Pathway to Progress

A Mathematics Intervention Programme

Year 5

Teachers' Guide

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Number and Place Value - Overview

Learning progression	Counting - doing it daily counts!	Learning Focus	Activity Cards	Resources
Session 1	Count forwards and backwards in 1,000s from any given number.	Recognise and represent the place value of digits in a five-digit number.	• Counting Starter • I do / We do • Intelligent Practice • Next Steps	Tens Frame Place Value Chart Place Value Counters Blank number lines
Session 2	Count forwards and backwards in 10,000s from any given number.	Round any number to the nearest 10, 100, 1000.	• Counting Starter • I do / We do • Intelligent Practice • Next Steps	Tens Frame Place Value Counters Blank number lines.
Session 3	Count up and down in tenths	Round decimals with two decimal places to the nearest whole number.	• Counting Starter • I do / We do • Intelligent Practice • Next Steps	Diennes Blank number lines.
Session 4	Count up and down in hundredths	Multiply and divide whole numbers by 10 and 100.	• Counting Starter • I do / We do 1 • I do / We do 2 • Intelligent Practice • Next Steps	Diennes Place Value Chart

Addition and Subtraction - Overview

Learning progression	Counting—doing it daily counts!	Learning Focus	Activity Cards	Resources
Session 1	Count forwards and backwards in steps of 25 from zero.	Add and subtract mentally with increasing larger numbers using partitioning.	• I do / We do • Intelligent Practice • Next Steps	Counting stick Hundred square Place value chart Diennes
Session 2	Count forwards and backwards in steps of 50 from zero.	Add and subtract mentally with increasing larger numbers using rounding and adjusting.	• Intelligent Practice • Next Steps	Counting stick Hundred square Blank number lines
Session 3	Count in steps of $\frac{1}{2}$ and 0.5 from zero.	Add and subtract whole numbers with more than 4 digits, including using formal written methods.	• I do / We do • Intelligent Practice • Next Steps	Counting stick Semi-circles Place value chart Place value counters
Session 4	Count in steps of $\frac{1}{4}$ and 0.25 from zero.	Solve addition and subtraction problems in context, deciding which operations and methods to use and why,	• I do / We do • Intelligent Practice • Next Steps	Counting stick Quarter-circles Blank number line

Multiplication and Division- Overview

Learning progression	Counting—doing it daily counts!	Learning Focus	Activity Cards	Resources
Session 1	Recall and use multiplication and division facts for the 2,3,4,5 and 10 multiplication tables.	Multiply and divide numbers mentally drawing upon known facts.	• Counting Starter • Derivation Board example • Intelligent Practice • Next Steps	Counting Stick Post it notes
Session 2	Recall and use multiplication and division facts for the 2,3,4,5 and 10 multiplication tables.	Multiply numbers up to 3-digits by one-digit using a formal written method.	• Counting Starter • Intelligent Practice • Next Steps	Diennes
Session 3	Recall and use multiplication and division facts for the 6, 7 and 8 multiplication tables.	Divide numbers up to 3-digits by a one-digit using the format written method of short division.	• Counting Starter • Intelligent Practice • Next Steps	Place Value Counters
Session 4	Recall and use multiplication and division facts for the 9, 11 and 12 multiplication tables.	Divide numbers up to 3-digits by a one-digit using the format written method of short division, interpreting remainders.	• Counting Starter • Intelligent Practice • Next Steps	Place Value Counters

Fractions- Overview

Learning progression	Counting—doing it daily counts!	Learning Focus	Activity Cards	Resources
Session 1	Count in steps of $\frac{1}{5}$ from zero.	Identify, name and write equivalent fractions of a given fraction.	• Counting Starter • I do / We do 1 • I do / We do 2 • Intelligent Practice • Next Steps	Counting stick Blank number line
Session 2	Read scales graded in different sized steps.	Compare and order fractions whose denominators are all multiples of the same number	• Counting Starter • Intelligent Practice • Next Steps	
Session 3	Read scales graded in different sized steps.	Add and subtract fractions with the same denominator.	• Counting Starter • Intelligent Practice • Next Steps	
Session 4	Read scales graded in different sized steps.	Add and subtract fractions with denominators that are multiples of the same number	• Counting Starter • Intelligent Practice • Next Steps	

Number and Place Value : Session 1

Counting Starter

Count forwards and backwards in 1,000s from any given number.

Millions			Thousands			Ones			-ths		
100s	10s	1s	100s	10s	1s	100s	10s	1s			
								0	0		1
								0	1		
								1			
							1	0			
						1	0	0			
					1	0	0	0			
				1	0	0	0	0			
			1	0	0	0	0	0			
		1	0	0	0	0	0	0			
	1	0	0	0	0	0	0	0			
1	0	0	0	0	0	0	0				

What is the value of 1 in each column?
How does the value of the 1 increase as it moves one place to the left?

**The 1 becomes 10 times the size as it moves one place to the left.
E.g. 1,000 is ten times the size of 100.**

Count in steps of 1,000 from 0.
How many steps did you count?
How many thousands are equivalent to 10,000?
How do you know?
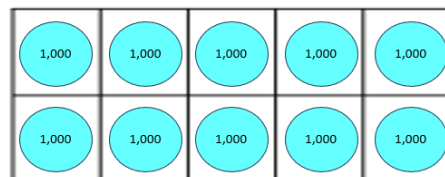
10 thousands are equivalent to 10,000.

Key Questions

• I'm going to start to count now, and I want you to carry on when I stop "0, 1,000, 2,000…"; "10,000, 9,000, 8,000….".

• I'm going to start to count forwards now, and I want you to carry on when I stop "3,013,   4,013,   5,013….."

• I'm going to start to count backwards now, and I want you to carry on when I stop "9,801, 8,801, 7, 801….."

• What changes and what stays the same?

Main Learning Focus

Recognise the place value of each digit in a five-digit number.

Previous Experience

Recognise the place value of each digit in a four-digit number

(1000s, 100s, 10s and ones).

Verbal Coding and Stem Sentences

The digit in the ten thousands place is __. It has a value of ___.

The digit in the thousands place is __. It has a value of ___.

The digit in the hundreds place is a __. 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 ___.

Watch Out For

♦ Pupils who are confused when zero is a placeholder.

♦ Pupils who lack fluency when reading numbers from words or numerals indicating weak place value understanding

Number and Place Value: Session 1

37,614

I am going to represent thirty seven thousand, six hundred and fourteen.

I know that the digit **3** is in the ten thousands place. The **3** represents thirty thousand. It has a value of 30,000.

I know that the digit **7** is in the thousands place. The **7** represents seven thousands. It has a value of 7000.

I know that the digit **6** is in the hundred place. The **6** represents six hundreds. It has a value of 600.

I know that the **1** is in the tens place. The 1 represents one ten. It has a value of 10.

I know that the **4** is in the ones place. The 4 represents four ones. It has a value of 4.
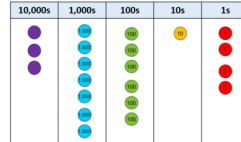
We do: Paired Example

Represent this number using a place value chart and counters.

81, 571

- Can you read the number aloud?
- What is the value of the ten thousands digit?
- What is the value of the thousands digit?
- What digit is in the hundreds place?
- What does the 7 represent?
- What is the value of the ones digit?

I do - Adult Modelling

I will now estimate the position of the number **37, 614** on a blank number line.
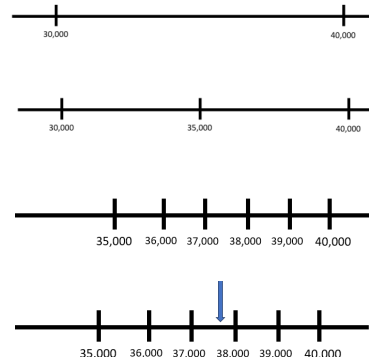
The previous multiple of ten thousand is 30,000.
The next multiple of ten thousand is 40,000.
The midpoint is 35,000.
I know that 37,614 is greater than 35,000.

I will mark on the multiples of 1000s.

I know that 37,614 is between 37,000 and 38,000.

We do: Paired Example

Estimate the position of the number 81, 571 on a blank number.

- What is the previous multiple of ten thousand?
- What is the next multiple of ten thousand?
- What is the midpoint?
- Is 81,571 higher or lower than the midpoint?
- Can you mark on the multiples of 1000 to help you position the number accurately?

Number and Place Value: Session 1

You do: Intelligent Practice

Use a place value chart and counters to represent each number.
Complete the sentence stems for each number.

The digit in the ten thousands place is __. It has a value of ___.

The digit in the thousands place is __. It has a value of ___.

The digit in the hundreds place is a __. 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 ___.

12,035	**47,506**
51, 390	**20, 817**
73, 202	**39,640**

Can you now estimate the position of each of these numbers on individual blank number lines?

Assessment Opportunities

- Check that pupils can recognise the place-value of each digit in a five-digit number.

- Check that pupils can partition a five-digit number accurately related to place value.

- Check that pupils can count in 10s, 100s, 1000s and 10,000s when representing a number using place value counters.

- Check that pupils can represent a five-digit number accurately using resources.

Next Steps

What number is shown here?

30 + 9,000 + 500 + 70,000 = ____

Counting Starter

Count forwards and backwards in 10,000s from any given number.

Millions			Thousands			Ones			-ths	
100s	10s	1s	100s	10s	1s	100s	10s	1s		
								0	0	1
								0	1	
								1		
							1	0		
						1	0	0		
					1	0	0	0		
				1	0	0	0	0		
			1	0	0	0	0	0		
		1	0	0	0	0	0	0		
	1	0	0	0	0	0	0	0		
1	0	0	0	0	0	0	0	0		

What is the value of 1 in each column?
How does the value of the 1 increase as it moves one place to the left?

**The 1 becomes 10 times the size as it moves one place to the left.
E.g. 10,000 is ten times the size of 1000.**

Count in steps of 10,000 from 0.
How many steps did you count?
How many ten thousands are equivalent to 100,000?
How do you know?

10 ten thousands are equivalent to 100,000.

Key Questions

- I'm going to start to count now, and I want you to carry on when I stop "0, 10,000, 20,000…"; "100,000, 90,000, 80,000….".

- I'm going to start to count forwards now, and I want you to carry on when I stop "38,013, 48,013, 58,013…..".

- I'm going to start to count backwards now, and I want you to carry on when I stop "95,801, 85,801, 75, 801…..".

- What changes and what stays the same?

Main Learning Focus

Round any whole number to the nearest multiple of 10, 100 and 1000.

Previous Experience

Recognise the place value of each digit in five-digit numbers and compose and decompose these numbers using standard and non-standard partitioning.

Verbal Coding and Stem Sentences

I know that the ___ is in the ___ place.

The ___ represents ___ . It has a value of ___.

The previous multiple of ____ is ___.

The next multiple of ___ is ___.

The midpoint is ___.

Watch Out For

- Misunderstanding zero as a place holder.

- Not recognising the previous or next multiple of 10, 100 or 1000.

- Not able to find the midpoint.

Number and Place Value: Session 2

I do - Adult Modelling

Round 2,863 to the nearest ten.

I know that the **6** is in the tens place. The 6 represents six tens. It has a value of 60.

The previous multiple of ten is 2,860.
The next multiple of ten is 2,870.
The midpoint is 2,865
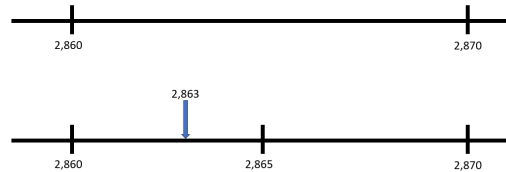
2,863 is lower than the midpoint of 2,865 so I round down to 2,860

2,863 rounded to the nearest ten is 2,860.

