Jeavons Wood
Primary School

Year 3

Key Mathematical Concepts and representations

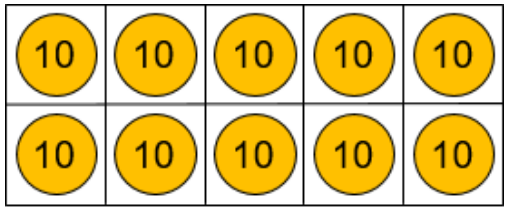
Number and Place Value

Year 3

Equivalence of 10 tens and 1 hundred (1)

Vocabulary:

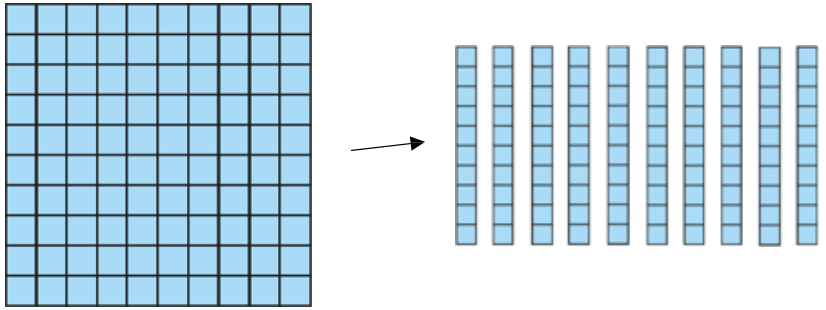
Ones Tens Hundreds Place Value Digit Represents Counters Pence
Coin Tens Frame Multiple Previous Next Gattegno Dienes
One-tenth the size Ten-times the size Centimetres Metres



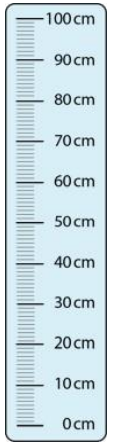
100

Count in multiples of 10 to 100 using Place Value Counters.

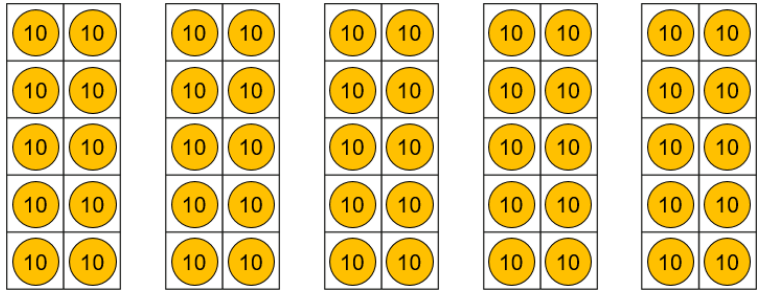
Ten tens are equivalent to 100.



Demonstrate using Dienes that 10 tens are equal to 1 hundred.



Make connections to other forms of measure eg. cm on a metre stick/money



Numberblocks – Season 4

Episode: One hundred

Recognise the number of tens in a three-digit number.

10 tens are equivalent to 100.

18 tens are equivalent to 180.

Grouping and Exchanging Models

Number and Place Value

Year 3

Equivalence of 10 tens and 1 hundred (2)

Vocabulary:

Ones Tens Hundreds Place Value Digit Represents Counters Pence Coin Tens Frame Multiple Previous Next Gattegno Dienes One-tenth the size Ten-times the size Centimetres Metres

10	20	30	40	50	60	70	80	90	100
110	120	130	140	150	160	170	180	190	200
210	220	230	240	250	260	270	280	290	300
310	320	330	340	350	360	370	380	390	400
410	420	430	440	450	460	470	480	490	500
510	520	530	540	550	560	570	580	590	600
610	620	630	640	650	660	670	680	690	700
710	720	730	740	750	760	770	780	790	800
810	820	830	840	850	860	870	880	890	900
910	920	930	940	950	960	970	980	990	1,000

Count in multiples of ten up to 1000.

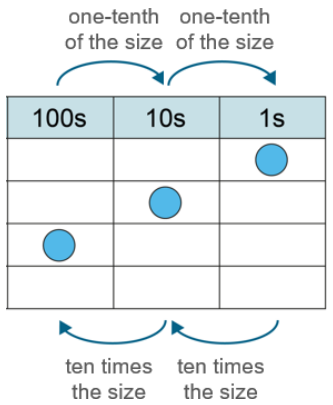
Ten, Twenty, Thirty…

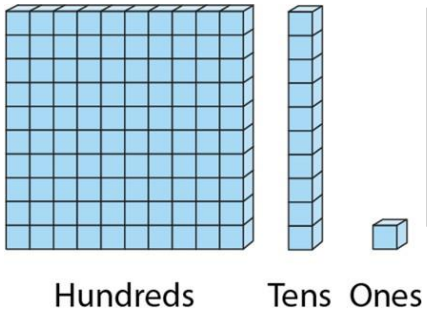
One ten, two tens, three tens…

1,000	2,000	3,000	4,000	5,000	6,000	7,000	8,000	9,000
100	200	300	400	500	600	700	800	900
10	20	30	40	50	60	70	80	90
1	2	3	4	5	6	7	8	9

Tap the Gattegno chart in multiples of 10.

Create multiples of ten using the Gattegno chart.





Consider how a number increases/decreases in size using scaling models.

100 is ten times the size of 10.

10 is one-tenth the size of 100.

Scaling Models

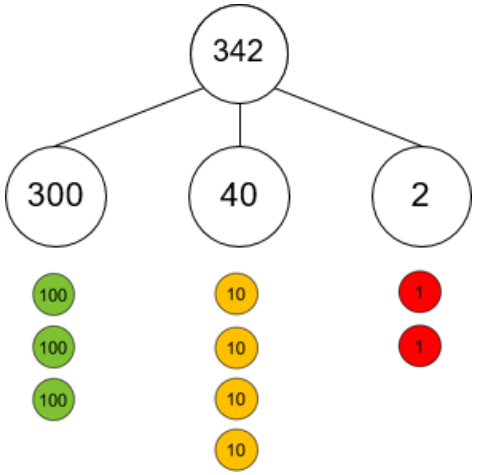
Number and Place Value

Year 3

Place Value in 3-digit numbers

Vocabulary:

Ones Tens Hundreds Digit Represents Place Value Counters Gattegno Partition Combine Equation Addend Sum Minuend Subtrahend Difference



300 + 40 + 2 = 342

Form 3-digit numbers using place value counters and the part-part-whole model.

