

St Paul's Primary School



Calculation Policy
2025

Addition: Year 1

Add with numbers up to 20

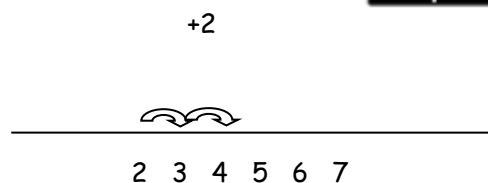
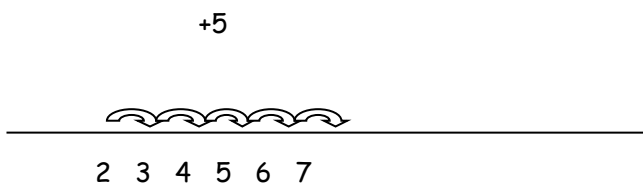
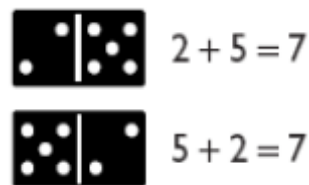
Key vocabulary: add, more, plus, and, make, altogether, total, equal to, equals, double, most, count on, number line

Key skills for addition at Y1:

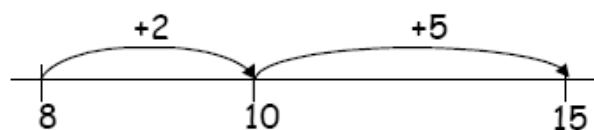
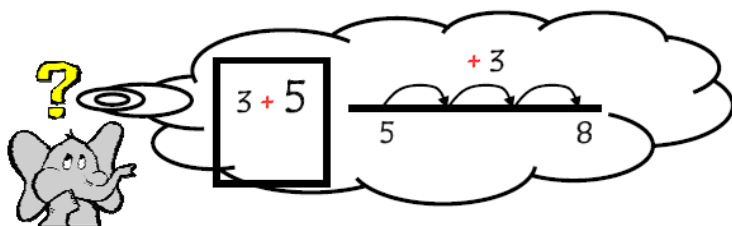
- Read and write numbers to 100 in numerals, incl. 1–20 in words
- Recall bonds to 10 and 20, and addition facts within 20
- Count to and across 100
- Count in multiples of 1, 2, 5 and 10
- Solve simple 1-step problems involving addition, using objects, number lines and pictorial representations.
- Be confident with place value up to 50 (specific focus on being able to discuss the tens and ones) "Forty-two has four tens and 2 ones"
- Can say their teen numbers clearly and can talk about the property of the number 13 is one ten and 3 ones.

Add one-digit and two-digit numbers to 20, including zero

Know that addition can be done in any order
(Record on number line using count on)



When the children have a lot of experience with count on to ten, they should be able to identify the next stage: Put the biggest number first and count on. (This is because it is easier, quicker and more accurate).



Add 3 or more single digit numbers

$$8 + 7 + 3 =$$

Encourage children to look for known facts, e.g. number bonds. E.g. $(7+3) + 8$

Read, write and interpret mathematical statements involving addition (+) and equals (=) signs

It is important that children have a clear understanding of the concept of equality, before using the '=' sign. Calculations should be on either side of the '=' so that children don't misunderstand '=' as to mean 'the answer'.

$$15 + 2 = 17$$

$$15 = 3 + 12$$

Solve one-step problems that involve addition using concrete objects and pictorial representations, and missing number problems such as $7 = \square + 4$

To support this, when solving calculations, missing numbers should be placed in all possible places:

$$3 + 4 = \square \quad \square = 4 + 3$$

$$3 + \square = 7 \quad 7 = \square + 4$$

$4 + \square = 7 \quad 7 = 3 + \square$

Addition: Year 2

Add with 2-digit numbers. Developing mental fluency with addition and place value involving 2-digit numbers, then establish more formal methods.

Key vocabulary: add, more, plus, and, make, altogether, total, equal to, equals, double, most, count on, number line, sum, tens, units, partition, addition, column, tens boundary

Key skills for addition at Y2:

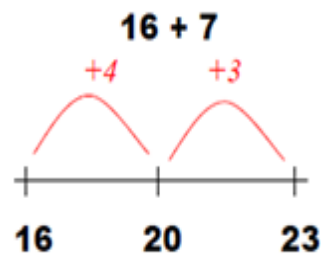
- Add a 2-digit number and ones (e.g. $27 + 6$)
- Add a 2-digit number and tens (e.g. $23 + 40$)
- Add pairs of 2-digit numbers (e.g. $35 + 47$)
- Add three single-digit numbers (e.g. $5 + 9 + 7$)
- Show that adding can be done in any order (the commutative law).
- Recall bonds to 20 and bonds of tens to 100 ($30 + 70$ etc.)
- Count in steps of 2, 3 and 5 and count in tens from any number - they may struggle initially but this is a strong focus for Year 2.
- Understand the place value of 2-digit numbers (tens and ones) building up from 50 from Year 1.

Add numbers using concrete objects, pictorial representations, and mentally, including:

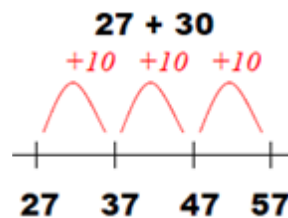
Add 2-digit numbers and units:

Use count on strategy....."Put 15 in your head and count on 2....15, 16, 17".

Use 0-100 number lines and empty number lines to build confidence and fluency in mental addition skills.

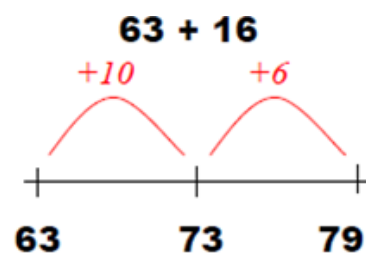


Add 2-digit numbers and tens.



Add pairs of 2-digit numbers.

Use empty number lines to add two 2 digit numbers, by counting on in multiples of ten then multiples of one.



Partition into tens and tens and ones and recombine.

$$\begin{aligned} 12 + 23 &= 10 + 2 + 20 + 3 \\ &= 10 + 20 + 2 + 3 \\ &= 30 + 5 \\ &= 35 \end{aligned}$$

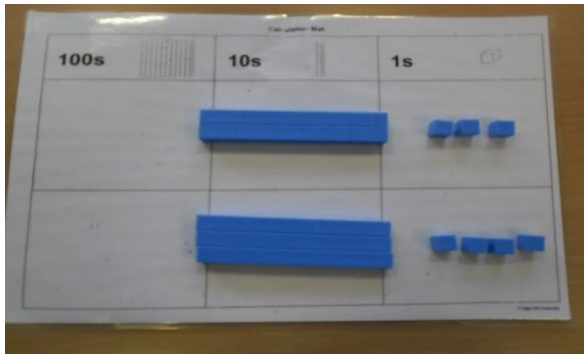
Refine to partitioning the second number only.

$$\begin{aligned} 23 + 12 &= 23 + 10 + 2 \\ &= 33 + 2 \\ &= 35 \end{aligned}$$

Record addition in columns using a calculation mat and diennes.

Solve calculations that do not cross the tens boundary until they are secure using the method. Place value with tens and units must be secure.

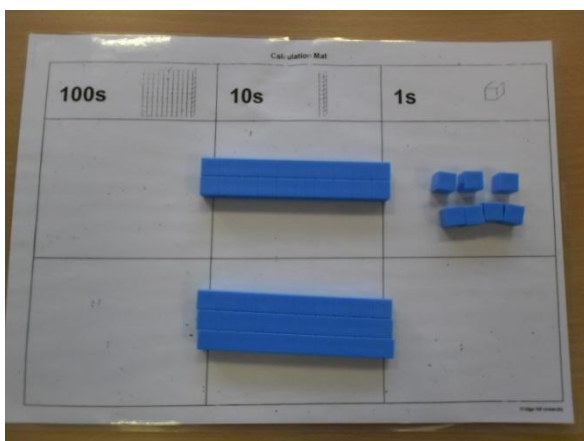
$$23 + 34 =$$



Make each number using diennes on the calculation mat as above. Record in books as column addition.

$$\begin{array}{r} 23 \\ + 34 \\ \hline \end{array}$$

Model and frame this.



Push the units up to add together.
Record the units.

$$\begin{array}{r} 23 \\ + 34 \\ \hline 7 \end{array}$$



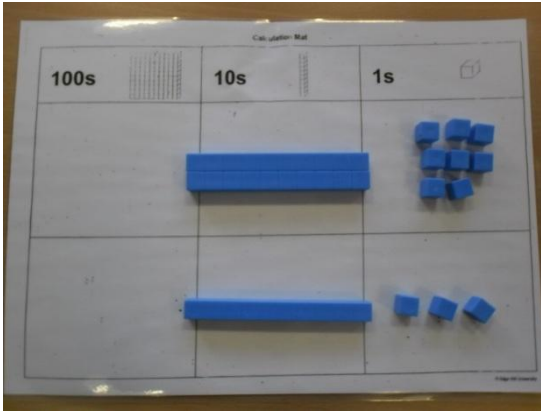
Push the tens up to add together.
Record the tens.

$$\begin{array}{r} 23 \\ + 34 \\ \hline 57 \end{array}$$

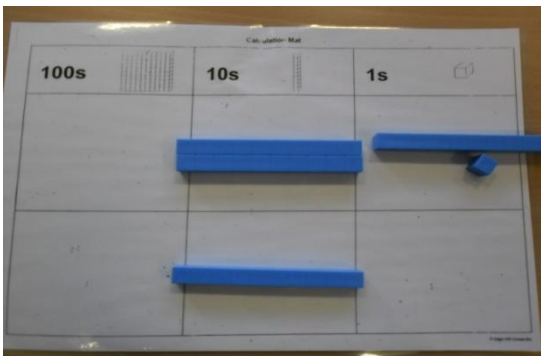
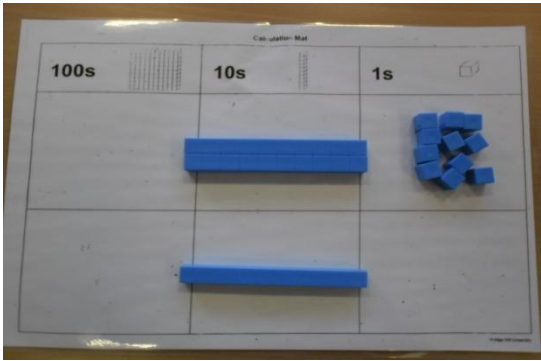
Solve calculations that cross the tens boundary.

In preparation for this stage play the 'exchange' game.....start with 'first to thirty wins'.

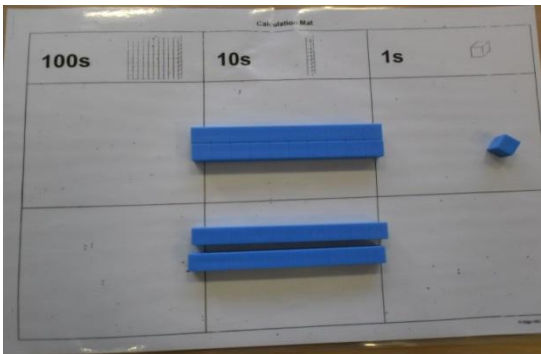
$$28 + 13 =$$



Record in books as column addition. $28 + 13$

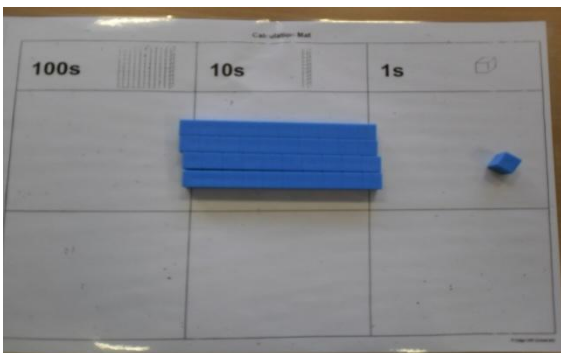


Push the units up and add together. Exchange 10 units for a ten.