We do: Paired Example

Round 4,056 to the nearest ten.

- What digit is in the tens place?
- What is the value?
- What is the previous multiple of ten?
- What is the next multiple of ten?
- What is the midpoint?
- Is 4,056 higher or lower than the midpoint?
- Do you need to round up or down?

4,056 rounded to the nearest ten is _____.

I do - Adult Modelling

Round 2,863 to the nearest hundred.

I know that the **8** is in the hundreds place.
The 8 represents eight hundreds. It has a value of 800.

The previous multiple of hundred is 2,800.
The next multiple of ten is 2,900.
The midpoint is 2,850.
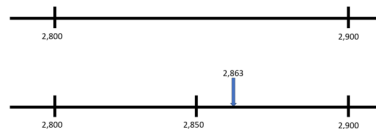
2,863 is higher than the midpoint of 2,850 so I round up to 2,900

2,863 rounded to the nearest hundred is 2,900.

We do: Paired Example

Round 4,056 to the nearest hundred.

- What digit is in the hundreds place?
- What is the value?
- What is the previous multiple of hundred?
- What is the next multiple of hundred?
- What is the midpoint?
- Is 4,056 higher or lower than the midpoint?
- Do you need to round up or down?

4,056 rounded to the nearest hundred is _____.

Number and Place Value: Session 2

You do: Intelligent Practice

Round each number to the nearest multiple of 10 and 100.

2,035	**7,506**
5, 390	**2, 817**
73, 202	**39,640**

I know that the ___ is in the ___ place.

The ___ represents ___ . It has a value of ___.

The previous multiple of ____ is ___.

The next multiple of ___ is ___.

The mid point is ___.

Using what you know, can you now round each number to the nearest multiple of 1000?

Assessment Opportunities

- Check pupils are able to identify the previous and next multiples of 10, 100 and 1000.

- Check pupils are able to identify the midpoint between two multiples of 10, 100 and 1000.

- Check pupils are able to position numbers on the number line accurately.

- Check pupils ability to reason and explain mathematical thinking.

Next Steps

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0   1,000 2,000 3,000 4,000 5,000 6,000 7,000 8,000 9,000 10,000
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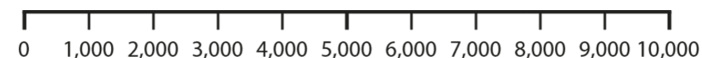
Position 6,929 on the number line.

Round to the nearest ten.

Round to the nearest hundred.

Round to the nearest thousand.

Counting Starter

Count up and down in tenths

Count up and down in tenths.
Practise starting from different numbers.

0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1
1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	2
2.1	2.2	2.3	2.4	2.5	2.6	2.7	2.8	2.9	3
3.1	3.2	3.3	3.4	3.5	3.6	3.7	3.8	3.9	4
4.1	4.2	4.3	4.4	4.5	4.6	4.7	4.8	4.9	5
5.1	5.2	5.3	5.4	5.5	5.6	5.7	5.8	5.9	6
6.1	6.2	6.3	6.4	6.5	6.6	6.7	6.8	6.9	7
7.1	7.2	7.3	7.4	7.5	7.6	7.7	7.8	7.9	8
8.1	8.2	8.3	8.4	8.5	8.6	8.7	8.8	8.9	9
9.1	9.2	9.3	9.4	9.5	9.6	9.7	9.8	9.9	10

Key Questions

- What do you notice when you get to the end of each row?

- How many tenths make one?
  10 tenths are equivalent to one.

- Can you show me how you would make 4.5 using diennes? 4.6? 4.7? 4.8?

- What has changed and what has stayed the same?

1 one   1 tenth
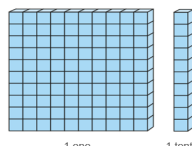
Main Learning Focus

Round decimals with two decimal places to the nearest whole number.

Previous Experience

Recognise the place value of each digit in five-digit numbers and compose and decompose these numbers using standard and non-standard partitioning.

Verbal Coding and Stem Sentences

I know that the ____ is in the ones place.

The ____ represents ____ . It has a value of ____.

The previous multiple of ____ is ____.

The next multiple of ____ is ____.

The midpoint is ____.

Watch Out For

- Misunderstanding zero as a place holder (4.5 and 4.50)
- Recognising whole numbers (integers) as positive numbers without a fractional or decimal part.
- Not able to find the midpoint.

Number and Place Value: Session 3

I do - Adult Modelling

Round 5.7 to the nearest whole number.

I know that the **5** is in the ones place. The 5 represents five ones. It has a value of 5.

The previous whole number is 5.
The next whole number is 6.
The midpoint is 5.5.
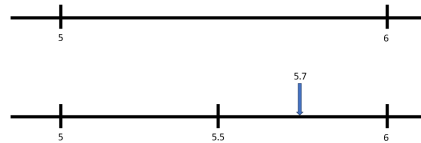
5.7 is higher than the midpoint of 5.5 so I round up to 6.

5.7 rounded to the nearest whole number is 6

We do: Paired Example

Round 7.4 to the nearest whole number.

- What digit is in the ones place?
- What is the value?
- What is the previous whole number?
- What is the next whole number?
- What is the midpoint?
- Is 7.4 higher or lower than the midpoint?
- Do you need to round up or down?

7.4 rounded to the nearest whole number is _____.

I do - Adult Modelling

Round 4.63 to the nearest whole number.

I know that the **4** is in the ones place. The 4 represents four ones. It has a value of 4.

The previous whole number is 4.
The next whole number is 5.
The midpoint is 4.5.
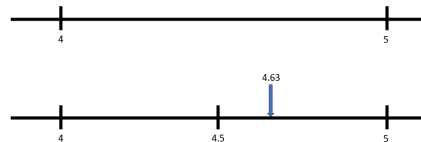
4.63 is higher than the midpoint of 4.5 so I round up to 5.

4.63 rounded to the nearest whole number is 5.

We do: Paired Example

Round 6.34 to the nearest whole number.

- What digit is in the ones place?
- What is the value?
- What is the previous whole number?
- What is the next whole number?
- What is the midpoint?
- Is 6.34 higher or lower than the midpoint?
- Do you need to round up or down?

6.34 rounded to the nearest whole number is _____.

You do: Intelligent Practice

Round each number to the nearest whole number.

6.8	**3.61**
1.2	**7.18**
9.5	**4.84**

I know that the ___ is in the ones place.

The ___ represents ___ . It has a value of ___ .

The previous whole number is ___ .

The next whole number is ___ .

The mid point is ___ .

Assessment Opportunities

- Check pupils are able to identify the previous and next whole number.

- Check pupils are able to identify the midpoint between two whole numbers.

- Check pupils are able to position numbers on the number line accurately.

- Check pupils ability to reason and explain mathematical thinking.

Next Steps

Circle the two decimals that round to the **same** whole number.

3.2   **4.7**   **5.9**   **6.3**   **7.9**

13

Number and Place Value : Session 4

Counting Starter

Count up and down in hundredths

Count up and down in hundredths.
Practise starting from different numbers.

0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.1
0.11	0.12	0.13	0.14	0.15	0.16	0.17	0.18	0.19	0.2
0.21	0.22	0.23	0.24	0.25	0.26	0.27	0.28	0.29	0.3
0.31	0.32	0.33	0.34	0.35	0.36	0.37	0.38	0.39	0.4
0.41	0.42	0.43	0.44	0.45	0.46	0.47	0.48	0.49	0.5
0.51	0.52	0.53	0.54	0.55	0.56	0.57	0.58	0.59	0.6
0.61	0.62	0.63	0.64	0.65	0.66	0.67	0.68	0.69	0.7
0.61	0.72	0.73	0.74	0.75	0.76	0.77	0.78	0.79	0.8
0.81	0.82	0.83	0.84	0.85	0.86	0.87	0.88	0.89	0.9
0.91	0.92	0.93	0.94	0.95	0.96	0.97	0.98	0.99	1

Key Questions
- What do you notice when you get to the end of each row?
- How is this different to counting in tenths?

- How many hundredths are in one tenth?
  10 hundredths are equivalent to 1 tenth.

- How many tenths make one?
  10 tenths are equivalent to one.

- Can you show me how you would make 5.5 using diennes? 5.49? 5.51?
- What has changed and what has stayed the same?

1 one   1 tenth   1 hundredth
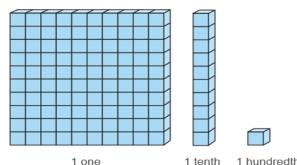
Main Learning Focus

Multiply and divide whole numbers by 10 and 100.

Previous Experience

Multiply and divide whole numbers by 10.

Verbal Coding and Stem Sentences

To multiply by 100, the digits all move two places to the left.

To divide by 100, the digits all move two places to the right.

Watch Out For

- Misunderstanding zero as a place holder.
- Lack of fluency when reading numbers from words or numerals indicating weak place value understanding.
- Pupils who do not have recall of the ten times table.

Number and Place Value: Session 4

I do - Adult Modelling

234 x 100 =

I know the place value of each digit.

10,000s	1,000s	100s	10s	1s
		2	3	4

To multiply by 10, the digits all move one place to the left.

10,000s	1,000s	100s	10s	1s
		2	3	4
x10	2	3	4	0

To multiply by 100, the digits all move two places to the left.

10,000s	1,000s	100s	10s	1s
		2	3	4
x10	2	3	4	0
x100 2	3	4	0	0

234 x 100 = 23400

23400 is a hundred times the size of 234.

We do: Paired Example

672 x 100 =

10,000s	1,000s	100s	10s	1s
x10				
x100				

- What is the value of each digit? Complete the place value grid.
- **To multiply by 100, the digits all move ___ places to the ___.**

672 x 100 =

___ is a hundred times the size of 672.

I do - Adult Modelling

4500 ÷ 100 =

I know the place value of each digit.

10,000s	1,000s	100s	10s	1s
	4	5	0	0

To divide by 10, the digits all move one place to the right.

10,000s	1,000s	100s	10s	1s
	4	5	0	0
÷10		4	5	0

To divide by 100, the digits all move two places to the right.

10,000s	1,000s	100s	10s	1s
	4	5	0	0
÷10		4	5	0
÷100			4	5

4500 ÷ 100 = 45

4500 divided by a hundred is equal to 45

We do: Paired Example

3200 ÷ 100 =

10,000s	1,000s	100s	10s	1s
÷10				
÷ 100				

- What is the value of each digit? Complete the place value grid.
- **To divide by 100, the digits all move ___ places to the ___.**

3200 ÷ 100 = ___

3200 divided by a hundred is equal to ___

You do: Intelligent Practice

55 x 10 =   **55 x 100 =**

505 x 10 =   **505 x 100 =**

5050 x 10 =   **5050 x 100 =**

Draw a place value grid for each calculation.

- What is the value of each digit?
- What direction do the digits move?
- What do you notice?

1,900 ÷ 10 =   **1,900 ÷ 100 =**

9,100 ÷ 10 =   **9,100 ÷ 100 =**

91,900 ÷ 10 =   **91,900 ÷ 100 =**

Draw a place value grid for each calculation.

- What is the value of each digit?
- What direction do the digits move?
- What do you notice?

Assessment Opportunities

- Check pupils are secure in their place value to support multiplying and dividing by 10 and 100.
- Check pupils can recognise which way the digits move and use a place value chart to support conceptual understanding.
- Ensure that pupils are not generalising that they "add a zero" or "take off a zero" when multiplying and dividing by 10 and 100.

