LEIGHSWOOD SCHOOL

WONDER INVESTIGATE LEARN DISCOVER

How we teach calculations:

Calculation Policy for Mathematics

September 2024

Leighswood School Calculation Policy

This calculation policy has been designed to meet the requirements of the 2014 National Curriculum for mathematics while ensuring a clear and consistent progression in calculation skills across the school. Built around the Oak Academy curriculum, it follows a carefully sequenced structure that enables pupils to build on prior knowledge and make meaningful connections in their learning.

Please note that early learning Mathematics in our Nursery and Reception provision, follows the Early Years Development Matters Framework, and this calculation policy is designed to build on progressively from the content and methods established in the Early Years Foundation Stage.

Pairing procedural knowledge with conceptual understanding

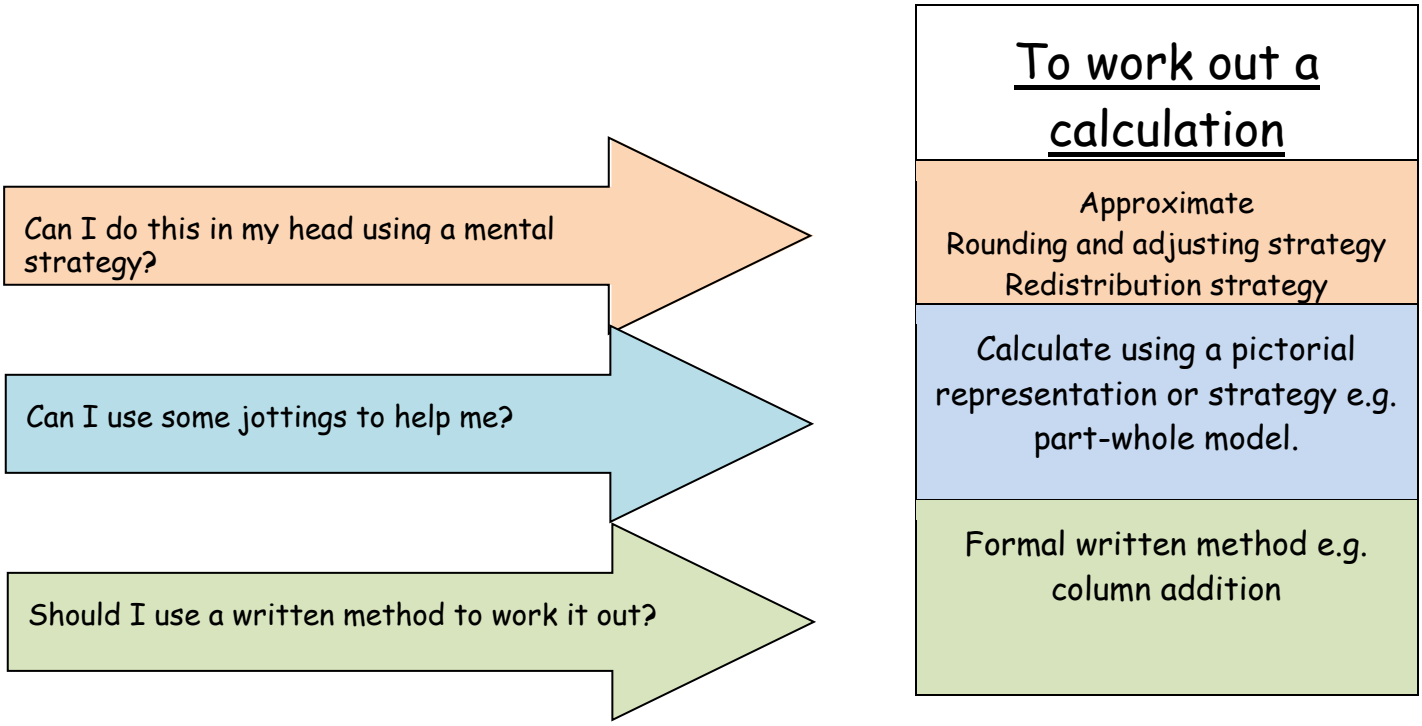
We introduce concepts and prompts to make children think hard about making sense of ideas, while also focusing on efficient procedural methods to ensure calculations can be completed easily and systematically. We often provide visual models to support understanding, then we remove scaffolding as ideas progress and foundation knowledge becomes secure, in order to aid development of mathematical fluency.

Models and representations which bridge mathematical concepts

We have identified and used the smallest set of models and representations that underpin and support the understanding of the greatest number of mathematical concepts. When children meet familiar tools and approaches, this signals explicit links between implicitly connected elements of mathematics. For example, ratio tables are used to calculate the dimensions of similar shapes, percentage changes, plotting coordinates and equivalent fractions which signposts the links between them. Most importantly, this concrete, pictorial and abstract (CPA) approach to maths, is not a linear model –the movement between these different representations enable children to develop a deeper understanding of the concept and connect ideas together to create a solid schema.

Choosing a calculation method:

Children need to be taught and encouraged to use a logical process in deciding what approach they will take to a calculation to ensure they select the most appropriate method for the numbers involved. This consists of:



What does reasoning 'look like' in Maths?

Reasoning v Explaining

When the children are reasoning they do not need to have the right answer – in fact the wrong answer is equally acceptable but they need to be able to justify why they have written/said/thought what they have written/said/thought eg 'I think that 713 might be in the 11 times table because the digits add up to 11'. (Their justification for this might be that they know that when the digits of any number add up to 9, or a multiple of 9, then they know that that number is in the 9 times table eg 612 or 972)

It is important that reasoning is not confused with explaining. Children do need to be provided with opportunities to explain what they have done but reasoning is essential if children are going to be able to develop depth of understanding and be able to make links and justify these links based on this mathematical understanding. The language of explanation would involve using **I do/I did** but the language of reasoning would involve using **I think/I noticed/when I tried.**

When the children reason they need to apply logical thinking to a situation so that they can come up with an appropriate problem solving strategy that they can then develop to work towards, but not necessarily come up with, a solution.

So, reasoning would be needed when:

- first encountering a new challenge
- logical thinking is required
- a range of starting points is possible
- there are different strategies to solve a problem
- there is missing information
- selecting a problem-solving skill
- evaluating a solution in context
- there is more than one solution
-

This is a breakdown of the steps leading to reasoning:

Step 1: *Describing:* simply tells what they did.

Step 2: *Explaining*: offers some reasons for what they did. These may or may not be correct. The argument may yet not hang together coherently. This is the beginning of being able to start to reason.

Step 3: *Convincing*: confident that their chain of reasoning is right and may use words such as, 'I think' or 'without doubt'. The underlying mathematical argument may or may not be accurate yet is likely to have more coherence and completeness than the explaining stage..

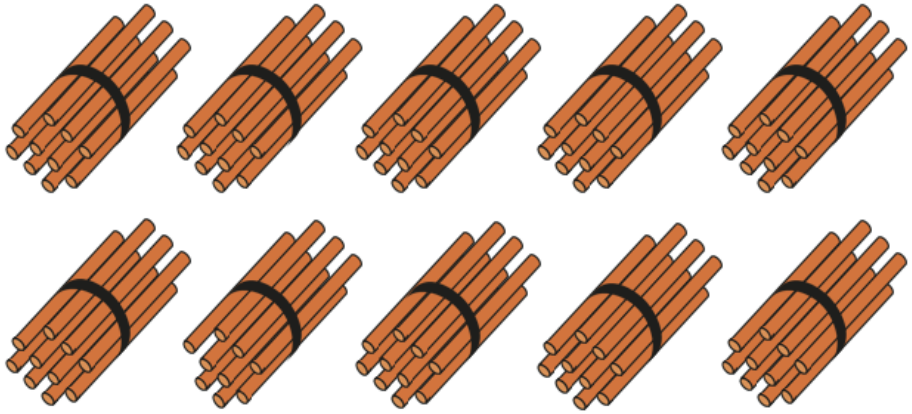
Step 4: *Justifying:* a correct logical argument that has a complete chain of reasoning to it and uses words such as 'because', 'therefore', 'and so', 'that leads to' ...

Step 5: *Proving:* a watertight argument that is mathematically sound, often based on generalisations and underlying structure. This is also called deductive reasoning and it is at this point that children are working at depth.

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

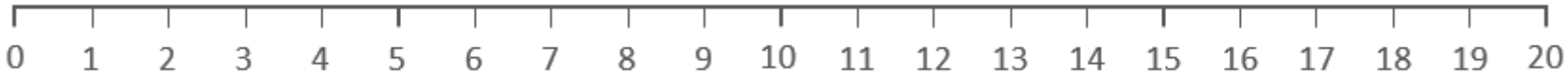
Count using a Gattegno chart

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

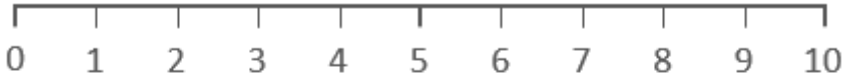
Number and Place Value

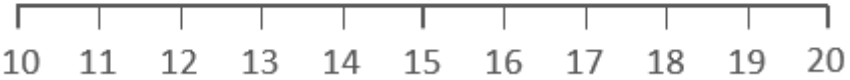
Year 1

Numbers to 20 in the linear number system.

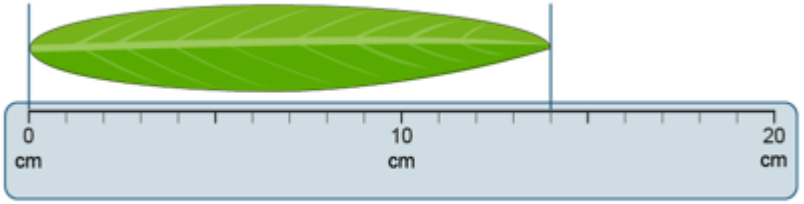


Recognise the position of each number on the number line.

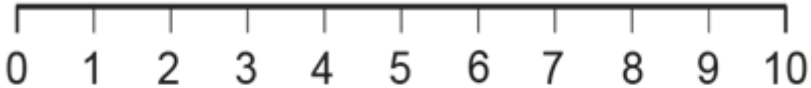




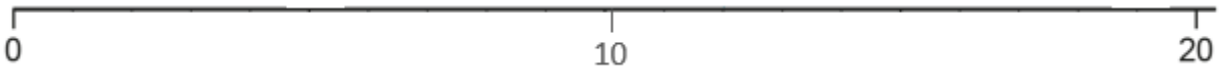
Make connections between 0-10 and 10-20 number lines.



