




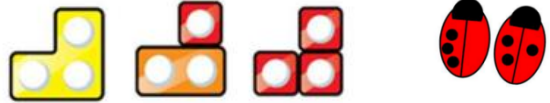


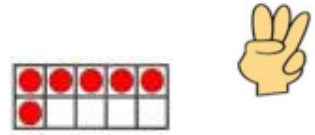

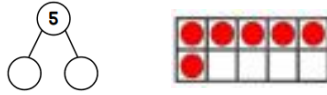
Thistly Meadow Primary School CALCULATION POLICY


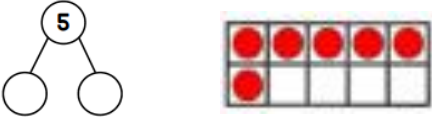

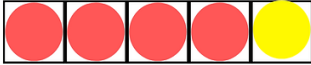



























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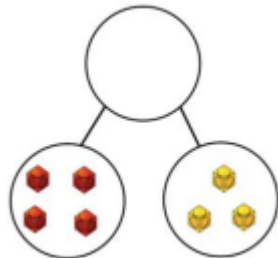
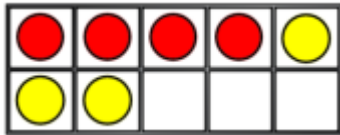
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Addition

| | Skill | Concrete | Pictorial | Abstract |
|------|------------------------------------|---|--|--|
| EYFS | Count objects, actions and sounds | <p>Children begin by counting concrete manipulatives and are encouraged to organise into a line and move each object as they count with 1-1 correspondence.</p>  |  | <p>-Children count actions and sounds e.g. counting/dropping an object into a tin, clapping and counting the claps, can you use 3 of this object i.e. 3 crates on the obstacle course?</p>  |
| | Subitise up to 5 | <p>Exposure to lots of different representations of the same amount e.g. 4 trees, 4 wheels, 4 strawberries.</p>  | <p>To identify how many objects there are in a group and check.</p>  | |
| | Explore the composition of numbers | <p>Use concrete objects to find different ways to make a number e.g. working systematically.</p>  | <p>Children record their mathematical graphics using pictures, numbers, words and symbols.</p>  | <p>-Children are encouraged to discuss the number sentence out loud using a range of vocabulary e.g. 2 add 1 equals 3 or 2 and 1 more is the same as 3.</p> |

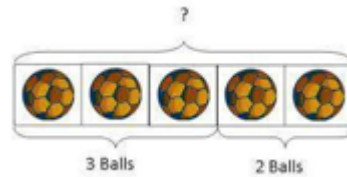
| <p style="writing-mode: vertical-rl; transform: rotate(180deg);">Number bonds to 5 and some to 10 including doubles</p> | <p>Explore using Part-part-whole, 5 and 10 frames, fingers, numicon.</p>  | <p>Explore using Part-part-whole, 5 and 10 frames, fingers, numicon.</p>  | <p>-Recall without the need for objects or models $1 + 4$, $3 + 2$, $5 + 0$ etc</p> | | | | | | | | | | | | |
|---|--|--|---|----------|-------------|----------|--|--|--|---|---|---|---|---|---|
| <p style="writing-mode: vertical-rl; transform: rotate(180deg);">Compare quantities up to 10 in different contexts.</p> | <p>Explore using concrete manipulatives to represent 1 more. Use a number track/counting stick to count forwards.</p>  | <p>Children draw the number/amount and draw 1 more.</p>  | <p>-To know mentally 1 more than 6 is 7.</p> <p>Number of the day is 3</p> <table border="1" data-bbox="1711 912 2101 1136"> <thead> <tr> <th>One less</th> <th>The same as</th> <th>One more</th> </tr> </thead> <tbody> <tr> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> </tr> </tbody> </table> | One less | The same as | One more |  |  |  |  |  |  |  |  |  |
| One less | The same as | One more | | | | | | | | | | | | | |
|  |  |  | | | | | | | | | | | | | |
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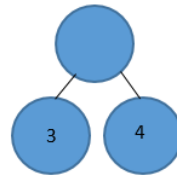
Use a variety of concrete equipment to count on from a given number (augmentation) and combine two numbers (aggregation).



Draw pictures of everyday objects and combine.



Draw pictures into a bar model format to show the addition.



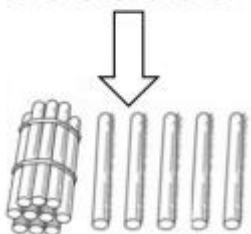
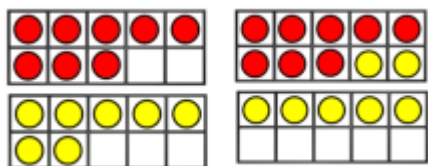
Move to use of symbols.

Move to linear equations:

$$4 + 3 = 7$$

Children use the + and = symbol to show addition facts. They should see the equations in different orders e.g. total at the start.

Add 1-digit and 2-digit numbers to 20

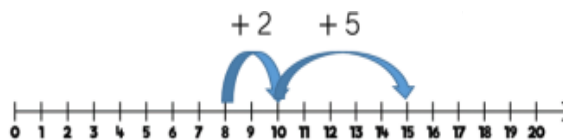


In year one, do this by counting on from the larger number until you reach a total.

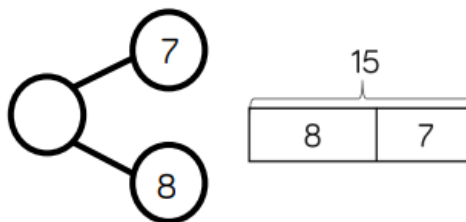
By year two, begin to partition numbers to add to ten first ten first before adding the remaining amount,



Children can draw pictures which represent the fact that the number is made of two parts – tens and ones.



Number lines support this method.



Part-whole and bar models support aggregation method.

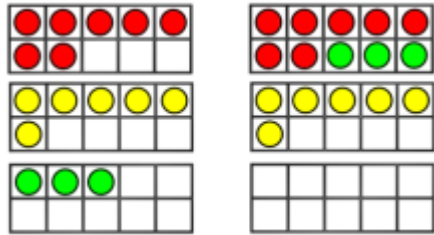
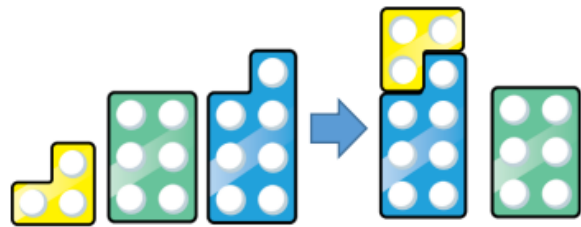
$$8 + 7 = 15$$

$$8 + 7 = 15$$

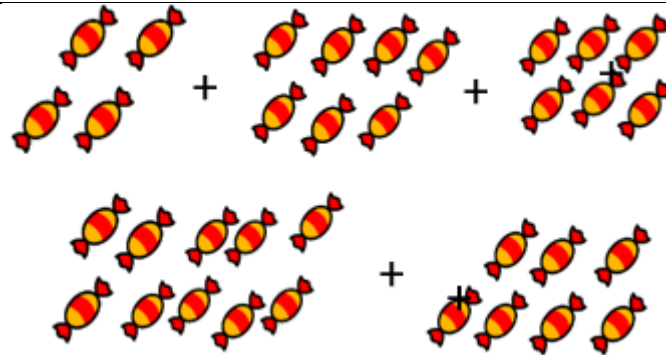
Children use jottings to partition numbers to support with augmentation.

Children should see linear equations in different orders.

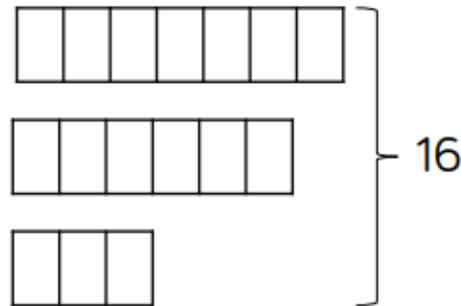
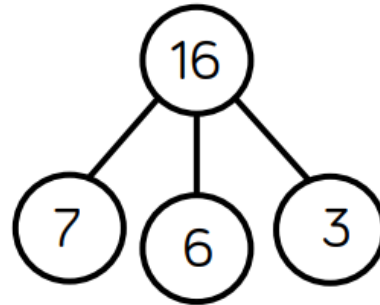
Add three 1-digit numbers



Use of equipment to model how two numbers can be combined to make ten.



The pictures show combined two amounts to make ten.



These models show that the total is made from three separate parts.

$$7 + 6 + 3 = 16$$



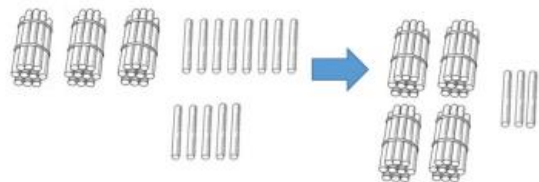
Use jottings to show number bonds to 10

$$7 + 6 + 3 = 16$$

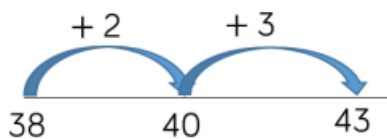
Linear equations should be written in different orders



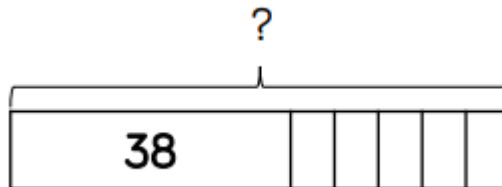
Make the larger number and count on in ones.



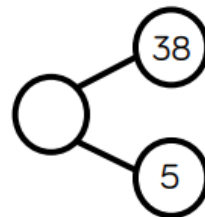
Count on to the next ten and then add the remaining ones.



Use number lines, bar models and hundred squares to count on in ones from the larger number then progress to jumping to the next multiple of 10.



| | | | | | | | | | |
|----|----|----|----|----|----|----|----|----|-----|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 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 |
| 61 | 62 | 63 | 64 | 65 | 66 | 67 | 68 | 69 | 70 |
| 71 | 72 | 73 | 74 | 75 | 76 | 77 | 78 | 79 | 80 |
| 81 | 82 | 83 | 84 | 85 | 86 | 87 | 88 | 89 | 90 |
| 91 | 92 | 93 | 94 | 95 | 96 | 97 | 98 | 99 | 100 |



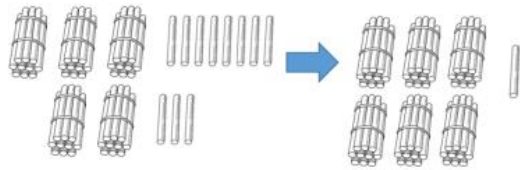
Part-whole models show the relationship between the addends and the total.

$$38 + 5 =$$

$$38 + 2 + 3$$

$$38 + 5 = 43$$

Linear equations can be done in different orders.