Next Steps
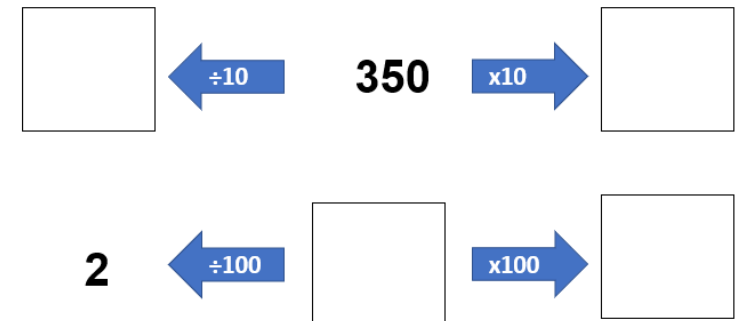
Counting Starter

Count in steps of 25 from zero.

Use a hundred square and a number line to support counting in steps of 25.

twenty five
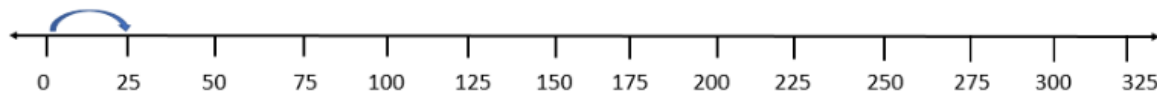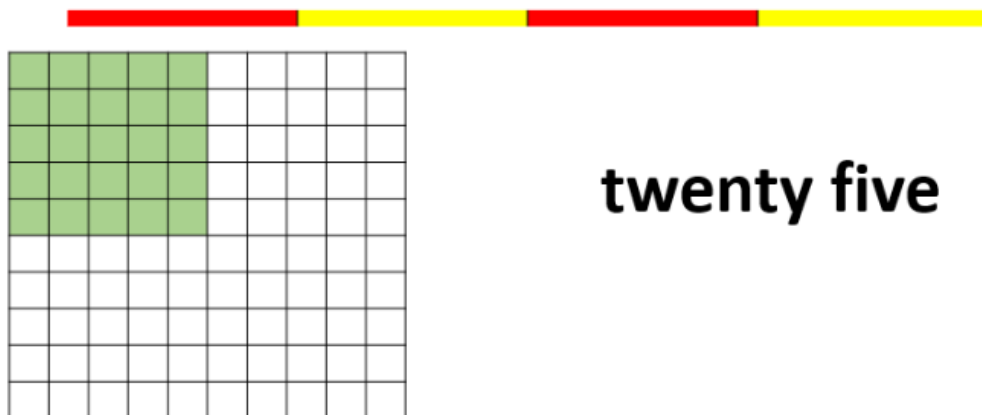
Move to a counting stick to practise counting in steps of 25 reliably from zero, forwards and backwards.

Key Questions

- How far can you count in steps of 25, starting from 0? Show me.

- I'm going to start to count now, and I want you to carry on when I stop "0, 25, 50, 75……"; "300, 275, 250, 225….".

- What patterns do you notice?

Main Learning Focus

Add and subtract mentally with increasing larger numbers using partitioning.

Previous Experience

Add and subtract numbers mentally, including a three-digit number and ones, tens and hundreds.

Verbal Coding and Stem Sentences

I can partition [10562] into ___ thousands, ___ hundreds, ___ tens and ___ ones.

___thousands +/- ___ thousands = ___ thousands

___hundreds +/- ___ hundreds = ____ hundreds

___ tens +/- ___ tens = ___ tens

___ ones +/- ___ ones = ___ ones

Watch Out For

- Pupils who do not understand the purpose of the zero as a place-holder.

- Pupils who are not secure with recognising the value of each digit.

17

Addition and Subtraction: Session 1

I do - Adult Modelling

3256 + 1731 = ___

I am going to partition each number into thousands, hundreds, tens and ones. I will use concrete resources and a place value grid to help me.

Now I am going to use place value to add the parts.

3 thousands + 1 thousand = 4 thousands

2 hundreds + 7 hundreds = 9 hundreds

5 tens + 3 tens = 8 tens

6 ones + 1 one = 7 ones

4 thousands + 9 hundreds + 8 tens + 7 ones = 4987

3256 + 1731 = 4987
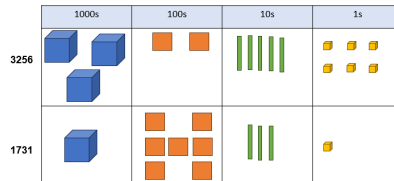
We do - Paired Example

5285 + 2413 = ___

Can you make the two numbers using concrete resources?

Can you partition each number into thousands, hundreds, tens and ones?

Can you use place value to add the parts:

___thousands + ____ thousands = ____ thousands

___hundreds + ____ hundreds = _____ hundreds

____ tens + ____ tens = ____ tens

____ ones + ____ ones = ____ ones

____ thousands + ____ hundreds + ____ tens + ____ ones = _____

5285 + 2413 = ___

I do - Adult Modelling

4837 - 1305 = ___

I am going to partition 4837 into thousands, hundreds, tens and ones. I will use concrete resources and a place value grid to help me.

Now I am going to use partitioning to subtract 1305.

4 thousands - 1 thousand = 3 thousands

8 hundreds - 3 hundreds = 5 hundreds

3 tens - 0 tens = 3 tens

7 ones - 5 ones = 2 ones

Recombine: 3 thousands + 5 hundreds + 3 tens + 2 ones = 3532

4837—1305 = 3532
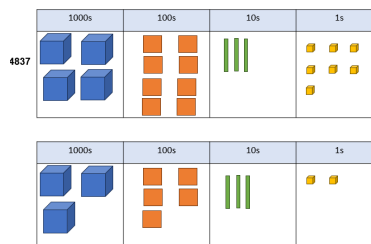
We do - Paired Example

6941—3021 = ___

Can you partition 6941 into thousands, hundreds, tens and ones and show this using concrete resources on a place value chart?

Can you use partitioning to subtract 3021:

___thousands - ____ thousands = ____ thousands

___hundreds - ____ hundreds = _____ hundreds

____ tens - ____ tens = ____ tens

____ ones - ____ ones = ____ ones

Recombine: __ thousands + __ hundreds + __ tens + __ ones = ___

6941—3021 = ___

Addition and Subtraction: Session 1

You do: Intelligent Practice

Solve the following number sentences using partitioning.

Solve each number sentence using either concrete resources or just the place value grid.

6011 + 3571 =   **6918 - 2605 =**

6818 - 2605 =   **6012 + 3571 =**

6928 - 2605 =   **6011 + 3671 =**

___thousands +/- ___ thousands = ___ thousands

___hundreds +/- ___ hundreds = ____ hundreds

___ tens +/- ___ tens = ___ tens

___ ones +/- ___ ones = ___ ones

Recombine: ___ thousands + ___ hundreds + ___ tens + ___ ones = _____

Assessment Opportunities

- Check that pupils are able to partition a 4-digit number into thousands, hundreds, tens and ones.

- Check that pupils understand zero as a placeholder.

- Check that pupils are using a place value grid accurately.

- Check that pupils can identify the correct operation needed.

- Check that pupils can use the inverse.

- Check that pupils are using known facts to help them calculate .

Next Steps

1,000—654 = 999—653

Explain why this is correct.

Why is this strategy more efficient?

Addition and Subtraction: Session 2

Counting Starter

Count in steps of 50 from zero.

Use a hundred square and a number line to support counting in steps of 50.

one hundred and fifty
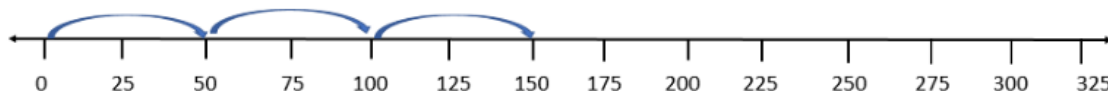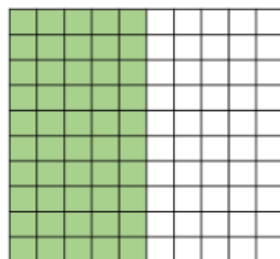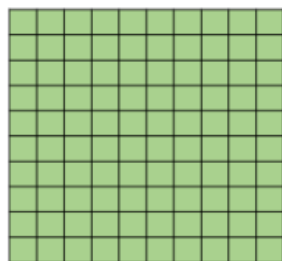
Move to a counting stick to practise counting in steps of 50 reliably from zero, forwards and backwards

Key Questions

- How far can you count in steps of 50, starting from 0? Show me.

- I'm going to start to count now, and I want you to carry on when I stop "0, 50, 100, 150……"; "500, 450, 400, 350…".

- What patterns do you notice?

Main Learning Focus

Add and subtract mentally with increasing larger numbers using rounding and adjusting.

Previous Experience

Add and subtract numbers mentally, including a three-digit number and ones, tens and hundreds.

Verbal Coding and Stem Sentences

I will round to the nearest 1000 by adding ____ .

I will then adjust by subtracting/adding ____.

E.g. 3568 + 999 =

I will round 999 to the nearest 1000 by adding 1.

I will then adjust by subtracting 1.

Watch Out For

- Pupils who are not secure with place value knowledge and can not represent numbers using concrete resources.

- Pupils who resort to formal written methods.

Addition and Subtraction: Session 2

I do - Adult Modelling

3568 + 999 =

I will round 999 to the nearest 1000 by adding 1.

3568 + 1000 = 4568.

+1000

3568   4568
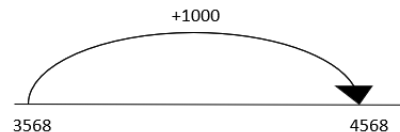
I will then adjust by subtracting 1.

4568 - 1 = 4567

+1000

3568   4567   4568
                -1
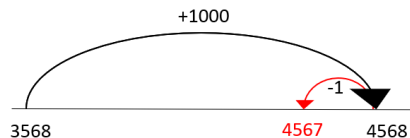
3568 + 999 = 4567

We do - Paired Example

3568 + 998 =

What do you need to add to 998 to round to the nearest 1000?

I will round 998 to the nearest 1000 by adding ___.

3568 + 1000 = ___.

Use a number line to help you.

What do you need to subtract from your answer to adjust accurately?

I will then adjust by subtracting ___.

How will your number line representation change?

3568 + 998 = ___

I do - Adult Modelling

3568 - 999 =

I will round 999 to the nearest 1000 by adding 1.

3568 - 1000 = 2568.

-1000

2568   3568
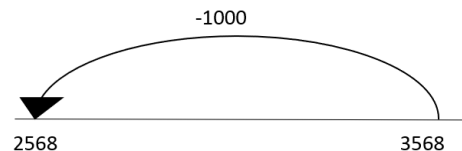
I will then adjust by adding 1.

2568 + 1 = 2569

-1000

2568   2569   3568
    +1
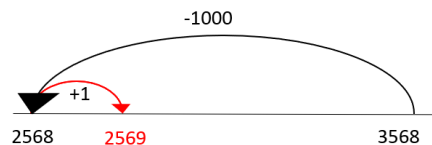
3568 - 999 = 2569

We do - Paired Example

3568 - 998 =

What do you need to add to 998 to round to the nearest 1000?

I will round 998 to the nearest 1000 by adding ___.

3568 - 1000 = ___.

Use a number line to help you.

What do you need to add to your answer to adjust accurately?

I will then adjust by adding ___.

How will your number line representation change?

3568 - 998 = ___

Addition and Subtraction: Session 2

You do: Intelligent Practice

Solve the following number sentences using rounding and adjusting

Solve each number sentence using a number line representation.

8027 + 999 =   **8097 - 999 =**

8027 + 998 =   **8097 - 998 =**

8027 + 997 =   **8027 - 997 =**

I will round to the nearest 1000 by adding ___ .

I will then adjust by subtracting/adding ___.

Assessment Opportunities

- Check that pupils can round accurately to the nearest 1000.