The 2 represents 2 ones

The 4 represents 4 tens

The 3 represents 3 hundreds.

Write as an additive equation.

100s	10s	1s
3	4	2

Explain what each digit represents and give its value.

The 2 represents 2 ones. It has a value of 2.

The 4 represents 4 tens. It has a value of 40.

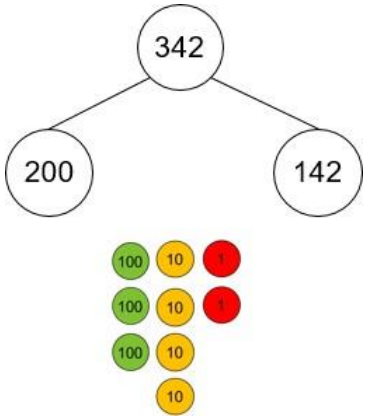
The 3 represents 3 hundreds. It has a value of 300.

342

1,000	2,000	3,000	4,000	5,000	6,000	7,000	8,000	9,000
100	200	300	400	500	600	700	800	900
10	20	30	40	50	60	70	80	90
1	2	3	4	5	6	7	8	9

300 + 40 + 2 = 342

Form 3-digit numbers using a Gattegno chart.



Explore non-standard partitioning using part-part-whole models and place value counters.

Number and Place Value

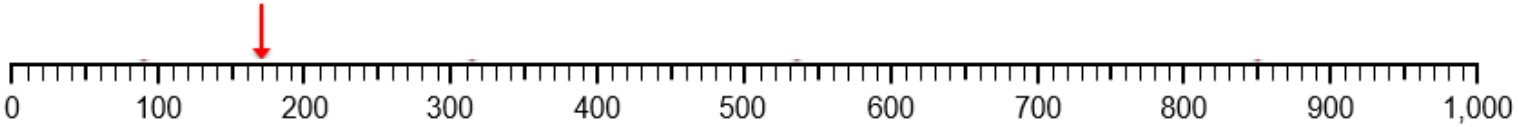
Year 3

Three-digit numbers in the linear number system.

Vocabulary:

Ones Tens Hundreds Place Value Number line Halfway Multiples of 10

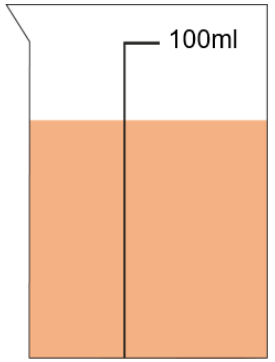
Multiples of 100 Previous Next Between

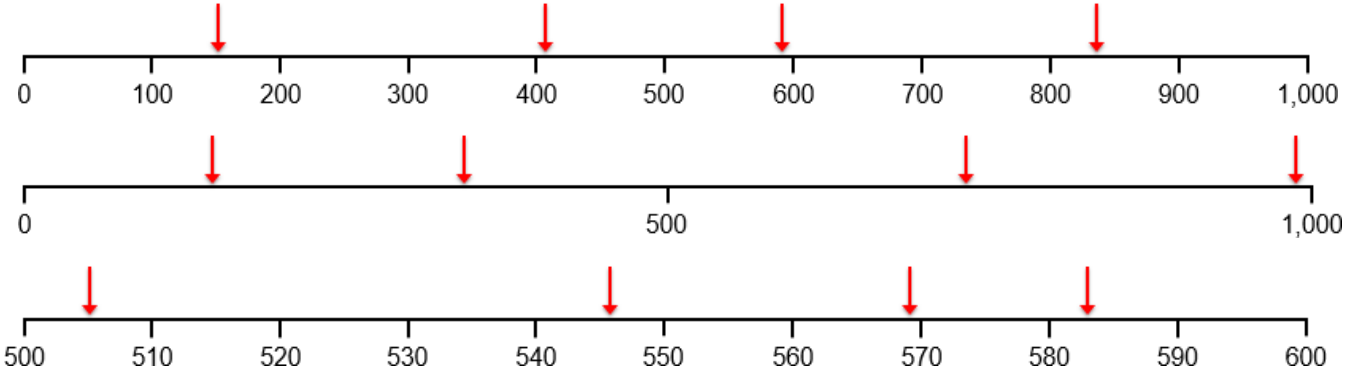


Identify the previous and next multiple of one hundred that a number sits between.

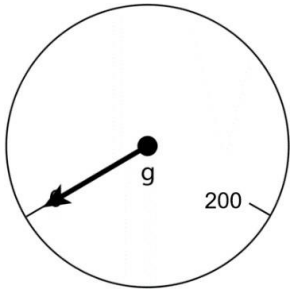
170 is between 100 and 200.

The previous multiple of 100 is 100. The next multiple of 100 is 200.





Estimate the position of a 3 digit number number lines that are not standard.



Make connections between the number line and the blank number line.

Estimate the position of numbers of the blank number line.

Recognise the previous and next multiple of 10 and 100 frequently.

Previous multiple of 100		Next multiple of 100
300	342	400

Find previous and next multiple of 10/100 for any 3 digit number without representations.

Number and Place Value

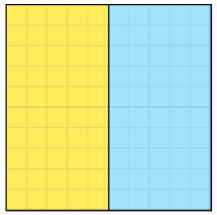
Year 3

Reading Scales with 2, 4, 5, or 10 intervals

Vocabulary:

Intervals Scales Divisions Equal Parts Whole Value

Bar model Plus Minus Multiply Divide

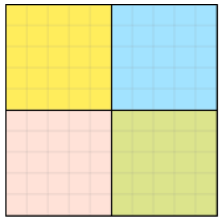


100	
50	50

100 = 50 + 50

100 = 2 × 50 100 = 50 × 2

100 ÷ 2 = 50 100 ÷ 50 = 2

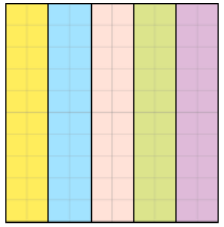


100			
25	25	25	25

100 = 25 + 25 + 25 +25

100 = 4 × 25 100 = 25 × 4

100 ÷ 4 = 25 100 ÷ 25 = 4

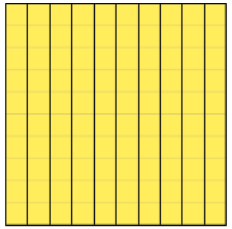


100				
20	20	20	20	20

100 = 20 + 20 + 20 +20 + 20

100 = 5 × 20 100 = 20 × 5

100 ÷ 5 = 20 100 ÷ 20 = 5



100									
10	10	10	10	10	10	10	10	10	10

100 = 10 + 10 + 10 + 10 + 10 + 10 + 10 + 10 + 10 + 10

100 = 10 × 10

100 ÷ 10 = 10

Recognise common divisions of 100.

