



Number Facts - Reception



Early Learning Goal : Number

Children at the expected level of development will: -

- Have a deep understanding of number to 10, including the composition of each number
- Subitise (recognise quantities without counting) up to 5
- Automatically recall (without reference to rhymes, counting or other aids) number bonds up to 5 (including subtraction facts) and some number bonds to 10, including double facts.

Early Learning Goal : Numerical Patterns

Children at the expected level of development will:

- Verbally count beyond 20, recognising the pattern of the counting system
- Compare quantities up to 10 in different contexts, recognising when one quantity is greater than, less than or the same as the other quantity
- Explore and represent patterns within numbers up to 10, including evens and odds, double facts and how quantities can be distributed equally.

Number Facts: Number and place value

- Know the sequence of counting in ones from 1 to 20 (by rote)
- Recognise numerals 0 - 9
- Accurately count up to 20 objects
- Place numbers to 20 in order
- Verbally count beyond 20 by patterning
- Recognise even and odd numbers up to 10

Number Facts: Fractions

- Develop an awareness of halving through practical experiences.

Number Facts: Early Calculation

- Be able to recognise numbers within numbers up to 10 (so 7 is made from 5 and 2)
- Know number bonds to 5
- Use the language of 'more' and 'fewer' to compare two sets of objects.
- Find the total number of items in two groups by counting all of them.
- Say the number that is one more than a given number to 20.
- Say the number that is one less than a given number to 20.
- Recognise when a quantity or items is reduced or increased by one.
- Subtract a quantity within 20. Say how many are left by counting (or counting back)
- Double small numbers (e.g. the amount shown on two dice)
- Share objects equally, or fairly, by putting them in equal sized groups

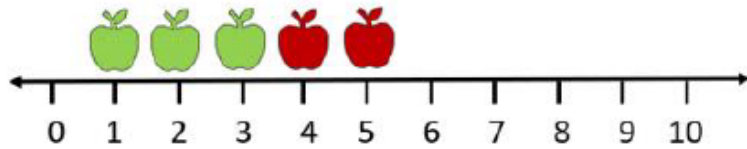
Number facts: Measure

- Develop an awareness of measure through practical experiences (e.g. length, weight/mass, capacity, distance, height) in readiness for more precise measuring in KS1
- Develop an awareness of time passing, in preparation for telling the time.
- Begin to use the language of time (next, before) to sequence personal events
- Develop their use and understanding of positional language.
- Explore 2-D and 3-D shape (e.g. through constructions and patterns)

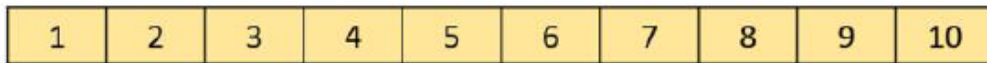
Mathematical models and images to support conceptual understanding underpinning key facts in Reception



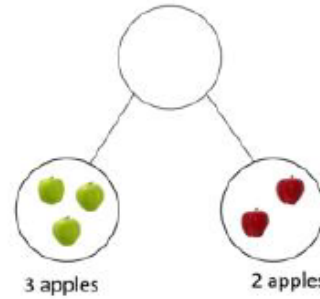
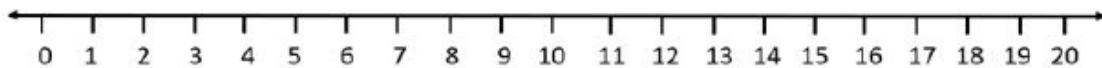
Early representations of structure



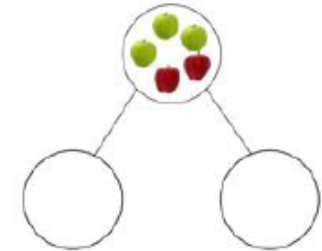
'part-part-whole' language



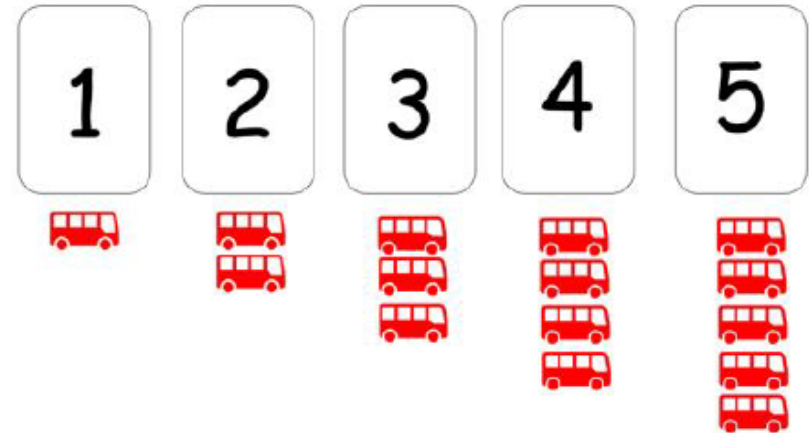
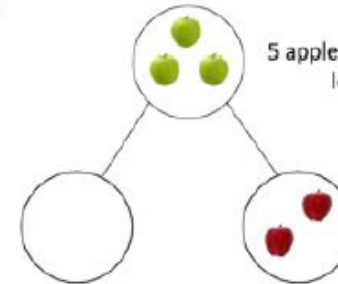
number tracks and number lines



3 apples and 2 apples altogether is 5 apples



5 apples take away 2 apples
leaves 3 apples





Number Facts - Year 1



Number and place value

Pupils should be taught to:

- count to and across 100, forwards and backwards, beginning with 0 or 1, or from any given number
- count, read and write numbers to 100 in numerals
- count in multiples of twos, fives and tens
- given a number, identify one more and one less

Addition and subtraction

Pupils should be taught to:

- read, write, and interpret mathematical statements involving addition (+) and subtraction (-) and equals (=) signs
- represent and use number bonds and related subtraction facts within 20
- add and subtract one-digit and two-digit numbers to 20, including zero
- solve one-step problems that involve addition and subtraction, using concrete objects and pictorial representations, and missing number problems such as $7 = \square - 9$.