- Check that pupils can add and subtract 1000 mentally.

- Check that pupils are adjusting their number by either adding or subtracting.

- Check that pupils understand zero as a placeholder.

- Check that pupils are using a place number line accurately.

- Check that pupils can identify the correct operation needed.

Next Steps

Jackson is working out 4671 - 999.

He works out 4671 — 1000 = 3671.

He then works out 3671 - 1 = 3670.

His answer is 3670

What mistake has Jackson made?

How could you help him correct his answer?

Addition and Subtraction: Session 3

Counting Starter

Revisit counting in steps of $\frac{1}{2}$ from zero.

Use a number line and a counting stick to support counting in halves. It may be helpful to use semi-circles or bar models to visually represent half.
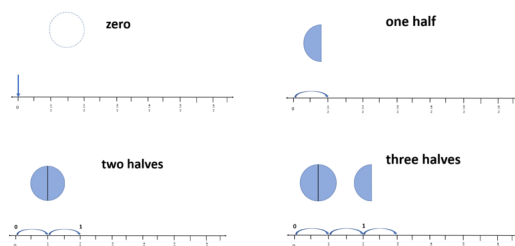
Revisit counting in steps of 0.5 from zero.

Encourage pupils to recognise the link between 0.5, 50% and half linked to the bar model.

What do you notice?
What other key facts can you recall linked to the bar model?

1 whole = 1.0 = 100%	
$\frac{1}{2}$	$\frac{1}{2}$
0.5	0.5
50%	50%

Use a number line and a counting stick to support counting in steps of 0.5.

- I'm going to start to count now, and I want you to carry on when I stop: "0, 0.5, 1.0, 1.5, 2.0, 2.5, 3.0….."

- What patterns do you notice?
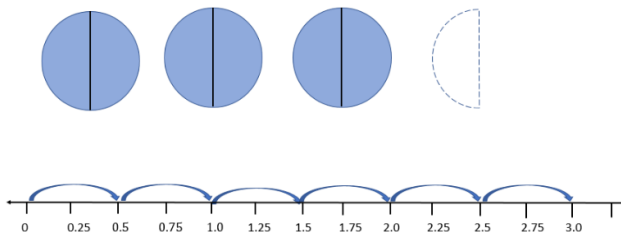
Main Learning Focus

Add and subtract whole numbers with more than 4 digits, including using formal written methods

Previous Experience

Add and subtract numbers with up to 4 digits using the formal written methods of columnar addition and subtraction where appropriate.

Verbal Coding and Stem Sentences

In column addition or subtraction, we start with the ones.

The ___ is in the ___ column. It represents ___.

E.g. The 3 is in the tens column. It represents 30.

Watch Out For

- Pupils who are not secure with place value knowledge and can not represent numbers using concrete resources.

- Pupils who can not line digits up in the correct columns.

I do - Adult Modelling

37 614 + 2372 =

I am going to represent thirty seven thousand, six hundred and fourteen in the place value chart. I will also record this in a formal column method.

10 000s	1 000s	100s	10s	1s
●●	●●●● ●●●	●●● ●●●	●	●● ●●

		3	7	6	1	4
+						

Now I am going to represent 2 thousand, three hundred and seventy two in the place value chart. I will make sure my digits are in the correct place value columns when I record this in a formal column method.

10 000s	1 000s	100s	10s	1s
●●	●●●● ●●●	●●● ●●●	●	●● ●●
	● ●	●● ●	●●●● ●●●	● ●

		3	7	6	1	4
+			2	3	7	2

I am going to start adding each column, starting with the ones.

4 ones + 2 ones = 6 ones

1 ten + 7 tens = 8 tens

6 hundreds + 3 hundreds = 9 hundreds

7 thousands + 2 thousands = 9 thousands

3 ten thousands + 0 ten thousands = 3 ten thousands

10 000s	1 000s	100s	10s	1s
●●	●●●● ●●●	●●● ●●●	●	●● ●●
	● ●	●● ●	●●●● ●●●	● ●
3	9	9	8	6

		3	7	6	1	4
+			2	3	7	2
		3	9	9	8	6

37 614 + 2372 = 39 986

We do - Paired Example

70 124 + 2475 =

Can you represent seventy thousand, one hundred and twenty four in a place value chart?

Can you record this in a formal column method?

Can you represent two thousand, four hundred and seventy five in a place value chart?

Can you record this in a formal column method?

What do you need to remember to help you add accurately?

Which column do you need to start with when adding?

___ ones + ___ ones = ___ ones

___ ten + ___ tens = ___ tens

___ hundreds + ___ hundreds = ___ hundreds

___ thousands + ___ thousands = ___ thousands

___ ten thousands + ___ ten thousands = ___ ten thousands

70 124 + 2475 =

Repeat with further examples where necessary.

Addition and Subtraction: Session 3

I do - Adult Modelling

57 693—2 471 =

I am going to represent fifty seven thousand, six hundred and ninety three in the place value chart. I will also record this in a formal column method.

Now I am going to subtract two thousand, four hundred and seventy one in the place value chart.
I will make sure my digits are in the correct place value columns when I record this in a formal column method.

I am going to start subtracting each column, starting with the ones.

3 ones - 1 one = 2 ones

9 tens - 7 tens = 2 tens

6 hundreds - 4 hundreds = 2 hundreds

7 thousands - 2 thousands = 5 thousands

5 ten thousands - 0 ten thousands = 5 ten thousands

57 693—2 471 = 55 222

We do - Paired Example

93 574 - 1 420 =

Can you represent ninety three thousand, five hundred and seventy four in a place value chart?

Can you record this in a formal column method?

Can you subtract one thousand, four hundred and twenty using the place value counters?

Can you record this in a formal column method?

What do you need to remember to help you subtract accurately?

Which column do you need to start with when subtracting?

____ ones - ____ ones = ____ ones

____ ten - ____ tens = ____ tens

____ hundreds - ____ hundreds = ____ hundreds

____ thousands - ____ thousands = ____ thousands

____ ten thousands - ____ ten thousands = ____ ten thousands

93 574 - 1 420 = ____

Repeat with further examples where necessary.

Addition and Subtraction: Session 3

You do: Intelligent Practice

Solve the following number sentences using place value counters and the formal column method.

56 713 + 2 085 =   **19 685 - 7254 =**

56 813 + 2085 =   **19 685 - 8254 =**

56 713 + 2086 =   **19 485 - 8254 =**

___ ones +/- ___ ones = ___ ones
___ tens +/ - ___ tens = ___ tens
___ hundreds +/- ___ hundreds = ___ hundreds
___ thousands +/- ___ thousands = ___ thousands
___ ten thousands +/- ___ ten thousands = ___ ten thousands

Assessment Opportunities

- Check that pupils can recognise the place-value of each digit in a five-digit number.

- Check that pupils can partition a five-digit number accurately related to place value.

- Check that pupils line up digits accurately in the formal written method.

- Check that pupils start with the ones column when adding or subtracting.

Next Steps

56 713 + 2 069 =

What happens when you add 3 ones and 9 ones?

Can you use your place value knowledge to help you calculate the answer?

Addition and Subtraction: Session 4

Counting Starter

Revisit counting in steps of $\frac{1}{4}$ from zero.

Use a number line and a counting stick to support counting in quarters. It may be helpful to use quarter circles or bar models to visually represent quarter.
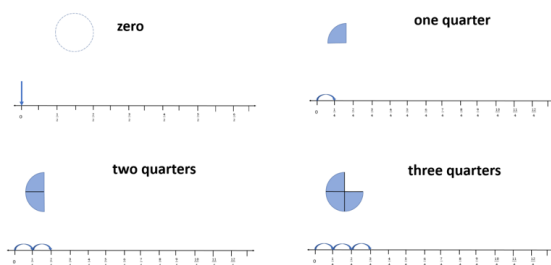
Revisit counting in steps of 0.25 from zero.

Encourage pupils to recognise the link between 0.25, 25% and quarters linked to the bar model.

What do you notice?
What other key facts can you recall linked to the bar model?

1 whole = 1.0 = 100%			
$\frac{1}{4}$	$\frac{1}{4}$	$\frac{1}{4}$	$\frac{1}{4}$
0.25	0.25	0.25	0.25
25%	25%	25%	25%

Use a number line and a counting stick to support counting in steps of 0.25 and 25%.

- I'm going to start to count now, and I want you to carry on when I stop "0, 0.25, 0.5, 0.75"; "1.0, 1.25, 1.5, 1.75, 2.0…..".
- "100%, 75% …."
- What patterns do you notice?
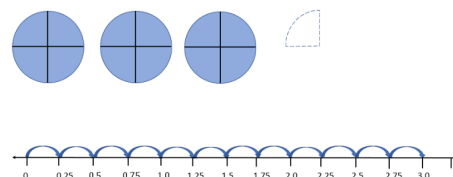
Main Learning Focus

Solve addition and subtraction problems in context, deciding which operations and methods to use and why.

Previous Experience

Add and subtract numbers with up to 4 digits using the formal written methods of columnar addition and subtraction where appropriate.

Verbal Coding and Stem Sentences

*Use sentence stems as appropriate, linked to the chosen method.

Watch Out For

- Comprehension of a word problem to identify the calculation/s required.
- Pupils' estimations are not accurate and formal written methods are used to estimate.
- Pupils who are unable to 'unpick' the maths needed to solve the problem and who are unsure of a way in.

I do - Adult Modelling

Logan is playing a game. He has 3,324 points.

Then he scores another 999 points.

Logan's target is 6855 points.

How many more points does Logan need to reach his target?

Step 1:

I need to work out how many points Logan has already scored.

3,324 + 999

I will use rounding and adjusting as the most efficient method.

I will round 999 to the nearest 1000 by adding 1.

3,324 + 1000 = 4,324

I will then adjust by subtracting 1.

4,324 - 1 = 4,323

+1000

-1

3,324   4,323   4,324
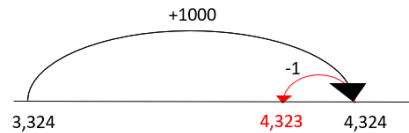
Step 2:

I need to calculate how many more points Logan needs to reach his target.

6855 - 4,323.

I will use partitioning as the most efficient method

6 thousands - 4 thousand = 2 thousands

8 hundreds - 3 hundreds = 5 hundreds

5 tens - 2 tens = 3 tens

5 ones - 3 ones = 2 ones

Recombine: 2 thousands + 5 hundreds + 3 tens + 2 ones = 2532

Logan needs 2,532 points to reach his target.

We do - Paired Example

Logan is playing a game. He has 5,275 points.

Then he scores another 1,312 points.

Logan's target is 6600 points.

How many more points does Logan need to reach his target?

Step 1:

What do you need to work out first?

Which strategy will you use? Why?

Step 2:

What do you need to work out next?

Which strategy will you use? Why?

Step 3:

Have you answered the problem in the context of the question?

How could you check your answer?

Addition and Subtraction: Session 4

You do: Intelligent Practice

Logan is playing a game. He has 5,275 points.

Then he loses 999 points.

Logan's target is 5000 points.

How many more points does Logan need to reach his target now?

- What is the same and what is different compared to the question from the 'We Do'?
- What information is the question asking for?
- What information do you already know?
- How would you solve this?
- Which strategy is the most efficient?
- How could you check your answer?

Assessment Opportunities

- Check for pupils who find it difficult to 'unpick' the maths needed to solve this type of problem, and to make sense of what the question is asking them particularly within the context of the problem.

- Pupils may need encouraging to make a record of each step throughout the problem as they go.

- Check pupils are able to apply mental strategies of whole number with more than 4-digits, including:

  - Using known facts and related facts.

  - Rounding and adjusting.

  - Partitioning and recombining.

  - Using approximation to estimate an answer.