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.

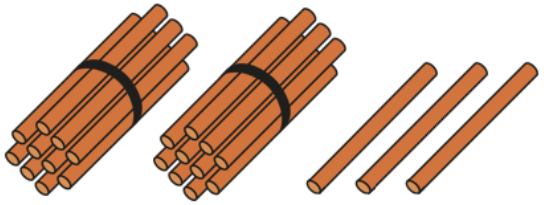
Number and Place Value

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.

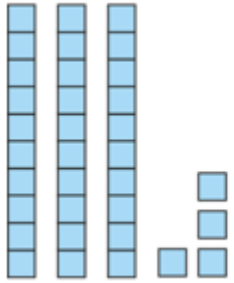
1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

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

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

Tap out 2-digit numbers on the Gattegno Chart.

Make connections to how we write the number.



10s	1s
3	4

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

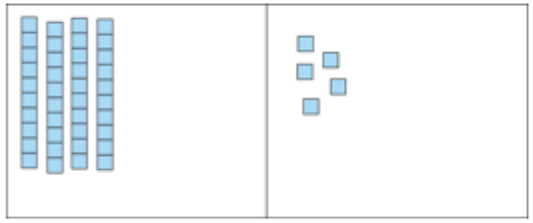
Number and Place Value

Year 2

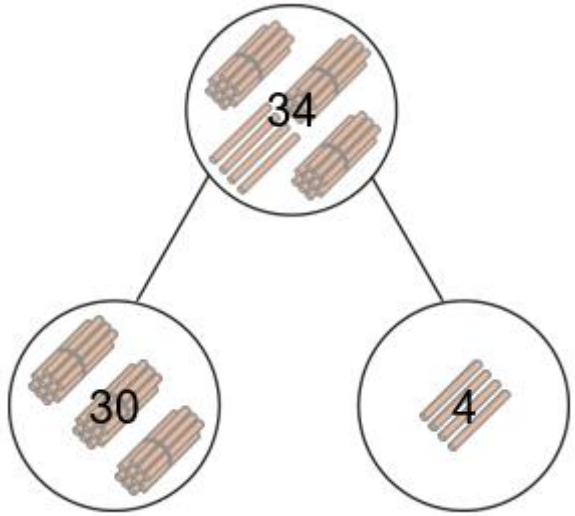
Place Value in 2-digit numbers (2)

Vocabulary:

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

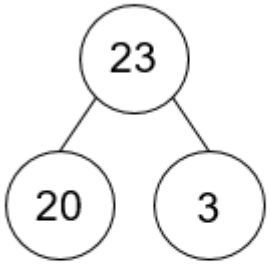


Make connections between the Deines and 100 square.



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.

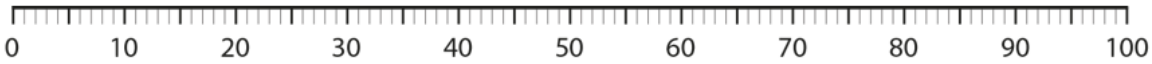
Vocabulary:

Ones Tens Place Value Number Line Multiple Previous Next

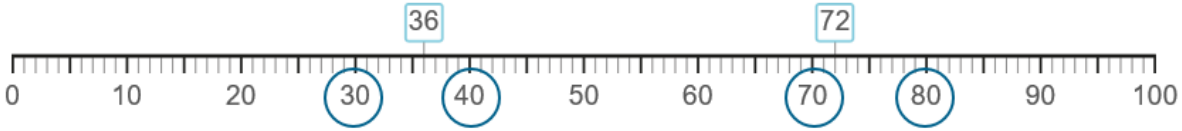
Bead string/bar

32

Describe the number of beads in tens and ones.



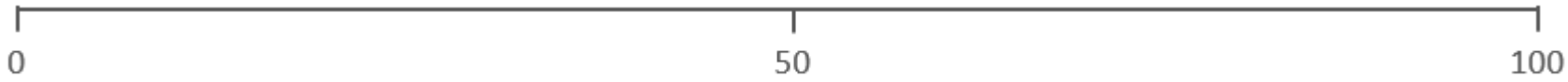
Make connections between the bead string and the number line.



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.

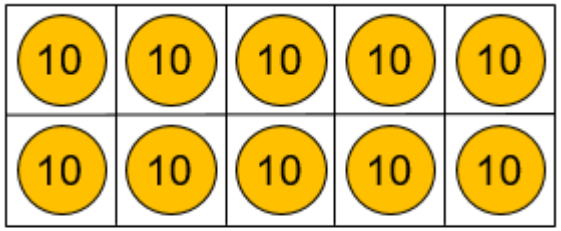
Number and Place Value

Year 3

Equivalence of 10 tens and 1 hundred (1)

Vocabulary:

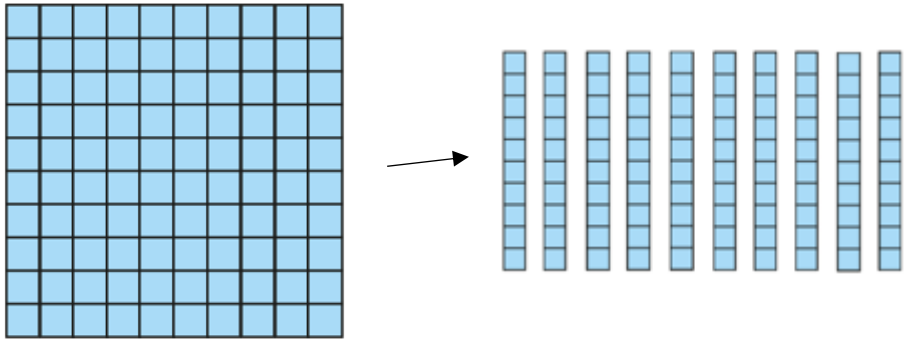
Ones Tens Hundreds Place Value Digit Represents Counters Pence Coin Tens Frame Multiple Previous Next Gattegno Deines One-tenth the size Ten-times the size Centimetres Metres



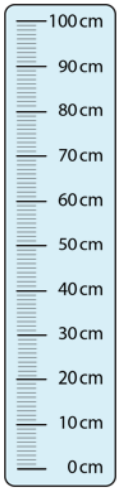
100

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

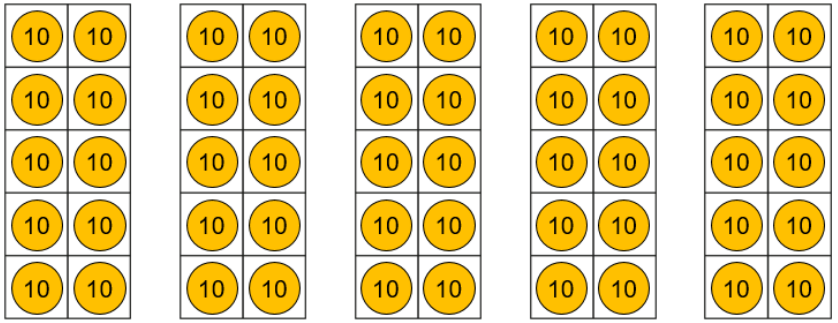
Ten tens are equivalent to 100.

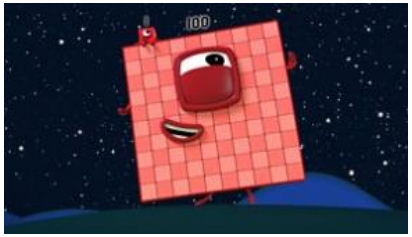


Demonstrate using Deines that 10 tens are equal to 1 hundred.



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.

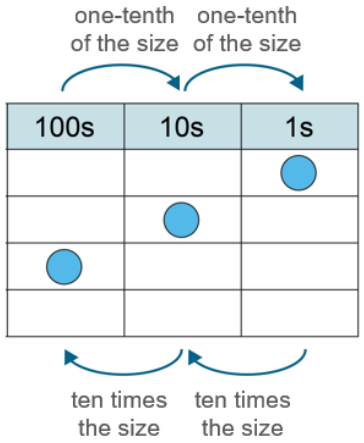
Ten, Twenty, Thirty…

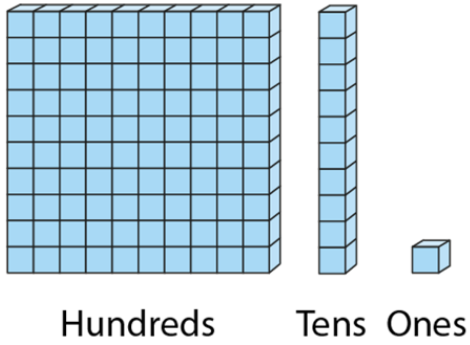
One ten, two tens, three tens…

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

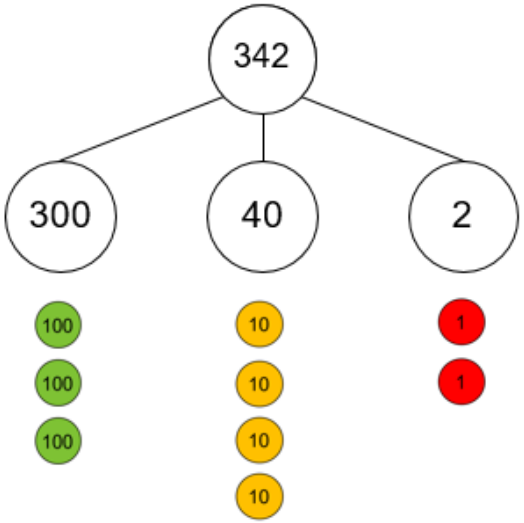
Number and Place Value

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.

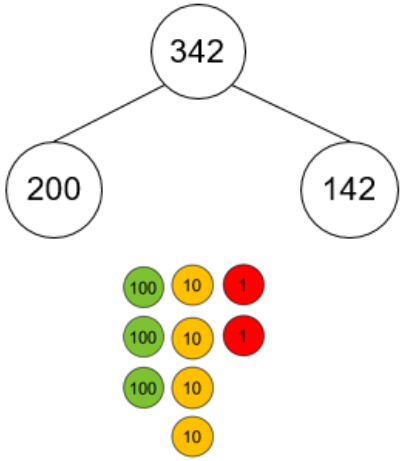
The 3 represents 3 hundreds. It has a value of 300.

