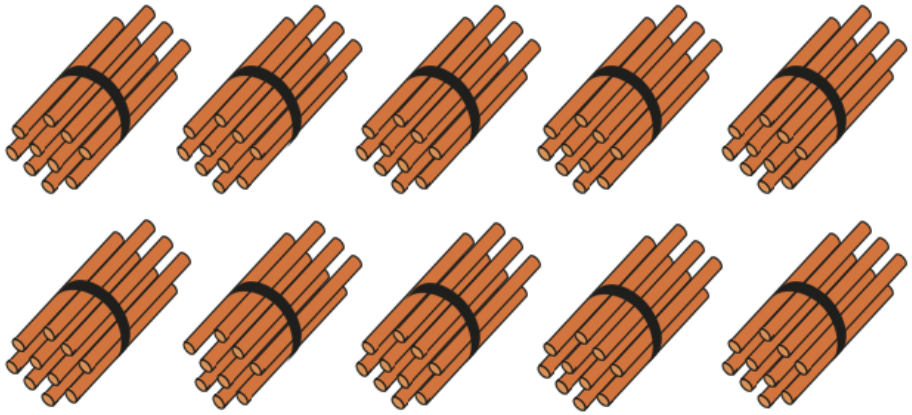
Number and Place Value

Year 1

Count forwards and backwards within 100.



Count with straw bundles grouped into 10s.

Eight, nine, ten, eleven, twelve….thirty eight, thirty nine, forty, forty one…

Eight, nine, ten, one-ten-one, one-ten-two, one-ten-three…

Three-tens-eight, three-tens- nine, four tens, four-tens-one…

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	42	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

Count on a hundred square

Count using a number line.

1 2 3 4 5 6 7 8 9 10 11 12…

Count using digits.

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

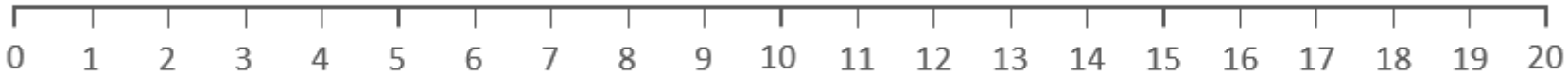
Count using a Gattegno chart

Tap the chart for each number. For two-digit numbers (excluding multiples of 10, tap both numbers e.g. 21 = 20 and 1).

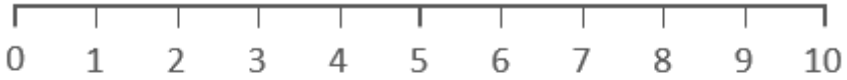
Number and Place Value

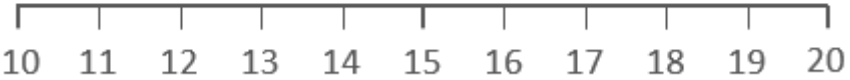
Year 1

Numbers to 20 in the linear number system.

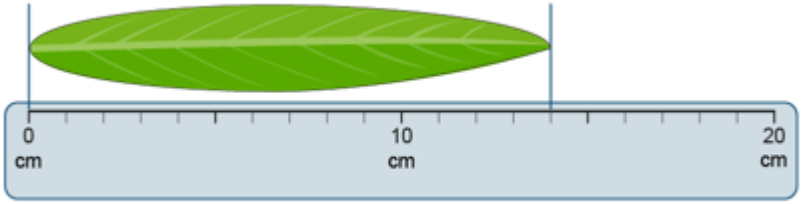


Recognise the position of each number on the number line.

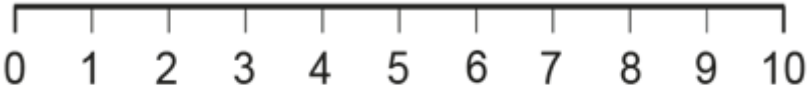




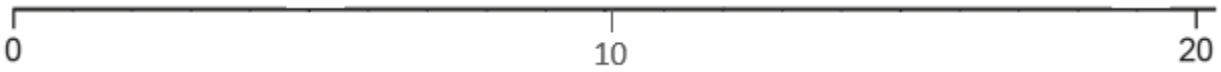
Make connections between 0-10 and 10-20 number lines.



Make connections to use of measures eg. Ruler to 20



Estimate where numbers sit on the number line.



Extend to estimating where numbers sit on the blank number line.

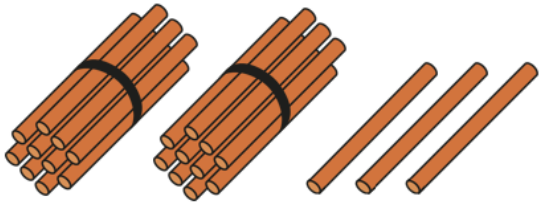
Number and Place Value

Year 2

Place Value in 2-digit numbers (1)

Vocabulary:

Ones Tens Digit Represents Place Value Gattegno Chart Column Model Part Whole Addend Sum Minuend Subtrahend Difference Plus Minus Equals Combine Partition



2 3

23 ones

2 tens and 3 ones

10s	1s

Recognise 2-digit numbers are composed of tens and ones.

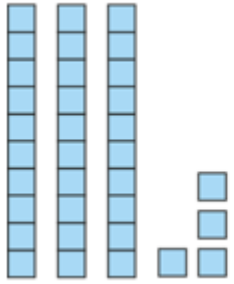
1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

1000	2000	3000	4000	5000	6000	7000	8000	9000
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 out 2-digit numbers on the Gattegno Chart.

Make connections to how we write the number.

Locate the position of two-digit numbers on a 100 square and make connections with other 2-digit numbers.



10s	1s
3	4

Create 2-digit numbers using Deines and record the number numerically.

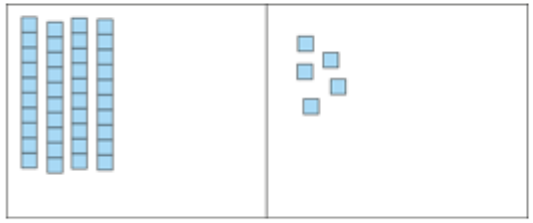
Number and Place Value

Year 2

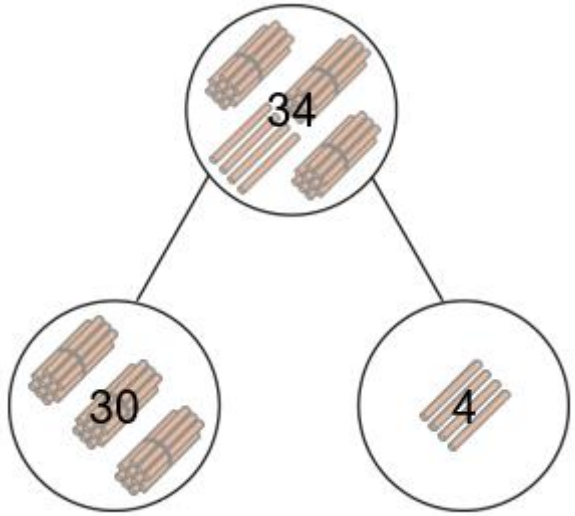
Place Value in 2-digit numbers (2)

Vocabulary:

Ones Tens Digit Represents Place Value Gattegno Chart Column Model Part Whole Addend Sum Minuend Subtrahend Difference Plus Minus Equals Combine Partition

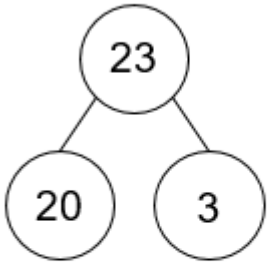


Make connections between the Deines and 100 square.



Partition 2-digit numbers into tens and ones.

2 tens and 3 ones



23	
20	3

20 + 3 = 23
3 + 20 = 23

23 = 20 + 3
23 = 3 + 20

23 – 20 = 3
23 – 3 = 20

3 = 23 – 20
20 = 23 – 3

Partition 2-digit numbers in the abstract forms of bar model and part-part-whole model (cherry model)

Record our understanding as additive equations.

Number and Place Value

Year 2

Two-digit numbers in the linear number system.

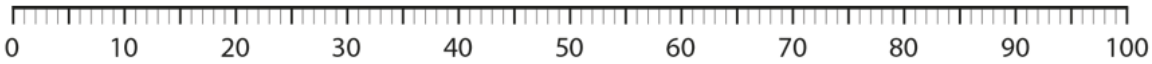
Vocabulary:

Ones Tens Place Value Number Line Multiple Previous Next

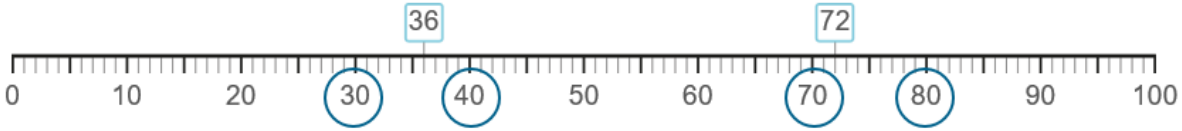
Bead string/bar

32

Describe the number of beads in tens and ones.



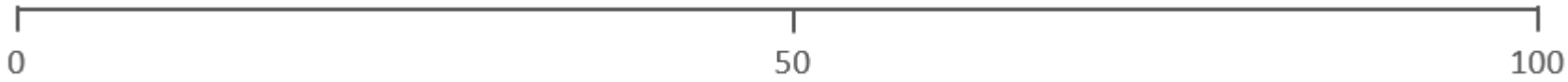
Make connections between the bead string and the number line.



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

36 is between 30 and 40.

30 is the previous multiple of 10. 40 is the next multiple of 10.



Identify the number that sits halfway between 0 and 100. Make connections to 0-10 number line.

Estimate the position of 2-digit numbers on the blank number line.

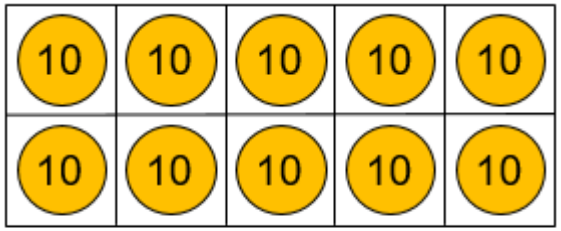
Number and Place Value

Year 3

Equivalence of 10 tens and 1 hundred (1)

Vocabulary:

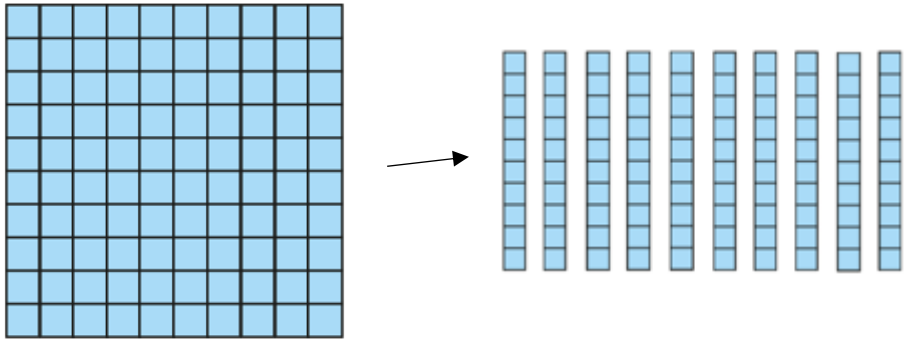
Ones Tens Hundreds Place Value Digit Represents Counters Pence
Coin Tens Frame Multiple Previous Next Gattegno Deines
One-tenth the size Ten-times the size Centimetres Metres



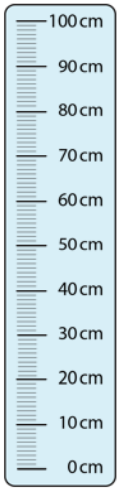
100

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

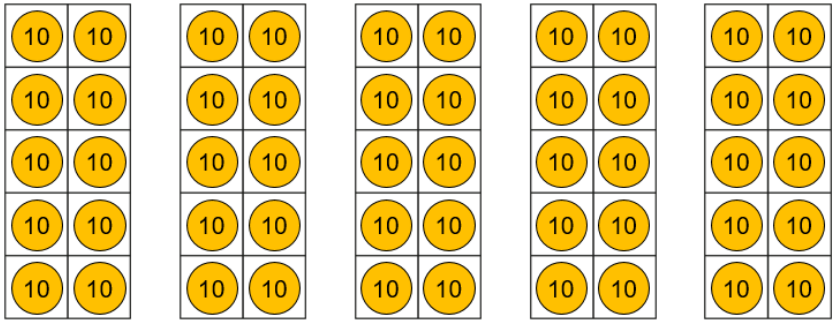
Ten tens are equivalent to 100.

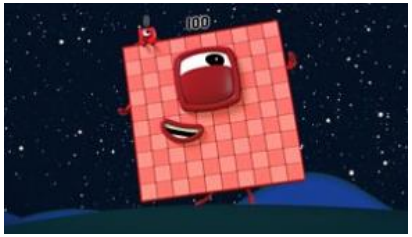


Demonstrate using Deines that 10 tens are equal to 1 hundred.



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 Deines 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.

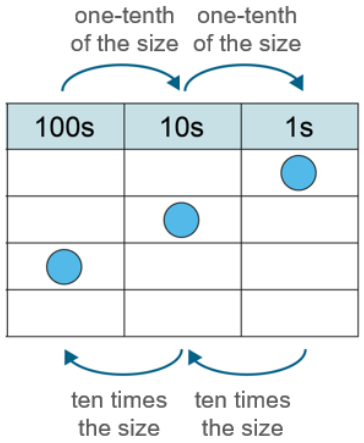
Ten, Twenty, Thirty…

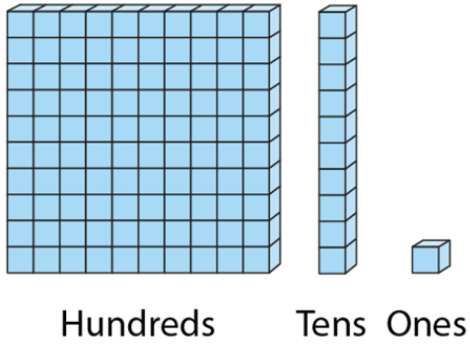
One ten, two tens, three tens…

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

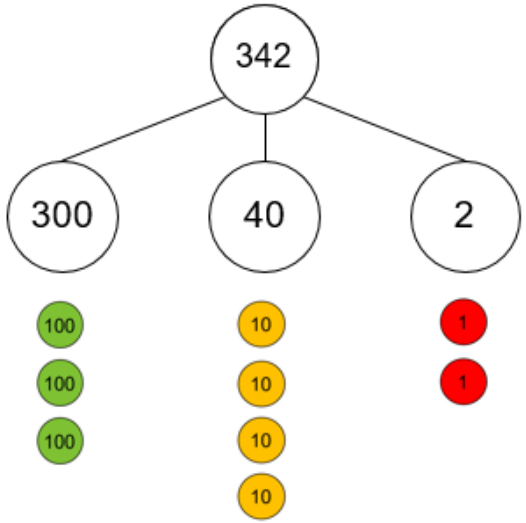
Number and Place Value

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.

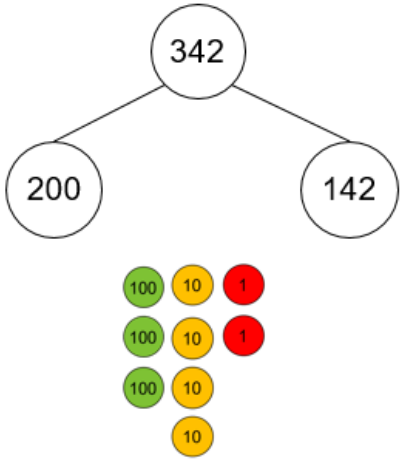
The 3 represents 3 hundreds. It has a value of 300.

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

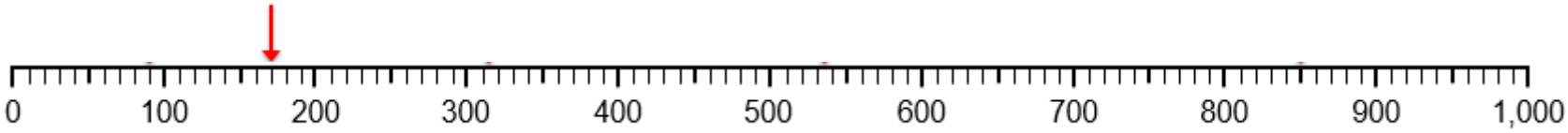
Year 3

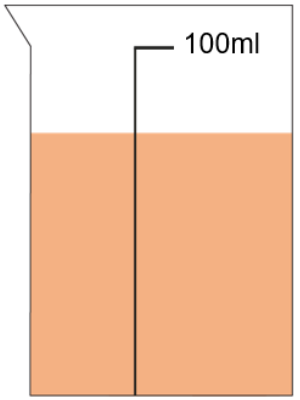
Three-digit numbers in the linear number system.

Vocabulary:

Ones Tens Hundreds Place Value Number line Halfway Multiples of 10

Multiples of 100 Previous Next Between

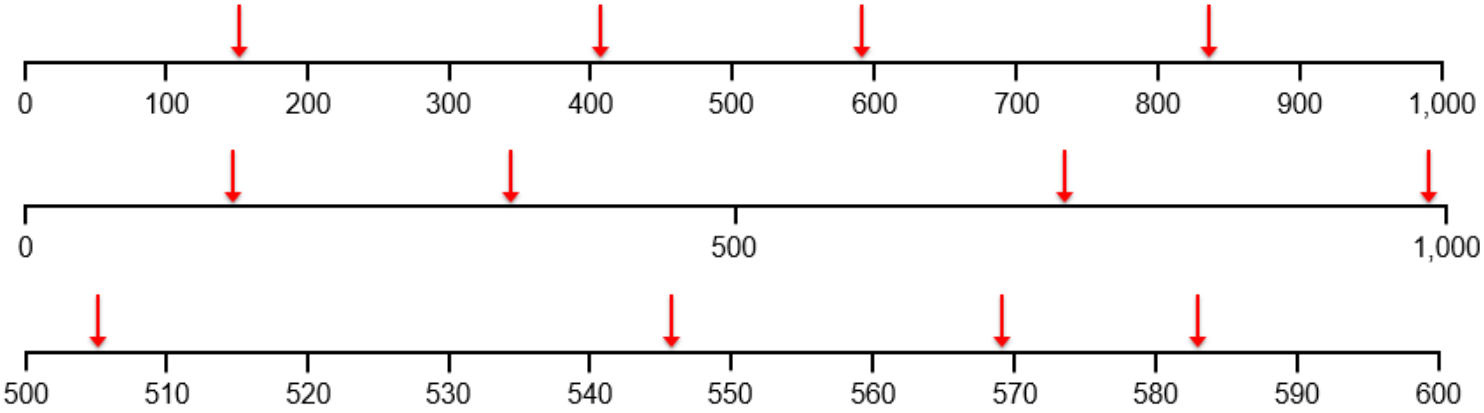




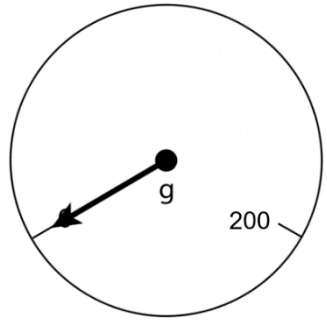
Identify the previous and next multiple of one hundred that a number sits between.

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

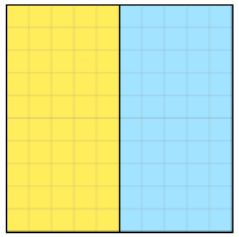
Year 3

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

Vocabulary:

Intervals Scales Divisions Equal Parts Whole Value

Bar model Plus Minus Multiply Divide

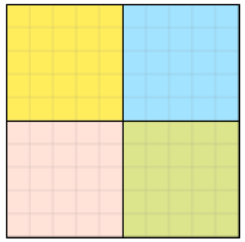


100	
50	50

100 = 50 + 50

100 = 2 × 50 100 = 50 × 2

100 ÷ 2 = 50 100 ÷ 50 = 2

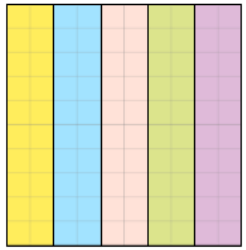


100			
25	25	25	25

100 = 25 + 25 + 25 +25

100 = 4 × 25 100 = 25 × 4

100 ÷ 4 = 25 100 ÷ 25 = 4

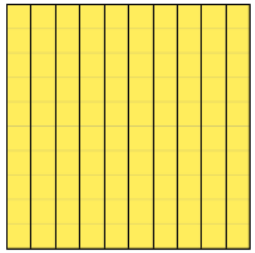


100				
20	20	20	20	20

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

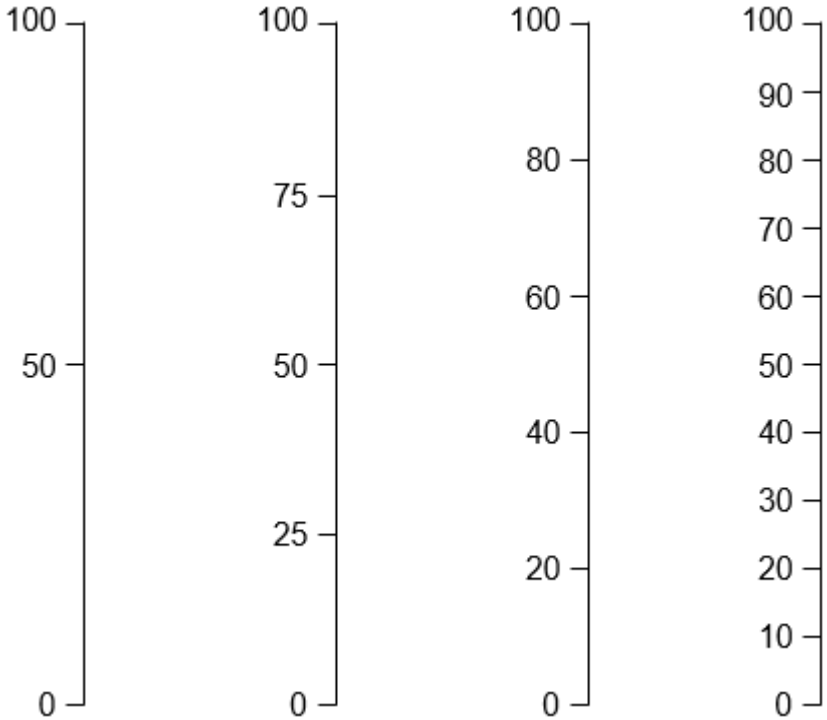
Year 3

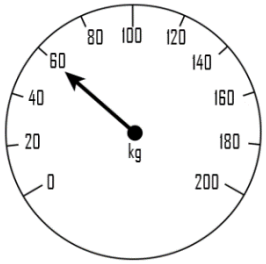
Reading Scales with 2, 4, 5, or 10 intervals

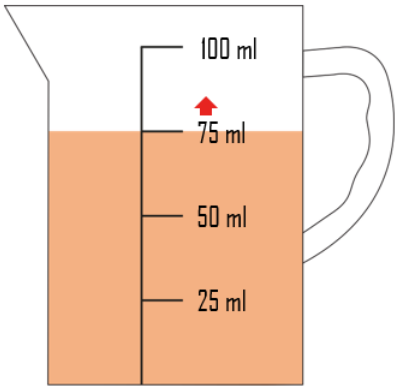
Vocabulary:

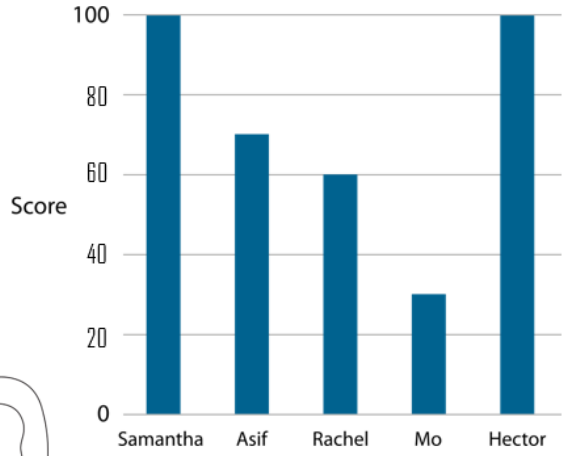
Intervals Scales Divisions Equal Parts Whole Value

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.

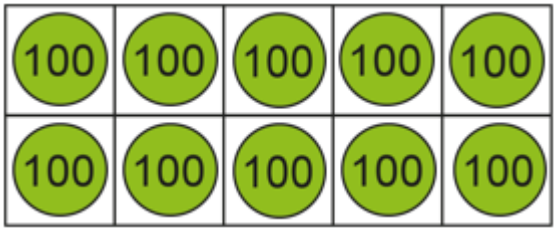
Number and Place Value

Year 4

Equivalence of 10 hundreds and 1 thousand (1)

Vocabulary:

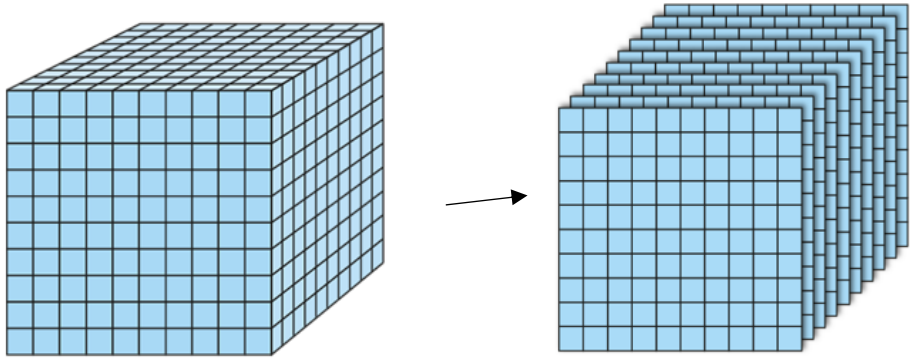
Ones Tens Hundreds Thousands Place Value Counters Pence Coin Tens Frame Multiple Previous Next Gattegno Deines One-tenth the size Ten-times the size Centimetres Metres Millilitres Litres Grams Kilograms



1,000

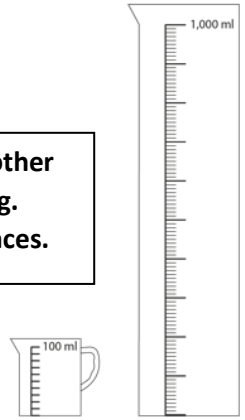
Count in multiples of 100 to 1000 using Place Value Counters.

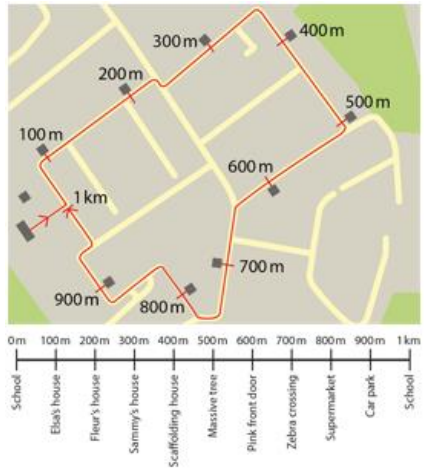
10 hundreds are equivalent to 1000.

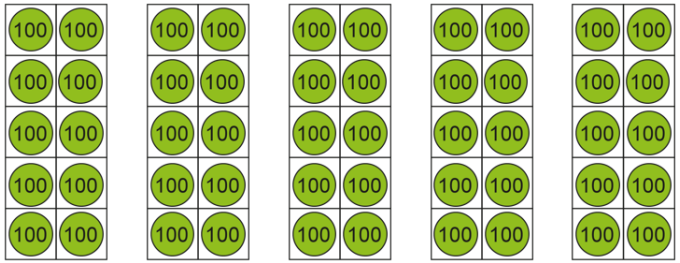


Demonstrate using Deines that 10 hundreds are equal to 1 thousand.

Make connections to other forms of measure eg. measuring jugs, distances.







Recognise the number of hundreds in a four-digit number.

10 hundreds are equivalent to 1000.

18 hundreds are equivalent to 1800.

Dual count in hundreds

Eight hundred, nine hundred, one thousand, one thousand one hundred….

Eight hundred, nine hundred, ten hundreds, eleven hundreds…

Grouping and Exchanging Models

Number and Place Value

Year 4

Equivalence of 10 hundreds and 1 thousand (2)

Vocabulary:

Ones Tens Hundreds Thousands Place Value Counters Pence Coin Tens Frame Multiple Previous Next Gattegno Deines One-tenth the size Ten-times the size Centimetres Metres Millilitres Litres Grams Kilograms

100	200	300	400	500	600	700	800	900	1,000
1,100	1,200	1,300	1,400	1,500	1,600	1,700	1,800	1,900	2,000
2,100	2,200	2,300	2,400	2,500	2,600	2,700	2,800	2,900	3,000
3,100	3,200	3,300	3,400	3,500	3,600	3,700	3,800	3,900	4,000
4,100	4,200	4,300	4,400	4,500	4,600	4,700	4,800	4,900	5,000
5,100	5,200	5,300	5,400	5,500	5,600	5,700	5,800	5,900	6,000
6,100	6,200	6,300	6,400	6,500	6,600	6,700	6,800	6,900	7,000
7,100	7,200	7,300	7,400	7,500	7,600	7,700	7,800	7,900	8,000
8,100	8,200	8,300	8,400	8,500	8,600	8,700	8,800	8,900	9,000
9,100	9,200	9,300	9,400	9,500	9,600	9,700	9,800	9,900	10,000

Count in multiples of hundred up to 1000.

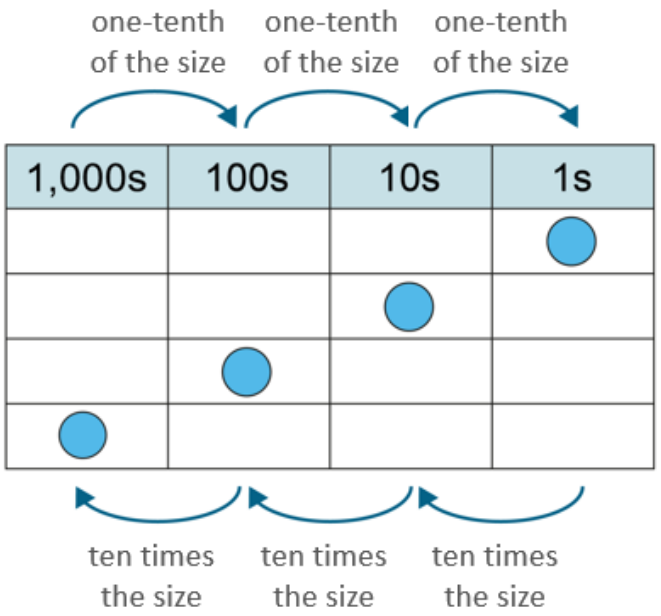
Eight hundred, nine hundred, one thousand, one thousand one hundred….

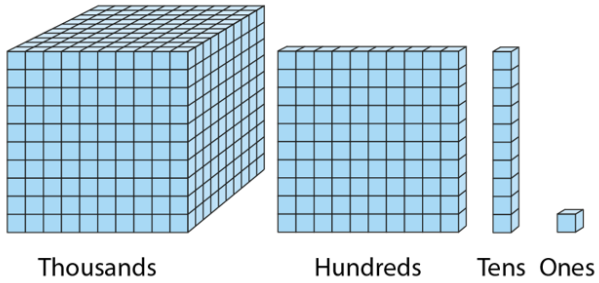
Eight hundred, nine hundred, ten hundreds, eleven hundreds…

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 100.

Create multiples of ten using the Gattegno chart.





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

1000 is ten times the size of 100.

100 is one-tenth the size of 1000.

Scaling Models

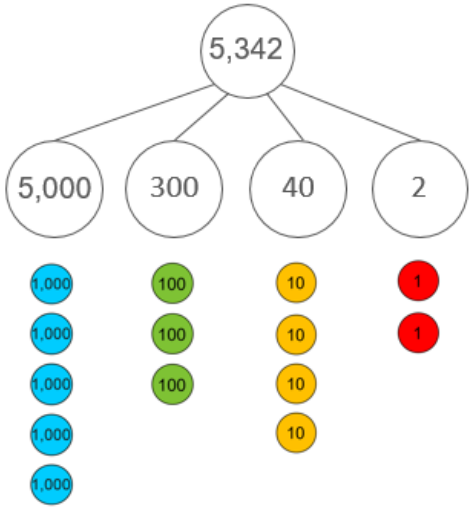
Number and Place Value

Year 4

Place Value in 4-digit numbers

Vocabulary:

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



Form 4-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.

The 5 represents 5 thousands

Write as an additive equation.

5,000 + 300 + 40 + 2 = 5,342

1,000s	100s	10s	1s
5	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.

The 5 represents 5 thousands

5,342

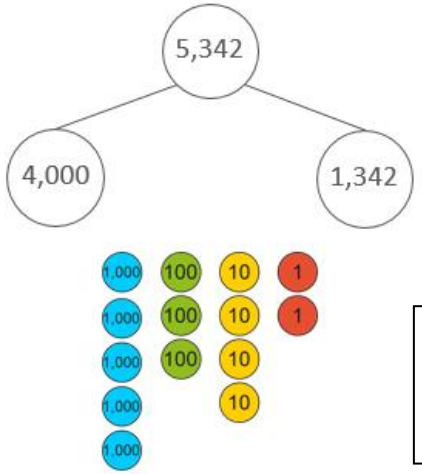
1,000	2,000	3,000	4,000	5,000	6,000	7,000	8,000	9,000
100	200	300	400	500	600	700	800	900
10	20	30	40	50	60	70	80	90
1	2	3	4	5	6	7	8	9

5,000 + 300 + 40 + 2 = 5,342

5,342 = 40 + 2 + _____ + _____

Form 4-digit numbers using a Gattegno chart.

Identify missing parts of an equation.