Next Steps

Logan is playing a game. He has 2,301 points.

Logan's friend has double the number of points.

How many points do they have altogether?

Multiplication and Division: Session 1

Counting Starter

Recall and use multiplication and division facts for the 2,3,4,5 and 10 multiplication tables.

x	2	3	4	5	10
2					
3					
4					
5					
10					

x	10	3	5	2	4
5					
3					
2					
10					
4					

Main Learning Focus

Multiply and divide numbers mentally drawing upon known facts.

Previous Experience

Derive, recall and use multiplication and division facts for up to 12 x 12.

Verbal Coding and Stem Sentences

Double ____ is ____

Half ____ is ____

Add one group of ____ to ____ x ____

Subtract one group of ____ to ____ x ____

If I know ____ then I know ____.

Watch Out For

♦ Pupils who are not secure with repeated addition as multiplication.

♦ Pupils who can not use known facts to derive new facts.

♦ Pupils who are not confident multiplying and dividing by 10, 100 and 1000.

♦ Pupils who are not secure using the inverse.

Multiplication and Division: Session 1

I do - Adult Modelling

I am going to work out the 8 times tables using my counting stick.

The first number I want here is 8.
1 x 8 is 8.

If I know that **10** x 8 = 80, I know that half of that is **5** x 8 = 40.
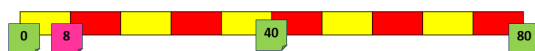
Double 8 is 16. So **2** x 8 is 16.

40 subtract 8 is 32. So **4** x 8 = 32
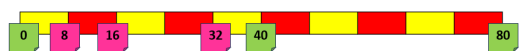
Double 32 is 64. **8** x 8 = 64
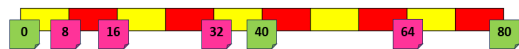
To find **3** x 8, I can add one group of 8 to 2 x 8 or take one group away from 4 x 8. I think 16 + 8 (partitioning so 16 + 4 + 4) is easier than 32—8.
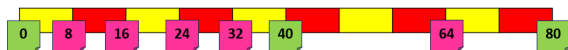
To find **6** x 8, I can double 3 x 8 or add one group of 8 to 5 x 8.
I think 40 + 8 is easier than doubling 24.
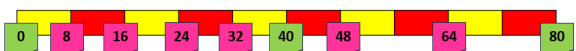
To find **7** x 8, I can add one group of 8 to 6 x 8 or take one group of 8 from 8 x 8. I think 48 + 8 (partitioning 48 + 2 + 6) is easier than 64—8.
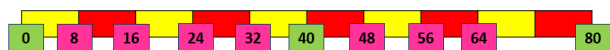
To find **9** x 9, I can add one group of 8 to 8 x 8 or take one group of 8 from 10 x 8. I think 80 - 8 is easier than 64 + 8.
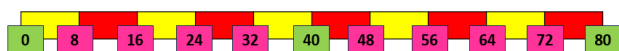
We do: Paired Example

Now you are going to work out the 7 times table using the counting stick.

What is the times table? **1** x __ is __

What is **10** x 7?

How can you use that to work out **5** x 7?
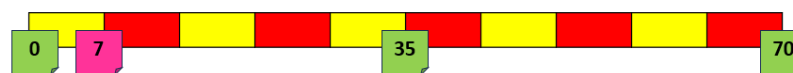
Now we have are **1, 10, 5,** we can derive the other facts.

What is **2** x 7?

How can you use that to work out **4** x 7? **8** x 7?

What is **3** x 7?
What are the different ways you can work this out without starting from 0?

Can you tell me two different ways you could work out **6** x 7?
Which is easier? Harder? Why?

Can you tell me two different ways you could work out **7** x 7?
Which is easier? Harder? Why?

Can you tell me two different ways you could work out **9** x 7?
Which is easier? Harder? Why?

How could we work out **11** x 7?

How about **12** x 7? How many different ways can you find the answer to 12 x 7? Which is easier? Harder? Why?

You do: Intelligent Practice

Here is an example of a completed derivation board using 7 x 8 = 56.

Fact Family		Nearby
7 x 8 = 56	56 ÷ 7 = 8	8 x 8 = 64
8 x 7 = 56	56 ÷ 8 = 7	6 x 8 = 48

Equivalent	If I know....	Place Value
7 + 7 + 7 + 7 + 7 + 7 + 7 + 7 = 56	**7 x 8 = 56**	7 x 80 = 560
8 + 8 + 8 + 8 + 8 + 8 + 8 = 56	Then I know...	70 x 8 = 560
7 x 4 + 7 x 4 = 56		70 x 80 = 5600
7 x 5 + 7 x 3 = 56	**Array**	700 x 8 = 5600
5 x 8 + 2 x 8 = 56		0.7 x 8 = 5.6
		56000 ÷ 7 = 800

Have a look at the strategies used to complete your own for the questions below:

9 x 8 = 72   **6 x 7 = 42**

96 ÷ 8 = 12   **49 ÷ 7 = 7**

Assessment Opportunities

- Check that pupils are fluent with and can emphasise the connections with facts they understand and can recall.

- Check that pupils can use scaling to derive new facts from known facts (e.g. If I know 7 x 8 = 56, then I know 70 x 8 = 560)

- Check that pupils can use the distributive law to identify equivalent facts (e.g. I know 7 x **8** = 56 is the same as 7 x **4** + 7 x **4**)

- Check that pupils are not using formal written methods to calculate division questions (e.g. 56000 ÷ 7 can be solved using known facts 7 x 8 = 56 therefore 56 ÷7 = 8)

Next Steps

0.8	8	80	800	8000

Use a card to complete each calculation.

32 = 4 x ____

3 200 = 4 x ____

3.2 = 4 x ____

320 ÷ ____ = 4

32

Counting Starter

Recall and use multiplication and division facts for the 2,3,4,5 and 10 multiplication tables.

The missing factors are 2, 3, 4, 5 and 10.
Can you complete the grid?

x					
		20		100	
			12	30	
	10				
				50	15
			16		

Key Questions:
- Where will you start? Why?
- What do you notice?
- How will this help you to narrow down the potential factors?
- How could you work systematically?

Main Learning Focus

Multiply numbers up to 3-digits by one-digit using a formal written method.

Previous Experience

Multiply 2-digit and 3-digit numbers by a 1-digit number.

Verbal Coding and Stem Sentences

___ ones x ___ = ____ ones

___ tens x ___ = ____ tens

___ hundreds x ___ = ____ hundreds

Watch Out For

- Pupils who can not use known facts to derive new facts.
- Pupils who are not confident with partitioning or using the grid method as a prerequisite skill.

Multiplication and Division: Session 2

I do - Adult Modelling
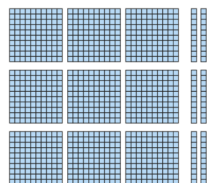
321 x 3 =

I am going to represent the number sentence using dienes.

I will then lay out my column method as follows:

100s	10s	1s	
3	2	1	
×		3	
		3	3 × 1 ones = 3 ones
	6	0	3 × 2 tens = 6 tens
9	0	0	3 × 3 hundreds = 9 hundreds
9	6	3	

First I will multiply the ones.

Then I will multiply the tens.

Next I will multiply the hundreds.

Now I am going to add the digits in the ones column, tens column and hundreds column.

321 x 3 = 963

We do - Paired Example

423 x 2 =

Can you represent the number sentence using dienes?

Can you lay out your formal column method?

What column will you multiply first?

What column will you multiply next?

What column will you multiply last?

What do you need to do to find the answer?

432 x 2 = ____

I do - Adult Modelling
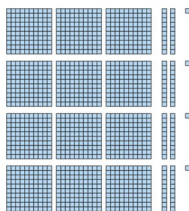
321 x 4 =

I am going to represent the number sentence using dienes.

I will then lay out my column method as follows:

1000s	100s	10s	1s	
	3	2	1	
x			4	
			4	4 x 1 ones = 4 ones
		8	0	4 x 2 tens = 8 tens
1	2	0	0	4 x 3 hundreds = 12 hundreds
1	2	8	4	

First I will multiply the ones.

Then I will multiply the tens.

Next I will multiply the hundreds.

Now I am going to add the digits in the ones column, tens column, hundreds column and thousands column.

321 x 4 = 1284

We do - Paired Example

423 x 3 =

Can you represent the number sentence using dienes?

Can you lay out your formal column method?

What column will you multiply first?

What column will you multiply next?

What column will you multiply last?

What do you need to do to find the answer?

432 x 3 = ____

Multiplication and Division: Session 2

You do: Intelligent Practice

Solve these multiplication number sentences using dienes and the expanded formal written method.

3 digit x 1 digit (no regrouping)

124 x 2 =

402 x 2 =

312 x 3 =

320 x 3 =

3-digit x 1 digit (with regrouping)

124 x 3 =

142 x 3 =

421 x 3 =

465 x 2 =

Assessment Opportunities

- Check that pupils can represent the numbers using the dienes.

- Check that pupils can lay out the formal written method accurately using place value.

- Check that pupils start with the ones column first.

- Check that pupils are confident with the procedure before moving on to questions that involve regrouping.

- Check that pupils are confident regrouping using the expanded formal method.

Next Steps

321 x 3 = 963

Without calculating, which is greater?

321 x 4 or 322 x 3?

Explain your answer.

Multiplication and Division: Session 3

Counting Starter

Recall and use multiplication and division facts for the 6, 7 and 8 multiplication tables.

We have used 1, 10, 5 derive to fill in 1x, 10x and 5x for you.

How can you use these facts to help you complete the times table grid?

x	1	2	3	4	5	6	7	8	9	10	11	12
6	6				30					60		
7	7				35					70		
8	8				40					80		

How will you use your known facts to complete the following times table grid efficiently?

x	3	6	12	9	1	4	8	5	10	11	2	7
6												
7												
8												

Main Learning Focus

Divide numbers up to 3-digits by a one-digit using the formal written method of short division.

Previous Experience

Multiply 2-digit and 3-digit numbers by a 1-digit number.
Use known and derived facts to divide mentally.

Verbal Coding and Stem Sentences

I will share the hundreds/tens/ones into groups of _____.

I have ____ groups of _____.

Watch Out For

- Pupils who can not use known facts to derive new facts.
- Pupils who are not confident with partitioning or using the grid method as a prerequisite skill.

Multiplication and Division: Session 3

I do - Adult Modelling

72 ÷ 3 =

First I will write the divisor (3) and the dividend (72). I will then represent this using place value counters alongside.
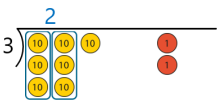
I will share the tens into groups of 3 (divisor).

I have **2** groups of 3. I have 1 ten remaining.
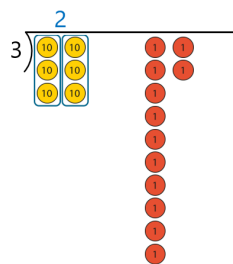
I will exchange 1 ten for 10 ones.

I now have 12 ones.

I will share the 12 ones into groups of 3 (divisor).

I have **4** groups of 3.

72 ÷ 3 = 24

We do - Paired Example

45 ÷ 3 =

What is the divisor?

What is the dividend?

How will you layout your formal written method?

Can you represent 45 using place value counters?

I will share the tens into groups of ____.

I have ___ groups of ____.

Do you have any tens remaining?

What do you need to do next?

I will share the ones into groups of ____.

I have ___ groups of ____.

45 ÷ 3 = ?

I do - Adult Modelling

73 ÷ 3 =
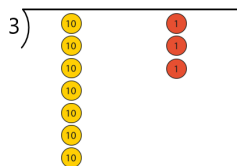
First I will write the divisor (3) and the dividend (73). I will then represent this using place value counters alongside.
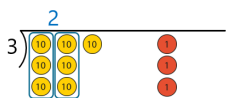
I will share the tens into groups of 3 (divisor).