Move the ten into the 10s column.
Record

$$\begin{array}{r} 28 \\ +13 \\ \hline 1 \\ \hline 1 \end{array}$$



Push the tens up and add together.

$$\begin{array}{r} 28 \\ +13 \\ \hline 41 \\ \hline 1 \end{array}$$

Solve problems with addition

- Using concrete objects and pictorial representations, including those involving numbers, quantities and measures
- Applying increasing knowledge of mental and written methods

Recognise and use the inverse relationship between addition and subtraction and use this to solve missing number problems and check calculations. Understand that addition can be done in any order. If struggling focus on 4 facts initially and then build up to 8 facts by the end of the year.

$$\begin{array}{cccc} 7 + 3 = 10 & 10 - 7 = 3 & 10 = 7 + 3 & 10 - 7 = 1 + ? \\ 3 + 7 = 10 & 10 - 3 = 7 & 10 = 3 + 7 & 10 - 3 = ? + 2 \end{array}$$

Addition: Year 3

Add numbers with up to 3-digits

Key vocabulary: add, more, plus, and, make, altogether, total, equal to, equals, double, most, count on, number line, sum, tens, units, partition, plus, addition, column, tens, hundreds, increase, vertical, exchange, expanded, compact, commutative

Key skills for addition at Y3:

- Read and write numbers to 1000 in numerals and words.
- Add 2-digit numbers mentally, incl. those exceeding 100.
- Add a three-digit number and ones mentally ($175 + 8$)
- Add a three-digit number and tens mentally ($249 + 50$)
- Add a three-digit number and hundreds mentally ($381 + 400$)
- Estimate answers to calculations, using inverse to check answers.
- Solve problems, including missing number problems, using number facts, place value, and more complex addition.
- Recognise place value of each digit in 3-digit numbers (hundreds, tens, ones.)
- Continue to practise a wide range of mental addition strategies, ie. number bonds, adding the nearest multiple of 10, 100, 100 and adjusting, using near doubles, partitioning and recombining.

Add numbers mentally, including

- A three digit number and ones
- A three digit number and tens
- A three digit number and hundreds

Use count on:

$$115 + 2 \quad \text{Put 115 in your head and count on 2.....115, 116, 117.}$$

Partition and reassemble:

$$\begin{aligned} 27 + 90 &= 100 + 20 + 7 + 90 \\ &= 100 + 110 + 7 \\ &= 100 + 117 \\ &= 217 \end{aligned}$$

Add near numbers and adjust:

$$\begin{aligned} 433 + 90 &= 433 + 100 - 10 \\ &= 533 - 10 \\ &= 523 \end{aligned}$$

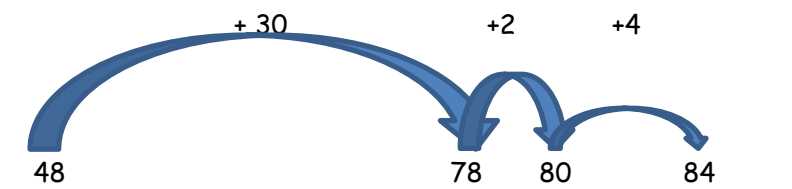
Count on by splitting units to make next multiple of ten/hundred:

$$\begin{aligned} 360 + 80 &= 360 + 40 + 40 \\ &= 400 + 40 \\ &= 440 \end{aligned}$$

Add two, two digit numbers (including answers that cross 100)

Count on with number lines:

$$48 + 36 = 84$$



Partition both numbers and recombine:

$$\begin{aligned} 27 + 82 &= 20 + 7 + 80 + 2 \\ &= 80 + 9 \\ &= 89 \end{aligned}$$

Count on by partitioning the second number only:

$$\begin{aligned} 36 + 93 &= 93 + 30 + 6 \\ &= 123 + 6 \\ &= 129 \end{aligned}$$

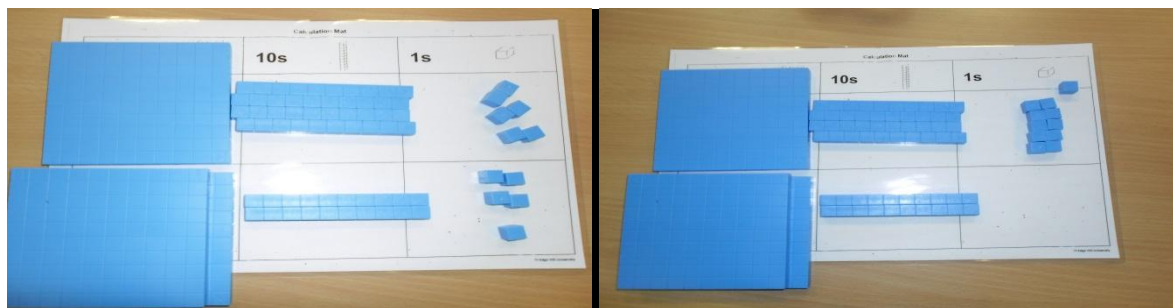
Add the nearest multiple of 10, then adjust:

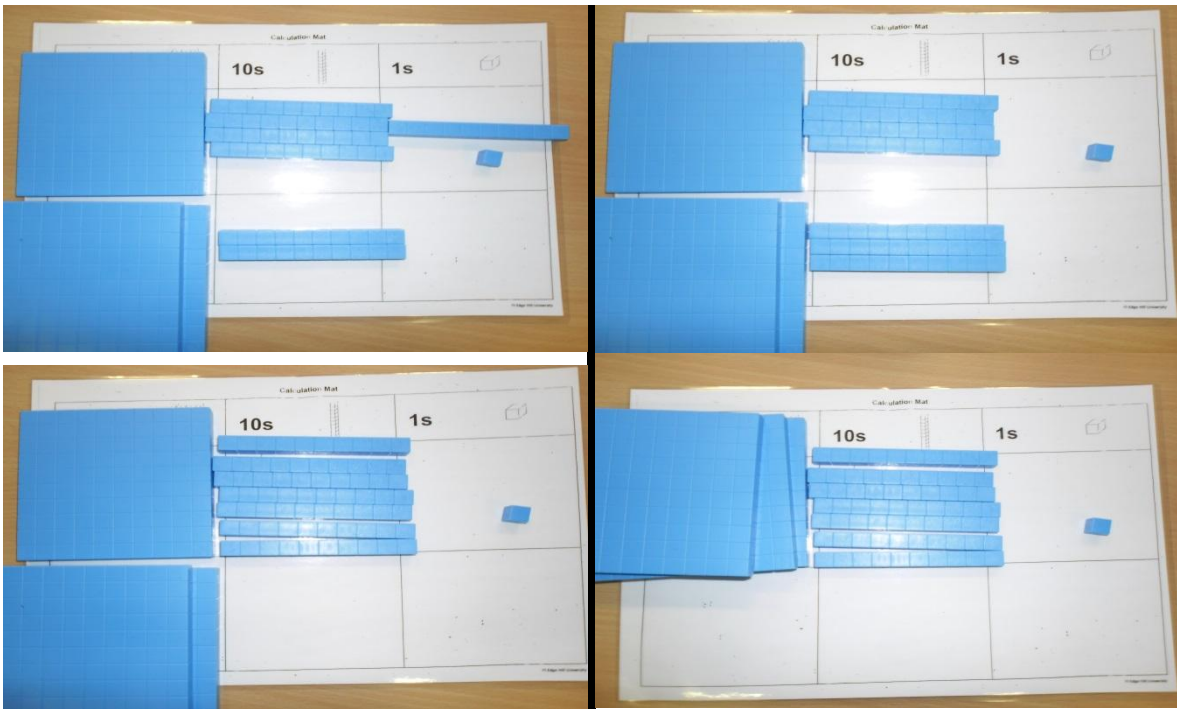
$$63 + 59 = 63 + 60 - 1$$

Add numbers with up to three digits, using formal written methods of columnar addition. Use calculation mat and firstly diennes to support conceptual understanding.

Play the 'exchange' game to prepare for column addition crossing the tens and hundreds.

146 + 225 = using counters - this may challenge them initially but continue to revisit throughout the year so that they become more confident. Initially, it may be the HA who are able to confidently complete the below activity.



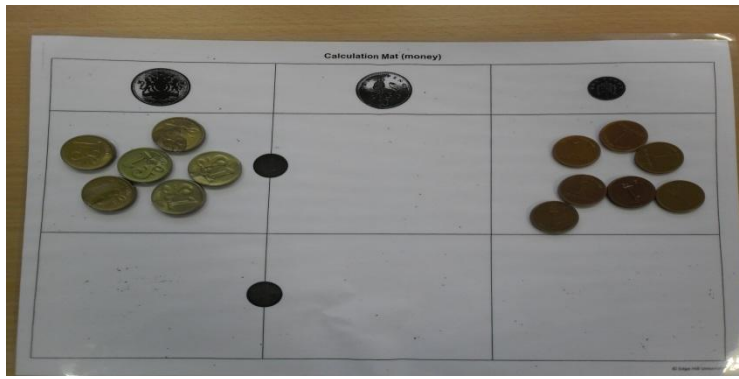


Record

$$\begin{array}{r}
 146 \\
 +225 \\
 \hline
 371 \\
 \hline
 1
 \end{array}$$

Add money: Play the 'exchange' game with money and a treasure chest.
 $\pounds 3.54 + \pounds 2.53 =$





Record

$$\begin{array}{r}
 \pounds 3.54 \\
 + \pounds 2.53 \\
 \hline
 \pounds 6.07 \\
 \hline
 1
 \end{array}$$

Solve missing number problems using number facts, place value, and more complex addition. Estimate the answer to a calculation and use inverse operations to check answers.

Year 4: Addition

Add numbers with up to four digits

Key vocabulary: add, more, plus, and, make, altogether, total, equal to, equals, double, most, count on, number line, sum, tens, units, partition, plus, addition, column, tens, hundreds, increase, vertical, thousands, hundreds, digits, inverse

Key skills for addition at Y4:

- Select most appropriate method: mental, jottings or written and explain why.
- Recognise the place value of each digit in a four-digit number.
- Round any number to the nearest 10, 100 or 1000.
- Estimate and use inverse operations to check answers.
- Solve 2-step problems in context, deciding which operations and methods to use and why.
- Find 1000 more or less than a given number.
- Continue to practise a wide range of mental addition strategies, ie. number bonds, use near doubles, partitioning.
- Add numbers with up to 4 digits using the formal written method of column addition
- Solve 2-step problems in contexts, deciding which operations and methods to use and why.
- Estimate and use inverse operations to check answers to a calculation.

Add numbers mentally including:

- A four digit number and ones
- A four digit number and tens
- A four digit number and hundreds
- A four digit number and thousands

Counting on $3115 + 2$ Put 3115 in your head, 3116, 3117

Partition number and recombine

$$\begin{aligned}
 5127 + 2000 &= \\
 &= 5000 + 100 + 20 + 7 + 2000 \\
 &= 7000 + 100 + 20 + 7 \\
 &= 7127
 \end{aligned}$$

Add near numbers and adjust

$$7433 + 90 = 7493 + 100 - 10$$

$$= 7593 - 10$$

$$= 7523$$

Add three and two digit numbers.

Partition both numbers and recombine

$$358 + 73 = 300 + 50 + 8 + 70 + 3$$

$$= 300 + 120 + 11$$

$$= 420 + 11$$

$$= 431$$

Partition second number only and recombine

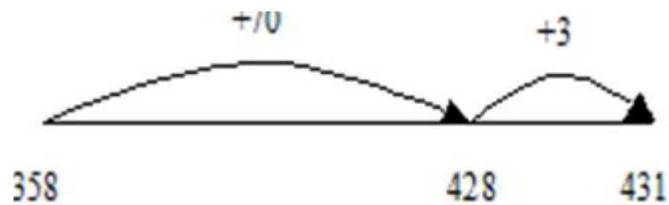
$$358 + 73 = 358 + 70 + 3$$

$$= 428 + 3$$

$$= 431$$

Add the nearest multiple of 10 or 100, then adjust

$$458 + 79 = 458 + 80 - 1$$



Partition with number lines: $358 + 73 =$

Add numbers with up to 4 digits using the formal written method of column addition

To ensure conceptual understanding, it is essential that place value is reinforced frequently. Use a calculation mat and diennes to support and reinforce learning.