Fractions

Pupils should be taught to:

- recognise, find, and name a half as one of two equal parts of an object, shape or quantity
- recognise, find, and name a quarter as one of four equal parts of an object, shape, or quantity

Measure

Pupils should be taught to:

- recognise and know the value of different denominations of coins and notes
- sequence events in chronological order using language such as before and after, next, first, today, yesterday, tomorrow, morning, afternoon, and evening
- recognise and use language relating to dates, including days of the week, weeks, months, and years

Number Facts: Number and place value

- Know the sequence of counting in multiples of 2.
- Know the sequence of counting in multiples of 10.
- Know the sequence of counting in multiples of 5.
- Say one more or one less than any number up to 20.

Number Facts: Addition and subtraction

- Know the number bonds and related subtraction facts for all numbers to 5

For example:

$4 + 0 = 4$	$4 - 0 = 4$
$3 + 1 = 4$	$4 - 1 = 3$
$2 + 2 = 4$	$4 - 2 = 2$
$1 + 3 = 4$	$4 - 3 = 1$
$0 + 4 = 4$	$4 - 4 = 0$

- Know the number bonds for all numbers to 10 and the related subtraction facts.
- Know the number bonds for all numbers to 20 and the related subtraction facts.

For example

$10 + 2 = 12$	$12 - 2 = 10$
$9 + 3 = 12$	$12 - 3 = 9$
$8 + 4 = 12$	$12 - 4 = 8$

- Recognise that 'teens' numbers comprise one ten and some ones.

Number facts: Measure

- Say the days of the week and the months of the year in the correct order.
- Recognise the coins and notes of the realm and starting with 1p, 2p, 5p, 10p, 20p.
- Apply number bond knowledge to coins
 $10p + 1p = 11p$
 $10p + 2p = 12p$

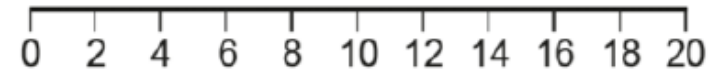
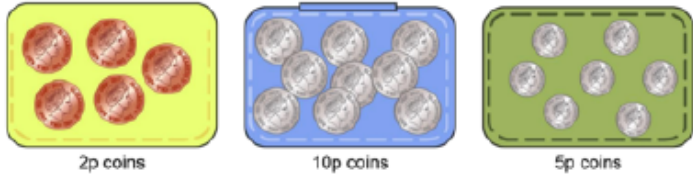
Number Facts: Fractions

Know that.....

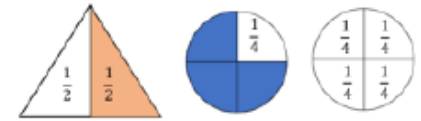
$$\frac{1}{2} + \frac{1}{2} = 1 \text{ whole}$$

$$\frac{1}{4} + \frac{1}{4} + \frac{1}{4} + \frac{1}{4} = 1 \text{ whole}$$

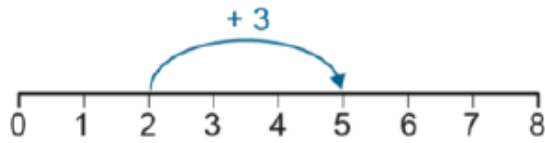
Mathematical models and images to support conceptual understanding underpinning key facts in Year 1



Number line to support counting in multiples of 2

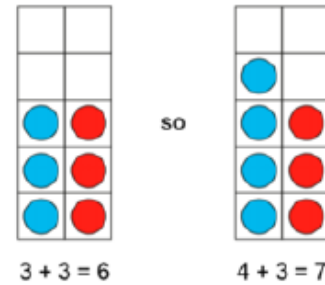


Counting in 2s, 5s and 10s in the context of money

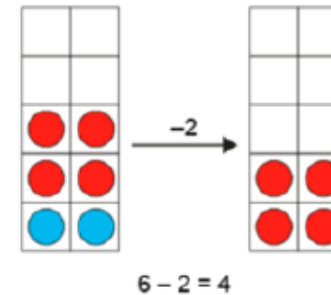


$2 + 3 = 5$

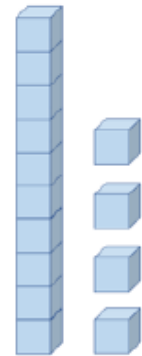
Number line with addition equation



Tens frames with counters to show near doubles addition strategy



Tens frames with counters to show subtracting two



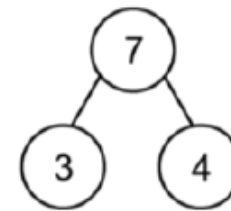
Fourteen is one ten and four ones
 $14 = 10 + 4$

+	0	1	2	3	4	5	6	7	8	9	10
0	0+0	0+1	0+2	0+3	0+4	0+5	0+6	0+7	0+8	0+9	0+10
1	1+0	1+1	1+2	1+3	1+4	1+5	1+6	1+7	1+8	1+9	
2	2+0	2+1	2+2	2+3	2+4	2+5	2+6	2+7	2+8		
3	3+0	3+1	3+2	3+3	3+4	3+5	3+6	3+7			
4	4+0	4+1	4+2	4+3	4+4	4+5	4+6				
5	5+0	5+1	5+2	5+3	5+4	5+5					
6	6+0	6+1	6+2	6+3	6+4						
7	7+0	7+1	7+2	7+3							
8	8+0	8+1	8+2								
9	9+0	9+1									
10	10+0										

Addition facts within 10

	Blue	Red
6	6	0
5	5	1
4	4	2
3	3	3
2	2	4
1	1	5
0	0	6

Systematic patterning to partition six



$7 - 3 = 4$

Cherry partitioning model with subtraction equation



$3 + 1 = 4$

Tens frame with addition equation



Number Facts - Year 2



Number and place value

Pupils should be taught to:

- count in steps of 2, 3, and 5 from 0, and in tens from any number, forward or backward

Addition and subtraction

Pupils should be taught to:

- recall and use addition and subtraction facts to 20 fluently, and derive and use related facts up to 100
- recognise and use the inverse relationship between addition and subtraction and use this to check calculations and missing number problems.