I have **2** groups of 3. I have 1 ten remaining.
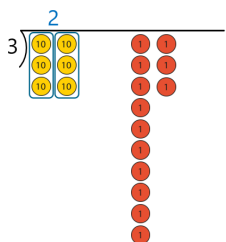
I will exchange 1 ten for 10 ones.

I now have 13 ones.
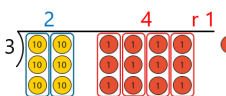
I will share the 13 ones into groups of 3 (divisor).

I have **4** groups of 3 and one remainder.

73 ÷ 3 = 24 r 1

We do - Paired Example

46 ÷ 3 =

What is the divisor?

What is the dividend?

How will you layout your formal written method?

Can you represent 46 using place value counters?

I will share the tens into groups of ____.

I have ___ groups of ____.

Do you have any tens remaining?

What do you need to do next?

I will share the ones into groups of ____.

I have ___ groups of ____ and ___ remainder.

46 ÷ 3 = ?

Multiplication and Division: Session 3

You do: Intelligent Practice

Solve these division number sentences using place value counters and the formal written method of short division.

2 digit ÷ 1 (no remainder)

$$48 \div 3 =$$

$$51 \div 3 =$$

$$63 \div 3 =$$

I will share the tens/ones into groups of _____.

I have _____ groups of _____

2 digit ÷ 1 (with remainder)

$$47 \div 3 =$$

$$50 \div 3 =$$

$$64 \div 3 =$$

I will share the tens/ ones into groups of _____.

I have _____ groups of _____ and _____ remainder.

Assessment Opportunities

- Check that pupils can represent the numbers using the place value counters
- Check that pupils can lay out the formal written method accurately using place value.
- Check that pupils group using the divisor.
- Check that pupils are confident with the procedure before moving on to questions that involve remainders.

Next Steps

Write <, > or = to compare the calculations.

$95 \div 5$ ◯ $95 \div 3$

$76 \div 4$ ◯ $94 \div 4$

$88 \div 4$ ◯ $44 \div 2$

Can you make a prediction before calculating?

Multiplication and Division: Session 4

Counting Starter

Recall and use multiplication and division facts for the 9, 11, 12 multiplication tables.

We have used 1, 10, 5 derive to fill in 1x, 10x and 5x for you.

How can you use these facts to help you complete the times table grid?

x	1	2	3	4	5	6	7	8	9	10	11	12
9	9				45					90		
11	11				55					110		
12	12				60					120		

Can you complete the multiplication wheels?
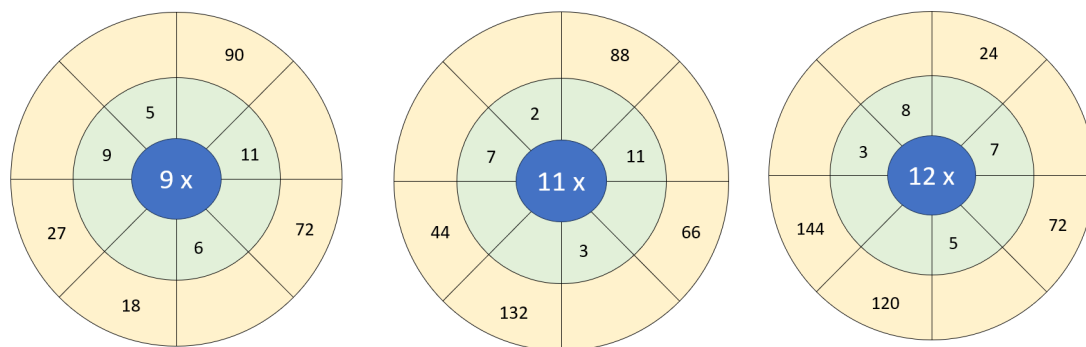
The green circle is the factor. The yellow circle is the product.

For example, 9 x ___ = 90   or   9 x 6 = ____

Main Learning Focus

Divide numbers up to 3-digits by a one-digit using the format written method of short division, interpreting remainders.

Previous Experience

Divide numbers up to 2- digits by a one-digit using the formal written method of short division.

Verbal Coding and Stem Sentences

I will share the hundreds/tens/ones into groups of _____.

I have ___ groups of _____ with a remainder of ___

Watch Out For

- ◆ Pupils who can not use known facts to derive new facts.
- • Pupils who are not confident with finding remainders using place value counters.

40

I do - Adult Modelling

612 ÷ 4 =

First I will write the divisor (4) and the dividend (612). I will then represent this using place value counters alongside.

I will share the hundreds into groups of 4 (divisor).

I have **1** group of 4. I have 2 hundreds remaining.

I will exchange 2 hundreds for 20 tens.
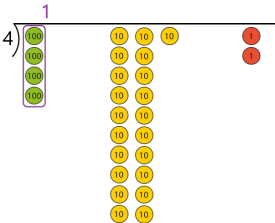
I now have 21 tens.

I will share the tens into groups of 4 (divisor).

I have **5** groups of 4. I have 1 ten remaining.

I will exchange 1 ten for 10 ones.

I now have 12 ones.

I will share the 12 ones into groups of 4 (divisor).

I have **3** groups of 4.

612 ÷ 4 = 153
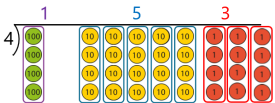
We do - Paired Example

516 ÷ 4 =

How will you layout your formal written method?

Can you represent 516 using place value counters?

I will share the hundreds into groups of ____.

I have ___ groups of ____.

I have ___ remaining.

What do you need to do next?

I will share the tens into groups of ____.

I have ___ groups of ____.

I have ___ remaining.

What do you need to do next?

I will share the ones into groups of ____.

I have ___ groups of ____.

516 ÷ 4 = ?

I do - Adult Modelling

613 ÷ 4 =
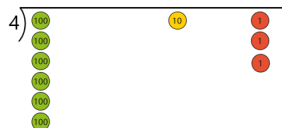
First I will write the divisor (4) and the dividend (613). I will then represent this using place value counters alongside.

I will share the hundreds into groups of 4 (divisor).

I have **1** group of 4. I have 2 hundreds remaining.

I will exchange 2 hundreds for 20 tens.

I now have 21 tens.

I will share the tens into groups of 4 (divisor).

I have **5** groups of 4. I have 1 ten remaining.

I will exchange 1 ten for 10 ones.

I now have 13 ones.

I will share the 13 ones into groups of 4 (divisor).

I have **3** groups of 4 with a remainder of 1

613 ÷ 4 = 153 r 1

We do - Paired Example

517 ÷ 4 =

How will you layout your formal written method?

Can you represent 517 using place value counters?

I will share the hundreds into groups of ____.

I have ___ groups of ____.

I have ___ remaining.

What do you need to do next?

I will share the tens into groups of ____.

I have ___ groups of ____.

I have ___ remaining.

What do you need to do next?

I will share the ones into groups of ____.

I have ___ groups of ____ with a remainder of ____.

517 ÷ 4 = ?

You do: Intelligent Practice

A farmer has 157 eggs.
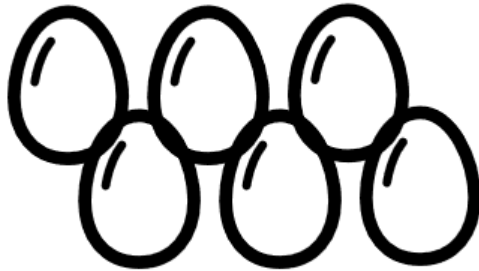
He stores them in trays.

Each tray holds 6 eggs.

1. How many full trays of eggs can the farmer fill?

2. How many eggs will be left over?

3. How many trays will he need to hold **all** of the eggs?

Assessment Opportunities

- Check that pupils can represent the numbers using the place value counters

- Check that pupils can lay out the formal written method accurately using place value.

- Check that pupils group using the divisor.

- Check that pupils are confident with the procedure before moving on to questions that involve remainders.

- Check that pupils can interpret the remainder in the context of the word problem.

Next Steps

6 children can sit on one picnic bench.

There are 134 children.

How many picnic benches are needed so each child can sit down?

Morgan has worked out the answer to the question as <u>22 picnic benches</u>.

Agree or disagree?

Counting Starter

Counting in steps of $\frac{1}{5}$ from zero.

Use a number line and a counting stick to support counting in fifths. It may be helpful to use five frames or bar models to visually represent one fifth.

One fifth

Two fifths

Three fifths

Five fifths
One whole

Seven fifths
One whole and two fifths

Ten fifths
Two wholes
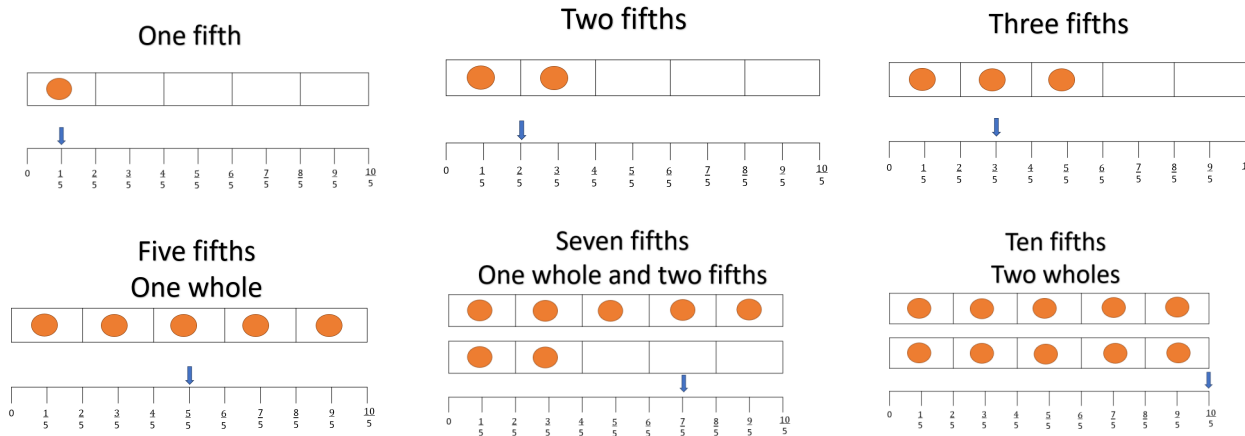
Revisit counting in steps of 0.2 from zero.

Encourage pupils to recognise the link between one fifth, 20% and 0.2 linked to the bar model.

What other key facts can you recall linked to the bar model?

Use a number line and a counting stick to support counting in steps of 0.2 and 20%.

1 whole = 1.0 = 100%				
$\frac{1}{5}$	$\frac{1}{5}$	$\frac{1}{5}$	$\frac{1}{5}$	$\frac{1}{5}$
0.2	0.2	0.2	0.2	0.2
20%	20%	20%	20%	20%

- I'm going to start to count now, and I want you to carry on when I stop "0, 0.2, 0.4, 0.6, 0.8, 1, 1.2 ….."
- "100%, 80%, 60%....."
- What patterns do you notice?

Main Learning Focus

Identify, name and write equivalent fractions of a given fraction.

Previous Experience

Recognise and show, using diagrams, families of common equivalent fractions.

Verbal Coding and Stem Sentences

The numerator has been multiplied by _____, so if the denominator is multiplied by _____ , then the fractions will be equivalent.

Watch Out For

- Pupils who do not recognise the number of equal parts in the whole.
- Pupils who not draw the wholes as the same length.
- Pupils who do not understand the language of numerator or denominator.