Column addition

$$\begin{array}{r} 2358 \\ 373 + \\ \hline 2731 \\ \hline 11 \end{array}$$

Including decimals and using money to support understanding.

$$\begin{array}{r} 72.8 \\ + 54.6 \\ \hline 127.4 \\ \hline 1 \end{array}$$

Year 5: Addition

Add numbers with more than 4 digits

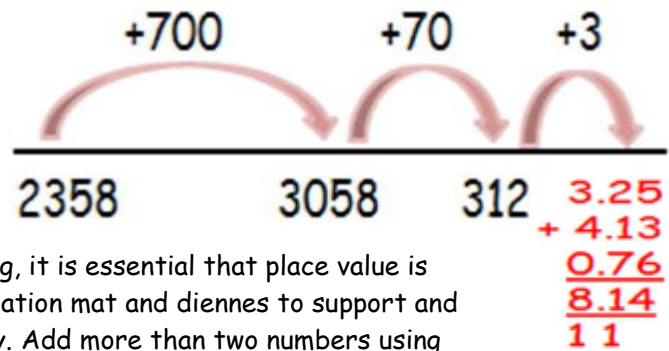
Key vocabulary: add, more, plus, and, make, altogether, total, equal to, equals, double, most, count on, number line, sum, tens, units, partition, plus, addition, column, tens, hundreds, increase, vertical, thousands, hundreds, digits, inverse & decimal places, decimal point, tenths, hundredths, thousandths

Key skills for addition at Y5:

- Add numbers mentally with increasingly large numbers, using and practising a range of mental strategies use near doubles, inverse, using number bonds.
- Use rounding to check answers and accuracy.
- Solve multi-step problems in contexts, deciding which operations and methods to use and why.
- Read, write, order and compare numbers to at least 1 million and determine the value of each digit.
- Round any number up to 1 000 000 to the nearest 10, 100, 1000, 10 000 and 100 000.
- Add numbers with more than 4 digits using formal written method of columnar addition.

Add numbers mentally with increasingly large numbers (eg. $12462 + 2300 = 14762$)

Partition with number lines



Add numbers with more than 4 digits using column addition.

$$\begin{array}{r} 124.90 \\ + 117.25 \\ \hline 242.15 \\ 11 \end{array}$$

To ensure conceptual understanding, it is essential that place value is reinforced frequently. Use a calculation mat and diennes to support and reinforce learning where necessary. Add more than two numbers using compact column method:

Year 6: Addition

Add several numbers of increasing complexity

Key vocabulary: add, more, plus, and, make, altogether, total, equal to, equals, double, most, count on, number line, sum, tens, units, partition, plus, addition, column, tens boundary, hundreds boundary, increase, „carry“, expanded, compact, vertical, thousands, hundreds, digits, inverse, decimal places, decimal point, tenths, hundredths, thousandths

Key skills for addition at Y6:

- Perform mental calculations, including with mixed operations and large numbers, using and practising a range of mental strategies.
- Solve multi-step problems in context, deciding which operations and methods to use and why.
- Use estimation to check answers to calculations and determine, in the context of a problem, levels of accuracy.
- Read, write, order and compare numbers up to 10 million and determine the value of each digit.
- Round any whole number to a required degree of accuracy.
- Pupils understand how to add mentally with larger numbers and calculations of increasing complexity.

Perform mental calculations with mixed operations with large numbers

And decimals

Partition both numbers and recombine:

$$\begin{aligned} 35.8 + 7.3 &= 30 + 5 + 7 + 0.3 \\ &= 30 + 12 + 1.1 \\ &= 42 + 1.1 \\ &= 43.1 \end{aligned}$$

Partition second number only and recombine:

$$\begin{aligned} 35.8 + 7.3 &= 35.8 + 7 + 0.3 \\ &= 42.8 + 0.3 \\ &= 43.1 \end{aligned}$$

Add the nearest whole number and adjust:

$$52 + 11.9 = 52 + 12 - 0.1$$

Practise addition with larger numbers, using the formal written method of columnar addition.

Extend the use of compact column method to adding several numbers with mixed decimals:

Teach the importance of aligning the columns accurately. Where there is an empty space in a decimal column, a zero can be inserted to show the value.

	2	3	.	3	6	1
		9	.	0	8	0
	5	9	.	7	7	0
+		1	.	3	0	0
	9	3	.	5	1	1
	2	1		2		

Use their knowledge of the order of operations to carry out calculations involving the four operations.

Explore the order of operations using brackets, for example:

$$2 + 1 \times 3 = 5 \quad \text{and} \quad (2 + 1) \times 3 = 9$$

Review and investigate the effect of carrying out operations in different orders. Introduce and use BODMAS to solve calculations.

Year 1: Subtraction

Year 1 Subtract from numbers up to 20

Key vocabulary: equal to, take, take away, less, minus, subtract, leaves, distance between, how many more, how many fewer / less than, most, least, count back, how many left, how much less is_?

Key skills for subtraction at Y1:

- Given a number, say one more or one less.
- Count to and over 100, forward and back, from any number.
- Represent and use subtraction facts to 20 and within 20.
- Subtract with one-digit and two-digit numbers to 20, including zero.
- Solve one-step problems that involve addition and subtraction, using concrete objects (ie bead string, objects, cubes) and pictures, and missing number problems.
- Read and write numbers from 0 to 20 in numerals and words.

Subtract one digit and two digit numbers to 20, including zero.

Children consolidate understanding of subtraction practically, showing subtraction on bead strings, using cubes etc. and in familiar contexts, and are introduced to more formal recording using number lines as below:

Practically with objects, fingers etc.

$$5 - 2 = \quad \text{Put 5 in your head or on your fingers.....4,3}$$

Taking away on a number line using count back in ones.

$$11 - 4 =$$



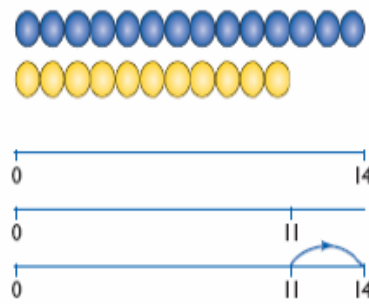
Begin to find the number difference by comparing 2 lines. Also teach the language 'how many more?'
Find a small number difference by counting on from the smallest number.

Read, write and interpret mathematical statements involving subtraction and the equals sign.

Ensure correct understanding of the equals sign and equality:

$$15 - 2 =$$

$$15 = 18 - 3$$



The difference between 11 and 14 is 3.
 $14 - 11 = 3$
 $11 + \square = 14$

Solve one stop problems involving subtraction, using concrete objects and pictorial representations, and missing number problems.

$$16 - 9 =$$

$$16 - ? = 7$$

$$? - 9 = 7$$

$$? - 16 = 9$$

$$7 = 9 - ?$$

Year 2: Subtraction

Subtract with 2-digit numbers

Key vocabulary: equal to, take, take away, less, minus, subtract, leaves, distance between, how many more, how many fewer / less than, most, least, count back, how many left, how much less is_?, difference, count on, strategy, partition, tens, units

Key skills for subtraction at Y2:

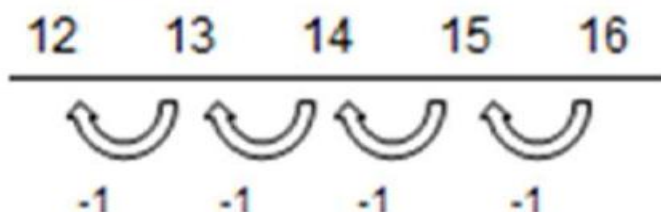
- Recognise the place value of each digit in a two-digit number.
- Recall and use subtraction facts to 20 fluently, and derive and use related facts up to 100.
- Subtract using concrete objects, pictorial representations, 100 squares and mentally, including: a two-digit number and ones, a two-digit number and tens, and two two-digit numbers.
- Show that subtraction of one number from another cannot be done in any order.
- Recognise and use inverse relationship between addition and subtraction, using this to check calculations and missing number problems.
- Solve simple addition and subtraction problems including measures, using concrete objects, pictorial representation, and also applying their increasing knowledge of mental and written methods.
- Read and write numbers to at least 100 in numerals and in words.

Subtract numbers using concrete objects, pictorial representations and mentally, including:

- A two digit number and ones or tens

Use counting back on unprepared number lines to subtract by counting back in **ones**:

$$16 - 4 = 12$$



Use a hundred square to count back in tens. Look at your answer, 'what is different? What stays the same?'

Hundred Square

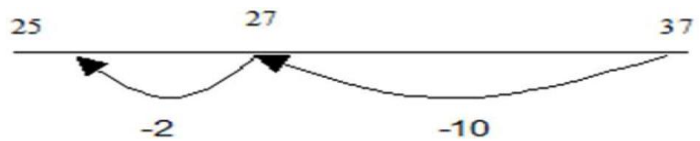
$$43 - 30$$

11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60

- Two, two-digit numbers.

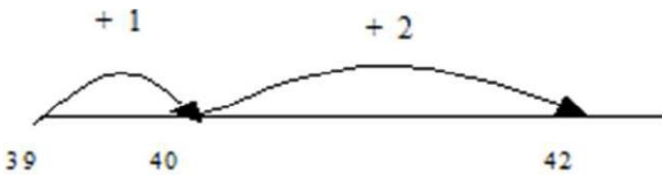
Use known number facts and place value to subtract (partition second number only)

$$\begin{aligned} 37 - 12 &= 37 - 10 - 2 \\ &= 27 - 2 \\ &= 25 \end{aligned}$$



Find a small difference by counting up:

$$42 - 39 =$$



Introduce column subtraction with a calculation mat and diennes (no exchanging).

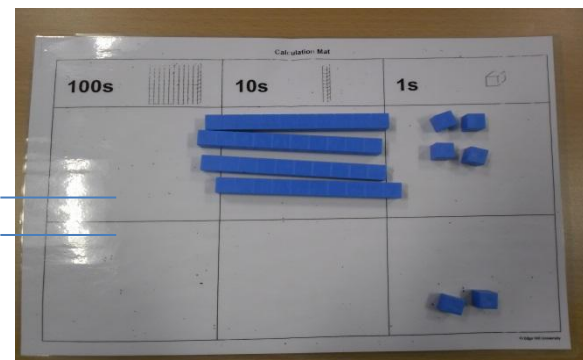
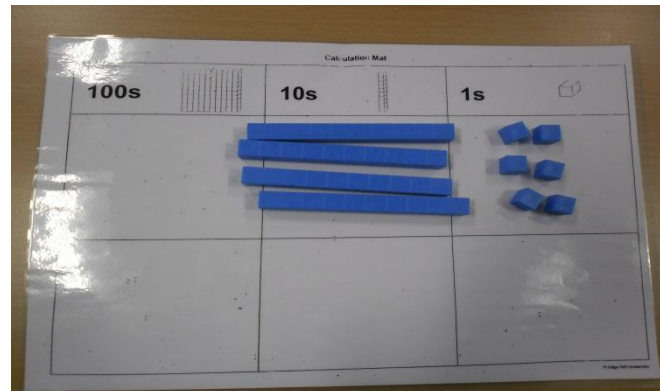
Follow **T**op **S**ign **B**ottom.

$$46 - 22 =$$

Make the top number on the calculation mat using diennes.

Record on whiteboard or in books:

$$\begin{array}{r} 46 \\ - 22 \\ \hline \hline \end{array}$$



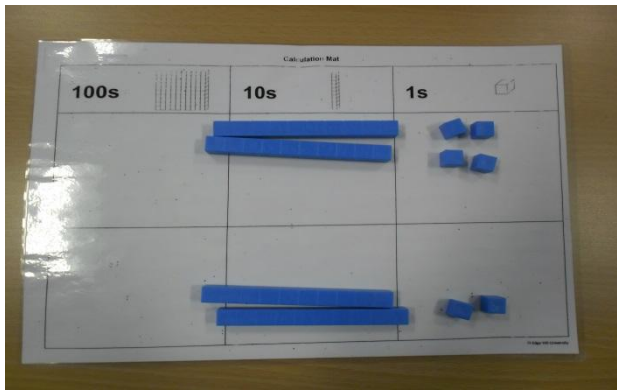
Pull down and take away the bottom units. Record how many units are left as below:

$$\begin{array}{r} 46 \\ - 22 \\ \hline 4 \end{array}$$

Pull down and
many tens are

$$\begin{array}{r} 46 \\ - 22 \\ \hline 24 \end{array}$$

Recognise and
addition and
number



take away the bottom tens. Record how
left as below:

use the inverse relationship between
subtraction and use this to solve missing
problems.

$$\begin{array}{ll} 7 - 3 = \square & \square = 4 + 3 \\ 7 - \square = 4 & 7 = \square + 3 \\ \square - 3 = 4 & 7 = 4 + \square \\ \square - \nabla = 4 & 7 = \square + \nabla \end{array}$$

Year 3: Subtraction

Subtracting with 2 and 3-digit numbers.