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

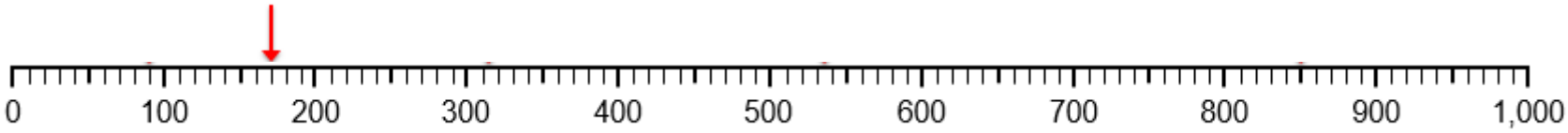
Year 3

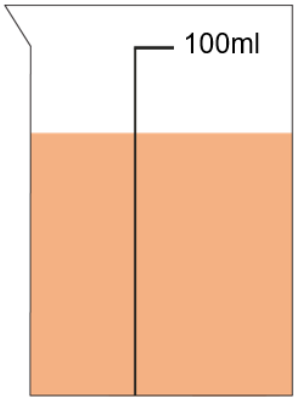
Three-digit numbers in the linear number system.

Vocabulary:

Ones Tens Hundreds Place Value Number line Halfway Multiples of 10

Multiples of 100 Previous Next Between

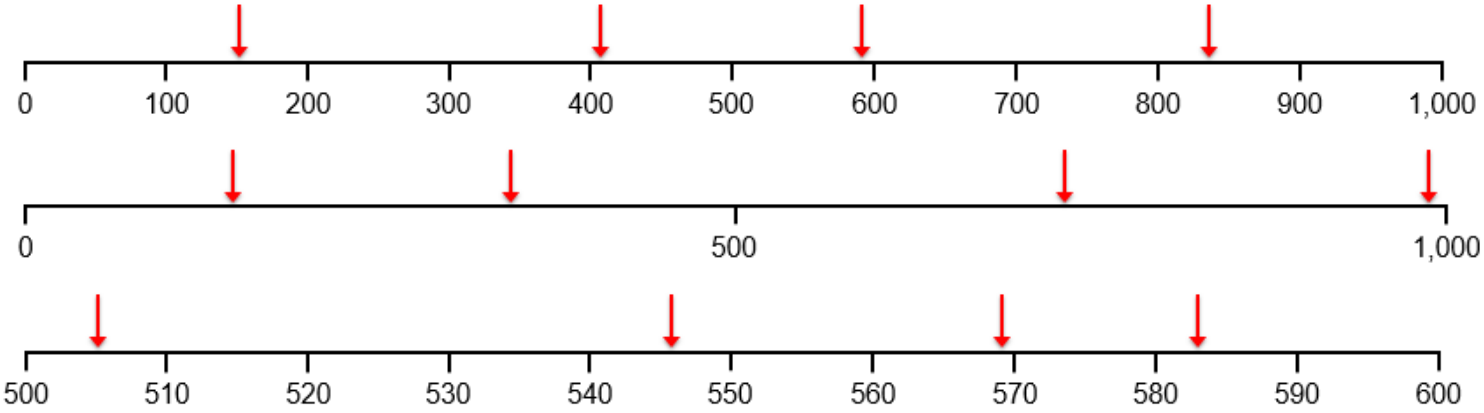




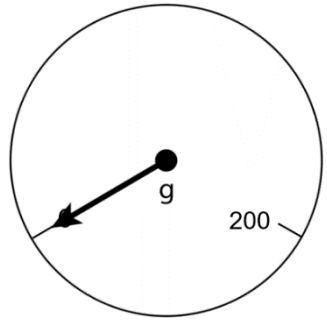
Identify the previous and next multiple of one hundred that a number sits between.

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

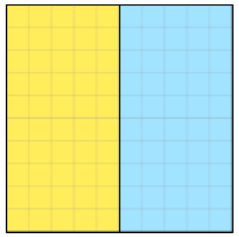
Year 3

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

Vocabulary:

Intervals Scales Divisions Equal Parts Whole Value

Bar model Plus Minus Multiply Divide

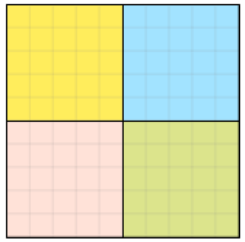


100	
50	50

100 = 50 + 50

100 = 2 × 50 100 = 50 × 2

100 ÷ 2 = 50 100 ÷ 50 = 2

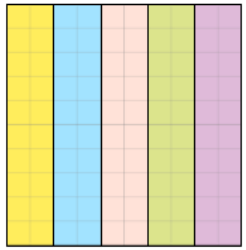


100			
25	25	25	25

100 = 25 + 25 + 25 +25

100 = 4 × 25 100 = 25 × 4

100 ÷ 4 = 25 100 ÷ 25 = 4

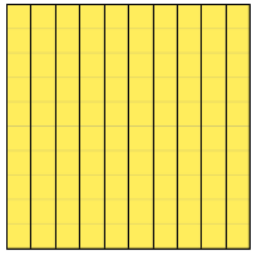


100				
20	20	20	20	20

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

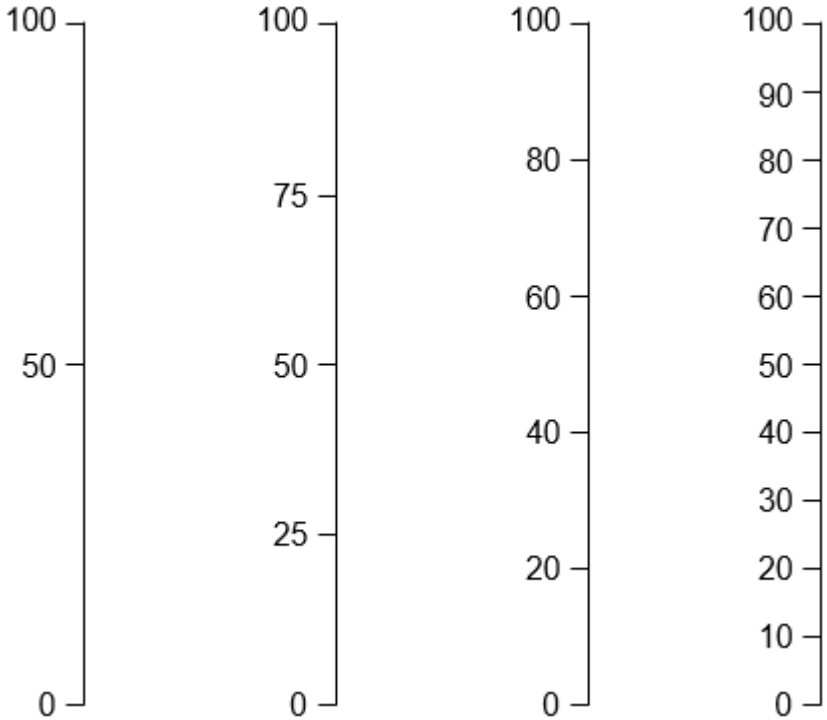
Year 3

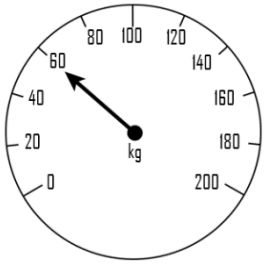
Reading Scales with 2, 4, 5, or 10 intervals

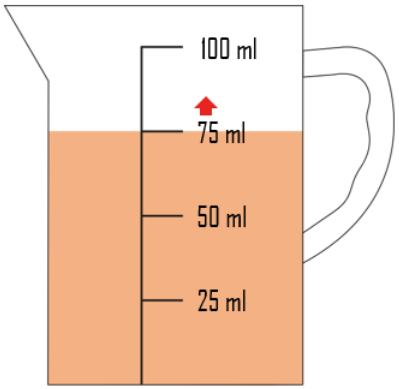
Vocabulary:

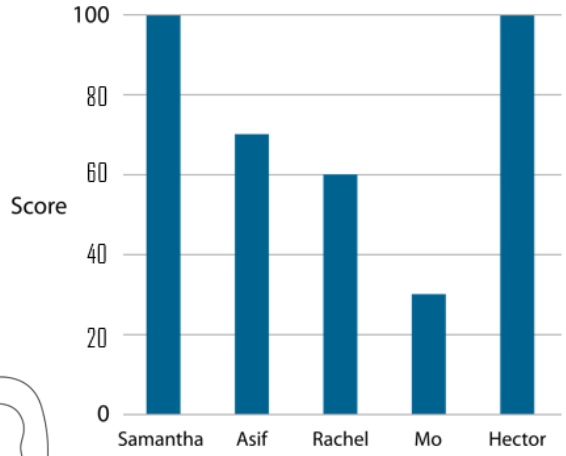
Intervals Scales Divisions Equal Parts Whole Value

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.

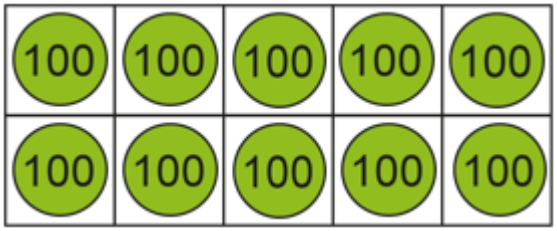
Number and Place Value

Year 4

Equivalence of 10 hundreds and 1 thousand (1)

Vocabulary:

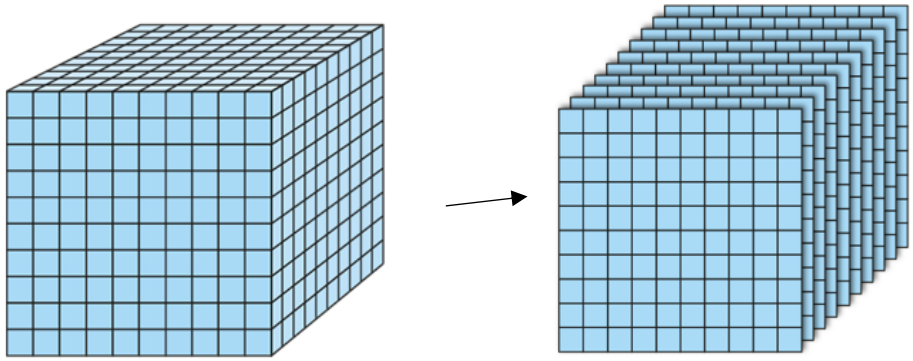
Ones Tens Hundreds Thousands Place Value Counters Pence Coin Tens Frame Multiple Previous Next Gattegno Deines One-tenth the size Ten-times the size Centimetres Metres Millilitres Litres Grams Kilograms



1,000

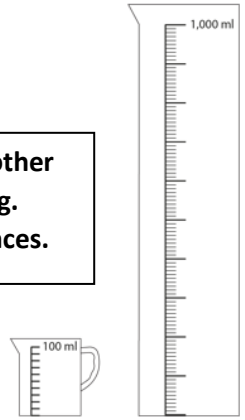
Count in multiples of 100 to 1000 using Place Value Counters.