Multiplication and division

Pupils should be taught to:

- recognise, find, and name a half as one of two equal parts of an object, shape, or quantity
- recognise, find, and name a quarter as one of four equal parts of an object, shape, or quantity

Fractions

Pupils should be taught to:

- recognise, find, name and write fractions $\frac{1}{3}$, $\frac{1}{4}$, $\frac{2}{4}$ and $\frac{3}{4}$ of a length, shape, set of objects or quantity
- write simple fractions e.g. $\frac{1}{2}$ of 6 = 3 and recognise the equivalence of $\frac{2}{4}$ and $\frac{1}{2}$

Measurement

Pupils should be taught to:

- compare and sequence intervals of time
- know the number of minutes in an hour and the number of hours in a day

Number Facts: Number and place value

- Know the sequence of counting in multiples of 3.
- Count in steps of 10 from any number.

Number Facts: Addition and subtraction

- Know number bonds and related subtraction facts to 20
- Derive number bonds to 100 using multiples of 10, relating this to known number bonds to 10 (from Y1)
- Add and subtract numbers to 100 using informal methods, manipulative resources and visual representations,

Number facts: Multiplication and division

- Know the 2x, 5x and 10x times table and the related division facts.
- Recognise odd and even numbers.

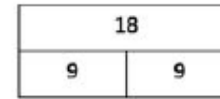
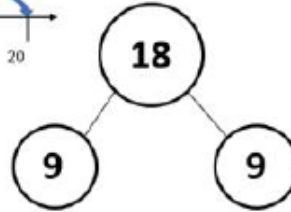
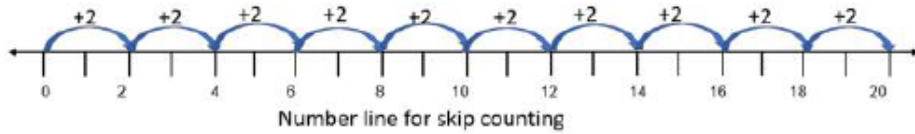
Number Facts: Measure

- 100p = £1 50p+50p= £1
- 100 cm = 1metre
- One hour = 60 minutes
- $\frac{1}{2}$ an hour = 30 minutes
- $\frac{1}{4}$ of an hour = 15 minutes
- $\frac{3}{4}$ of an hour = 45 minutes
- There are 24 hours in a day
- Recite the months of the year in the correct order

Number Facts: Fractions

- $\frac{1}{3} + \frac{1}{3} + \frac{1}{3} = 1$ whole
- $\frac{1}{4} + \frac{1}{4} + \frac{1}{4} = \frac{3}{4}$
- 1 whole $- \frac{1}{4} = \frac{3}{4}$
- $\frac{2}{4} = \frac{1}{2}$
- Halve all even numbers to 20

Mathematical models and images to support conceptual understanding underpinning key facts in Year 2



100-square for skip counting in tens from any number

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

Half of 18 is 9



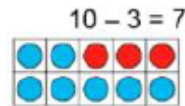
Partitioning 28 into 20 and 8



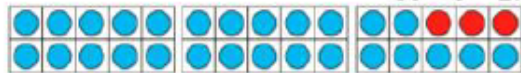
$9 + 9 = 18$



Finding the difference using a bar model and a number line

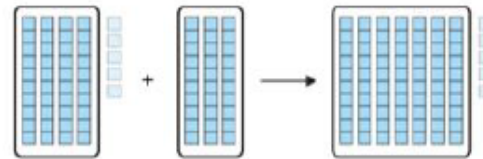


$10 - 3 = 7$



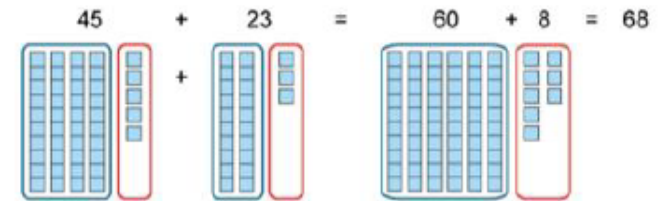
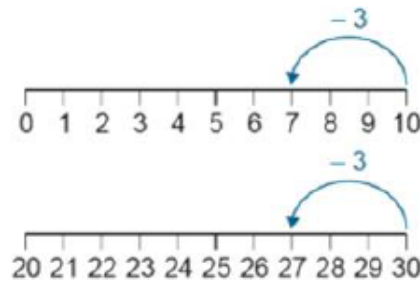
$30 - 3 = 27$

Tens frames with counters and number lines to support subtracting ones from a multiple of 10

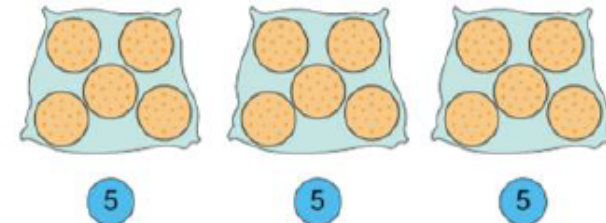


$4 + 3 = 7$
 so $40 + 30 = 70$
 $45 + 30 = 75$

Base 10 material and equations to support adding a multiple of 10



Base 10 material and equations to support adding 2 two-digit numbers



Three bags of five biscuits with three 5-value counters to support skip counting for $3 \times 5 = 15$



Number Facts - Year 3



Number and place value

Pupils should be taught to:

- count from 0 in multiples of 4, 8, 50 and 100
- find 10 or 100 more or less than a given number up to 1000

Addition and subtraction

Pupils should be taught to:

- derive complements to 100
- add and subtract numbers mentally, including:
 - a three-digit number and ones
 - a three-digit number and tens
 - a three-digit number and hundreds

Multiplication and division

Pupils should be taught to:

- recall and use multiplication and division facts for the 3, 4 and 8 multiplication tables
- write and calculate mathematical statements for multiplication and division using the multiplication tables that they know, including for two-digit numbers times one-digit numbers, using mental and progressing to formal written methods

Fractions

Pupils should be taught to:

- count up and down in tenths; recognise that tenths arise from dividing an object into 10 equal parts and in dividing one-digit numbers or quantities by 10
- recognise and show, using diagrams, equivalent fractions with small denominators
- add and subtract fractions with the same denominator within one whole (e.g. $\frac{5}{7} + \frac{1}{7} = \frac{6}{7}$)

Measurement

Pupils should be taught to:

- measure, compare, add and subtract lengths (m/cm/mm); mass (kg/g); volume/capacity (l/ml)
- know the number of seconds in a minute and the number of days in each month, year, and leap year

Number Facts: Number and place value

- Know the sequence of counting in 50's.
- Know the sequence of counting in 100's

Number Facts: Measure

- 60 seconds = 1 minute
- How many days in each month / year / leap year.
- Find complements to 60.
- 50p x 2 = £1.00 £50 x 2 = £100
- 25 p x 4 = £1.00 £25 x 4 = £100
- 20p x 5 = £1.00 £20 x 5 = £100
- 1000 g = 1kg 1000ml = 1l
- 1000 m = 1km
- 1000 ÷ 2 = 500 1000 ÷ 4 = 250
- $\frac{1}{2}$ l/kg/km = 500
- $\frac{1}{4}$ l/kg/km = 250
- $\frac{3}{4}$ l/kg/km = 750

Number Facts: Fractions

- $\frac{1}{2} = \frac{2}{4} = \frac{3}{6} = \frac{4}{8} = \frac{5}{10}$
- $\frac{1}{5} + \frac{1}{5} + \frac{1}{5} + \frac{1}{5} + \frac{1}{5} = \frac{5}{5} = 1$ whole
- $\frac{1}{6} + \frac{1}{6} + \frac{1}{6} + \frac{1}{6} + \frac{1}{6} + \frac{1}{6} = \frac{6}{6} = 1$ whole
- $\frac{1}{7} + \frac{1}{7} + \frac{1}{7} + \frac{1}{7} + \frac{1}{7} + \frac{1}{7} + \frac{1}{7} = \frac{7}{7} = 1$ whole
- $\frac{1}{8} + \frac{1}{8} + \frac{1}{8} + \frac{1}{8} + \frac{1}{8} + \frac{1}{8} + \frac{1}{8} + \frac{1}{8} = \frac{8}{8} = 1$ whole
- $\frac{1}{9} + \frac{1}{9} + \frac{1}{9} + \frac{1}{9} + \frac{1}{9} + \frac{1}{9} + \frac{1}{9} + \frac{1}{9} + \frac{1}{9} = \frac{9}{9} = 1$ whole
- $\frac{1}{10} + \frac{1}{10} + \frac{1}{10} + \frac{1}{10} + \frac{1}{10} + \frac{1}{10} + \frac{1}{10} + \frac{1}{10} + \frac{1}{10} + \frac{1}{10} = \frac{10}{10} = 1$ whole
- Understand fraction facts related to whole number facts
- $1 + 5 = 6$ (Year1) linked to $\frac{1}{6} + \frac{5}{6} = \frac{6}{6}$ (Year 3)

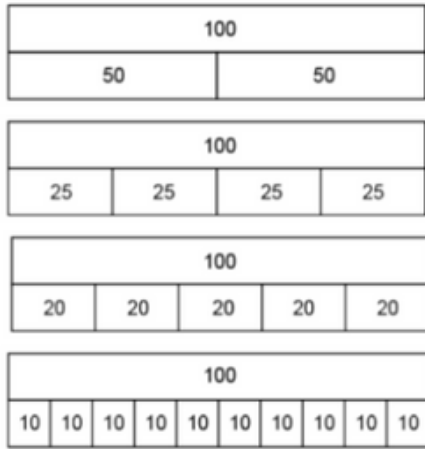
Number facts: Addition and subtraction

- Know or derive all the complements to 100
 $x + y = 100$; $x = ?$ and $y = ?$
- Know pairs of multiples of 100 that total 1000
 $1 + 9 = 10$ (Year 1)
 $10 + 90 = 100$ (Year 2)
 $100 + 900 = 1000$ (Year 3)
- Add and subtract numbers with up to 3 digits (e.g. $253 + 75 = 328$)

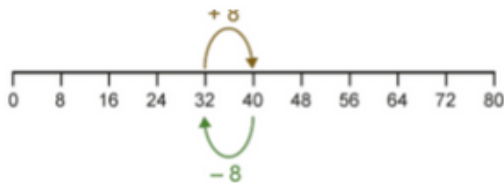
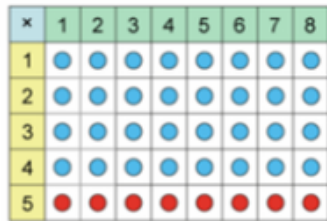
Number Facts: Multiplication and division

- Know the 3x, 4x and 8x table and the related division facts
- Understand that doubling means x 2
- Understand that halving means ÷ 2
- Know that...
 $50 \times 2 = 100$; $25 \times 4 = 100$; $20 \times 5 = 100$

Mathematical models and images to support conceptual understanding underpinning key facts in Year 3



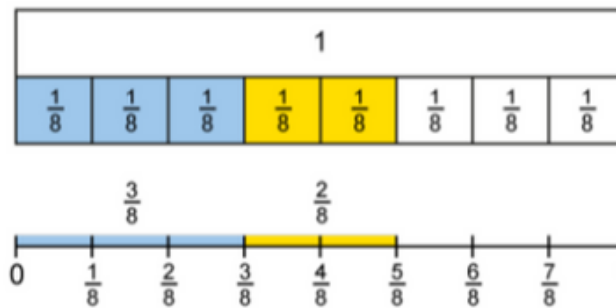
Bar models showing 100 partitioned into 2, 4, 5 and 10 equal parts.



