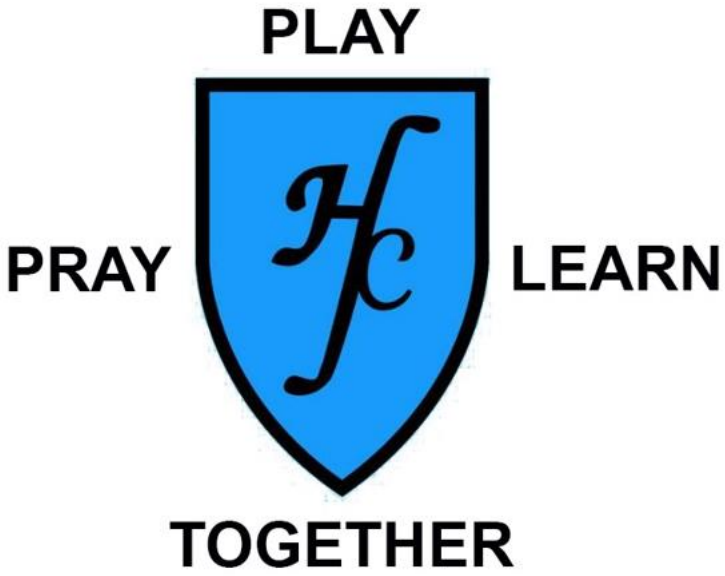
Welcome to the KS2 Workshop for Maths☺



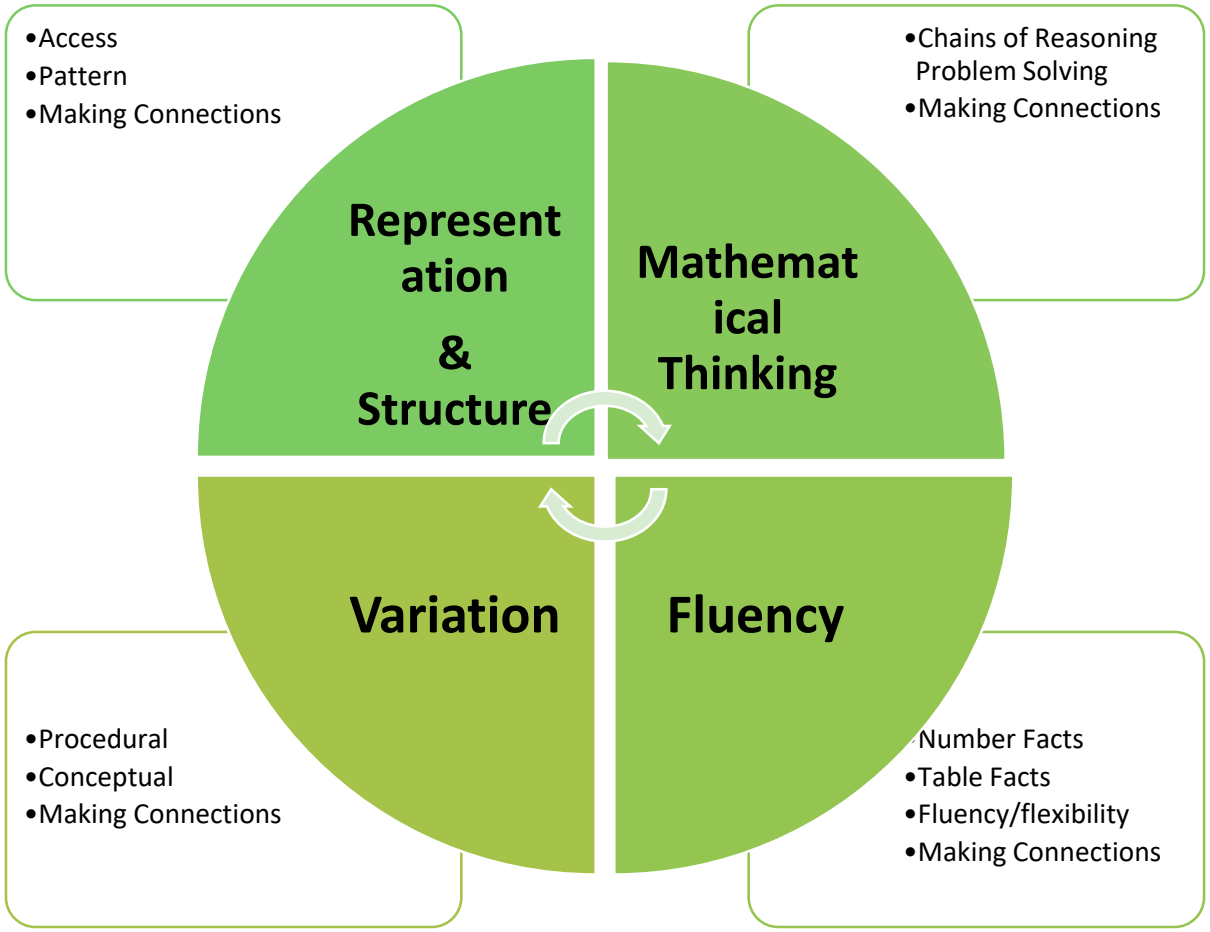
Respect, Responsibility, Resilience

Maths at Holy Family

At Holy Family, children are taught through a mastery approach – whole class interactive teaching, where the expectation is that the majority of pupils will move through the programmes of study at broadly the same pace.

Teachers use the White Rose Small Steps to build up on previous learning, embedding knowledge and ensure the confident use of mathematical vocabulary. We use these small connected steps alongside a variety of resources to provide tasks for fluency, reasoning and problem solving e.g. White Rose documents, MathShed, I See Maths, NRICH tasks and NCTEM Spine materials.

What is a ‘mastery’ approach?

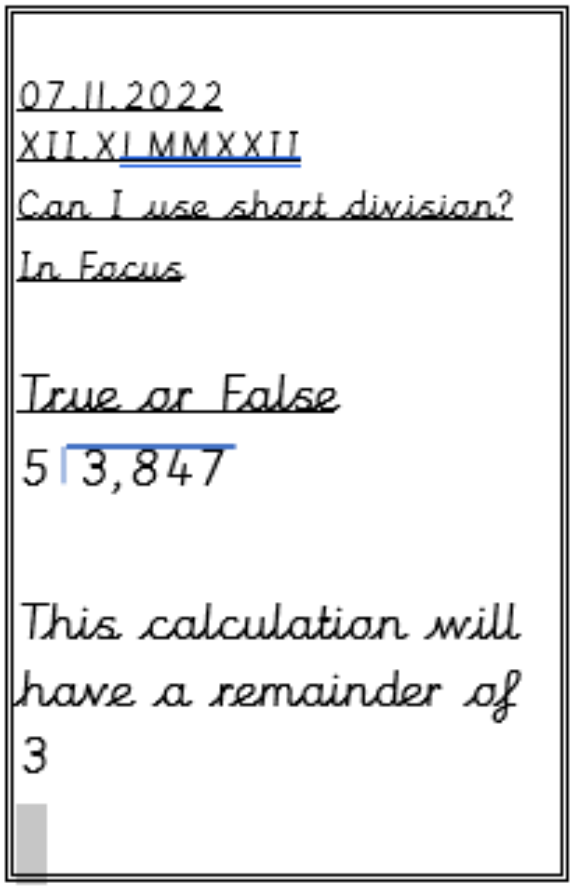


CPA- Concrete/Pictorial/Abstract

- Our pupils are encouraged to physically represent mathematical concepts. Objects and pictures are used to demonstrate and visualise abstract ideas, alongside numbers and symbols.
- Concrete – children have the opportunity to use concrete objects and manipulatives to help them understand and explain what they are doing.
- Pictorial – children then build on this concrete approach by using pictorial representations, which can then be used to reason and solve problems.
- Abstract – With the foundations firmly laid, children can move to an abstract approach using numbers and key concepts with confidence.

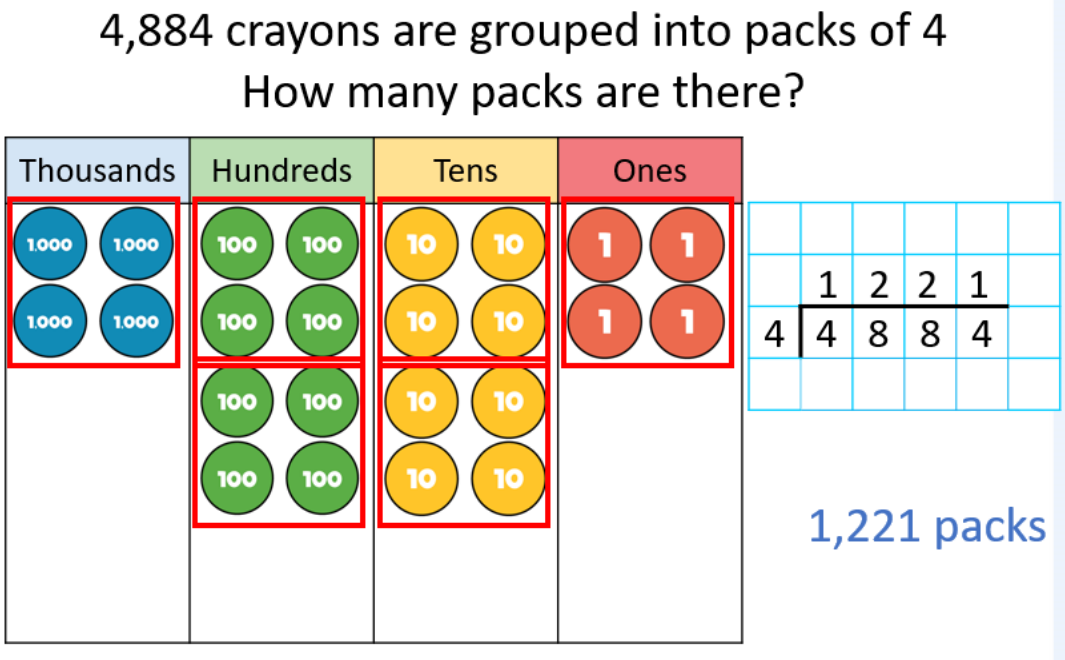
What does maths look like at Holy Family?