Record using a bar model and equations that come from this.

100 is divided in ____equal parts.

Each part has a value of ____.

Number and Place Value

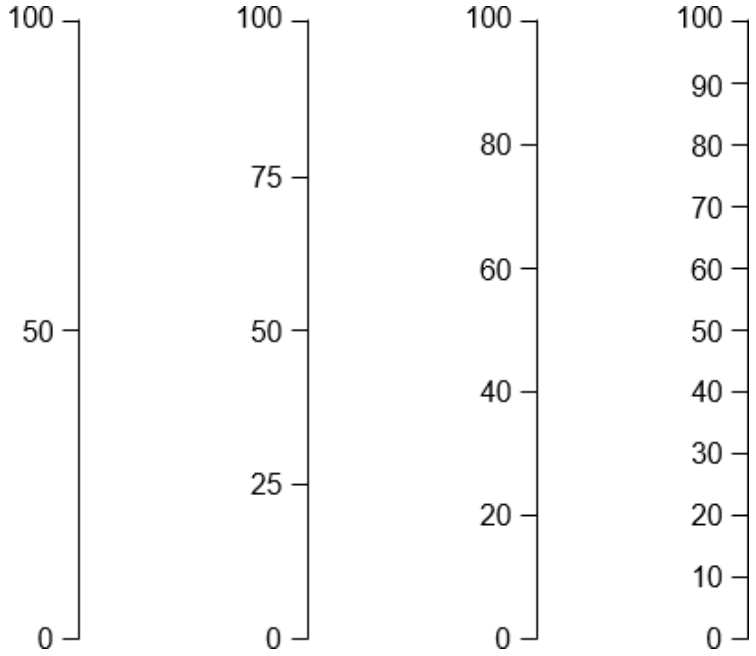
Year 3

Reading Scales with 2, 4, 5, or 10 intervals

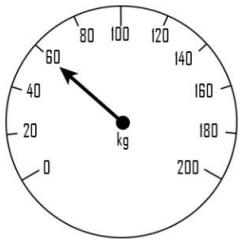
Vocabulary:

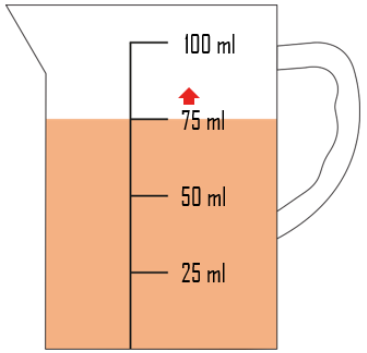
Intervals Scales Divisions Equal Parts Whole Value

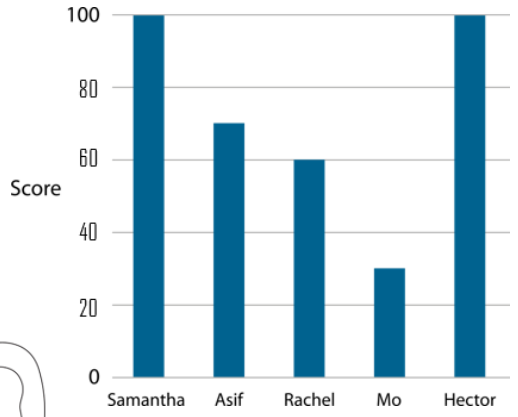
Bar model Plus Minus Multiply Divide



Count using these intervals in both horizontal and vertically linear scales.







Find the value of a scale with missing numbers and read scales with numbers included in a variety of contexts.

Addition and Subtraction

Year 3

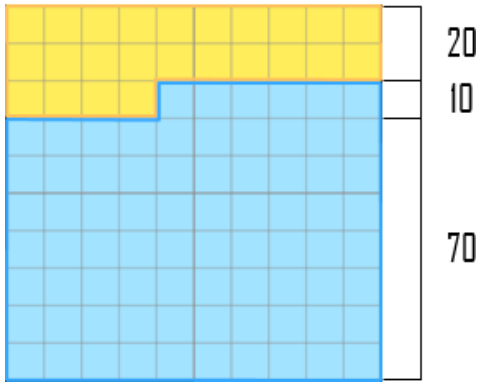
Calculate complements to 100.

Vocabulary:

Part Whole Ones Tens Represents Compose Combine Partition Total
Part-Part-Whole (Cherry) model Dienes 100 square Plus + Minus - Equal to =
Addition Subtraction Expression Equation Exchange Complements

Addend + Addend = Sum

24 + 76 = 100



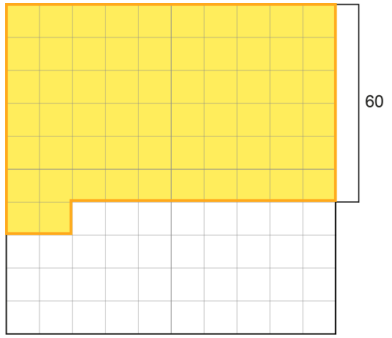
24 + 76 = 100

20 4 6 70

10

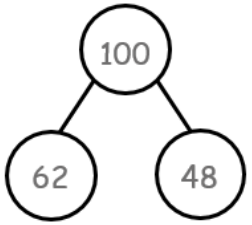
Use knowledge of subtracting from 10 to subtract a single-digit number from a multiple of 10.

First we make 10 ones. The ones digits add up to make 1 ten, so we need 9 more tens to make a total of 100.



62 + ☐ = 100

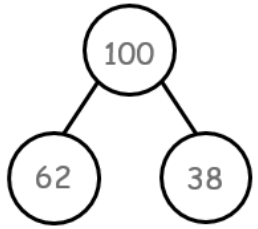
Solve missing number problems that sum to 100.



62 + 48 = 110

60 2 8 40

10



62 + 38 = 100

60 2 8 30

10

Compare equations which do and do not sum to 100.