Number line and array showing that adjacent multiples of 8 (32 and 40) have a difference of 8

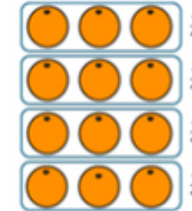


Number line to identify previous and next multiples of 100

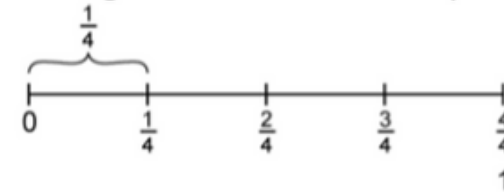


$$\frac{3}{8} + \frac{2}{8} = \frac{5}{8}$$

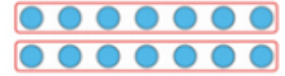
$$\frac{5}{8} - \frac{2}{8} = \frac{3}{8}$$



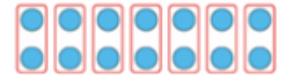
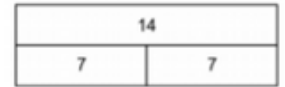
12 oranges divided into four equal parts



10-value place value counters in a 3-by-5 array to show $3 \times 50 = 30 \times 5 = 150$



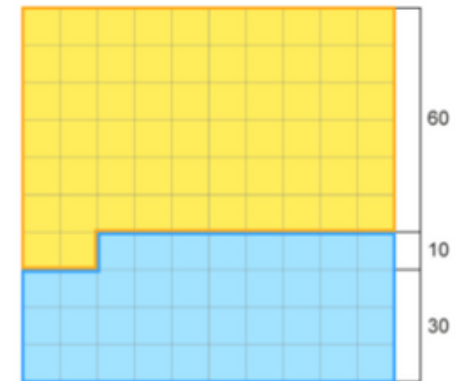
$$14 \div 2 = 7$$



$$14 \div 2 = 7$$



$$7 \times 2 = 2 \times 7$$



100-grid to show the complement $62 + 38 = 100$



Number Facts - Year 4



Number and place value

Pupils should be taught to:

- count from 0 in multiples of 6, 7, 9, 25 and 1000
- find 100 or 1000 more or less than a given number up to 10,000

Addition and subtraction

Pupils should be taught to:

- order and compare numbers beyond 1000
- add and subtract numbers with up to 4 digits

Multiplication and division

Pupils should be taught to:

- recall and use multiplication and division facts for multiplication tables up to 12 x 12
- multiply two-digit and three-digit numbers by a one-digit number

Fractions

Pupils should be taught to:

- count up and down in hundredths; recognise that hundredths arise from dividing an object into 100 equal parts and in dividing tenths by 10
- recognise and write decimal equivalents of $\frac{1}{4}$, $\frac{1}{2}$ and $\frac{3}{4}$

Measurement

Pupils should be taught to:

- convert between different units of measure (e.g. kilometres to metres, hours to minutes)

Number Facts: Number and place value

- Know the sequence of counting in multiples of 25.

Number Facts: Measure

- £5.00 x 2 = £10.00
£50 x 2 = £100
£500 x 2 = £1000
£2.50 x 4 = £10.00
£25 x 4 = £100
£250 x 4 = £1000
£2.00 x 5 = £10.00
£20 x 5 = £100
£200 x 5 = £1000
- 10cm = $\frac{1}{10}$ m 1cm = $\frac{1}{100}$ m
- 100g = $\frac{1}{10}$ kg
1.1 kg = 1kg 100g = 1kg + $\frac{1}{10}$ kg
- 48 hours = 2 days
120 minutes = 2 hours
90 minutes = 1 $\frac{1}{2}$ hours

Number Facts: Fractions

- 100 ÷ 10 = 10 1000 ÷ 10 = 100
10 ÷ 10 = 1 1 ÷ 10 = $\frac{1}{10}$
- 1 ÷ 10 = $\frac{1}{10}$ = 0.1 2 ÷ 10 = $\frac{2}{10}$ = 0.2
3 ÷ 10 = $\frac{3}{10}$ = 0.3 4 ÷ 10 = $\frac{4}{10}$ = 0.4
5 ÷ 10 = $\frac{5}{10}$ = 0.5 6 ÷ 10 = $\frac{6}{10}$ = 0.6
7 ÷ 10 = $\frac{7}{10}$ = 0.7 8 ÷ 10 = $\frac{8}{10}$ = 0.8
9 ÷ 10 = $\frac{9}{10}$ = 0.9 10 ÷ 10 = $\frac{10}{10}$ = 1.0
- $\frac{1}{4}$ = 0.25 $\frac{1}{2}$ = 0.5
 $\frac{3}{4}$ = 0.75

Number facts: Addition and subtraction

- Know or derive all the complements to 10,000 using multiples of 1000 and related subtraction facts
 $x + y = 10,000$; $x = ?$ and $y = ?$

1 + 9 = 10 (Year 1)
10 + 90 = 100 (Year 2)
100 + 900 = 1000 (Year 3)
1000 + 9000 = 10,000 (Year 4)
- Mentally add and subtract numbers with up to 2 digits reliably

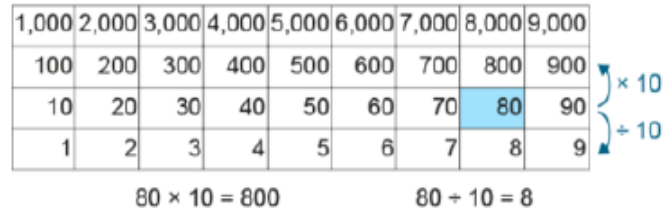
Number Facts: Multiplication and division

- Know the 6x, 7x, 9x, 11x, and 12x tables and the related division facts
- Know that...
500 x 2 = 1000 1000 ÷ 2 = 500
250 x 4 = 1000 1000 ÷ 4 = 250
200 x 5 = 1000 1000 ÷ 5 = 200