Create groups of ten before adding the remaining ones

| Tens | Ones |
|------|------|
| | |
| | |

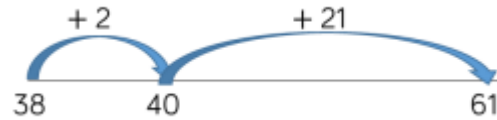
A green arrow points from the ones column to the tens column, indicating the exchange of ten ones for one ten.

Use representations of 10s and 1s to count the ones first and then the tens, renaming as appropriate.

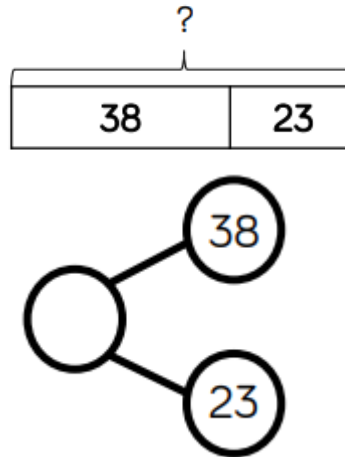
Children can progress to counters when confident with the tens blocks.

| Tens | Ones |
|------|------|
| | |
| | |

A green arrow points from the ones column to the tens column, indicating the exchange of ten ones for one ten.



Add on from the larger number to reach a multiple of ten.



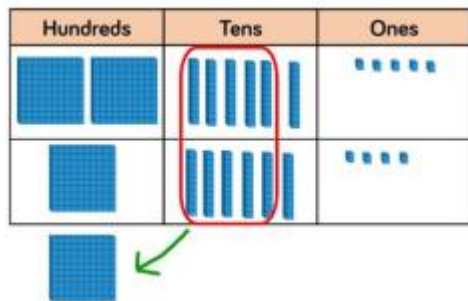
$$38 + 23 = 61$$

Linear equations are used to represent the calculation in both years

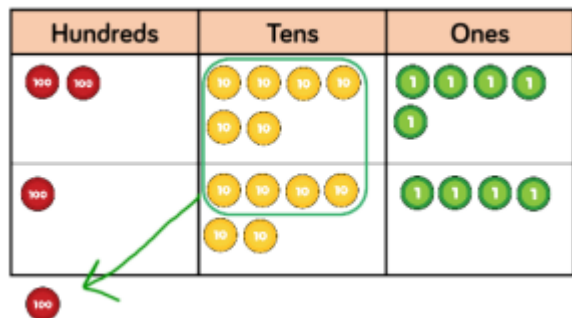
$$\begin{array}{r} 38 \\ + 23 \\ \hline 61 \\ \hline 1 \end{array}$$

Column method is introduced in Year 3. Initially record alongside concrete images to support understanding.

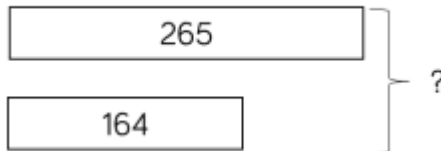
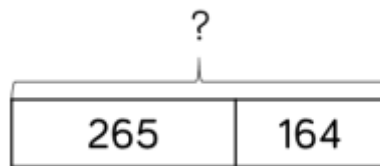
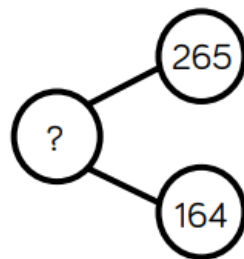
Add numbers with up to 3 digits



Start with tens blocks



Progress to counters when secure on place value



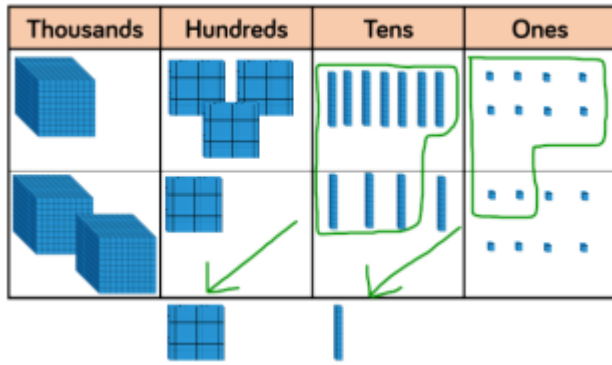
Bar models and part-whole models can be used dependent on context to show relationship between the addends.

$$265 + 164 = 429$$

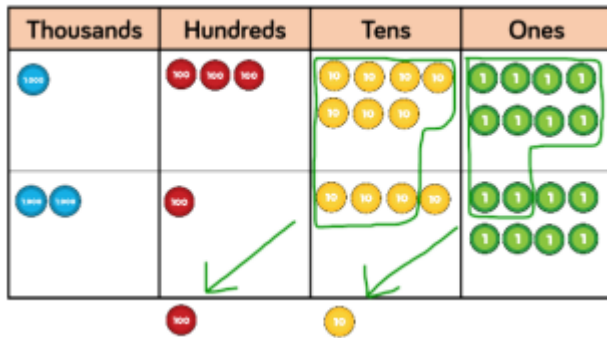
$$\begin{array}{r} 265 \\ + 164 \\ \hline 429 \\ \hline 1 \end{array}$$

Initially write column method alongside concrete resources to aid progression and understanding.

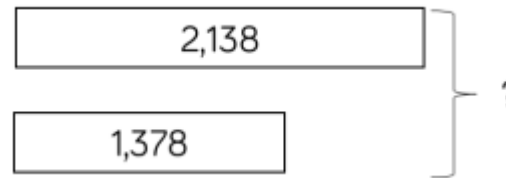
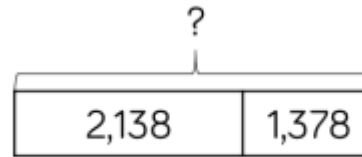
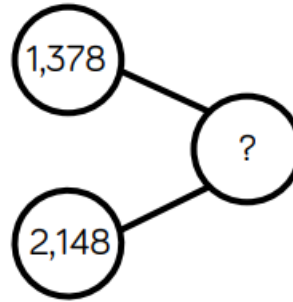
Add numbers with up to 4-digits



Begin with tens blocks to highlight place value.



Progress to counters.



Bar models and part-whole models can be used dependent on context to show relationship between the addends.

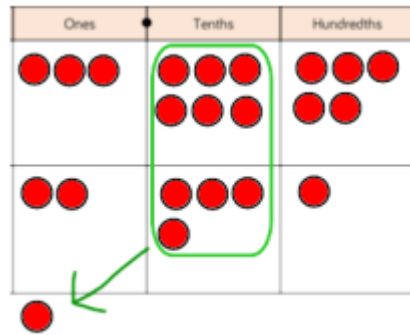
$$1,378 + 2,148 = 3,526$$

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

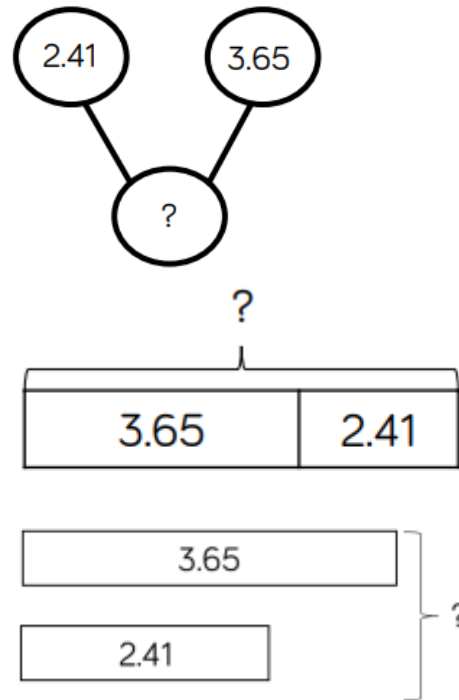
Initially write column method alongside concrete resources to aid progression and understanding.

Year 5

Add with up to 3 decimal places



Use counters to represent this.



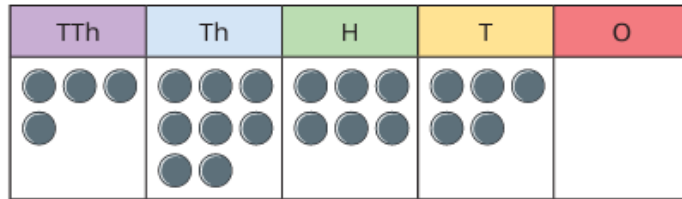
Bar models and part-whole models can be used dependent on context to show relationship between the addends.

$$3.65 + 2.41 = 6.06$$

$$\begin{array}{r} 3.65 \\ + 2.41 \\ \hline 6.06 \\ 1 \end{array}$$

Initially write column method alongside concrete resources to aid progression and understanding.

Use a place value chart to help with additions.

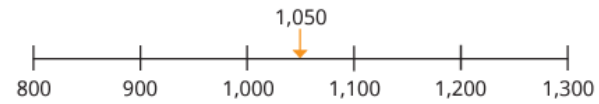


$$48,650 + 300 =$$

$$48,650 + 10 =$$

$$1,210 + 48,650 =$$

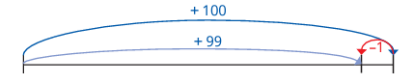
Using a number line to help with mental calculations.



Use the number line to help you work out the calculations.

$$\blacktriangleright 1,050 + 100$$

$$\blacktriangleright 1,050 - 100$$



$$3,724 + 999 =$$

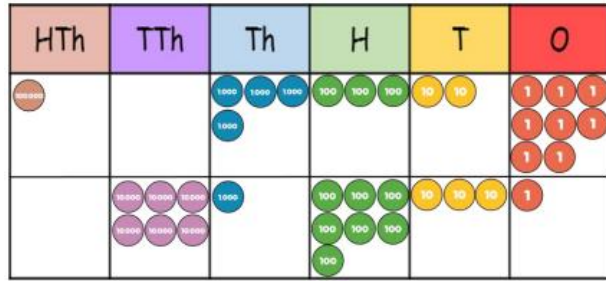
$$3724 + 990 =$$

$$590 + 590 =$$

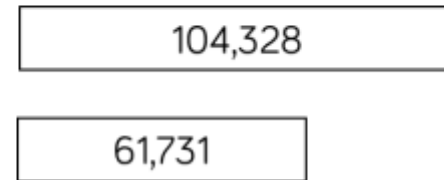
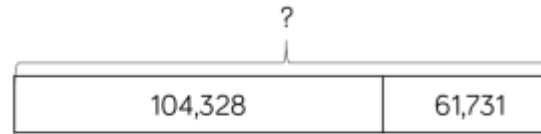
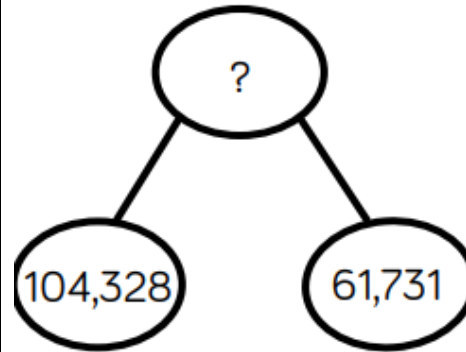
The sum of ____ ones and ____ ones is ____ ones, so the sum of ____ thousands and ____ thousands is ____ thousands.