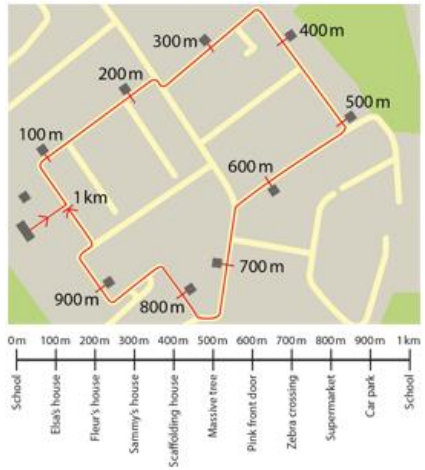
10 hundreds are equivalent to 1000.

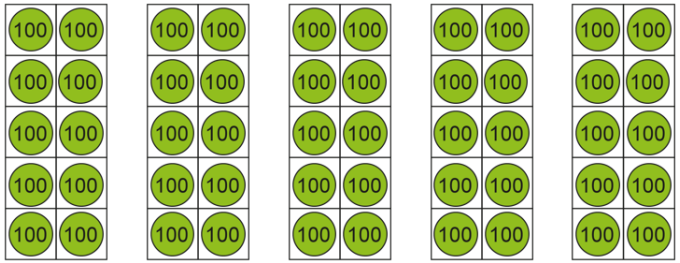


Demonstrate using Deines that 10 hundreds are equal to 1 thousand.

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.

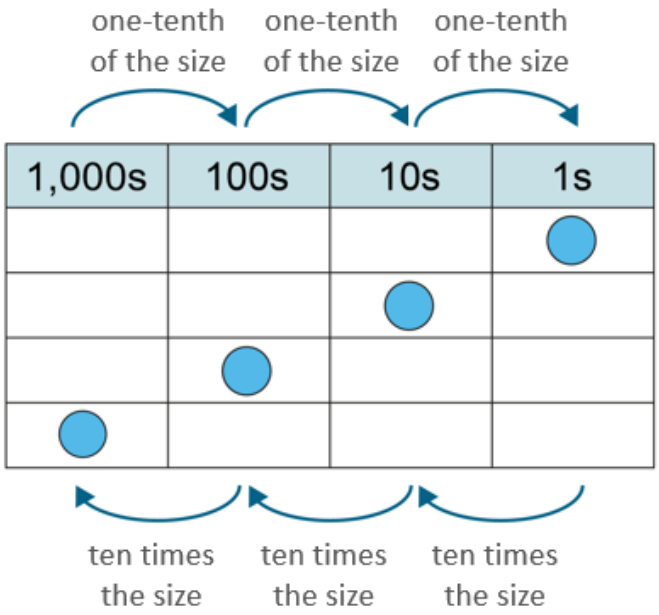
Eight hundred, nine hundred, one thousand, one thousand one hundred….

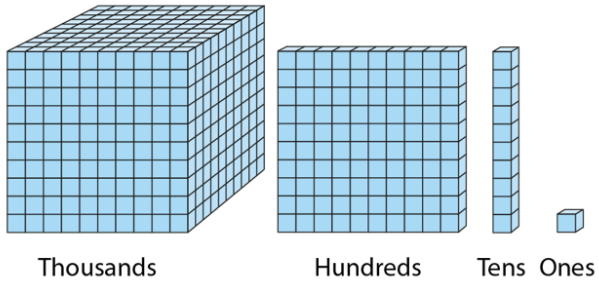
Eight hundred, nine hundred, ten hundreds, eleven hundreds…

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

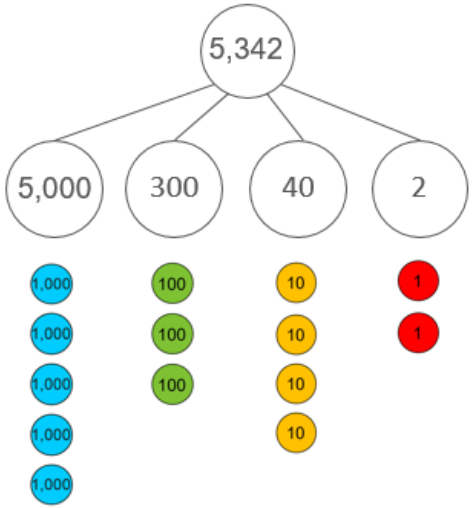
Number and Place Value

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

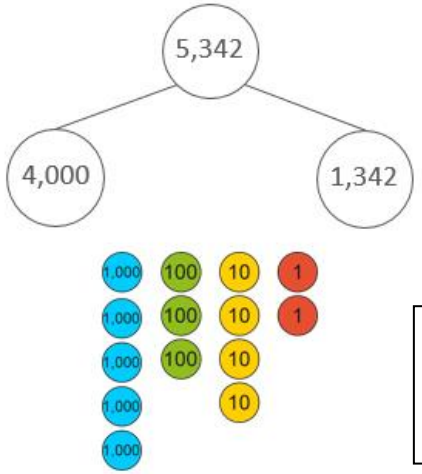
1,000	2,000	3,000	4,000	5,000	6,000	7,000	8,000	9,000
100	200	300	400	500	600	700	800	900
10	20	30	40	50	60	70	80	90
1	2	3	4	5	6	7	8	9

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

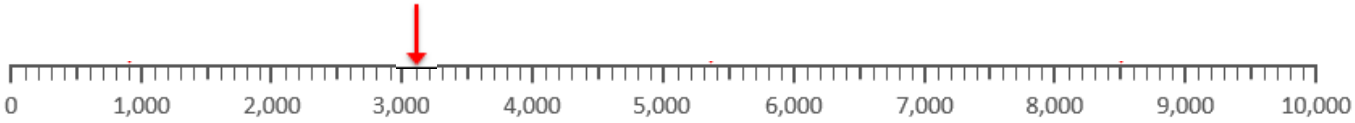
Year 4

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

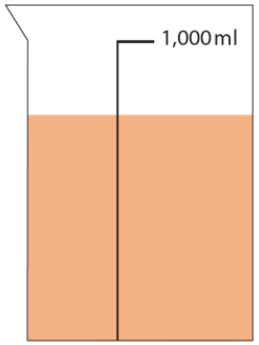
Less than Grams Millilitres Estimate

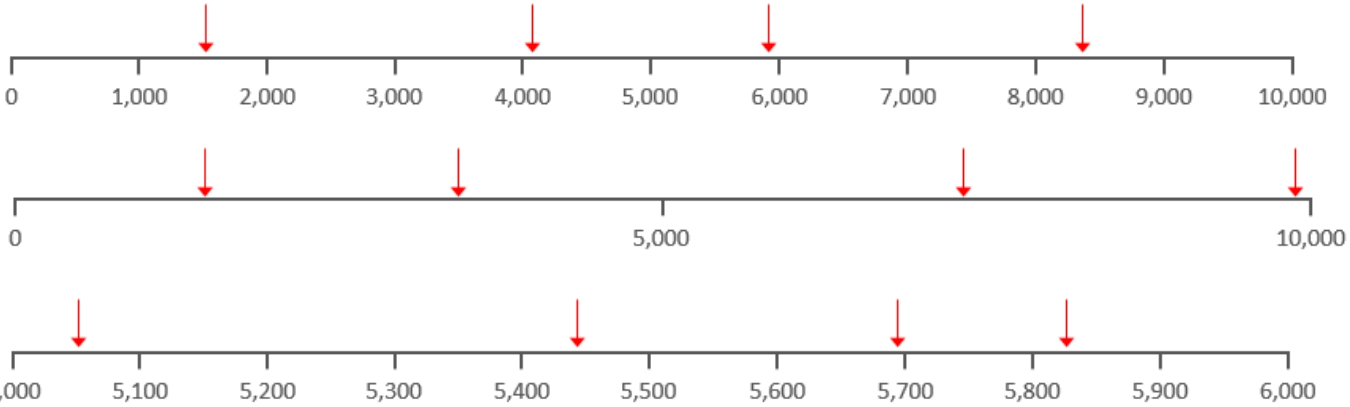


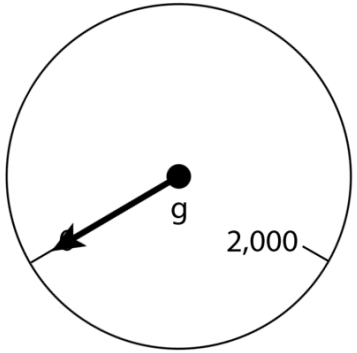
Identify the previous and next multiple of one thousand that a number sits between.

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.