44

Fractions: Session 1

I do - Adult Modelling

$$\frac{1}{4} = \frac{3}{12}$$
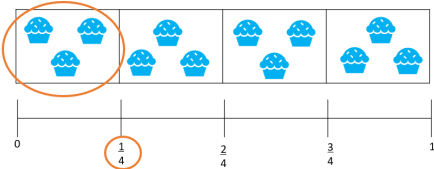
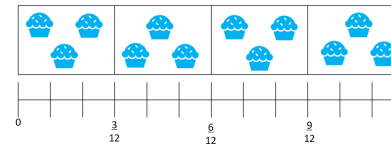I notice that the whole is divided into 4 equal parts, and one of those parts is circled.
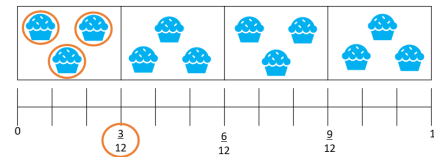
I notice that the whole is divided into 12 equal parts, and three parts are circled.

The numerator has been multiplied by 3, so if the denominator is multiplied by 3, then the fractions will be equivalent.
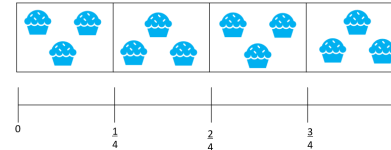
We do - Paired Example
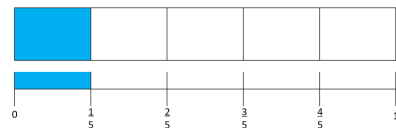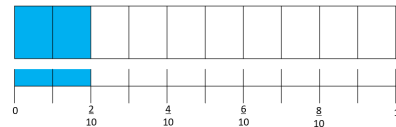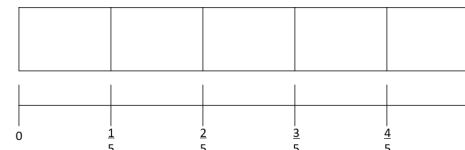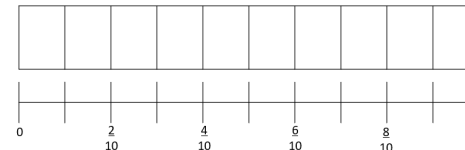
How many equivalent fractions can you find using the image?

Can you check your equivalent fractions by using the stem sentence below?

The numerator has been multiplied by ___, so if the denominator is multiplied by ___, then the fractions will be equivalent.

I do - Adult Modelling

$$\frac{1}{5} = \frac{2}{10}$$

I notice that the whole is divided into 5 equal parts, and one of those parts is shaded.

I notice that the whole is divided into 10 equal parts, and two parts are shaded.

The numerator has been multiplied by 2, so if the denominator is multiplied by 2, then the fractions will be equivalent.

We do - Paired Example

How many equivalent fractions can you find using the image?

Can you check your equivalent fractions by using the stem sentence below?

The numerator has been multiplied by ___, so if the denominator is multiplied by ___, then the fractions will be equivalent.

45

Fractions: Session 1

You do: Intelligent Practice

Can you draw a bar model and/or a number line to prove that these fractions are equivalent?

$$\frac{1}{2} = \frac{4}{8} \qquad \frac{2}{3} = \frac{8}{12}$$

$$\frac{3}{4} = \frac{12}{16} \qquad \frac{3}{8} = \frac{6}{16}$$

The numerator has been multiplied by ___, so if the denominator is multiplied by ___, then the fractions will be equivalent.

Assessment Opportunities

- Check that pupils are keeping the bar models/ number lines the same length to avoid misconceptions.

- Check pupils are making connections between the denominator of a fraction and the number of equal parts needed to make one whole.

- Check that pupils are able to recognise and represent equivalent fractions using concrete resources or bar models.

Next Steps

Write the two missing values to make these equivalent fractions correct.

$$\frac{\square}{5} = \frac{6}{10} = \frac{12}{\square}$$

Fractions: Session 2

Counting Starter

Read scales graded in different sized steps.

If we divide the hundred into 2 equal parts, what is the value of each part?

What if we divide the hundred into 4 equal parts?

5 equal parts?

10 equal parts?

2 part — 100

4 part — 100

5 part — 100

10 part — 100
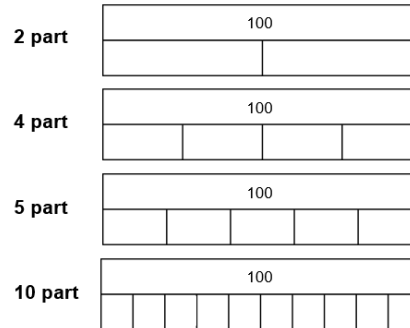
Key Questions

- Let's count forwards and backwards in fifties from zero to one hundred.
- Now let's count forwards and backwards in steps of twenty-five.
- If we count in steps of twenty, what comes after 40? Before 100?
- If I count in tens, what comes between 30 and 50?
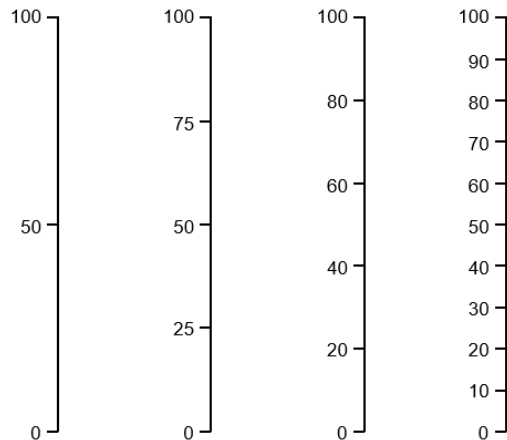
Main Learning Focus

Compare and order fractions whose denominators are all multiples of the same number.

Previous Experience

Recognise and show, using diagrams, families of common equivalent fractions.

Verbal Coding and Stem Sentences

The numerator has been multiplied by _____, so if the denominator is multiplied by _____ , then the fractions will be equivalent.

Watch Out For

- Pupils who do not recognise the number of equal parts in the whole.
- Pupils who not draw the wholes as the same length.
- Pupils who do not understand the language of numerator or denominator.
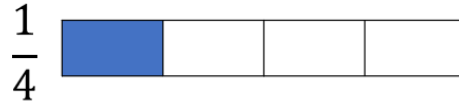
I do - Adult Modelling

Place these fractions in ascending order. $\frac{1}{2}$ $\frac{3}{8}$ $\frac{1}{4}$ $\frac{10}{16}$

First I will draw 4 blank bar models of equal length so I can compare the number of parts within the whole.

I will divide each bar model into 2 parts.
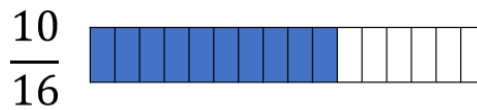I will shade one bar model in to represent 1 our of 2 parts.

$\frac{1}{2}$

I will then half each part again to represent quarters.
I will shade 1 out of the 4 parts.

$\frac{1}{4}$

I will then half each quarter again to represent eighths. I will shade 3 our of the 8 parts.

$\frac{3}{8}$

Finally, I will half each eighth to represent sixteenths. I will shade 10 out of the 16 parts.

$\frac{10}{16}$

Now I can compare the fractions and order them smallest to largest.

$\frac{1}{4}$ $\qquad$ $\frac{3}{8}$ $\qquad$ $\frac{1}{2}$ $\qquad$ $\frac{10}{16}$

We do—Paired Example

Place these fractions in ascending order $\frac{3}{4}$ $\frac{7}{8}$ $\frac{1}{2}$ $\frac{5}{16}$

Can you make any predictions before you start?

Why do you think this?

Can you draw each fraction as a bar model?

What do you need to remember?

How many parts are in the whole?

How many parts will you shade?

Can you order the fractions from smallest to largest?

Fractions: Session 2

You do: Intelligent Practice

Put these fractions in **<u>descending</u>** order:

$$\frac{1}{3} \qquad \frac{3}{24} \qquad \frac{5}{6} \qquad \frac{6}{12}$$
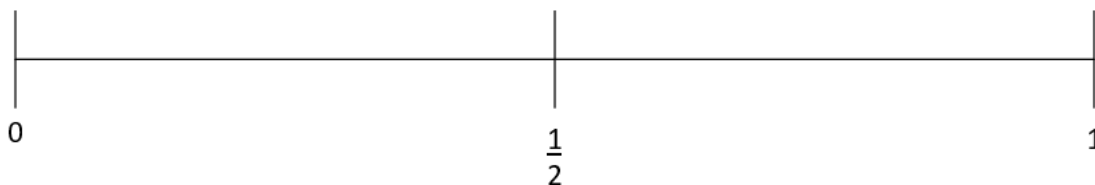
Can you make any predictions before you start?

Why do you think this?

Can you draw each fraction as a bar model?

Can you order the fractions from largest to smallest?

Challenge:

Can you place the fractions on this number line?

Assessment Opportunities

- Check that pupils are keeping the bar models/ number lines the same length to avoid misconceptions.

- Check pupils are making connections between the denominator of a fraction and the number of equal parts needed to make one whole.

- Check that pupils are able to recognise and represent equivalent fractions using concrete resources or bar models.

- Check that pupils are starting to make generalisations about fractions equivalent to a half, third and quarter.

  - Half: the denominator is double the numerator
  - Third: the denominator is three times the numerator
  - Quarter: the denominator is four times the numerator
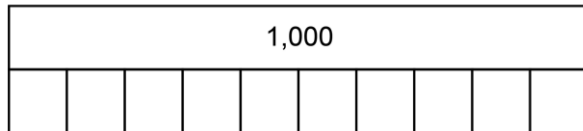
Next Steps

Write two **different** fractions that are greater than $\frac{1}{2}$ but less than 1
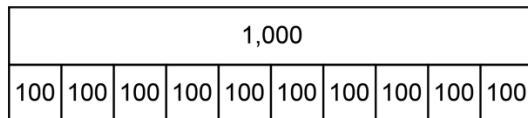
Fractions: Session 3

Counting Starter

Read scales graded in different sized steps.

| 1,000 |
|-------|

What kind of representation have we used this time?
How many parts are there?
What do you think we need to count in?
How do you know?
Let's count….

1,000

| 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |

"100, 200, 300….one thousand"
Why don't we say ten hundred?

Key Questions

- Let's count in five hundreds from zero to a thousand.
- Now let's count in steps of two hundred and fifty, two hundred, one hundred.
- Can you count backwards from each of these?
- If I count in steps of 200, what comes after 400? Before 1000?
- If I count in one hundreds, what comes between 300 and 500?
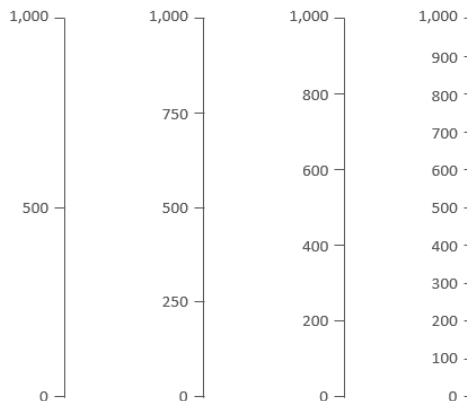
Main Learning Focus

Add and subtract fractions with the same denominator (beyond 1).

Previous Experience

Year 4: Add and subtract fractions with the same denominator (within 1).

Verbal Coding and Stem Sentences

The whole has been divided into _____ equal parts.

When fractions have the same _____ , to add them I just add the _____.

When fractions have the same _____ , to subtract them I just subtract the _____.

Watch Out For

- Pupils who add / subtract both the numerators and denominators.

- Pupils who are not secure in knowing how many equal parts to divide the bar models into.

