rain?
- Frank had 165 marbles. Then he gave 105 marbles to his friend. How many marbles does Frank have now?

Application

Largest value
Use a deck of cards, select 3
Whoever has the largest value wins the point!
(Can be changed to lowest value/ odd number/ even/ greater than/less than/ rounded to)

Take Home

Place value number hunt
Find the numbers around your home (TIP: look at food packets, magazines…)

Category	3 digit number	Where you found it
A number with a 3 ones		
A number with all odd digits		
A number with a 5 hundreds		
A number with 2 even digits		
A number with 9 in the tens column		
A number whose digits add up to 9		
A number with 0 in the tens column		
A number that is less than 200		
A number that is greater than 800		
A number whose digits add up to 3		

Do pupils know that 10 tenths are equivalent/the same as 1 one and that 1 is 10 times the size of 0.1, 100 hundredths are equivalent to 1 one, and that 1 is 100 times the size of 0.01, 10 hundredths are equivalent to 1 tenth, and that 0.1 is 10 times the size of 0.01?

Y5 Diagnostic Assessment 1

YEAR 5

Learning Intention

Explore the multiplicative relationship between adjacent place value positions:
Know that 10 tenths are equivalent/the same as 1 one and that 1 is 10 times the size of 0.1, Know that 100 hundredths are equivalent to 1 one, and that 1 is 100 times the size of 0.01, Know that 10 hundredths are equivalent to 1 tenth, and that 0.1 is 10 times the size of 0.01
Know 10 hundreds are equivalent to 1 thousand and 1000 is 10 times the size of 100

Diagnostic Questions

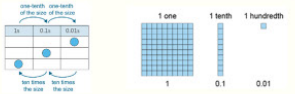
- How many tens in 160? How many hundreds in 3430?
- How many tenths in 2? How do you know? How many tenths in 1.8? 3.6?
- Starting at zero, count on in tenths
- My school field is 100m long. How many times do I have to run its length to run 3km?
- How many 10ps in £3.20?

Look Out For;

- Children saying how many are in the tens/ hundreds column? E.g. 6 tens in 160, 4 hundreds in 3430
- Children unsure that tenths can be found in whole numbers saying how many are in the tenths column, e.g. 8 tenths in 1.8
- Children saying '....0.8, 0.9. 0.10'.
- Unsure of the relationship between m and km.
- Children unsure how many 10ps in a pound, the connection between tenths and hundredths in a money context

Teaching Points

- Reinforce relationship between adjacent place value positions, the value of a given digit is made 10 times the size if it is moved 1 position to left, and is made one tenth times the size if it is moved 1 position to the right
- Use representations to show when one is divided into ten equal parts, each part is one tenth of the whole, when one is divided into 100 equal parts, each part is one hundredth
- Tenths and hundredths can be expressed as decimal fractions, the number 0.1 is one tenth, 0.01 is one hundredth
- Use manipulatives / representations to count in tenths up to and beyond one.



Links

- NCETM: 1.22 Composition and calculation: 1,000 and four-digit numbers
- 1.23 Composition and calculation: tenths
- https://mathsbot.com/manipulatives/blocks
- https://thirdspacelearning.com/blog/ks1-ks2-place-value-games/
- White Rose
- NRICH

Post assessment questions

Fill in the missing numbers.
$0.01 \times \square = 1$ $0.1 \times \square = 1$ $0.01 \times \square = 0.1$

An apple weighs about 0.1kg. Approximately how many apples are there in a 1.8kg bag?

Colour in 1.6 litres of juice.

Year 5: Session 1a

- **Understand the relationship between adjacent place-value positions; the value of a given digit is made 10 times the size if it is moved 1 position to left, and is made one tenth times the size if it is moved 1 position to the right**
- **Know 10 hundreds are equivalent to 1 thousand and 1000 is 10 times the size of 100**

What you need:

Ten frames, place value counters, base ten, place value chart, place value cards, dice, cards labelled 1s, 10s, 100s and 1000s

Key Vocabulary

Value, worth, digit, thousands, hundreds, tens, ones, equivalent

Sentence Stems

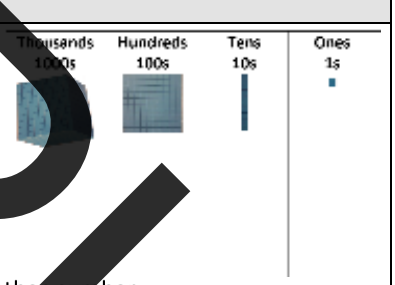
'10 hundreds are equivalent to 1 thousand' "10 hundreds is equal to 1 thousand."
18 hundreds is equal to 10 hundreds and 8 more hundreds." "10 hundreds is equal to 1,000." "So, 18 hundreds is equal to 1,000 and 8 more hundreds, which is 1,800."
"1000 is 10 times the size of 100." "1,800 is 10 times the size of 180." "180 is one tenth the size of 1800"

Let's Count

Use place value counters and a ten frame to practise counting in steps of 100, what happens when the ten frame is full? How many pv counters did you count? What do you know? Count 4 more counters onto another ten frame, how much do you have now? (1400) How many hundreds in 1400? Count backwards in steps of 100 from 1800, to zero, how many steps altogether?