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

Number and Place Value

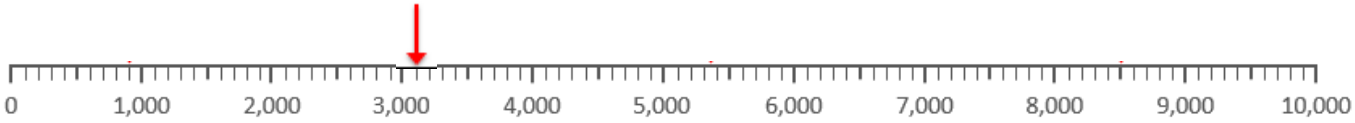
Year 4

Four-digit numbers in the linear number system (1)

Vocabulary:

Ones Tens Hundreds Thousands Place Value Number line Halfway
Multiples of 100/1000 Previous Next Between Round Greater than

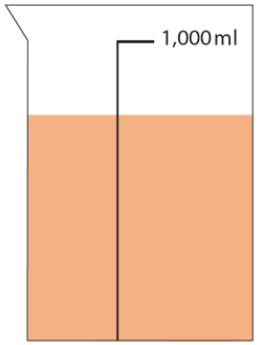
Less than Grams Millilitres Estimate

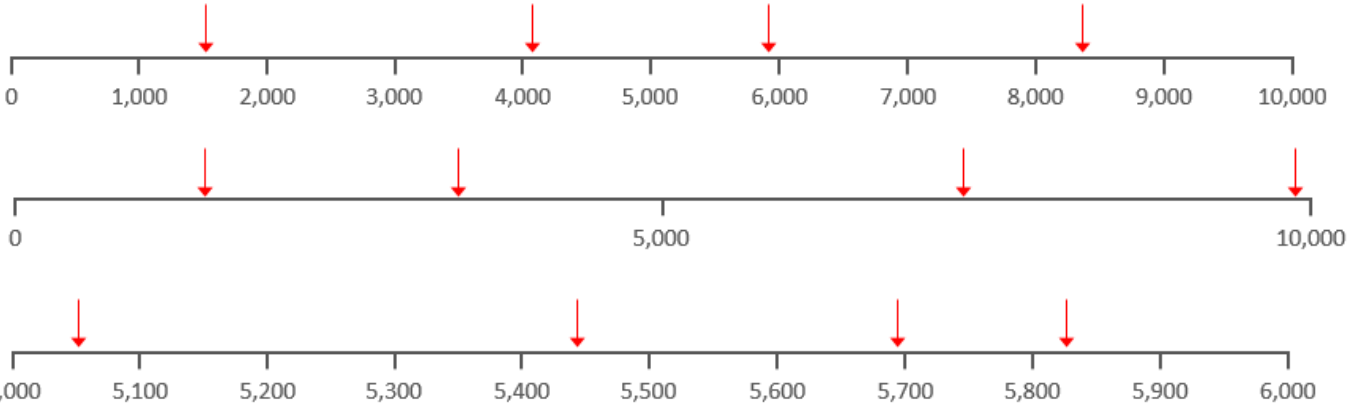


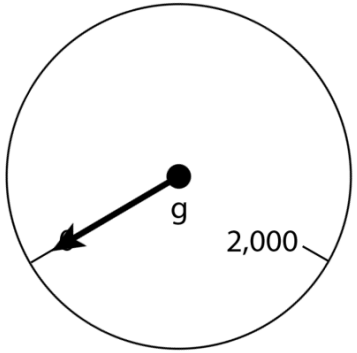
Identify the previous and next multiple of one thousand that a number sits between.

3200 is between 3000 and 4000.

The previous multiple of 1000 is 3000. The next multiple of 1000 is 4000.







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.

Estimate the position of a 3 digit number number lines that are contextualised.

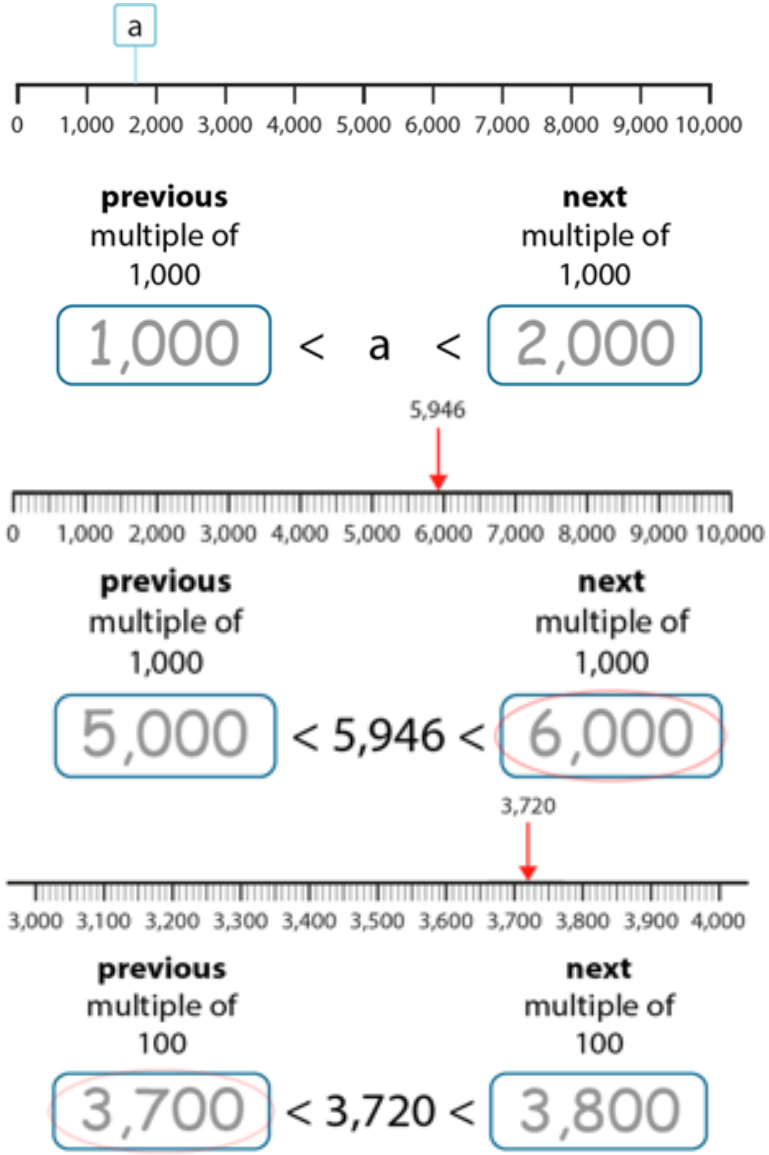
Number and Place Value

Year 4

Four-digit numbers in the linear number system (2)

Vocabulary:

Ones Tens Hundreds Thousands Place Value Number line Halfway
Multiples of 100/1000 Previous Next Between Round Greater than
Less than Estimate



Round to the nearest 1000 and nearest 100.

Build towards finding the previous and next multiple of 100/1000 for any 4-digit number without representations.

The previous multiple of 1,000 is __.

The next multiple of 1,000 is __.

a is greater than ___ and less than ___.

a is nearest to ___ .

5,725

1,000s	100s	10s	1s	
5	7	2	5	
6	0	0	0	nearest 1,000
5	7	0	0	nearest 100

Number and Place Value

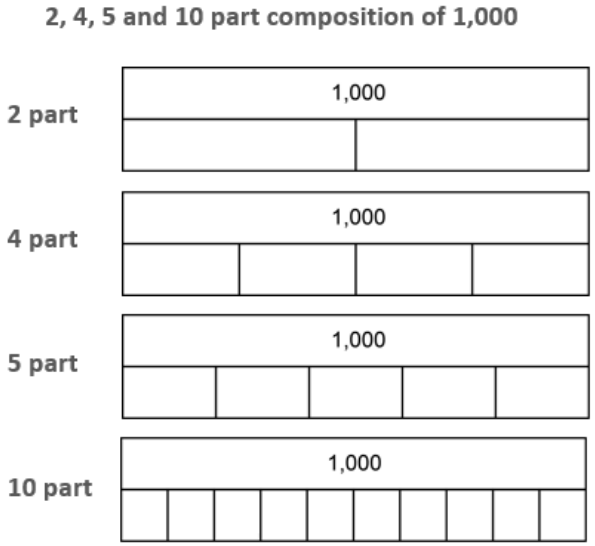
Year 4

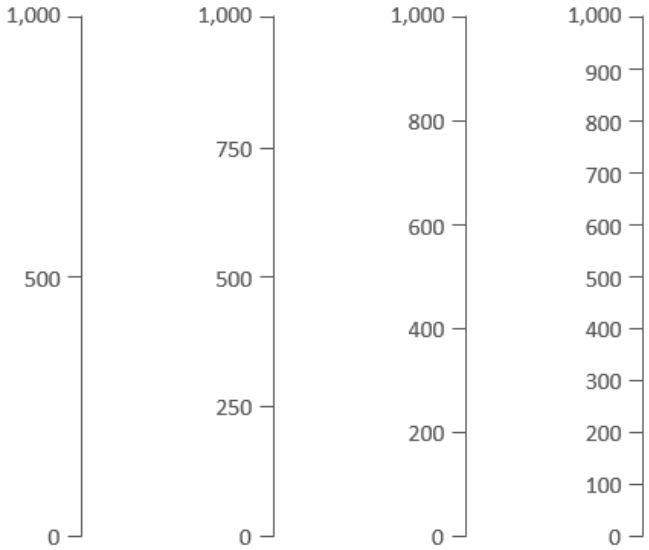
Reading scales with intervals of 2, 4, 5 or 10.

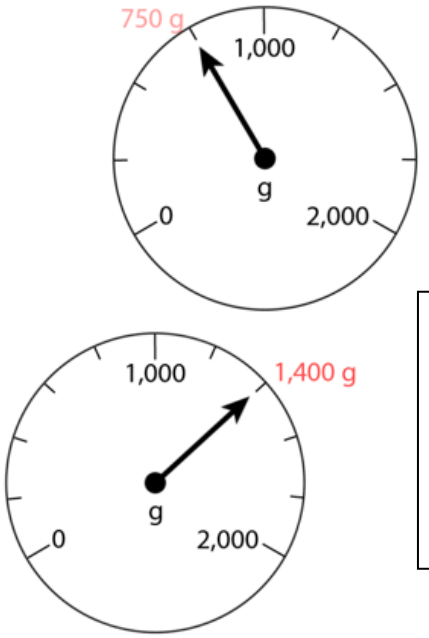
Vocabulary:

Intervals Scales Divisions Equal Parts Whole Value

Bar model Plus Minus Multiply Divide Bar graph Grams

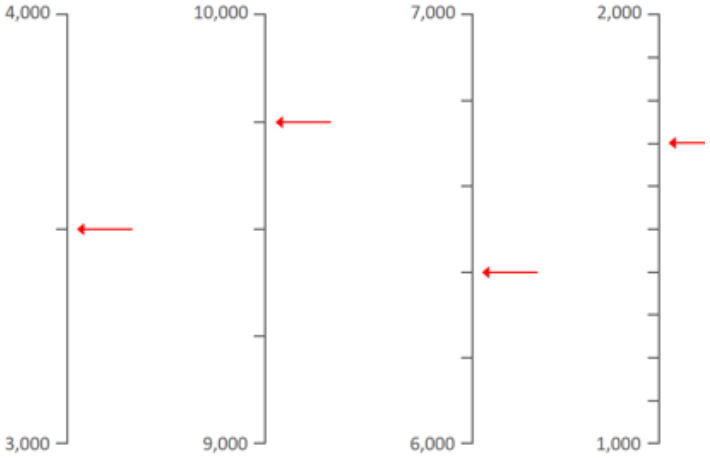




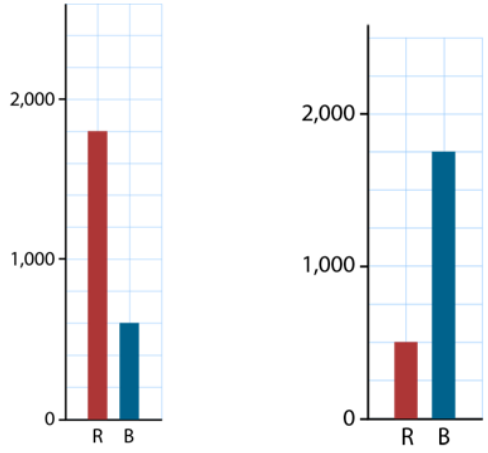


Use the number of intervals given to find values in other contexts (e.g. weighing scales/bar graphs)

Identify intervals and count forwards/backwards using these intervals with both bar models and vertical number lines.



Use the number of intervals given to find the numbers that the arrows are pointing to.



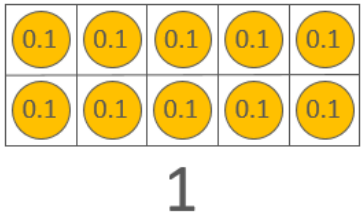
Number and Place Value

Year 5

Tenths and Hundredths

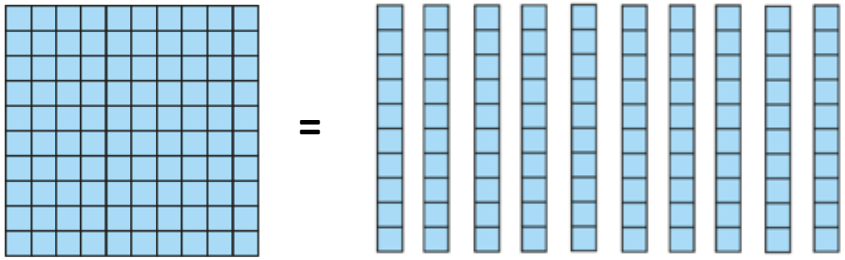
Vocabulary:

Ones Tens Tenths Hundredths Place Value Counters Pence Coin Tens Frame Multiple Previous Next Gattegno Deines One-tenth the size Ten-times the size Centimetres Metres



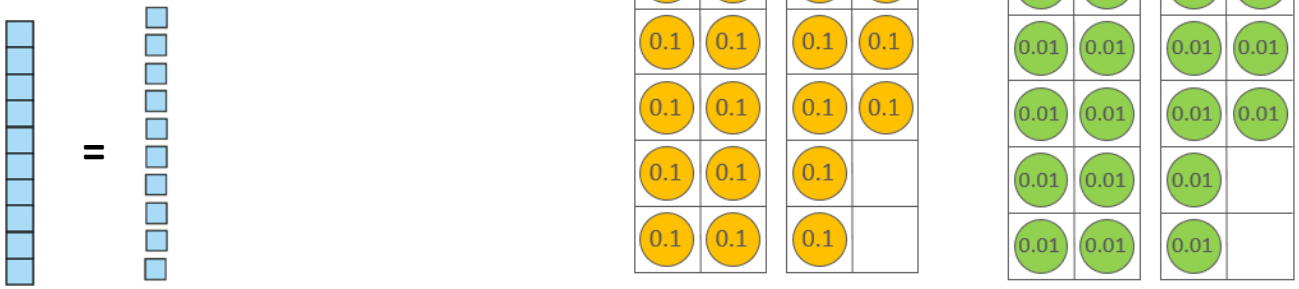
Ten tenths are equal to one (whole).

One (whole) is equal to ten tenths.



Ten hundredths are equal to one tenth.

One tenth is equal to ten hundredths.



Grouping and Exchanging Models

Recognise the number of tenths and hundredths

18 tenths are equivalent to 1.8

18 hundredths are equivalent to 0.18

Dual count in tenths and hundredths

Eight tenths, nine tenths, ten tenths, eleven tenths…

0.8, 0.9, 1.0, 1.1

Eight hundredths, nine hundredths, ten hundredths, eleven hundredths…

0.08, 0.09, 0.10, 0.11

Number and Place Value

Year 5

Tenths and Hundredths (2)

Vocabulary:

Ones Tens Tenths Hundredths Place Value Counters Pence Coin Tens Frame Multiple Previous Next Gattegno Deines One-tenth the size Ten-times the size Centimetres Metres

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

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

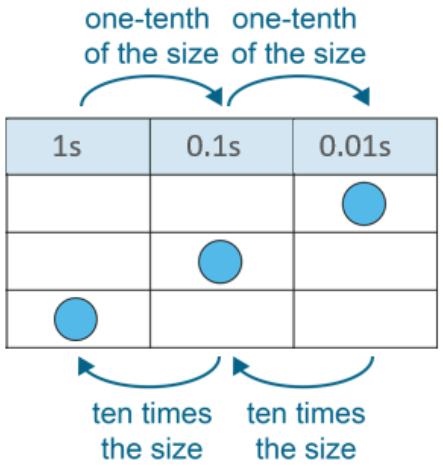
Count in multiples of tenths and hundredths.

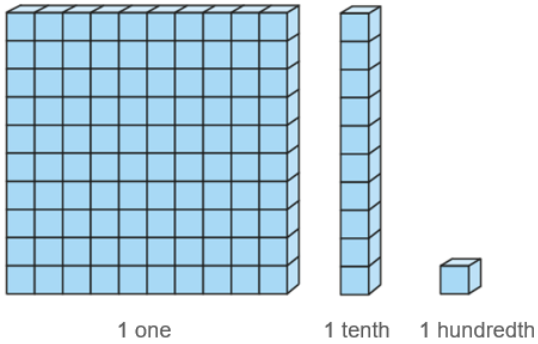
Eight tenths, nine tenths, ten tenths, eleven tenths…

0.8, 0.9, 1.0, 1.1

Eight hundredths, nine hundredths, ten hundredths, eleven hundredths…

0.08, 0.09, 0.10, 0.11





Scaling Models

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

1 is ten times the size of 0.1.

0.1 is one-tenth the size of 1.

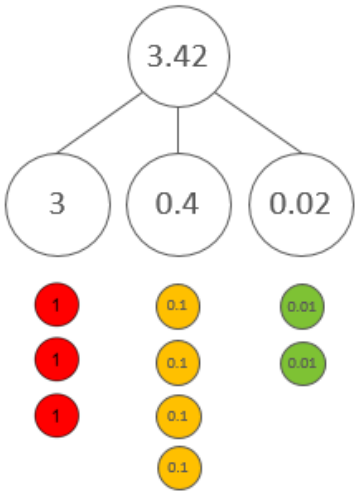
Number and Place Value

Year 5

Place Value in decimal fractions

Vocabulary:

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



3 + 0.4 + 0.02 = 3.42

Form decimal fractions using place value counters and the part-part-whole model.

The 2 represents 2 hundredths

The 4 represents 4 tenths

The 3 represents 3 ones.

Write as an additive equation.

10s	1s	0.1s	0.01s
5	3	4	2

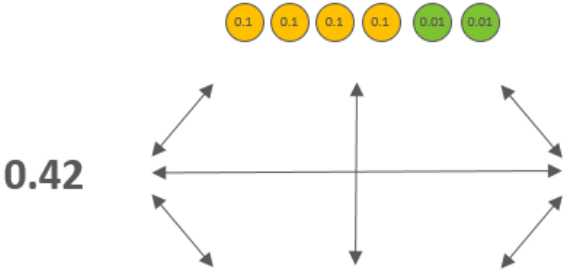
Represent on a Place Value Chart and describe each value.

The digit in the tens place is 5. It has a value of 50.

The digit in the ones place is 3. It has a value of 3.

The digit in the tenths place is 4. It has a value of 0.4.

The digit in the hundredths place is 2. It has a value of 0.02.



4 tenths and 2 hundredths

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
0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09

Make connections between different representations of decimal fractions with the Gattegno Chart.

ones tenths hundredths

0.12

Skip count in one-hundredths recognising the number of hundredths in a 2-digit decimal fraction.

Number and Place Value

Year 5

Place Value in decimal fractions

Vocabulary:

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

53.42

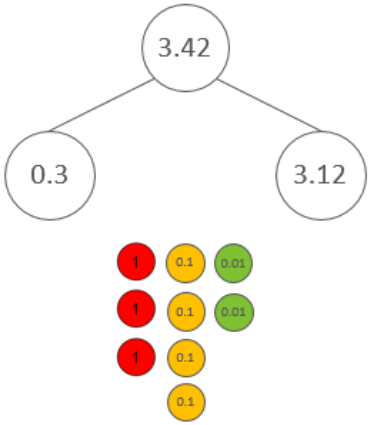
1,000	2,000	3,000	4,000	5,000	6,000	7,000	8,000	9,000
100	200	300	400	500	600	700	800	900
10	20	30	40	50	60	70	80	90
1	2	3	4	5	6	7	8	9
0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09

0.02 + 0.4 + 3 + 50 = 53.42

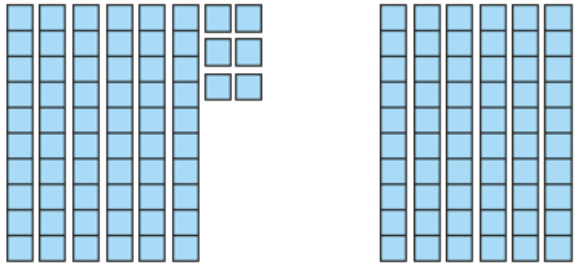
72.49 = 0.09 + 2 + _____ + _____

Form 4-digit numbers including decimals using a Gattegno chart.

Identify missing parts of an equation.

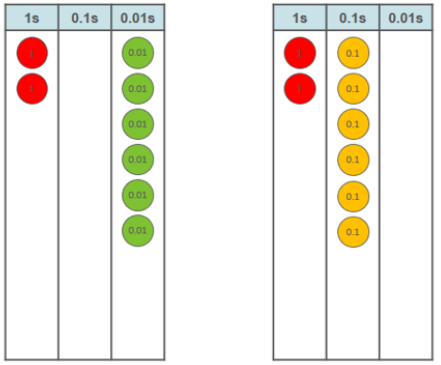


Explore non-standard partitioning using part-part-whole models and place value counters.



2.06 2.6

Compare decimal fractions using deines, place value counters and a place value chart.



Number and Place Value

Year 5

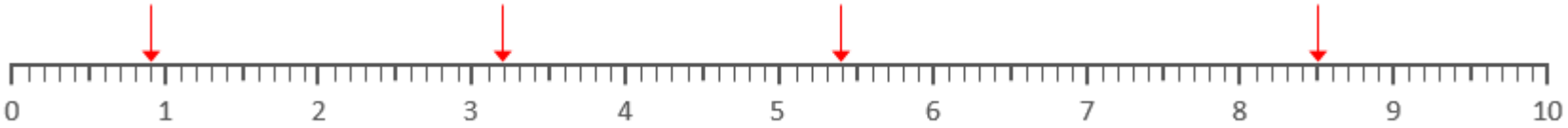
Decimal Fractions in the Linear Number System

Vocabulary:

Ones Tens Hundreds Thousands Place Value Number line Halfway
Multiples of 100/1000 Previous Next Between Round Greater than

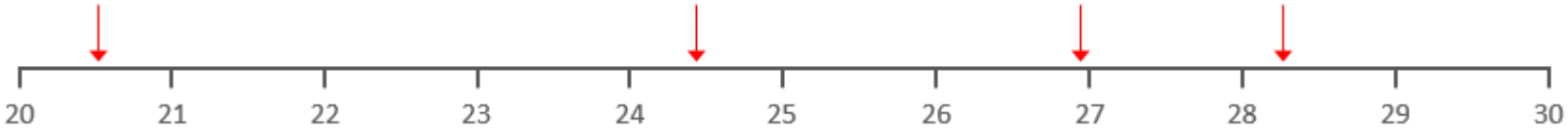
Less than Estimate

Recognise the intervals found between on each number line.



Recognise the value of a position on a number line split into tenths.

The arrow is pointing to 5.4 because it is 4 one-tenth intervals after 5 and because it is 1 one-tenth interval before the halfway point between 5 and 6.



Estimate the value of an arrow on a blank number line split into ones.

Number and Place Value

Year 5

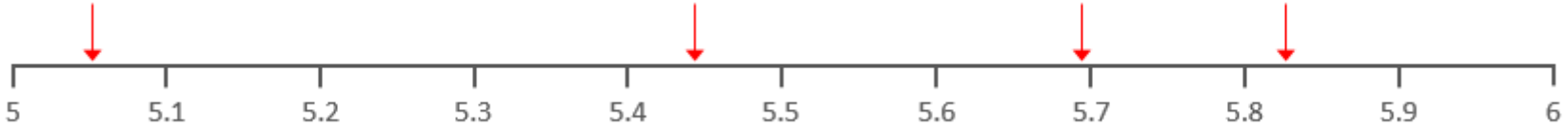
Decimal Fractions in the Linear Number System (1)

Vocabulary:

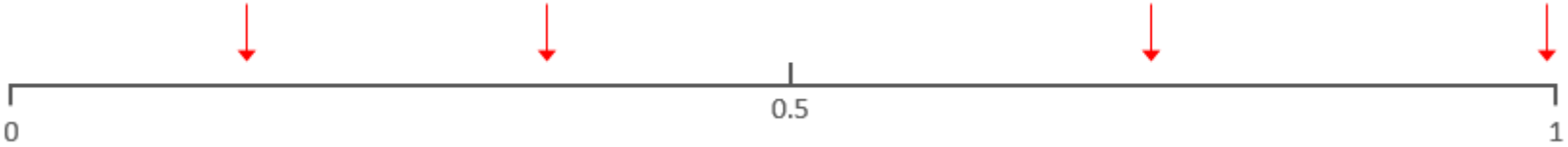
Ones Tens Hundredths Tenths Place Value Number line Halfway Previous Next Multiple of… Between Round Greater than

Less than Grams Millilitres Litres Grams Kilograms Metres Centimetres Estimate Round

Recognise the value of a position on a number line split into hundredths.

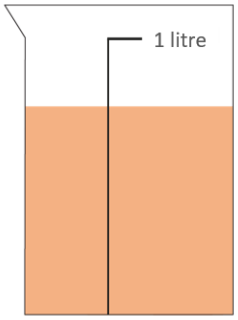


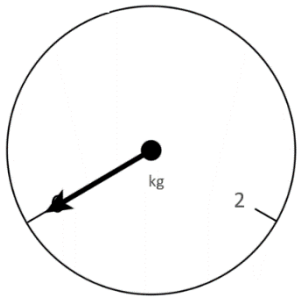
Estimate the value of an arrow on a blank number line split into tenths.

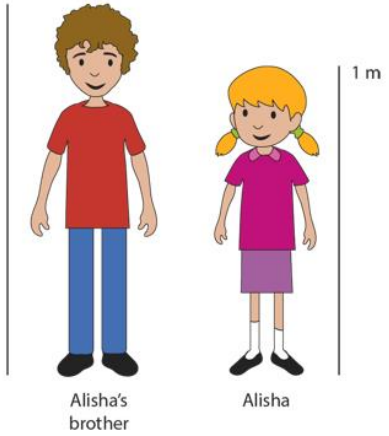


Estimate the value of an arrow on a blank number line.

Estimate the position of a 3 digit number number lines that contextualised.







Estimate a value when given one known value.

Number and Place Value

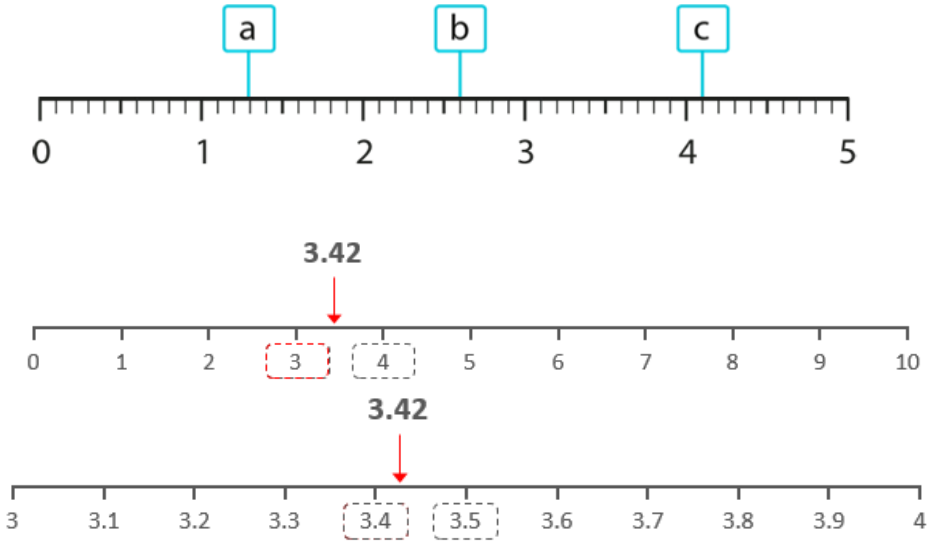
Year 5

Decimal Fractions in the Linear Number System (2)

Vocabulary:

Ones Tens Hundredths Tenths Place Value Number line Halfway Previous Next Multiple of… Between Round Greater than

Less than Grams Millilitres Litres Grams Kilograms Metres Centimetres Estimate Round



Identify the previous and next multiple of 1 that a value sits between.

Round to the nearest 1 and nearest tenth.

The previous multiple of 1 is __.

The next multiple of 1 is __.

a is greater than ___ and less than ___.

a is nearest to ___ .

Previous multiple of 1		Next multiple of 1
3	3.42	4

Previous multiple of 0.1		Next multiple of 0.1
3.4	3.42	3.5

57.62

57.6 nearest 0.1

58 nearest 1

Generalise which digit you need to look at in order to round to the nearest 1 and nearest tenth.

Number and Place Value

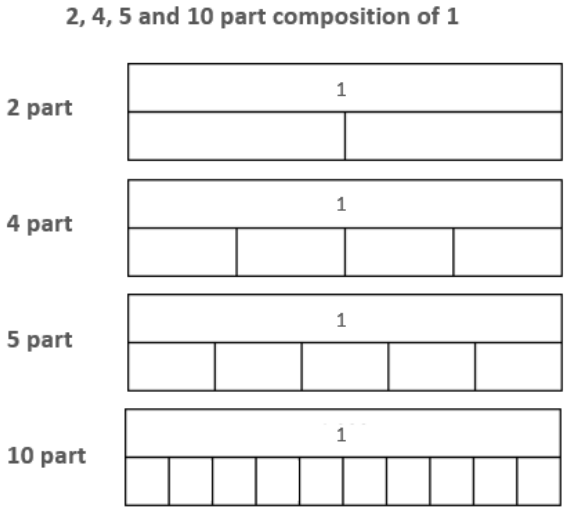
Year 5

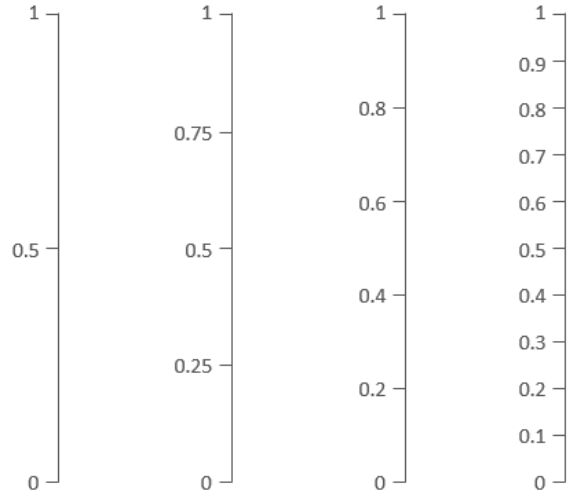
Reading Scales with 2, 4, 5, or 10 intervals

Vocabulary:

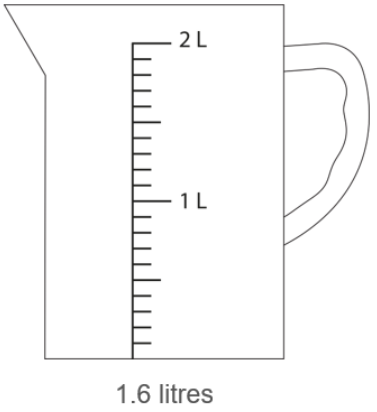
Intervals Scales Divisions Equal Parts Whole Value

Bar model Plus Minus Multiply Divide Grams Millilitres Litres Grams Kilograms Metres Centimetres Estimate

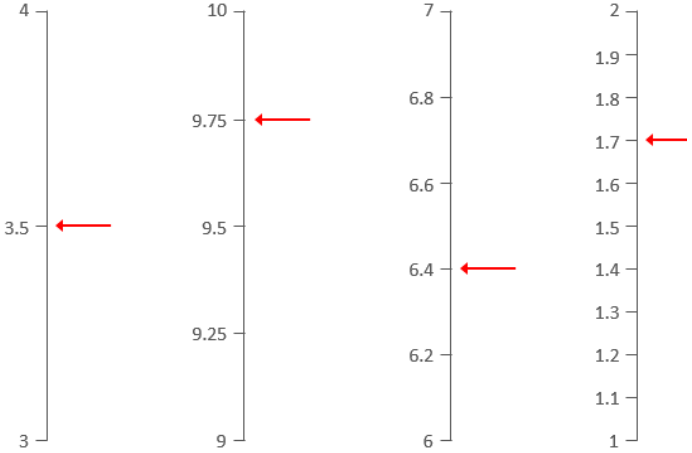




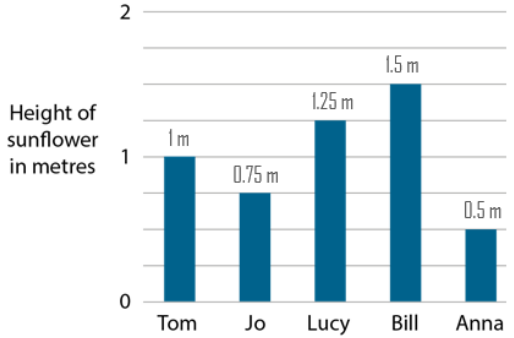
Identify intervals and count forwards/backwards using these intervals with both bar models and vertical number lines.

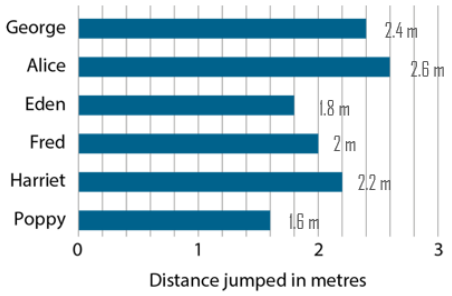


Use the number of intervals given to find values in other contexts (e.g. weighing scales/bar graphs)



Use the number of intervals given to find the numbers that the arrows are pointing to.





Number and Place Value

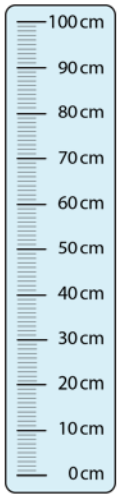
Year 5

Convert between Units of Measure

Vocabulary:

Intervals Scales Divisions Equal Parts Whole Value

Bar model Plus Minus Multiply Divide Grams Millilitres Litres Grams Kilograms Metres Centimetres Estimate



100 cm 1 metre

Recognise that 10 lots of 10cm is equivalent to 1m.

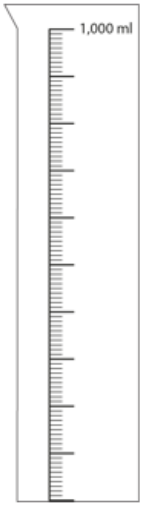
Practice counting forwards and backwards along the scale.

1 metre is equivalent to 100 centimetres.

Recognise that 1000m is equivalent to 1km.

Practice counting forwards and backwards along the scale.

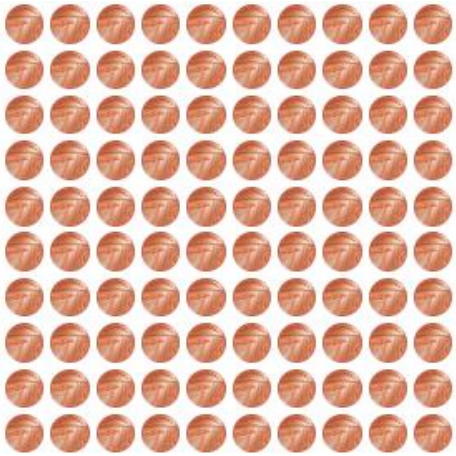
1 kilometre is equivalent to 1000 metres.



Recognise that 1000ml is equivalent to 1L.

Practice counting forwards and backwards along the scale.

1 litre is equivalent to 1000 millilitres.



Recognise that 100p is equivalent to £1.

Practice counting forwards and backwards along the scale.

1 pound is equivalent to 100 pence.

Number and Place Value

Year 5

Convert between Units of Measure

Vocabulary:

Conversions Pounds Pence Grams Millilitres Litres Grams Kilograms Metres Centimetres Decimal Fraction Whole Number Multiple Divide

1km = 1,000m

1 litre = 1,000ml

1m = 100cm

1kg = 1,000g

1cm = 10mm

£1 = 100p

Make connections from the conversions to larger numbers.