Addition and Subtraction

Year 3

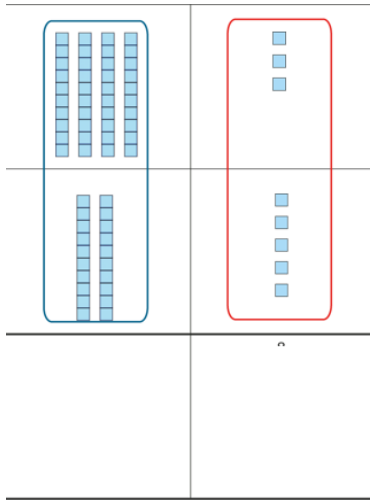
Columnar Addition and Subtraction

Vocabulary:

Ones Tens Represents Compose Combine Total Dienes Plus + Minus - Equal to = Addition Subtraction Equation Regroup Algorithm

Addend + Addend = Sum

Minuend – Subtrahend = Difference



	10s	1s
	4	3
+	2	5
	6	8

Use Dienes to represent columnar addition *without exchange* pictorially before moving to abstract algorithm.

We add the ones. 3 ones plus 5 ones are equal to 8 ones.

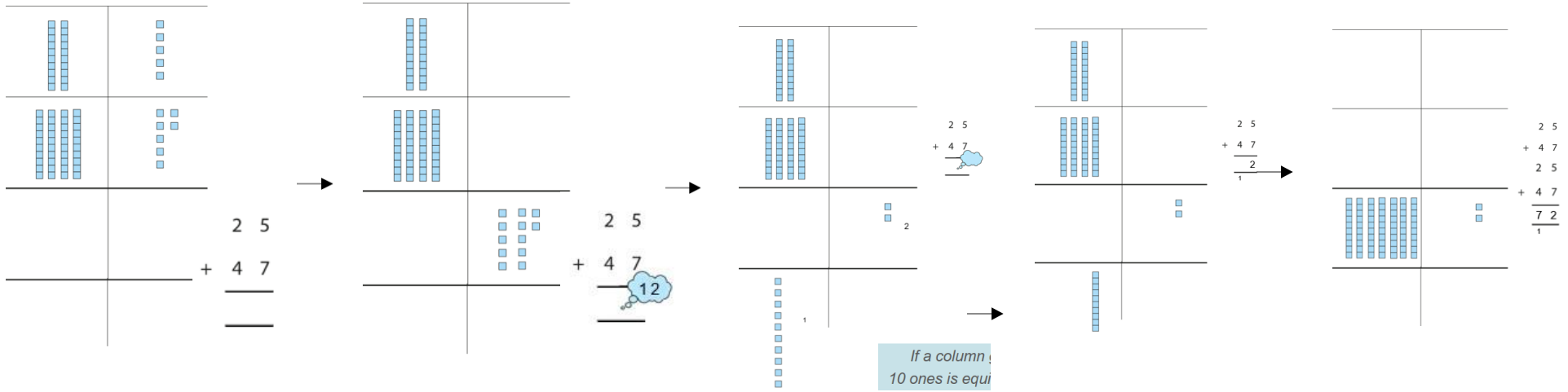
We add the tens. 4 tens plus 2 tens is equal to 6 tens.

Use Dienes to represent columnar addition *with exchange* pictorially before moving to abstract algorithm.

5 ones plus 7 ones is equal to 12 ones. I can regroup 12 ones. 12 ones is equal to 1 ten and 2 ones.

2 tens plus 4 tens is equal to 6 tens. We also need to add 1 ten from the regrouping. There are 7 tens altogether.

If a column group is equal to 10 or more we must regroup. 10 ones is equal to 1 ten. 10 tens is equal to 1 hundred.



Addition and Subtraction

Year 3

Columnar Addition and Subtraction

Vocabulary:

Ones Tens Represents Compose Combine Total Dienes Plus + Minus - Equal to = Addition Subtraction Equation Expression Regroup Algorithm

Addend + Addend = Sum

Minuend – Subtrahend = Difference

475 + 25

237 + 156

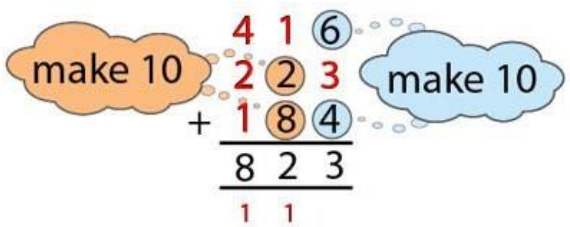
349 + 84

120 + 130

Use column addition	Use mental strategies

Compare expressions which can be calculated using mental or written strategies.

416 + 223 + 184 = 823



Add 3 addends using columnar addition, using a make 10 strategy to support.

Addition and Subtraction

Year 3

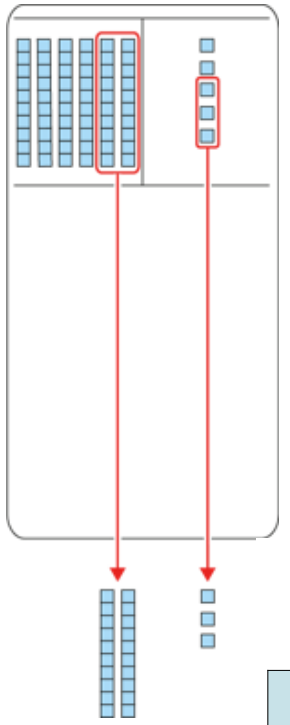
Columnar Addition and Subtraction

Vocabulary:

Ones Tens Represents Compose Combine Total Dienes Plus + Minus - Equal to = Addition Subtraction Equation Expression Regroup Algorithm

Addend + Addend = Sum

Minuend – Subtrahend = Difference



	10s	1s
	6	5
−	2	3
	4	2

Use Dienes to represent columnar subtraction *without exchange* pictorially before moving to abstract algorithm.

We subtract the ones. 5 ones minus 3 ones is equal to 2 ones.

We subtract the tens. 6 tens minus 2 tens is equal to 4 tens.