Fractions: Session 3
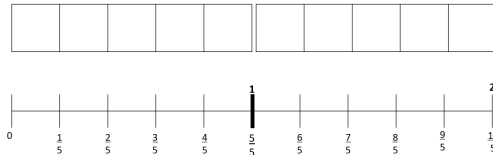
I do - Adult Modelling

$$\frac{4}{5} + \frac{3}{5} =$$

When fractions have the same denominator, to add them I just add the numerators.

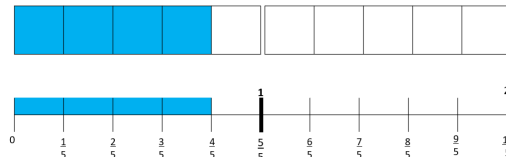I know that $\frac{4}{5} + \frac{1}{5} = \frac{5}{5}$, which is the same as 1 whole.

$\frac{4}{5} + \frac{3}{5}$ will be more than 1 whole.

I will need to draw two bar models, each one representing **one whole divided into 5 equal parts**.
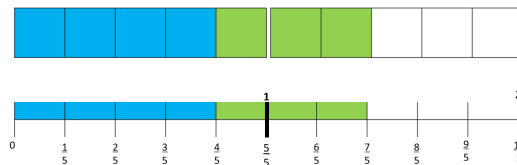
I can also represent this as a number line counting up in fifths.

Then I will shade in $\frac{4}{5}$

Then I will shade in $\frac{3}{5}$

$$\frac{4}{5} + \frac{3}{5} = \frac{7}{5}$$

We do: Paired Example

$$\frac{4}{5} + \frac{4}{5} =$$

When fractions have the same denominator, to add them I just add the _____.

How many fifths make 1 whole?

The whole has been divided into ____ equal parts.

How many bar models will you need to draw?

How many equal parts will you need to divide each bar model into?

What will you be counting up in on a number line?

What will you shade in first?

What will you shade in next?

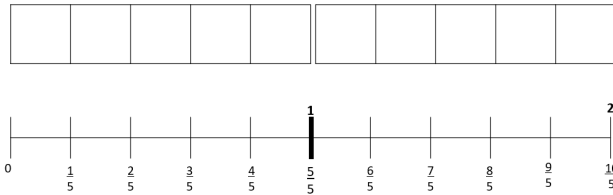What is the answer?

$$\frac{4}{5} + \frac{4}{5} =$$

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I do - Adult Modelling

$$\frac{8}{5} - \frac{5}{5} =$$

When fractions have the same denominator, to subtract them I just subtract the numerators.
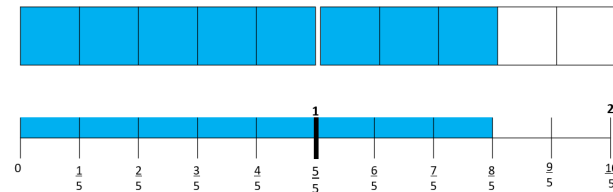
I know that $\frac{8}{5}$ is greater than 1 whole because there are 5 fifths in 1 whole.

To represent this, I will need to draw two bar models, each one representing **one whole divided into 5 equal parts**.
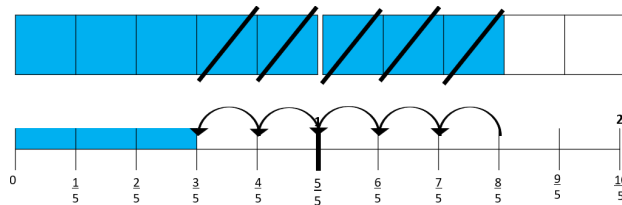
I can also represent this as a number line counting up in fifths.

I will shade in $\frac{8}{5}$.

To subtract $\frac{5}{5}$, I will need to cross off or count back 5 fifths.

$$\frac{8}{5} - \frac{5}{5} = \frac{3}{5}$$

We do: Paired Example

$$\frac{6}{5} - \frac{2}{5} =$$

When fractions have the same denominator, to subtract them I just subtract the _____.

How many fifths make 1 whole?

The whole has been divided into ____ equal parts.

How many bar models will you need to draw?

How many equal parts will you need to divide each bar model into?

What will you be counting up in on a number line?

What will you shade in?

What do you need to cross out or count back?

What is the answer?

$$\frac{6}{5} - \frac{2}{5} =$$

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Fractions: Session 3

You do: Intelligent Practice

Draw a bar model and/or number line to show your mathematical understanding.

Adding fractions:

$$\frac{6}{8} + \frac{4}{8} =$$

$$\frac{3}{4} + \frac{3}{4} =$$

$$\frac{5}{7} + \frac{3}{7} =$$

$$\frac{5}{6} + \frac{4}{6} =$$

Subtracting fractions:

$$\frac{10}{8} - \frac{4}{8} =$$

$$\frac{5}{4} - \frac{2}{4} =$$

$$\frac{12}{7} - \frac{6}{7} =$$

$$\frac{7}{6} - \frac{5}{6} =$$

Assessment Opportunities

- Check that pupils are able to recognise and represent equivalent fractions using concrete resources or bar models.

- Check that pupils are not adding / subtracting denominators and numerators.

- Check that pupils know how many equal parts to divide the bar models into.

- Check that pupils know how to count on / count back on a number line in fractional steps.

Next Steps

Reeves buys two cakes and cuts each one into 8 equal pieces.
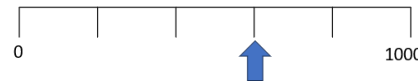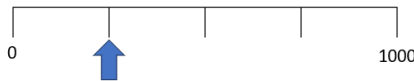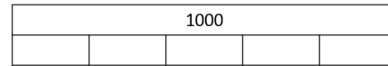
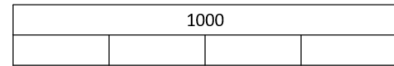Reeves eats $\frac{5}{8}$ and Greg eats $\frac{4}{8}$.

What fraction of the two cakes is left?

Fractions: Session 4

Counting Starter

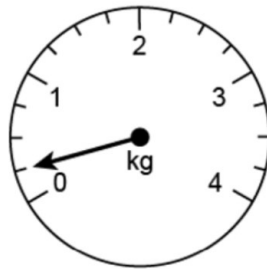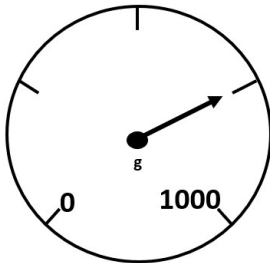**Read scales graded in different sized steps.**

	1000		

	1000			

0 ⬆ 1000   0 ⬆ 1000

Key Questions
- How many parts are there?
- What do you think we need to count in?
- What number is the blue arrow pointing to?
- How do you know?

If 1000 is shared into ___ equal parts, then each part is worth ____.

Key Questions
- How many grams are in 1 kg?
- How many parts are there?
- What do you think we need to count in?
- What number is the arrow pointing to?
- How do you know?

If 1000 is shared into ___ equal parts, then each part is worth ____.

Main Learning Focus

Add and subtract fractions with denominators that are multiples of the same number.

Previous Experience

Add and subtract fractions with the same denominator (beyond 1).

Verbal Coding and Stem Sentences

Fractions must have the same _____ before they can be added/subtracted.

The denominator has been multiplied by ___ , so to make the equivalent fraction, multiply the numerator by ___.

When fractions have the same _____ , to add/subtract them I just add/subtract the _____.

Watch Out For

- Pupils who do not make the denominators equal before adding/subtracting.
- Pupils who add / subtract both the numerators and denominators.
- Pupils who are not secure in knowing how many equal parts to divide the bar models into.

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Fractions: Session 4

I do - Adult Modelling

Adding fractions.

$$\frac{1}{5} + \frac{3}{10} =$$

Fractions must have the same denominator before they can be added.

I notice that 10 is a multiple of 5 so I only need to find an equivalent fraction for $\frac{1}{5}$.

I know that $\frac{1}{5}$ is equal to $\frac{2}{10}$. The denominator has been multiplied by 2, so to make the equivalent fraction, multiply the numerator by 2.

$$\frac{1}{5} + \frac{3}{10} \text{ can now be written as } \frac{2}{10} + \frac{3}{10}$$

When fractions have the same denominator, to add them I just add the numerators.

.

$$\frac{2}{10} + \frac{3}{10} =$$

$$\frac{2}{10} + \frac{3}{10} = \frac{5}{10}$$

We do—Paired Example

Adding fractions.

$$\frac{5}{12} + \frac{2}{4} =$$

Fractions must have the same _____ before they can be added.

What do you notice about the denominators?

Can you use your knowledge of multiples to help you convert efficiently?

Use bar models to help you find an equivalent fraction for $\frac{2}{4}$.

What is your new number sentence? $\quad \frac{5}{12} + \frac{\square}{12}$

The denominator has been multiplied by ___ , so to make the equivalent fraction, multiply the numerator by ___.

Can you use a bar model or number line to help you add the fractions together?

When fractions have the same _____ , to add them I just add the _____.

$$\frac{5}{12} + \frac{\square}{12} = \frac{\square}{12}$$

Fractions: Session 4

I do - Adult Modelling

Subtracting fractions

$$\frac{7}{10} - \frac{3}{5} =$$

Fractions must have the same denominator before they can be subtracted.

I notice that 10 is a multiple of 5 so I only need to find an equivalent fraction for $\frac{3}{5}$.

I know that $\frac{3}{5}$ is equal to $\frac{6}{10}$. The denominator has been multiplied by 2, so to make the equivalent fraction, multiply the numerator by 2.

$$\frac{7}{10} - \frac{3}{5} \text{ can now be written as } \frac{7}{10} - \frac{6}{10}$$

When fractions have the same denominator, to subtract them I just subtract the numerators.

$$\frac{7}{10} - \frac{6}{10} =$$

$$\frac{7}{10} - \frac{6}{10} = \frac{1}{10}$$

We do- Paired Example

Subtracting fractions

$$\frac{10}{12} - \frac{2}{4} =$$

Fractions must have the same _____ before they can be subtracted.

What do you notice about the denominators?

Can you use your knowledge of multiples to help you convert efficiently?

Use bar models to help you find an equivalent fraction for $\frac{2}{4}$.

What is your new number sentence?

$$\frac{10}{12} - \frac{\square}{12} =$$

The denominator has been multiplied by ___ , so to make the equivalent fraction, multiply the numerator by ___.

Can you use a bar model or number line to help you subtract the fractions?

When fractions have the same _____ , to subtract them I just subtract the _____.

$$\frac{10}{12} - \frac{\square}{12} = \frac{\square}{12}$$

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You do: Intelligent Practice

Adding fractions:

$$\frac{5}{8} + \frac{1}{4} =$$

$$\frac{2}{3} + \frac{2}{9} =$$

$$\frac{11}{30} + \frac{6}{10} =$$

$$\frac{3}{5} + \frac{5}{20} =$$

The denominator has been multiplied by ___ , so to make the equivalent fraction, multiply the numerator by ___.

When fractions have the same _____ , to add them I just add the _____.

Subtracting fractions:

$$\frac{7}{8} - \frac{1}{4} =$$

$$\frac{3}{4} - \frac{1}{2} =$$

$$\frac{24}{30} - \frac{6}{10} =$$

$$\frac{5}{6} - \frac{5}{12} =$$

When fractions have the same _____ , to subtract them I just subtract the _____.

Assessment Opportunities

- Check that pupils are able to recognise and represent equivalent fractions using concrete resources or bar models.

- Check that pupils are not adding / subtracting denominators and numerators.

- Check that pupils are not changing both denominators if one is a multiple of another.

- Check that pupils know how many equal parts to divide the bar models into.

- Check that pupils know how to count on / count back on a number line in fractional steps.

Next Steps

$$\frac{1}{4} + \frac{2}{[?]} = \frac{[?]}{20}$$

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