If 1km = 1000m, then 3km = _____.

These conversions must be memorised. Practice recall of these conversions over time.

Distance in km expressed as a fraction	Distance in km expressed as a decimal fraction	Distance in metres
$\frac{1}{5}$km	0.2km	200m
$\frac{1}{4}$km	0.25km	250m
$\frac{1}{2}$km	0.5km	500m
$\frac{3}{4}$km	0.75m	750m
$\frac{1}{10}$km	0.1km	100m
all other multiples of $\frac{1}{10}$km, for example, $\frac{7}{10}$km	0.7km	700m

Recognise how units can be converted between fractions, decimals and whole numbers.

$\frac{1}{5} = 0.2$ so $\frac{1}{5}$ km = 0.2km

1km = 1,000m

so $\frac{1}{5}$ km = 1,000 ÷ 5 = 200m

1m	100cm
$\frac{3}{4}$m	

Use known conversion facts to solve conversions from a fraction.

1m = 100 cm

$\frac{3}{4}$ *m = 75 cm*

Number and Place Value

Year 6

Powers of 10 (1)

Vocabulary:

Ones Tens Hundreds Thousands Ten-thousands Hundred-thousands
Millions Ten-Millions Tenths Hundredths Represents Digit Place Value
Counters Gattegno Tens Frame Equivalent Equation Multiply Divide

Ten/hundred times the size One-tenth/hundredth times the size

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

1,000,000	2,000,000	3,000,000	4,000,000	5,000,000	6,000,000	7,000,000	8,000,000	9,000,000
100,000	200,000	300,000	400,000	500,000	600,000	700,000	800,000	900,000
10,000	20,000	30,000	40,000	50,000	60,000	70,000	80,000	90,000
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
0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09

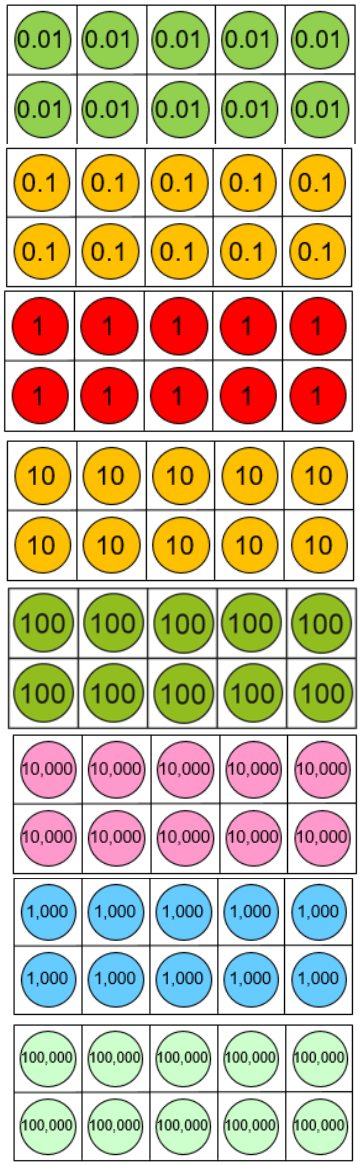
0 . 0 1	one hundredth
0 . 1	one tenth
1	one
1 0	ten
1 0 0	one hundred
1 , 0 0 0	one thousand
1 0 , 0 0 0	ten thousand
1 0 0 , 0 0 0	one hundred thousand
1 , 0 0 0 , 0 0 0	one million
1 0 , 0 0 0 , 0 0 0	ten million

Recognise that the 1 becomes ten times the size as it moves from right to left in a place value chart.

Recognise that 1 becomes one-tenth the size as it moves from left to right in a place value chart.

Recognise that the 1 becomes 10 times the size as it moves up in a Gattegno chart.

Recognise that 1 becomes one-tenth the size as it moves down in a Gattegno chart.



Recognise that:

10 hundredths are equivalent to 1 tenth.

10 tenths are equivalent to 1 one.

10 ones are equivalent to 1 ten.

10 tens are equivalent to 1 hundred.

10 hundreds are equivalent to 1 thousand.

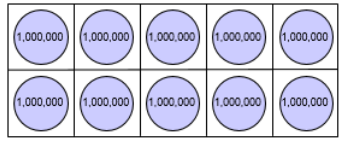
10 thousands are equivalent to 1 ten thousand.

10 ten thousands are equivalent to 1 hundred thousand.

10 hundred thousands are equivalent to 1 million.

10 millions are equivalent to 1 ten million.

Grouping and Exchanging Models



Number and Place Value

Year 6

Powers of 10 (2)

Vocabulary:

Ones Tens Hundreds Thousands Ten-thousands Hundred-thousands Millions Ten-Millions Tenths Hundredths Represents Digit Place Value Counters Gattegno Tens Frame Equivalent Equation Multiply Divide

Ten/hundred times the size One-tenth/hundredth times the size

10,000,000	20,000,000	30,000,000	40,000,000	50,000,000	60,000,000	70,000,000	80,000,000	90,000,000
1,000,000	2,000,000	3,000,000	4,000,000	5,000,000	6,000,000	7,000,000	8,000,000	9,000,000
100,000	200,000	300,000	400,000	500,000	600,000	700,000	800,000	900,000
10,000	20,000	30,000	40,000	50,000	60,000	70,000	80,000	90,000
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
0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09

× 100 ÷ 100

Explore the Gattegno chart and recognise numbers that are one hundred times the size and one-hundredth times the size.

Ten is one hundred times the size of 0.1. 0.1 multiplied by 100 is equal to 10.

0.1 is one-hundredth of the size of 10. 10 divided by 100 is equal to 0.1.

	1,000s	100s	10s	1s	0.1s	0.01s	0.001s
			2	5			
			0	0	2	5	

÷ 100 ↓ ↓ × 0.01

0.25	×	100	=	**25**
25	÷	100	=	**0.25**

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
0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
0.001	0.002	0.003	0.004	0.005	0.006	0.007	0.008	0.009

Use the Place Value chart and Gattegno chart to support children to visualise multiplying and dividing by 10, 100 or 1000.

25 is one hundred times the size of 0.25. 0.25 multiplied by 100 is equal to 25.

0.25 is one-hundredth of the size of 25. 25 divided by 100 is equal to 0.25.

Scaling Models

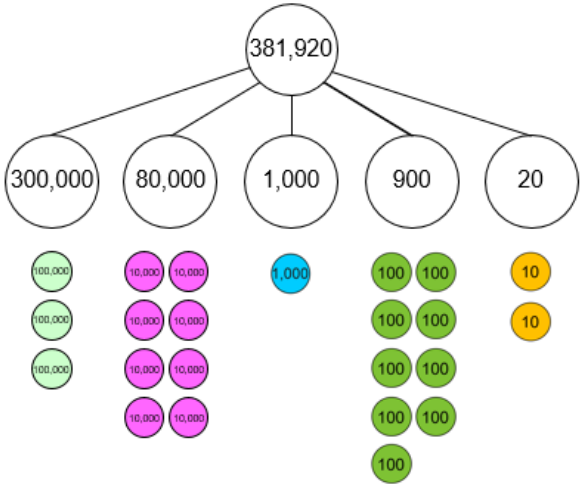
Number and Place Value

Year 6

Place Value in Numbers up to 10,000,000.

Vocabulary:

Ones Tens Hundreds Thousands Ten-thousands Hundred-thousands Millions Ten-Millions Tenths Hundredths Represents Digit Place Value Counters Gattegno Partition Combine Equation Addend Sum Minuend Subtrahend Difference



Form numbers to 10,000,000 using place value counters and the part-part-whole model.

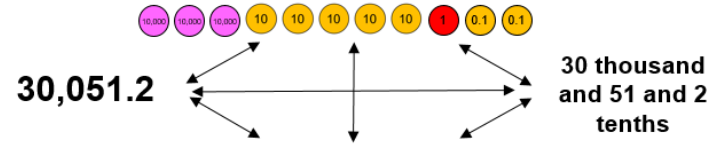
The 2 represents 2 tens

The 9 represents 9 hundreds

The 3 represents 3 hundred thousands.

Write as an additive equation.

200,000 + 10,000 + 100 + 20 = 210,120



1,000,000	2,000,000	3,000,000	4,000,000	5,000,000	6,000,000	7,000,000	8,000,000	9,000,000
100,000	200,000	300,000	400,000	500,000	600,000	700,000	800,000	900,000
10,000	20,000	30,000	40,000	50,000	60,000	70,000	80,000	90,000
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
0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09

Make connections between different representations of numbers to 10,000,000 with the Gattegno Chart.

Millions			Thousands			Ones		
100s	10s	1s	100s	10s	1s	100s	10s	1s
					1	9	3	7
				5	1	9	3	7
			4	5	1	9	3	7
		5	4	5	1	9	3	7

Read numbers to 10,000,000. Focus on the structure of millions, thousands and ones.

5 million, four hundred and fifty one thousand, nine hundred and thirty one (ones).

3,870,291.46

Millions			Thousands			Ones				
100s	10s	1s	100s	10s	1s	100s	10s	1s	0.1s	0.01s
		3	8	7	0	2	9	1	4	6

Recognise the value of each digit.

The 3 represent 3 million.

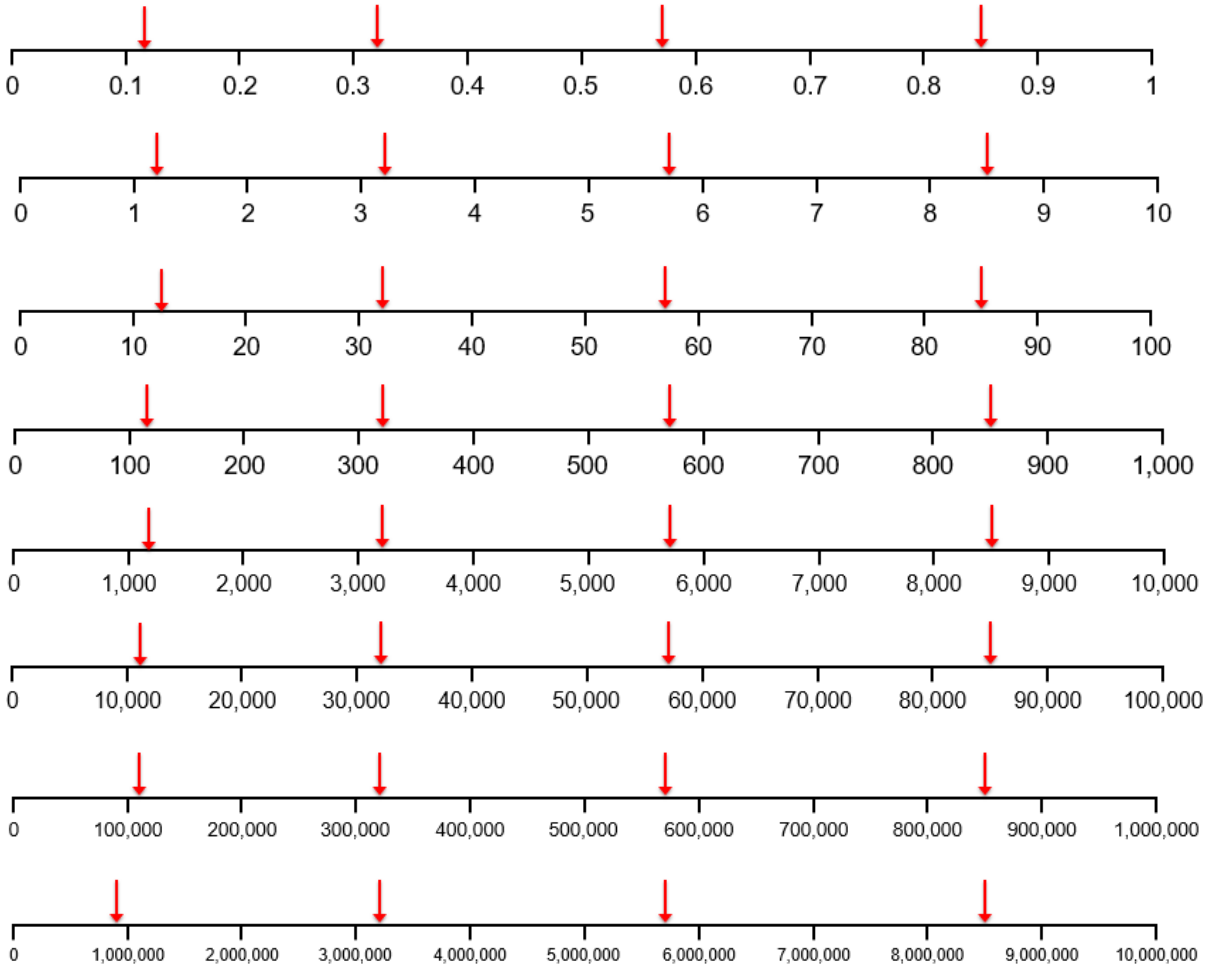
Number and Place Value

Year 6

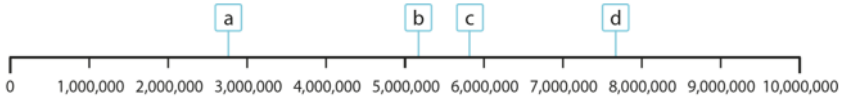
Numbers to 10,000,000 in the Linear Number System

Vocabulary:

Ones Tens Hundreds Thousands Ten-thousands Hundred-thousands Millions Ten-Millions Tenths Hundredths Represents Digit Place Value Number line Halfway Previous Next Multiple of… Between Round Greater than



Recognise the value of a position on a number line split into ten intervals. Discuss what information children used to help identify the value.



previous multiple of 1,000,000 | **next** multiple of 1,000,000

2,000,000 < a < 3,000,000

Identify the previous and next multiple of 1,000,000 that a value sits between.

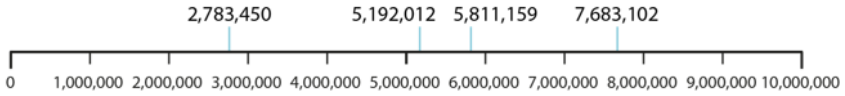
Round to the nearest million/hundred thousand/ten thousand.

The previous multiple of 1,000,000 is __.

The next multiple of 1,000,000 is __.

a is greater than ___ and less than ___.

a is nearest to ___ .



previous multiple of 1,000,000 | **next** multiple of 1,000,000

2,000,000 < 2,783,450 < 3,000,000

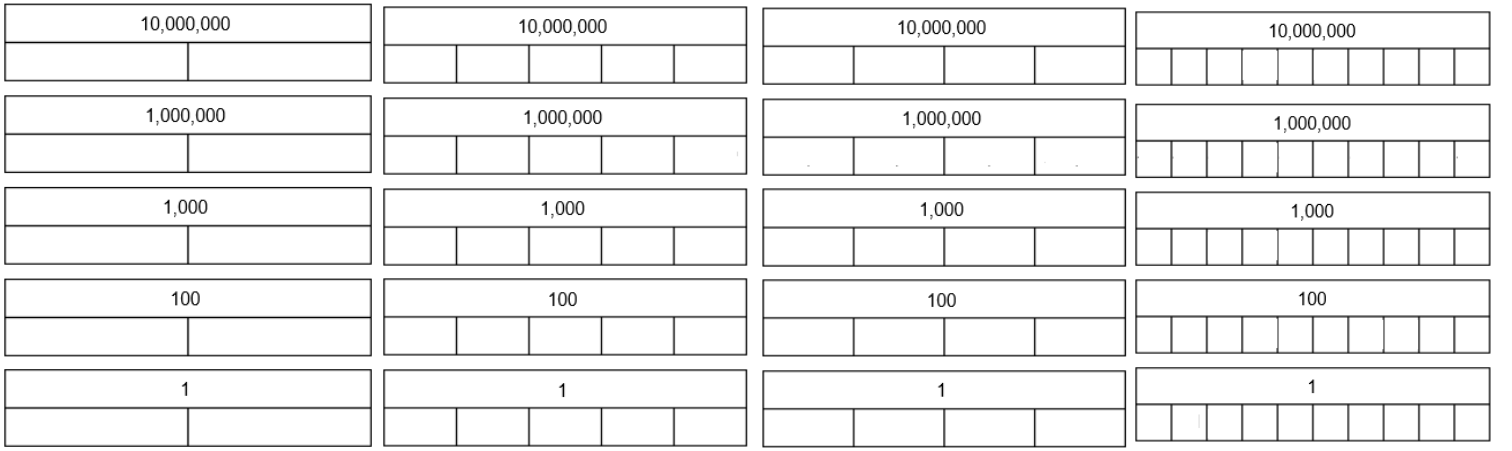
Number and Place Value

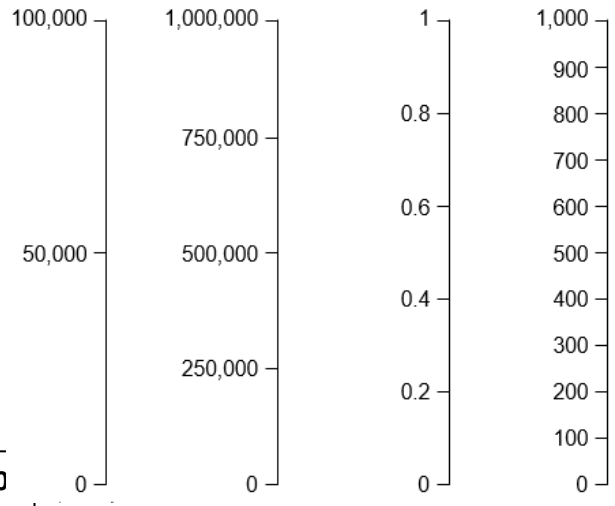
Year 6

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

Vocabulary:

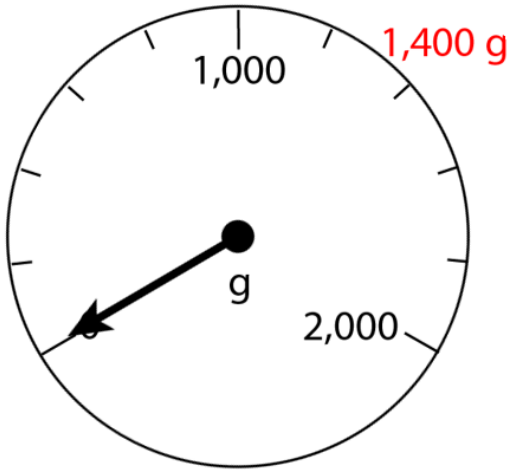
Ones Tens Hundreds Thousands Ten-thousands Hundred-thousands Millions Ten-Millions
Tenths Hundredths Represents Digit Place Value Intervals Scales Divisions
Equal Parts Whole Value Bar model Plus Minus Multiply Divide Grams
Millilitres Litres Grams Kilograms Metres Centimetres Estimate

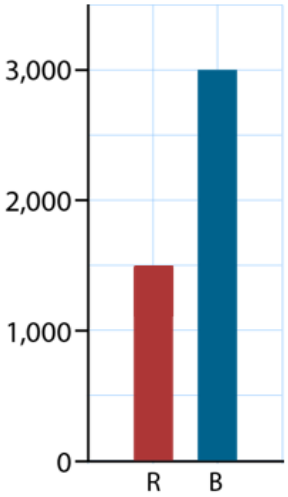


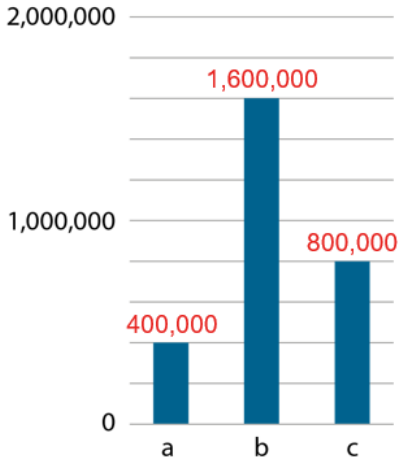


Make connections with different wholes when dividing these into 2, 4, 5, and 10 equal parts.

Identify intervals and count forwards/backwards using these intervals with both bar models and vertical number lines.







Use the number of intervals given to find values in other contexts (e.g. weighing scales/bar graphs)

Addition and Subtraction

Year 1

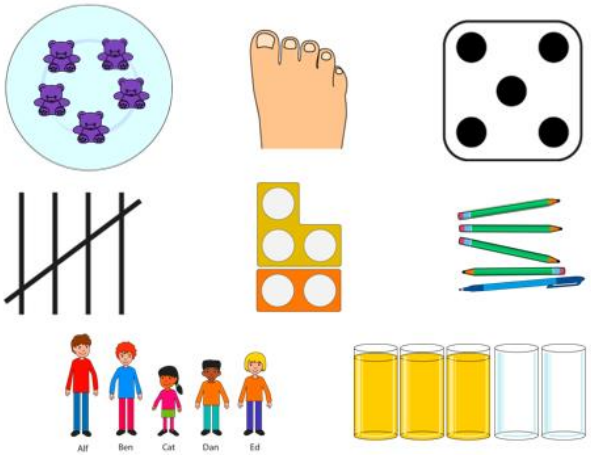
Compose and Partition Numbers to 10 (1)

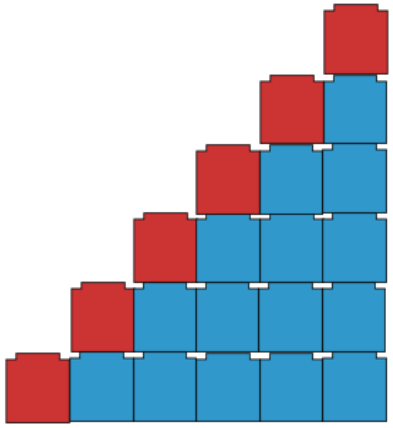
Vocabulary:

Part Whole One Two Three Four Five Six Seven Eight Nine Ten
Represents Compose Combine Partition Numberblocks Part-Part-Whole
(Cherry) model Tens Frame Fingers Five and-a-bit Systematic Subitise
One more One less

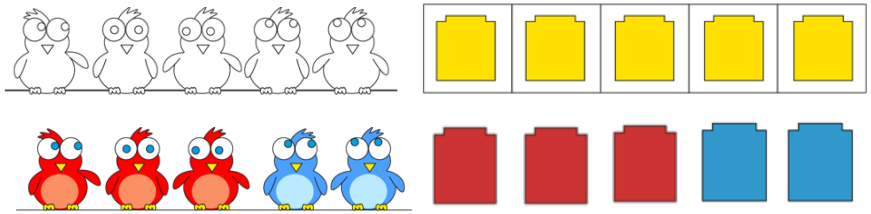
Understand that numbers to 10 can be represented in many different ways.

Numbers to 5 can be identified without counting (subitising).





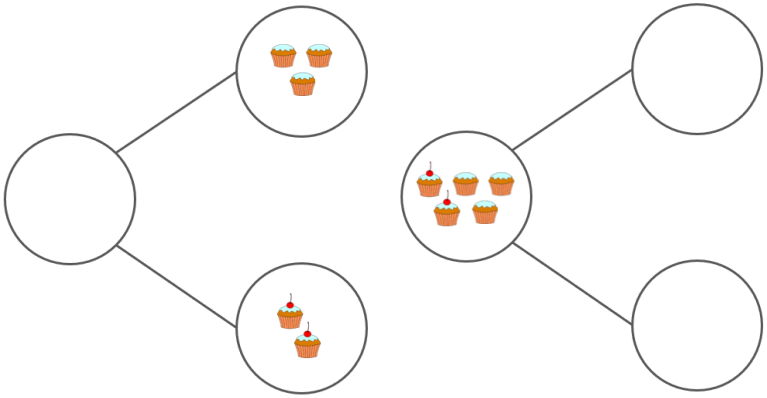
Each number is composed of the previous number and one more.



Each number can be partitioned into two smaller numbers

There are 5 ____. 3 are ____. 2 are ____.

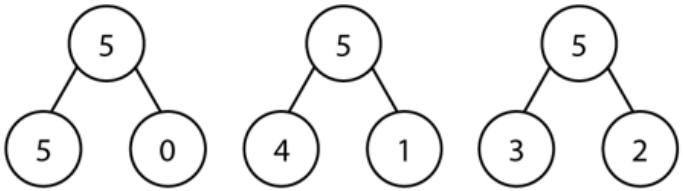
5 is the whole. 3 is a part. 2 is a part.



A number can be partitioned in different ways.

There are 5 ____. 3 are ____. 2 are ____.

5 is the whole. 3 is a part. 2 is a part.



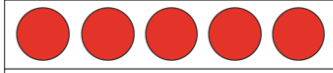
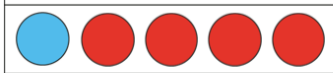
Addition and Subtraction

Year 1

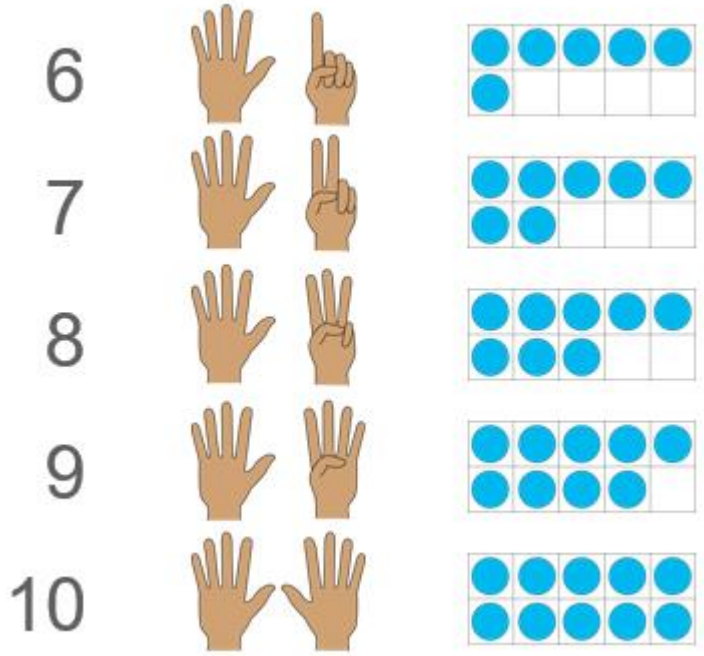
Compose and Partition Numbers to 10 (2)

Vocabulary:

Part Whole One Two Three Four Five Six Seven Eight Nine Ten Represents Compose Combine Partition Numberblocks Part-Part-Whole (Cherry) model Tens Frame Fingers Five and-a-bit Systematic Subitise One more One less

	Blue	Red
	0	5
	1	4
	2	3
	3	2
	4	1
	5	0

A number can be partitioned in different ways systematically.



Numbers from 6 – 10 are composed of the '5 and a bit' structure.

Addition and Subtraction

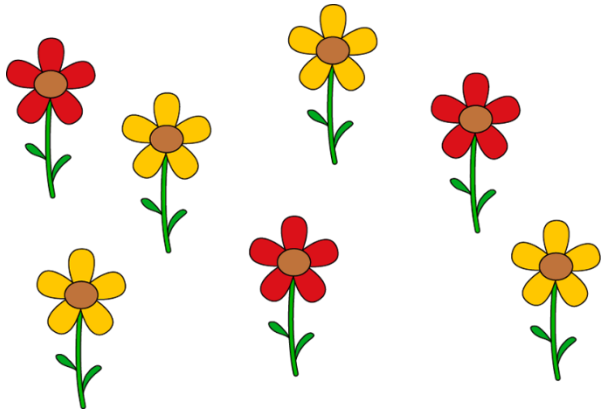
Year 1

Read, Write and Interpret Additive Equations (1)

Vocabulary:

Part Whole One Two Three Four Five Six Seven Eight Nine Ten
Represents Compose Combine Partition Total Part-Part-Whole (Cherry) model
Tens Frame Fingers Five and-a-bit Systematic Plus + Minus - Equal to =
Addition Subtraction Quantity Increase Decrease First, Then, Now
Expression Equation

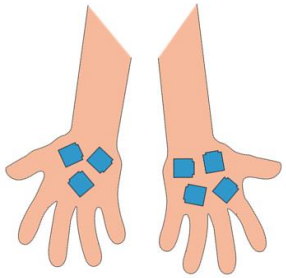
Addend + Addend = Sum Minuend – Subtrahend = Difference



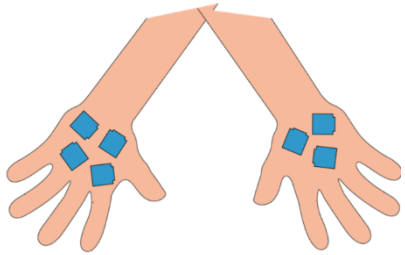
Identify what each number represents in an expression.

The 4 represents the 4 yellow flowers.

The 3 represents the 3 red flowers.



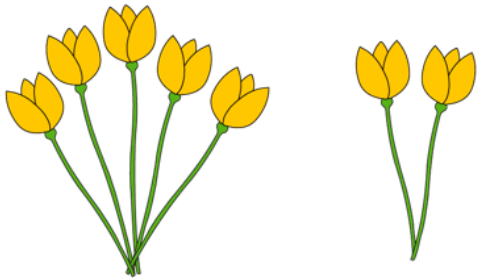
3 + 4



4 + 3

We can write the addends in either order.

(Commutative Law)



5 + 2 = 7

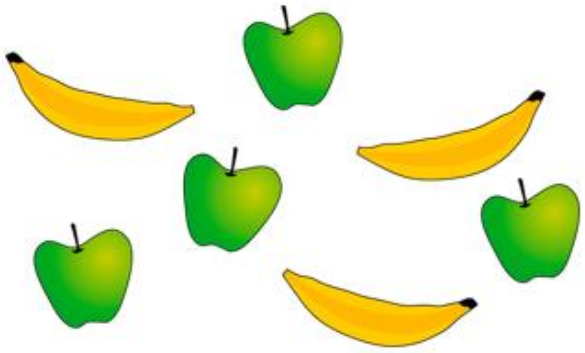
Identify what each number represents in an expression.

We can write 5 plus 2 is equal to 7.

The 5 represents ____.

The 2 represents___.

The 7 represents the total number of ___.



4 + 3 = 7

Addition and Subtraction

Year 1

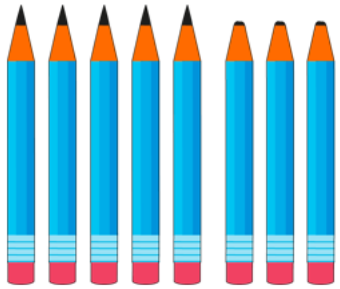
Read, Write and Interpret Additive Equations

Vocabulary:

Part Whole One Two Three Four Five Six Seven Eight Nine Ten
Represents Compose Combine Partition Total Part-Part-Whole (Cherry) model
Tens Frame Fingers Five and-a-bit Systematic Plus + Minus - Equal to =
Addition Subtraction Quantity Increase Decrease First, Then, Now
Expression Equation

Addend + Addend = Sum

Minuend – Subtrahend = Difference



Subtraction can tell us about partitioning.

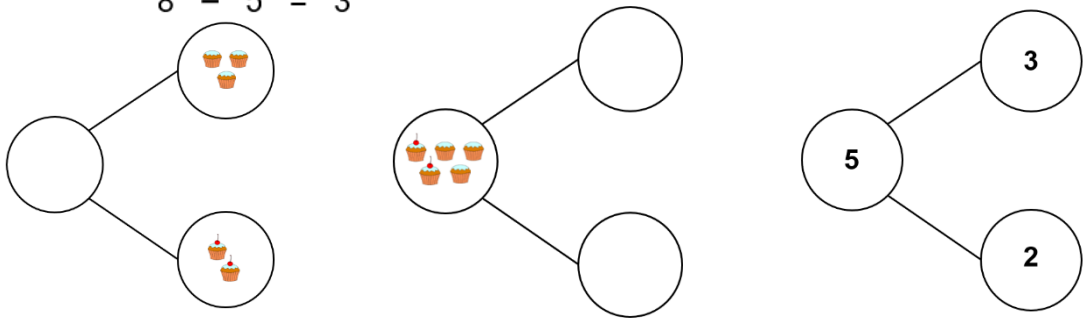
There are 8 ____ altogether.

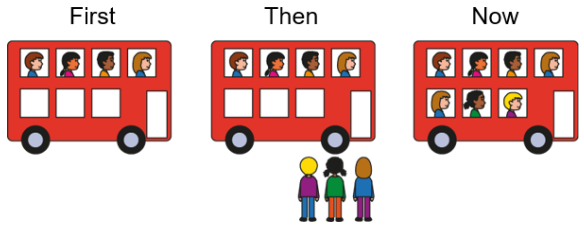
5 ___ are ____.

3 ___ are ____.

We can write this as 8 minus 5 is equal to 3.

8 – 5 = 3



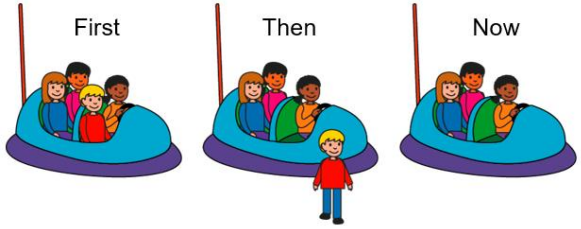


4 + 3 = 7

Understand the First, Then, Now structure of addition and subtraction.

Addition can tell us about a quantity increasing.

Subtraction can tell us about a quantity decreasing.



4 – 1 = 3

Make connections between addition and subtraction using the part-part-whole model.

Addition can tell us about combining objects.

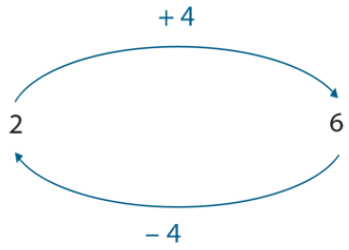
Subtraction can tell us about partitioning objects.

2 + 3 = 5

3 + 2 = 5

5 – 3 = 2

5 – 2 = 3



Addition and Subtraction undo eachother.

Addition and Subtraction

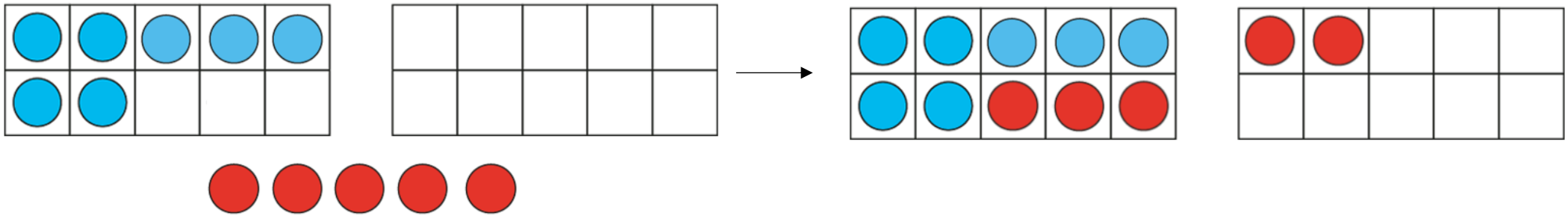
Year 2

Add and Subtract across 10 (1)

Vocabulary:

Part Whole One Two Three Four Five Six Seven Eight Nine Ten
Represents Compose Combine Partition Total Part-Part-Whole (Cherry) model
Tens Frame Fingers Five and-a-bit Systematic Plus + Minus - Equal to =
Addition Subtraction Quantity Increase Decrease First, Then, Now
Expression Equation

Addend + Addend = Sum Minuend – Subtrahend = Difference



7 + 5

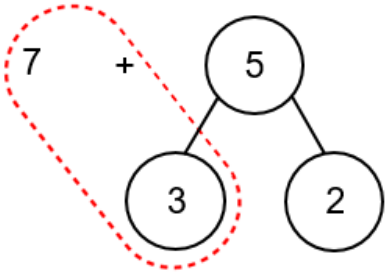
7 + 5 = 7 + 3 + 2 = 10 + 2

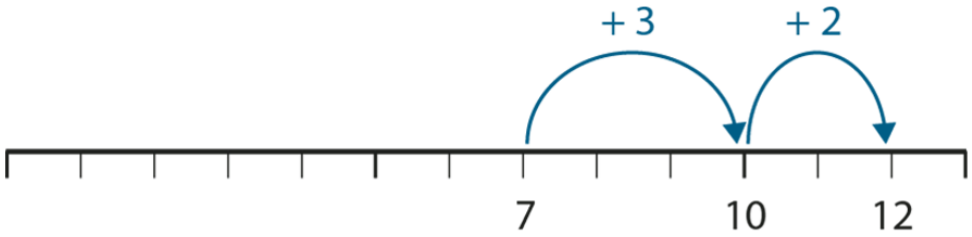
Use knowledge of known facts to bridge 10 using a 'make 10' strategy.