I can partition the number into ____, ____ and ____ and add the parts separately.

Add numbers with more than 4 digits



Use counters to represent this.



Bar models and part-whole models can be used dependent on context to show relationship between the addends.


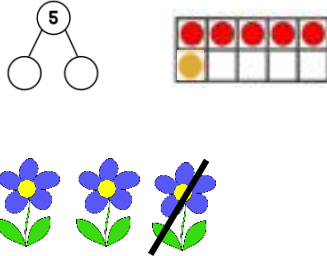

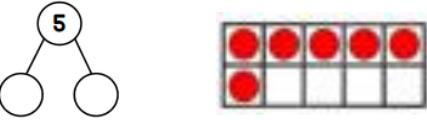
$$104,328 + 61,731 = 166,059$$

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

1

Initially write column method alongside concrete resources to aid progression and understanding.

Subtraction

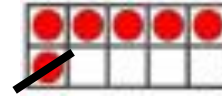
| | Skill | Concrete | Pictorial | Abstract |
|------|--|---|--|--|
| EYFS | Explore the composition of numbers to 10 | <p>Use concrete objects to find different ways to make a number e.g. working systematically. Look at all number facts, including the subtraction facts for these numbers.</p>  | <p>Children record their mathematical graphics using pictures, numbers, words and symbols.</p>  | <p>-Children are encouraged to discuss the number sentence out loud using a range of vocabulary e.g 4 take away 2 is the same as 2, 4 subtract 2 equals 2.</p> |
| | Number bonds to 5 and some to 10 including subtraction facts | <p>Explore using Part-part-whole, 5 and 10 frames, fingers, numicon.</p>  | <p>Explore using Part-part-whole, 5 and 10 frames, fingers, numicon.</p>  | <p>-Recall without the need for objects or models 5-3, 5-4, 4-1 etc.</p> |

Compare quantities up to 10 in different contexts.

Explore using concrete manipulatives to represent 1 less. Use a number track/counting stick to count backwards.












Children draw the number/amount and cross 1 out.

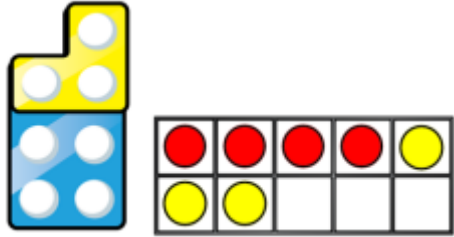


-To know mentally 1 less than 6 is 5.

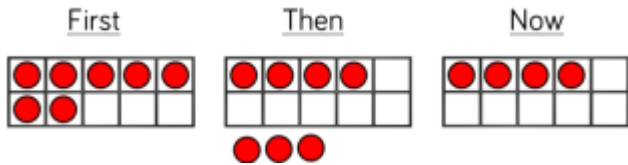
Number of the day is 3

| One less | The same as | One more |
|---|---|---|
|  |  |  |
|  |  |  |
|  |  |  |

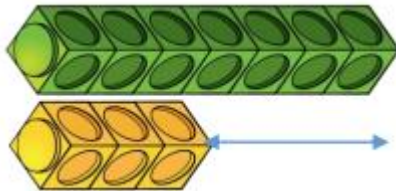
Subtract 1-digit numbers within 10



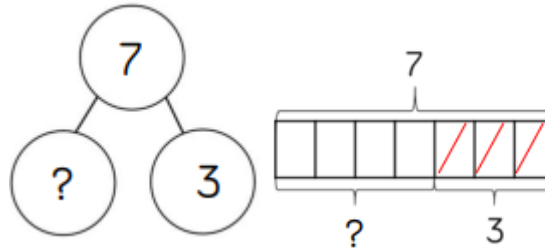
Use representations to show partition method.



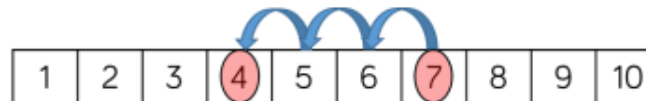
These models show reduction.



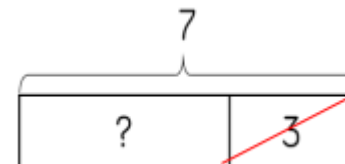
Use cubes to show finding the difference



Partition



Reduction

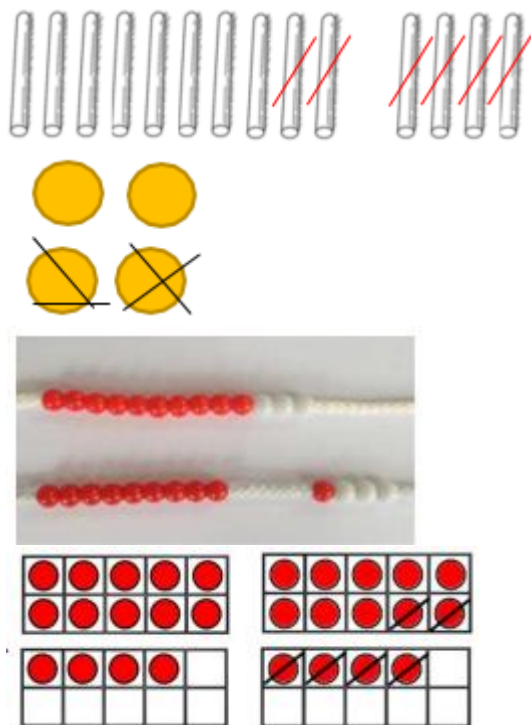


Difference

$$7 - 3 = 4$$

Linear equations should be written in different orders

Subtract 1-digit and 2-digit numbers to 20

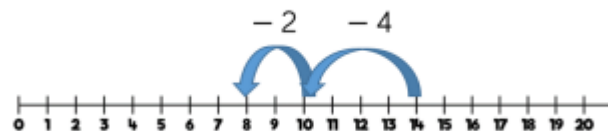


In Year 1, count back from the larger number using objects, bead strings, tens frames and counters.

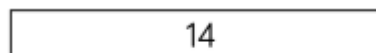
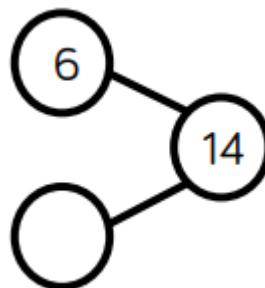
In Year 2, begin to look for number bonds to 10 and subtract using partition.



Count back in ones on a number track.



Use a number line to partition and count back



Bar models and part-whole models show the relationship between the minuend and the subtrahend.

$$14 - 6 = 8$$

$$14 - 6 = 8$$

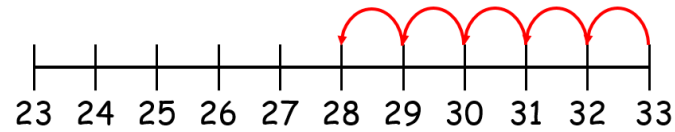
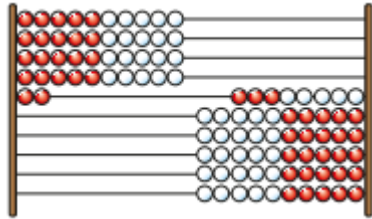
Use jottings to show partition of subtrahend.

Linear equations should be written in different orders.

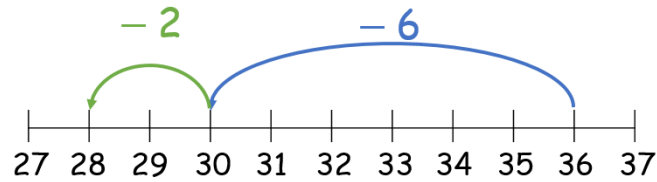
Subtract 1 and 2-digit numbers to 100



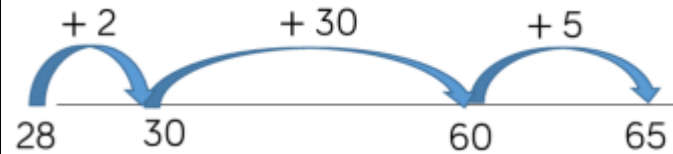
Use tens blocks to take away by counting back and renaming.
Progress to partitioning to reach the next ten.



Counting back



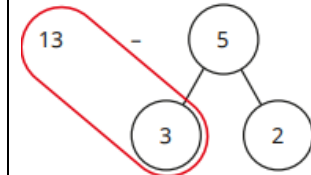
Partition method



This number line shows counting on by partition.

$$22 - 7 = \square$$

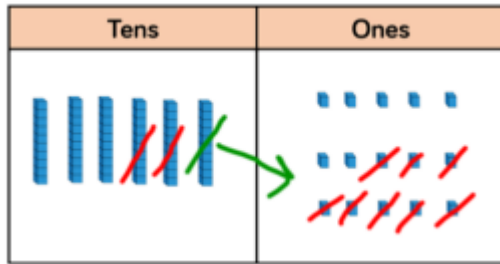
Linear equations should be written in different orders



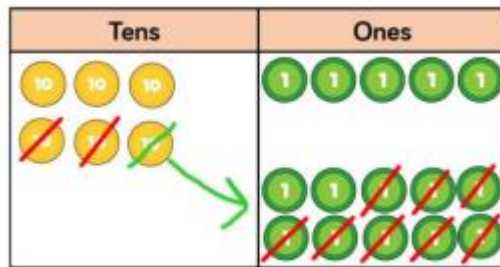
$$10 - 2 = 8$$

Jottings support use of partition method.

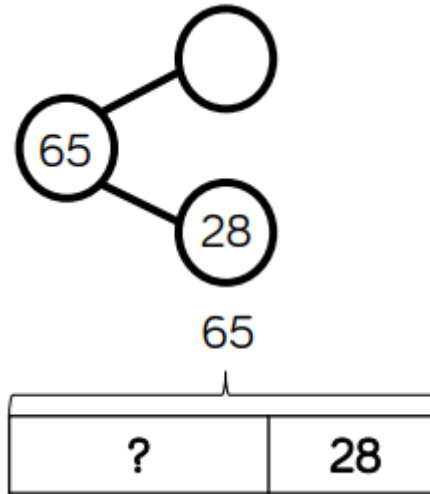
Subtract 1-digit and 2-digit numbers to 100



Use tens blocks to secure place value understanding



Progress to counters when place value is secure.



Bar models and part-whole models show the relationship between the subtrahend and the minuend.