- The lesson design, used at Holy Family, allows the children vital opportunities to make connections between areas covered in the maths curriculum. We start each small step with a 'Focus Task' to get the children thinking mathematically and making links to other areas of the maths curriculum.



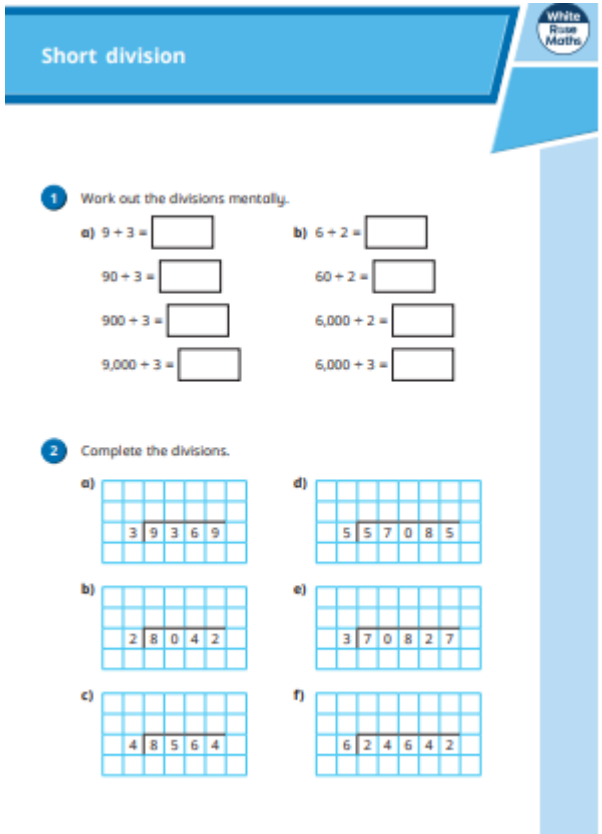
Guided Practice

Guided practice - a series of related tasks that the children complete independently or in pairs at first. After each one the children are asked to come back together to review and discuss their findings. This gives an opportunity for self assessment and use blue pen/pencil to make corrections. It is during these sections that a lot of really impressive discussion and reasoning takes place.
Lots of manipulatives used to build concepts



Independent Work

- Independent activities (use of White Rose/MNP worksheets or other tasks)these are tasks graduating in difficulty. Here children are encouraged (under guidance) to complete to the level that they felt comfortable with after completing the guided practice.



Short division

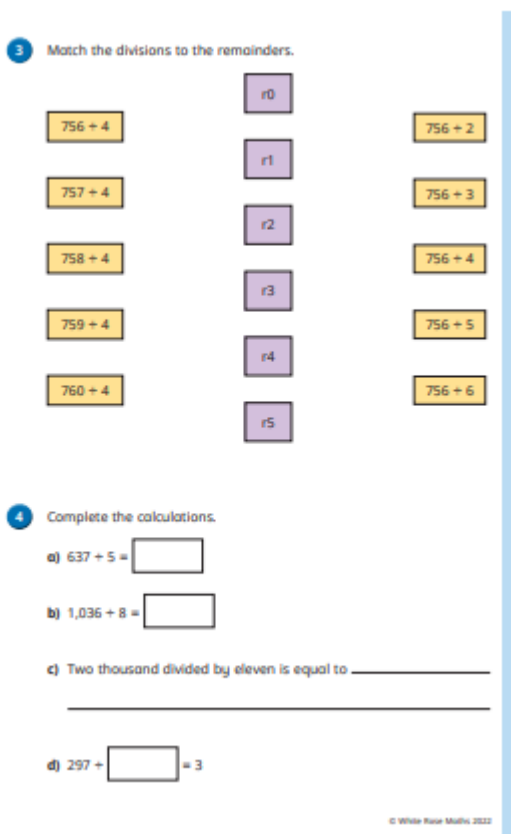
1 Work out the divisions mentally.

a) 9 ÷ 3 = ☐
90 ÷ 3 = ☐
900 ÷ 3 = ☐
9,000 ÷ 3 = ☐

b) 6 ÷ 2 = ☐
60 ÷ 2 = ☐
6,000 ÷ 2 = ☐
6,000 ÷ 3 = ☐

2 Complete the divisions.

a) 3 9 3 6 9
b) 2 8 0 4 2
c) 4 8 5 6 4
d) 5 5 7 0 8 5
e) 3 7 0 8 2 7
f) 6 2 4 6 4 2



3 Match the divisions to the remainders.

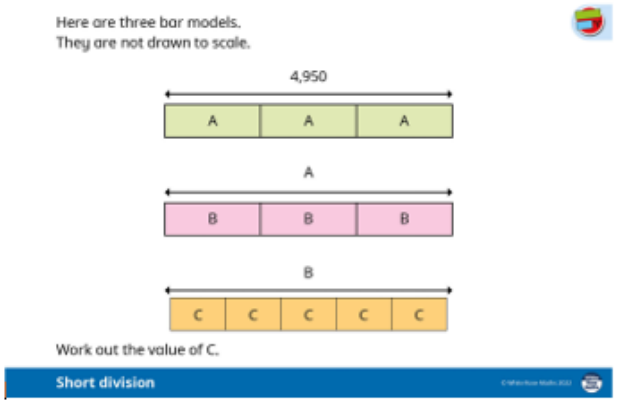
756 ÷ 4	r0	756 ÷ 2
757 ÷ 4	r1	756 ÷ 3
758 ÷ 4	r2	756 ÷ 4
759 ÷ 4	r3	756 ÷ 5
760 ÷ 4	r4	756 ÷ 6
	r5	

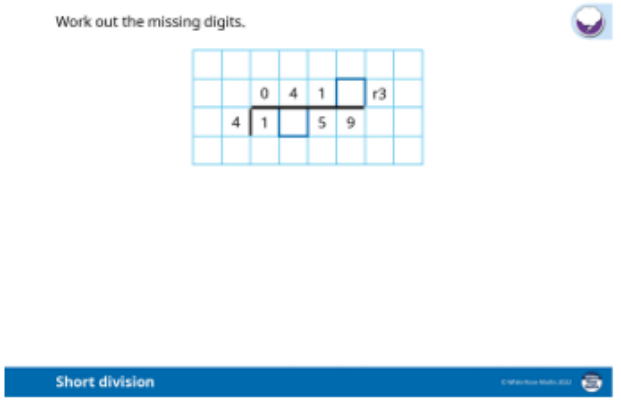
4 Complete the calculations.

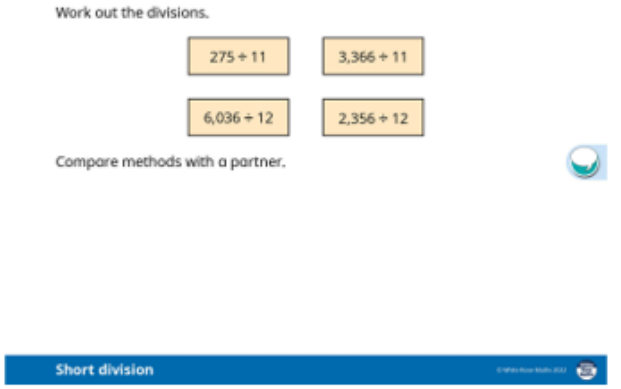
a) 637 ÷ 5 = ☐
b) 1,036 ÷ 8 = ☐
c) Two thousand divided by eleven is equal to _____
d) 297 ÷ ☐ = 3

Star Work

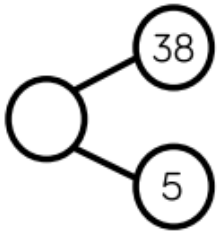
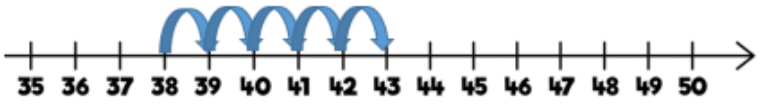
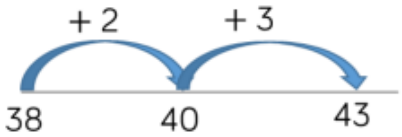
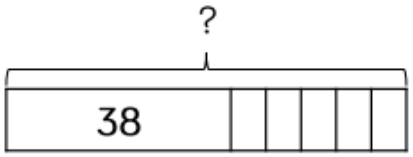
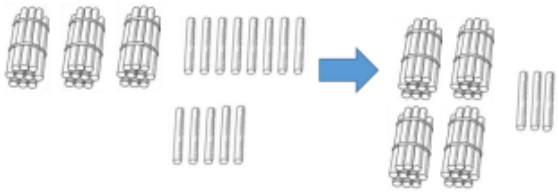
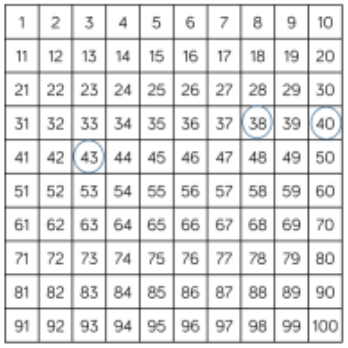
- ‘Star Work’ is available for any child who shows a greater understanding of the small step covered.





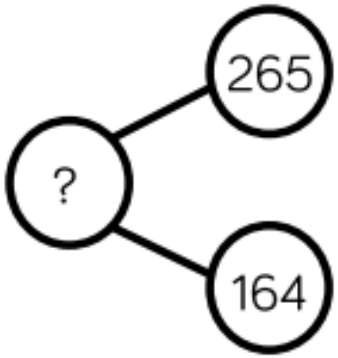


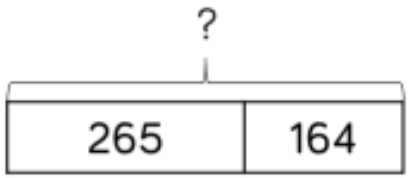
Manipulatives and Pictorials used to build progression in Addition

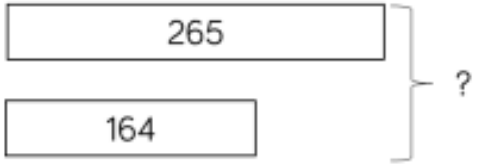
Skill: Add 1-digit and 2-digit numbers to 100	Year: 2/3
    **38 + 5 = 43**  	When adding single digits to a two-digit number, children should be encouraged to count on from the larger number. They should also apply their knowledge of number bonds to add more efficiently e.g. 8 + 5 = 13 so 38 + 5 = 43. Hundred squares and straws can support children to find the number bond to 10.