First, I partition the __ into ___ and ___.

Then, I add ___ and ___ to make 10.

Then, I add the remaining ___ to make ___.





7 + 3 = 10

10 + 2 = 12

Addition and Subtraction

Year 2

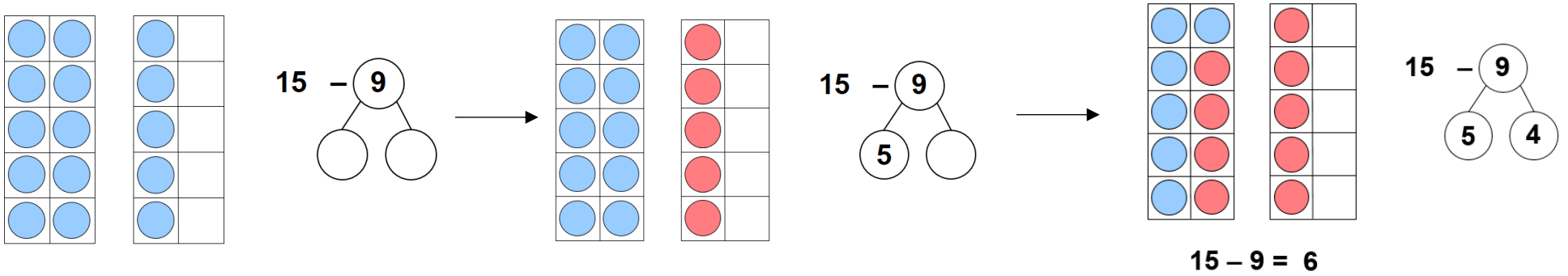
Add and Subtract across 10 (2)

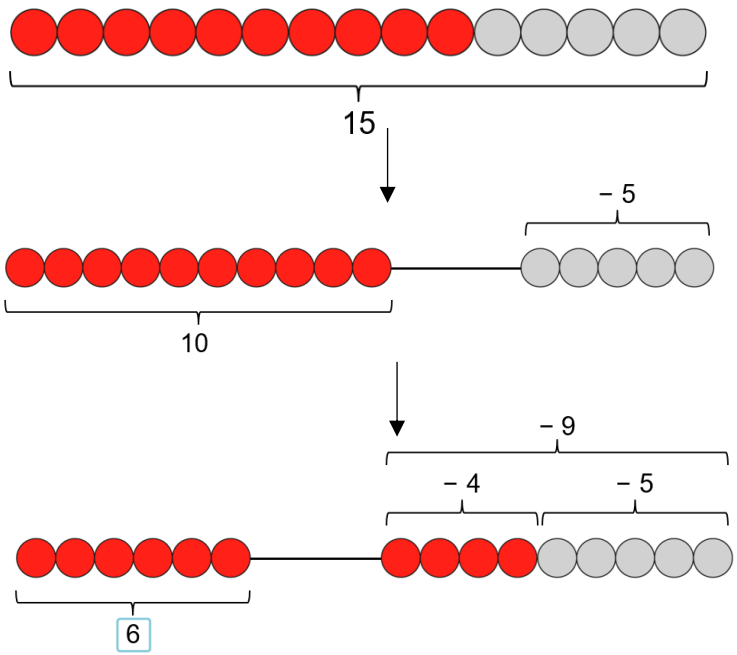
Vocabulary:

Part Whole One Two Three Four Five Six Seven Eight Nine Ten
Represents Compose Combine Partition Total Part-Part-Whole (Cherry) model
Tens Frame Fingers Five and-a-bit Systematic Plus + Minus - Equal to =
Addition Subtraction Quantity Increase Decrease First, Then, Now
Expression Equation

Addend + Addend = Sum

Minuend – Subtrahend = Difference



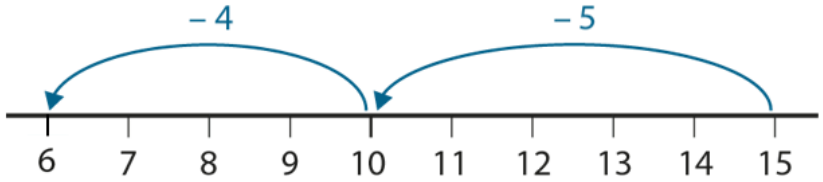


Use knowledge of known facts to subtract *through 10*. We can partition the subtrahend to help us subtract.

First, I partition the __ into ___ and ___.

Then, I subtract ___ and ___ to get to 10.

Then, I subtract the remaining ___ to make ___.



Addition and Subtraction

Year 2

Add and Subtract across 10 (3)

Vocabulary:

Part Whole One Two Three Four Five Six Seven Eight Nine Ten
Represents Compose Combine Partition Total Part-Part-Whole (Cherry) model
Tens Frame Fingers Five and-a-bit Systematic Plus + Minus - Equal to =
Addition Subtraction Quantity Increase Decrease First, Then, Now
Expression Equation

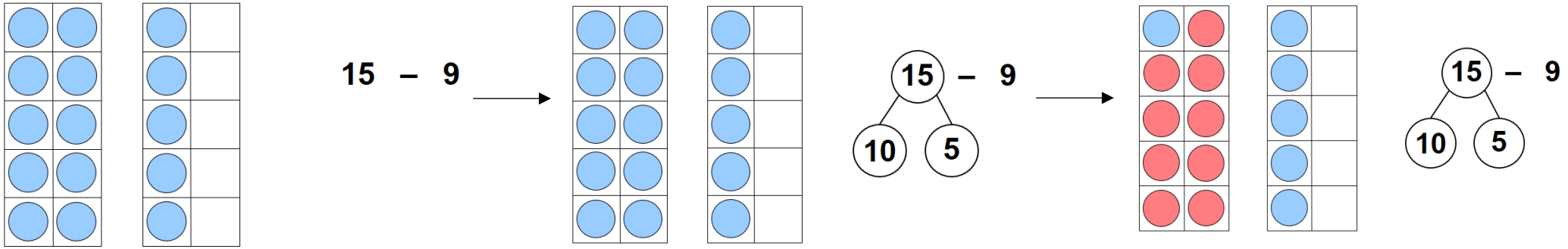
Addend + Addend = Sum Minuend – Subtrahend = Difference

Use knowledge of known facts to subtract *from 10*. We can partition the subtrahend to help us subtract.

First, I partition the __ into ___ and ___.

Then, I subtract ___ from 10 to make ___.

Then, I add the remaining ___ to make ___.



10 – 9 = 1

1 + 5 = 6

15 – 9 = 6

Addition and Subtraction

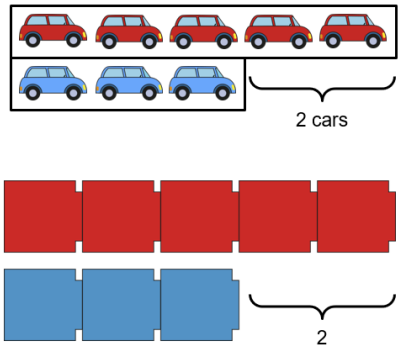
Year 2

Solve Comparative Addition and Difference Problems

Vocabulary:

Part Whole One Two Three Four Five Six Seven Eight Nine Ten
Represents Compose Combine Partition Total Part-Part-Whole (Cherry) model
Tens Frame Fingers Five and-a-bit Systematic Plus + Minus - Equal to =
Addition Subtraction Quantity Increase Decrease First, Then, Now
Expression Equation Difference Bar model

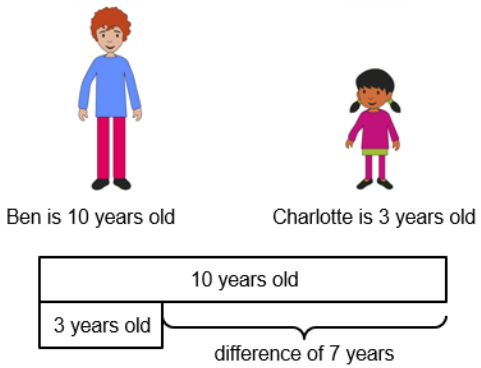
Addend + Addend = Sum Minuend – Subtrahend = Difference



Line up sets of objects in a bar model structure to support comparison.

There are 2 fewer blue cars than red cars.

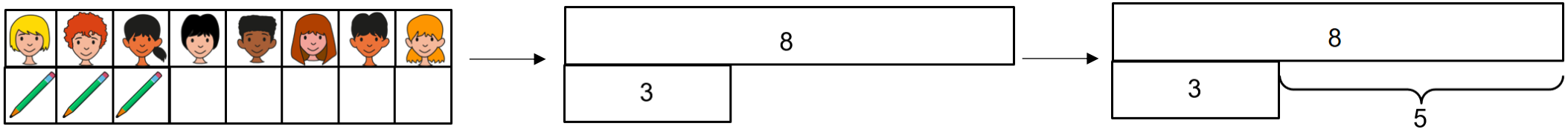
There are 2 more red cars that blue cars.



Represent a range of comparison contexts.

Ben is 7 years older than Charlotte.

Charlotte is 7 years younger than Ben.

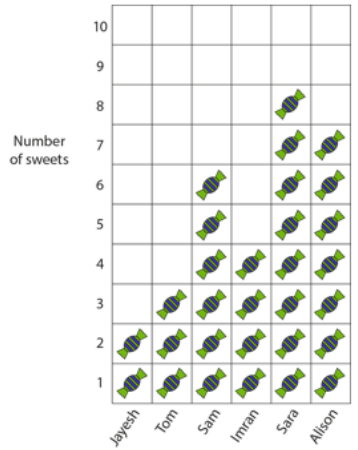


We can use subtraction to help solve difference problems / missing addend problems about 'how many more?' and 'how many fewer?'

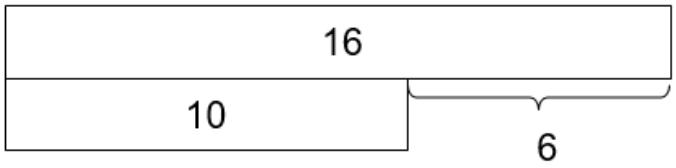
3 + __ = 8

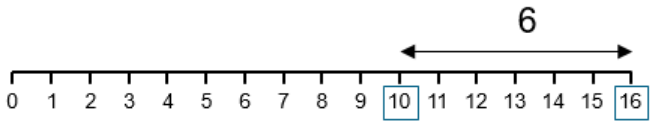
8 – 3 = 5

Create contexts for recognising the difference/comparative addition structure with all representations below.



10 + ☐ = 16 **16 – 10 = ☐**





Addition and Subtraction

Year 2

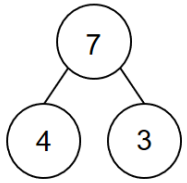
Add and Subtract within 100 (1).

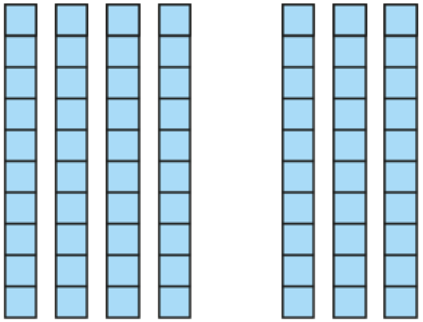
Vocabulary:

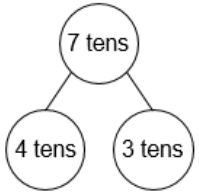
Part Whole Ones Tens Represents Compose Combine Partition Total Part-Part-Whole (Cherry) model Tens Frame Deines Plus + Minus - Equal to = Addition Subtraction Expression Equation Exchange Count on Count back Number line Tens Boundary

Addend + Addend = Sum

Minuend – Subtrahend = Difference







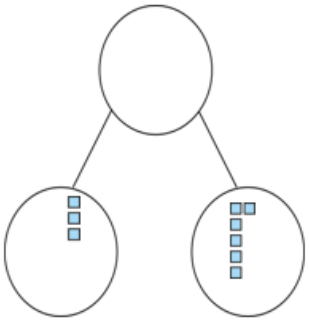
Use known facts within 10 to add/subtract multiples of 10.

I know that 4 plus 3 is equal to 7.

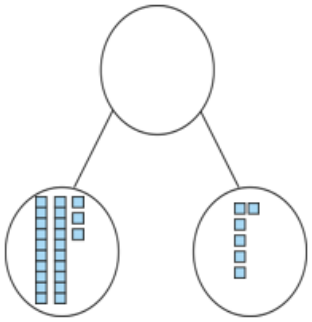
So, 4 tens plus 3 tens is equal to 7 tens.

40 + 30 = 70.

70 – 40 = 30



3 + 6 = 9



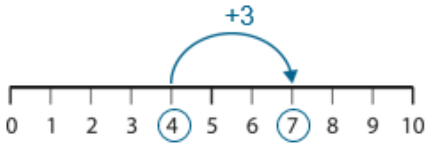
23 + 6 = 29

Use known facts within 10 to add/subtract ones to/from a 2 digit number.

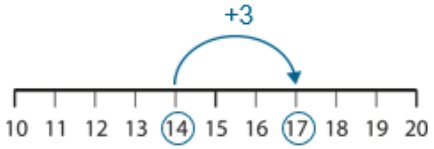
I know that 3 plus 6 is equal to 9.

So, 2 tens and 3 ones plus 6 ones is equal to 2 tens and 9 ones.

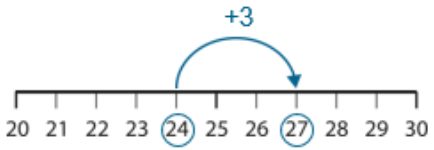
23 + 6 = 29.



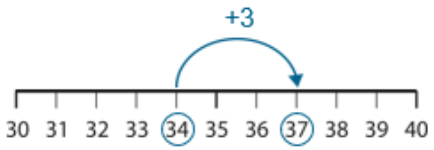
4 + 3 = 7



14 + 3 = 17



24 + 3 = 27



34 + 3 = 37

Generalise that adding/subtracting within 10 can be applied to adding a 2 digit number with a 1 digit number – not crossing the tens boundary.

I know that 4 plus 3 is equal to 7.

So, 1 ten and 4 ones plus 3 ones is equal to 1 tens and 7 ones.

14 + 3 = 17.

Addition and Subtraction

Year 2

Add and Subtract within 100 (2).

Vocabulary:

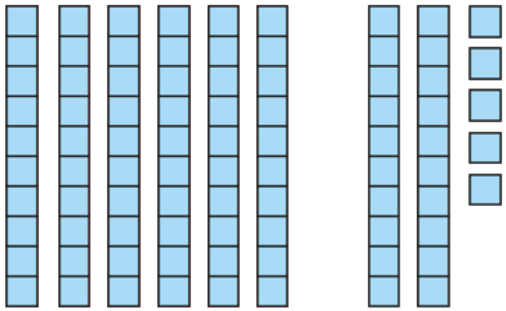
Part Whole Ones Tens Represents Compose Combine Partition Total Part-Part-Whole (Cherry) model Tens Frame Deines Plus + Minus - Equal to = Addition Subtraction Expression Equation Exchange Count on Count back Number line Tens Boundary

Addend + Addend = Sum

Minuend – Subtrahend = Difference

6 + 2 = 8

60 + 25 = ?



Use known facts within 10 to add/subtract multiples of 10 to a 2 digit number.

I know that 6 plus 2 is equal to 8.

So, 6 tens plus 2 tens is equal to 8 tens. Then add the additional 5 ones.

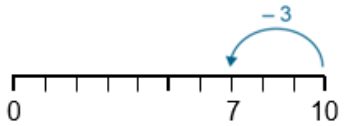
60 + 25 = 85.

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

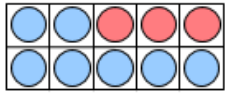
I know that 10 minus 3 is equal to 7.

So, 3 tens minus 3 ones is equal to 2 tens and 7 ones.

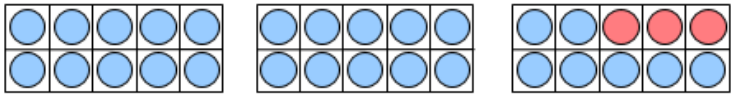
30 - 3 = 27.



10 – 3



30 – 3



Addition and Subtraction

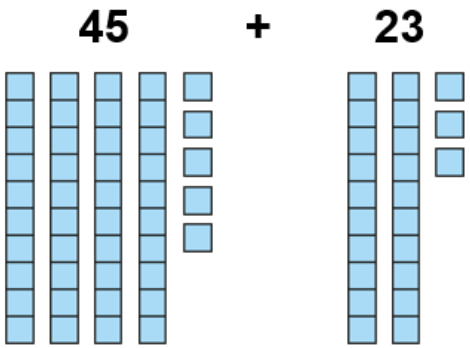
Year 2

Add and Subtract within 100 (3).

Vocabulary:

Part Whole Ones Tens Represents Compose Combine Partition Total
Part-Part-Whole (Cherry) model Tens Frame Deines Plus + Minus - Equal to =
Addition Subtraction Expression Equation Exchange Count on Count back
Number line Tens Boundary

Addend + Addend = Sum Minuend – Subtrahend = Difference

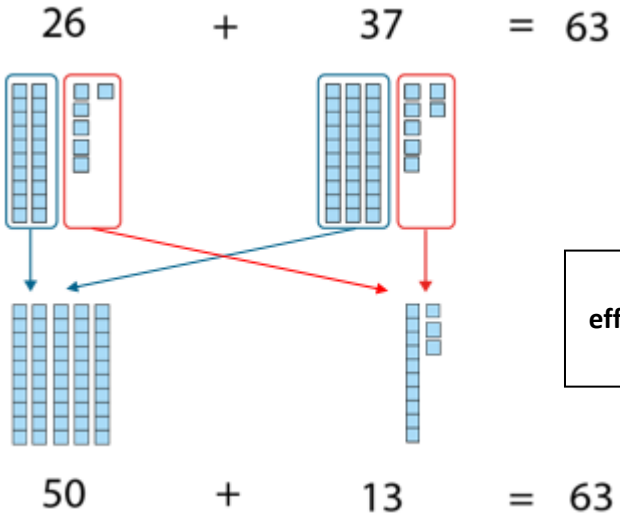


40 + 20 = 60

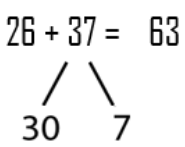
5 + 3 = 8

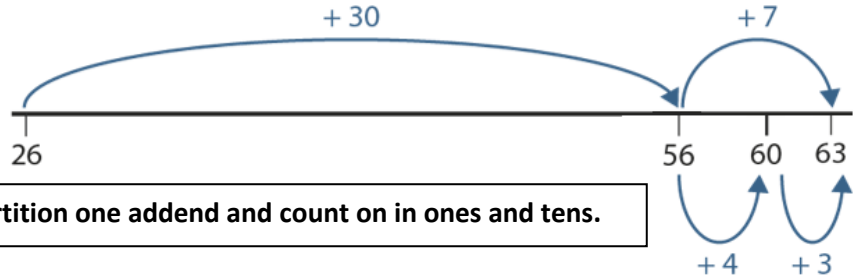
60 + 8 = 68

Partition both addends to add efficiently without crossing the tens boundary.

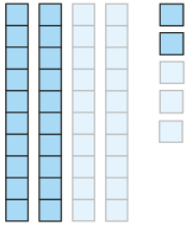


Partition both addends to add efficiently when the ones require an exchange.

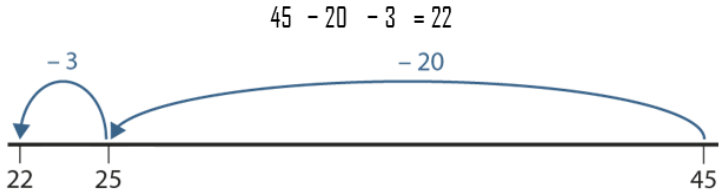


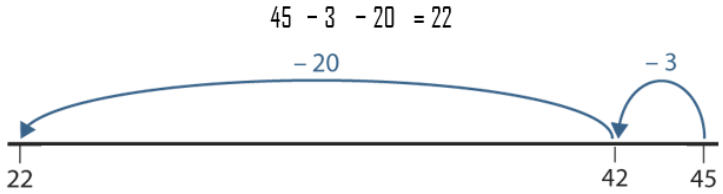


Partition one addend and count on in ones and tens.

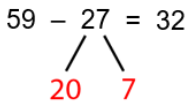


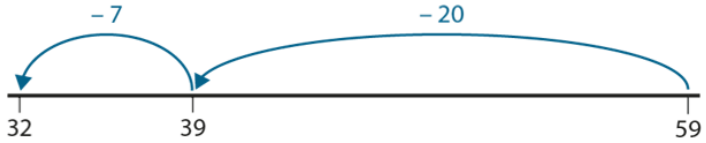
45 – 23 = 22





Subtract from any two-digit number by subtracting tens then ones without crossing a tens boundary.





Subtract from any two-digit number by portioning the subtrahend into tens and ones and counting back.

Addition and Subtraction

Year 3

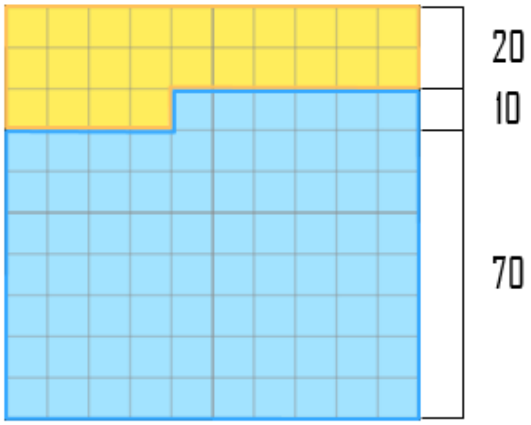
Calculate complements to 100.

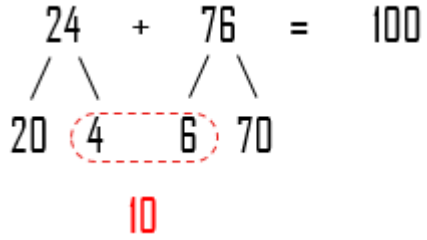
Vocabulary:

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

Addend + Addend = Sum

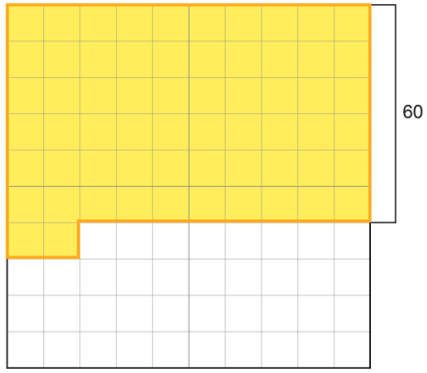
24 + 76 = 100





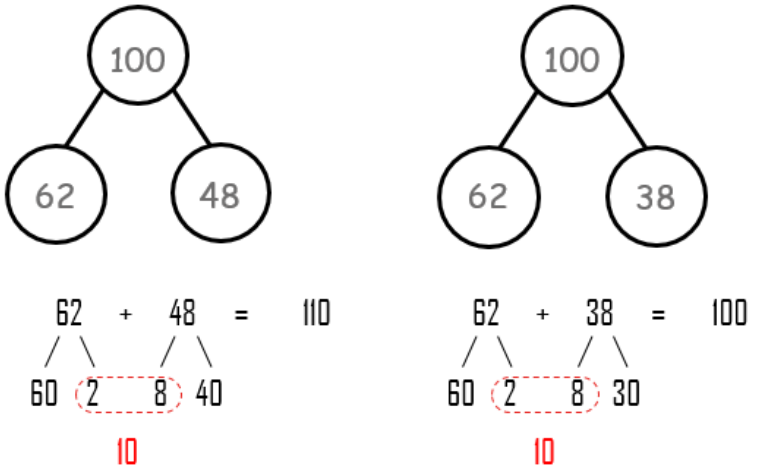
Use knowledge of subtracting from 10 to subtract a single-digit number from a multiple of 10.

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.



Compare equations which do and do not sum to 100.

Addition and Subtraction

Year 3

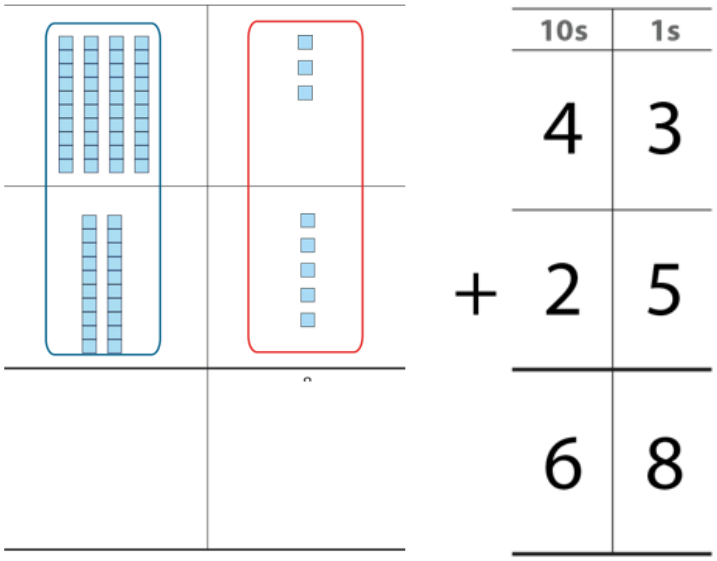
Columnar Addition and Subtraction

Vocabulary:

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

Addend + Addend = Sum

Minuend – Subtrahend = Difference



	10s	1s
	4	3
+	2	5
	6	8

Use deines 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.

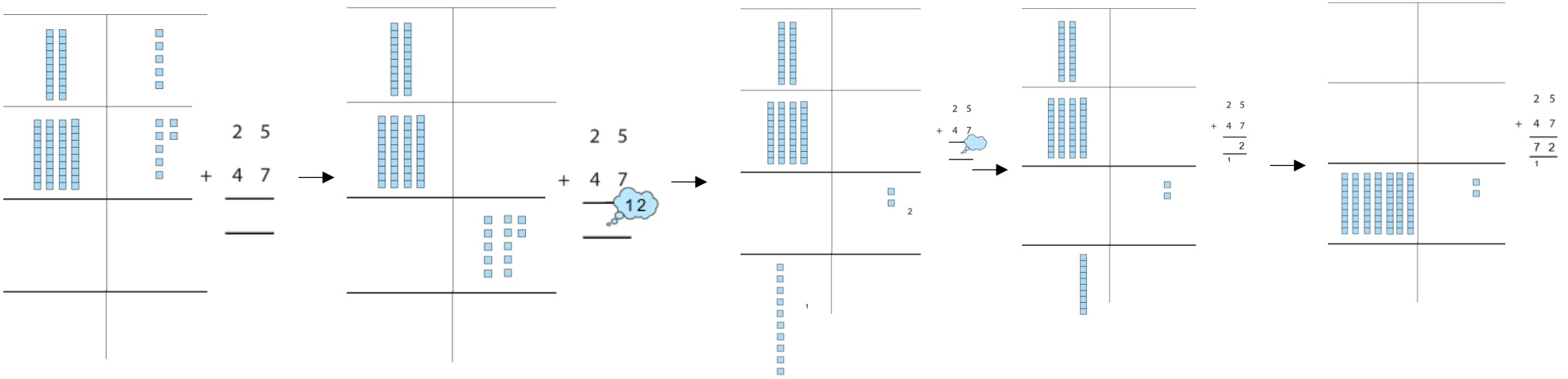
We add the tens. 4 tens plus 2 tens is equal to 6 tens.

Use deines 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 Deines Plus + Minus - Equal to = Addition Subtraction Equation Expression Regroup Algorithm

Addend + Addend = Sum

Minuend – Subtrahend = Difference

475 + 25

237 + 156

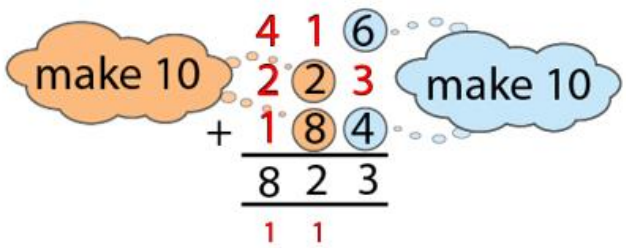
349 + 84

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

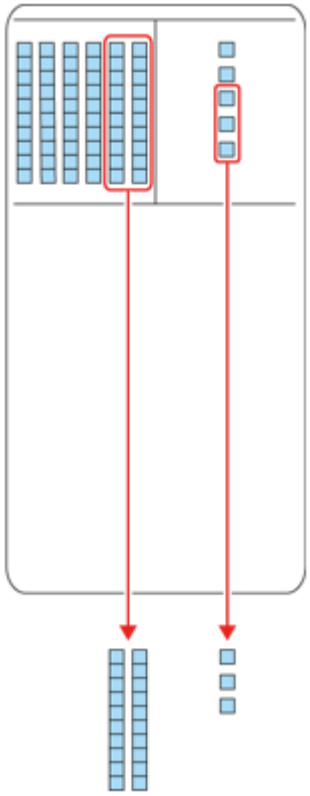
Columnar Addition and Subtraction

Vocabulary:

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

Addend + Addend = Sum

Minuend – Subtrahend = Difference

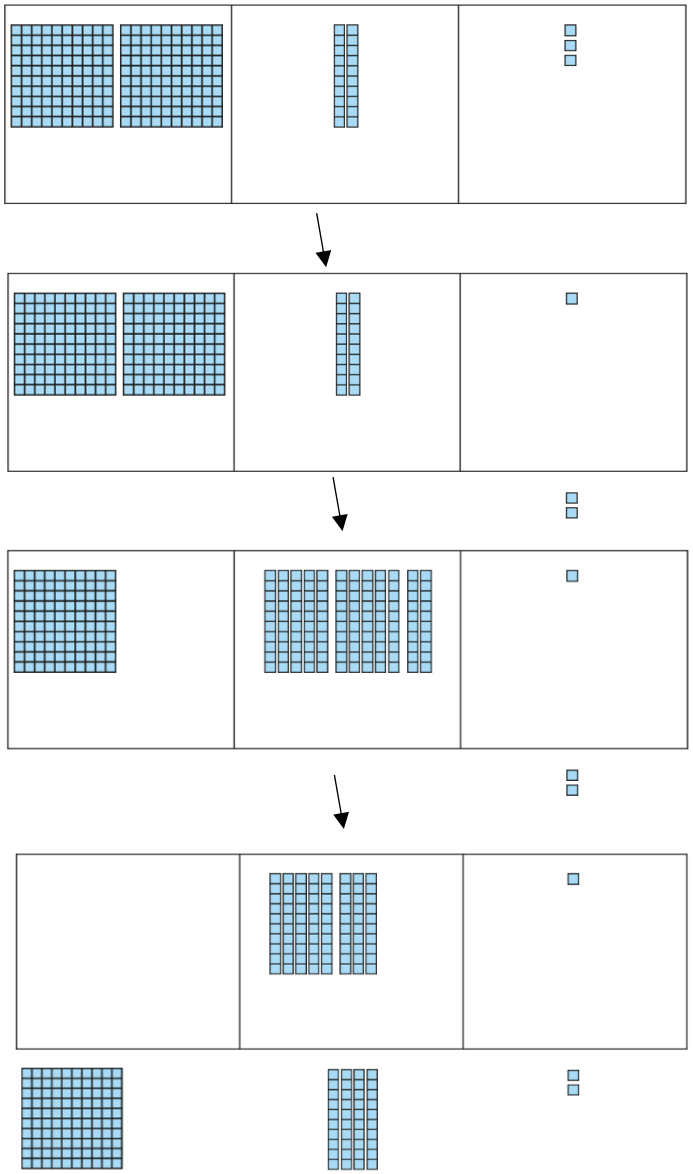


	10s	1s
	6	5
–	2	3
	4	2

Use deines 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.



	~~2~~ 1	12	3
–	1	4	2
	0	8	1

475 – 358 170 – 140

349 – 101 201 – 198

Use column subtraction	Use mental strategies

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

Addition and Subtraction

Year 3

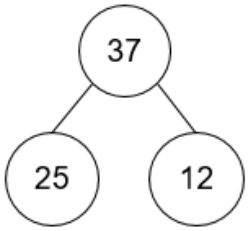
Manipulate the Additive Relationship

Vocabulary:

Represents Compose Combine Total Deines 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

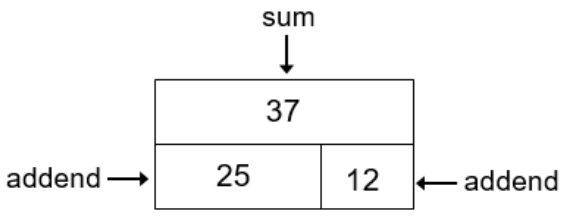
25 = 37 – 12

12 = 37 – 25

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

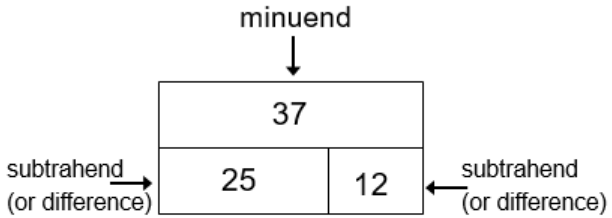
Addend + addend = sum

Minuend – subtrahend = difference



25 + 12 = 37

12 + 25 = 37



37 – 25 = 12

37 – 12 = 25

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.

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.