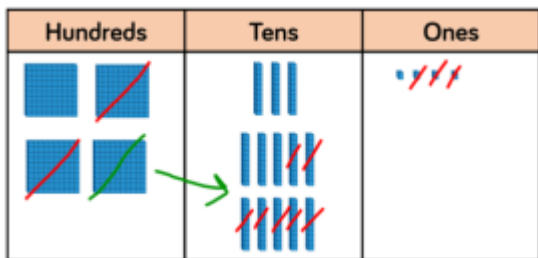
$$65 - 28 = 37$$

Linear equations should be presented in different orders

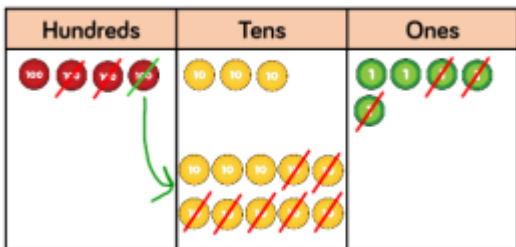
$$\begin{array}{r} 5 \\ 65 \\ - 28 \\ \hline 37 \end{array}$$

Initially write column method alongside concrete resources to aid progression and understanding.

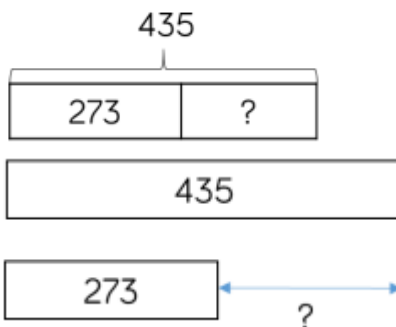
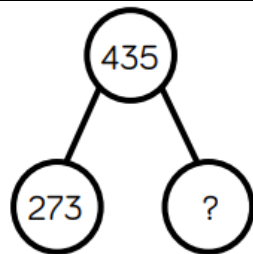
Subtract numbers with up to 3 digits



Use tens blocks to secure place value understanding



Progress to counters when place value is secure.



Bar models and part-whole models can be used dependent on context to show relationship between the subtrahends.

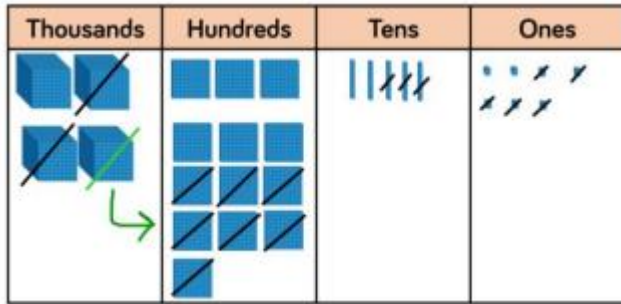
$$435 - 273 = 162$$

Linear equations should be presented in different orders

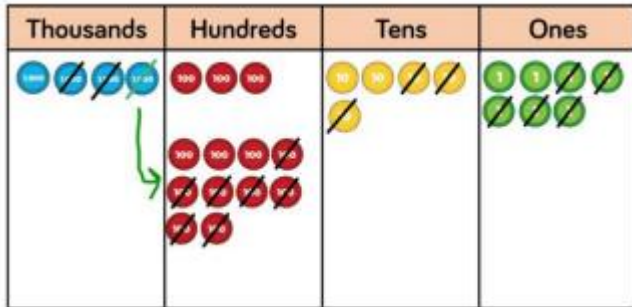
$$\begin{array}{r} 3 \quad 1 \\ 435 \\ - 273 \\ \hline 162 \end{array}$$

Initially write column method alongside concrete resources to aid progression and understanding.

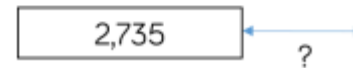
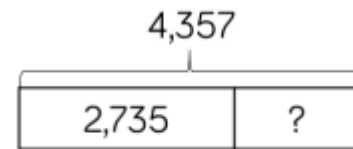
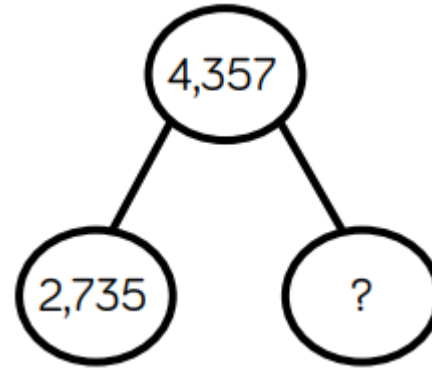
Subtract numbers with up to 4-digits



Use tens blocks to secure place value understanding



Progress to counters when place value is secure.



Bar models and part-whole models can be used dependent on context to show relationship between the subtrahends.

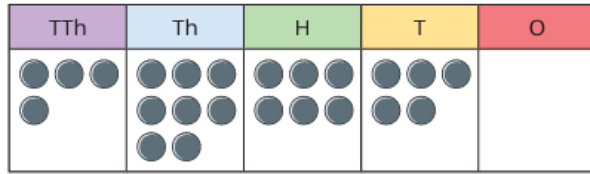
$$4,357 - 2,735 = 1,622$$

Linear equations should be presented in different orders

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

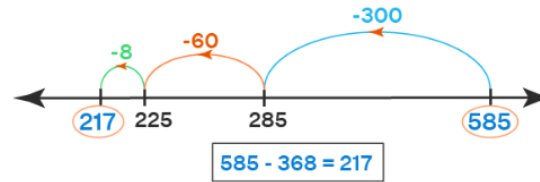
Initially write column method alongside concrete resources to aid progression and understanding.

Use place value equipment to assist with subtractions.



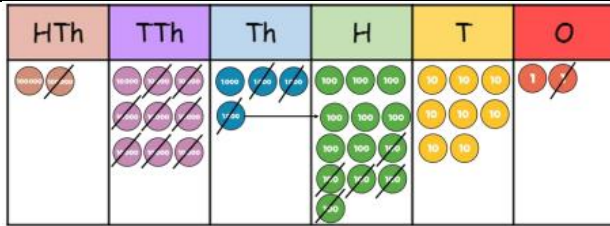
- ▶ $48,650 - 3,000$ ▶ $43,650 - 200$ ▶ $43,650 - 10$
- ▶ $48,650 - 3,210$ ▶ $48,650 - 7,100$ ▶ $48,650 - 5,030$

Using a number line to help with mental calculations.

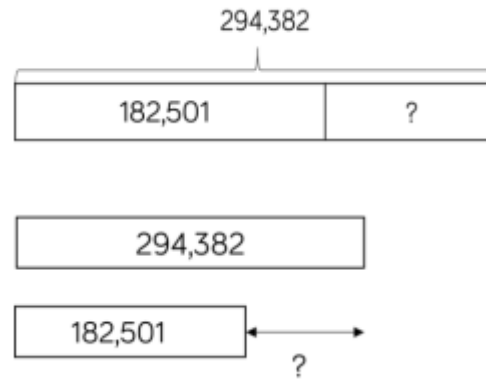
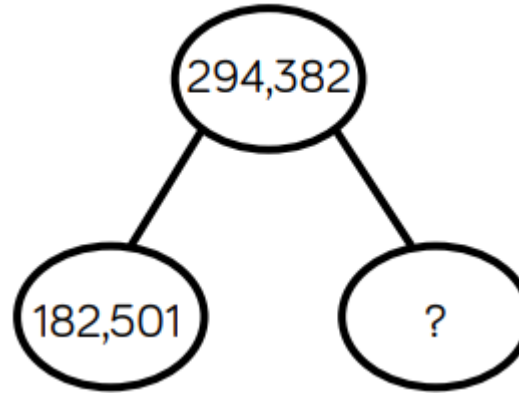


- Counting forwards and backwards in tenths and hundredths: $1.7 + 0.55$
- Reordering: $4.7 + 5.6 - 0.7$, $4.7 - 0.7 + 5.6 = 4 + 5.6$
- Partitioning: counting on or back - $540 + 280$, $540 + 200 + 80$
- Partitioning: bridging through multiples of 10
- Partitioning: compensating: $5.7 + 3.9$, $5.7 + 4.0 - 0.1$
- Partitioning: using 'near' double: $2.5 + 2.6$ is double 2.5 and add 0.1 or double 2.6 and subtract 0.1

Add numbers with more than 4-digits



Use counters to represent this.



Bar models and part-whole models can be used dependent on context to show relationship between the subtrahends.

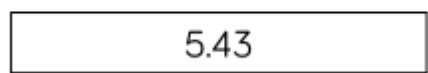
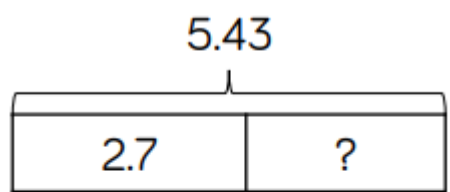
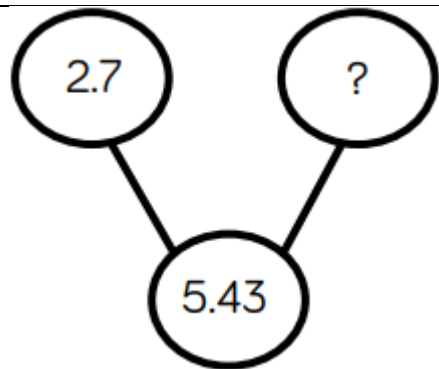
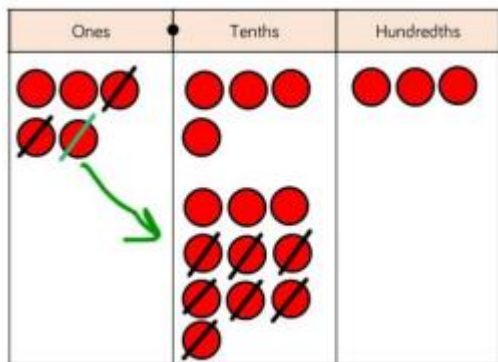
$$294,382 - 182,501 = 111,881$$

Linear equations should be presented in different orders

| | | | | | | |
|---|---|---|--------------|----------------|---|---|
| | 2 | 9 | 3 | 1 3 | 8 | 2 |
| - | 1 | 8 | 2 | 5 | 0 | 1 |
| | 1 | 1 | 1 | 8 | 8 | 1 |

Initially write column method alongside concrete resources to aid progression and understanding.

Subtract with up to three decimal places



Bar models and part-whole models can be used dependent on context to show relationship between the subtrahends.

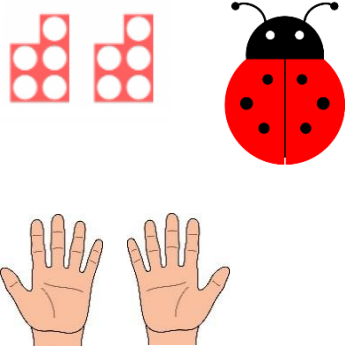

$$5.43 - 2.7 = 2.73$$


Linear equations should be presented in different orders

$$\begin{array}{r} 4 \ 1 \\ 5.43 \\ - 2.7 \\ \hline 2.73 \end{array}$$

Initially write column method alongside concrete resources to aid progression and understanding.