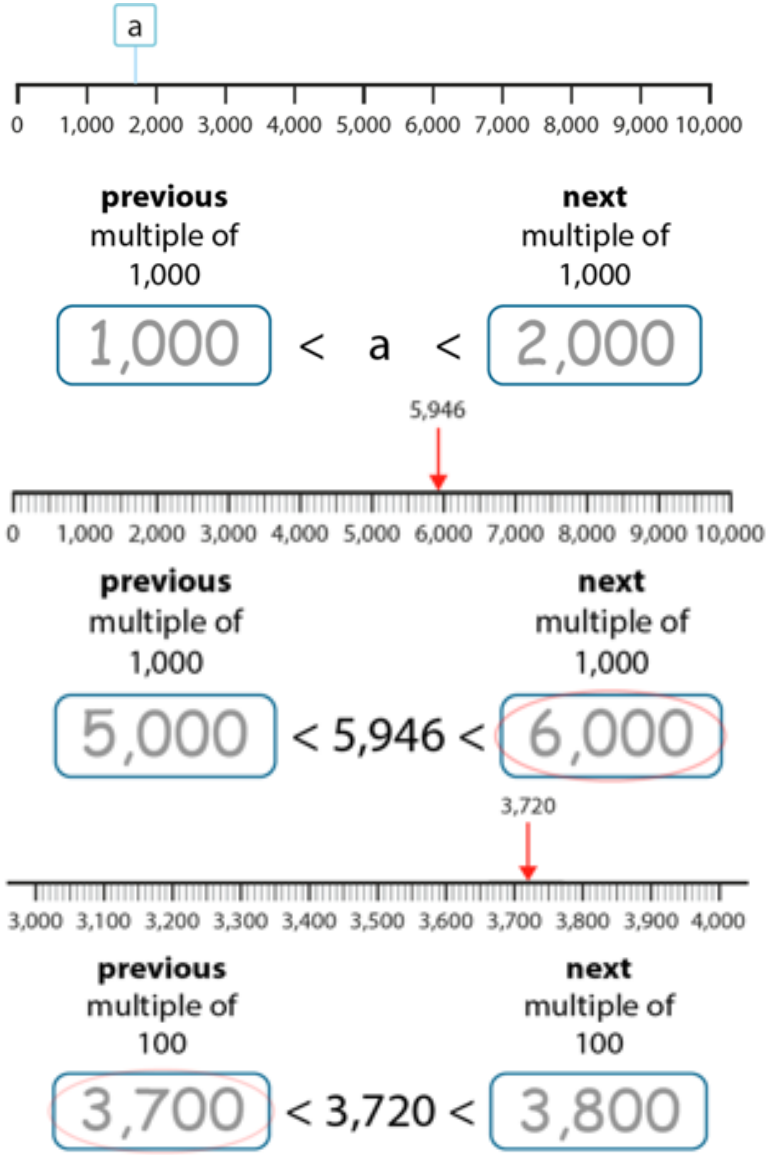
Number and Place Value

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

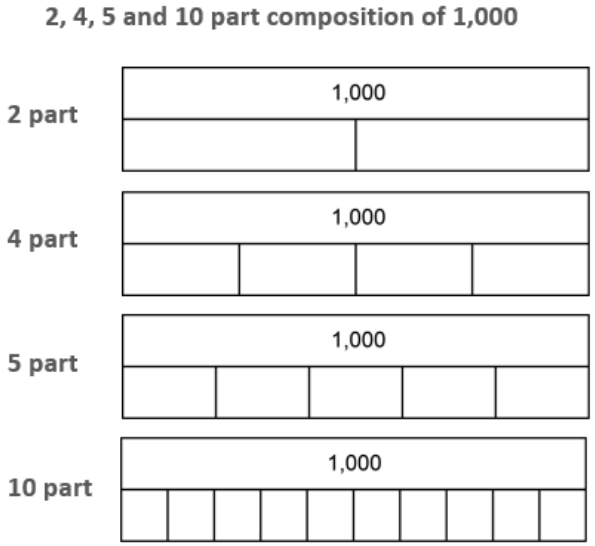
Year 4

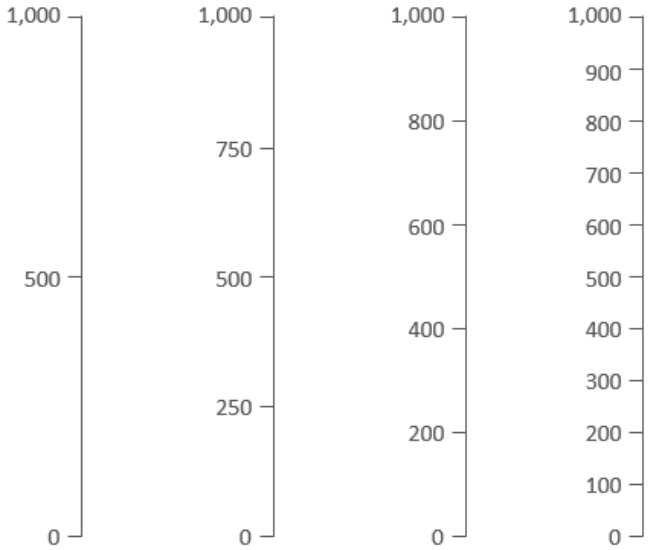
Reading scales with intervals of 2, 4, 5 or 10.

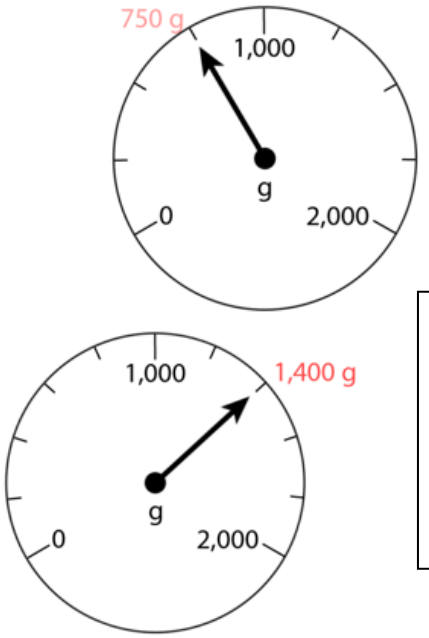
Vocabulary:

Intervals Scales Divisions Equal Parts Whole Value

Bar model Plus Minus Multiply Divide Bar graph Grams

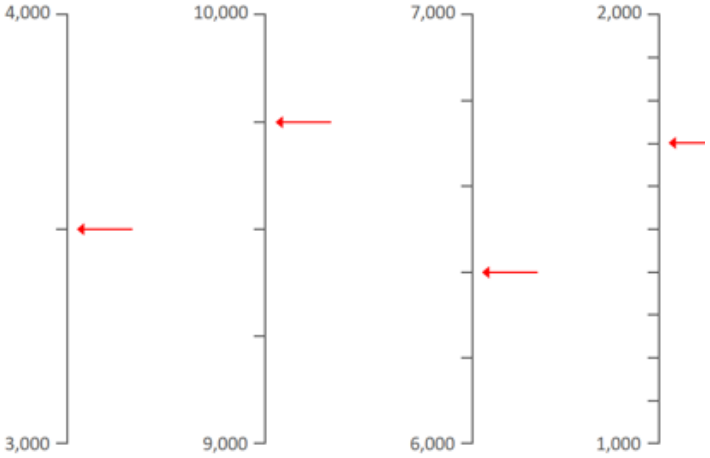




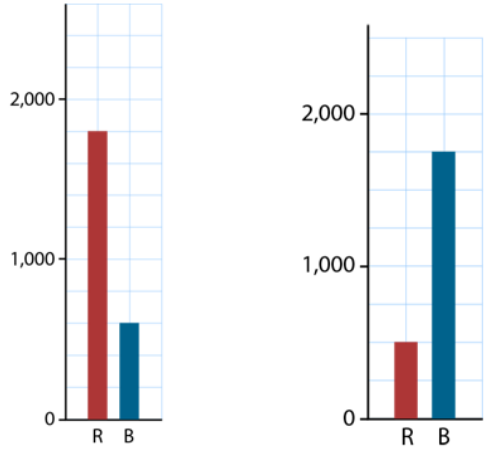


Use the number of intervals given to find values in other contexts (e.g. weighing scales/bar graphs)

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.



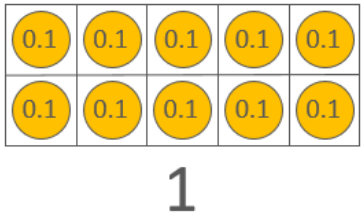
Number and Place Value

Year 5

Tenths and Hundredths

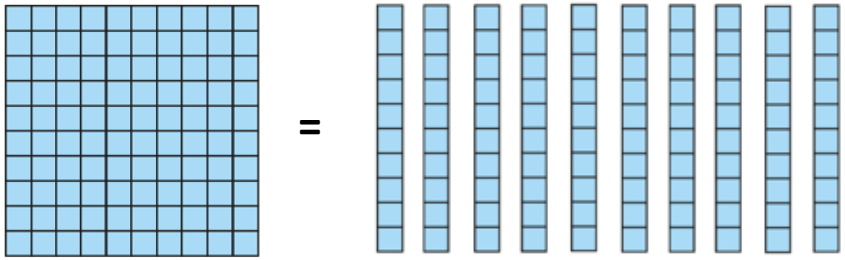
Vocabulary:

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



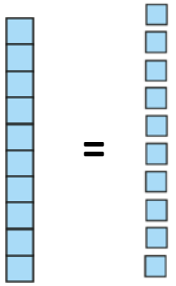
Ten tenths are equal to one (whole).

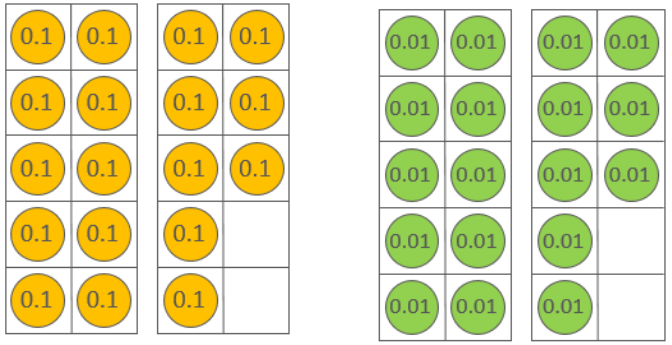
One (whole) is equal to ten tenths.



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

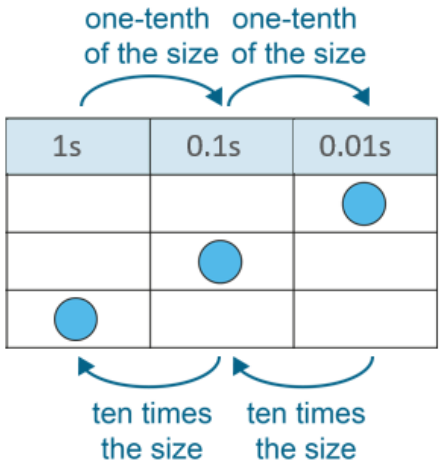
Count in multiples of tenths and hundredths.