Addition and Subtraction

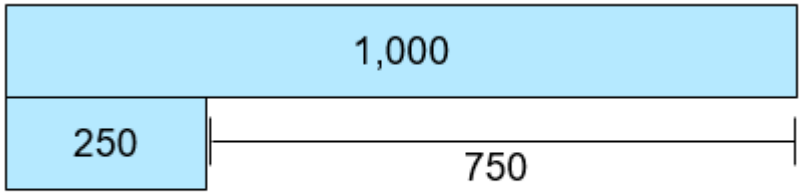
Year 6

Quantify additive and multiplicative relationships

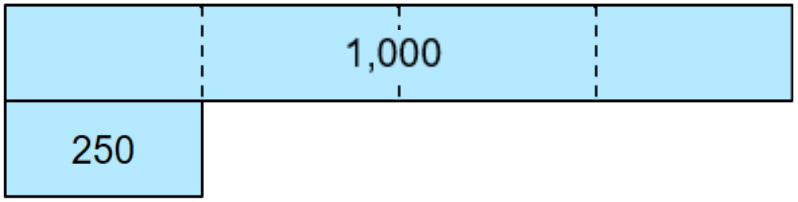
Vocabulary:

Additive Multiplicative Relationship Represents Compose Combine Total More than Less than Plus + Minus - Equal to = Addition Subtraction Divide ÷ Multiply x One-_____ of Equation Expression Bar Model Whole Part Difference Multiplier Unknown Sequence

Addend + Addend = Sum

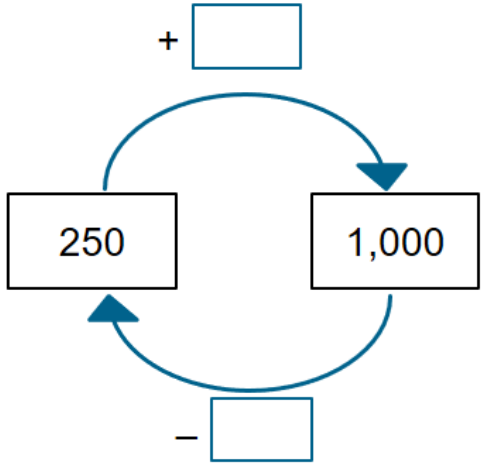


250 + 750 = 1,000 1,000 – 750 = 250



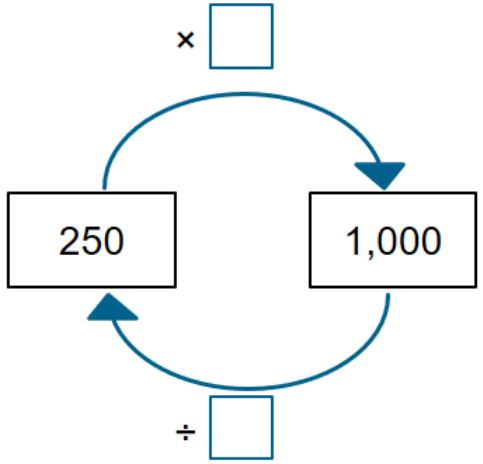
250 x 4 = 1,000 1000 ÷ 4 = 250

The relationship between two numbers can be expressed both additively and multiplicatively.



1000 is ___ more than 250.

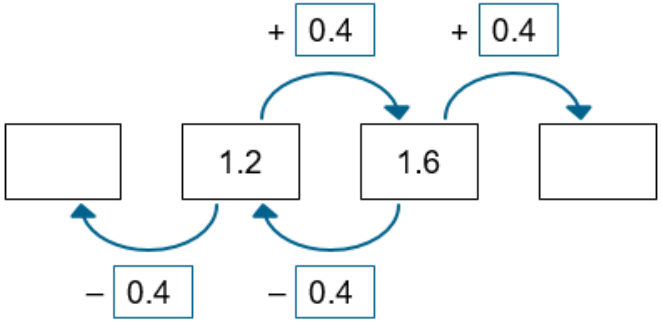
250 is _____ less than 1000.



1000 is ___ times the size of 250.

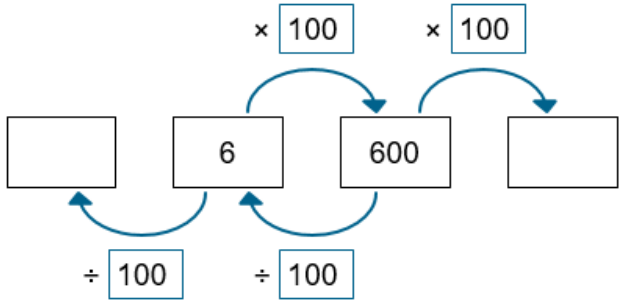
250 is one-_____ of 1000.

To find one-quarter of a number, we divide by 4.



Finding the difference can help calculate the unknown terms in a sequence.

Finding the known multiplier can help calculate the unknown terms in a sequence.



Addition and Subtraction

Year 6

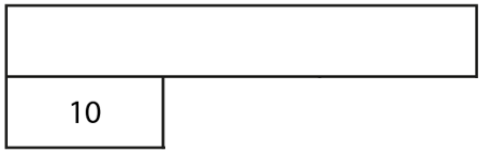
Quantify additive and multiplicative relationships

Vocabulary:

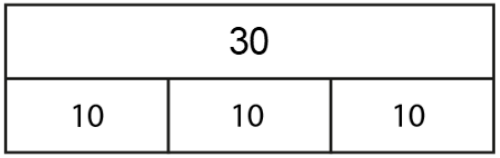
Additive Multiplicative Relationship Represents Compose Combine Total More than Less than Plus + Minus - Equal to = Addition Subtraction Divide ÷ Multiply x One-_____ of Equation Expression Bar Model Whole Part Difference Multiplier Unknown Sequence

Addend + Addend = Sum

$\frac{1}{3}$ of ?= 10



$\frac{1}{3}$ of ?= 10



$\frac{1}{3}$ of 30 = 10

Calculate the unknown whole by recognising how many parts the whole has been divided into.

Addition and Subtraction

Year 6

Derive Related Calculations

Vocabulary:

Additive Multiplicative Relationship Represents Equation Unknown Re-arrange Inverse Place Value Properties Commutative Associative Distributive Compensation

Addend + Addend = Sum Factor x Factor = Product (Multiplicand x Multiplier = Product)

Minuend – Subtrahend = Difference Dividend ÷ Divisor = Quotient

$252 = 3 \times 84$	$252 = 3 \times 84$	$252 = 3 \times 84$
$2{,}520 = 30 \times \square$	$\square = 3 \times 85$	$252 = 3 \times 60 + 3 \times \square$

$625 - 148 = 477$	$625 - 148 = 477$	$625 - 148 = 477$
$6{,}250 - 1{,}480 = \square$	$625 - 70 - \square = 477$	$625 - 248 = \square$

$14.8 + 7.6 = 22.4$	$14.8 + 7.6 = 22.4$	$14.8 + 7.6 = 22.4$
$1{,}480 + \square = 2{,}240$	$\square - 7.6 = 14.8$	$12.8 + \square = 22.4$

$4{,}800 \div 25 = 192$	$4{,}800 \div 25 = 192$	$4{,}800 \div 25 = 192$
$25 \times 192 = \square$	$4{,}800 \div 250 = \square$	$4{,}800 \div 5 \div 5 = \square$

Manipulate an equation to solve another. Pupils could:

- **rearrange the terms;**
- **rewrite using inverse operations;**
- **apply place value;**
- **use the properties of division that correspond to the commutative, associative or distributive property of multiplication;**
- **use the compensation property.**

Additive examples

Multiplicative examples

Addition and Subtraction

Year 6

Solve Problems involving Ratio Relationship

Vocabulary:

Additive Multiplicative Relationship Represents Equation Unknown Scale-factor Ratio Ratio Table ___ times the size one-___ the size of Vertical Horizontal

Factor x Factor = Product (Multiplicand x Multiplier = Product)

Dividend ÷ Divisor = Quotient

$1 \times 5 = 5$

$5 \div 5 = 1$

$5 \times \frac{1}{5} = 1$

$3 \times 5 = 15$

$15 \div 5 = 3$

$15 \times \frac{1}{5} = 3$

Ratio table to compare sets of information.

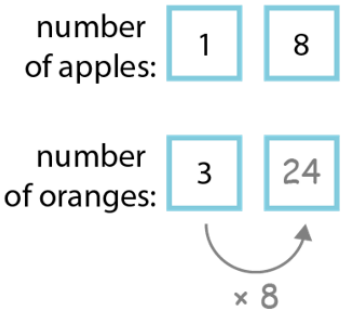
For every ___, there are ___.

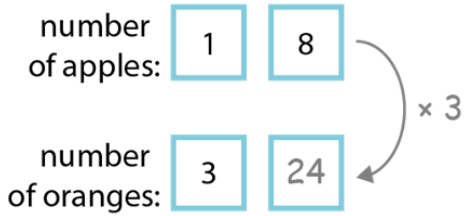
For every 1 litre of petrol, you can drive 7 miles.

For every 7 miles you will drive, you need 1 litre of petrol.

Extend sequences using knowledge of patterns based on ratio table.

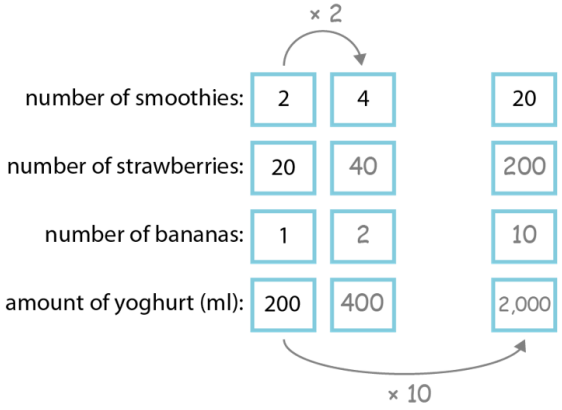
Litres of petrol	1	2	3	4	5	6	7	8	9	10
Miles driven	7	14	21	28	35	42	49	56	63	70





Explore vertical and horizontal relationship between numbers.

For every ___, there are ___.

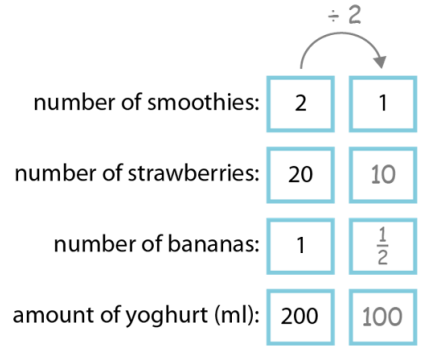


Identify the scale-factor in order to find unknown values.

___ is ___ times the size of ___.

Therefore I must multiply/divide by ___.

___ is one-__ the size of ___.



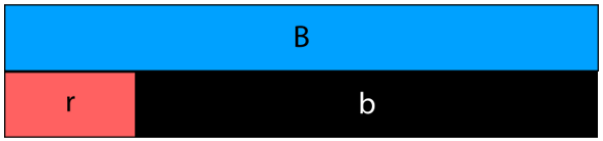
Addition and Subtraction

Year 6

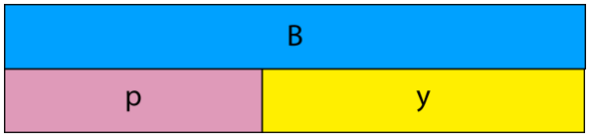
Solve Problems with Two Unknowns

Vocabulary:

Additive Multiplicative Relationship Represents Equation Two Unknowns Scale-factor Ratio ___ times the size one-___ the size of Total Bar Model Structure



$$B = r + b$$



$$B = p + y$$

Use Cuisenaire to find 2 bars of total length that are equal to another.

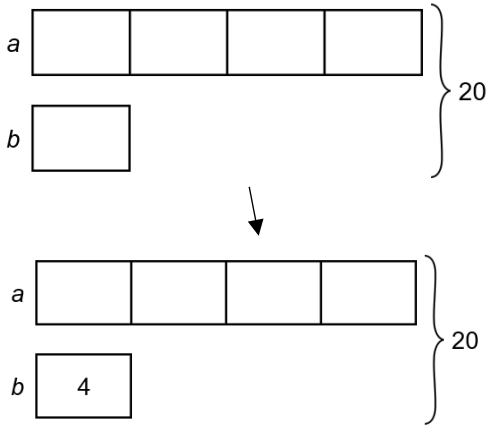
There is more than one solution to the problem.

There can be infinite solutions to a problem.

$$5 \times \square = 10 \times \square$$

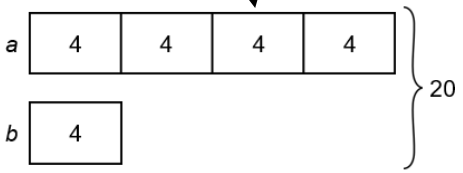
Solve multiplicative problems with two unknowns when the total is known.

v



one part = 20 ÷ 5 = 4

$b = 4$



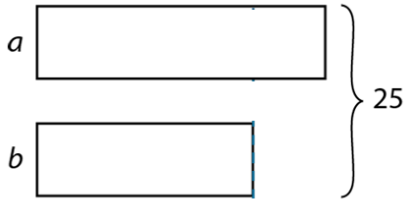
one part = 20 ÷ 5 = 4

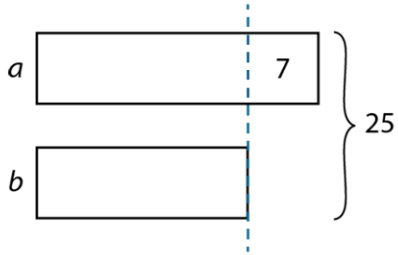
$b = 4$

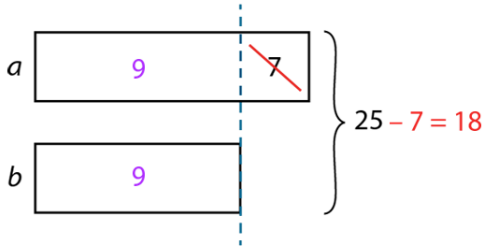
$a = 4 \times 4 = 16$

The two numbers are 16 and 4.

Solve additive problems with two unknowns when the total is known.







$b = 18 \div 2 = 9$

$a = 9 + 7 = 16$

The two numbers are 9 and 16.

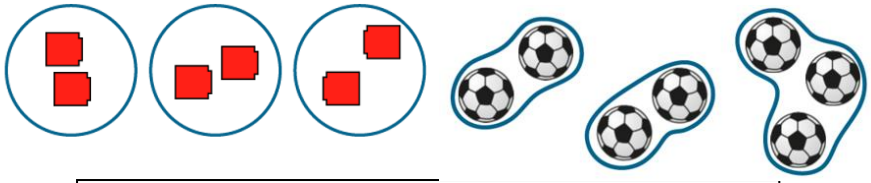
Multiplication and Division

Year 2

Multiplication as Repeated Addition

Vocabulary:

Group Equal Unequal Repeated Addition Multiplication Expression Equation Part Altogether Represents Amount Size



Understand the difference between equal and unequal groups.

The ___ have been grouped.

We can represent equal groups as repeated addition.

There are 3 groups of 5.

5 + 5 + 5

3 × 5

5 + 5 + 5 = 3 × 5

We can represent repeated addition using a multiplication expression.

The 3 represents the number of groups.

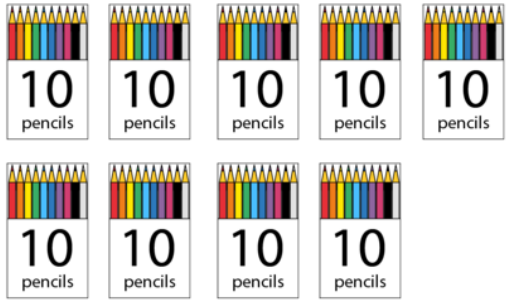
The 5 represents the number of eggs in each group.

15 represents the total number of eggs.

The ___ represents the number of groups.

The __ represents the number of ___ in each group.

___ represents the total number of ___.



9 × 10

We can skip count in multiples of __ to work out the total amount.

10, 20, 30, 40 … there are 90 pencils altogether.

7 × 2

Notice how the representations allow the children to see each of the numbers (i.e. 10 pencils and 9 packets).

Multiplication and Division

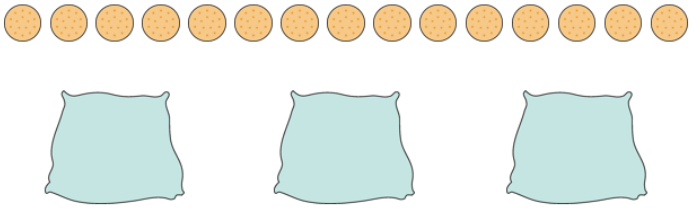
Year 2

Grouping problems: missing factors and division

Vocabulary:

Multiplication Division Factor 'divided by' Represents Skip Counting

Multiplication facts Groups Amount Size



$3 \times 5 = 15$

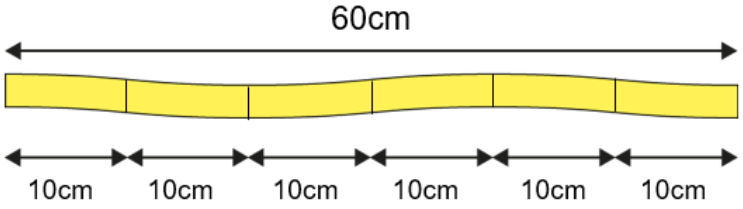
$15 \div 5 = 3$

We can solve division problems by finding missing factors.

The 15 represents the number of biscuits.

The 5 represents the number of biscuits in each bag (group).

The 3 represents the number of bag (groups).



$6 \times 10 = 60$

$60 \div 10 = 6$

The 60cm represents the length of the ribbon.

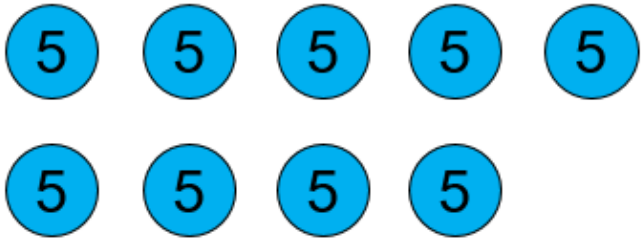
The 10 represents the size of each piece.

The 6 represents the number of pieces we can make.

We can use ÷ to mean 'divided by'

We can use our knowledge of times tables to help solve division problems.

$45 \div 5 = 9$



Multiplication and Division

Year 3

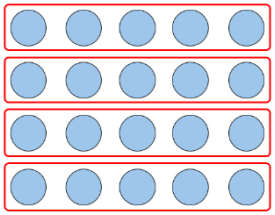
Multiplication and Division Structures

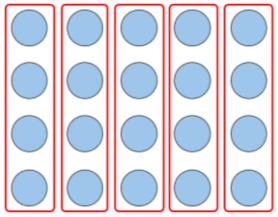
Vocabulary:

Multiplication Division Commutative Grouping (Quotitive) Sharing (Partitive)

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

30	÷	5	=	6
dividend	÷	divisor	=	quotient



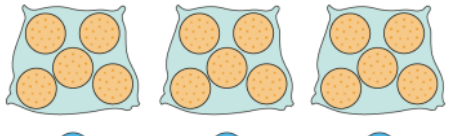


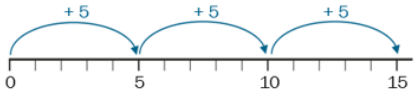
Identify that multiplication is commutative.

4 x 5 = 5 x 4

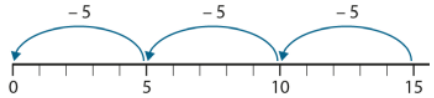
Factor times factor is equal to product.

The order of the factors does not affect the product.





Making groups of



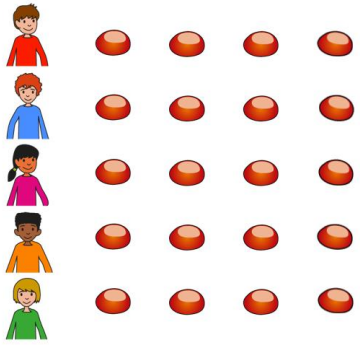
Removing groups of

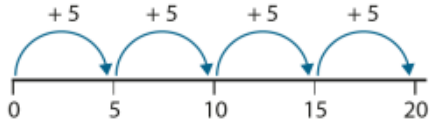
Division equations can be used to represent 'grouping' problems.

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

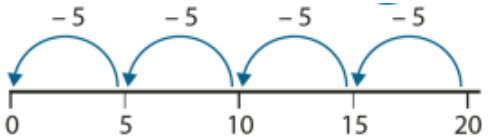
(Quotitive division)

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



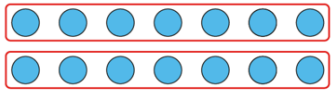
Giving a share

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

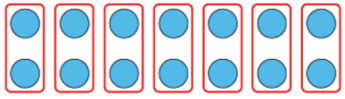


14 ÷ 2 = 7

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

Multiplication and Division

Year 4

Multiplying and Dividing by 10 and 100

Vocabulary:

Multiply Divide Unitise Ten/Hundred times Bigger Smaller One-tenth the size One-hundredth the size Gattegno chart Factor Product Multiple Groups of Inverse

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

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

Develop language in order to multiply and divide by 10 or 100.

80 is ten times bigger than 8.
8 is ten times smaller than 80.
80 is ten times the size of 8
8 is one-tenth the size of 80.

800 is one hundred times bigger than 8.
8 is one hundred times smaller than 800.
800 is on hundred times the size of 8
8 is one-hundredth the size of 80.

8 x 1 = 8
8 x 1 ten – 8 tens
8 x 1 hundred = 8 hundreds

Generalisations

All multiples of 10 have a ones digit of zero.

All multiples of 100 have both a tens and ones digit of zero.

To find the inverse of ___times as many, you divide by ____.

If one factor if made ___ times bigger/smaller then the product will be ten times bigger/smaller

8 made ___ times the size is ___.

ten times the size
x10

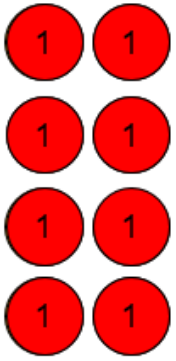
1,000s	100s	10s	1s
			8
		8	0

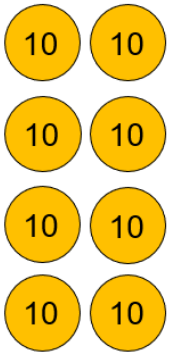
÷10
one-tenth of the size

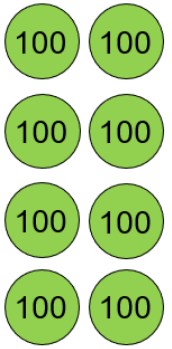
one hundred times the size
x100

1,000s	100s	10s	1s
			8
	8	0	0

÷100
one-hundredth of the size







8 × 1 = 8 **8 × 10 = 80** **8 × 100 = 800**

8 groups of ___ is ___.

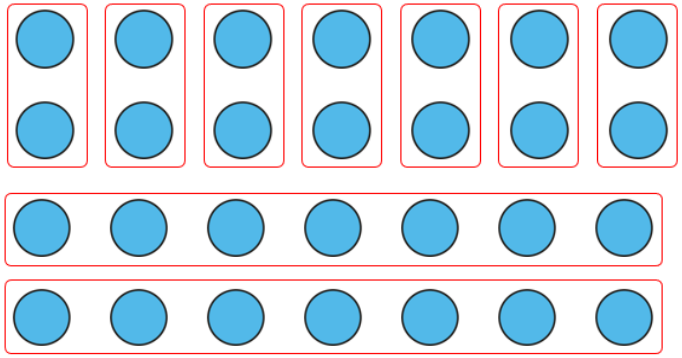
Multiplication and Division

Year 4

Manipulating the Multiplicative Relationship

Vocabulary:

Multiply Divide Commutative Groups of Times Equal to Factors
Product Quotient Dividend Divisor Represents Array



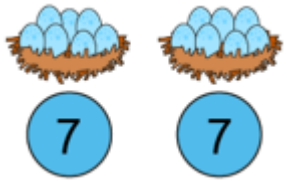
$2 \times 7 = 7 \times 2$

Understand that multiplication is commutative and the factors can be

2 groups of 7 is equal to 14.

2, 7 times is equal to 14.

2 groups of 7 is equal to 7, two times.



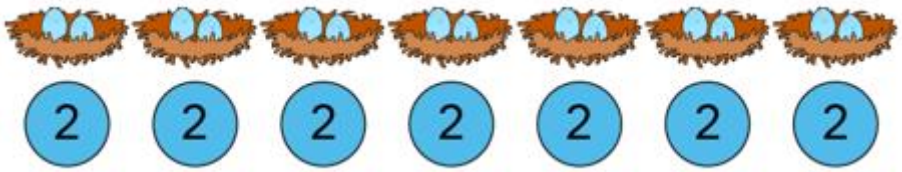
$2 \times 7 = 14$

$7 \times 2 = 14$

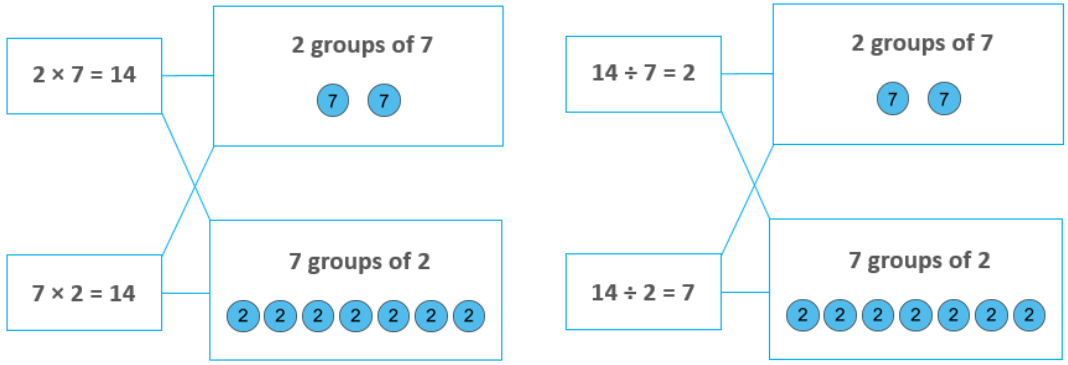
The 2 represents ___.

The 7 represents ___.

The 14 represents ___.



Match equations to representations and contexts.



Multiplication and Division

Year 4

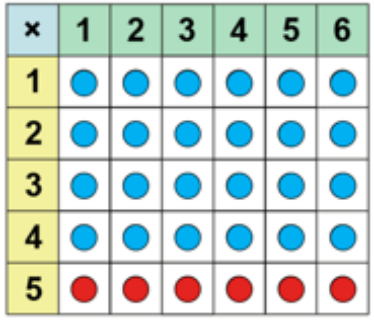
The Distributive Property of Multiplication

Vocabulary:

Multiplication Distributive Law Adjacent Multiples Factors Partitioning
Equations Expressions Arrays Part-whole model Difference

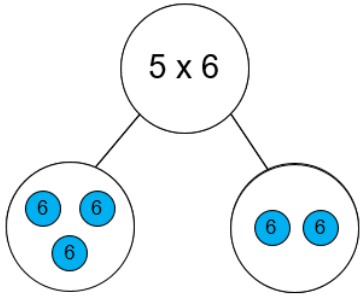
0 × 6 = 0	6 × 0 = 0
1 × 6 = 6 (+ 6)	6 × 1 = 6 (+ 6)
2 × 6 = 12 (+ 6)	6 × 2 = 12 (+ 6)
3 × 6 = 18 (+ 6)	6 × 3 = 18 (+ 6)
4 × 6 = 24 (+ 6)	6 × 4 = 24 (+ 6)
5 × 6 = 30 (+ 6)	6 × 5 = 30 (+ 6)
6 × 6 = 36	6 × 6 = 36
7 × 6 = 42	6 × 7 = 42
8 × 6 = 48	6 × 8 = 48
9 × 6 = 54	6 × 9 = 54
10 × 6 = 60	6 × 10 = 60
11 × 6 = 66	6 × 11 = 66
12 × 6 = 72	6 × 12 = 72

Adjacent multiples of ___ have a difference of ___.



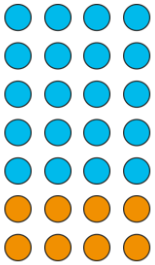
4 × 6 + 6

Five sixes is one more six than four sixes.



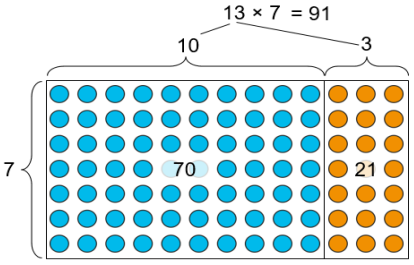
3 x 6 + 2 x 6 = 5 x 6

5 is equal to 3 plus 2, so 5 sixes is equal to 3 sixes plus 2 sixes.

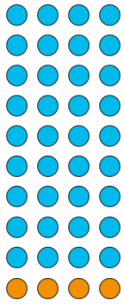


7 = 5 + 2
7 × **4** = 5 × **4** + 2 × **4**
= 20 + 8
= 28

We can partition one of the factors to make calculations easier.

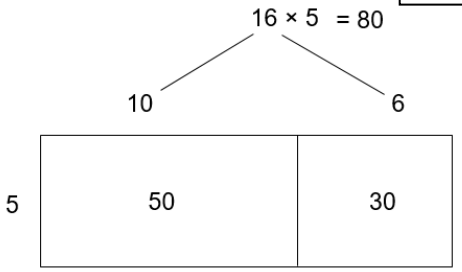


13 × 7 = 10 × 7 + 3 × 7
= 70 + 21
= 91

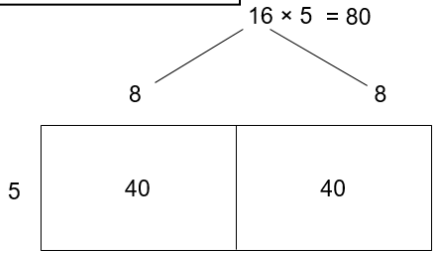


9 = 10 − 1
9 × 4 = **10** × 4 − **1** × 4
= 40 − 4
= 36

We can partition the factors in different ways to make calculations easier.



16 × 5 = 10 × 5 + 6 × 5
= 50 + 30
= 80



16 × 5 = 8 × 5 + 8 × 5
= 40 + 40
= 80

Multiplication and Division

Year 5

Multiplying and Dividing by 10 and 100 (1)

Vocabulary:

Multiply Divide Unitise Ten/Hundred times Bigger Smaller One-tenth the size One-hundredth the size Gattegno chart Factor Product Multiple Groups of Inverse Ones Tens Hundreds Tenths Hundredths

8 ÷ 10 =

0.8 ÷ 10 =

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
0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09

÷ 10
÷ 10
one-tenth the size

0.08 x 10 =

0.8 x 10 =

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
0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09

× 10
× 10
ten times the size

We can multiply and divide a number by 10.

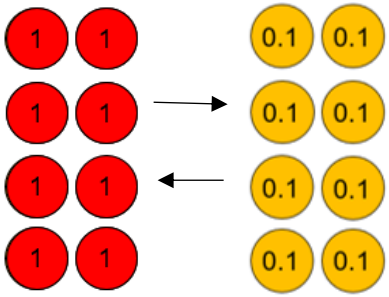
8, made one-tenth the size is 0.8.

8 divided by 10 is 0.8.

First we had 8 ones, now we have 8 tenths.

8 ÷ 10 = 0.8

one-tenth of the size



0.8 x 10 = 8

ten times the size

We can multiply and divide a number by 100. Multiplying by 100 is the same as multiplying/dividing by 10 twice.

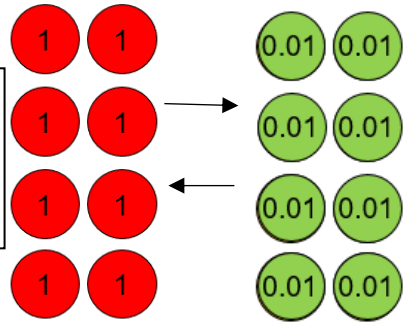
8, made 100 times smaller is 0.08.

8 divided by 100 is 0.08.

First we had 8 ones, now we have 8 hundredths

8 ÷ 100 = 0.08

one-hundredth of the size



0.08 x 100 = 8

one hundred times the size

Multiplication and Division

Year 5

Multiplying and Dividing by 10 and 100 (2)

Vocabulary:

Multiply Divide Unitise Ten/Hundred times Bigger Smaller One-tenth the size One-hundredth the size Gattegno chart Factor Product Multiple Groups of Inverse Ones Tens Hundreds Tenths Hundredths

3.6 × 10 = 36

36 ÷ 10 = 3.6

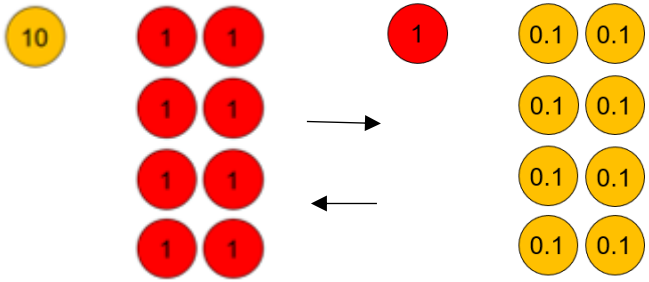
1,000	2,000	3,000	4,000	5,000	6,000	7,000	8,000	9,000
100	200	300	400	500	600	700	800	900
10	20	30	40	50	60	70	80	90
1	2	3	4	5	6	7	8	9
0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09

18 ÷ 10 = 1.8

one-tenth of the size

1.8 is one-tenth the size of 18

18 divided by 10 is 1.8.



1.8 × 10 = 18

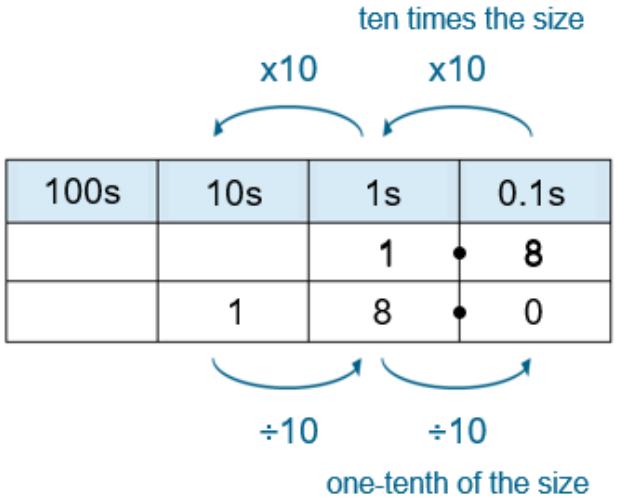
ten times the size

__ divided by 10/100 is equal to__.

__ is one-tenth/hundredth the size of __.

__ multiplied by 10/100 is equal to__.

__ is 10/100 times the size of __.



We can multiply and divide numbers with digits greater than 0 by 10 or 100.

Generalisation

To multiply by 10, move each digit one place to the left.

To multiply by 100, move each digit two places to the left.

To divide by 10, move each digit one place to the right.

Multiplication and Division

Year 5

Multiplying and Dividing by 10 and 100 (3).