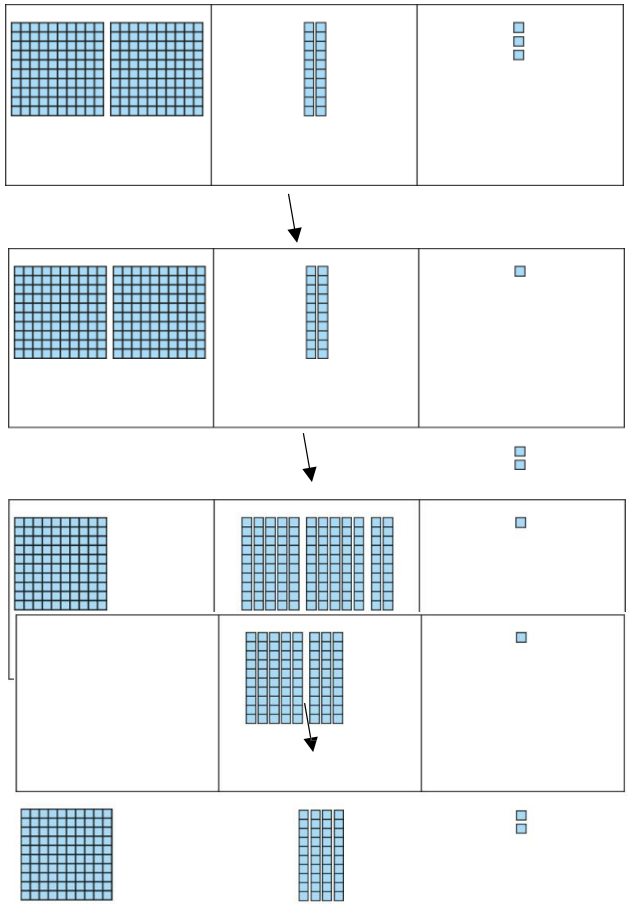
475 − 358 170 − 140

349 − 101 201 − 198

Use column subtraction	Use mental strategies

	2	12	3
−	1	4	2
	0	8	1

Compare expressions which can be calculated using mental or written strategies.



Addition and Subtraction

Year 3

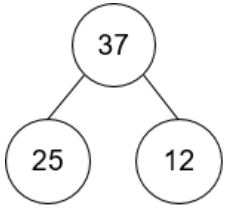
Manipulate the Additive Relationship

Vocabulary:

Represents Compose Combine Total Dienes Plus + Minus - Equal to = Addition Subtraction Equation Expression Bar Model Part-Part-Whole Model (Cherry) Whole Part

Addend + Addend = Sum

Minuend – Subtrahend = Difference



37	
25	12

25 + 12 = 37
12 + 25 = 37

37 = 25 + 12
37 = 12 + 25

37 – 12 = 25
37 – 25 = 12

25 = 37 – 12
12 = 37 – 25

Recognise the different equations that can be recorded based on the part-whole structure.

Addend + addend = sum

Minuend – subtrahend = difference

Part Part Whole

329 + 414 = 743

743	
329	414

743 – 329 = 414

Whole Part Part

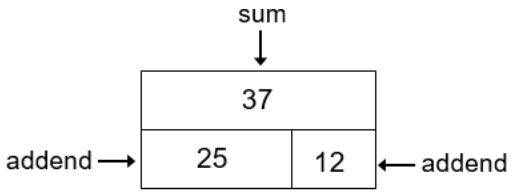
447 – 162 = 285

447	
285	162

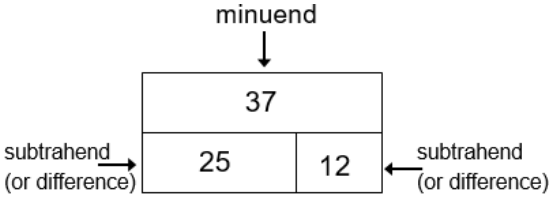
447 – 285 = 162

Use the part-whole structure to support finding a missing part.

There is a missing part. To find the missing part, we subtract the other part from the whole.



25 + 12 = 37
12 + 25 = 37



37 – 25 = 12
37 – 12 = 25

Whole Part Part

614 – 527 = 87

614	
527	87

527 + 87 = 614

Use the part-whole structure to support finding a missing whole.

There is a missing whole. To find the missing whole, we add the two parts.

Multiplication and Division

Year 3

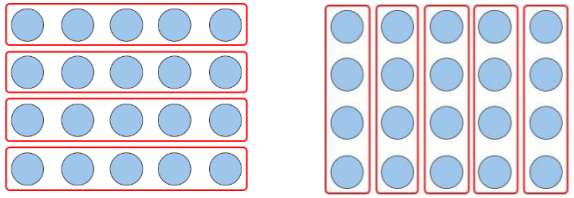
Multiplication and Division Structures

Vocabulary:

Multiplication Division Commutative Grouping (Quotitive) Sharing (Partitive)

'Divided into' 'Divided between' 'Divided by' Equation Factor Product

30	÷	5	=	6
dividend	÷	divisor	=	quotient

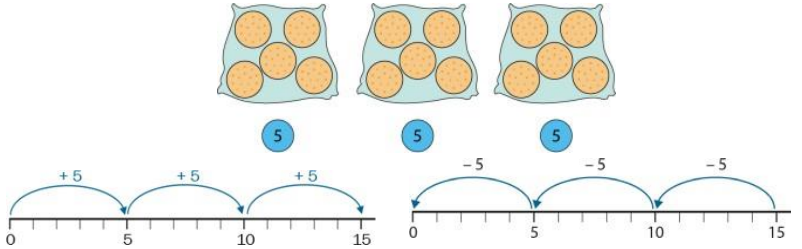


Identify that multiplication is commutative.

4 x 5 = 5 x 4

Factor times factor is equal to product.

The order of the factors does not affect the product.



Making groups of

Removing groups of

Division equations can be used to represent 'grouping' problems.

We can use multiplication facts to find the number of groups.

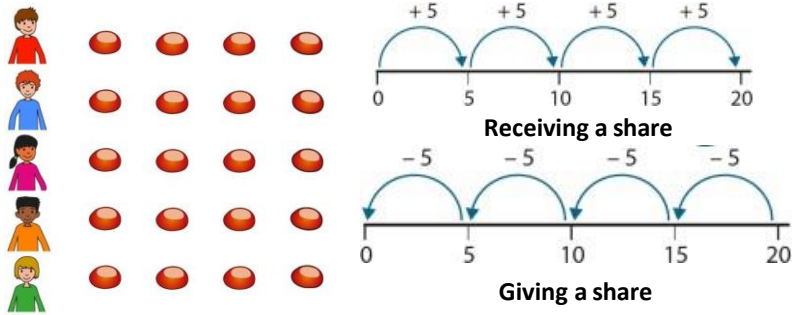
(Quotitive division)

15 divided into groups of 5 is equal to 3.

5 + 5 + 5 = 15

15 – 5- 5 – 5 = 0

15 ÷ 5 = 3



Receiving a share

Giving a share

Division equations can be used to represent 'sharing' problems.

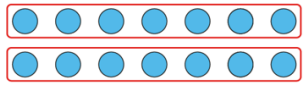
We can use multiplication facts to find the size of groups.

(Partitive division)

Four fives are four each.

20 divided between 5 is equal to 4 each.