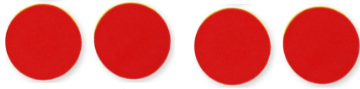
Multiplication

| | Skill | Concrete | Pictorial | Abstract |
|------|--|--|--|--|
| EYFS | Recall number bonds to 5 and some to 10 including double facts | <ul style="list-style-type: none"> - Children know that 'double means that same again' - Use a range of concrete objects to represent doubling facts – cubes, numicon, ladybirds, butterflies, fingers. - Sing songs that represent doubling facts.  | <p>Children use a range of pictorial representations to show doubling facts (the same again) – part=part-whole, tens frames.</p>  | <p>Children to mentally know doubling facts.</p> <p>I know double 3 is 6. 3 and 3 again is 6. 3 and 3 more is 6.</p> |

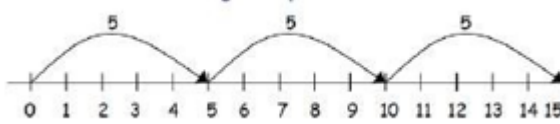
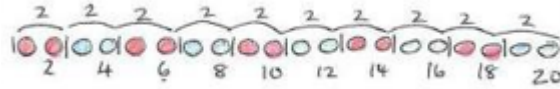
| | | | |
|---|---|--|--|
| Explore and represent patterns in numbers up to 10 and beyond, including odd and evens. | <ul style="list-style-type: none">- Daily, children count how many children are in school using tens frames. Children count how many full tens there are and how many more.- Explore using numicon and other equipment to identify odd and even numbers.- Children use a tens frame and other equipment to count in fives and tens.  | | <p>Children can count in 2s, 5s, and 10s independently.</p> <p>Children know which numbers are odd and which numbers are even.</p> |
|---|---|--|--|

Year 1

Repeated addition of 2, 5 and 10



Use a variety of resources to make groups of two and count up from zero



$$2 + 2 + 2 = 6$$

$$5 + 5 + 5 = 15$$

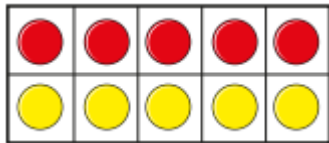
Count in multiples:

10, 20, 30, 40, 50, 60, 70, 80, 90, 100

$$\square + \square = \square$$

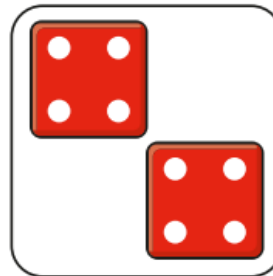
$$\square + \square = \square$$

$$\square + \square = \square$$

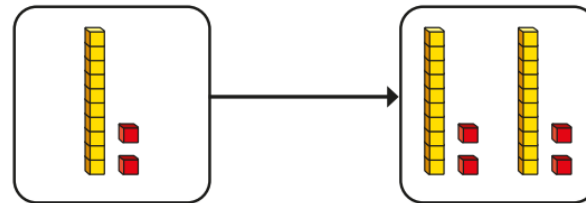


Use varied resources to create doubles

Double 4 is 8



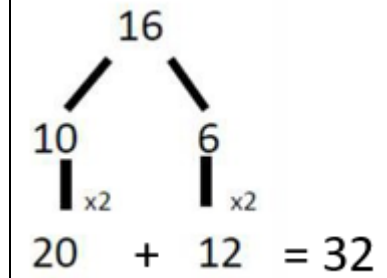
Children draw pictures of familiar objects to show doubling



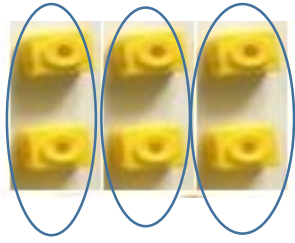
Progress to doubling two digit numbers less than 20 using tens blocks

$$4 + 4 = 8$$

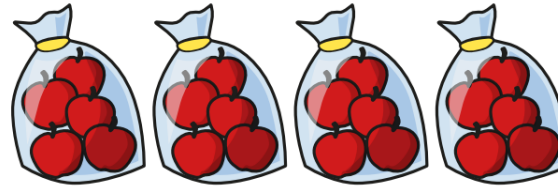
Double 4 is 8



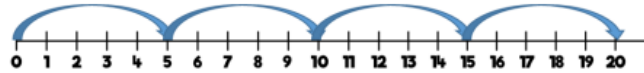
Children will be able to partition numbers into tens and ones to aid the doubling process



Arrange singular objects into equal group sizes and count to find the total



Draw pictures of objects and items arranged into groups to count.



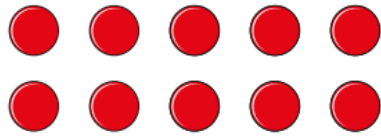
$$2 + 2 + 2 + 2 =$$

There are candles.

Record the abstract notation alongside concrete equipment and pictorial images to embed understanding.

Progress to solving problems

One bag holds 5 apples.
How many apples do 4 bags hold?



Use counters, cubes and other single objects to build arrays



Draw pictures of common objects in array patterns without use of notation in year 1

In year 2, begin to link to multiplication



$$2 \times 4 = 8$$

$$4 \times 2 = 8$$

There are _____ rows.

There are _____ in a row.

There are _____ in total.

There are _____ columns.

There are _____ in a column.

There are _____ altogether.

Begin to use the multiplication symbol in year 2 to link to repeated addition



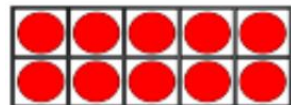
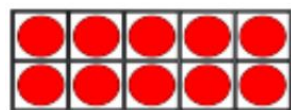
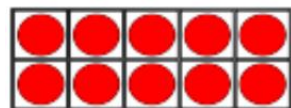
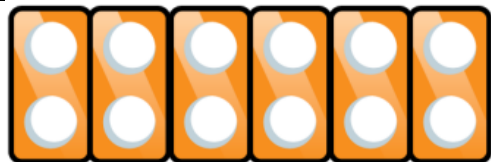
$$5 + 5 + 5 = 15$$

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

$$5 \times 3 = 15$$

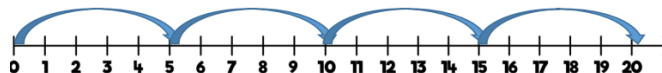
$$3 \times 5 = 15$$

Learn to 2, 5 and 10 x table



Use a variety of practical resources to model making groups to count in

| | | | | | | | | | |
|----|----|----|----|----|----|----|----|----|----|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 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 |



Use different representations of 2, 5 and 10 to help when counting in multiples

Count in multiples of the number out loud

Write sequences involving multiples of the number e.g.
0, 2, 4, 6, 8...

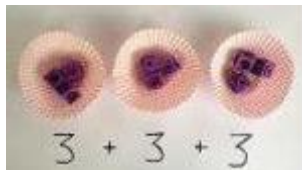
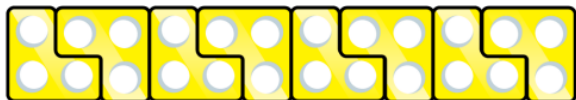
Complete linear equations in different orders.

$$3 \times 4 = 12$$

$$12 = 3 \times 4$$

Look for rules and patterns
e.g. all multipliers of 2 are even
all multiples of 10 have no ones
Multiples of five go odd, even, odd, even
Multiples of five are half of the corresponding multiple of 10

Learn the 3, 4 and 8 times tables



Count in groups of the given number using manipulatives placed in that number of groups



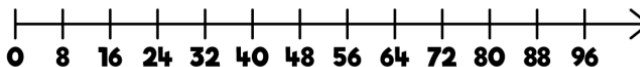
4 8 12 16



8 16 24 32

Use pictures of objects which represent that number to aid counting

| | | | | | | | | | |
|----|----|----|----|----|----|----|----|----|-----|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 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 |
| 61 | 62 | 63 | 64 | 65 | 66 | 67 | 68 | 69 | 70 |
| 71 | 72 | 73 | 74 | 75 | 76 | 77 | 78 | 79 | 80 |
| 81 | 82 | 83 | 84 | 85 | 86 | 87 | 88 | 89 | 90 |
| 91 | 92 | 93 | 94 | 95 | 96 | 97 | 98 | 99 | 100 |



Use hundred squares and number lines to make the jumps.

Linear equations done in any order

$$3 \times 8 = 24$$

$$24 = 3 \times 8$$

Look for rules and patterns

e.g.

Multiples of 3 go odd, even, odd, even

The digits sum to a multiple of 3

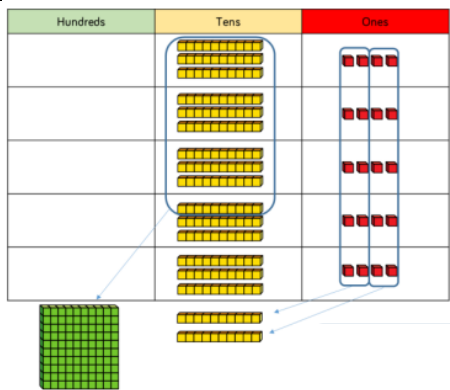
Multiples of 4 are all even.

Multiples of four are double the corresponding multiple of 2

Multiples of 8 are all even

Multiples of 8 are double the corresponding multiple of 4

Multiply 2-digit numbers by 1-digit numbers



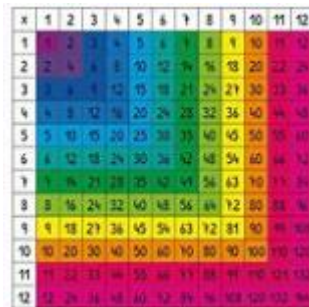
Use base ten initially to secure understanding

Progress to counters when place value is secure



Children draw pictures of tens blocks to support with partition and multiplication.

They can extend this to pictures of counters drawn in a place value grid.



Multiplication squares help where children do not have secure knowledge of the prerequisite number facts

$$34 \times 5 = 170$$

Linear equations written in different orders

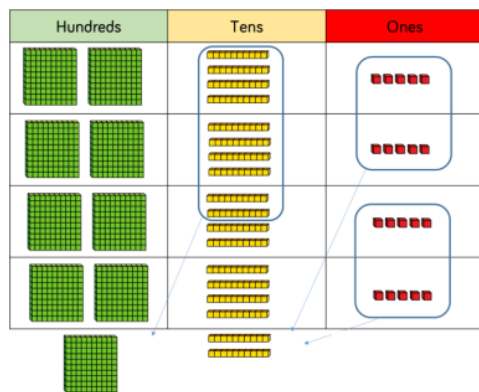
| | H | T | O | |
|---|---|---|---|----------|
| | | 3 | 4 | |
| x | | | 5 | |
| | | 2 | 0 | (5 × 4) |
| + | 1 | 5 | 0 | (5 × 30) |
| | 1 | 7 | 0 | |

Begin with expanded method to secure understanding of exchanging

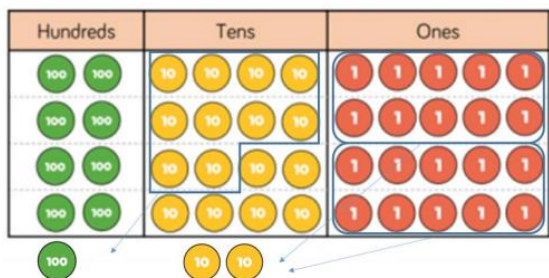
| | H | T | O | |
|---|---|---|---|--|
| | | 3 | 4 | |
| x | | | 5 | |
| | 1 | 7 | 0 | |
| | 1 | 2 | | |

Progress to short multiplication

Multiply 3-digit numbers by 1-digit numbers



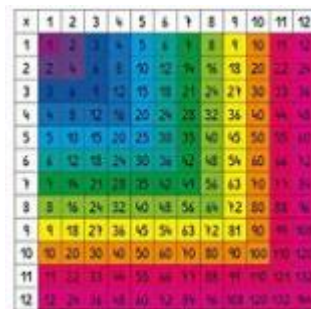
Use tens blocks to support understanding of the written method



Progress to counters when understanding of place value is secure

Children draw pictures of tens blocks to support with partition and multiplication.