Vocabulary:

Multiply Divide Unitise Ten/Hundred times Bigger Smaller One-tenth the size One-hundredth the size Gattegno chart Factor Product Multiple Groups of Inverse Ones Tens Hundreds Tenths Hundredths

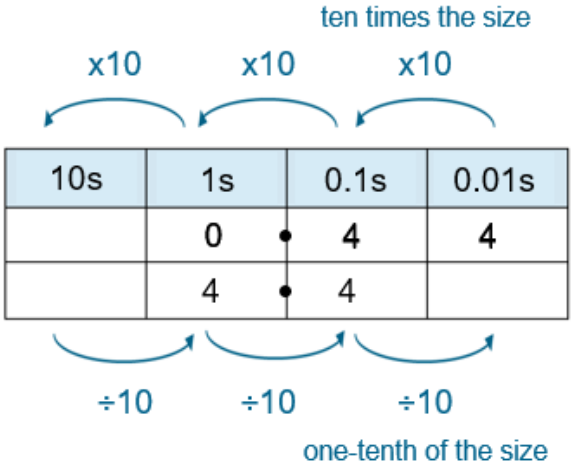
0.27 × 10 = 2.7

2.7 ÷ 10 = 0.27

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
0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09

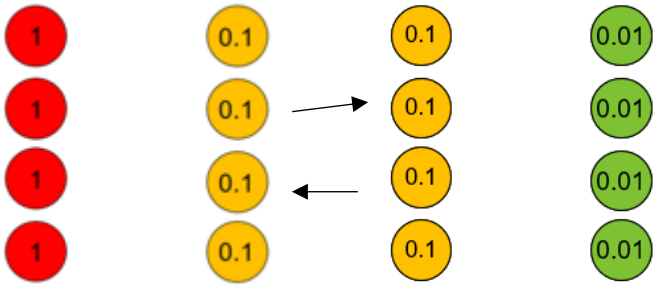
0.27 is one-tenth the size of 2.7

2.7 divided by 10 is 0.27.



4.4 ÷ 10 = 0.44

one-tenth of the size



0.44 × 10 = 4.4

ten times the size

__ divided by 10/100 is equal to__.

__ is one-tenth/hundredth the size of __.

__ multiplied by 10/100 is equal to__.

__ is 10/100 times the size of __.

We can multiply and divide numbers with digits greater than 0 by 10 or 100.

Generalisation

To multiply by 10, move each digit one place to the left.

To multiply by 100, move each digit two places to the left.

To divide by 10, move each digit one place to the right.

Multiplication and Division

Year 5

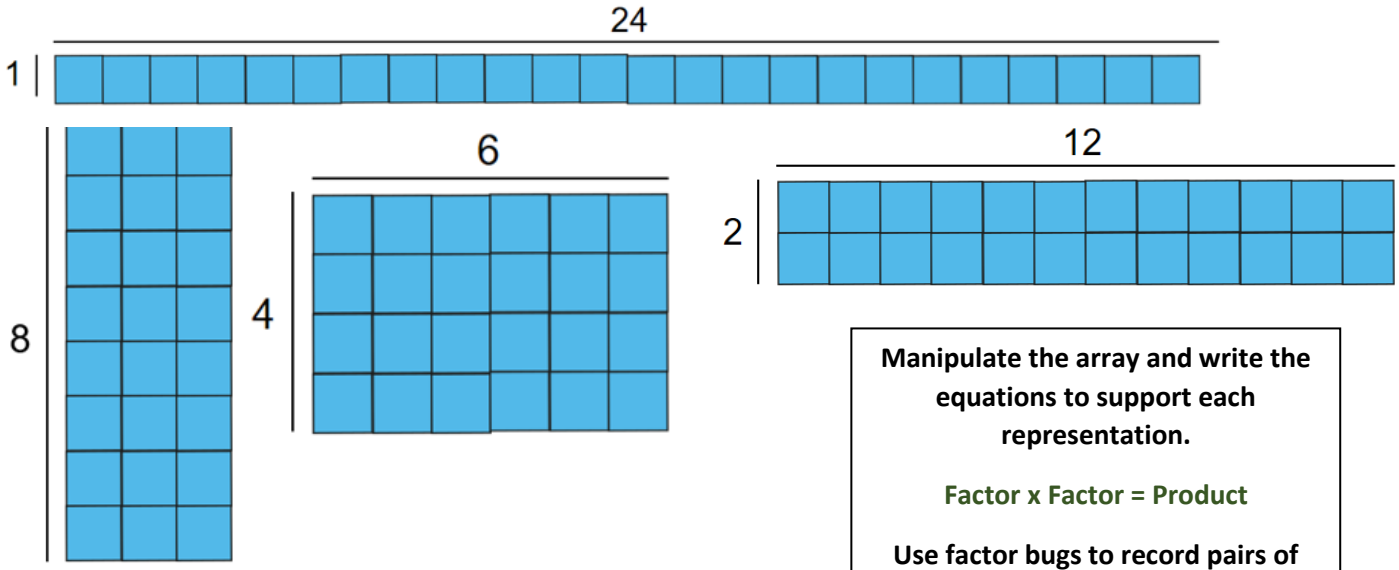
Find Factors and Multiples

Vocabulary:

Factor Multiple Composite Square Prime Common Factor Prime Factor

Factor Bug Array Positive Integer Working Systematically

Factor x Factor = Product Dividend ÷ Divisor = Quotient



8 x 3 = 24

4 x 6 = 24

2 x 12 = 24

1 x 24 = 24

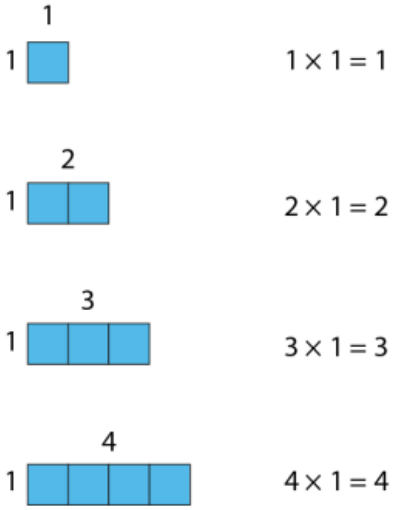
There are ___ tiles. There are ___ rows and ___ columns. So ___ and ___ are factors of ___.

Generalise: Numbers that have more than two factors are composite numbers.

Manipulate the array and write the equations to support each representation.

Factor x Factor = Product

Use factor bugs to record pairs of factors.



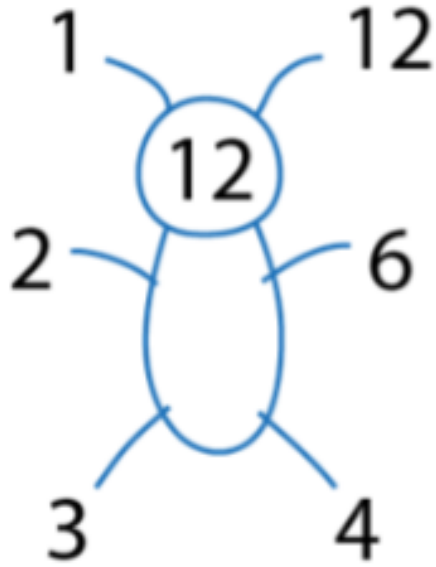
Generalise:

When one is a factor, the product is equal to the other factor.

All positive integers have a factor of 1.

Every positive integer is a factor of itself.

The smallest factor of a positive integer is always 1. The largest factor of a positive integer is always itself.



Multiplication and Division

Year 5

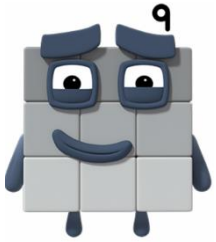
Find Factors and Multiples

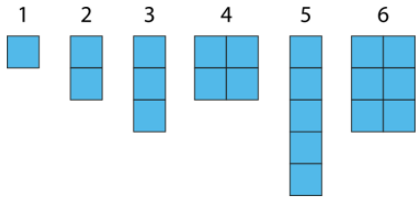
Vocabulary:

Factor Multiple Composite Square Prime Common Factor Prime Factor

Factor Bug Array Positive Integer Working Systematically

Factor x Factor = Product Dividend ÷ Divisor = Quotient





Extend this to square numbers, and prime numbers recognising the number of factors.

×	0	1	2	3	4	5	6	7	8	9	10	11	12
0	0	0	0	0	0	0	0	0	0	0	0	0	0
1	0	1	2	3	4	5	6	7	8	9	10	11	12
2	0	2	4	6	8	10	12	14	16	18	20	22	24
3	0	3	6	9	12	15	18	21	24	27	30	33	36
4	0	4	8	12	16	20	24	28	32	36	40	44	48
5	0	5	10	15	20	25	30	35	40	45	50	55	60
6	0	6	12	18	24	30	36	42	48	54	60	66	72
7	0	7	14	21	28	35	42	49	56	63	70	77	84
8	0	8	16	24	32	40	48	56	64	72	80	88	96
9	0	9	18	27	36	45	54	63	72	81	90	99	108
10	0	10	20	30	40	50	60	70	80	90	100	110	120
11	0	11	22	33	44	55	66	77	88	99	110	121	132
12	0	12	24	36	48	60	72	84	96	108	120	132	144

Make connections with factors and times tables. Make connections with factors of factors

___ is a factor of ___ because it is in the ___ times table.

Nine is a factor of all of these numbers.

Three is a factor of nine which means it is also a factor of all of these numbers.

Is 9 a factor of 54?

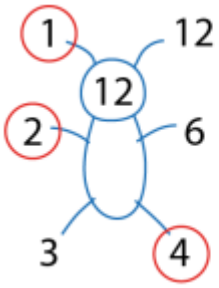
54 ÷ 9 = 6

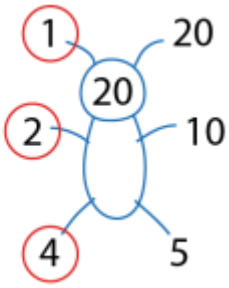
9 and 6 are factors of 54.

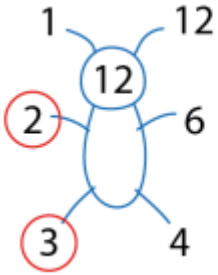
1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

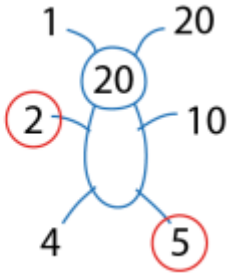
Use factor bugs to find

common factors and prime factors.









Multiplication and Division

Year 5

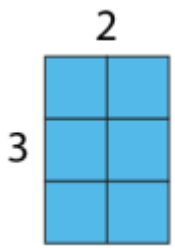
Find Factors and Multiples

Vocabulary:

Factor Multiple Composite Square Prime Common Factor Prime Factor

Factor Bug Array Positive Integer Working Systematically

Factor x Factor = Product Dividend ÷ Divisor = Quotient



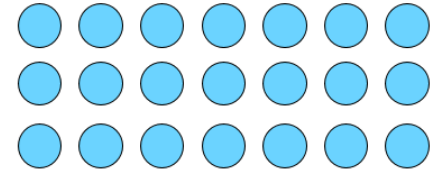
Introduce Multiples

___ is a factor of ___ because ___ x ____ = ____.

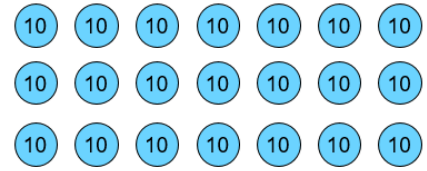
___ is a multiple of ___ because ___ x ___ = ____

___ is a factor of ___ because ___ ÷ ____ = ____.

___ is a multiple of ___ because ___ ÷ ___ = ____



7 × 3 = 21



7 × 30 = 210

70 × 3 = 210

10 x 21 = 210

Make statements about factors and multiples whilst increasing the amount of each counter in the array.

___ represents the number of counters in each row.

___ represents the total value of the counters in each column.

____ represents the total value of the counters.

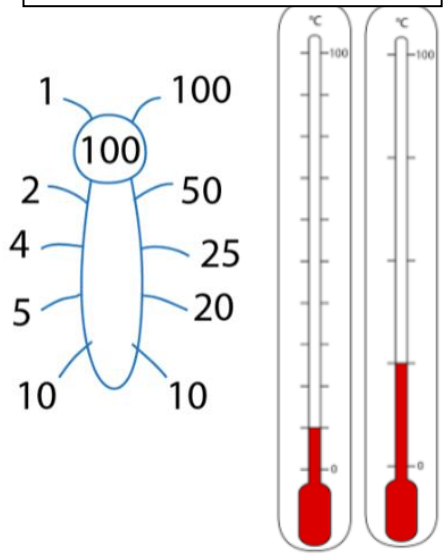
3, 7, 10, 21 and 70 are factors of 210.

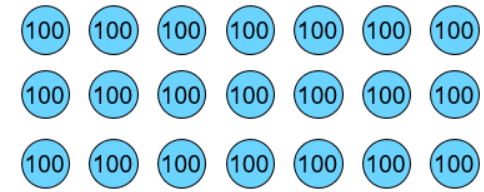
210 is a multiple of 3, 7, 10, 21 and 70.

Identify Common Multiples using a 100 square.

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

Factors of 100 can be applied to contexts





7 × 300 = 2,100

700 × 3 = 2,100

100 x 21 = 2,100

Multiplication and Division

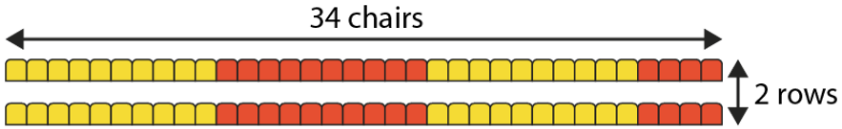
Year 5

Multiply using a Formal Written Method (1)

Vocabulary:

Ones Tens Hundreds Thousands Represents Partition Recombine Multiply Unitising Partial Product Aligned Calculation Expanded layout Compact layout Equation Regroup Algorithm

Factor x Factor = Product

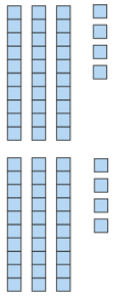


34 = 30 + 4

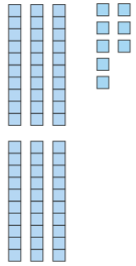
34 × 2 = 30 × 2 + 4 × 2

Use dienes to represent context as repeated addition and move to multiplication.

Move between representations of dienes and expanded written multiplication.

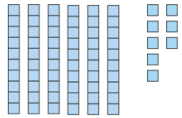


	10s	1s
	3	4
×		2



	10s	1s
	3	4
×		2
		8

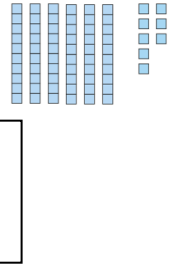
2 × 4 ones = 8 ones



	10s	1s
	3	4
×		2
		8
	6	0

2 × 4 ones = 8 ones

2 × 3 tens = 6 tens



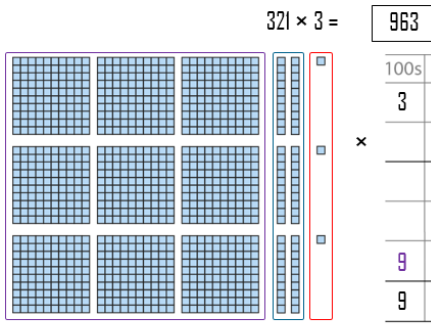
	10s	1s
	3	4
×		2
		8
	6	0
	6	8

2 × 4 ones = 8 ones

2 × 3 tens = 6 tens

Move between representations of expanded layout and compact layout.

	10s	1s
	3	4
×		2
	6	8



321 × 3 = 963

	100s	10s	1s
	3	2	1
×			3
			3
		6	0
	9	0	0
	9	6	3

3 × 1 ones = 3 ones

3 × 2 tens = 6 tens

3 × 3 hundreds = 9 hundreds

	3	2	1
×			3
	9	6	3

Represent 3 digit by 1 digit multiplication without exchanges using dienes, moving from expanded layout to compact layout.

Multiplication and Division

Year 5

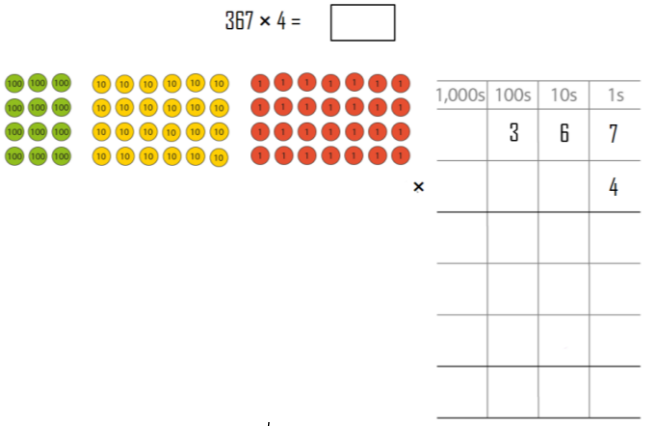
Multiply using a Formal Written Method (2)

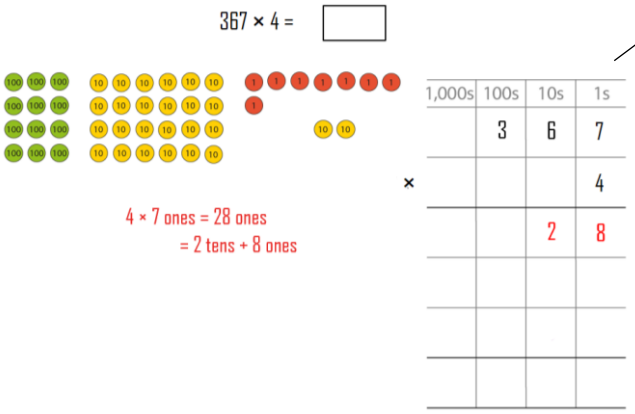
Vocabulary:

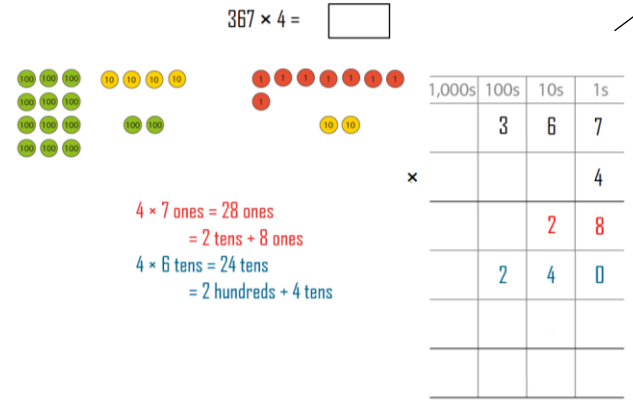
Ones Tens Hundreds Thousands Represents Partition Recombine Multiply Unitising Partial Product Aligned Calculation Expanded layout Compact layout Equation Regroup Algorithm

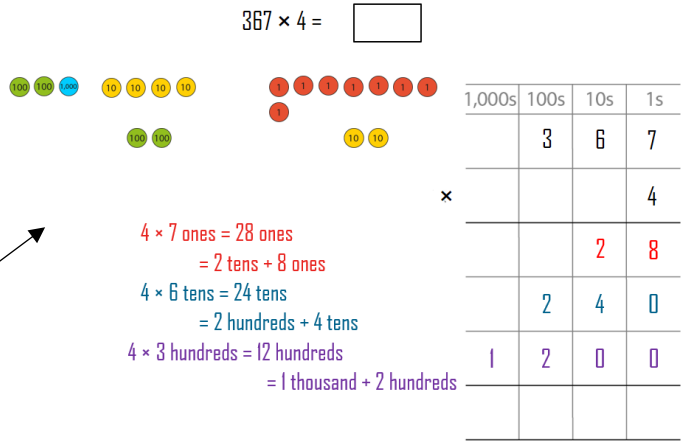
Factor x Factor = Product

Represent 3 digit by 1 digit multiplication with exchanges using place value counters, moving from expanded layout to compact layout.









Move from expanded layout to compact layout.

367 × 4 = 1,468

$$\begin{array}{r} 3\ 6\ 7 \\ \times\quad 4 \\ \hline 1\ 4\ 6\ 8 \\ \hline 2\ 2 \end{array}$$

If there are 10 or more ones, we must regroup ones into tens and ones.

If there are 10 or more tens, we must regroup into hundreds and tens.

If there are 10 or more hundreds, we must regroup into thousands and hundreds.

Multiplication and Division

Year 5

Divide using a Formal Written Method (1)

Vocabulary:

Partitive (sharing) Quotitive (grouping) Ones Tens Hundreds Thousands Represents Divide Unitising Dividend Divisor Quotient Partial Quotient Aligned Calculation Equation Exchange Algorithm 'Sharees' Divisible Remainder Short Division

84 ÷ 4 = 21	$4\overline{)84}$ → 21
dividend ÷ divisor = quotient	$\text{divisor}\overline{)\text{dividend}}$ → quotient

Use sticks to represent partitive (sharing) context where the dividend is divisible (to give a whole number). Skip count in multiples of the divisor.

84 sticks shared equally between 4 children. How many sticks each?

84 ÷ 4 = ☐

Step 1 – write the divisor and dividend:

10s 1s

$4\overline{)8\ \ 4}$

Step 2 – share the 10s:

10s 1s

$4\overline{)8\ \ 4}$ → 2

8 tens ÷ 4 = 2 tens

8 tens divided by 4 is equal to 2 tens.

Remove a group of 4 each time before sharing.

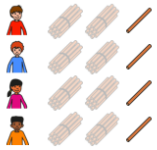
One four is one each. That's four.

Two fours is two each. That's eight.

Eight divided between 4 is equal to two each.

Each child gets two sticks.

Step 3 – share the 1s:



10s 1s

$4\overline{)8\ \ 4}$ → 2 1

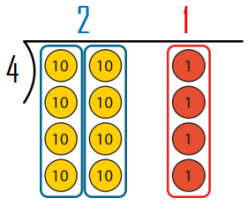
8 tens ÷ 4 = 2 tens

4 ones ÷ 4 = 1 one

Add the partial quotients to find the quotient.

2 tens + 1 one = 21

10s 1s



8 tens ÷ 4 = 2 tens

4 ones ÷ 4 = 1 one

Multiplication and Division

Year 5

Divide using a Formal Written Method (2)

Vocabulary:

Partitive (sharing) Quotitive (grouping) Ones Tens Hundreds Thousands Represents Divide Unitising Dividend Divisor Quotient Partial Quotient Aligned Calculation Equation Exchange Algorithm 'Sharees' Divisible Remainder Short Division

84	÷	4	=	21
dividend	÷	divisor	=	quotient

$$4\overline{)\,8\;4}^{\,2\;1} \qquad \text{divisor}\overline{)\text{dividend}}^{\text{quotient}}$$

72 sticks shared equally between 3 children. How many sticks each?

72 ÷ 3 = ☐

Step 1 – write the divisor and the dividend:

$$3\overline{)\,7\;\;{}^{1}2}$$

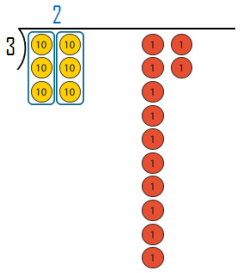
Step 2 – share the 10s:

$$3\overline{)\,7\;\;2}^{\,2}$$

7 tens ÷ 3 = 2 tens r 1 ten

Step 3 – exchange:

$$3\overline{)\,7\;\;{}^{1}2}^{\,2}$$

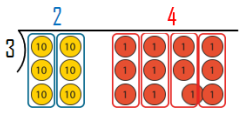


7 tens ÷ 3 = 2 tens r 1 ten

72 ÷ 3 = 24

Step 4 – share the 1s:

$$3\overline{)\,7\;\;{}^{1}2}^{\,2\;4}$$



7 tens ÷ 3 = 2 tens r 1 ten

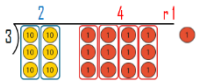
12 ones ÷ 3 = 4 ones

Use sticks and place value counters to represent partitive (sharing) context where the dividend is divisible (to give a whole number) though requires an exchange from the tens. Skip count in multiples of the divisor.

If dividing the tens gives a remainder of one or more ten, we must exchange the remaining tens for ones.

73 ÷ 3 = 24 r 1

$$3\overline{)\,7\;\;{}^{1}3}^{\,2\;4\text{r}1}$$



7 tens ÷ 3 = 2 tens r 1 ten

13 ones ÷ 3 = 4 ones r 1 one

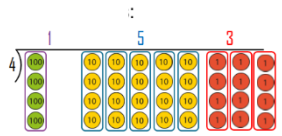
Apply the same representations though this time include a remainder.

Then extend to division of 3 digits by one digit and where there can be no hundreds cannot be shared.

If dividing the hundreds gives a remainder of one or more hundred, we must exchange the remaining hundreds for tens.

612 ÷ 4 = 153

$$4\overline{)\,6\;{}^{2}1\;{}^{1}2}^{\,1\;5\;3}$$



6 hundreds ÷ 4 = 1 hundred r 2 hundreds

2 hundreds = 20 tens

21 tens ÷ 4 = 5 tens r 1 ten

1 ten = 10 ones

12 ones ÷ 4 = 3 ones

Addition, Subtraction, Multiplication and Division

Year 6

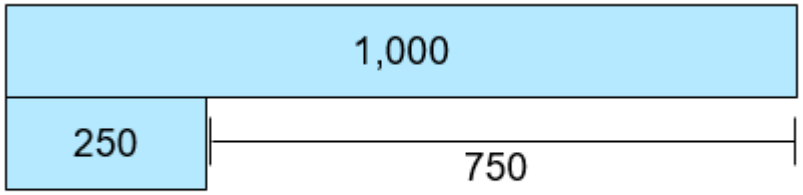
Quantify additive and multiplicative relationships

Vocabulary:

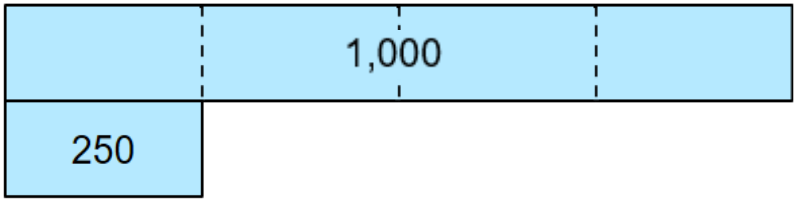
Additive Multiplicative Relationship Represents Compose Combine Total More than Less than Plus + Minus - Equal to = Addition Subtraction Divide ÷ Multiply x One-_____ of Equation Expression Bar Model Whole Part Difference Multiplier Unknown Sequence

Addend + Addend = Sum Factor x Factor = Product (Multiplicand x Multiplier = Product)

Minuend – Subtrahend = Difference Dividend ÷ Divisor = Quotient

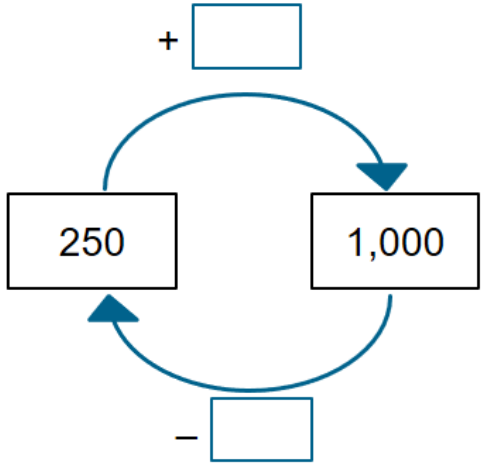


250 + 750 = 1,000 1,000 – 750 = 250



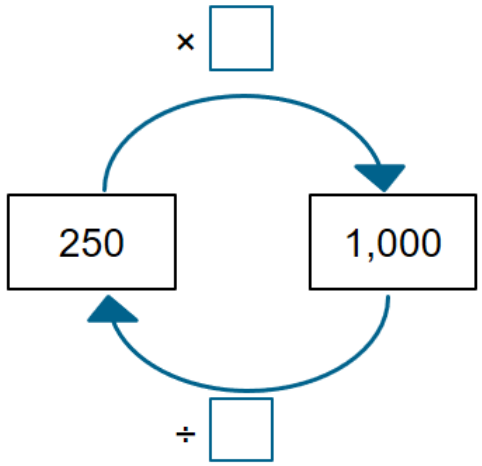
250 x 4 = 1,000 1000 ÷ 4 = 250

The relationship between two numbers can be expressed both additively and multiplicatively.



1000 is ___ more than 250.

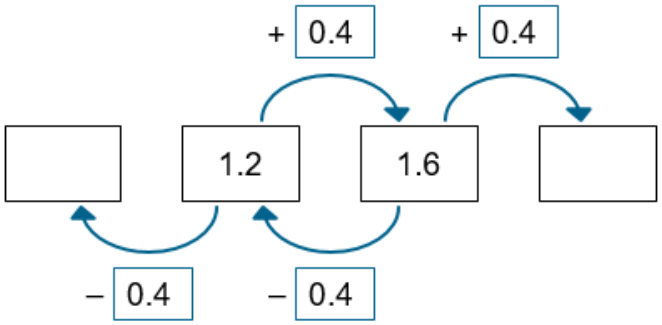
250 is ____ less than 1000.



1000 is ___ times the size of 250.

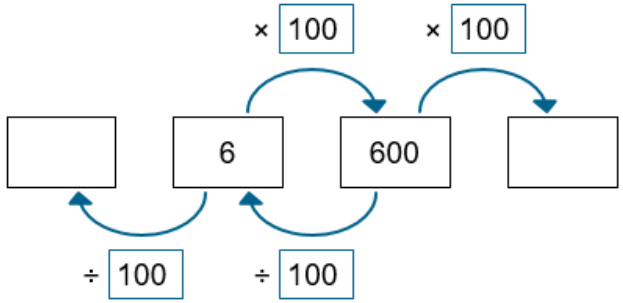
250 is one-_____ of 1000.

To find one-quarter of a number, we divide by 4.



Finding the difference can help calculate the unknown terms in a sequence.

Finding the known multiplier can help calculate the unknown terms in a sequence.



Addition, Subtraction, Multiplication and Division

Year 6

Quantify additive and multiplicative relationships

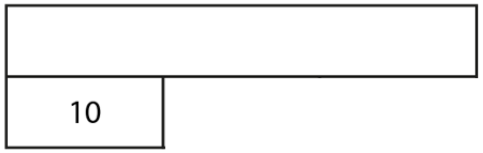
Vocabulary:

Additive Multiplicative Relationship Represents Compose Combine Total More than Less than Plus + Minus - Equal to = Addition Subtraction Divide ÷ Multiply x One-_____ of Equation Expression Bar Model Whole Part Difference Multiplier Unknown Sequence

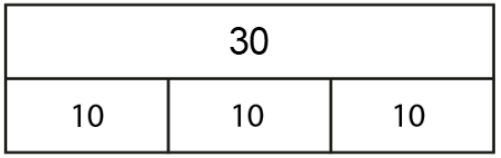
Addend + Addend = Sum Factor x Factor = Product (Multiplicand x Multiplier = Product)

Minuend – Subtrahend = Difference Dividend ÷ Divisor = Quotient

$\frac{1}{3}$ of ?= 10



$\frac{1}{3}$ of ?= 10



$\frac{1}{3}$ of 30 = 10

Calculate the unknown whole by recognising how many parts the whole has been divided into.

Addition and Subtraction

Year 6

Derive Related Calculations

Vocabulary:

Additive Multiplicative Relationship Represents Equation Unknown Re-arrange Inverse Place Value Properties Commutative Associative Distributive Compensation

Addend + Addend = Sum Factor x Factor = Product (Multiplicand x Multiplier = Product)

Minuend – Subtrahend = Difference Dividend ÷ Divisor = Quotient

$252 = 3 \times 84$	$252 = 3 \times 84$	$252 = 3 \times 84$
$2{,}520 = 30 \times \square$	$\square = 3 \times 85$	$252 = 3 \times 60 + 3 \times \square$

$625 - 148 = 477$	$625 - 148 = 477$	$625 - 148 = 477$
$6{,}250 - 1{,}480 = \square$	$625 - 70 - \square = 477$	$625 - 248 = \square$

$14.8 + 7.6 = 22.4$	$14.8 + 7.6 = 22.4$	$14.8 + 7.6 = 22.4$
$1{,}480 + \square = 2{,}240$	$\square - 7.6 = 14.8$	$12.8 + \square = 22.4$

$4{,}800 \div 25 = 192$	$4{,}800 \div 25 = 192$	$4{,}800 \div 25 = 192$
$25 \times 192 = \square$	$4{,}800 \div 250 = \square$	$4{,}800 \div 5 \div 5 = \square$

Manipulate an equation to solve another. Pupils could:

- **rearrange the terms;**
- **rewrite using inverse operations;**
- **apply place value;**
- **use the properties of division that correspond to the commutative, associative or distributive property of multiplication;**
- **use the compensation property.**

Additive examples

Multiplicative examples

Addition and Subtraction

Year 6

Solve Problems involving Ratio Relationship

Vocabulary:

Additive Multiplicative Relationship Represents Equation Unknown Scale-factor Ratio Ratio Table ___ times the size one-___ the size of Vertical Horizontal

Factor x Factor = Product (Multiplicand x Multiplier = Product)

Dividend ÷ Divisor = Quotient

$1 \times 5 = 5$

$5 \div 5 = 1$

$5 \times \frac{1}{5} = 1$

$3 \times 5 = 15$

$15 \div 5 = 3$

$15 \times \frac{1}{5} = 3$

Ratio table to compare sets of information.

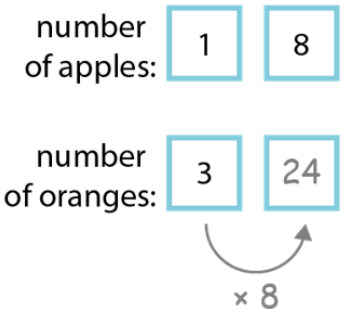
For every ___, there are ___.

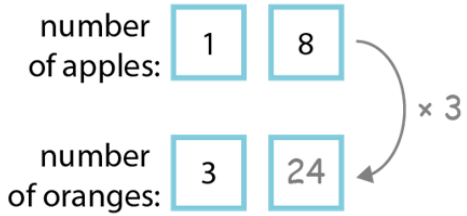
For every 1 litre of petrol, you can drive 7 miles.

For every 7 miles you will drive, you need 1 litre of petrol.

Extend sequences using knowledge of patterns based on ratio table.

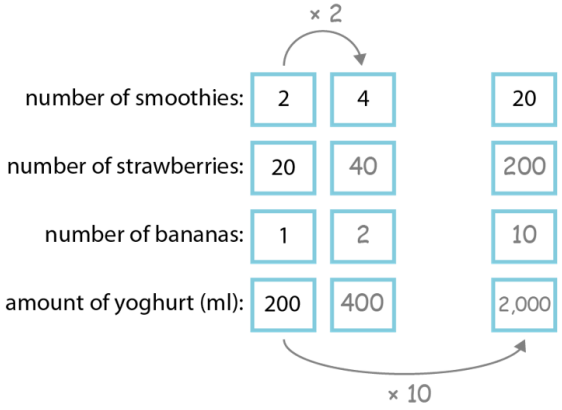
Litres of petrol	1	2	3	4	5	6	7	8	9	10
Miles driven	7	14	21	28	35	42	49	56	63	70





Explore vertical and horizontal relationship between numbers.

For every ___, there are ___.

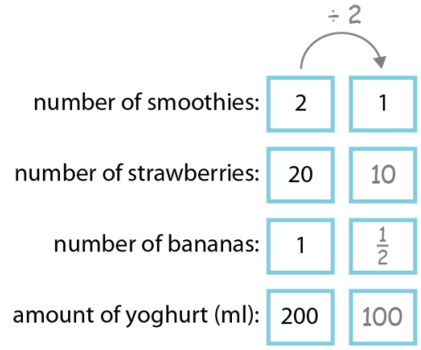


Identify the scale-factor in order to find unknown values.

___ is ___ times the size of ___.

Therefore I must multiply/divide by ___.