20 ÷ 5 = 4

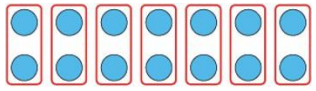


14 ÷ 2 = 7

14	
7	7

The same equation can be represented in both grouping and sharing contexts.

7 times 2 is 14, so 14 ÷ 2 = 7



14 ÷ 2 = 7

14						
2	2	2	2	2	2	2

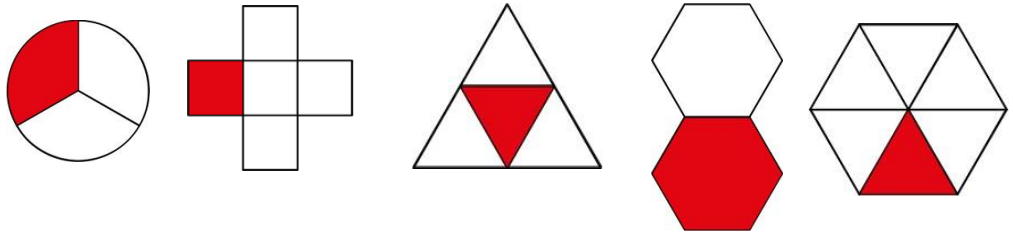
Fractions

Year 3

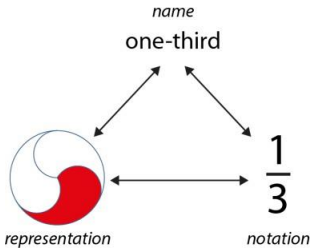
Use and Understand Fraction Notation

Vocabulary:

Fraction Notation Divided Equal Numerator Denominator Whole Parts Fraction Bar (Vinculum) Half Third Quarter Fifth Sixth Seventh Eighth Ninth Tenth



Make connections between the representation, the notation and the name.



Understand that a fraction is a part of a whole using a range of representations.

There whole has been divided into ____ equal parts.

____of the parts has been shaded in.

— → $\frac{}{3}$ → $\frac{1}{3}$

The whole has been divided…

…into 3 equal parts…

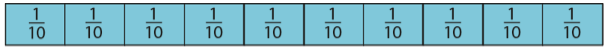
…there is one part shaded.

When writing a fraction, we write the division bar (vinculum) first, then the denominator and then the numerator.

Generalise:

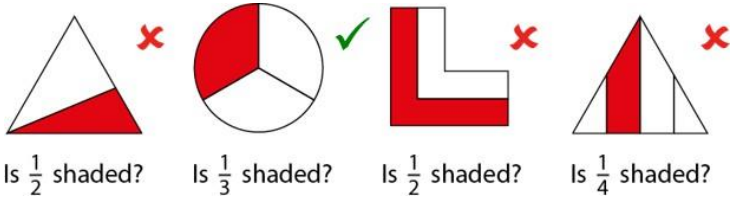
The numerator tells us the number of parts shaded.

The denominator tells us the number of equal parts the whole has been split into.



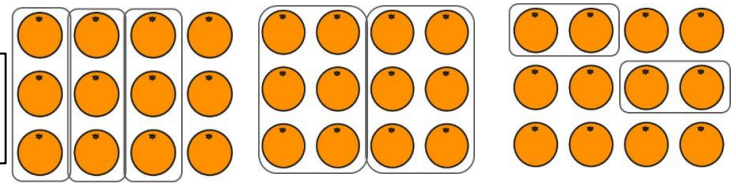
10 one-tenths = ten-tenths

Understand that we can describe fractions in two ways:



Develop understanding through reasoning about non-examples aswell.

Recognise the numerators and denominators in different types of wholes and when divided differently.



Fractions

Year 3

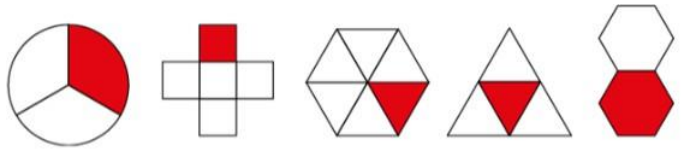
Find Unit Fractions of Quantities (1)

Vocabulary:

Fraction Notation Divided Equal Numerator Denominator Whole Parts Fraction Bar (Vinculum) Half Third Quarter Fifth Sixth Seventh Eighth Ninth Tenth One-_____ Bar Model Equation Expression Linear Volume Area Quantity Times as much / Times the size of

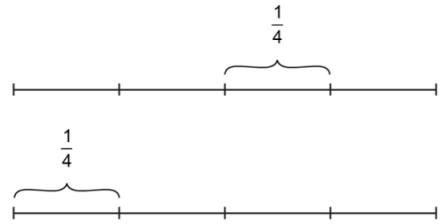
We can use fraction notation to record unit fractions in different contexts including:

Area contexts

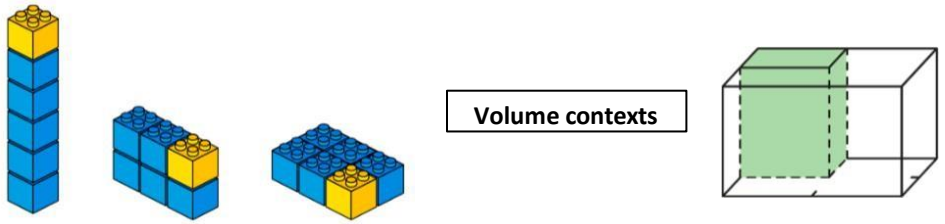


$\frac{1}{3}$ one-third | $\frac{1}{5}$ one-fifth | $\frac{1}{6}$ one-sixth | $\frac{1}{4}$ one-quarter | $\frac{1}{2}$ one-half

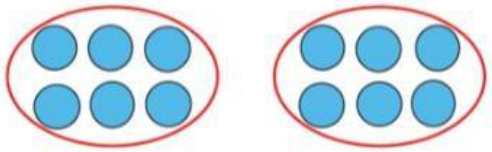
Linear contexts



Volume contexts



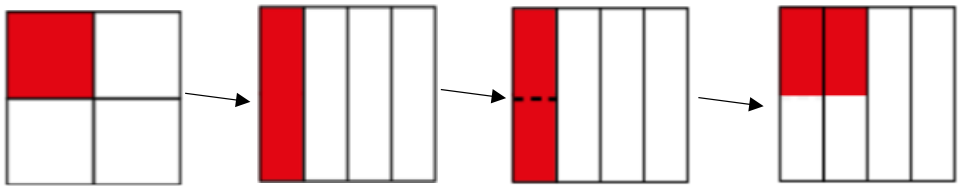
Quantity contexts



The whole is _____. The whole has been divided into ___equal parts.