They can extend this to pictures of counters drawn in a place value grid.



Multiplication squares help where children do not have secure knowledge of the prerequisite number facts

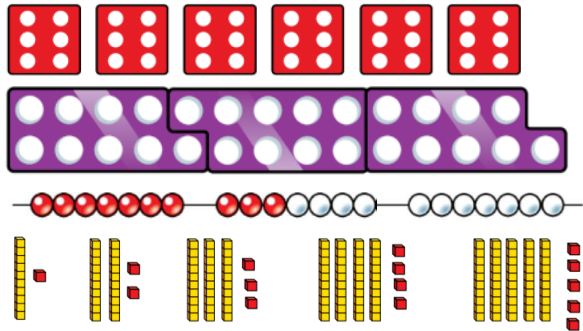
$$245 \times 4 = 980$$

Linear equations written in any order

| | H | T | O |
|-------|---|---|---|
| | 2 | 4 | 5 |
| x | | | 4 |
| <hr/> | | | |
| | 9 | 8 | 0 |
| | 1 | 2 | |

Use short multiplication method. Limit the number of exchanges initially.

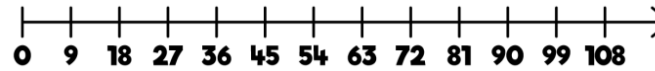
Recall all times tables facts up to 12 x 12



Use a variety of objects which can represent the amount for counting.

Tens and ones can be separated using partition

| | | | | | | | | | |
|----|----|----|----|----|----|----|----|----|-----|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 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 |
| 61 | 62 | 63 | 64 | 65 | 66 | 67 | 68 | 69 | 70 |
| 71 | 72 | 73 | 74 | 75 | 76 | 77 | 78 | 79 | 80 |
| 81 | 82 | 83 | 84 | 85 | 86 | 87 | 88 | 89 | 90 |
| 91 | 92 | 93 | 94 | 95 | 96 | 97 | 98 | 99 | 100 |



Use hundred squares and numbers lines to look for patterns and aid counting

Linear equations done in any order

$$12 \times 6 = 72$$

$$72 = 6 \times 12$$

Look for patterns

e.g.

Multiples of 7, 9 and 11 go odd, even, odd, even



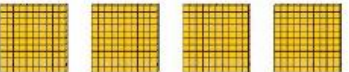
The digits in a multiple of 9 sum to a multiple of 9.

All multiples of 6 and 12 are even.







| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|--------|---|---|--|---|----|----|----|-----|----|---|----|---|---|---|---|---|---|--|---|---|---|---|---|---|---|--|--|---|---|--|---|---|---|--|---|---|---|
| Year 5 | Multiply 4-digit by 1-digit numbers | | <p>Children draw pictures of counters to support with partition and multiplication.</p> <p>Multiplication squares help where children do not have secure knowledge of the prerequisite number facts</p> | <p>$1,826 \times 3 = 5,478$</p> <p>Linear equations should be written in different orders</p> <table border="1" data-bbox="1630 304 1939 555"> <tr><td></td><td>Th</td><td>H</td><td>T</td><td>O</td></tr> <tr><td></td><td>1</td><td>8</td><td>2</td><td>6</td></tr> <tr><td>x</td><td></td><td></td><td></td><td>3</td></tr> <tr><td></td><td>5</td><td>4</td><td>7</td><td>8</td></tr> </table> <p style="text-align: center;">2 1</p> <p>Short multiplication method</p> | | Th | H | T | O | | 1 | 8 | 2 | 6 | x | | | | 3 | | 5 | 4 | 7 | 8 | | | | | | | | | | | | | |
| | Th | H | T | O | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 1 | 8 | 2 | 6 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| x | | | | 3 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 5 | 4 | 7 | 8 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Year 5 | Multiply 2-digit numbers by 2-digit numbers | <p>Use the area model with base 10 and counters to support understanding of the size of numbers</p> | <table border="1" data-bbox="936 778 1375 1066"> <tr><td>x</td><td>20</td><td>2</td></tr> <tr><td>30</td><td>600</td><td>60</td></tr> <tr><td>1</td><td>20</td><td>2</td></tr> </table> <p>The area model is extended to contain numbers instead of pictures</p> | x | 20 | 2 | 30 | 600 | 60 | 1 | 20 | 2 | <p>$22 \times 31 = 682$</p> <p>Linear equations should be recorded in different ways</p> <table border="1" data-bbox="1630 927 1928 1385"> <tr><td></td><td>H</td><td>T</td><td>O</td></tr> <tr><td></td><td></td><td>2</td><td>2</td></tr> <tr><td>x</td><td></td><td>3</td><td>1</td></tr> <tr><td></td><td></td><td>2</td><td>2</td></tr> <tr><td></td><td>6</td><td>6</td><td>0</td></tr> <tr><td></td><td>6</td><td>8</td><td>2</td></tr> </table> | | H | T | O | | | 2 | 2 | x | | 3 | 1 | | | 2 | 2 | | 6 | 6 | 0 | | 6 | 8 | 2 |
| x | 20 | 2 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 30 | 600 | 60 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | 20 | 2 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | H | T | O | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | 2 | 2 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| x | | 3 | 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | 2 | 2 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 6 | 6 | 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 6 | 8 | 2 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

| | | | | Use long multiplication method. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|----------------|---|---|--|---------------------------------|-----|----|---|----|-------|-----|-----|---|-----|----|---|--|--|----|---|---|---|--|--|---|---|---|---|--|--|---|---|--|--|---|---|---|----------------|----------------|---|---|--|---|---|---|---|--|
| Year 5 | Multiply 3-digit numbers by 2-digit numbers | <p>Use the area model with counters to support understanding of the size of numbers</p> | <table border="1" data-bbox="931 544 1565 791"> <tr> <td>×</td> <td>200</td> <td>30</td> <td>4</td> </tr> <tr> <td>30</td> <td>6,000</td> <td>900</td> <td>120</td> </tr> <tr> <td>2</td> <td>400</td> <td>60</td> <td>8</td> </tr> </table> <p>The area model is extended to contain numbers instead of pictures.</p> | × | 200 | 30 | 4 | 30 | 6,000 | 900 | 120 | 2 | 400 | 60 | 8 | <div style="border: 1px solid black; padding: 5px; display: inline-block;"> $234 \times 32 = 7,488$ </div> <p>Linear equations should be recorded in different ways</p> <table border="1" data-bbox="1630 743 1899 1150"> <thead> <tr> <th></th> <th>Th</th> <th>H</th> <th>T</th> <th>O</th> </tr> </thead> <tbody> <tr> <td></td> <td></td> <td>2</td> <td>3</td> <td>4</td> </tr> <tr> <td>×</td> <td></td> <td></td> <td>3</td> <td>2</td> </tr> <tr> <td></td> <td></td> <td>4</td> <td>6</td> <td>8</td> </tr> <tr> <td>¹7</td> <td>¹0</td> <td>2</td> <td>0</td> <td></td> </tr> <tr> <td>7</td> <td>4</td> <td>8</td> <td>8</td> <td></td> </tr> </tbody> </table> <p>Use long multiplication method.</p> | | 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 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Th | H | T | O | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | 2 | 3 | 4 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| × | | | 3 | 2 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | 4 | 6 | 8 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| ¹ 7 | ¹ 0 | 2 | 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 7 | 4 | 8 | 8 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

Use place value equipment to multiply through unitising.

| | |
|---|---|
| $4 \times 1 = 4 \text{ ones} = 4$ |  |
| $4 \times 10 = 4 \text{ tens} = 40$ |  |
| $4 \times 100 = 4 \text{ hundreds} = 400$ |  |

Represent multiplication as exchange on a place value grid.

| O | . | Tth | Hth |
|---|---|---|---|
| | |  |  |
| | |  |  |
| | |  |  |

$0.14 \times 10 = 1.4$

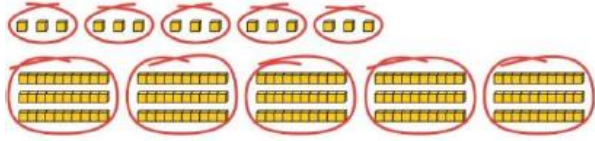
Multiply numbers including decimals by 10, 100, 1000 using moving digits across place value columns.

| Th | H | T | O | . | Tth |
|----|---|---|---|---|-----|
| | | | 2 | . | 5 |
| | | 2 | 5 | . | |
| | 2 | 5 | 0 | . | |
| 2 | 5 | 0 | 0 | . | |

$2.5 \times 10 = 25$
 $2.5 \times 100 = 250$
 $2.5 \times 1,000 = 2,500$

There were ___ ones/tens. Now there are ___ tens/hundreds

Use place value equipment to multiply through unitising.

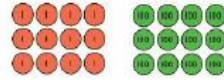


5 groups of 3 ones is 15 ones

5 groups of 3 tens is 15 tens

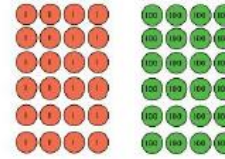
5 groups of 3 hundreds is 15 hundreds etc.

Draw place value representations to show how to multiply by multiples of 10, 100 and 1,000.



$$4 \times 3 = 12$$

$$4 \times 300 = 1,200$$



$$6 \times 4 = 24$$

$$6 \times 400 = 2,400$$

Use known facts and unitising to multiply.

$$5 \times 4 = 20$$

$$5 \times 40 = 200$$

$$5 \times 400 = 2,000$$

$$4,000 \times 5 = 20,000$$

___ = ___ \times ___, so to multiply by ___
you can first multiply by ___ and then
by ___.

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

Linear equations should be recorded in different ways

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

1

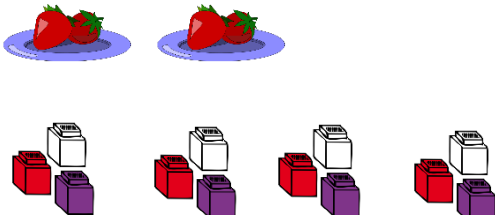
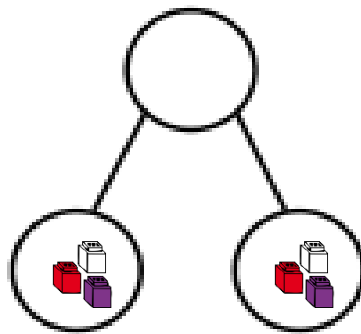
Use long multiplication method.