___ is one-__ the size of ___.



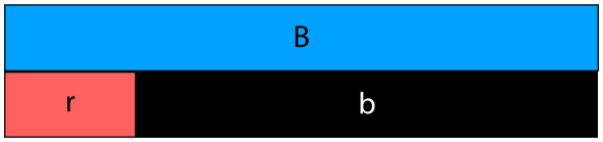
Addition and Subtraction

Year 6

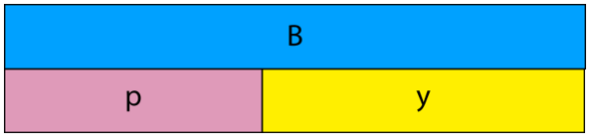
Solve Problems with Two Unknowns

Vocabulary:

Additive Multiplicative Relationship Represents Equation Two Unknowns Scale-factor Ratio ___ times the size one-___ the size of Total Bar Model Structure



$$B = r + b$$



$$B = p + y$$

Use Cuisenaire to find 2 bars of total length that are equal to another.

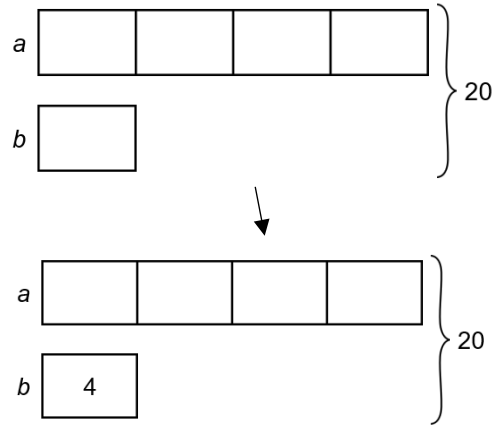
There is more than one solution to the problem.

There can be infinite solutions to a problem.

$$5 \times \square = 10 \times \square$$

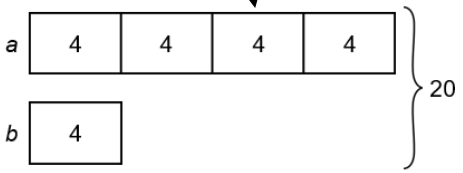
Solve multiplicative problems with two unknowns when the total is known.

v



one part = 20 ÷ 5 = 4

$b = 4$



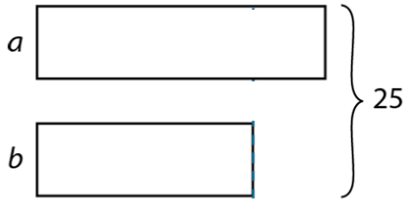
one part = 20 ÷ 5 = 4

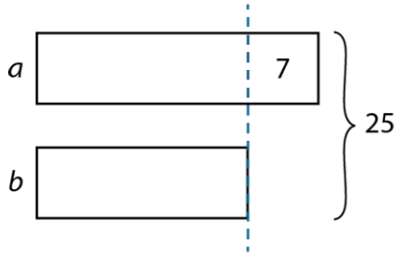
$b = 4$

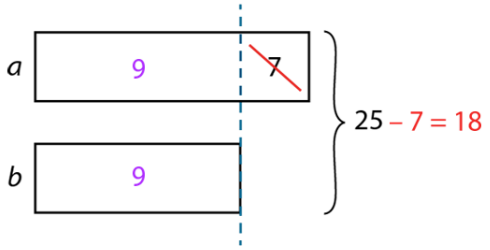
$a = 4 \times 4 = 16$

The two numbers are 16 and 4.

Solve additive problems with two unknowns when the total is known.







$b = 18 \div 2 = 9$

$a = 9 + 7 = 16$

The two numbers are 9 and 16.

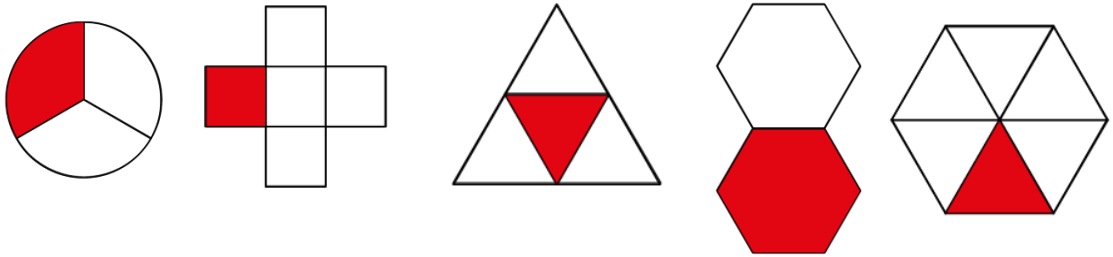
Fractions

Year 3

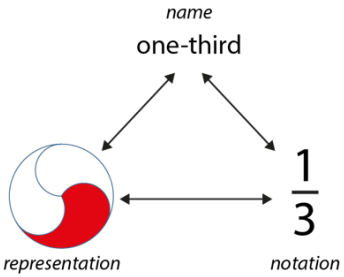
Use and Understand Fraction Notation

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…

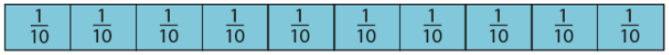
…there is one part shaded.

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

Generalise:

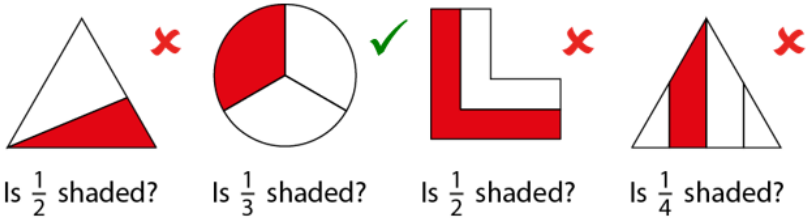
The numerator tells us the number of parts shaded.

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



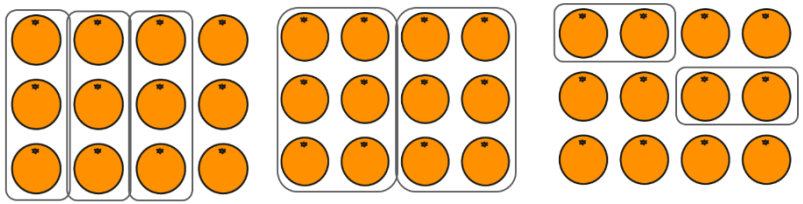
10 one-tenths = ten-tenths

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:

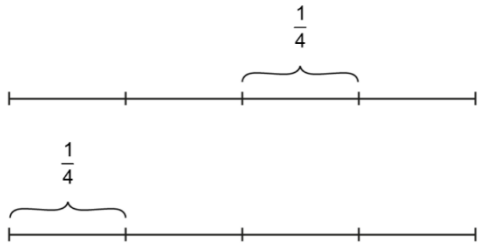
Fraction Notation Divided Equal Numerator Denominator Whole Parts Fraction Bar (Vinculum) Half Third Quarter Fifth Sixth Seventh Eighth Ninth Tenth One-_____ Bar Model Equation Expression Linear Volume Area Quantity Times as much / Times the size of

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

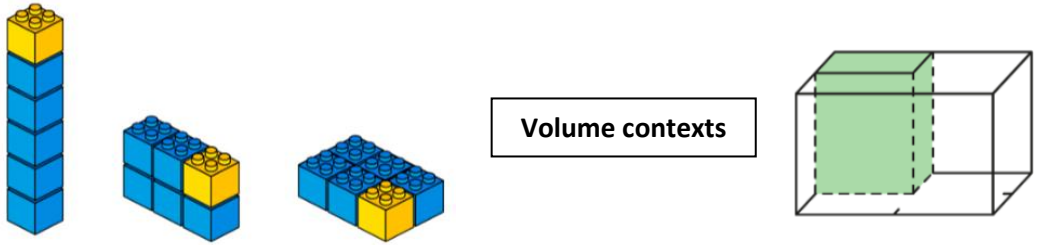
Area contexts

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

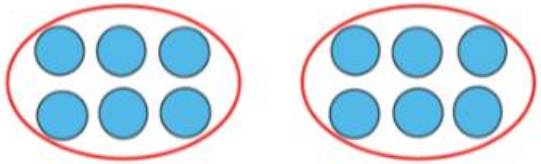
Linear contexts

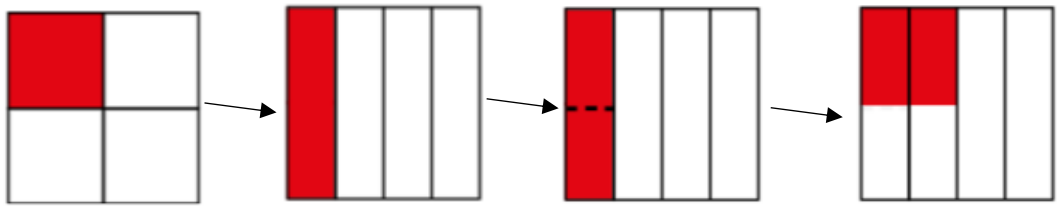


Volume contexts



Quantity contexts





The whole is ____. The whole has been divided into __ equal parts.

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

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

Generalisation:

Equal parts don't always look the same.

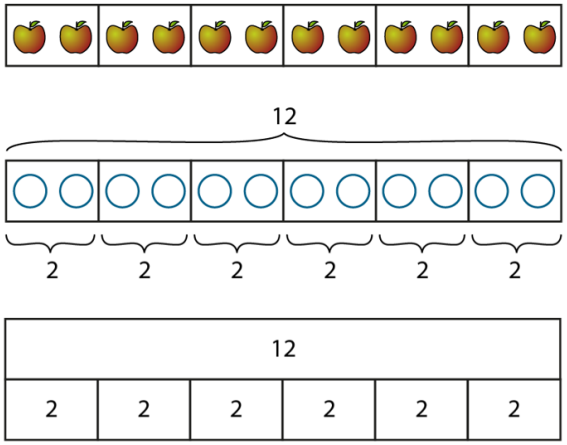
Fractions

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,

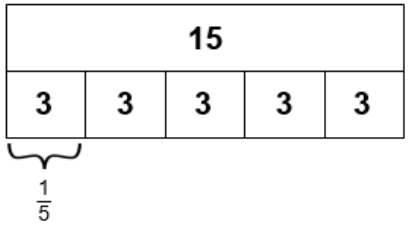
so $\frac{1}{5}$ of 15 is 3.

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



$15 \div 5 = 3$

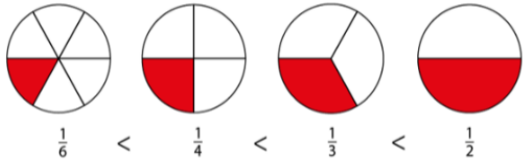
so $\frac{1}{5}$ of 15 = 3

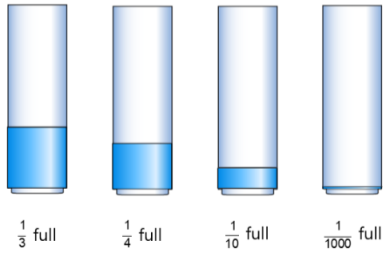
We can compare fractions with the same numerator. We can compare these in different contexts.

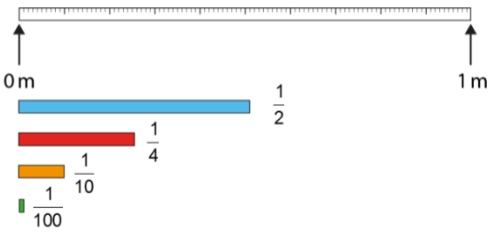
Generalisation:

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.







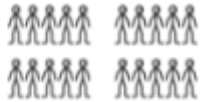
Fractions

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.

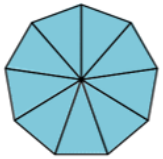
Fractions

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

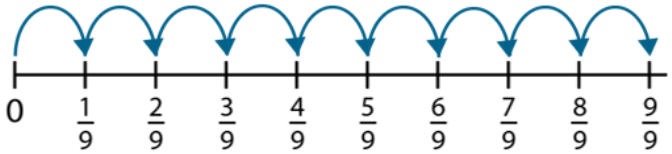


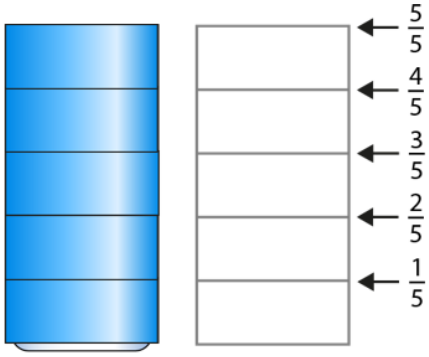
$\frac{9}{9}$

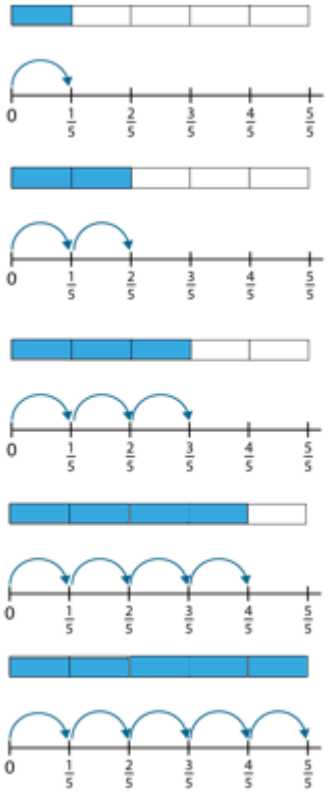
We can represent fractions on both horizontal and vertical number lines.

The whole is divided into ___ equal parts. Each part is ___ of the whole.

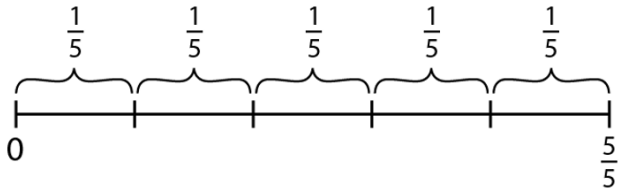
The whole is made up of 9 one-ninths.



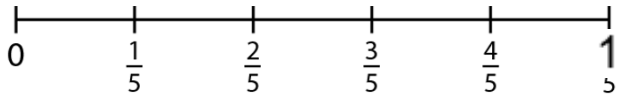




Fractions as part of a whole



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.

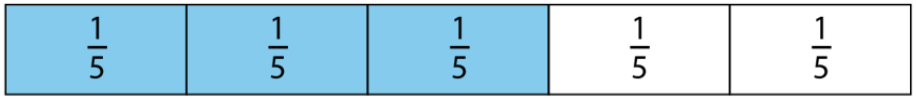
Fractions

Year 3

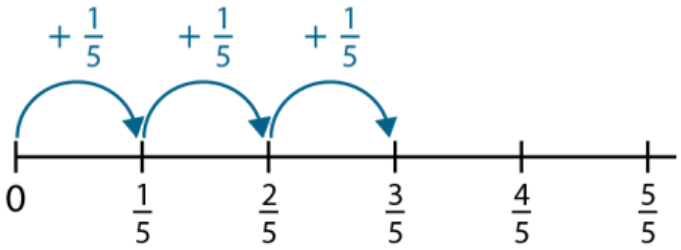
Add and Subtract Fractions within 1

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.

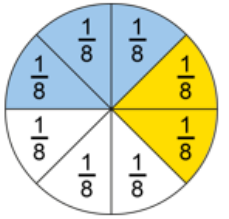
5 one eighths minus 2 one-eighths is equal to 3 one-eighths.

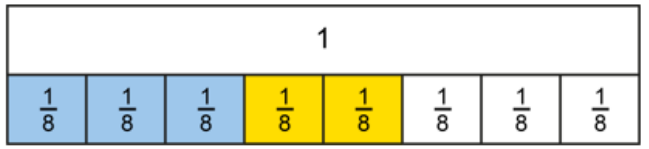
Five-eighths, minus two-eighths is equal to three-eighths.

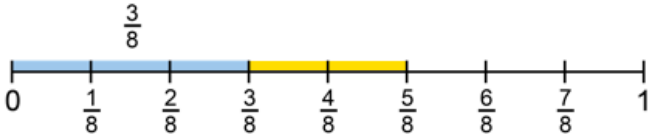
We can add multiples of the unit fraction and record this as an addition equation.

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

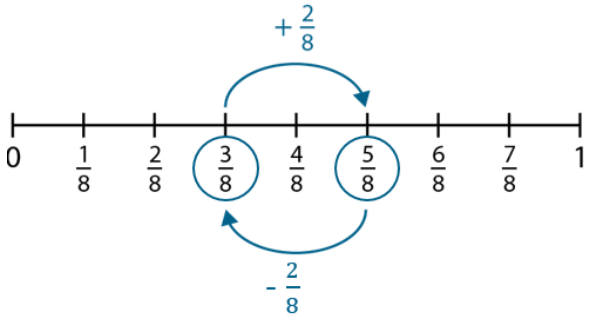
Three-fifths is made up of one-fifth, add another one-fifth, and another one-fifth.







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



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

Fractions

Year 3

Add and Subtract Fractions within 1

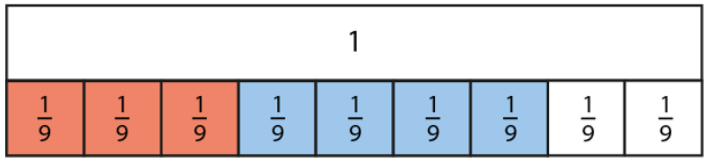
Vocabulary:

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.

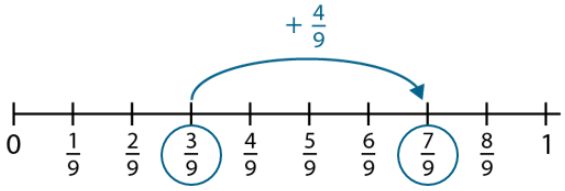
1 – Use a Diagram

***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.**



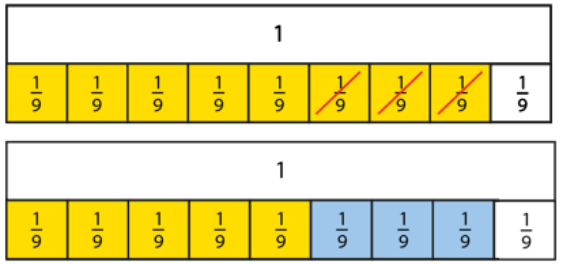
3 – Verbal reasoning

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

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

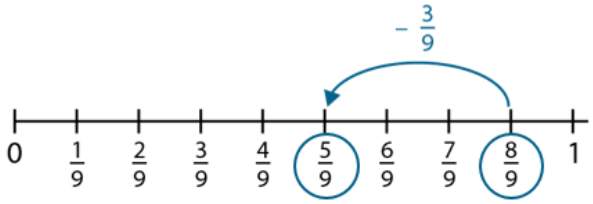
I know that $3 + 4 = 7$

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.

Fractions

Year 4

Mixed Numbers in the Linear Number System

Vocabulary:

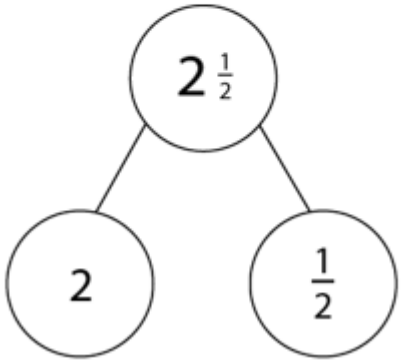
Fraction Notation Divided Equal Numerator Denominator Whole Parts Fraction Bar (Vinculum) Half Third Quarter Fifth Sixth Seventh Eighth Ninth Tenth One-_____ Add Subtract (Minus) Number line Part-Part-Whole Model Units Previous Next Estimate Intervals

Quantities that are made up of both wholes and parts are called Mixed Numbers.

There are two whole oranges. There is half an orange. There are two and a half oranges altogether.

There are more than two whole oranges.

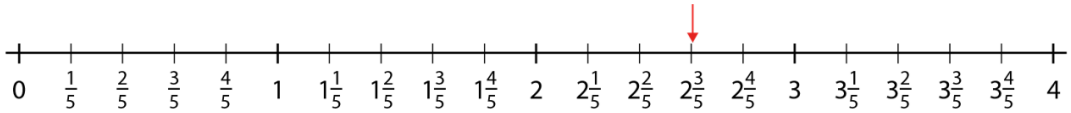
There are less than three whole oranges.

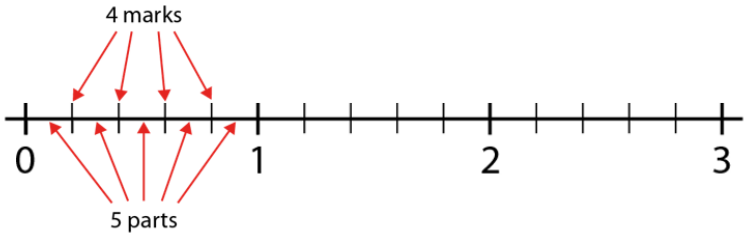


We can place Mixed Numbers on a number line.

There are ___ parts between zero and one. This means we are counting in units of ___.

The line is divided into ___ equal parts. This means we are counting in ___s.

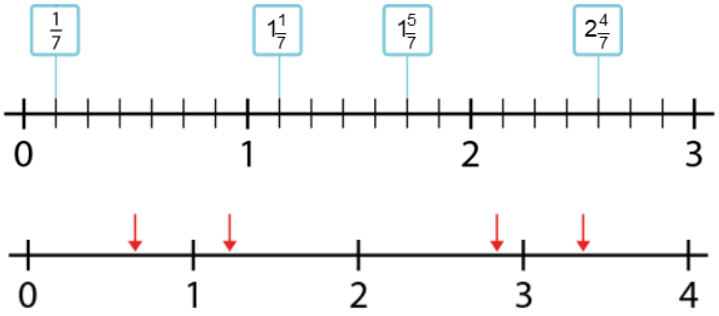




We can use our knowledge of ordering proper fractions to order Mixed Numbers.

$1\frac{1}{7}$ is between 1 and 2. The previous number is 1. The next number is 2.

We can use our knowledge of placing mixed numbers on a number line to estimate the position of a Mixed Number on a blank number line.



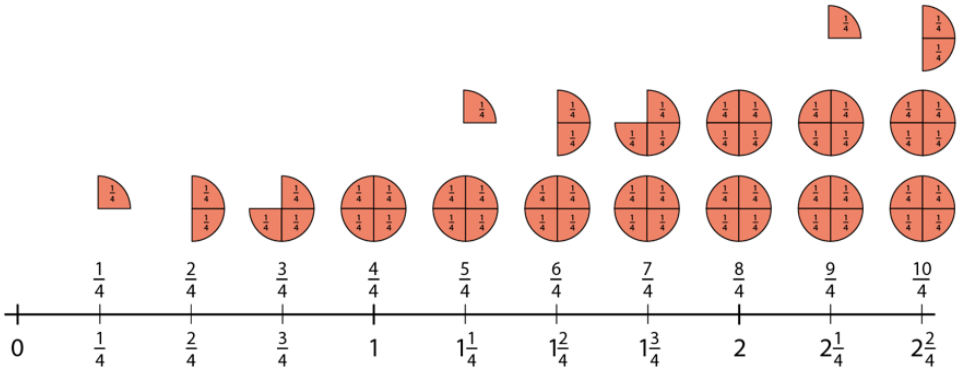
Fractions

Year 4

Convert between Mixed Numbers and Improper Fractions

Vocabulary:

Fraction Notation Divided Equal Numerator Denominator Whole Parts Fraction Bar (Vinculum) Half Third Quarter Fifth Sixth Seventh Eighth Ninth Tenth One-_____ Number line Part-Part-Whole Model Units Previous Next Estimate Intervals Convert Improper Fractions Mixed Numbers



We can count in unit fractions over 1 whole and record this as either a Mixed Number or an Improper Fraction.

We can dual count to support this:

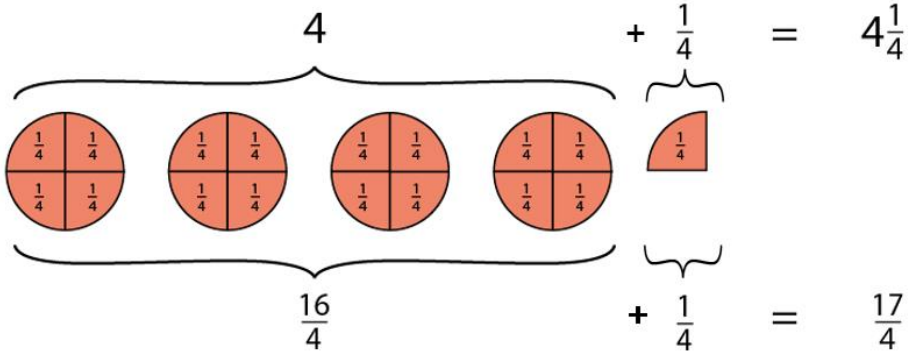
1 quarter, 2 quarter, 3 quarters, 4 quarters, 5 quarters …

1 quarter, 2 quarter, 3 quarters, 1 whole, 1 whole and 1 quarter…

1 group of 4 quarters is 1 whole

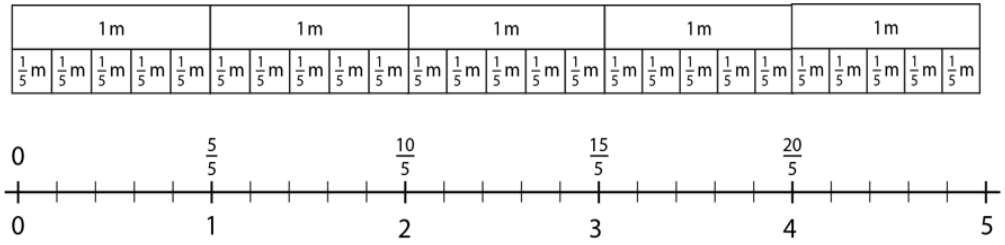
2 groups of 4 quarters in 2 wholes

3 groups of 4 quarters is 3 wholes



There are __ groups of 4 quarters which is __ quarters, and __ more quarters, so that is __ quarters in total.

This counting can be connected to wider contexts including measures.



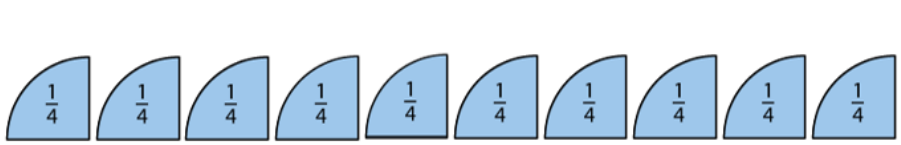
Fractions

Year 4

Convert between Mixed Numbers and Improper Fractions

Vocabulary:

Fraction Notation Divided Equal Numerator Denominator Whole Parts Fraction Bar (Vinculum) Half Third Quarter Fifth Sixth Seventh Eighth Ninth Tenth One-_____ Number line Part-Part-Whole Model Units Previous Next Estimate Intervals Convert Improper Fractions Mixed Numbers



$\frac{10}{4}$

1 1

$\frac{2}{4}$

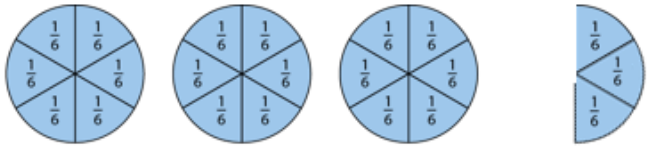
$\frac{10}{4} = 2\frac{2}{4}$

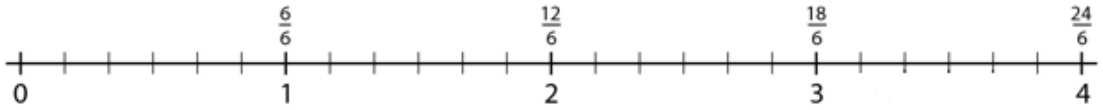
We can convert between Improper Fractions and Mixed Numbers by thinking about the counting unit.

Our unit is quarters so we will be thinking about groups of 4.

There are __ groups of four quarters which is ___-quarters, and ___ more quarters, so that is ___-quarters.

How many groups of 4 quarters in 10 quarters?





We can convert between Improper Fractions and Mixed Numbers by thinking about the counting unit.

Each whole has been divided into ___ equal parts. We have __ of these equal parts. This represents ___ ___s.

This knowledge can be connected to wider contexts including area, quantities, linear and volumes.

Generalise:

If we multiply the number of wholes by the denominator, we can find the value of the numerator.

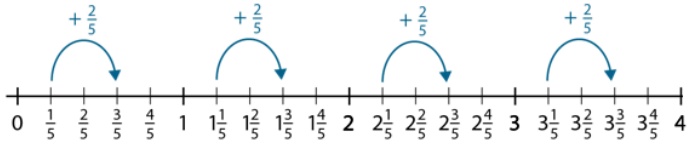
Fractions

Year 4

Add and Subtract Improper Fractions and Mixed Fractions (Same Denominator) (1)

Vocabulary:

Fraction Notation Divided Equal Numerator Denominator Whole Parts Fraction Bar (Vinculum) Half Third Quarter Fifth Sixth Seventh Eighth Ninth Tenth One-_____ Number line Part-Part-Whole Model Units Previous Next Estimate Intervals Convert Improper Fractions Mixed Numbers Add Subtract (Minus)

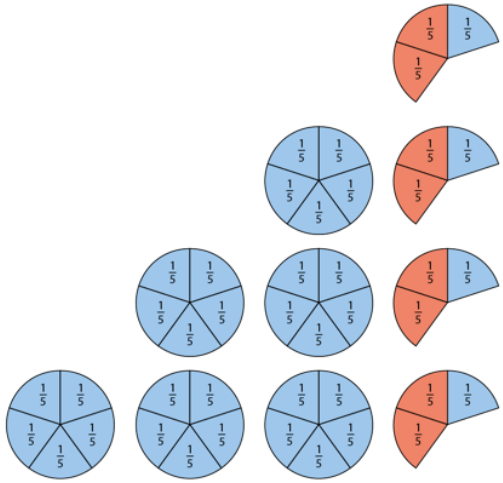


$\frac{1}{5} + \frac{2}{5} = \frac{3}{5}$

$1\frac{1}{5} + \frac{2}{5} = 1\frac{3}{5}$

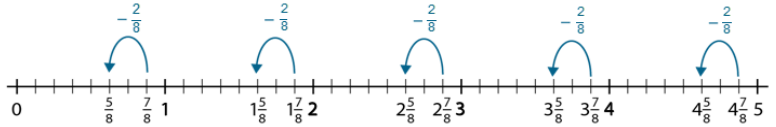
$2\frac{1}{5} + \frac{2}{5} = 2\frac{3}{5}$

$3\frac{1}{5} + \frac{2}{5} = 3\frac{3}{5}$



We can apply our understanding of adding fractions within one with the same denominator to adding a mixed number and fractions within one with the same denominators.

The parts are __ and __. The total, or <u>whole</u>, is __.



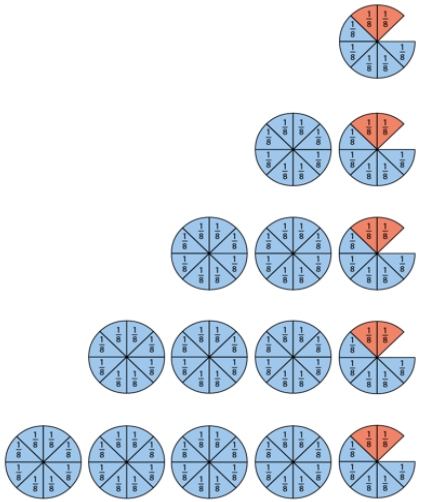
$\frac{7}{8} - \frac{2}{8} = \frac{5}{8}$

$1\frac{7}{8} - \frac{2}{8} = 1\frac{5}{8}$

$2\frac{7}{8} - \frac{2}{8} = 2\frac{5}{8}$

$3\frac{7}{8} - \frac{2}{8} = 3\frac{5}{8}$

$4\frac{7}{8} - \frac{2}{8} = \boxed{4\frac{5}{8}}$



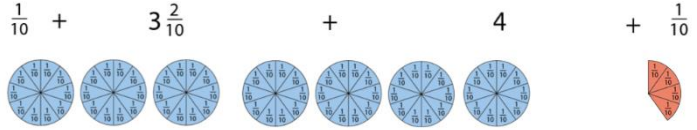
We can apply our understanding of subtracting fractions within one with the same denominator to subtract a fraction within one from a mixed number with the same denominators.

The total, or <u>whole</u>, is __. One part is __. The missing part is ___.

When adding combined mixed numbers and fractions within one, we combine the parts and then combine the wholes.

The parts are __ and __. The total, or <u>whole</u>, is __.

$\frac{1}{10} + 3\frac{2}{10} + 4 + \frac{1}{10}$



$7\frac{4}{10}$

Fractions

Year 4

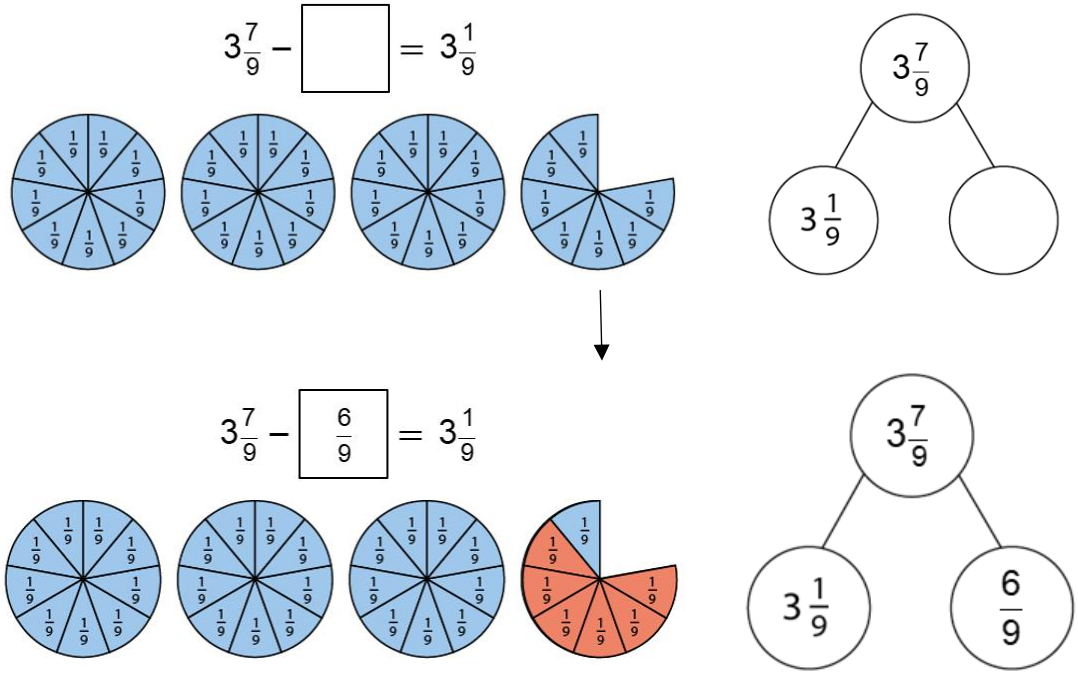
Add and Subtract Improper Fractions and Mixed Fractions (Same Denominator) (2)

Vocabulary:

Fraction Notation Divided Equal Numerator Denominator Whole Parts Fraction Bar (Vinculum) Half Third Quarter Fifth Sixth Seventh Eighth Ninth Tenth One-_____ Number line Part-Part-Whole Model Units Previous Next Estimate Intervals Convert Improper Fractions Mixed Numbers Add Subtract (Minus)

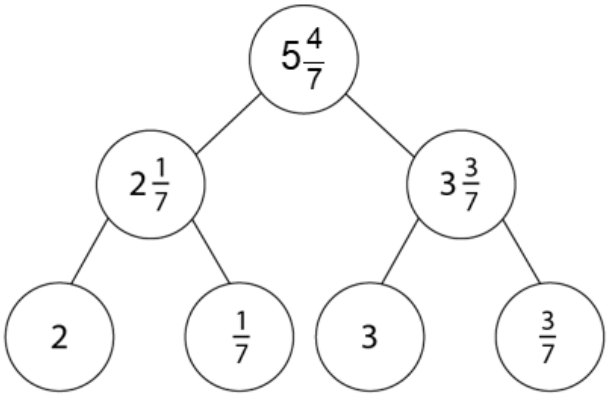
When subtracting fractions within one from a mixed number, we subtract the fraction to reveal the missing part. We can use a part-whole model to help represent this.