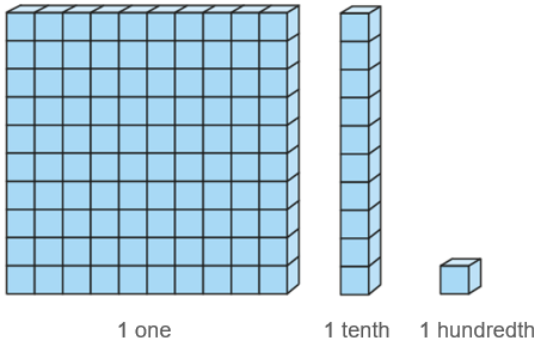
Eight tenths, nine tenths, ten tenths, eleven tenths…

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.

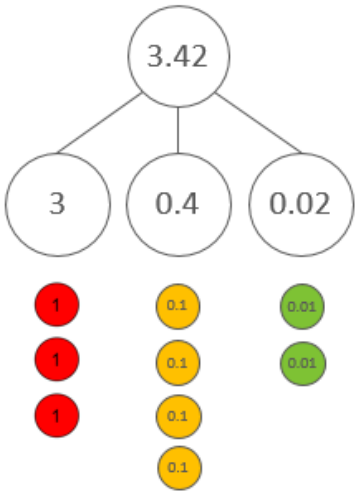
Number and Place Value

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

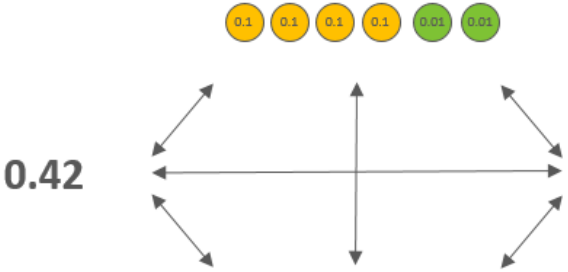
Represent on a Place Value Chart and describe each value.

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

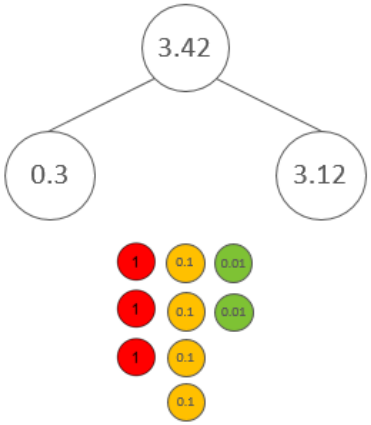
1,000	2,000	3,000	4,000	5,000	6,000	7,000	8,000	9,000
100	200	300	400	500	600	700	800	900
10	20	30	40	50	60	70	80	90
1	2	3	4	5	6	7	8	9
0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09

0.02 + 0.4 + 3 + 50 = 53.42

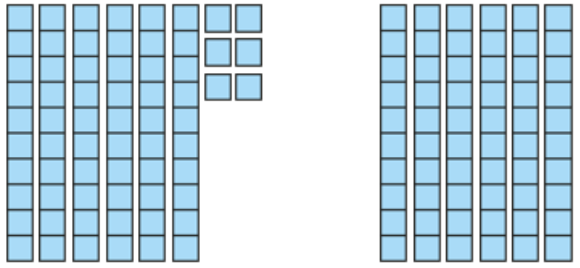
72.49 = 0.09 + 2 + _____ + _____

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

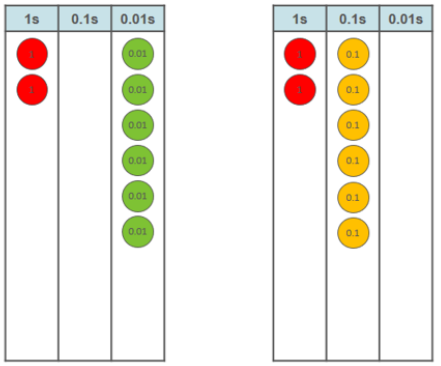
Identify missing parts of an equation.



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

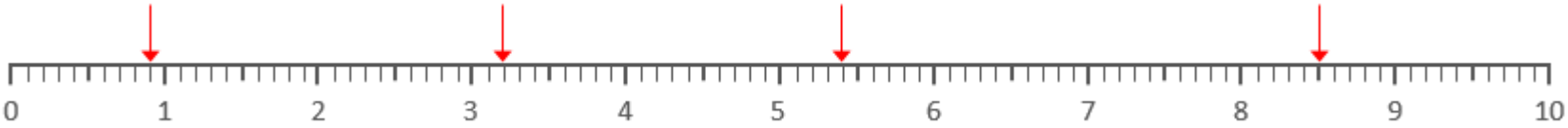
Decimal Fractions in the Linear Number System

Vocabulary:

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

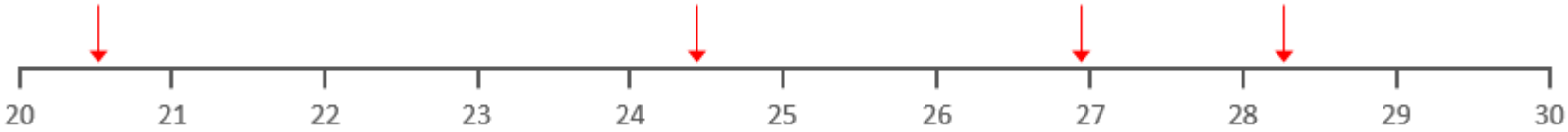
Less than Estimate

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

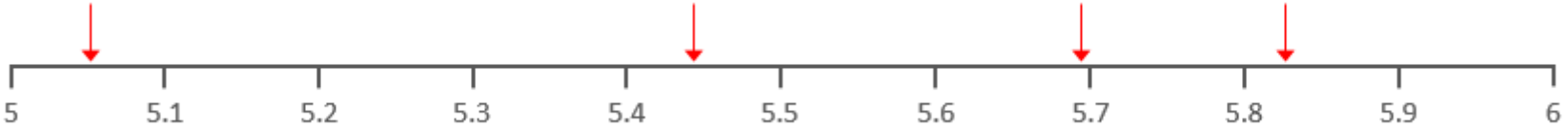
Decimal Fractions in the Linear Number System (1)

Vocabulary:

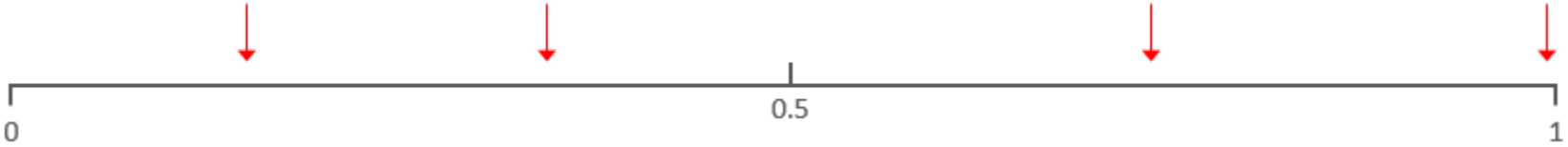
Ones Tens Hundredths Tenths Place Value Number line Halfway Previous Next Multiple of… Between Round Greater than

Less than Grams Millilitres Litres Grams Kilograms Metres Centimetres Estimate Round

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

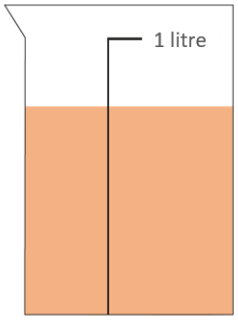


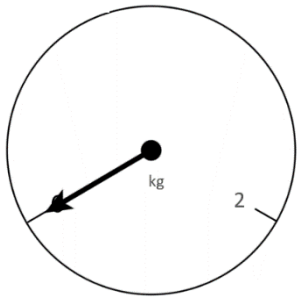
Estimate the value of an arrow on a blank number line split into tenths.

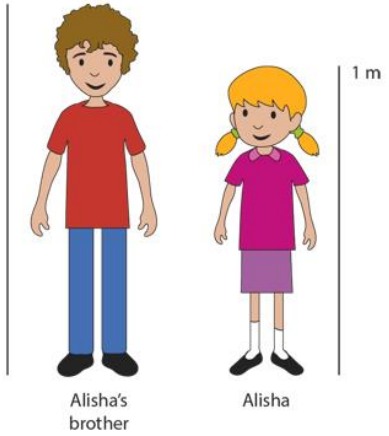


Estimate the value of an arrow on a blank number line.

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







Estimate a value when given one known value.