Each part is $\frac{1}{\square}$ of the whole.

$\frac{1}{\square}$ of ___ is __.



Generalisation:

Equal parts don't always look the same.

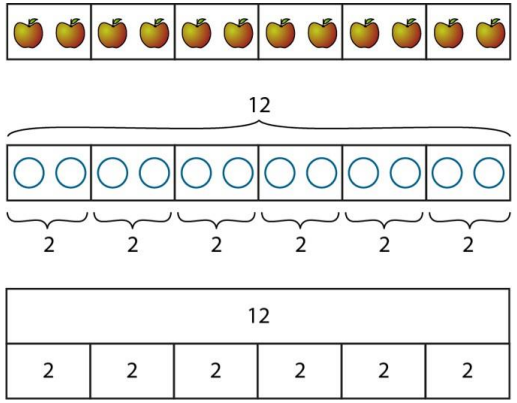
Fractions

Year 3

Find Unit Fractions of Quantities (2)

Vocabulary:

Fraction Notation Divided Equal Numerator Denominator Whole Parts Fraction Bar (Vinculum) Half Third Quarter Fifth Sixth Seventh Eighth Ninth Tenth One-_____ Bar Model Equation Expression Linear Volume Area Quantity Times as much / Times the size of



$12 \div 6 = 2$

$\frac{1}{6}$ of 12 = 2

We can division facts to help us find the fraction of an amount, representing this use bar models.

To find $\frac{1}{5}$ of 15, we divide 15 into 5 equal parts.

15 divided by 5 is equal to 3,

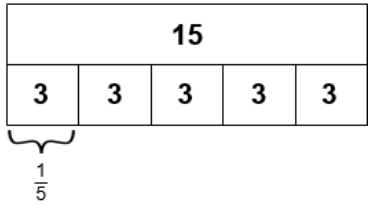
so $\frac{1}{5}$ of 15 is 3.

The whole is 12 apples. The whole has been divided into 6 equal parts.

Each part is $\frac{1}{6}$ of the whole.

$\frac{1}{6}$ of 12 apples is 2 apples.

$\frac{1}{5}$ of 15



$15 \div 5 = 3$

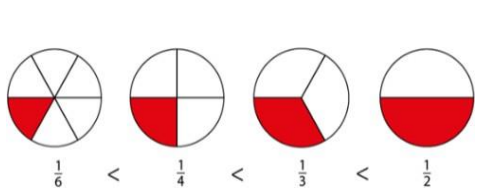
so $\frac{1}{5}$ of 15 = 3

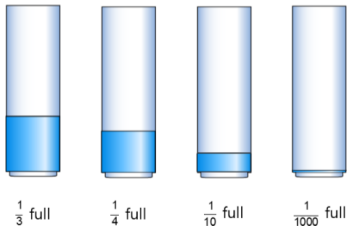
We can compare fractions with the same numerator. We can compare these in different contexts.

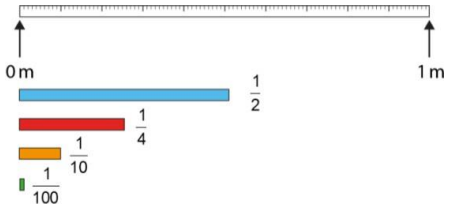
Generalisation:

When both fractions have the same numerator, the greater the denominator, the greater the fraction.

When we compare fractions, the whole must be the same.







Fractions

Year 3

Find Unit Fractions of Quantities (3)

Vocabulary:

Fraction Notation Divided Equal Numerator Denominator Whole Parts Fraction Bar (Vinculum) Half Third Quarter Fifth Sixth Seventh Eighth Ninth Tenth One-_____ Bar Model Equation Expression Linear Volume Area Quantity Times as much / Times the size of

Part	Part as a fraction of the whole	Number of equal parts in the whole	Whole
	$\frac{1}{3}$	3	
	$\frac{1}{5}$	5	
	$\frac{1}{4}$	4	
	$\frac{1}{5}$	5	
	$\frac{1}{7}$	7	

If we know the size of the unit fraction, we can work out the size of the whole.

The whole is divided into ____equal parts. Each part is ____of the whole.

If one-____is a part, then the whole is ____ times as much. Take ____parts and put them together to make one whole.

Fractions

Year 3

Fractions within 1 in the Linear Number System.

Vocabulary:

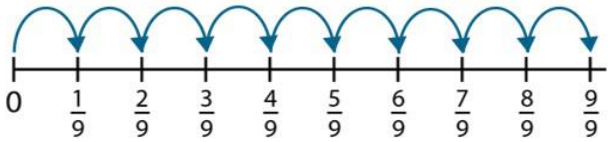
Fraction Notation Divided Equal Numerator Denominator Whole Parts
Fraction Bar (Vinculum) Half Third Quarter Fifth Sixth Seventh Eighth
Ninth Tenth One-_____ Linear Number Line Bar Model Vertical Horizontal

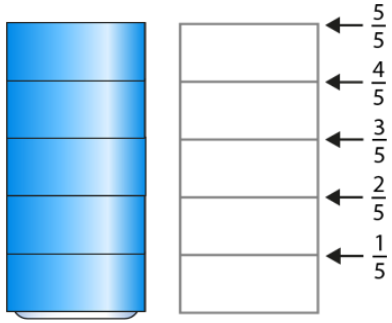
$\frac{9}{9}$

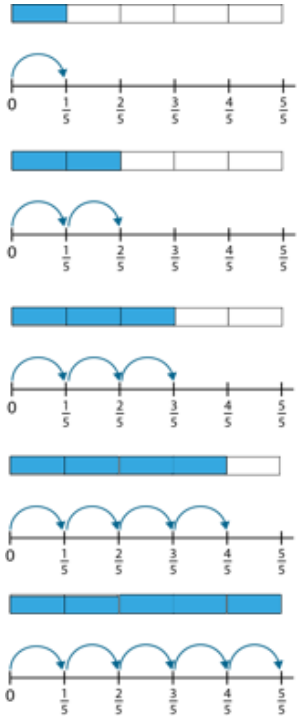
We can represent fractions on both horizontal and vertical number lines.

The whole is divided into ____equal parts. Each part is ____of the whole.

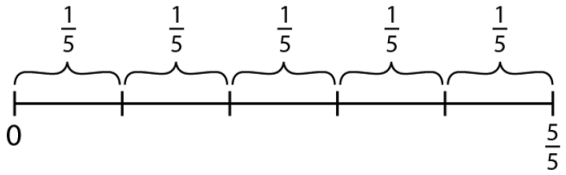
The whole is made up of 9 one-ninths.