Skill: Add numbers with up to 3 digits

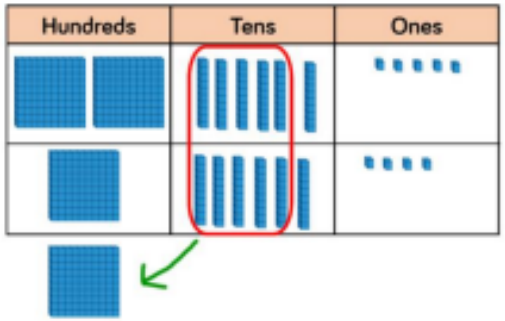
Year: 3



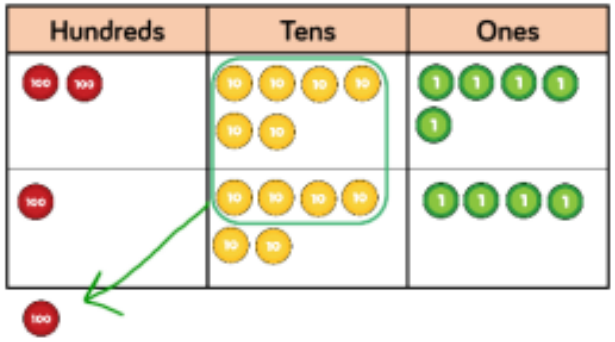




$$265 + 164 = 429$$



$$\begin{array}{r} 265 \\ +\ 164 \\ \hline 429 \\ \hline 1 \end{array}$$



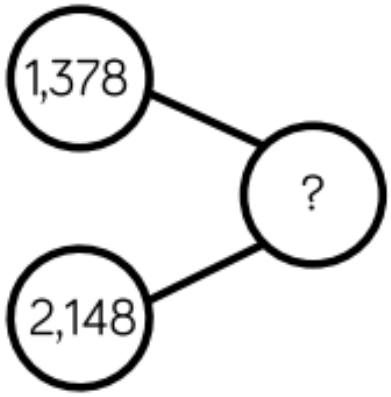
Base 10 and place value counters are the most effective manipulatives when adding numbers with up to 3 digits.

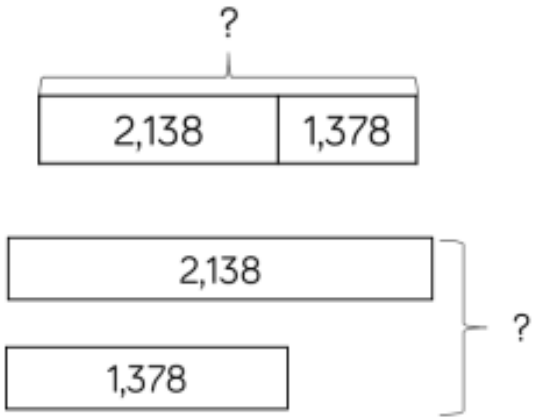
Ensure children write out their calculation alongside any concrete resources so they can see the links to the written column method.

Plain counters on a place value grid can also be used to support learning.

Skill: Add numbers with up to 4 digits

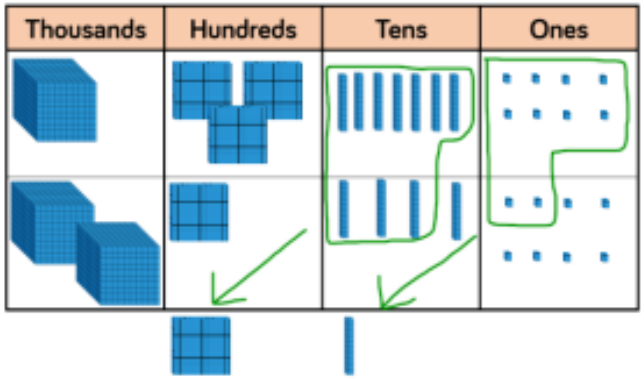
Year: 4

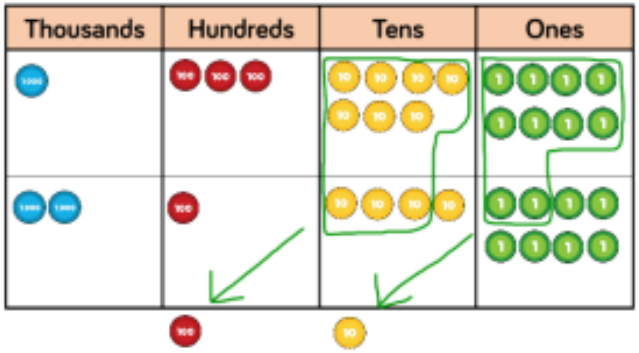




	1	3	7	8
+	2	1	4	8
	3	5	2	6
		1	1	

$$1{,}378 + 2{,}148 = 3{,}526$$





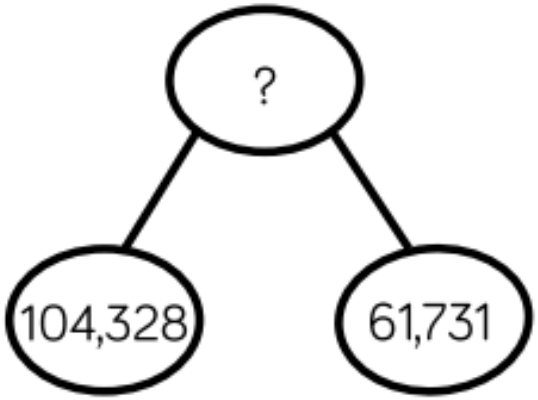
Base 10 and place value counters are the most effective manipulatives when adding numbers with up to 4 digits.

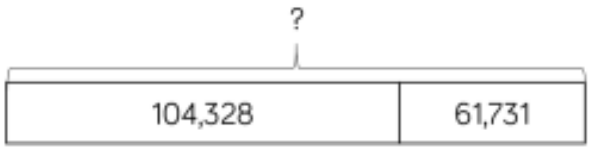
Ensure children write out their calculation alongside any concrete resources so they can see the links to the written column method.

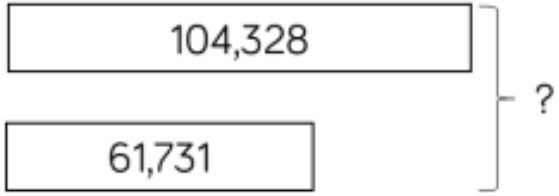
Plain counters on a place value grid can also be used to support learning.

Skill: Add numbers with more than 4 digits

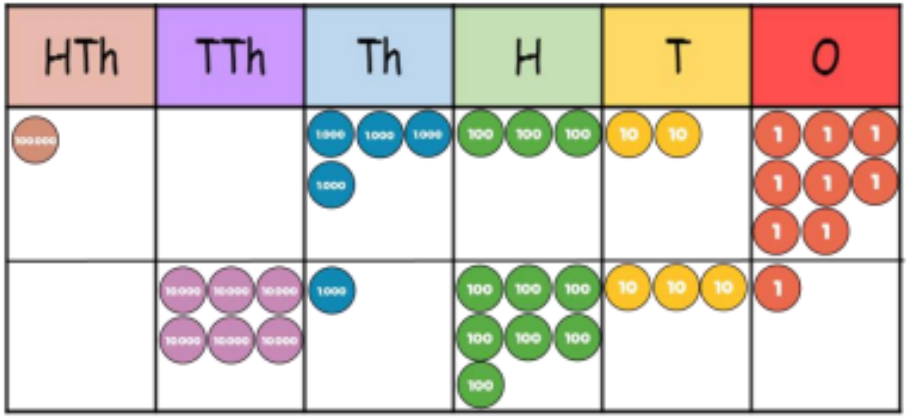
Year: 5/6







104,328 + 61,731 = 166,059

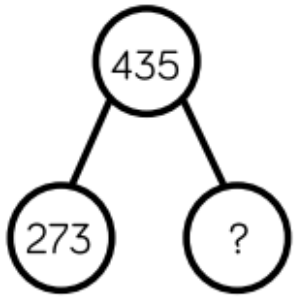
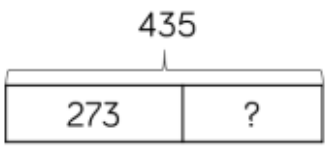
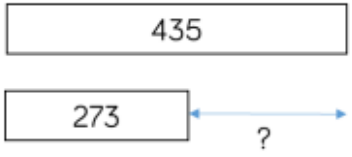
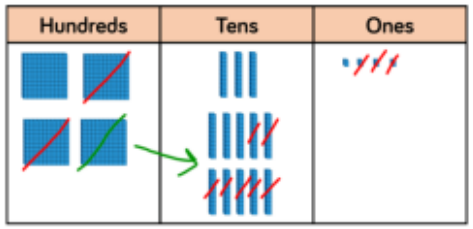
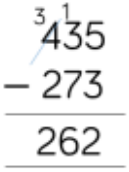
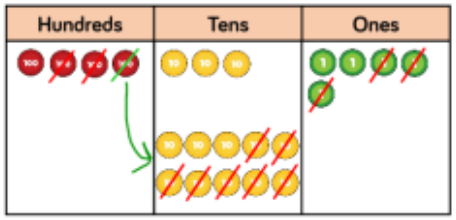


1	0	4	3	2	8
+	6	1	7	3	1
1	6	6	0	5	9
		1			

Place value counters or plain counters on a place value grid are the most effective concrete resources when adding numbers with more than 4 digits.

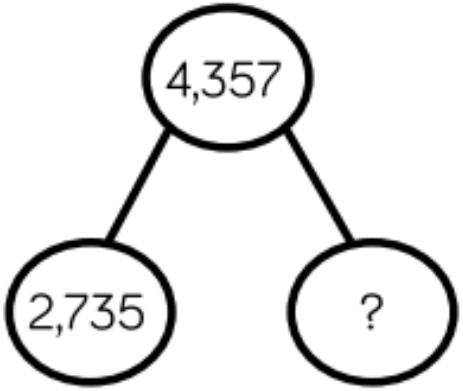
At this stage, children should be encouraged to work in the abstract, using the column method to add larger numbers efficiently.