Key vocabulary: equal to, take, less, minus, subtract, leaves, distance between, how many more, how many fewer / less than, most, least, count back, how many left, how much less is _? difference, count on, strategy, partition, tens, units exchange, decrease, hundreds, value, digit

Key skills for subtraction at Y3:

- Subtract mentally a: 3-digit number and ones, 3-digit number and tens, 3-digit number and hundreds .
- Estimate answers and use inverse operations to check.
- Solve problems, including missing number problems.
- Find 10 or 100 more or less than a given number.
- Recognise the place value of each digit in a 3-digit number .
- Counting up differences as a mental strategy when numbers are close together or near multi-ples of 10 (see examples above)
- Read and write numbers up to 1000 in numerals and words.
- Practise mental subtraction strategies, such as subtracting near multiples of 10 and adjusting (e.g. subtracting 19 or 21), and select most appropriate methods to subtract, explaining why.

Subtract numbers mentally

A three digit number and ones

A three digit number and tens

A three digit number and hundreds

Counting back: $263 - 5$

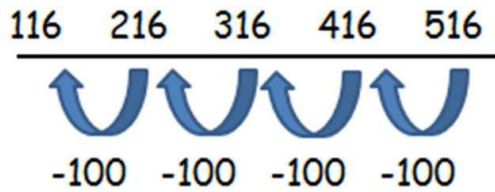
"Put 263 in your head, 262, 261, 260, 259, 258."

Subtract mentally a 'near multiple of 10' to or from a two-digit number:

$$678 - 90 = 678 - 100 + 10$$

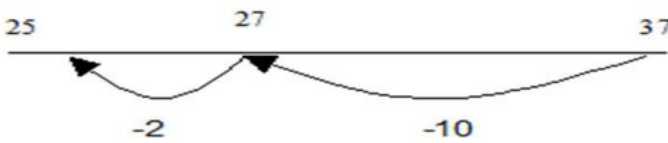
Use unprepared numbered lines to subtract, by counting back:

$$516 - 400 = 116$$



Two two-digit numbers (including answers crossing 100)

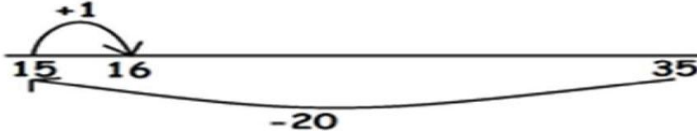
Use known number facts and place value to subtract (partition second number only):



$$\begin{aligned} 37 - 12 &= 37 - 10 - 2 \\ &= 27 - 2 \\ &= 25 \end{aligned}$$

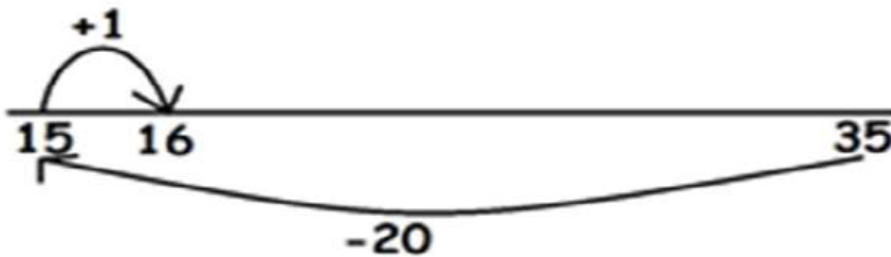
Subtract mentally a number near 10 from a two digit number:

$$35 - 19 = 35 - 20 + 1$$



Find a small difference by counting up:

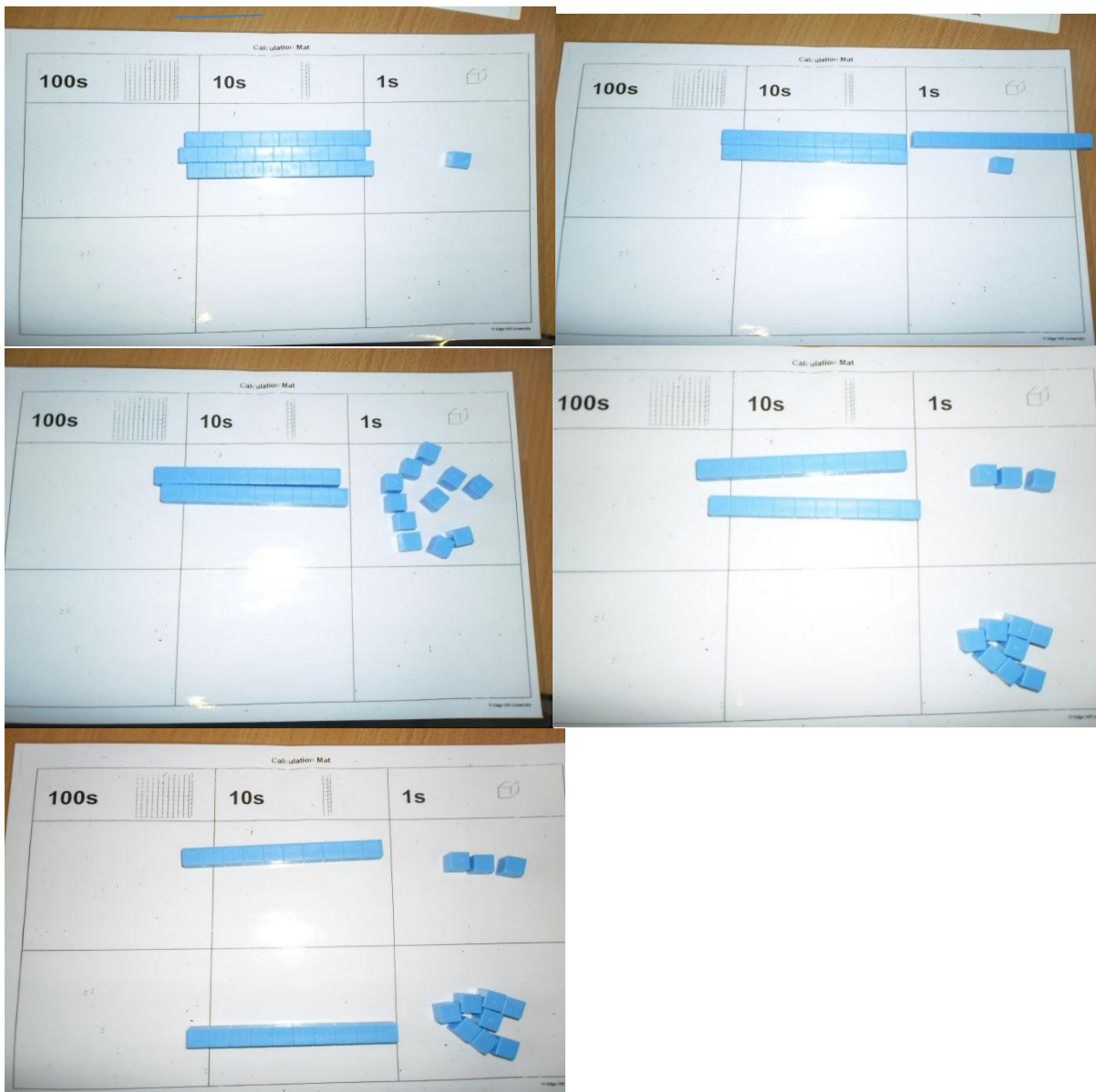
$$42 - 39 =$$



Subtract numbers with up to three digits, using formal written methods of columnar subtraction. Play the 'exchange' game with subtraction to prepare for decomposition.

$$31 - 18 =$$

Record $\begin{array}{r} 31 \\ -18 \\ \hline \end{array}$ Look at **T**op **S**ign **B**ottom



$$\begin{array}{r}
 \text{Record} \quad 31 \\
 \quad \quad -18 \\
 \hline
 \quad \quad 13
 \end{array}$$

Introduce three digit subtraction without decomposition:

$$\begin{array}{r}
 458 \\
 - 232 \\
 \hline
 226
 \end{array}$$

Solve problems including missing number problems:

Missing numbers should be placed in all possible places:

$$16 - 9 = \square \quad \square = 16 - 9$$

$$16 - \square = 7 \quad 7 = \square - 9$$

$$\square - 9 = 7 \quad 7 = 16 - \square$$

Year 4: Subtraction

Subtract with up to 4 digit numbers

Key vocabulary: equal to, take, take away, less, minus, subtract, leaves, distance between, how many more, how many fewer / less than, most, least, count back, how many left, how much less is_? difference, count on, strategy, partition, tens, units exchange, decrease, hundreds, value, digit, inverse

Key skills for subtraction at Y4:

- Subtract by counting on where numbers are close together or they are near to multiples of 10, 100 etc.
- Children select the most appropriate and efficient methods for given subtraction calculations.
- Estimate and use inverse operations to check answers.
- Solve addition and subtraction 2-step problems, choosing which operations and methods to use and why.
- Solve simple measure and money problems involving fractions and decimals to two decimal places.
- Find 1000 more or less than a given number.
- Count backwards through zero, including negative numbers.
- Recognise place value of each digit in a 4-digit number Round any number to the nearest 10, 100 or 1000
- Solve number and practical problems that involve the above, with increasingly large positive numbers.

Subtract numbers mentally, including:

- a four-digit number and ones
- a four-digit number and tens
- a four-digit number and hundreds
- a four-digit number and thousands

Counting back: $5263 - 5$

“Put 5263 in your head, 5262, 5261, 5260, 5259, 5258.”

• three and two-digit numbers

Use known facts and place value to subtract (partition second number only)

$$\begin{aligned}437 - 12 &= 437 - 10 - 2 \\ &= 427 - 2 \\ &= 425\end{aligned}$$



Find a small difference by counting up

$$6003 - 5998 = 5$$

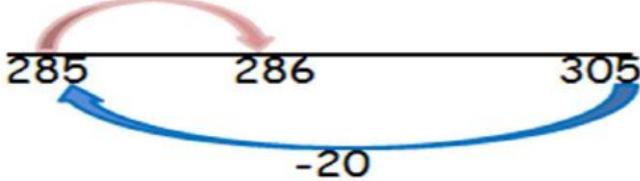
+2 +3



Subtract mentally a number near 10 to or from a two digit number:

$$305 - 19 = 305 - 20 + 1$$

+1



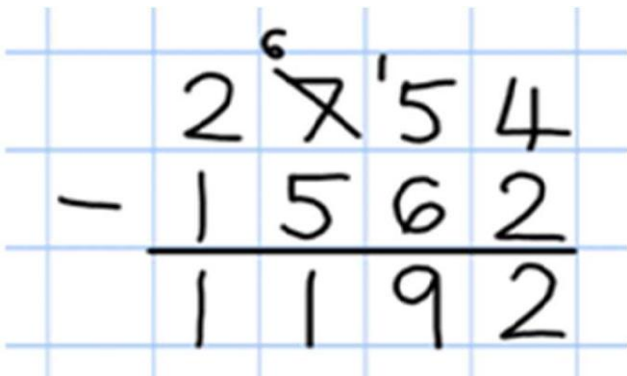
Subtract numbers with up to 4 digits using the formal written methods of columnar subtraction where appropriate:

Column subtraction without decomposition:

$$\begin{array}{r} 458 \\ -232 \\ \hline 226 \end{array}$$

Use calculation mat method as outlined in Year 3 to structure and support this learning.

Column subtraction with decomposition:



Use calculation mat method as outlined in Year 3 to structure and support this learning.

Year 5: Subtraction

Subtract with at least 4-digit numbers including money, measures, decimals.

Key vocabulary: equal to, take, take away, less, minus, subtract, leaves, distance between, how many more, how many fewer / less than, most, least, count back, how many left, how much less is_? difference, count on, strategy, partition, tens, units exchange, decrease, hundreds, value, digit, inverse, tenths, hundredths, decimal point, decimal

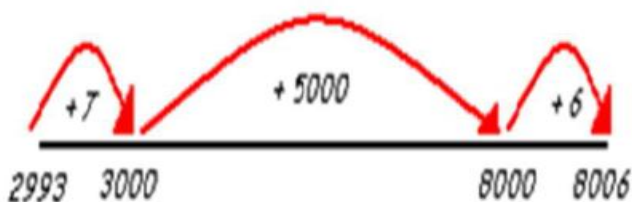
Key skills for subtraction at Y5:

- Subtract numbers mentally with increasingly large numbers .
- Use rounding and estimation to check answers to calculations and determine, in a range of contexts, levels of accuracy .
- Solve addition and subtraction multi-step problems in context, deciding which operations and methods to use and why.
- Read, write, order and compare numbers to at least 1 million and determine the value of each digit.
- Count forwards or backwards in steps of powers of 10 for any given number up to 1 million.
- Interpret negative numbers in context, counting forwards and backwards with positive and negative integers through 0.
- Round any number up to 1 million to the nearest 10, 100, 1000, 10 000 and 100 000.
- Choose most efficient method when subtracting multiples of 1000 i.e. $5000 - 2967$ changes to $4999 - 2966$ link technique to that taught in White Rose (starting with smaller numbers i.e. $5 - 2$ is the same as $4 - 1$).