First, I multiply ___ by ___ ones.

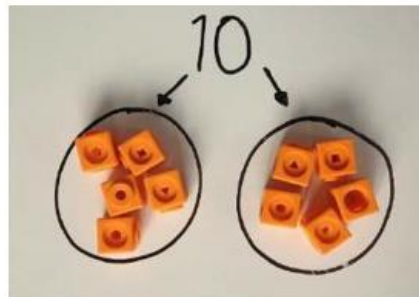
Then I multiply ___ by ___ tens.

Finally, I add together ___ and ___.

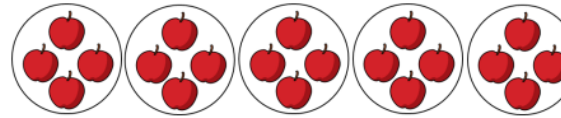
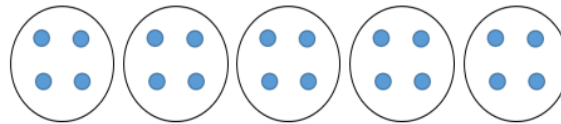
Division

| | Skill | Concrete | Pictorial | Abstract |
|------|---|---|--|---|
| EYFS | Explore how quantities can be shared equally. | <ul style="list-style-type: none"> - Children use concrete objects to share between two or more people/teddies/plates etc. - Children explore what half means by ensuring that objects are shared equally and fairly.  | <p>Children can find a half using part-part-whole models ensuring that both parts are equal or the same.</p>  | <p>Children know how numbers are halved. Children will know that they need to share the quantity.</p> |

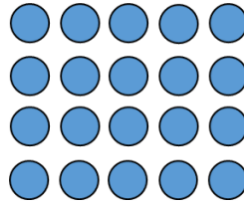
| | | | |
|--|--|--|---|
| <p>Explore and represent patterns in numbers up to 10 and beyond, including odd and evens.</p> | <p>Children explore with equipment which numbers can be shared equally up to 10.</p>  <p>The image shows five colorful dot patterns arranged in a row. From left to right: 1. A single orange square with one white dot. 2. A yellow shape with two white dots in a 1-2 arrangement. 3. A red shape with three white dots in a 1-2 arrangement. 4. A pink shape with four white dots in a 1-3 arrangement. 5. A purple shape with five white dots in a 1-4 arrangement.</p> | | <p>Children know that 1, 3, 5, 7 and 9 are odd numbers.</p> <p>Children know that 2, 4, 6, 8 and 10 are even numbers.</p> |
|--|--|--|---|



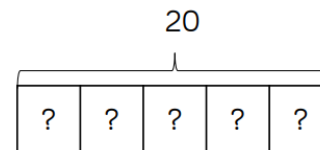
Use different manipulatives to reorganise into separately demarked groups.



Draw pictures into predefined groups, taking it in turns between each group.



Arrays can be used when identifying the number of rows or columns



Bar models can be used to share pictures or marks.

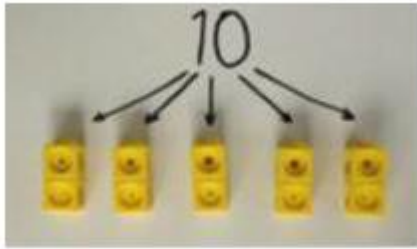
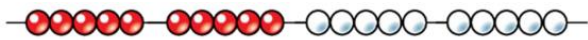
There are 20 apples altogether.
They are shared equally between 5 bags.
How many apples are in each bag?

Asked in the form of worded questions in Year 1.

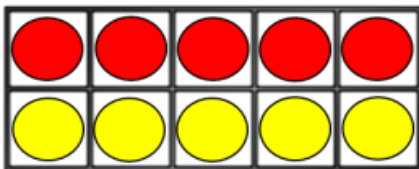
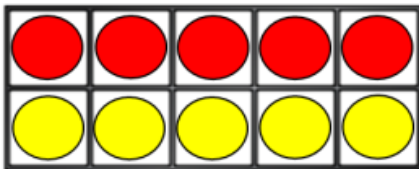
$$20 \div 5 = 4$$

In year 2, move to written method in any order

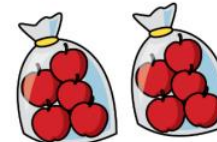
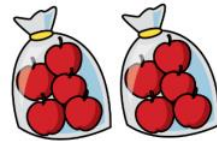
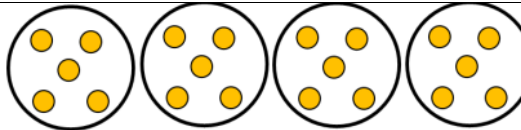
Division as grouping



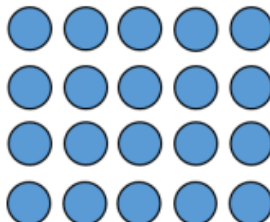
Bead strings, Numicon and cubes can be used to represent full groups.



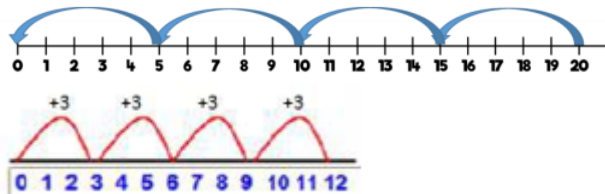
Tens frames can be used when dividing by 5 and 10.



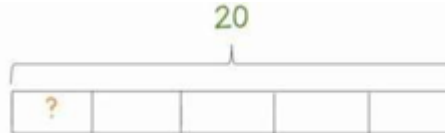
Draw pictures into groups in groups of the divisor.



Children can progress to arrays.



Number-lines show grouping, counting either on from 0 or back to 0.



Bar models can be used by drawing pictures or numerals into each part.

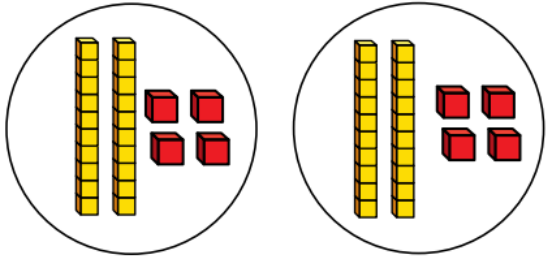
There are 20 apples altogether.
They are put in bags of 5.
How many bags are there?

In Year 1, children will be asked questions in worded form but without the symbol.

$$20 \div 5 = 4$$

Linear equations begin in Year 2 with the symbol. These should be done in any order.

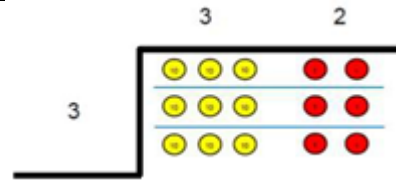
Divide 2-digit numbers by 1-digit numbers with no exchange



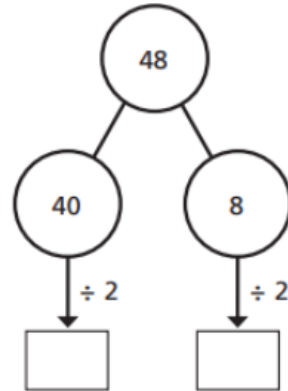
Base 10 can be used to model sharing by splitting the tens and ones.

| Tens | Ones |
|------|------|
| | |
| | |

Progress to counter, starting with the tens. This can also be done with Base 10.



Draw counters or Base 10 into a short division method.

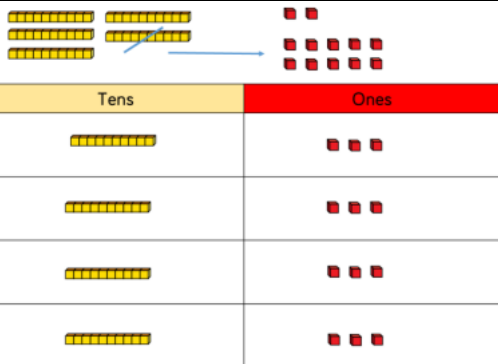


Part-whole models can be used to partition the number into tens and ones.

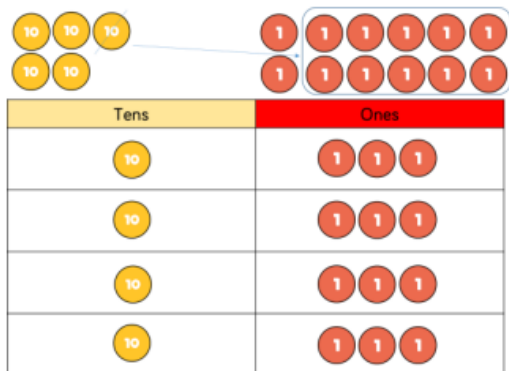
$$48 \div 2 = 24$$

Linear equations should be written in different orders.

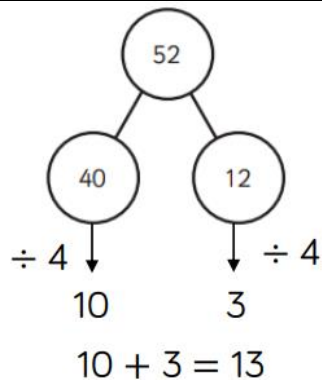
Dividing 2-digit numbers by 1-digit numbers involving no exchange



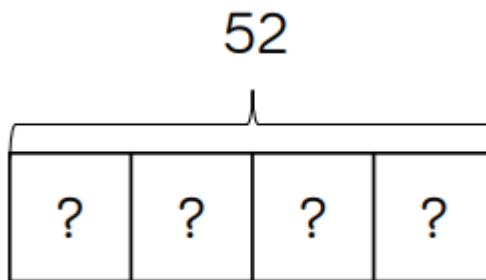
Use Base 10 to help secure understanding of place value.



Progress to counters when place value is secure



Use partition models where numbers are split into multiples.



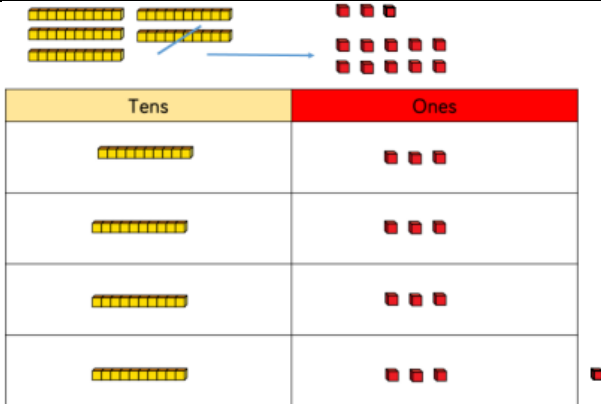
Bar models can be used to model sharing.