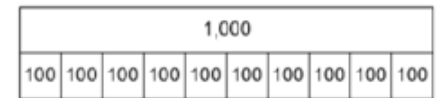
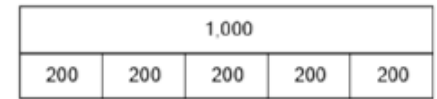
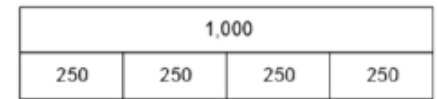
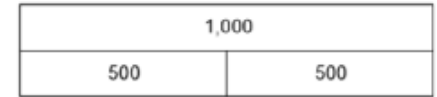
Mathematical models and images to support conceptual understanding underpinning key facts in Year 4



eighteen 100-value place-value counters in two tens frames to show 1800

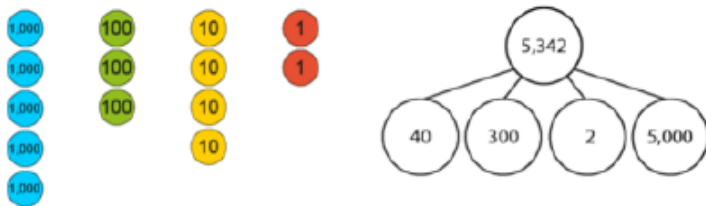


Gattegno chart to multiply and divide by 10



bar models showing 1,000 partitioned into 2, 4, 5, and 10 equal parts and

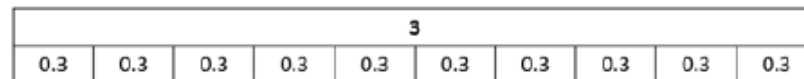
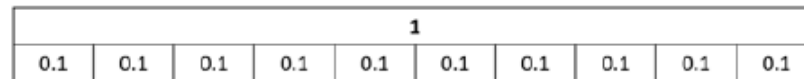
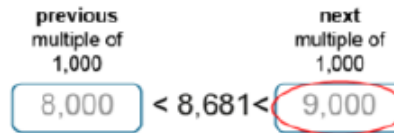
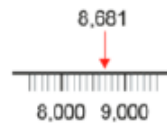
$1000 \div 2 = 500$ and $\frac{1}{2}$ of 1000 = 500
 $1000 \div 4 = 250$ and $\frac{1}{4}$ of 1000 = 250
 $1000 \div 5 = 200$ and $\frac{1}{5}$ of 1000 = 200
 $1000 \div 10 = 100$ and $\frac{1}{10}$ of 1000 = 100



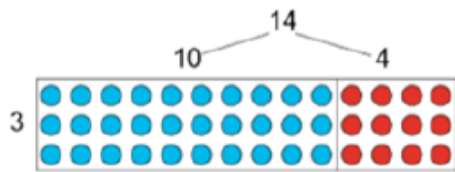
Representations of the place value composition of 5,342



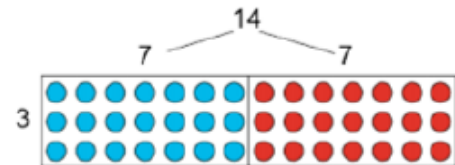
number-line to identify the previous and next multiple of 1,000



bar models showing $1 \div 10 = 0.1$ and $3 \div 10 = 0.3$



array to show that $14 \times 3 = 10 \times 3 + 4 \times 3$



array to show that $14 \times 3 = 2 \times 7 \times 3$



Number Facts - Year 5



Addition and subtraction

Multiplication and division

Pupils should be taught to:

- add and subtract with more than four digits and with decimals (informal and formal methods)
- recall prime numbers to 19
- multiply and divide mentally using known facts
- multiply and divide whole and decimal numbers by 10, 100 and 1000
- recognise and use square numbers

Fractions, decimals and percentages

Pupils should be taught to:

- read and write decimal numbers as fractions (e.g. $0.8 = \frac{8}{10}$)
- recognise and use thousandths, relating them to tenths, hundredths, and decimal equivalents
- recognise the per cent symbol (%) and know that per cent relate to the number of parts per hundred
- write percentages as a fractions with a denominator of 100 and as a decimal fraction (e.g. $0.71 = \frac{71}{100} = 71\%$)

Measurement

Pupils should be taught to:

- convert between different units of metric measure such as kilometre to metre, centimetre to metre, centimetre and millimetre, gram and kilogram, litre and millilitre
- know and use equivalences between metric units and common imperial units such as inches, pounds and pints

Geometry

Pupils should be taught to:

- identify angles at a point (one whole turn) as 360°
- identify angles at a point on a straight line (half a turn) as 180°
- identify angles in a right angle (quarter of a turn) as 90°
- recognise multiples of 90°
- know the sum of the angles in any triangle is 180°
- know the sum of the angles in any quadrilateral is 360°

Number facts: Addition and subtraction; multiplication and division

- Derive new facts from known facts:
For example:

$12 \times 5 = 60$	$60 \div 5 = 12$
$5.2 \times 5 = 6.0$	$6 \div 5 = 1.2$
$5 \times 7 = 35$	$5 \times 0.7 = 3.5$
$5 \times 0.07 = 0.35$	
- Square numbers:
1, 4, 9, 16, 25, 36, 49, 64, 81, 100, 121, 144
- Prime numbers:
2, 3, 5, 7, 11, 13, 17, 19
- Associated facts
 $10,000 = 9500 + 500$
 $10,000 = 5000 + 5000$
 $10,000 = 2500 + 2500 + 2500 + 2500$
 $10,000 \div 2 = 5000$
 $10,000 \div 4 = 2500$
 $10,000 \div 5 = 2000$
 $10,000 \div 10 = 1000$
 $10,000 \div 100 = 100$

Number Facts: Fractions

- $1 \div 100 = \frac{1}{100} = 0.01$ $2 \div 100 = \frac{2}{100} = 0.02$
- $3 \div 100 = \frac{3}{100} = 0.03$ $4 \div 100 = \frac{4}{100} = 0.04$
- $5 \div 100 = \frac{5}{100} = 0.05$ $6 \div 100 = \frac{6}{100} = 0.06$
- $7 \div 100 = \frac{7}{100} = 0.07$ $8 \div 100 = \frac{8}{100} = 0.08$
- $9 \div 100 = \frac{9}{100} = 0.09$ $10 \div 100 = \frac{10}{100} = \frac{1}{10} = 0.1$
- $10\% = 0.1 = \frac{1}{10} = \frac{10}{100} = \frac{100}{1000}$
- $50\% = 0.5 = \frac{1}{2} = \frac{5}{10} = \frac{50}{100}$
- $25\% = 0.25 = \frac{1}{4} = \frac{25}{100}$
- $75\% = 0.75 = \frac{3}{4} = \frac{75}{100}$
- $20\% = 0.2 = \frac{1}{5} = \frac{2}{10} = \frac{20}{100}$
- $40\% = 0.4 = \frac{2}{5} = \frac{4}{10} = \frac{40}{100}$