Subtract numbers mentally with increasingly large numbers
(e.g $12\ 462 - 2300 = 10\ 162$)

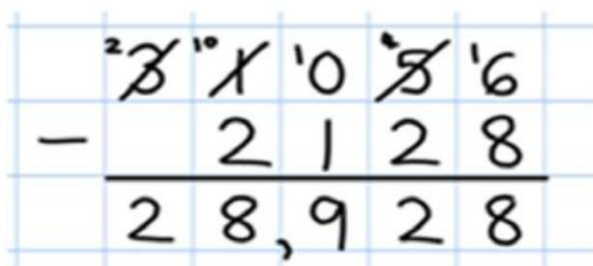
Find a difference by counting up

$8006 - 2993 = 5013$



Subtract numbers with more than 4 digits, including using columnar addition.

Revision of formal compact column method extending to calculations involving numbers with more than 4 digits. Use diennes and different manipulatives to structure and support learning:



When confident in using formal compact column method with integers and decimals involving money (always 2 decimal places), extend to subtraction with mixtures of integers and decimals. Use calculation mat and diennes/money to structure and support learning:

$$\begin{array}{r}
 - \quad \overset{5/12}{\cancel{263.0}} \quad \overset{1}{} \\
 \quad \quad \quad 26.5 \\
 \hline
 \quad \quad \quad \underline{236.5}
 \end{array}$$

Year 6: Subtraction

Subtracting with increasingly large and more complex numbers and decimal values.

Key vocabulary: equal to, take, take away, less, minus, subtract, leaves, dis-tance between, how many more, how many fewer / less than, most, least, count back , how many left, how much less is_? difference, count on, strategy, partition, tens, units exchange, decrease, hundreds, value, digit, inverse, tenths, hundredths, decimal point, decimal

Key skills for subtraction at Y6:

- Solve addition and subtraction multi-step problems in context, deciding which operations and methods to use and why.
- Read, write, order and compare numbers up to 10 million and determine the value of each digit
- Round any whole number to a required degree of accuracy
- Use negative numbers in context, and calculate intervals
- across zero.
- Children need to utilise and consider a range of mental subtraction strategies, jottings and written methods before choosing how to calculate.

Perform mental calculations, with mixed operations and large numbers (and decimals).

Use known number facts and place value to subtract

$$6.1 - 2.4 = 3.7$$

Subtract the nearest whole number then adjust (building on the techniques used in Year 5)

$$\begin{aligned}
 52 - 11.9 &= 52 - 12 + 0.1 \\
 &= 40 + 0.1 \\
 &= 40.1
 \end{aligned}$$

Practise subtraction for larger numbers, using the formal written method of columnar addition.

Column subtraction with decomposition:

Column Subtraction with decomposition

$$\begin{array}{r} \overset{0}{\cancel{7}}\overset{14}{\cancel{3}}\overset{14}{\cancel{4}} \\ - 286 \\ \hline 468 \end{array}$$

$$\begin{array}{r} \overset{2}{\cancel{8}}\overset{1}{\cancel{3}}\overset{1}{\cancel{6}} \\ - 1.17 \\ \hline 7.19 \end{array}$$

Including
decimals

Revise formal complex column method extending to more complex integers and applying to problem solving including money and measures, with decimals and with different numbers of decimal places.

Align the decimal point when setting out calculations.

Use place holders to aid understanding of the values in that column.

	7	10	15	.	3	4	1	9	kg
-		3	6	.	0	8		0	kg
		6	9	.	3	3	9		kg

Use their knowledge of the order of operations to carry out calculations involving the four operations. Explore the order of operations using brackets; for example,

$$2 + 1 \times 3 = 5 \text{ and } (2 + 1) \times 3 = 9$$

Review and investigate the effect of carrying out operations in different orders. Explore the effect. Introduce and use BODMAS to solve calculations.

Year 1: Multiplication

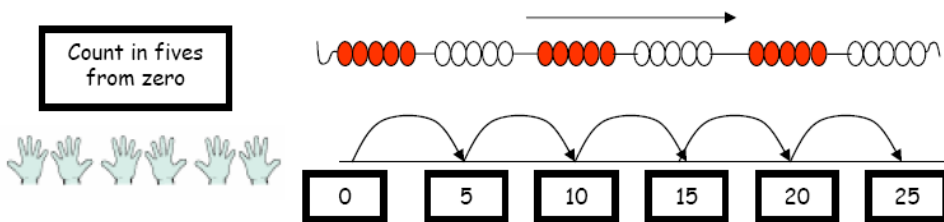
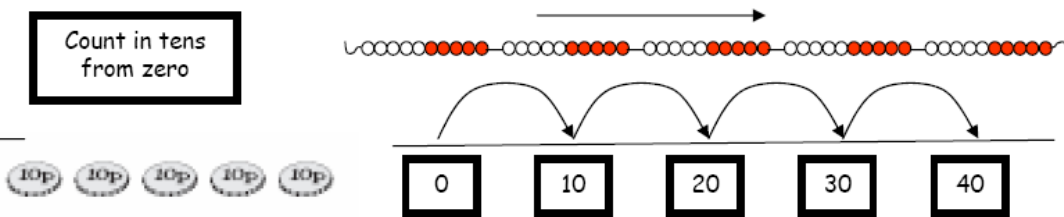
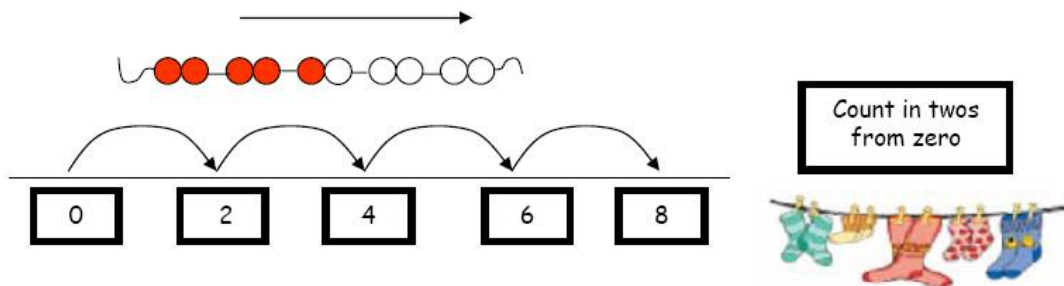
Multiply with concrete objects, arrays and pictorial representations.

Key vocabulary: groups of, lots of, times, array, altogether, multiply, count, repeated addition

Key skills for multiplication at Y1:

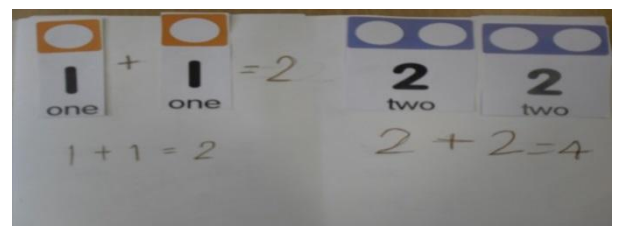
- Count in multiples of 2, 5 and 10.
- Solve one-step problems involving multiplication, by calculating the answer using concrete objects, pictorial representations and arrays with the support of the teacher.
- Make connections between arrays, number patterns, and counting in twos, fives and tens.
- Begin to understand doubling using concrete objects and pictorial representations.

Counting in 2s, 5s and 10s



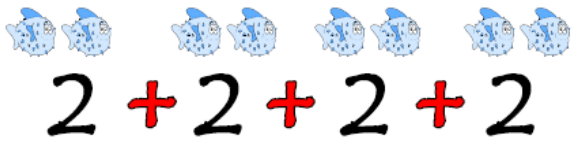
Use rhymes, songs and stories involving counting on and counting back in ones, twos, fives and tens. Use 2p, 5p and 10p coins.

Double numbers and quantities Practically double a group of objects and/or quantities to find double of a number by combining then counting the two groups. Progress onto using known facts and counting (in 1s, 2s, 5s and 10s) to double more efficiently.



Make connections between arrays and number patterns

Arrays and repeated addition



$2 + 2 + 2 + 2 = 8$ or $2 \times 4 = 8$

Say this as: 2, four times.

Find arrays around us



Make your own array

Looking at columns $4 + 4$

Looking at rows $3 + 3 + 3$

$\times 3$ (4, three times)

$\times 4$ (3, four times)

The number sentence is not to be read in order, e.g. 3×4 is NOT read as 3 lots of 4. It is read as 3, four times.

Year 2: Multiplication

Multiply using arrays and repeated addition (using at least 2s, 5s and 10s)

Key vocabulary: groups of, lots of, times, array, altogether, multiply, count, multiplied by, repeated addition, column, row, commutative, sets of, equal groups, times as big as, once, twice, three times...

Key skills for multiplication at Y2:

- Count in steps of 2, 3 and 5 from zero, and in 10s from any number.
- Recall and use multiplication facts from the 2, 5 and 10 multiplication tables, including recognising odds and evens.
- Write and calculate number statements using the x and = signs.
- Show that multiplication can be done in any order (commutative).
- Solve a range of problems involving multiplication, using concrete objects, arrays, repeated addition, mental methods, and multiplication facts.
- Pupils use a variety of language to discuss and describe multiplication.





Recall and use multiplication facts for the 2, 5 and 10 multiplication tables, including recognising odd and even numbers

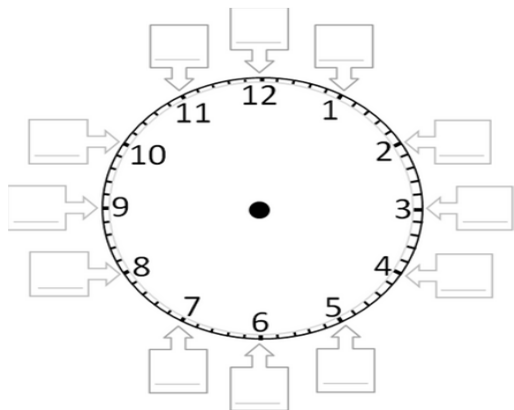
Play games, chant and test in order to increase speed of recalling facts to 20.

Make models and images to display facts.

Investigate related facts to 100 and repeat as above.

Connect the 10 multiplication table to place value, and the 5 multiplication table to the divisions on the clock face

H	T	U
	 1	0
	 2	0
	 3	0
	 4	0



Relate multiplication to arrays and to repeated addition using a range of materials and contexts

Practically combine groups of objects (2s, 5s and 10s) and verbalise (then record) what has been found out:

There are 3 plates. Each plate has 2 star biscuits on. How many biscuits are there? 2 add 2 add 2 equals 6
 Mum washed 5 pairs of socks, how many socks did she get out of the washing? 2 add 2 add 2 add 2 add 2 equals 10

Use arrays for repeated addition and relate this to the \times calculation: (Use counters or objects as well as visual representations to support understanding) Show that multiplication can be done in any order (?).

$$5 + 5 + 5 = 15$$



$$3 + 3 + 3 + 3 + 3 = 15$$

$$5 \times 3 = 15$$

$$3 \times 5 = 15$$

(say this as: 5, three times)

(say this as: 3, five times)

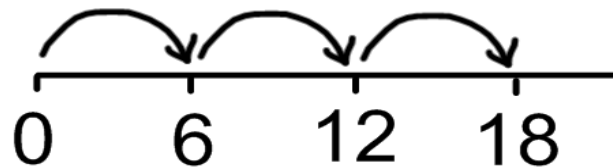
Record rows and columns: The number sentence 5×3 is not to be read in order, e.g. 5×3 is NOT read as 5 lots of 3. It is read as 5, three times.

Use a number line for repeated addition

$$6 \times 3 = 18$$

This means:

- 3 lots of 6
- 6, three times



Calculate mathematical statements for multiplication within the multiplication tables and write them using the multiplication (\times) and equals (=) signs

$3 \times 4 = 12$ Repetition of sentence with different vocabulary. Use all examples as below:

"3 times 4 equals 12"

"3, four times equals 12"

"3 multiplied by 4 equals 12"

"The product of 3 and 4 is 12"

"Four lots of 3 equals 12"

Recognise and use the inverse relationship between multiplication and division and use this to solve missing number problems.

$$3 \times 5 = 15$$



$$15 \div 3 = 5$$

$$5 \times 3 = 15$$

$$15 \div 5 = 3$$

Use this to develop multiplicative reasoning and "facts for free" so if I know $3 \times 5 = 15$, $5 \times 3 = 15$, $30 \times 50 = 1500$ etc.