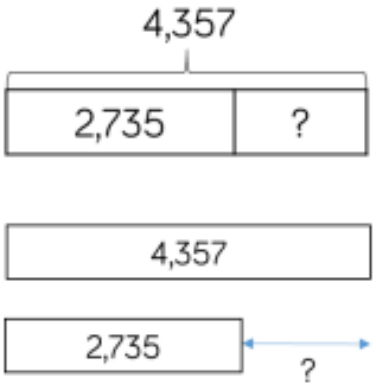
Manipulatives and Pictorials used to build progression in Subtraction

Skill: Subtract numbers with up to 3 digits	Year: 3
   $435 - 273 = 262$   	Base 10 and place value counters are the most effective manipulative when subtracting numbers with up to 3 digits. Ensure children write out their calculation alongside any concrete resources so they can see the links to the written column method. Plain counters on a place value grid can also be used to support learning.

Skill: Subtract numbers with up to 4 digits

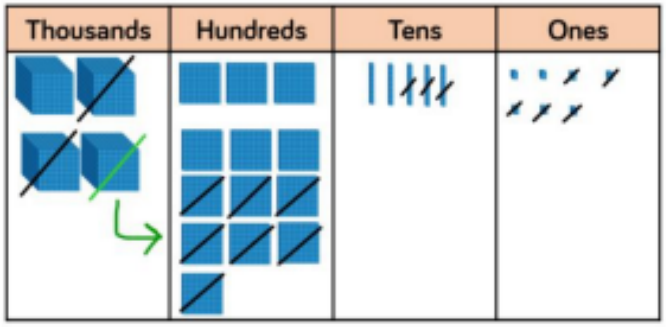
Year: 4

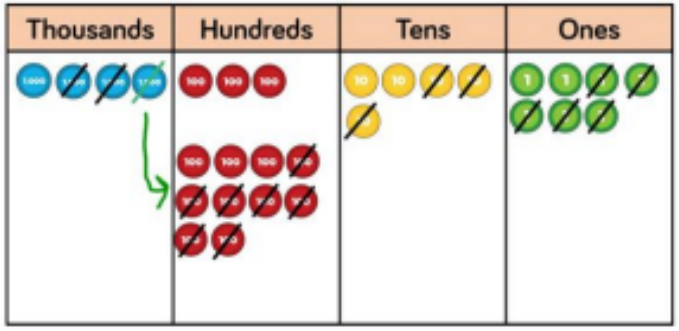




$$\begin{array}{r} {}^{3}\cancel{4}^{1}357 \\ -\ 2735 \\ \hline 1622 \end{array}$$

$$4{,}357 - 2{,}735 = 1{,}622$$





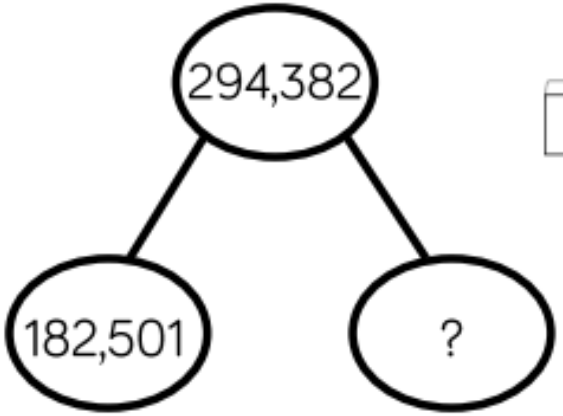
Base 10 and place value counters are the most effective manipulatives when subtracting numbers with up to 4 digits.

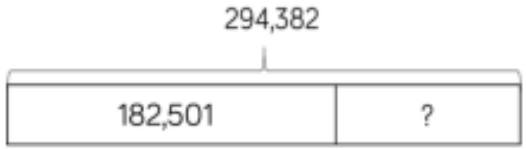
Ensure children write out their calculation alongside any concrete resources so they can see the links to the written column method.

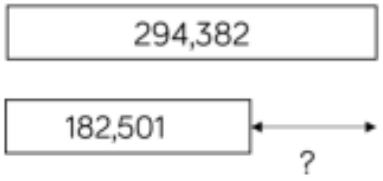
Plain counters on a place value grid can also be used to support learning.

Skill: Subtract numbers with more than 4 digits

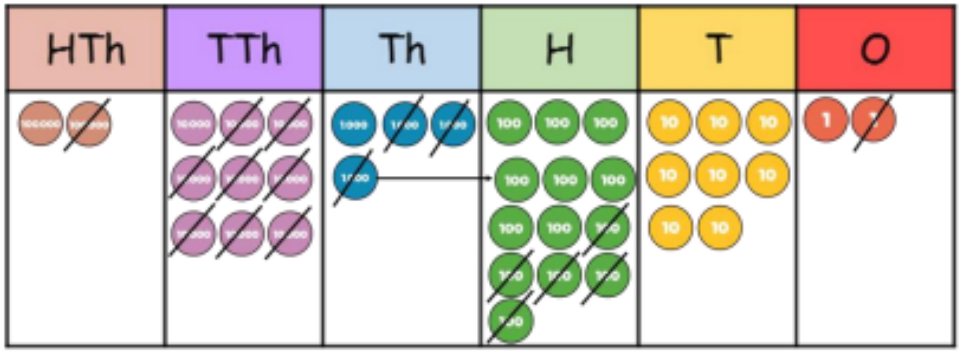
Year: 5/6







294,382 − 182,501 = 111,881



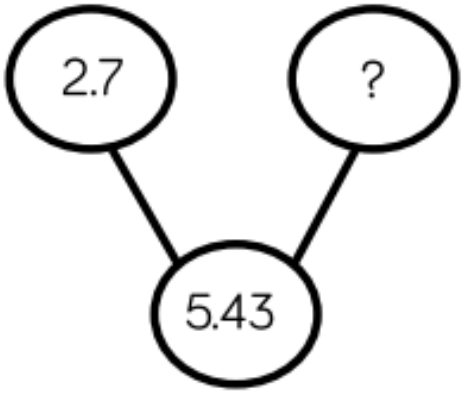
	2	9	$\cancel{3}$	$^{1}3$	8	2
−	1	8	2	5	0	1
	1	1	1	8	8	1

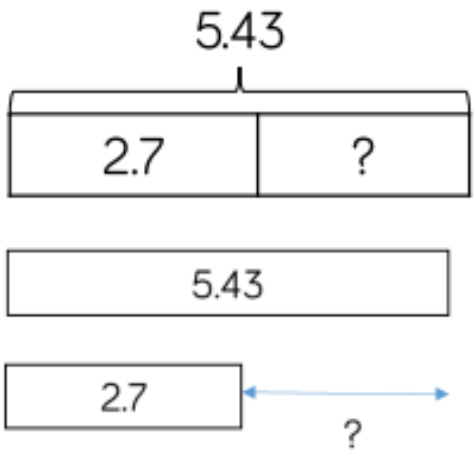
Place value counters or plain counters on a place value grid are the most effective concrete resource when subtracting numbers with more than 4 digits.

At this stage, children should be encouraged to work in the abstract, using column method to subtract larger numbers efficiently.

Skill: Subtract with up to 3 decimal places

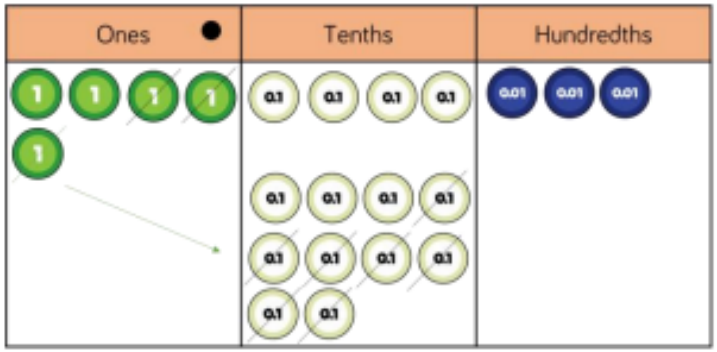
Year: 5

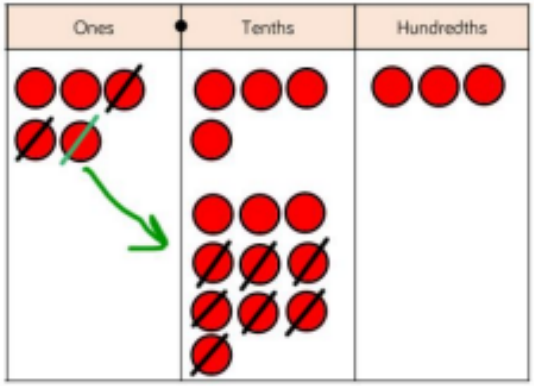




$$\begin{array}{r} {}^{4}\cancel{5}.{}^{1}43 \\ -\ 2.7 \\ \hline 2.73 \end{array}$$

$$5.43 - 2.7 = 2.73$$

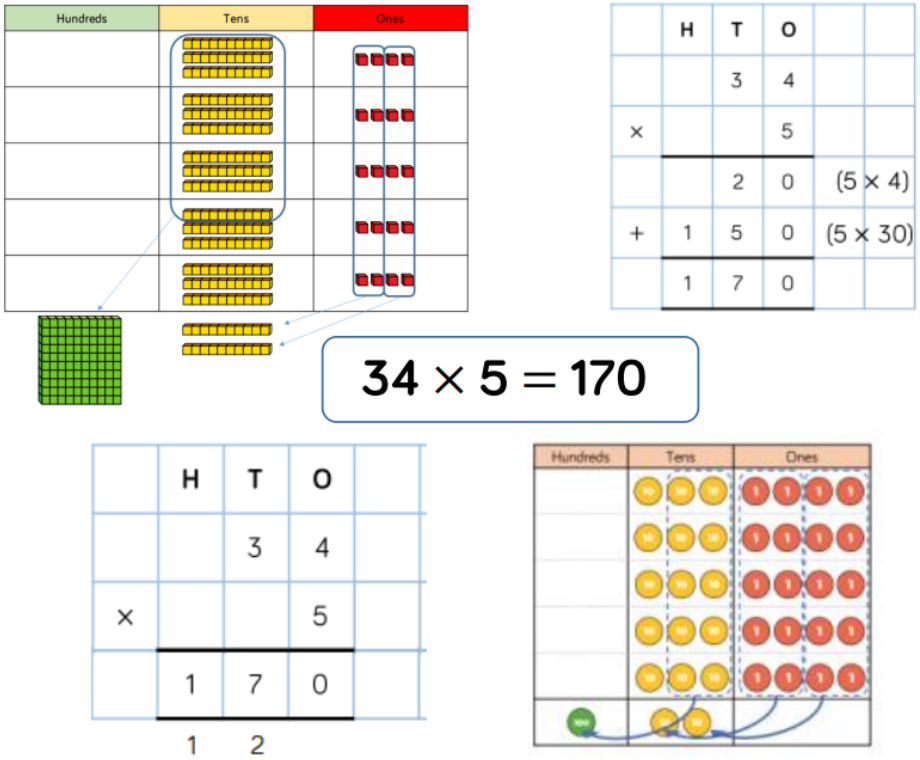




Place value counters and plain counters on a place value grid are the most effective manipulative when subtracting decimals with 1, 2 and then 3 decimal places.