Number and Place Value

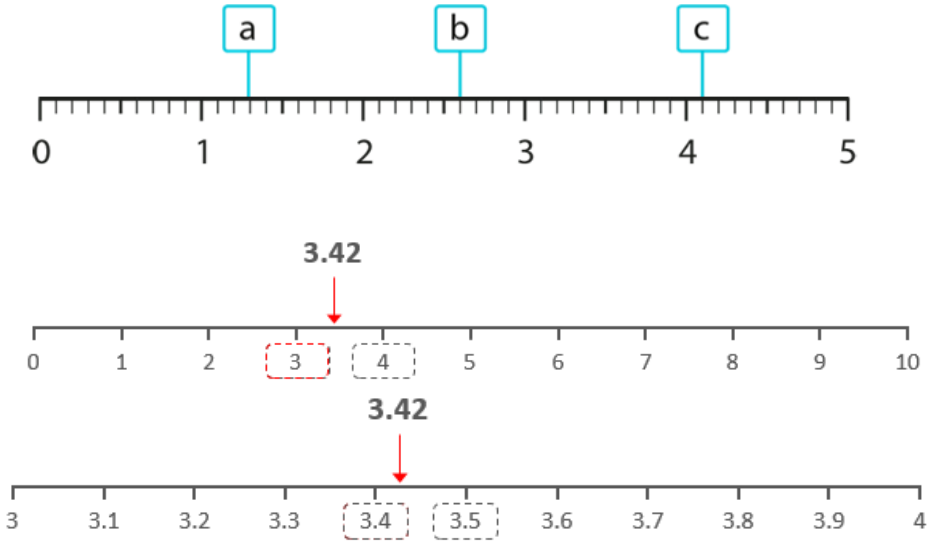
Year 5

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

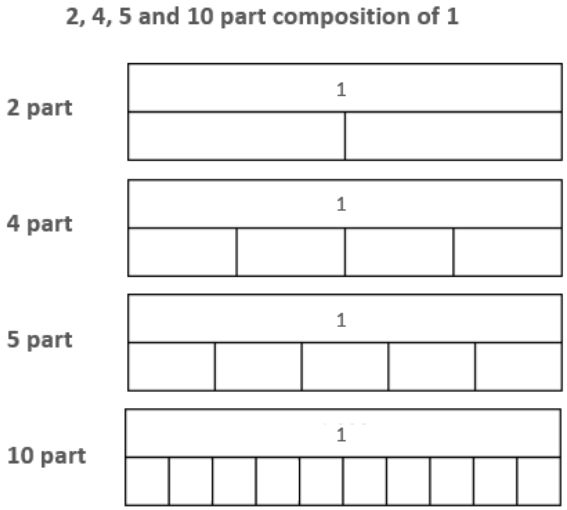
Year 5

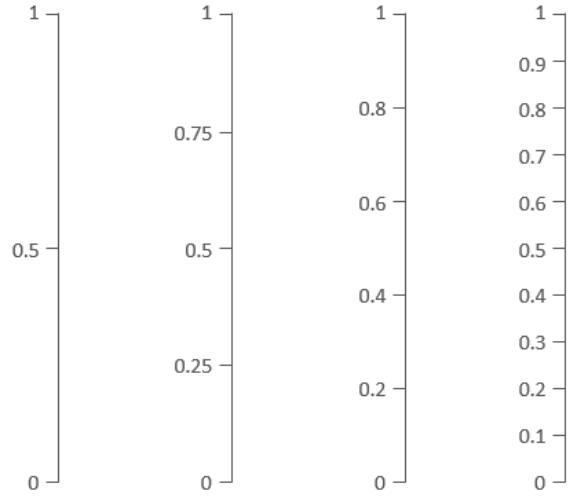
Reading Scales with 2, 4, 5, or 10 intervals

Vocabulary:

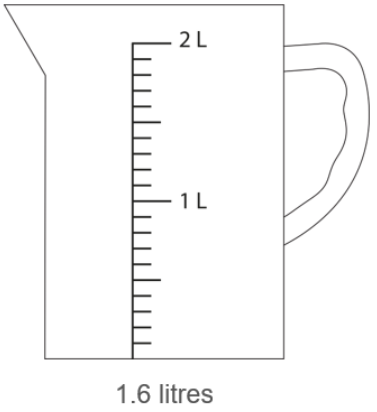
Intervals Scales Divisions Equal Parts Whole Value

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

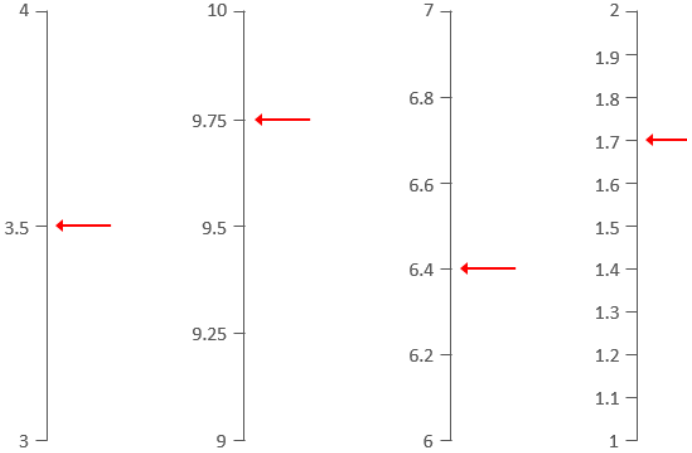




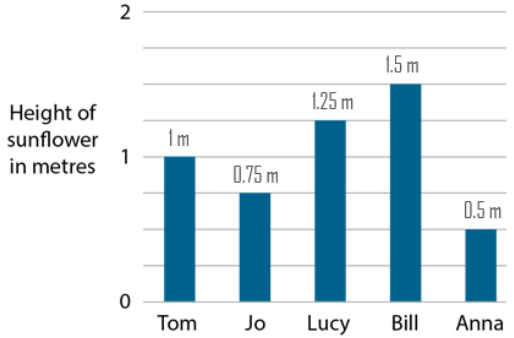
Identify intervals and count forwards/backwards using these intervals with both bar models and vertical number lines.

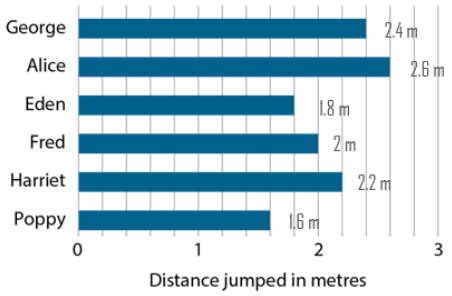


Use the number of intervals given to find values in other contexts (e.g. weighing scales/bar graphs)



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





Number and Place Value

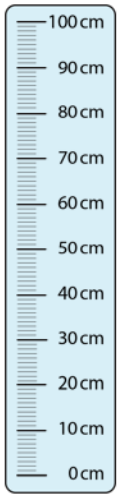
Year 5

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.

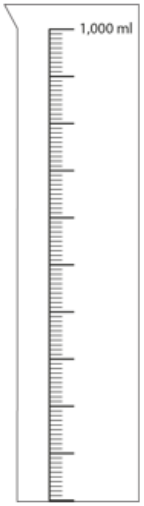
Practice counting forwards and backwards along the scale.

1 metre is equivalent to 100 centimetres.

Recognise that 1000m is equivalent to 1km.

Practice counting forwards and backwards along the scale.

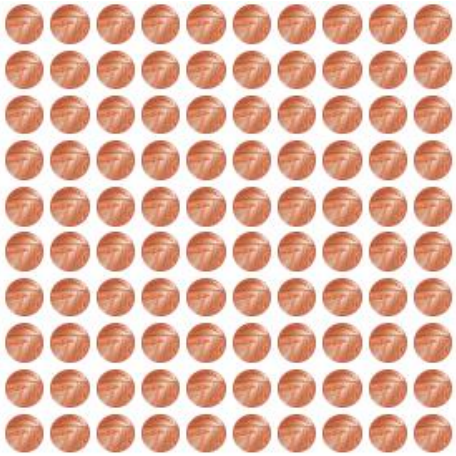
1 kilometre is equivalent to 1000 metres.



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

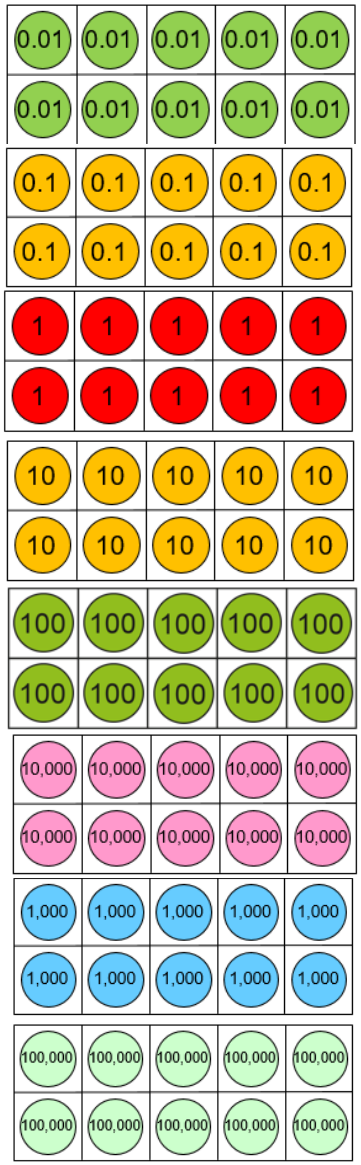
0 . 0 1	one hundredth
0 . 1	one tenth
1	one
1 0	ten
1 0 0	one hundred
1 , 0 0 0	one thousand
1 0 , 0 0 0	ten thousand
1 0 0 , 0 0 0	one hundred thousand
1 , 0 0 0 , 0 0 0	one million
1 0 , 0 0 0 , 0 0 0	ten million

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.

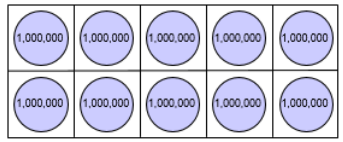
10 thousands are equivalent to 1 ten thousand.

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

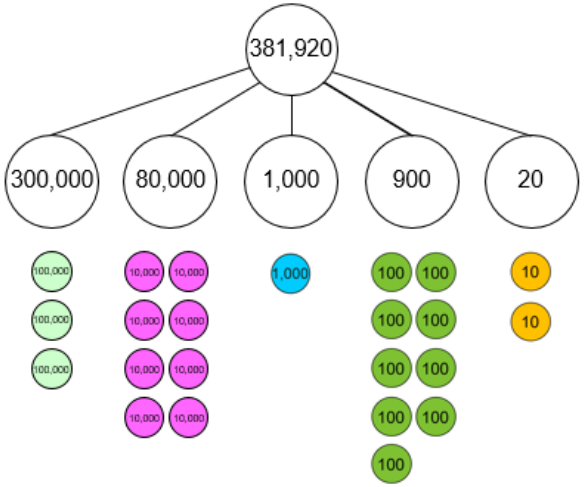
Number and Place Value

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.

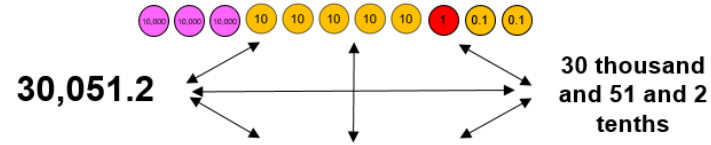
The 2 represents 2 tens

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.