Year 3: Multiplication

Multiply 2-digits by a single digit number

Key vocabulary: groups of, lots of, times, array, altogether, multiply, count, multiplied by, repeated addition, column, row, commutative, sets of, equal groups, times, _times as big as, once, twice, three times..., partition, grid method, multiple, product, tens, units, value

Key skills for multiplication:

- Recall and use multiplication facts for the 2, 3, 4, 5, 8 and 10 tables, and multiply multiples of 10.
- Write and calculate number statements using the multiplication tables they know, including 2-digit x single-digit, drawing upon mental methods, and progressing to reliable written methods.
- Solve multiplication problems, including missing number problems.
- Develop mental strategies using commutativity
- Solve simple problems in contexts, deciding which operations and methods to use.
- Develop efficient mental methods to solve a range of problems e.g. using commutativity and for missing number

Recall and use multiplication facts for the 3, 4 and 8 multiplication tables

Play games, chant, test etc to increase speed of recalling facts. Make models and images to display facts. Investigate patterns within tables. Recall and use division facts for the 3, 4 and 8 multiplication tables.

Understand and use mental methods using commutativity and associativity

(for example, $4 \times 3 \times 2 = 2 \times 3 \times 4 = 6 \times 4 = 24$)

Use a variety of resources to investigate order of multiplication. Make models and images to display facts.

Understand and use mental methods using multiplication facts (e.g. using $3 \times 2 = 6$, $6 \div 3 = 2$ and $2 = 6 \div 3$) to derive related facts (e.g. $30 \times 2 = 60$, $60 \div 3 = 20$ and $20 = 60 \div 3$)

$$3 \times 5 = 15$$



$$15 \div 3 = 5$$

$$5 \times 3 = 15$$

$$15 \div 5 = 3$$

If we know these facts we get the following facts for free:

$$\begin{array}{ll} 30 \times 5 = 150 & 50 \times 3 = 150 \\ 50 \times 30 = 1500 & 30 \times 50 = 1500 \quad \text{Etc.} \end{array}$$

Develop reliable written methods for multiplication, starting with calculations of two-digit numbers by one-digit numbers and progressing to the formal written methods of short multiplication.

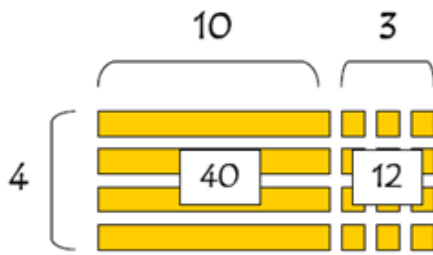
Introduce the grid method for multiplying 2-digit by single-digits. The grid method is just the first stage in the conceptual understanding of multiplication.

Children should be introduced to estimate the answer based on what they know. Children should be encouraged to apply their understanding of place value and number so that they know whether their final answer looks right. For example, before attempting the following calculation: 15×5 , children should estimate based on what they know: $10 \times 5 = 50$, therefore the answer will be over 50.

Multiplying TU x U (one ten only)

This depends on the ability to multiply by 10 mentally. Use diennes to support understanding of place value.

13×4



Record on grid:

x	10	3	
4	40	12	

Solve problems, including missing number problems, involving multiplication. Solve simple problems in contexts, deciding which of the four operations to use and why.

Missing numbers placed in all possible places.

$7 \times 2 = ? \quad ? = 2 \times 7$

$7 \times ? = 14 \quad 4 = ? \times 7$

$? \times 2 = 14 \quad 14 = 2 \times ?$

Extend to

$2 \times 6 = 3 \times ?$

and using three numbers

$10 \times ? \times ? = 60 \quad 12 = 2 \times ? \times ?$

Do not move children onto year four objectives before they can do all the objectives fluently and mastered Y3.

Year 4: Multiplication

Multiply 2 and 3-digits by a single digit, using all multiplication tables up to 12 x 12

Key vocabulary: groups of, lots of, times, array, altogether, multiply, count, multiplied by, repeated addition, array, column, row, commutative, groups of, sets of, lots of, equal groups, times, multiply, times as big as, once, twice, three times... partition, grid method, total, multiple, product, sets of, inverse


Key skills for multiplication at Y4:

- Count in multiples of 6, 7, 9, 25 and 1000
- Recall multiplication facts for all multiplication tables up to 12 x 12.
- Recognise place value of digits **up to 4-digit numbers**
- Use place value, known facts and derived facts to multiply mentally, e.g. multiply by 1, 10, 100, by 0, or to multiply 3 numbers.
- Use commutativity and other strategies mentally $3 \times 6 = 6 \times 3$, $39 \times 7 = 30 \times 7 + 9 \times 7$.
- Solve problems with increasingly complex multiplication in a range of contexts.
- Count in multiples of 6, 7, 9, 25 and 1000
- Recognise the place value of each digit in a four-digit number (thousands, hundreds, tens, and ones)

Recall multiplication facts for multiplication tables up to 12×12

Play games, chant, test etc to increase speed of recalling facts. Make models and images to display facts. Investigate patterns within tables. Recall division facts for multiplication tables up to 12×12

Use knowledge of multiplication facts and place value to derive related facts.

$30 \times 5 = 150$	$50 \times 3 = 150$	$150 \div 5 = 30$	$150 \div 3 = 50$
	$3 \times 5 = 15$		$15 \div 3 = 5$
$3 \times 50 = 150$	$5 \times 3 = 15$		$150 \div 30 = 5$
		$15 \div 5 = 3$	
$5 \times 30 = 150$	$50 \times 30 = 1500$	$30 \times 50 = 1500$	$150 \div 50 = 3$

The above practise is done within Fluent in Five.

Partition

$$\begin{aligned} 18 \times 9 &= (10 \times 9) + (8 \times 9) \\ &= 90 + 72 \\ &= 162 \end{aligned}$$

Multiply two digit and three digit numbers by a one digit number using formal written layout:

Use Grid method for multiplying $TU \times U$

This depends on the ability to multiply multiples of 10 together mentally - therefore only use if not secure with using known facts - i.e. if $4 \times 2 = 8$ so $4 \times 20 = 80$. Building on the techniques used in Year 3.

Leads to:

Multiplying $HTU \times U$

Eg. $136 \times 5 = 680$

X	100	30	6
5	500	150	30

Add with column addition

$$\begin{array}{r} 500 \\ 150 \\ + 30 \\ \hline 680 \end{array}$$

Year 5: Multiplication

Multiply up to 4-digits by 1 or 2 digits.

Key vocabulary: groups of, lots of, times, array, altogether, multiply, count, multiplied by, repeated addition, column, row, commutative, sets of, equal groups, _times as big as, once, twice, three times..., partition, grid method, total, multiple, product, inverse, square, factor, integer, decimal, short/long multiplication, 'carry'

Key skills for multiplication at Y5:

- Identify multiples and factors, using knowledge of multiplication tables to 12x12.
- Solve problems where larger numbers are decomposed into their factors.
- Multiply and divide integers and decimals by 10, 100 and 1000.
- Recognise and use square and cube numbers and their notation.
- Solve problems involving combinations of operations, choosing and using calculations and methods appropriately.

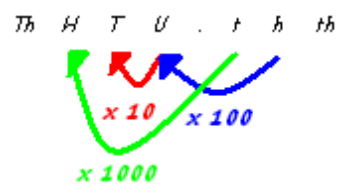
Multiply numbers mentally drawing upon known facts.

Partition

$$\begin{aligned} 47 \times 6 &= (40 \times 6) + (7 \times 6) \\ &= (240) + (42) \\ &= 282 \end{aligned}$$

Multiply whole numbers and those involving decimals by 10, 100, 1000.

Using place value:



Identify multiples, (and use them to construct equivalence statements, e.g. $4 \times 35 = 2 \times 2 \times 35$;

Use a variety of resources (including a calculator) to investigate multiples. Make models and images to display facts.

Recall prime numbers up to 19. Establish whether a number up to 100 is prime.

Play games, chant, test etc to increase speed of recalling facts. Make models and images to display facts. Investigate patterns within primes.

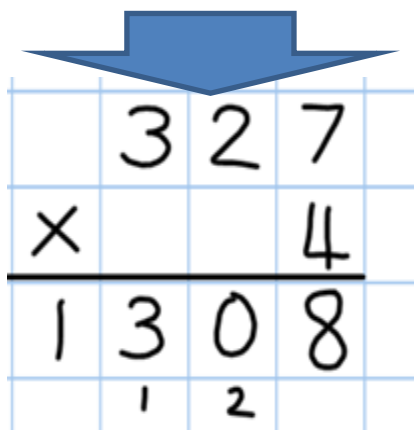
Recognise and use square numbers and cube numbers, and the notation for squared (²) and cubed (³).

Use a variety of resources (including a calculator) to investigate square and cubed numbers. Make models and images to display facts. Investigate the patterns within squared and cubed.

Multiply numbers up to 4 digits by a one- or two-digit number using a formal written method, including long multiplication for two-digit numbers.

Move from grid method to short multiplication for multiplying by a single digit:

x	300	20	7
4	1200	80	28



Pupils could be asked to work out a given calculation using the grid, and then compare it to your column method. What are the similarities and differences? Unpick the steps and show how it reduces the steps.

Move on to 4 digit by a single digit:

$$\begin{array}{r}
 1243 \\
 \times \quad 8 \\
 \hline
 9624 \\
 \hline
 132
 \end{array}$$

Introduce long multiplication for multiplying by 2 digits by starting with grid method and moving on:

	10	8
10	100	80
3	30	24

		1	8	
	×	1	3	
		5	4	
	1	8	0	
	2	3	4	

The grid could be used to introduce long multiplication, as the relationship can be seen in the answers in each row.

When this is secure move onto more complex numbers:

	1	2	3	4
×			1	6
	7	4	0	4
1	2	3	4	0
1	9	7	4	4

Solve problems that use multiplication and division as inverses, for example, by multiplying and dividing by powers of 10 in scale drawings or by multiplying and dividing by powers of a 1000 in converting between units such as kilometres and metres.

Use and explain the equals sign to indicate equivalence, including missing number problems (e.g, $13+24 = 12+25$; $33 = 5 \times []$) express distributivity, for example as $a(b + c) = ab + ac$

Use rounding to check answers to calculations and determine, in the context of a problem, levels of accuracy.

Year 6: Multiplication

Short and long multiplication as in Y5, and multiply decimals with up to 2d.p by a single digit.

Key vocabulary: groups of, lots of, times, array, altogether, multiply, count, multiplied by, repeated addition, array, column, row, commutative, sets of, equal groups, times as big as, once, twice, three times... partition, grid method, total, multiple, product, inverse, square, factor, integer, decimal, short / long multiplication, carry, tenths, hundredths, decimal

Key skills for multiplication at Y6:

- Recall multiplication facts for all times tables up to 12×12 (as Y4 and Y5).
- Multiply multi-digit numbers, up to 4-digit \times 2-digit using long multiplication.
- Perform mental calculations with mixed operations and large numbers.
- Solve multi-step problems in a range of contexts, choosing appropriate combinations of operations and methods.
- Estimate answers using round and approximation and determine levels of accuracy.
- Round any integer to a required degree of accuracy.

Perform mental calculations, including with mixed operations and large numbers (and decimals).

Partitioning:

$$\begin{aligned} 4.7 \times 6 &= (4 \times 6) + (0.7 \times 6) \\ &= (24) + (4.2) \\ &= 28.2 \end{aligned}$$

Double and halve:

$$\begin{aligned} 4.25 \times 32 &= 8.5 \times 16 \\ &= 17 \times 8 \\ &= 34 \times 4 \\ &= 68 \times 2 \\ &= 136 \end{aligned}$$

Identify common factors, common multiples and prime numbers.

Use a variety of resources (including a calculator) to investigate common factors, common multiples and prime numbers. Make models and images to display facts. Investigate the patterns within the numbers.

Multiply multi-digit numbers up to 4 digits by a two-digit whole number using the formal written method of short and long multiplication (Appendix 1).

	3	.	1	9
x	8			
<hr/>				
2	5	.	5	2
	1		7	

Remind children that the single digit belongs in the units (ones) column. Line up the decimal points in the question and the answer.