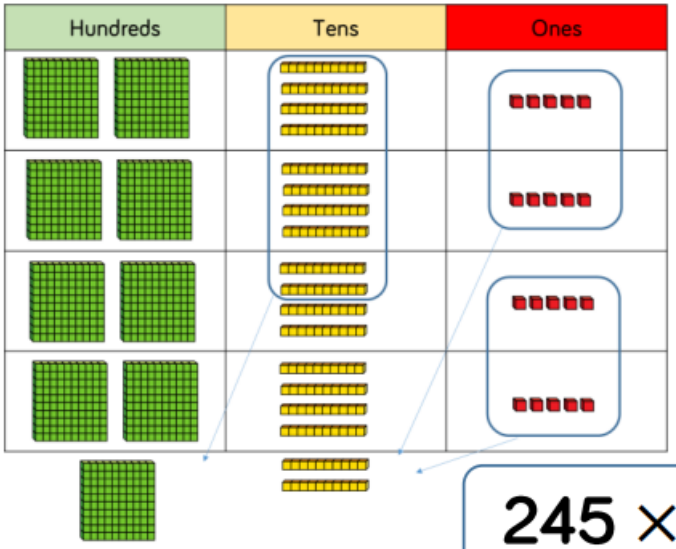
Ensure children have experience of subtracting decimals with a variety of decimal places. This includes putting this into context when subtracting money and other measures.

Manipulatives and Pictorials used to build progression in Multiplication

Skill: Multiply 2-digit numbers by 1-digit numbers	Year: 3/4
	Teachers may decide to first look at the expanded column method before moving on to the short multiplication method. The place value counters should be used to support the understanding of the method rather than supporting the multiplication, as children should use times table knowledge.

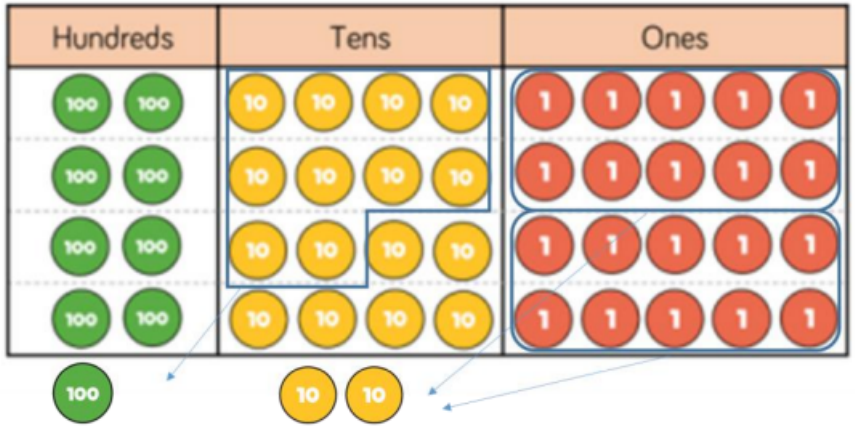
Skill: Multiply 3-digit numbers by 1-digit numbers

Year: 3/4



	H	T	O
	2	4	5
×			4
	9	8	0
	1	2	

$$245 \times 4 = 980$$



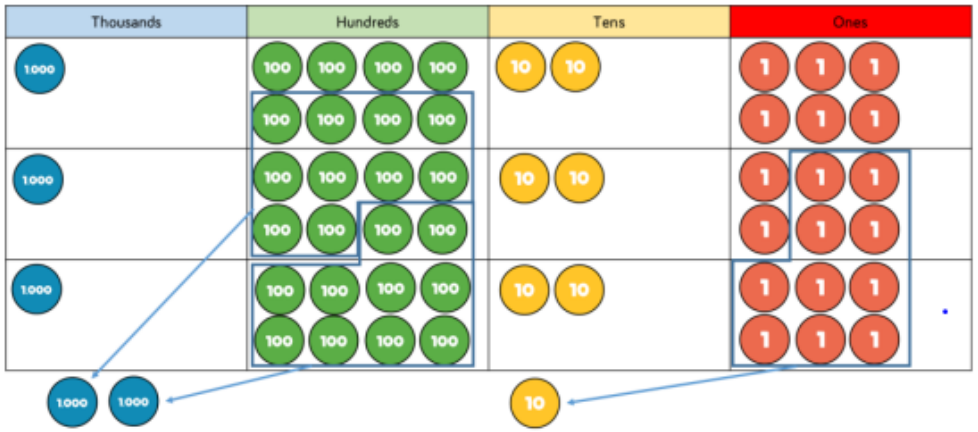
When moving to 3-digit by 1-digit multiplication, encourage children to move towards the short, formal written method.

Base 10 and place value counters continue to support the understanding of the written method.

Limit the number of exchanges needed in the questions and move children away from resources when multiplying larger numbers.

Skill: Multiply 4-digit numbers by 1-digit numbers

Year: 5



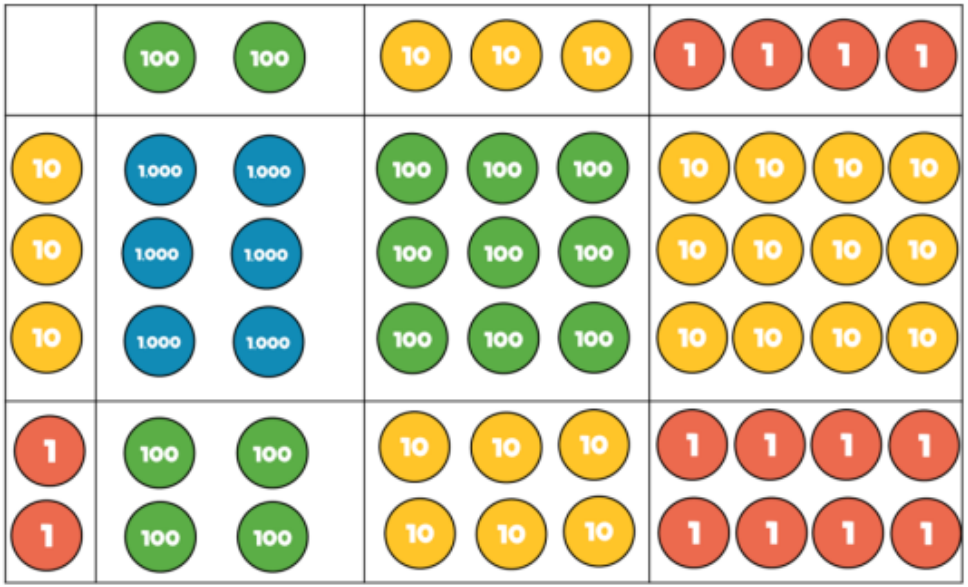
$$1{,}826 \times 3 = 5{,}478$$

	Th	H	T	O
	1	8	2	6
×				3
	5	4	7	8
	2		1	

When multiplying 4-digit numbers, place value counters are the best manipulative to use to support children in their understanding of the formal written method.
If children are multiplying larger numbers and struggling with their times tables, encourage the use of multiplication grids so children can focus on the use of the written method.

Skill: Multiply 3-digit numbers by 2-digit numbers

Year: 5



Th	H	T	O
	2	3	4
×		3	2
	4	6	8
$^{1}7$	$^{1}0$	2	0
7	4	8	8

×	200	30	4
30	6,000	900	120
2	400	60	8

$234 \times 32 = 7{,}488$

Children can continue to use the area model when multiplying 3-digits by 2-digits. Place value counters become more efficient to use but Base 10 can be used to highlight the size of numbers.

Encourage children to move towards the formal written method, seeing the links with the grid method.

Skill: Multiply 4-digit numbers by 2-digit numbers	Year: 5/6

TTh	Th	H	T	O
	2	7	3	9
×			2	8
2 (2)	1 (5)	9 (3)	1 (7)	2
5 (1)	4	7 (1)	8	0
7	6	6	9	2
		1		

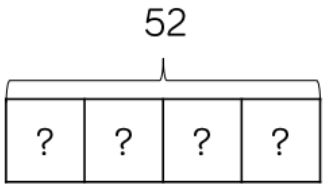
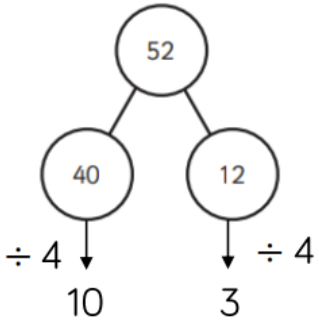
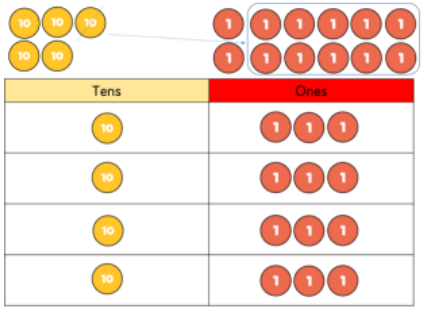
$2{,}739 \times 28 = 76{,}692$

When multiplying 4-digits by 2-digits, children should be confident in the written method.