Draw pictures of Base 10 or counters to model the short division process.

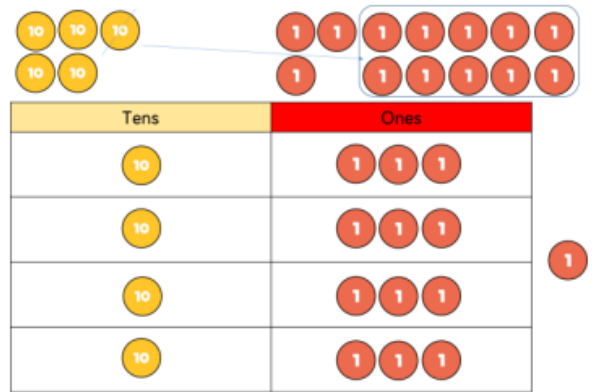
$$52 \div 4 = 13$$

Linear equations should be written in different orders.

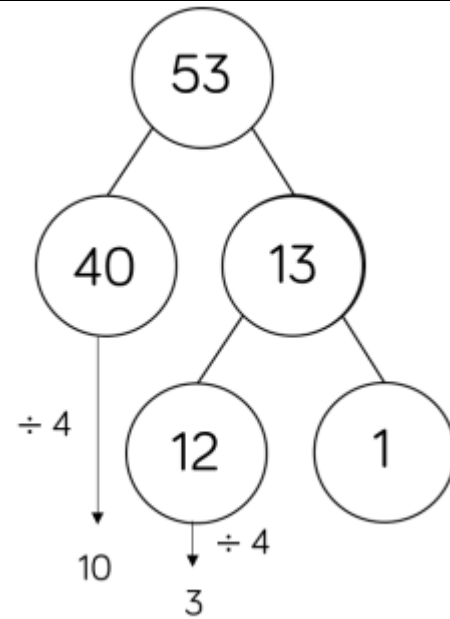
Dividing 2-digit numbers by 1-digit numbers with remainders



Use Base 10 to secure place value.



Progress to counters when place value is secure.



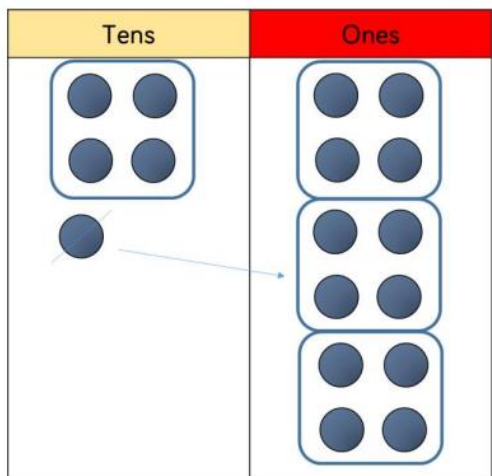
Partition the number into known multiples.

$$53 \div 4 = 13 \text{ r}1$$

Linear equations written in any order.

Years 3, 4 and 5

Divide 2-digit numbers by 1-digit numbers using grouping



Use Base 10 initially to show grouping, exchanging any left overs. Progress to counters when ready.

Remainders are shown outside of the grid.

Draw counters or Base 10 into the grid, exchanging any left overs and drawing remainders outside of the grid.

Circle groups of the divisor.

$$52 \div 4 = 13$$

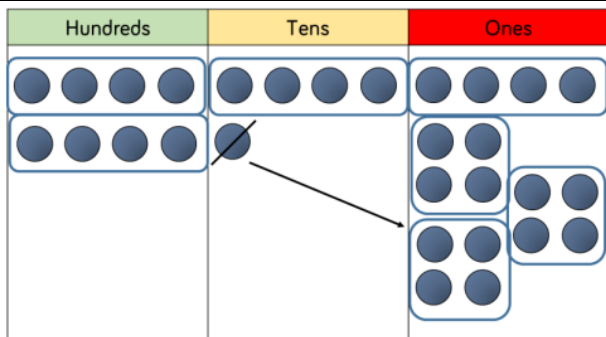
Linear equations should be done in any order

| | | | | |
|--|---|---|----|--|
| | | 1 | 3 | |
| | 4 | 5 | 12 | |

From Year 4 onwards, progress to the short division method when children are secure with place value

Year 4 and 5

Divide 3-digit numbers by 1-digit numbers



Use counters to represent different values.

Draw counters or Base 10 into the grid, exchanging any left overs and drawing remainders outside of the grid.

Circle groups of the divisor.

$$856 \div 4 = 214$$

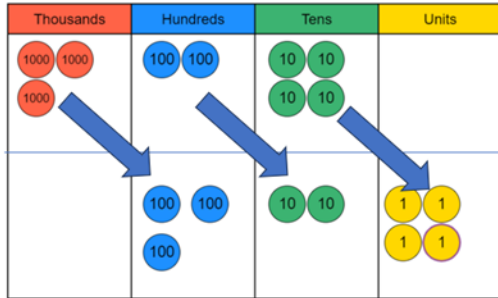
Linear equations should be done in any order

| | | | | |
|--|---|---|---|----------------|
| | | 2 | 1 | 4 |
| | 4 | 8 | 5 | ¹ 6 |

Progress to short division method when place value is secure.

Year 5

Divide by 10, 100 and 1,000



$$3,210 \div 10 = 321$$

| HTh | TTh | Th | H | T | O |
|-----|-----|----|---|---|---|
| | 6 | 4 | 0 | 0 | 0 |

Pupils will show jottings on their place value charts by:

Divide by 10 (moving each digit 1 place to the right)

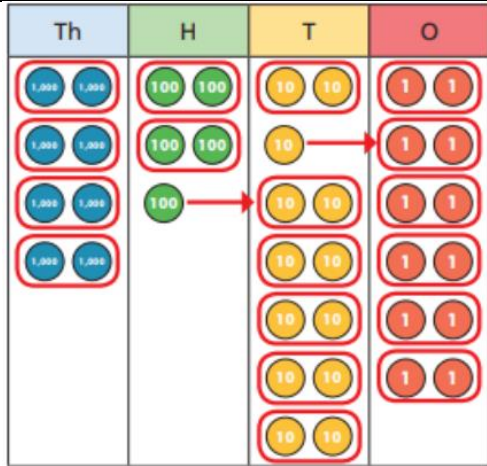
Divide by 100 (moving each digit 2 places to the right)

Divide by 1,000 (moving each digit 3 places to the right)

$$64,000 \div 100 = 640$$

Year 5

Divide 4-digit numbers by 1-digit numbers



Use counters to show place value.

Draw counters or Base 10 into the grid, exchanging any left overs and drawing remainders outside of the grid.

Circle groups of the divisor.

$$8,532 \div 2 = 4,266$$

Linear equations should be done in any order

| | | | | |
|---|---|---|----|----|
| | 4 | 2 | 6 | 6 |
| 2 | 8 | 5 | 13 | 12 |

Progress to short division method when place value is secure.

Year 6

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

$$432 \div 12 = 36$$

Linear equations should be done in any order

| | | | | |
|--|----|---|----------------|----------------|
| | | 0 | 3 | 6 |
| | 12 | 4 | ⁴ 3 | ⁷ 2 |

For 11 and 12, division facts should be known.

| | | | | |
|----|---|----------------|-----------------|-----------------|
| | 0 | 4 | 8 | 9 |
| 15 | 7 | ⁷ 3 | ¹³ 3 | ¹³ 5 |

When numbers exceed 12, draw number tracks for multiples alongside.

e.g.

15, 30, 45, 60, 75...

$$432 \div 12 = 36$$

Linear equations should be done in any order

| | | | | | |
|---|---|---|---|---|-------|
| | | 0 | 3 | 6 | |
| 1 | 2 | 4 | 3 | 2 | (x30) |
| | - | 3 | 6 | 0 | |
| | | | 7 | 2 | (x6) |
| | - | | 7 | 2 | |
| | | | | 0 | |

$12 \times 1 = 12$
 $12 \times 2 = 24$
 $12 \times 3 = 36$
 $12 \times 4 = 48$
 $12 \times 5 = 60$
 $12 \times 6 = 72$
 $12 \times 7 = 84$
 $12 \times 8 = 96$
 $12 \times 9 = 108$
 $12 \times 10 = 120$

Use long division method recording multiples by the side.

$$\begin{array}{r}
 015 \\
 32 \overline{) 487} \\
 \underline{-0} \\
 48 \\
 \underline{-32} \\
 167 \\
 \underline{-160} \\
 7
 \end{array}$$

Multiples can also be recorded by partition for larger numbers e.g.

$$30 + 2 = 32$$

$$60 + 4 = 64$$

$$90 + 6 = 96$$

$$120 + 8 = 128$$

| | | | | |
|--------|---|--|--|--|
| | | | | $150 + 10 = 160\dots$ |
| Year 6 | Dividing multi-digits by 2-digit numbers (remainders) | | | <div style="border: 1px solid black; border-radius: 10px; padding: 5px; display: inline-block;"> $372 \div 15 = 24 \text{ r}12$ </div> <p>Linear equations should be done in any order</p> $ \begin{array}{r} 86 \text{ r } 2 \\ 3 \\ \hline 5 \overline{) 432} \end{array} $ <p>Initially express remainders as remainders.</p> $ \begin{array}{r} 186 \frac{1}{5} \\ 5 \overline{) 943^3 1} \end{array} $ |

| | | | | |
|--|--|--|--|--|
| | | | | $\begin{array}{r} 14.6 \\ 35 \overline{) 511.0} \\ \underline{16} \\ 11 \\ \underline{10} \\ 10 \\ \underline{10} \\ 0 \end{array}$ <p>Progress to showing remainders in the forms of fractions and decimals dependent on context.</p> |
|--|--|--|--|--|

Glossary

Addend - a number to be added to another

Aggregation - combining two or more quantities or measures to find a total

Array – an ordered collection of counters, cubes or other items in rows and columns.

Augmentation - increasing a quantity or measure by another quantity

Commutative – numbers can be multiplied in any order

Difference - the numerical difference between two numbers is found by comparing the quantity in each group

Dividend – the number which is divided

Divisor – the number by which another is divided

Exchange – change a number or expression for another of equal value

Multiplicand – a number to be multiplied

Minuend - a quantity or number from which another is subtracted

Partitioning – splitting a number into its component parts

Reduction - subtraction as take away

Remainder – the amount left over after a division when the divisor is not a factor of the dividend

Renaming - changing a number or expression for another of an equal value

Partitioning - splitting a number into its component parts

Subtrahend - a number to be subtracted from another

Total - the sum found by addition.

| Version | Date | Comment |
|---------|--|---------|
| V6 | Date created: 1/7/2024 Review date: July 2027 | |