The total, or <u>whole</u>, is __. One part is __. The missing part is ___.



Representing addition and subtraction of mixed numbers and fractions within one, using a part-whole model can be helpful when problem solving.

The parts are __ and __. The total, or <u>whole</u>, is __.



Generalisations:

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

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

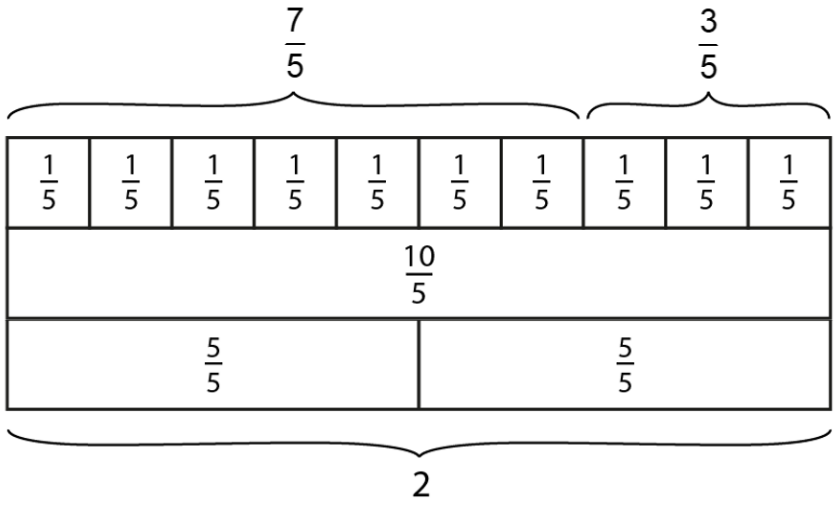
Fractions

Year 4

Add and Subtract Improper Fractions and Mixed Fractions (Same Denominator) (3)

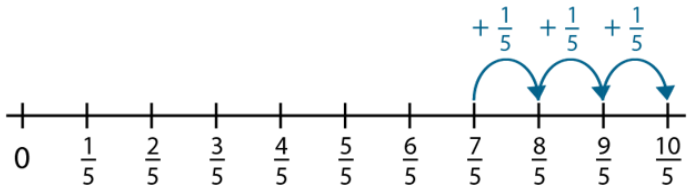
Vocabulary:

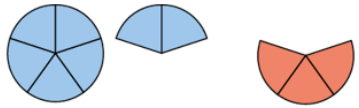
Fraction Notation Divided Equal Numerator Denominator Whole Parts Fraction Bar (Vinculum) Half Third Quarter Fifth Sixth Seventh Eighth Ninth Tenth One-_____ Number line Part-Part-Whole Model Units Previous Next Estimate Intervals Convert Improper Fractions Mixed Numbers Add Subtract (Minus)



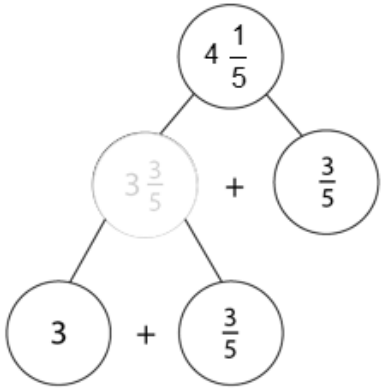
We can apply our understanding of unitising and converting between improper fractions and mixed numbers when adding improper fractions.

7 one-fifths and 3 one-fifths is equal to 10 one-fifths.



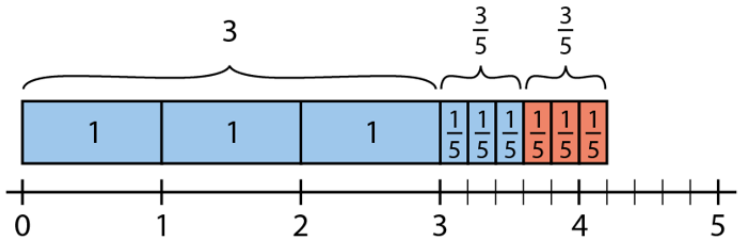


$\frac{7}{5} + \frac{3}{5} = \frac{10}{5} = 2$



Partitioning a mixed number and then adding the fractional parts is helpful when adding mixed numbers with fractions within one that result in bridging over a whole.

3 one-fifths and 3 one-fifths is equal to 6 one-fifths. This is equal to one whole and 1 one-fifth.



Fractions

Year 4

Add and Subtract Improper Fractions and Mixed Fractions (Same Denominator) (4)

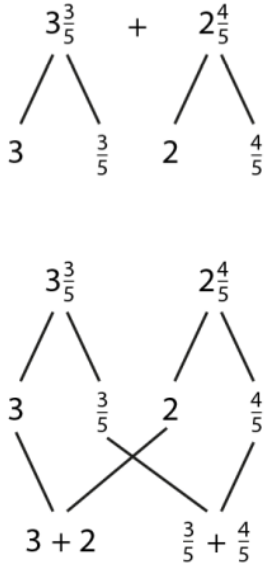
Vocabulary:

Fraction Notation Divided Equal Numerator Denominator Whole Parts Fraction Bar (Vinculum) Half Third Quarter Fifth Sixth Seventh Eighth Ninth Tenth One-_____ Number line Part-Part-Whole Model Units Previous Next Estimate Intervals Convert Improper Fractions Mixed Numbers Add Subtract (Minus) Aggregation Augmentation Reduction Partitioning Difference

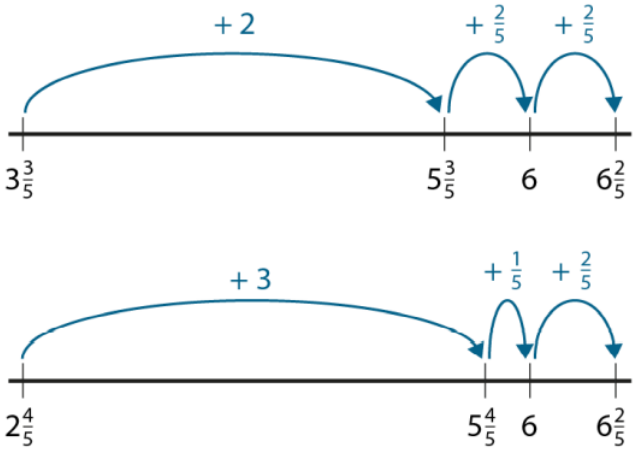
$3\frac{3}{5}+2\frac{4}{5}=$

When adding two mixed numbers which bridge a whole, we can apply either a counting on (augmentation) or counting all (aggregation) strategy.

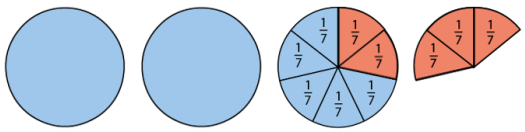
Counting all (aggregation) strategy.



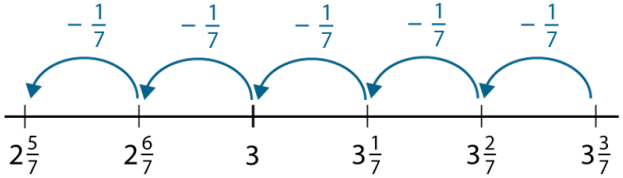
Counting on (augmentation) strategy.



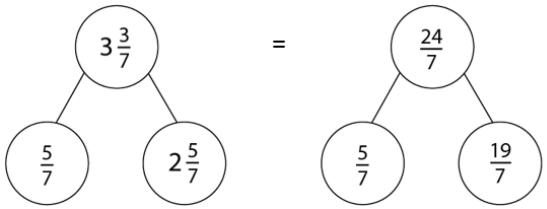
$3\frac{3}{7}-\frac{5}{7}$



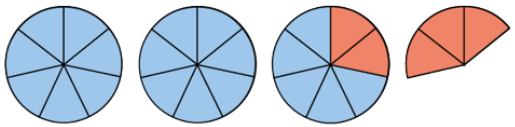
$5\frac{7}{5}$

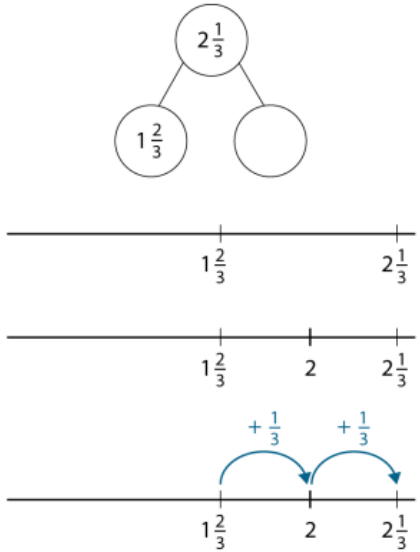


We can subtract a fraction from a mixed number with the same denominator using our awareness of converting between mixed numbers and improper fractions.



$3\frac{3}{7}-\frac{5}{7}=2\frac{5}{7}$





We can also subtract a fraction from a mixed number with the same denominator using our understanding of subtraction as finding the difference.

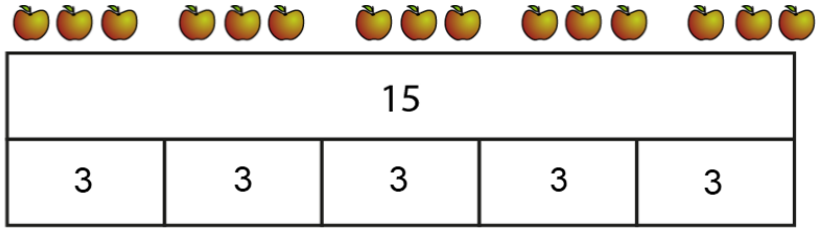
Fractions

Year 5

Find Non-Unit Fractions of Quantities.

Vocabulary:

Fraction Notation Divided Equal Numerator Denominator Whole Parts Fraction Bar (Vinculum) Half Third Quarter Fifth Sixth Seventh Eighth Ninth Tenth One-_____ Number line Part-Part-Whole Model Units Previous Next Estimate Intervals Convert Improper Fractions Mixed Numbers Add Subtract (Minus) Aggregation Augmentation Reduction Partitioning Difference



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

$\frac{2}{5}$ of 15 = 6

$\frac{3}{5}$ of 15 = 9

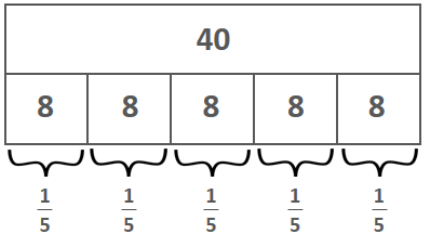
$\frac{4}{5}$ of 15 = 12

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

We can skip count in unit fractions to help us find the quantity of a non-unit fraction.

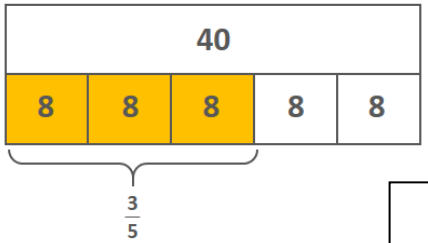
2 one-fifths of 15 is equal to 6,

3 one-fifths of 15 is equal to 9…



40 ÷ 5 = 8

so $\frac{1}{5}$ of 40 = 8



40 ÷ 5 = 8

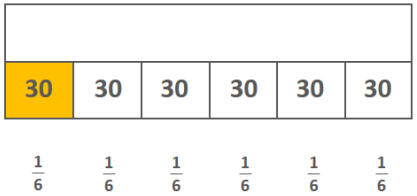
so $\frac{1}{5}$ of 40 = 8

$\frac{3}{5}$ of 40 = 24

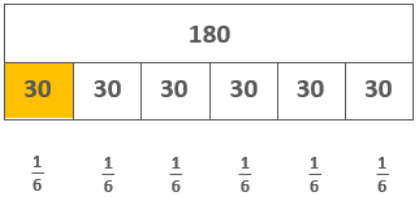
If the whole is unknown but we know the quantity of one part – we can find the size of the whole.

One-sixth of a number is equal to thirty.
6 one-sixths is equal to one whole.

To find the whole, multiply the value of 1 one-sixth by 6.



$\frac{1}{6}$ of a number is 30



$\frac{1}{6}$ of a number is 30

6 × 30 = 180

We can skip count in unit fractions to help us find the quantity of a non-unit fraction.

To find 3 one-fifths of 40, first find one-fifth of 40 by dividing by 5, and then multiply by 3.

Generalisation:

Divide the whole by the denominator and then multiply quotient by the numerator.

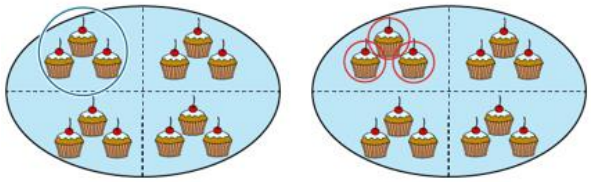
Fractions

Year 5

Find Equivalent Fractions

Vocabulary:

Fraction Notation Divided Equal Numerator Denominator Whole Parts Fraction Bar (Vinculum) Half Third Quarter Fifth Sixth Seventh Eighth Ninth Tenth One-_____ Number line Intervals Convert Portion Proportional Relationship Equivalent Vertical Horizontal



Quantities can be expressed by more than one fraction.

The whole is divided into 4 equal parts and 1 of those parts is circled.

The whole is divided into 12 equal parts and 3 of those parts are circled.

$\frac{1}{4}$ and $\frac{3}{12}$ are equivalent because 1 is the same portion of 4 as 3 is of 12.

Investigate the proportional relationship between the numerator and denominator in each individual fraction.

Investigate the proportional relationship between the numerators in both fractions and the denominators in both fractions.

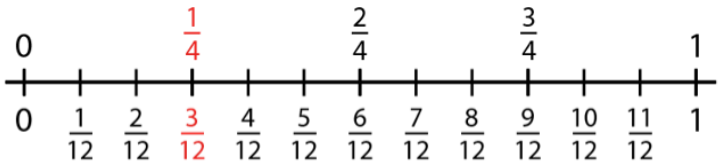
The denominator is five times larger than the numerator. (Vertical relationship)

The numerator and denominator of the second fraction are both __ times greater than the first fraction. This means that the fractions are equivalent. (Horizontal relationship)

$\frac{1}{4}$ $\frac{1}{4}$ $\frac{1}{4}$ $\frac{1}{4}$

$\frac{1}{12}$ $\frac{1}{12}$ $\frac{1}{12}$ $\frac{1}{12}$ $\frac{1}{12}$ $\frac{1}{12}$ $\frac{1}{12}$ $\frac{1}{12}$ $\frac{1}{12}$ $\frac{1}{12}$ $\frac{1}{12}$ $\frac{1}{12}$

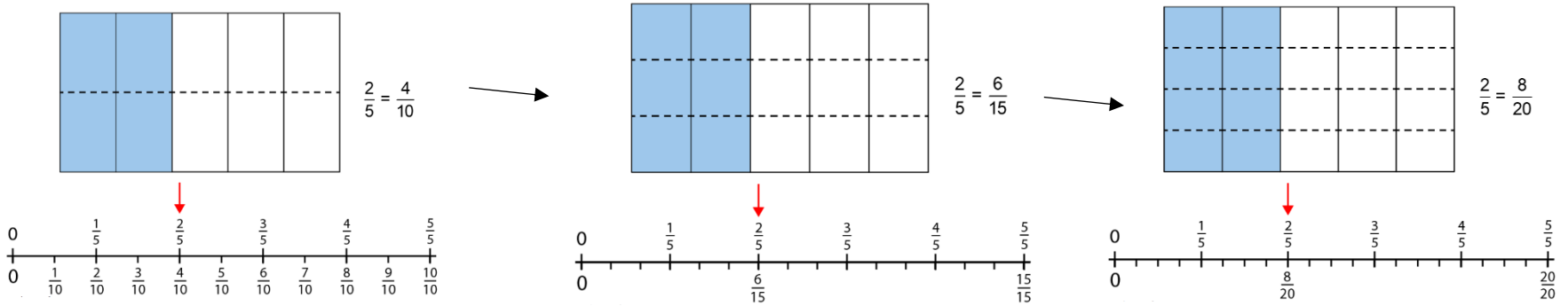
$\frac{1}{4} = \frac{3}{12}$



$\times 4 \left(\frac{1}{4} = \frac{3}{12} \right) \times 4$

$\times 3 \left(\frac{1}{4} = \frac{3}{12} \right) \times 3$

Continue to show how the same whole can be divided into different sized equal parts and how these can be seen as equivalent.



Fractions

Year 5

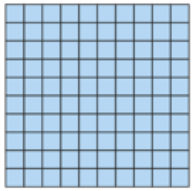
Recall Decimal Equivalents for Common Fractions (1)

Vocabulary:

Fraction Notation Divided Equal Numerator Denominator Whole Parts Fraction Bar (Vinculum) Half Quarter Fifth Tenth One-_____ Number line Greater than Less than Multiple Common Partitions Previous Next Estimate Intervals Convert Decimal Fraction One Tenths Hundredths

Use dienes to represent one whole and the corresponding size of one-tenth and one-hundredth.

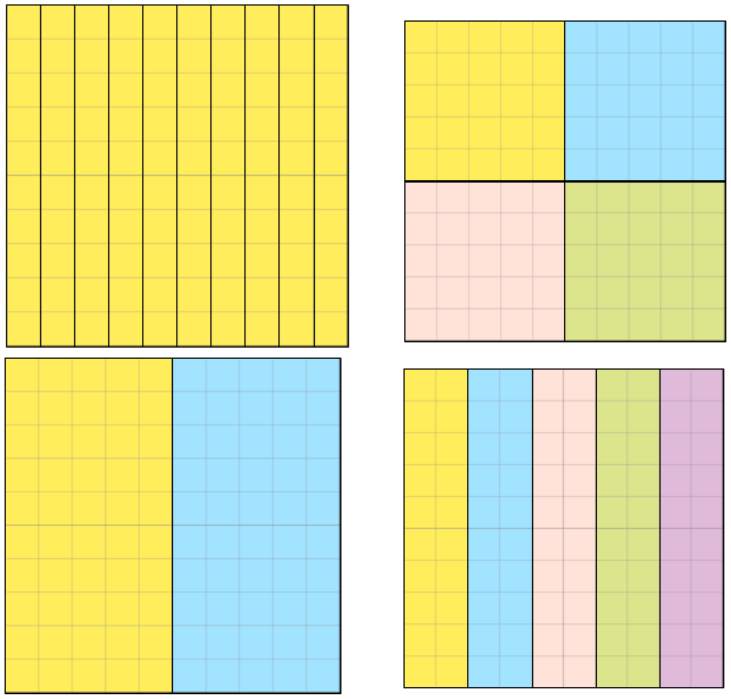
1 one 1 tenth 1 hundredth



Fraction notation	Decimal notation	Name
$\frac{1}{10}$	0.1	one-tenth
$\frac{1}{100}$	0.01	one-hundredth

We can use our knowledge of splitting 100 into common partitions and apply this to splitting a whole, made up of 100ths into common partitions.

I know __ and __ are equivalent because if the hundred grid is split into __ equal parts there would be __ hundredths in each part.

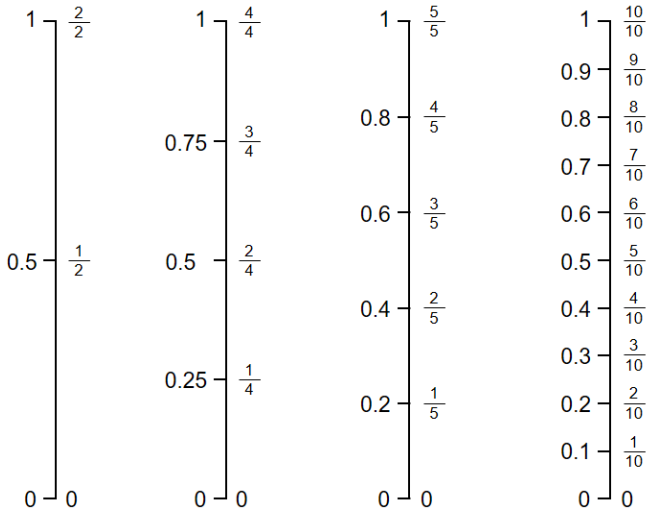


Count forward and backwards on a number line recognising the position of each decimal fraction.

0, 0.5, 1 1, 0.5, 0

Zero, one-half, two-halves.

Two-halves, one-half, zero



Unit fraction	Decimal fraction
$\frac{1}{2}$	0.5
$\frac{1}{4}$	0.25
$\frac{1}{5}$	0.2
$\frac{1}{10}$	0.1

Fractions

Year 5

Recall Decimal Equivalents for Common Fractions (2)

Vocabulary:

Fraction Notation Divided Equal Numerator Denominator Whole Parts Fraction Bar (Vinculum) Half Quarter Fifth Tenth One-_____ Number line Greater than Less than Multiple Common Partitions Previous Next Estimate Intervals Convert Decimal Fraction One Tenths Hundredths

$0.6 < \frac{4}{5}$

$0.6 = \frac{3}{5}$

$\frac{3}{5} < \frac{4}{5}$

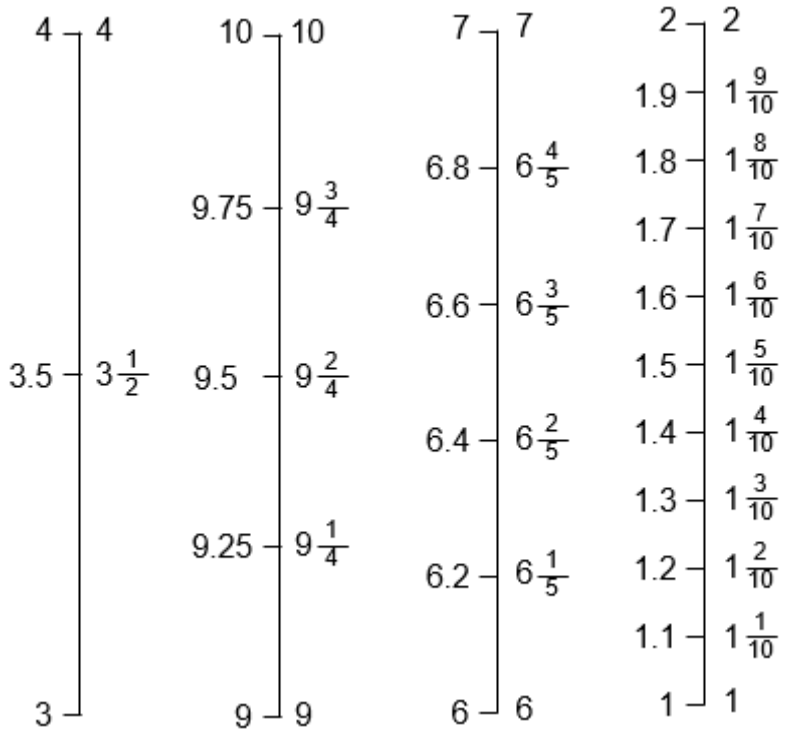
Use understanding of fractional equivalents in order to reason about the comparative size of decimals and fractions.

If I know 0.6 = $\frac{3}{5}$

and I know $\frac{3}{5} < \frac{4}{5}$,

then I know 0.6 < $\frac{4}{5}$.

Recognise the positioning of a decimal fraction and their equivalent fractional notation between numbers greater than 1.



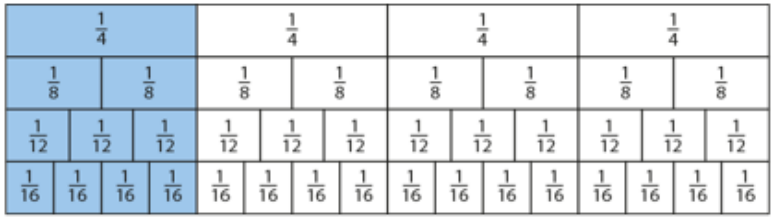
Fractions

Year 6

Simplify Fractions

Vocabulary:

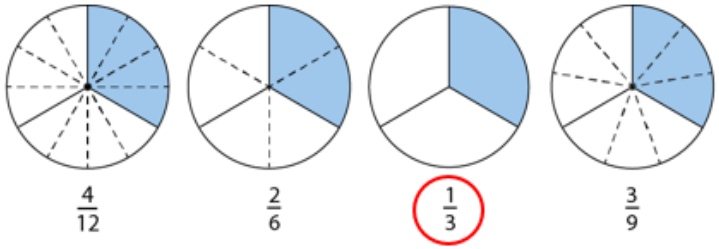
Fraction Notation Divided Equal Numerator Denominator Whole Parts Fraction Bar (Vinculum) Half Third Quarter Fifth Sixth Seventh Eighth Ninth Tenth One-_____ Multiple Factor Common Simplify Simplest Form Mixed Number Improper Fraction Highest Common Factor

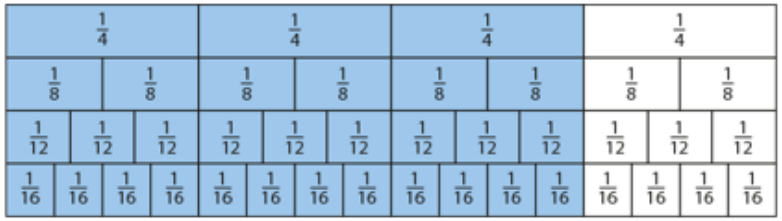


$$\frac{1}{4} = \frac{2}{8} = \frac{3}{12} = \frac{4}{16}$$

Recap equivalent fractions with multiple representations. Identify a fraction in its simplest form when the only common multiple of both the numerator and denominator is 1.

$\frac{1}{4}$ is in its simplest form. I know this because the only common factor of the numerator and the denominator is 1.

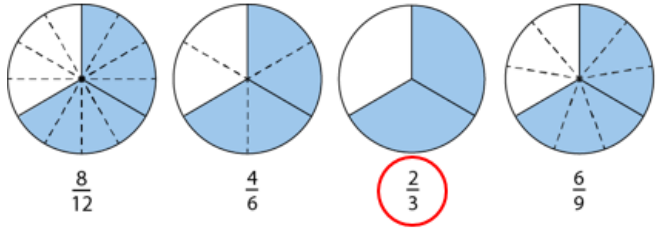


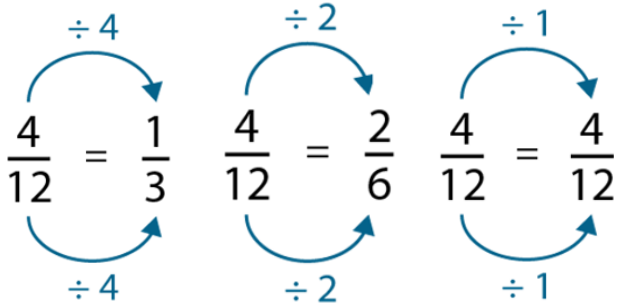


$$\frac{3}{4} = \frac{6}{8} = \frac{9}{12} = \frac{12}{16}$$

Extend to fractions where the numerator in the simplest form is greater than 1.

$\frac{3}{4}$ is in its simplest form. I know this because the only common factor of the numerator and the denominator is 1.





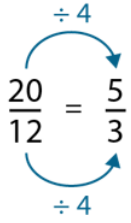
Finding the common factors of both the numerator and denominator allows us to simplify each fraction to its simplest form.

The common factors of 4 and 12 are 1, 2 and 4.

The highest common factor is 4.

Generalisation:

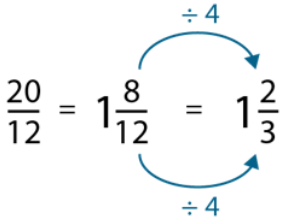
Dividing both the numerator and the denominator of a fraction by their highest common factor converts the fraction to its simplest form.



Improper fraction can be simplified before or after they are converted to a mixed number.

The highest common factor of 20 and 12 is 4.

The highest common factor of 8 and 12 is 4.



Fractions

Year 6

Express Fractions in Common Denomination

Vocabulary:

Fraction Notation Divided Equal Numerator Denominator Whole Parts Fraction Bar (Vinculum) Half Third Quarter Fifth Sixth Seventh Eighth Ninth Tenth One-_____ Multiple Common Denominator Convert Express Proportion

$\frac{1}{5}$ $\frac{4}{15}$

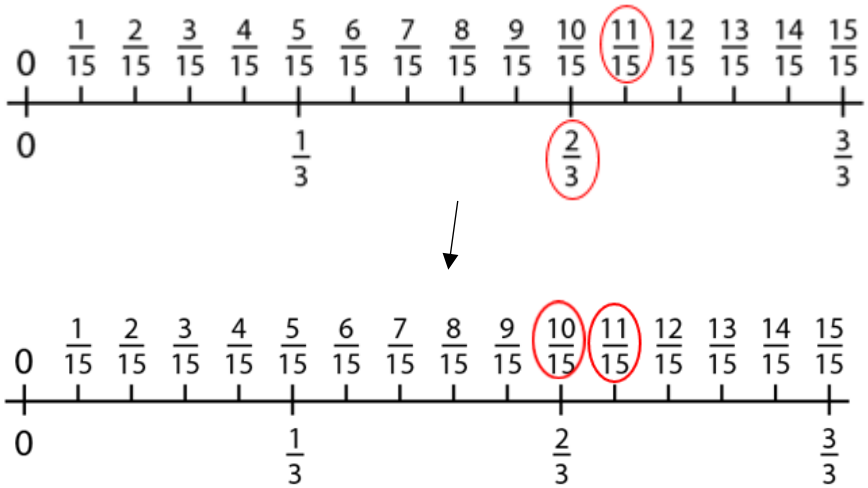
$\frac{1}{5} \xrightarrow{\times 3} \frac{3}{15}$

$\frac{4}{15}$

We can convert fraction into the same denomination in order to make them easier to compare in size. We can also represent this on a number line.

15 is a multiple of 5.

We can use 15 as the common denominator.



$\frac{1}{3}$ $\frac{3}{8}$

$\frac{1}{3} \xrightarrow{\times 8} \frac{8}{24}$ $\frac{3}{8} \xrightarrow{\times 3} \frac{9}{24}$

$\frac{8}{24}$ $\frac{9}{24}$

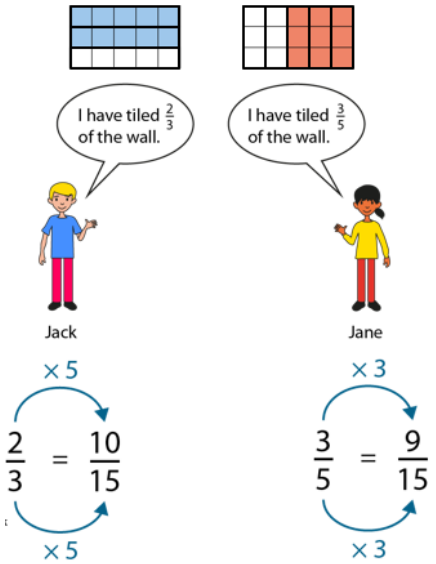
Where one denominator is not a multiple of another, we can multiply both denominators by different amounts in order to find a common denomination.

8 is not a multiple of 3.

24 is a multiple of both 3 and 8.

We can use 24 as the common denominator.

We need to express both fractions in twenty-fourths.



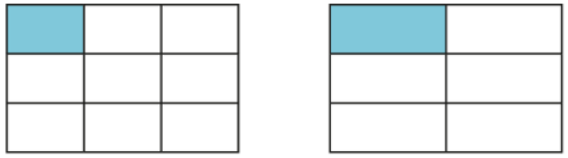
Fractions

Year 6

Compare Fractions with Different Denominators

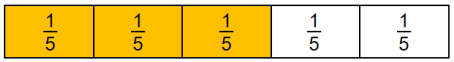
Vocabulary:

Fraction Notation Divided Equal Numerator Denominator Whole Parts Fraction Bar (Vinculum) Half Third Quarter Fifth Sixth Seventh Eighth Ninth Tenth One-_____ Multiple Common Denominator Convert Express Proportion Estimate Position Number Line Greater than Less than



$\frac{1}{9} < \frac{1}{6}$

We can compare fractions and mixed numbers with the same numerator in different ways

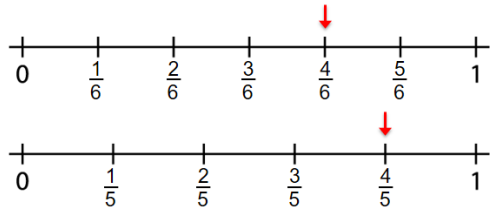


$\frac{3}{5} > \frac{3}{6}$

Verbal Reasoning

$\frac{2}{5}$ is 2 one-fifths $\frac{2}{6}$ is 2 one-sixths

I know that $\frac{1}{5} > \frac{1}{6}$, so $\frac{2}{5} > \frac{2}{6}$



$\frac{4}{5} > \frac{4}{6}$

Comparing their position in relation to the nearest landmark.

How close is it to 1 whole?

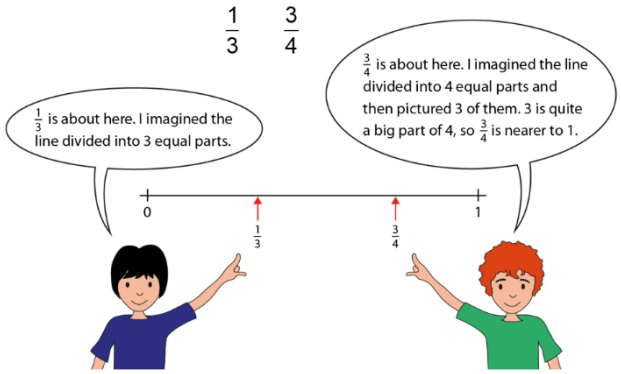
How close is it to 0?

How close is it from $\frac{1}{2}$?

Generalisations:

If the numerators are both 1, then the larger the denominator, the smaller the fraction.

The denominator represents the number of equal parts the whole has been split into. The greater this number, the more equal parts and therefore the smaller the size of each part.



We can use our knowledge of fractions on a number line to help estimate and compare their relative size.

We can reason about the proportional size of the numerator in relation to the denominator to compare fractions.

5 is a larger part of 6 than 7 is of 11, which means $\frac{5}{6}$ is greater than $\frac{7}{11}$

$\frac{7}{11} < \frac{5}{6}$