If they are still struggling with times tables, provide multiplication grids to support when they are focusing on the use of the method.

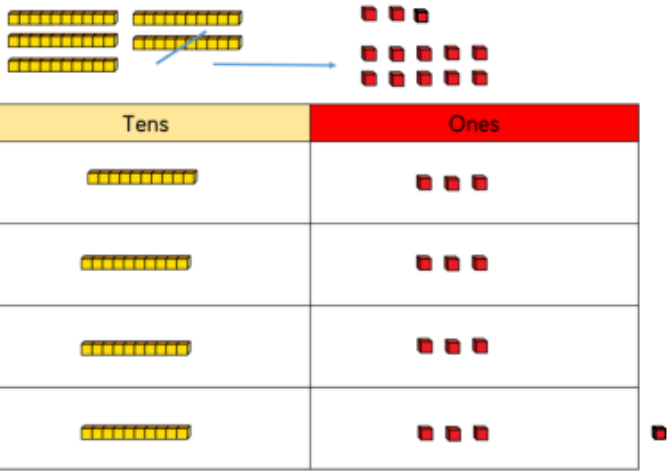
Consider where exchanged digits are placed and make sure this is consistent.

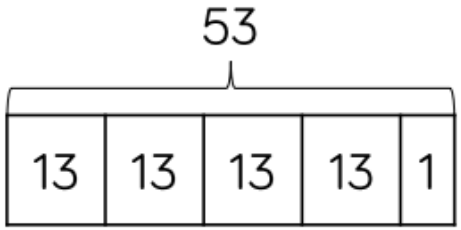
Manipulatives and Pictorials used to build progression in Division

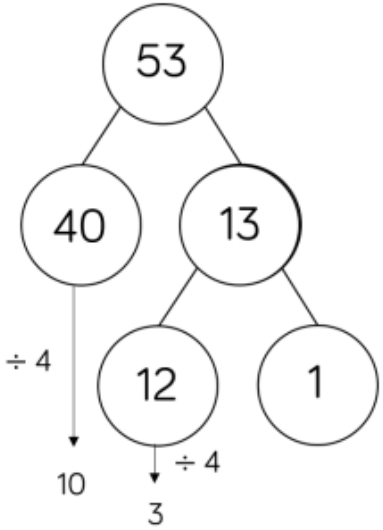
Skill: Divide 2-digits by 1-digit (sharing with exchange)	Year: 3/4
  $52 \div 4 = 13$  $10 + 3 = 13$ 	When dividing numbers involving an exchange, children can use Base 10 and place value counters to exchange one ten for ten ones. Children should start with the equipment outside the place value grid before sharing the tens and ones equally between the rows. Flexible partitioning in a part-whole model supports this method.

Skill: Divide 2-digits by 1-digit (sharing with remainders)

Year: 3/4







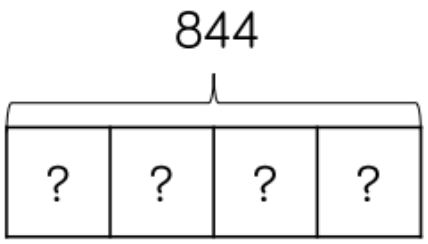
53 ÷ 4 = 13 r1

When dividing numbers with remainders, children can use Base 10 and place value counters to exchange one ten for ten ones.
Starting with the equipment outside the place value grid will highlight remainders, as they will be left outside the grid once the equal groups have been made.
Flexible partitioning in a part-whole model supports this method.

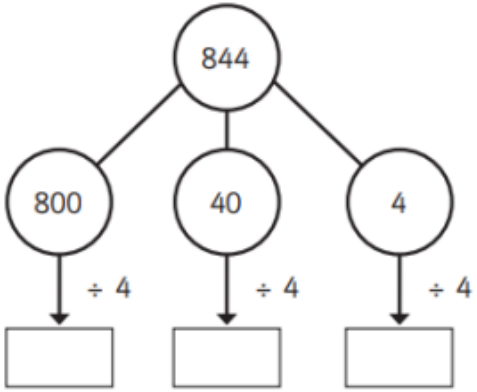
Skill: Divide 3-digits by 1-digit (sharing)

Year: 4

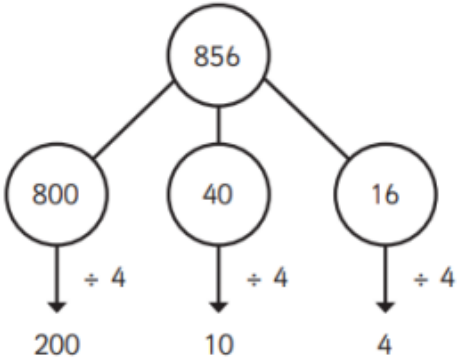
844 ÷ 4 = 122

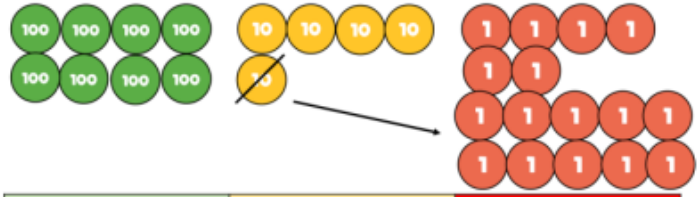


H	T	O
100 100	10	1
100 100	10	1
100 100	10	1
100 100	10	1



844 ÷ 4 = 122



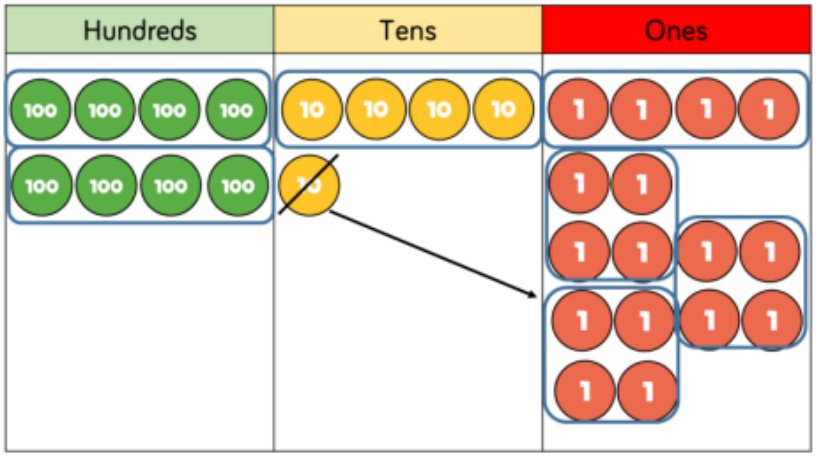


Hundreds	Tens	Ones
100 100	10	1 1 1 1
100 100	10	1 1 1 1
100 100	10	1 1 1 1
100 100	10	1 1 1 1

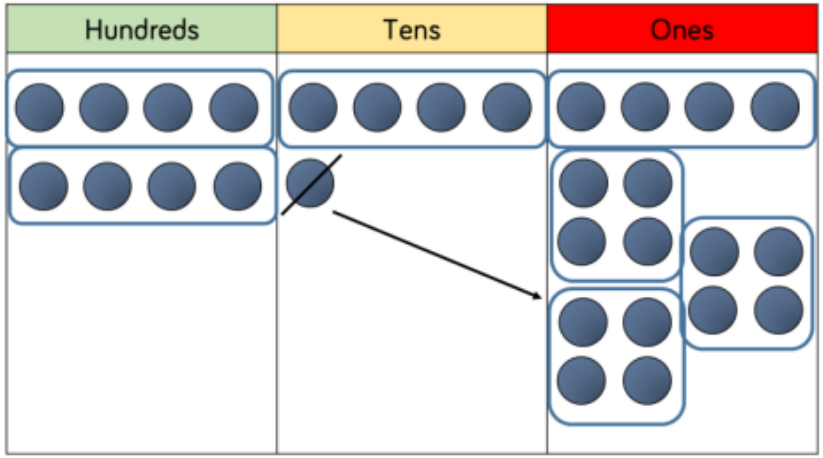
Children can continue to use place value counters to share 3-digit numbers into equal groups.
Children should start with the equipment outside the place value grid before sharing the hundreds, tens and ones equally between the rows.
This method can also help to highlight remainders.
Flexible partitioning in a part-whole model supports this method.

Skill: Divide 3-digits by 1-digit (grouping)

Year: 5



		2	1	4
	4	8	5	$^{1}6$



$$856 \div 4 = 214$$

Children can continue to use grouping to support their understanding of short division when dividing a 3-digit number by a 1-digit number.

Place value counters or plain counters can be used on a place value grid to support this understanding. Children can also draw their own counters and group them through a more pictorial method.

Skill: Divide multi digits by 2-digits (short division)

Year: 6

		0	3	6
	12	4	$^{4}3$	$^{7}2$

$$432 \div 12 = 36$$

$$7{,}335 \div 15 = 489$$

	0	4	8	9
15	7	$^{7}3$	$^{13}3$	$^{13}5$

15	30	45	60	75	90	105	120	135	150

When children begin to divide up to 4-digits by 2-digits, written methods become the most accurate as concrete and pictorial representations become less effective. Children can write out multiples to support their calculations with larger remainders. Children will also solve problems with remainders where the quotient can be rounded as appropriate.

Skill: Divide multi digits by 2-digits (long division)	Year: 6

$372 \div 15 = 24\ r12$

			2	4	r	1	2
1	5	3	7	2			
	–	3	0	0			
			7	2			
	–		6	0			
			1	2			

$1 \times 15 = 15$
$2 \times 15 = 30$
$3 \times 15 = 45$
$4 \times 15 = 60$
$5 \times 15 = 75$
$10 \times 15 = 150$

			2	4	$\frac{4}{5}$
1	5	3	7	2	
	–	3	0	0	
			7	2	
	–		6	0	
			1	2	

$372 \div 15 = 24\frac{4}{5}$

When a remainder is left at the end of a calculation, children can either leave it as a remainder or convert it to a fraction.
This will depend on the context of the question.

Children can also answer questions where the quotient needs to be rounded according to the context.