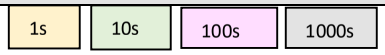
Focus Task

Use a place value chart to illustrate the columnar values of each digit and the relationships between the columns. State a relationship between 2 columns and show with base ten, e.g. 1 hundred is ten times the size of ten, ask children to take turns to state a relationship. Use base ten to make a number, e.g. 340 'How many tens are in this number?' Reinforce how many tens are in each 100 to prove there are 34 altogether. 'What happens if we make 340 ten times as big?' Model with base ten on place value chart, discuss what has happened to each digit: they have moved 1 position to the left and are now 'ten times as big' Ask questions about the number, e.g. 'How many hundreds are in this number?' 'How many tens?' 'How many ones?' Repeat with another number.



Application

Give each child a card: In



the factory, stickers are packed individually, packs of 10, 100 and 1000.
If there are 4128 stickers, ask each child to say how many packs would they receive. Each Child A would receive 4128 individual stickers, Child B would receive 412 packs of 10 stickers, Child C would receive 41 packs of 100 and Child D would receive 4 packs of 1000. Ask children to give answers using given sentence stem, e.g. 'I would receive __ packs as there are __ tens in ____'. Repeat with other numbers

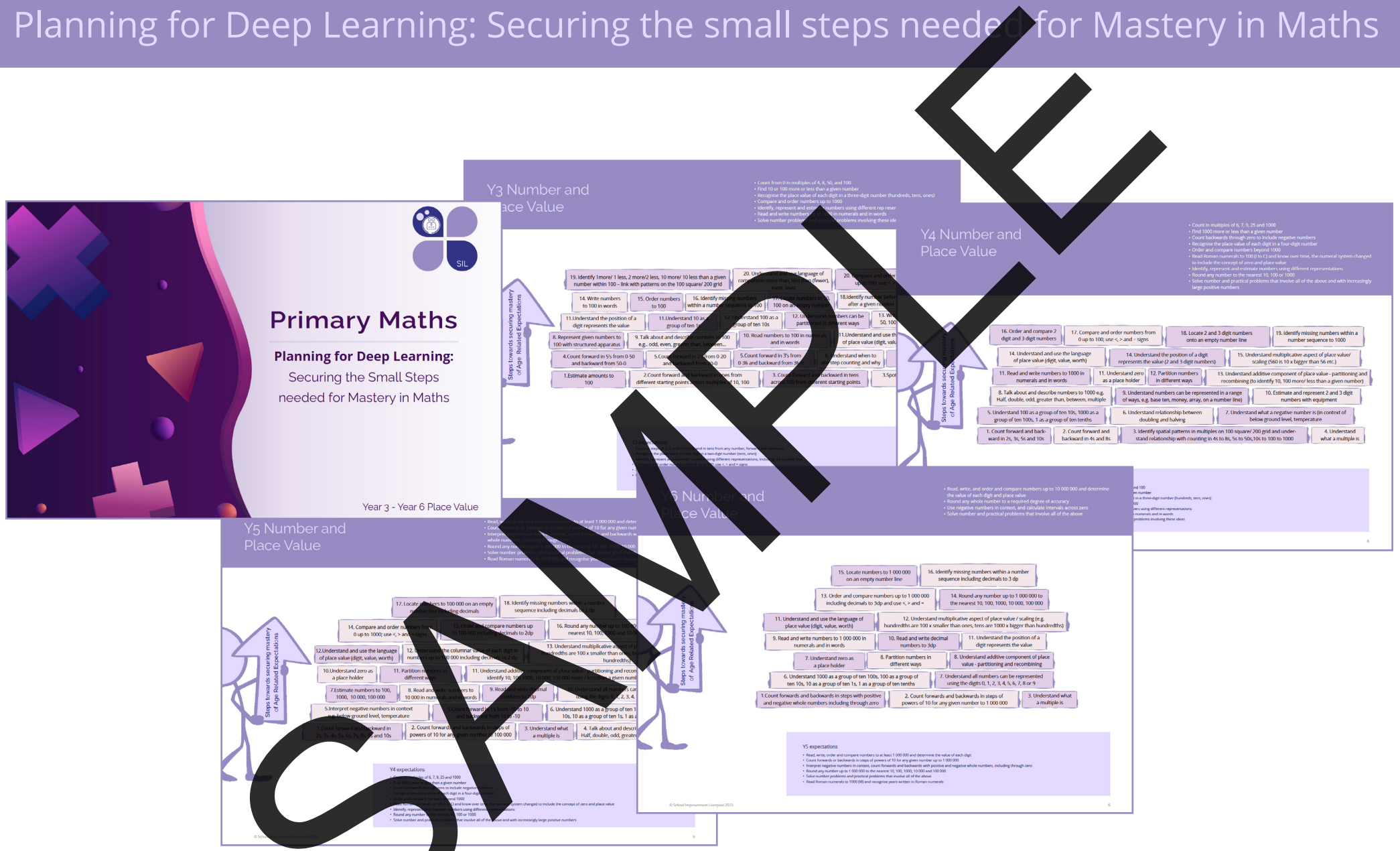
Take Home

Each player rolls a dice 4 times to make a 4-digit number. You get a point if you can state how many 100s are in the number. Bonus points for stating how many tens and how many ones.

Further Consolidation

- 1.22 Composition and calculation: 1,000 and four-digit numbers
- Generate a 4-digit number with cups, state how many hundreds, tens and ones in the number.

Planning for Deep Learning: Securing the small steps needed for Mastery in Maths



View the Y3-6 Place value pages here.

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