Use their knowledge of the order of operations to carry out calculations involving the four operations explore the order of operations using brackets; for example, $2 + 1 \times 3 = 5$ and $(2 + 1) \times 3 = 9$

Review and investigate the effect of carrying out operations in different orders. Explore the effect.

Introduce and use BODMAS to solve calculations.

Write what BODMAS means.

Year 1: Division

Year 1 Group and share small quantities

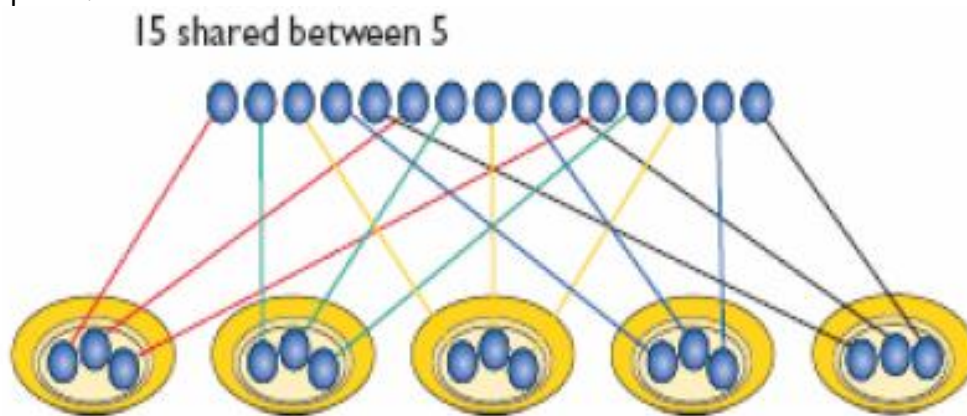
Key Vocabulary: share, share equally, one each, two each..., group, groups of, lots of, array

Key number skills needed for division at Y1:

- Solve one-step problems involving multiplication and division, by calculating the answer using concrete objects, pictorial representations arrays with the support of the teacher
- Through grouping and sharing small quantities, pupils begin to understand, division, and finding simple fractions of objects, numbers and quantities.
- They make connections between arrays, number patterns, and counting in twos, fives and tens.

Group and share small quantities

Practical activities involving sharing. Distributing cards when playing a game, putting objects onto plates, into cups, hoops etc.



Grouping

Sorting objects into 2s / 5s/ 10s etc

Begin with the multiplication tables the children know (2,5,10).

We are now "putting objects/ourselves into groups of....2"
"dividing objects/ourselves into groups of....5 or 10"
"Put the pencils into pots of 10"
"Get into groups of 5"

How many pairs of socks are there?

There are 12 crocus bulbs. Plant 3 in each pot. How many pots are there?

Jo has 12 Lego wheels. How many cars can she make?

Sharing pictures /objects

12 children get into teams of 4 to play a game. How many teams are there?

Sweets are shared between 2 people. How many do they have each?

Find half of numbers and quantities

Practically halve objects and/or **qualities** by sharing them out into two piles and then counting the number of objects in each pile, or cutting/folding pictures of objects in half.

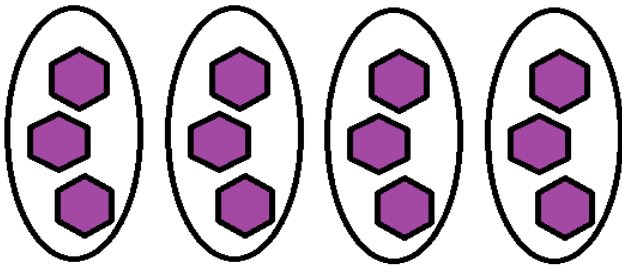
Progress onto using known facts and counting (in 1s, 2s, 5s and 10s) to halve more efficiently.



Make connections between arrays and number patterns.

There are 4 groups of 3 in 12.

12 shared between 4 is 3.



Solve one-step problems involving division, by calculating the answer using concrete objects, pictorial representations and arrays.

Use all the models and images mentioned above. Discuss which is most effective and why.

Year 2: Division

Group and share, using the \div and = sign

Use objects, arrays, diagrams and pictorial representations, and grouping on a number line.

Key Vocabulary: share, share equally, one each..., group, equal groups of, lots of, array, divide, divided by, divided into, division, grouping, number line, left, left over

Key number skills needed for division at Y2:

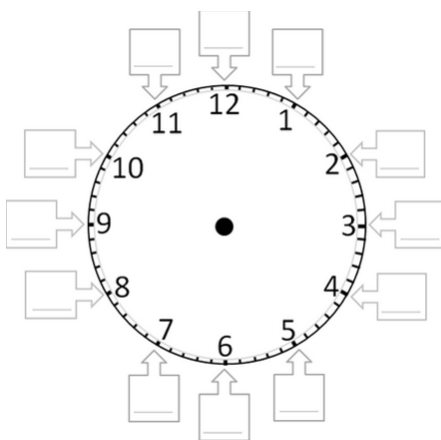
- Count in steps of 2, 3, and 5 from 0
- Recall and use multiplication and division facts for the 2, 5 and 10 multiplication tables, including recognising odd and even numbers.
- Calculate mathematical statements for multiplication and division within the multiplication tables and write them using the \times , \div and = signs.
- Show that multiplication of two numbers can be done in any order (commutative) and division of one number by another cannot.
- Solve problems involving multiplication and division, using materials, arrays, repeated addition, mental methods, and multiplication and division facts, including problems in contexts.

Recall and use division facts for the 2, 5 and 10 multiplication tables, including recognising odd and even numbers.

Play games, chant, test etc to increase speed of recalling facts to 20. Make models and images to display facts. Investigate related facts to 100 and repeat above.

Connect the 10 multiplication table to place value, and the 5 multiplication table to the divisions on the clock face.

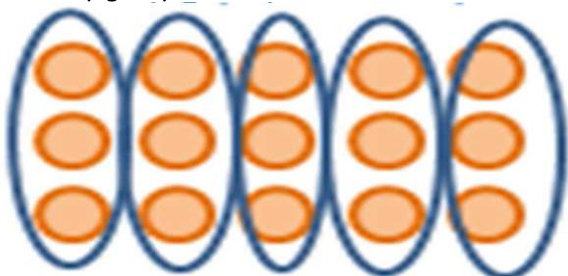
H	T	U
	1	0
	2	0
	3	0
	4	0



Relate division to grouping and sharing discrete and continuous quantities, to arrays using a range of materials and contexts.

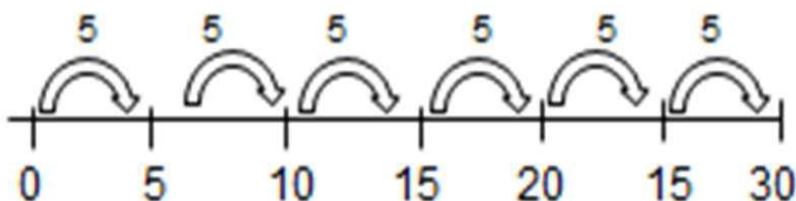
Initially, pupils to practically 'share' and 'group' using practical equipment and pictorial representation. Move on to using arrays to identify groups, use physical counters before pictorial representations:

How many groups of 3 are in 15?

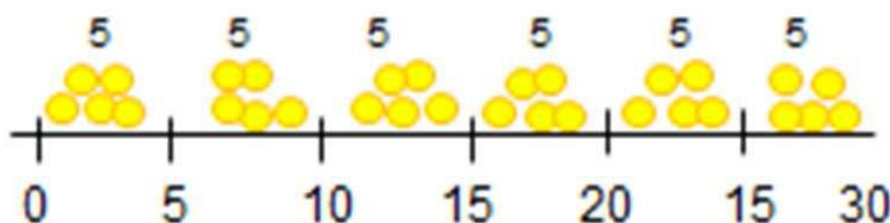


Grouping using a number line:

There are 30 children in the class, how many groups of 5 can we get into?



Use counters to support pupils understanding.



Calculate mathematical statements for division within the multiplication tables and write them using the division (\div) and equals (=) signs.

$12 \div 4 = 3$

Repetition of sentence with different vocabulary:

"12 divided by 4 equals 3"

"12 shared by 4 is 3"

"12 grouped into 4s is 3"

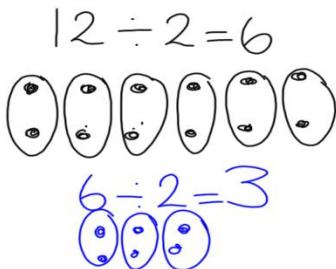
$12 \div 2 =$

This says 12 divided by 2. This means, "How many groups of 2 are there in 12?"

Draw 12 counters or dots. How many groups of 2 can you make?

How?

- Draw the right number of dots $12 \div 2 =$
- Know how many I need to group $12 \div 2 =$
- Put them into groups
- Count how many groups
- Record the division sentence and answer



Solve problems involving division, using materials, arrays, repeated addition, mental methods, and division facts, including problems in contexts. Use all the models and images mentioned above. Discuss which is most effective and why.

Recognise and use the inverse relationship between multiplication and division and use this to solve missing number problems.

$3 \times 5 = 15$



$15 \div 3 = 5$

$5 \times 3 = 15$

$15 \div 5 = 3$

Show that division of one number by another cannot be done in any order.

Use commutativity and inverse relations to develop multiplicative reasoning (for example, $4 \times 5 = 20$ and $20 \div 5 = 4$).

Arrays – related facts

$3 \times 5 = 15$

$5 \times 3 = 15$



$15 \div 3 = 5$

$15 \div 5 = 3$

Year 3: Division

Key Vocabulary: share, share equally, one each, two each..., group, equal groups of, lots of, array, divide, divided by, divided into, division, grouping, number line, left, left over, inverse, short division, 'carry', remainder, multiple

Key number skills needed for division at Y3:

- Recall and use multiplication and division facts for the 2, 3, 4, 5, 8 and 10 multiplication tables (through doubling, connect the 2, 4 and 8s).
- Write and calculate mathematical statements for multiplication and division using the multiplication tables that they know, including for two-digit numbers times one-digit numbers, using mental and progressing to formal written methods.
- Solve problems, in contexts, and including missing number problems, involving multiplication and division.
- Pupils develop efficient mental methods, for example, using multiplication and division facts (e.g. using $3 \times 2 = 6$, $6 \div 3 = 2$ and $2 = 6 \div 3$) to derive related facts ($30 \times 2 = 60$, so $60 \div 3 = 20$ and $20 = 60 \div 3$).
- Pupils develop reliable written methods for division, starting with calculations of 2-digit numbers by 1-digit numbers and progressing to the formal written method of short division.


Recall and use division facts for the 3, 4 and 8 multiplication tables

Play games, chant, test etc to increase speed of recalling facts.

Make models and images to display facts.

Investigate patterns within tables.

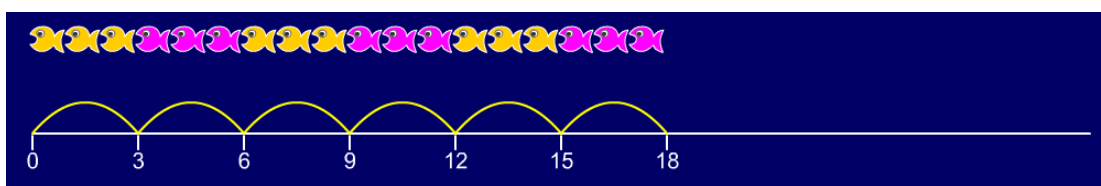
Understand and use mental methods using multiplication facts (e.g. using $3 \times 2 = 6$, $6 \div 3 = 2$ and $2 = 6 \div 3$) to derive related facts (e.g. $30 \times 2 = 60$, $60 \div 3 = 20$ and $20 = 60 \div 3$)

$30 \times 5 = 150$	$50 \times 3 = 150$	$150 \div 5 = 30$	$150 \div 3 = 50$
	$3 \times 5 = 15$		$15 \div 3 = 5$
$3 \times 50 = 150$	$5 \times 3 = 15$		$150 \div 30 = 5$
		$15 \div 5 = 3$	
$5 \times 30 = 150$	$50 \times 30 = 1500$	$30 \times 50 = 1500$	$150 \div 50 = 3$

Develop reliable written methods for division, starting with calculations of two-digit numbers by one-digit numbers and progressing to the formal written methods of short division.