Times Tables

Why children need to be fluent with times tables

Top Times Table Hints

It may seem a daunting task to learn so many multiplication facts, but because of the commutative property of multiplication, there are fewer facts than you may think.
For example, 3 x 4 and 4 x 3 give the same answer so you need to only learn this once. Zero Times Table
Anything multiplied by zero will always equal zero.
Multiplication is repeated addition so 3 x 0 is 0 + 0 + 0, which equals 0.

One Times table: Any number multiplied by one is itself.

Two Times Table: Any number multiplied by two is double the number. 7 x 2 =14 7 + 7 = 14 double 7 is 14

Three Times Table: Digits within this times table add up to multiples of 3. For example: 3, 6, 9, 12 (1+2=3), 15 (1+5=6), 18 (1+8=9) 21 (2+1=3), 24 (2+4=6) etc. The numbers also follow the pattern of: odd, even, odd, even (3,6,9,12).

Four Times Table: The four times table is double the two times table. 4 x 2 = 8, 4 x 4 = 16, 16 is double 8. Alternatively the fours can be thought of as double double. So double 3 (6) and double again (12) is the same as 3 x 4 = 12.

Five Times Table: All multiples of 5 end in five or zero. For even numbers (e.g. 8 x 5) you can halve the number (4) and then put a zero after it (40). For odd numbers (e.g. 7 x 5) you can subtract one from the number (6), halve it (3) and then put a 5 after it (35). Any odd number times 5 ends in a 5. Any even number times 5 ends in 0.

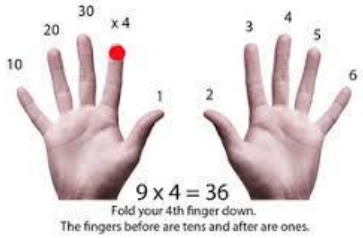
Six Times Table: The six times table is double the three times table. So 5 x 3 = 15, 5 x 6 = 30, 30 is double 15.

Seven Times Table: Combine the 5 and the 2 times table: 7 x 4 = 28 or (5x4) + (2x4) = 28

Eight Times Table: The eight times table is double the four times table. So 7 x 4 = 28, 7 x 8 = 56, 56 is double 28. The units in the multiples of eight also go down in twos. 8, 16, 24, 32, 40, 48, 56, 64, 72, 80 (8, 6, 4, 2, 0, 8, 6, 4, 2, 0).

Nine Times Tables

Fingers can be used to work out the nine times table up to 10 x 9. The first finger is put down for 1 x 9 and the remaining fingers show 9 units (1 x 9 =9). Then the second finer is put down for 2 x 9 and the remaining fingers show 1 ten (to the left) and 8 units (to the right) which equals 18, and so on. For example:



9 x 0 = 0
9 x 1 = 9
9 x 2 = 18
9 x 3 = 27
9 x 4 = 36
9 x 5 = 45
9 x 6 = 54
9 x 7 = 63
9 x 8 = 72
9 x 9 = 81
9 x 10 = 90

The digits found in the multiples of nine when added together also equal nine. For example: 9 = 9, 18 (1 + 8) = 9, 27 (2 + 7) = 9, 36 (3 + 6) = 9, 45 (4 + 5) = 9 etc.

See the pattern shown:

Ten Times Table: All the digits in the ten times table end in zero.

Eleven Times Table: Most of the multiples in the eleven times table are recalled by putting two of the number side by side. 7 x 11 = 77, 8 x 11 =88.

Twelve Times Table: The units in the twelve times table go up in twos. 12, 24, 36, 48, 60, 72, 84, 96, 108, 120, 132, 144 (2, 4, 6, 8, 0, 2, 4, 6, 8, 0). The multiples of 12 are also the multiples of 10 and the multiples of 2 combined

Odd and Even Numbers E = even O = odd

The following rules always apply:

E x E = E E x O = E O x E = E O x O = O

2 x 6 = 12 4 x 5 = 20 9 x 2 = 18 7 x 3 = 21

Therefore, the only time you get an odd answer is when two odd numbers

×	1	2	3	4	5	6	7	8	9	10	11	12
1	1	2	3	4	5	6	7	8	9	10	11	12
2	2	4	6	8	10	12	14	16	18	20	22	24
3	3	6	9	12	15	18	21	24	27	30	33	36
4	4	8	12	16	20	24	28	32	36	40	44	48
5	5	10	15	20	25	30	35	40	45	50	55	60
6	6	12	18	24	30	36	42	48	54	60	66	72
7	7	14	21	28	35	42	49	56	63	70	77	84
8	8	16	24	32	40	48	56	64	72	80	88	96
9	9	18	27	36	45	54	63	72	81	90	99	108
10	10	20	30	40	50	60	70	80	90	100	110	120
11	11	22	33	44	55	66	77	88	99	110	121	132
12	12	24	36	48	60	72	84	96	108	120	132	144

Notice the diagonally shaded numbers.
These are square numbers.
The answer to a whole number multiplied by itself is a square number.
1 x 1 = 1 2 x 2 = 4 3 x 3 = 9 4 x 4 = 16
5 x 5 = 25 6 x 6 = 36
7 x 7 = 49 8 x 8 = 64 9 x 9 = 81 10 x 10 = 100 11 x 11 = 121
12 x 12 = 144

Games to try:

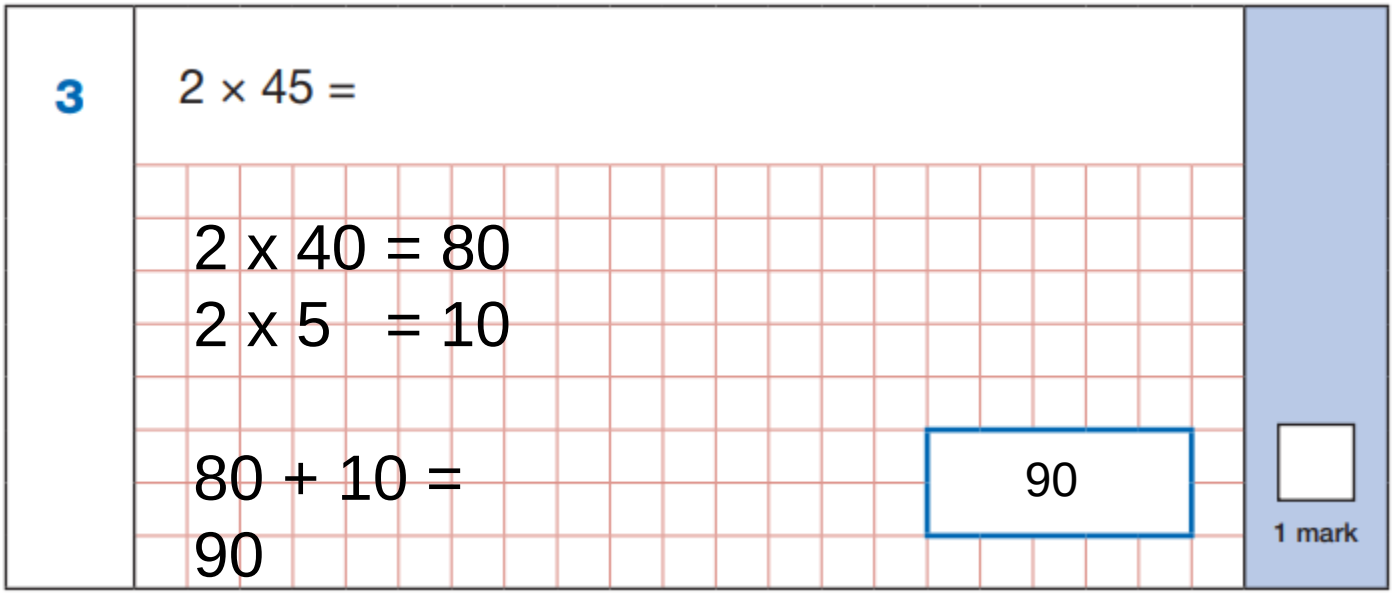
- Climb the stairs counting in multiples
- Play time tables games verbally.
- Listen and sing along to times tables songs.
- Take it in turns to say times tables in funny voices.

- Play maths games online:
  Hit the Button- https://www.topmarks.co.uk/maths-games/hit-the-button
  Snappy Maths http://www.snappymaths.com/multiplication/multiplication.htm
  Time table games: https://www.timestables.co.uk/games/
  Maths frame: https://mathsframe.co.uk/en/resources/resource/477/Multiplication-Tables-Check
  TT Rockstars: https://ttrockstars.com/

Times Tables links to other areas of maths

- 19/36 questions in Paper 1 definitely require children to have fluent times tables knowledge
- If times tables knowledge is not it will take them too long (some questions require 8 different times tables)
- If it takes them too long they won't finish
- If they are not secure they may make mistakes

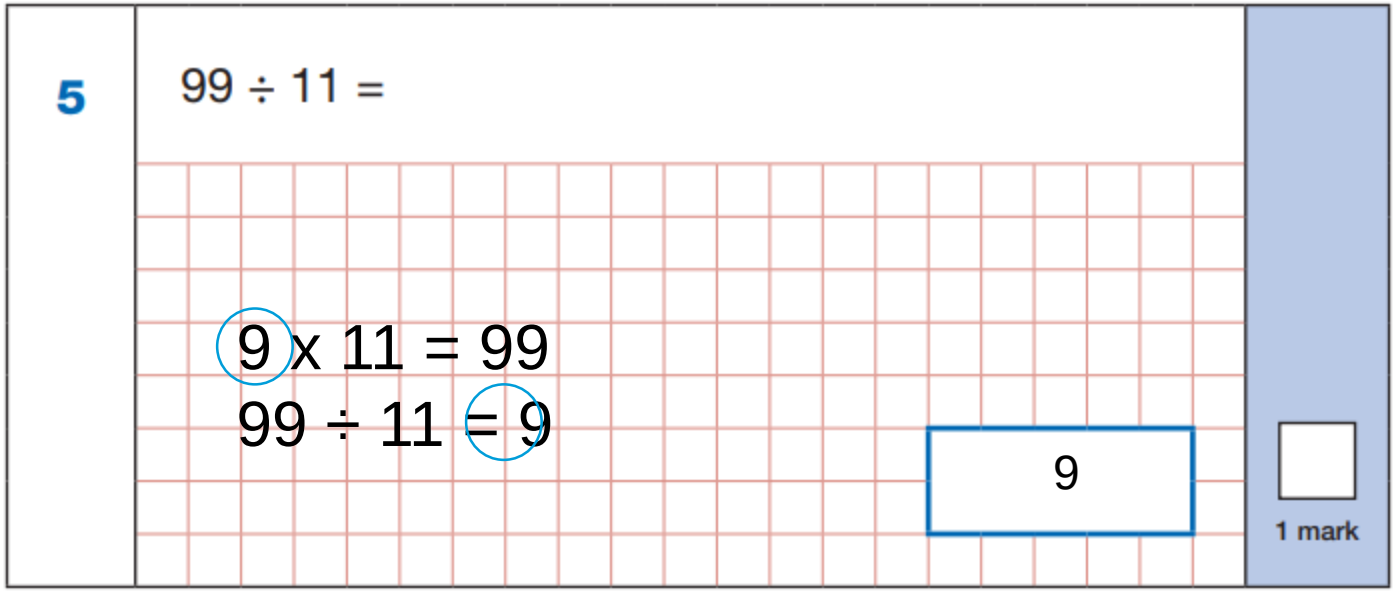
Year 3:



Children need to:

- Know x2 is the same as double
- Do 2 x 4 to help with 2 x 40; 2 x 5

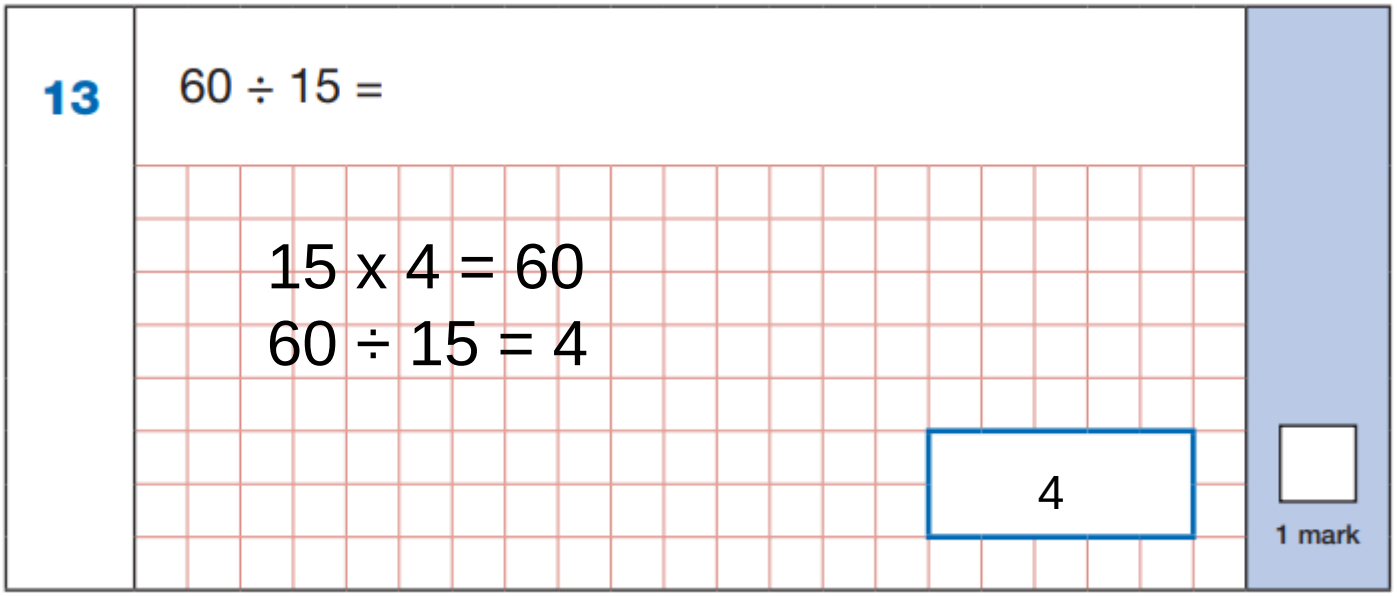
Year 4:



Children need to:

- Know x11 tables
- Know that 9 x 11 = 99 so 99 ÷ 11 = 9 (inverse)

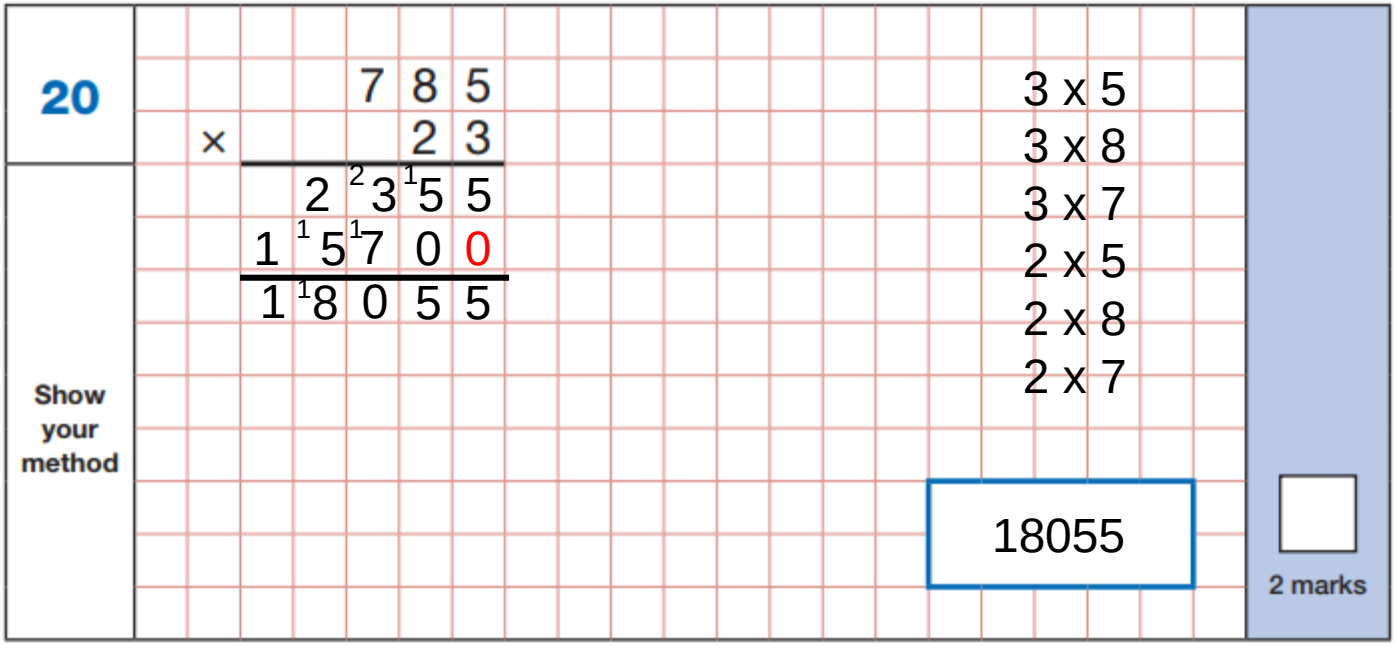
Year 5:



Children need to:

- Recognise that 15 is ¼ of 60
- Know that 15 x 4 = 60 so 60 ÷ 15 = 4

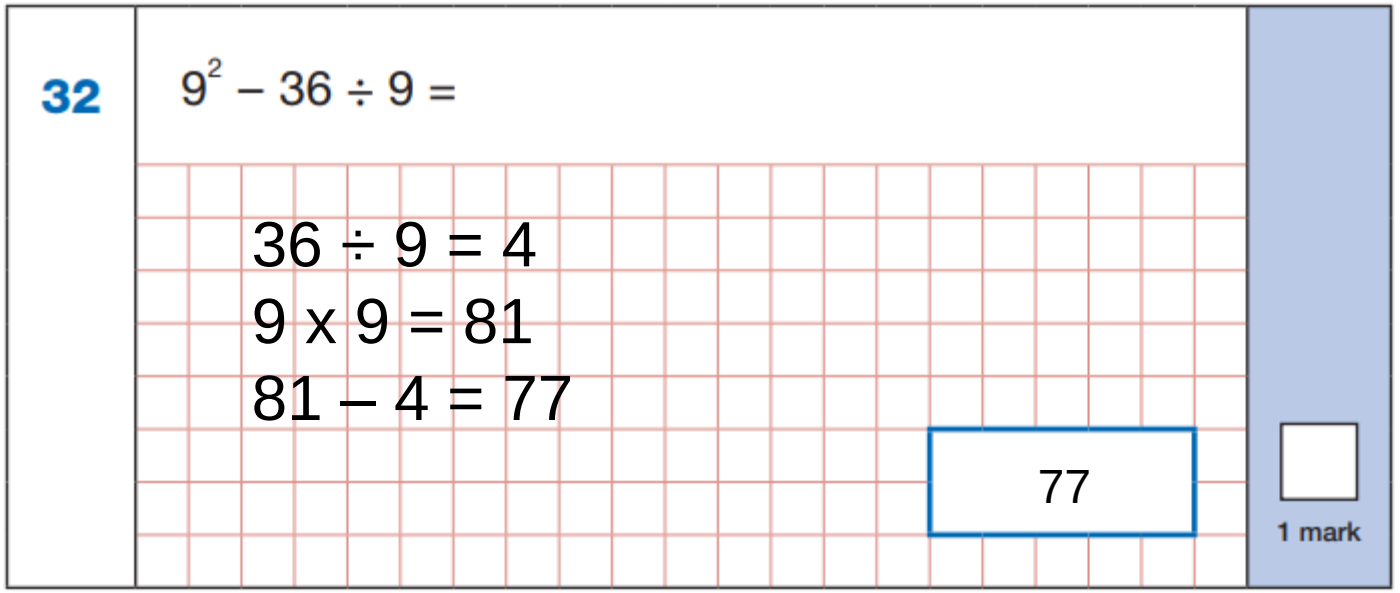
Year 6:



Children need to:

- Know 3 x 5; 3 x 8; 3 x 7; 2 x 5; 2 x 8; 2 x 7
- (as well as how to carry out this procedure accurately)

Year 5/6:



Children need to:

- Know that 9 squared is 9 x 9 = 81
- Know that 9 x 4 = 36