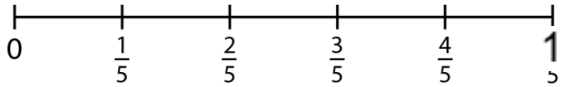




Fractions as part of a whole



Fractions as numbers



Fractions should be seen as part of a whole and as numbers which have their own unique place on a number line.

Generalisation:

When the numerator and denominator are the same, the fraction has a value of 1.

Fractions

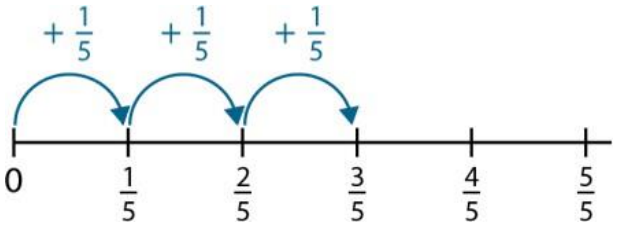
Year 3

Add and Subtract Fractions within 1

Vocabulary:

Fraction Notation Divided Equal Numerator Denominator Whole Parts Fraction Bar (Vinculum) Half Third Quarter Fifth Sixth Seventh Eighth Ninth Tenth One-_____ Add Subtract Number line Bar model Equation Expression

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



We can use our knowledge of addition and subtraction structures to add/subtract non-unit fractions, recording these as equations.

3 one-eighths plus 2 one-eighths is equal to 5 one-eighths.

Three-eighths, plus two-eighths is equal to five-eighths.

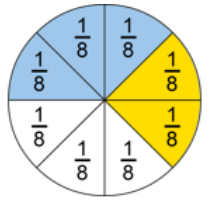
5 one eighths minus 2 one-eighths is equal to 3 one-eighths.

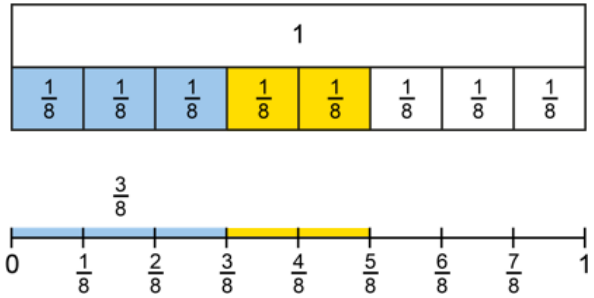
Five-eighths, minus two-eighths is equal to three-eighths.

We can add multiples of the unit fraction and record this as an addition equation.

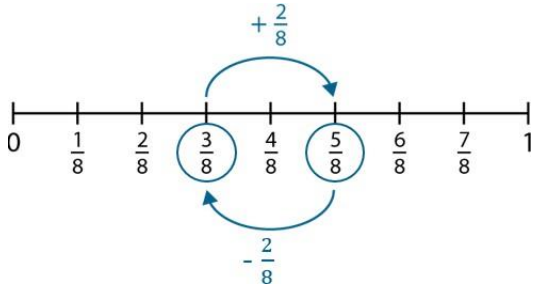
The unit fraction is one-fifth. There are three one-fifths in three-fifths.

Three-fifths is made up of one-fifth, add another one-fifth, and another one-fifth.





$$\frac{3}{8} + \frac{2}{8} = \frac{5}{8}$$



$$\frac{5}{8} - \frac{2}{8} = \frac{3}{8}$$

Fractions

Year 3

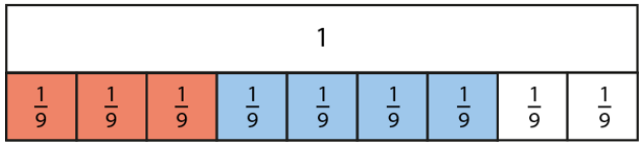
Add and Subtract Fractions within 1

Vocabulary:

Fraction Notation Divided Equal Numerator Denominator Whole Parts Fraction Bar (Vinculum) Half Third Quarter Fifth Sixth Seventh Eighth Ninth Tenth One-_____ Add Subtract (Minus) Number line Bar model Equation Expression

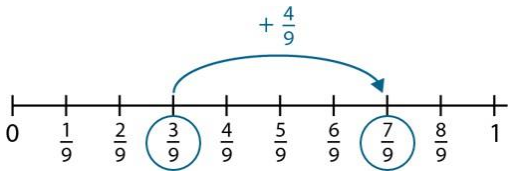
We can use one of three methods to represent our understanding of adding and subtracting fractions with the same denominator.

1 – Use a Diagram



***Note – this may best represent an aggregation (adding with) addition structure.**

2 – Use a Number Line



***Note – this may best represent an augmentation (adding to) addition structure.**

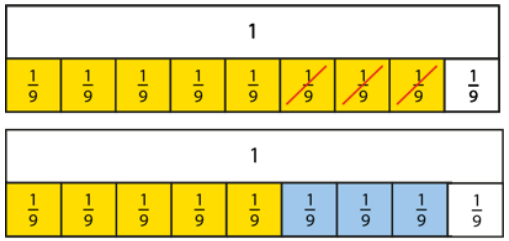
3 – Verbal reasoning

$\frac{3}{9}$ is 3 lots of $\frac{1}{9}$

$\frac{4}{9}$ is 4 lots of $\frac{1}{9}$

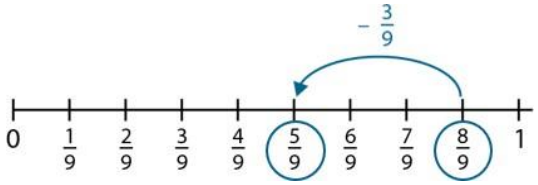
I know that $3 + 4 = 7$

So I know that $\frac{3}{9} + \frac{4}{9} = \frac{7}{9}$



***Note – this may best represent a reductive (take away) subtraction structure.**

***Note – this may best represent a partitioning (separation) subtraction structure.**



***Note – this may best represent a partitioning (separation) subtraction structure.**

$\frac{8}{9}$ is 8 lots of $\frac{1}{9}$

$\frac{3}{9}$ is 3 lots of $\frac{1}{9}$

$8 - 3 = 5$

So $\frac{8}{9} - \frac{3}{9}$ is $\frac{5}{9}$

Generalisation:

When adding/subtracting fractions with the same denominator, just add/subtract the numerators.