Number Facts: Measure

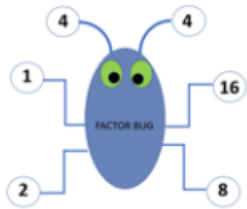
- $1\text{mm} = \frac{1}{10}\text{ cm}$
- $1\text{mm} = \frac{1}{1000}\text{ m}$
- $1\text{ kg} \approx 2.2\text{ lbs}$
- $1\text{ L} \approx 1.76\text{ pints}$
- $1\text{m} \approx 39.4\text{ inches}$
- $1\text{cm} \approx 2.54\text{ inches}$

\approx means 'approximately equal to'

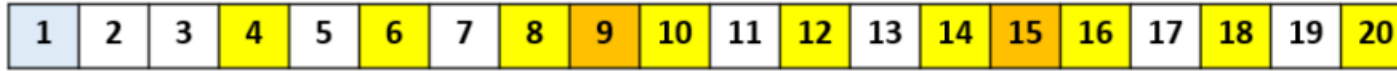
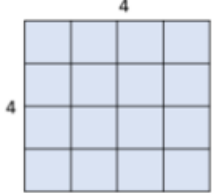
Number Facts: Geometry

- $360 \div 4 = 90$ $\frac{1}{4}$ of $360 = 90$
- $360 \div 2 = 180$ $\frac{1}{2}$ of $360 = 180$
- $\frac{3}{4}$ of $360 = 270$
- complements such as
 $70 + 110 = 180$
 $95 + 85 = 180$
- multiples: 90, 180, 270, 360, 450, 540

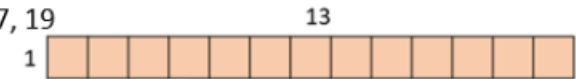
Mathematical models and images to support conceptual understanding underpinning key facts in Year 5



Square numbers have an odd number of factors

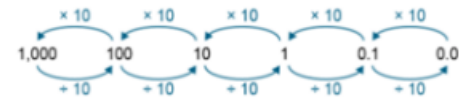


Using a number track to generate multiples of primes to identify primes: 2, 3, 5, 7, 11, 13, 17, 19

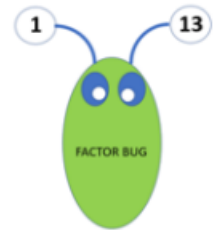
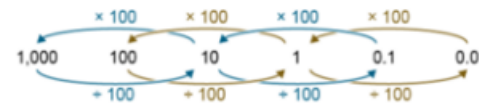


1,000	2,000	3,000	4,000	5,000	6,000	7,000	8,000	9,000
100	200	300	400	500	600	700	800	900
10	20	30	40	50	60	70	80	90
1	2	3	4	5	6	7	8	9
0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09

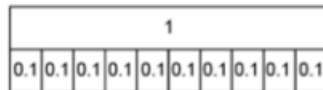
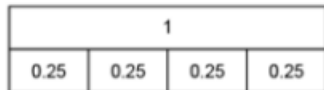
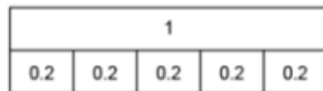
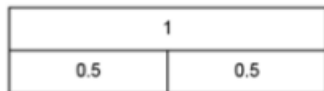
Gattegno chart showing thousands, hundreds, tens, ones, tenths and hundredths



Multiplicative relationships between powers of ten



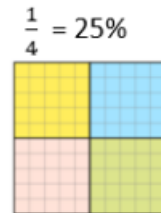
Prime numbers have exactly two factors



Bar models showing 1 partitioned into 2, 4, 5 and 10 equal parts

$1 \div 2 = 0.5$ and $\frac{1}{2}$ of 1 = 0.5
 $1 \div 4 = 0.25$ and $\frac{1}{4}$ of 1 = 0.25
 $1 \div 5 = 0.2$ and $\frac{1}{5}$ of 1 = 0.2
 $1 \div 10 = 0.1$ and $\frac{1}{10}$ of 1 = 0.1

A hundred grid divided into four equal parts.



Ratio tables for conversion

1m	100cm	1,000ml	1 litre	100p	£1
$\frac{3}{4}$ m	75cm	3,700ml	3.7 litres	52p	£0.52

Key multiplication facts to support place value calculations, fractions and ratio

$2 \times 2 = 4$	$3 \times 3 = 9$							
$3 \times 2 = 6$	$4 \times 3 = 12$	$4 \times 4 = 16$						
$4 \times 2 = 8$	$5 \times 3 = 15$	$5 \times 4 = 20$	$5 \times 5 = 25$					
$5 \times 2 = 10$	$6 \times 3 = 18$	$6 \times 4 = 24$	$6 \times 5 = 30$	$6 \times 6 = 36$				
$6 \times 2 = 12$	$7 \times 3 = 21$	$7 \times 4 = 28$	$7 \times 5 = 35$	$7 \times 6 = 42$	$7 \times 7 = 49$			
$7 \times 2 = 14$	$8 \times 3 = 24$	$8 \times 4 = 32$	$8 \times 5 = 40$	$8 \times 6 = 48$	$8 \times 7 = 56$	$8 \times 8 = 64$		
$8 \times 2 = 16$	$9 \times 3 = 27$	$9 \times 4 = 36$	$9 \times 5 = 45$	$9 \times 6 = 54$	$9 \times 7 = 63$	$9 \times 8 = 72$	$9 \times 9 = 81$	



Number Facts - Year 6



Ratio and proportion

Pupils should be taught to:

- solve problems involving the calculation of percentages of quantities such as 15% of 360 and then use their solutions for comparison
- represent fractions sums such as $\frac{1}{4} + \frac{3}{4}$ in ratio form (a:b) as 1:3
- simplify ratios such as 2:6 to their simplest form (1:3 in this case) using common factors

Fractions, decimals, and percentages

Pupils should be taught to:

- associate a fraction with division and calculate decimal fraction equivalents for a vulgar fraction (e.g. $0.375 = \frac{3}{8}$)
- recall and use equivalences between vulgar fractions, decimals, and percentages
- use common factors to simplify fractions
- add and subtract fractions with different denominators and mixed numbers
- multiply simple pair of proper fractions
- multiply one-digit numbers with up to two decimal places by whole numbers (e.g. 1.37×5)
- divide numbers where the quotient has up to two decimal places (e.g. $145 \div 4 = 3.75$)

Measurement

Pupils should be taught to:

- convert between common imperial and metric units of measure. (e.g. miles and kilometres)
- recognise when it is possible to use formulae for the area and volume of shapes.
- know and use formulae for the area of a triangle, the area of a rectangle, the area of a parallelogram, the volume of a cuboid and the diameter of a circle (diameter = 2 x radius)

Geometry

Pupils should be taught to:

- illustrate and name parts of circles, including the radius, diameter, and circumference.
- know and use the relationship between the diameter and the radius (diameter = 2 x radius)
- know that vertically opposite angles are equal and use this to calculate missing angles around a point

Number facts: Ratio and proportion

- Derive new % facts from known facts:
For example:
1% doubled will give 2% of a quantity
10% halved will give 5% of a quantity
100% is the whole amount, so twice as much is the same as 200%
- Fluency with multiplication and division facts up to 12 x 12 and derive others beyond known facts.
- For example:
24 : 48 simplifies to 1:2 with a common factor of 24
(24 x 1 and 24 x 2)

Number Facts: Fractions

- $12.5\% = 0.125 = \frac{1}{8}$ $25\% = 0.25 = \frac{2}{8} = \frac{1}{4}$
- $37.5\% = 0.375 = \frac{3}{8}$ $50\% = 0.5 = \frac{4}{8} = \frac{1}{2}$
- $62.5\% = 0.625 = \frac{5}{8}$ $75\% = 0.75 = \frac{6}{8} = \frac{3}{4}$
- $82.5\% = 0.825 = \frac{7}{8}$ $100\% = 1.0 = \frac{8}{8}$
- $112.5\% = 1.125 = \frac{9}{8}$ $125\% = 1.25 = \frac{10}{8}$
- $33.\dot{3}\% = 0.333\dots = \frac{1}{3}$
- $66.\dot{6}\% = 0.666\dots = \frac{2}{3}$
- $100\% = 1.0 = \frac{3}{3}$
- $133.\dot{3}\% = 1.333\dots = \frac{4}{3}$
- $266.\dot{6}\% = 2.666\dots = \frac{8}{3}$
- $0.\dot{3} = 0.333333\dots$ a recurring decimal continually repeats and does not terminate

Number Facts: Measure

- $1 \text{ km} \approx \frac{5}{8} \text{ mile}$
- $1 \text{ mile} \approx \frac{8}{5} \text{ km}$ (or 1.6 km)
- Area of a triangle = $\frac{1}{2}$ x base x height
- Area of a rectangle = length x width
- Area of a parallelogram = length x perpendicular height
- Volume of a cuboid = length x width x height
- \approx means 'approximately equal to'

Number Facts: Geometry

- Diameter = 2 x radius
- Radius = $\frac{1}{2}$ x diameter

Mathematical models and images to support conceptual understanding underpinning key facts in Year 6

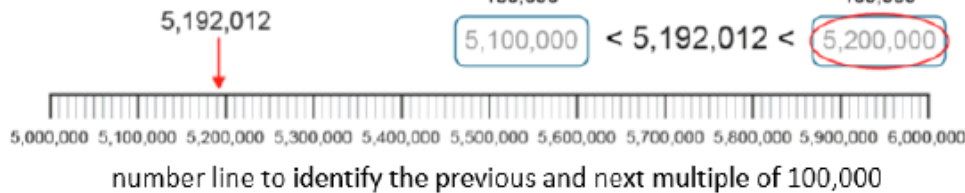
0.01	one hundredth
0.1	one tenth
1	one
10	ten
100	one hundred
1,000	one thousand
10,000	ten thousand
100,000	one hundred thousand
1,000,000	one million
10,000,000	ten million



One million represented as ten 100,000-value place-value counters in a tens frame

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

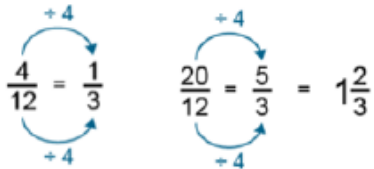
Gattegno chart to multiply and divide by 100



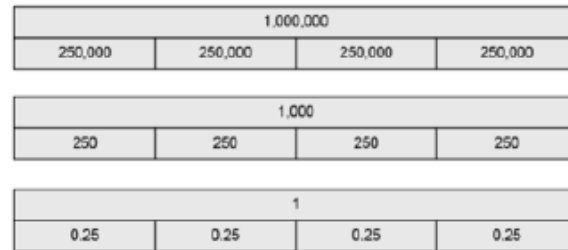
bead strings to show 'for every 1 red bead, there are 3 blue beads'
 $r : b = 1 : 3$



$\frac{2}{5} > \frac{2}{6}$



compare and simplify fractions



Bar models showing 1 million, 1,000 and 1 partitioned into 4 equal parts

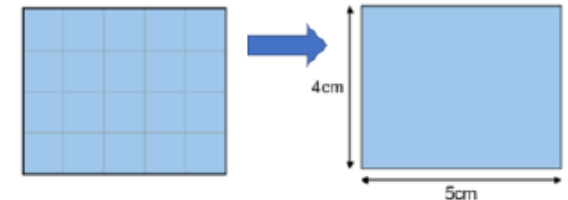
$1,000,000 \div 4 = 250,000$ and $\frac{1}{4}$ of 1,000,000 = 250,000

$1,000 \div 4 = 250$ and $\frac{1}{4}$ of 1,000 = 250

$1 \div 4 = 0.25$ and $\frac{1}{4}$ of 1 = 0.25

number of red beads	1	2	3	4
number of blue beads	3	6	9	12
total number of beads	4	8	12	16

table to show total quantities in proportion



area of a rectangle = length x width
 $4 \times 5 = 5 \times 4 = 20 \text{ cm}^2$