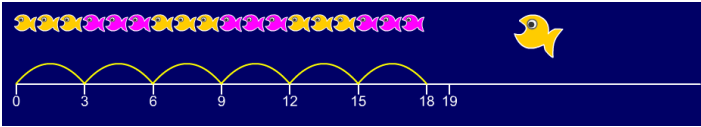
Use a number line to record **grouping up**. This is clearly modelled on the Grouping ITP. The fish are grouped into threes and then this is shown as jumps of three on the number line.

So $18 \div 3 = 6$



Move on to introduce remainders. Again this is clearly modelled on the Grouping ITP.

$$19 \div 3 = 6 \text{ rem } 1$$



When children have had experience with and demonstrated understanding of grouping for division begin to look at short division with no remainders in the final answer or carried within the calculation.

$$\begin{array}{r} 32 \\ 3 \overline{) 96} \end{array}$$

Say:

How many 3's in 9? = 3, and record it above the 9 tens.

How many 3's in 6? = 2, and record it above the 6 units.

Solve problems, including missing number problems, involving division, including positive integer scaling problems and correspondence problems in which n objects are connected to m objects.

Solve simple problems in contexts, deciding which of the four operations to use and why.

Missing numbers placed in all possible places.

$$6 \div 2 = \square \quad \square = 6 \div 2$$

$$6 \div \square = 3 \quad 3 = 6 \div \square$$

$$\square \div 2 = 3 \quad 3 = \square \div 2$$

$$\square \div \tilde{N} = 3 \quad 3 = \square \div \tilde{N}$$

Extend to

$$12 \div 6 = 8 \div \square$$

Year 4: Division

Divide up to 3-digit numbers by a single digit (without remainders initially)

Key Vocabulary: share, share equally, one each, two each..., group, equal groups of, lots of, array, divide, divided by, divided into, division, grouping, number line, left, left over, inverse, short division, „carry“, remainder, multiple, divisible by, factor


Key number skills needed for division at Y4:

- Recall multiplication and division facts for all numbers up to 12×12 .
- Use place value, known and derived facts to multiply and divide mentally, including: multiplying and dividing by 10 and 100 and 1.
- Pupils practise to become fluent in the formal written method of short division with exact answers when dividing by a one-digit number
- Pupils practise mental methods and extend this to three-digit numbers to derive facts, for example $200 \times 3 = 600$ so $600 \div 3 = 200$
- Pupils solve two-step problems in contexts, choosing the appropriate operation, working with increasingly harder numbers. This should include correspondence questions such as three cakes shared equally between 10 children.

Recall division facts for multiplication tables up to 12×12

Play games, chant, test etc to increase speed of recalling facts. Make models and images to display facts. Investigate patterns within tables.

Use place value, known and derived facts to divide mentally, including: dividing by 1. Practice and extend mental methods to three-digit numbers to derive facts, (for example $600 \div 3 = 200$ can be derived from $2 \times 3 = 6$)

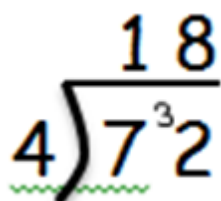
$30 \times 5 = 150$	$50 \times 3 = 150$	$150 \div 5 = 30$	$150 \div 3 = 50$
	$3 \times 5 = 15$		$15 \div 3 = 5$
$3 \times 50 = 150$	$5 \times 3 = 15$		$150 \div 30 = 5$
		$15 \div 5 = 3$	
$5 \times 30 = 150$	$50 \times 30 = 1500$	$30 \times 50 = 1500$	$150 \div 50 = 3$

Recognise and use factor pairs in mental calculations.

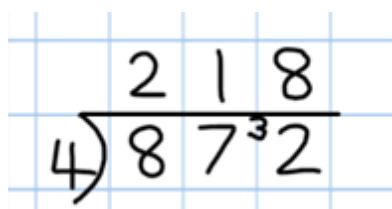
Use a variety of resources (including a calculator) to investigate factor pairs. Make models and images to display facts.

Divide numbers up to 3 digit by a one-digit number using the formal written method of short division and begin to interpret remainders.

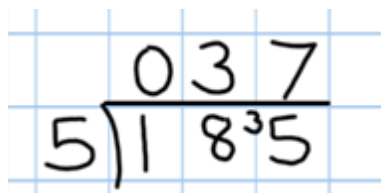
Short division with no remainders in the final answer, use place value counters/Dienes where support is required.



Pupils must be secure with the process of short division for dividing 2-digit numbers by a single digit (those that do not result in a final remainder —see steps in Y3), but must understand how to calculate remainders, using this to 'carry' remainders within the calculation process (see example). Use diagrams or manipulatives to support the learning.



Pupils move onto dividing numbers with up to 3-digits by a single digit, however problems and calculations provided should not result in a final answer with remainder at this stage. Children who exceed this expectation may progress to Y5 level.

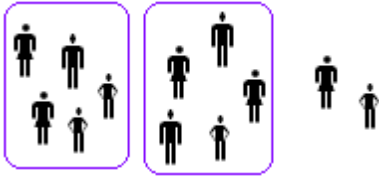


When the answer for the first column is zero ($1 \div 5$, as in example), children could initially write a zero above to acknowledge its place, and must always 'carry' the number (1) over to the next digit as a remainder.

Include money and measure contexts when confident.

Remainders

Begin to interpret remainders by looking at word problems to give context and with small numbers to start with. Cars carry 5 people. 12 people are going on a trip. How many cars will they need?



$12 \div 5 = 2 \text{ r } 2$ So they would need 3 cars.

Explore this practically using objects as many pupils find this type of division word problem very tricky.

Year 5: Division

Divide up to 4 digits by a single digit, including those with remainders.

Key Vocabulary: share, share equally, one each, two each..., group, equal groups of, lots of, array, divide, divided by, divided into, division, grouping, number line, left, left over, inverse, short division, 'carry', remainder, multiple, divisible by, factor, inverse, quotient, prime number, prime factors, composite number (non-prime)

Key number skills needed for division at Y5:

- Recall multiplication and division facts for all numbers up to 12×12 (as in Y4).
- Multiply and divide numbers mentally, drawing upon known facts.
- Identify multiples and factors, including finding all factor pairs of a number, and common factors of two number.
- Solve problems involving multiplication and division where larger numbers are decomposed into their factors.
- Multiply and divide whole numbers and those involving decimals by 10, 100 and 1000.
- Use the vocabulary of prime numbers, prime factors and composite (non-prime) numbers.
- Work out whether a number up to 100 is prime, and recall prime numbers to 19.
- Divide numbers up to 4 digits by a one-digit number using the formal written method of short division and interpret remainders appropriately for the context
- Use multiplication and division as inverses.
- Interpret non-integer answers to division by expressing results in different ways according to the context, including with remainders, as fractions, as decimals or by rounding (e.g. $98 \div 4 = 24 \text{ r } 2 = 24\frac{1}{2} = 24.5 \approx 25$).
- Solve problems involving combinations of all four operations, including understanding of the equals sign, and including division for scaling by different fractions and problems involving simple rates.

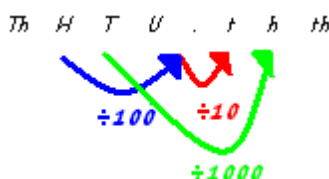
Divide numbers mentally drawing upon known facts

Partitioning

$$\begin{aligned} 72 \div 3 &= (60 \div 3) + (12 \div 3) \\ &= 20 + 4 \\ &= 24 \end{aligned}$$

Divide whole numbers and those involving decimals by 10, 100 and 1000

Place Value



Identify factors, including finding all factor pairs of a number, and common factors of two numbers (and use them to construct equivalence statements, e.g.

$$4 \times 35 = 2 \times 2 \times 35; 3 \times 270 = 3 \times 3 \times 9 \times 10 = 9^2 \times 10)$$

Use a variety of resources (including a calculator) to investigate factors. Make models and images to display facts.

Recall prime numbers up to 19. Establish whether a number up to 100 is prime

Play games, chant, test etc to increase speed of recalling facts.

Make models and images to display facts.

Investigate patterns within primes.

Divide numbers up to 4 digits by a one-digit number using the formal written method of short division and interpret remainders appropriately for the context (as fractions, as decimals or by rounding)

The answer to $5309 \div 8$ could be expressed as 663 and five eighths, $663 \text{ r } 5$, as a decimal, or rounded as appropriate to the problem involved.

		0	6	6	3	r	5
8)	5	3	0	9		

Short division with remainders: Now that pupils are introduced to examples that give rise to remainder answers, division needs to have a real life problem solving context, where pupils consider the meaning of the remainder and how to express it, ie. as a fraction, a decimal, or as a rounded number or value, depending upon the context of the problem.

If children are confident and accurate:

Introduce long division for pupils who are ready to divide any number by a 2-digit number (e.g. $2678 \div 19$). This is a Year 6 expectation.

Year 6: Division

Divide at least 4 digits by both single-digit and 2-digit numbers (including decimal numbers and quantities)

Key Vocabulary: share, share equally, one each, two each..., group, equal groups of, lots of, array, divide, divided by, divided into, division, grouping, number line, left, left over, inverse, short division, „carry“, remainder, multiple, divisible by, factor, inverse, quotient, prime number, prime factors, composite number (non-prime)

Key number skills needed for division at Y6:

- Recall multiplication and division facts for all numbers up to 12×12 (as in Y4).
- Multiply and divide numbers mentally, drawing upon known facts.
- Identify multiples and factors, including finding all factor pairs of a number, and common factors of two number.
- Solve problems involving multiplication and division where larger numbers are decomposed into their factors.
- Multiply and divide whole numbers and those involving decimals by 10, 100 and 1000.
- Use the vocabulary of prime numbers, prime factors and composite (non-prime) numbers.
- Work out whether a number up to 100 is prime, and recall prime numbers to 19.
- Divide numbers up to 4 digits by a one-digit number using the formal written method of short division and interpret remainders appropriately for the context
- Use multiplication and division as inverses.

- Interpret non-integer answers to division by expressing results in different ways according to the context, including with remainders, as fractions, as decimals or by rounding (e.g. $98 \div 4 = 24 \text{ r } 2 = 24\frac{1}{2} = 24.5 \approx 25$).
- Solve problems involving combinations of all four operations, including understanding of the equals sign, and including division for scaling by different fractions and problems involving simple rates.

Perform mental calculations, including with mixed operations and large numbers (and decimals)

Partitioning

$$7.2 \div 3 = (6 \div 3) + (1.2 \div 3) \\ = 2 + 0.4 \\ = 2.4$$

Identify common factors, common multiples and prime numbers.

Use a variety of resources (including a calculator) to investigate common factors, common multiples and prime numbers. Make models and images to display facts. Investigate the patterns within the numbers.

Divide numbers up to 4 digits by a two-digit whole number using the formal written method of short and long division, and interpret remainders as whole number remainders, fractions, or by rounding, as appropriate for the context (Appendix 1)

Short division

$98 \div 7$ becomes

$$\begin{array}{r} 14 \\ 7 \overline{) 98} \\ \underline{7} \\ 28 \\ \underline{28} \\ 0 \end{array}$$

Answer: 14

$432 \div 5$ becomes

$$\begin{array}{r} 86 \text{ r } 2 \\ 5 \overline{) 432} \\ \underline{40} \\ 32 \\ \underline{30} \\ 2 \end{array}$$

Answer: 86 remainder 2

$496 \div 11$ becomes

$$\begin{array}{r} 45 \text{ r } 1 \\ 11 \overline{) 496} \\ \underline{44} \\ 56 \\ \underline{55} \\ 1 \end{array}$$

Answer: $45\frac{1}{11}$

Long division

$432 \div 15$ becomes

$$\begin{array}{r} 28 \text{ r } 12 \\ 15 \overline{) 432} \\ \underline{30} \\ 132 \\ \underline{120} \\ 12 \end{array}$$

Answer: 28 remainder 12

$432 \div 15$ becomes

$$\begin{array}{r} 28 \\ 15 \overline{) 432} \\ \underline{30} \\ 132 \\ \underline{120} \\ 12 \end{array} \begin{array}{l} 15 \times 20 \\ 15 \times 8 \end{array}$$

$$\frac{12}{15} = \frac{4}{5}$$

Answer: $28\frac{4}{5}$

$432 \div 15$ becomes

$$\begin{array}{r} 28.8 \\ 15 \overline{) 432.0} \\ \underline{30} \\ 132 \\ \underline{120} \\ 120 \\ \underline{120} \\ 0 \end{array}$$

Answer: 28.8

Remainders

Quotients expressed as fractions or decimal fractions

$$61 \div 4 = 15\frac{1}{4} \text{ or } 15.25$$

Solve problems involving division

Use all the models and images mentioned above. Discuss which is most effective and why.