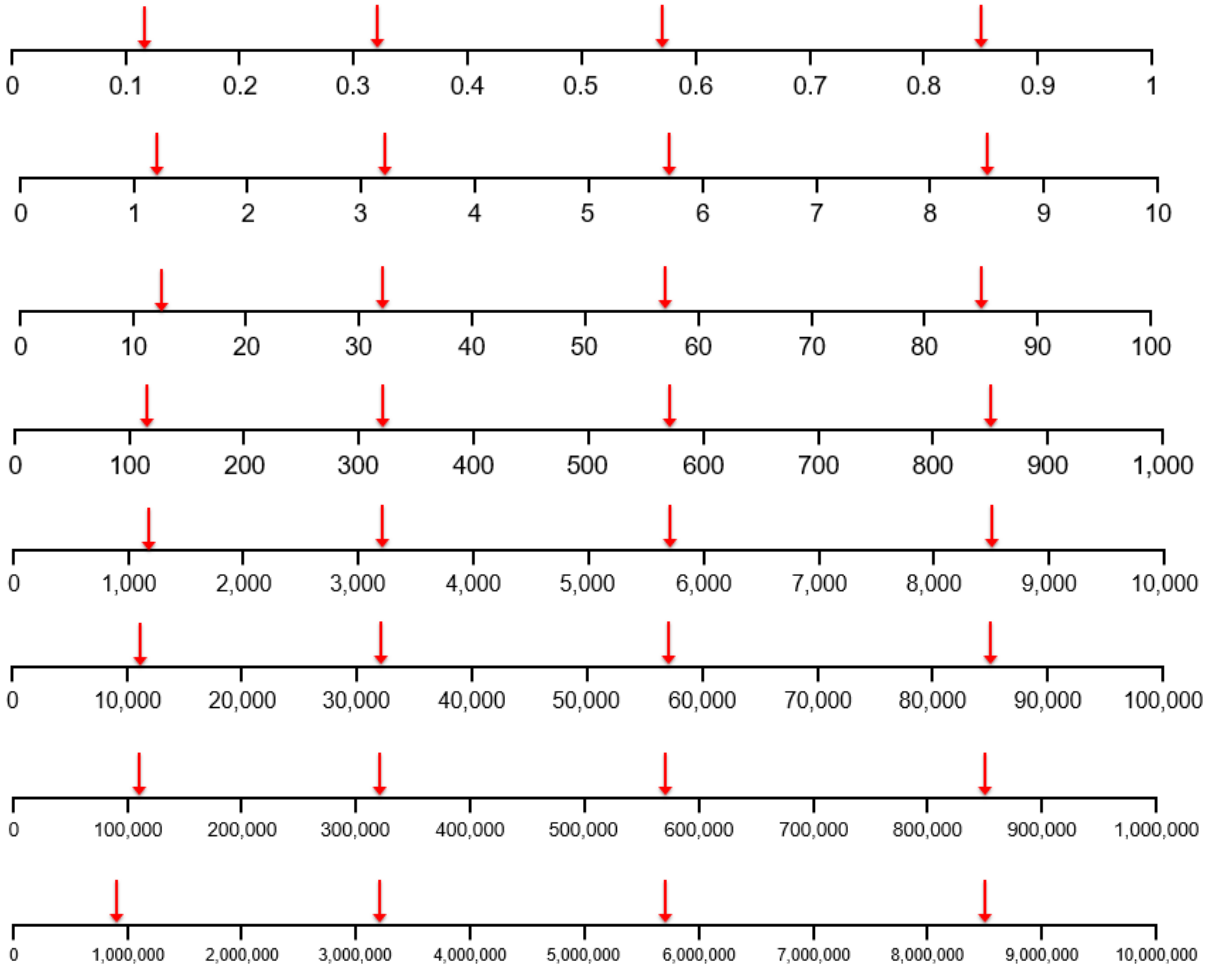
Number and Place Value

Year 6

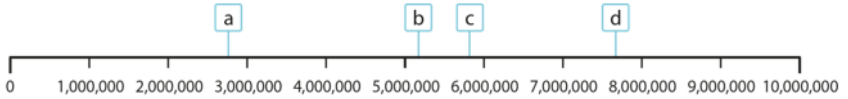
Numbers to 10,000,000 in the Linear Number System

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.

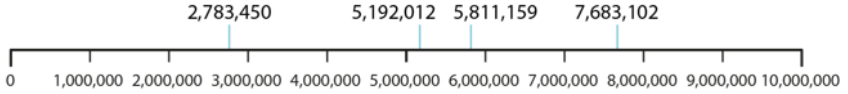
Round to the nearest million/hundred thousand/ten thousand.

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

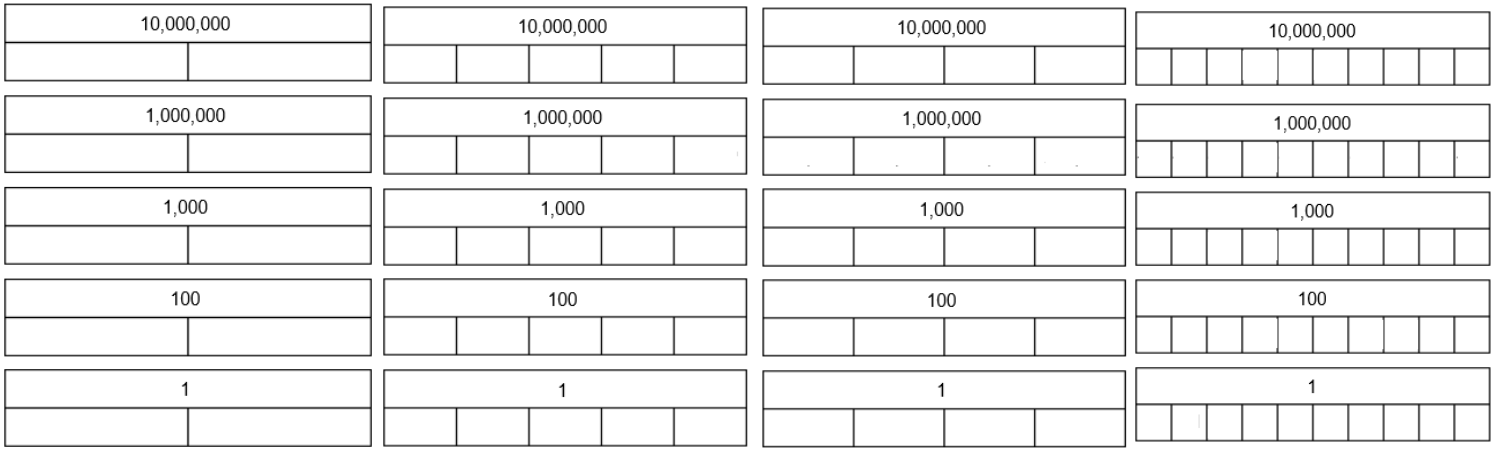
Number and Place Value

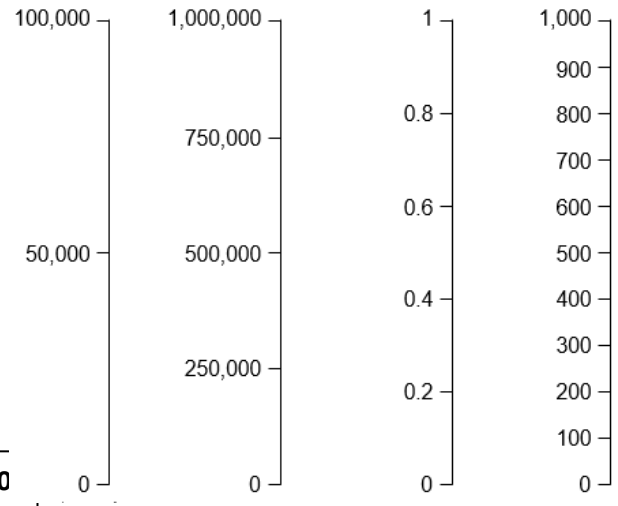
Year 6

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

Vocabulary:

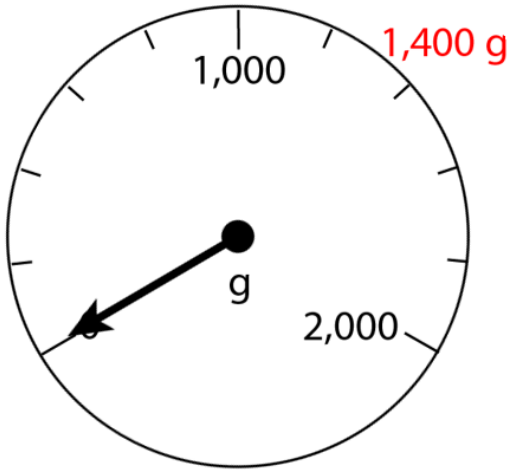
Ones Tens Hundreds Thousands Ten-thousands Hundred-thousands Millions Ten-Millions
Tenths Hundredths Represents Digit Place Value Intervals Scales Divisions
Equal Parts Whole Value Bar model Plus Minus Multiply Divide Grams
Millilitres Litres Grams Kilograms Metres Centimetres Estimate

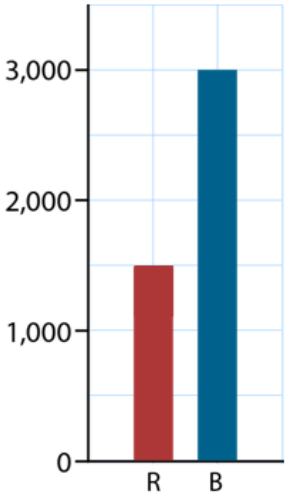


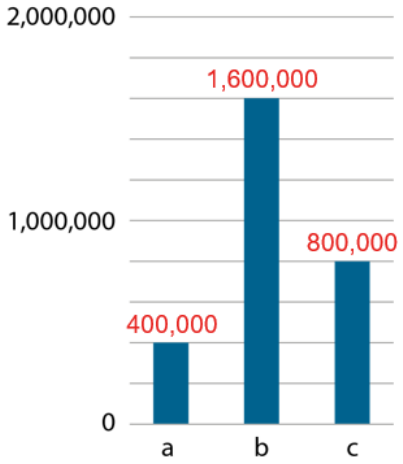


Make connections with different wholes when dividing these into 2, 4, 5, and 10 equal parts.

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)