



St Stephen's Tockholes CE Primary School - Mental Maths Policy



Addition and Subtraction Strategies	Multiplication and Division Strategies
<p>Counting Forwards and Backwards</p> <p>90 - 27 = 90 - 20 - 7 = (Count back in tens then ones) 3.2 + 0.6 = (Count on in tenths) 87 - 85 = 85 + 3 = 87 (Counting up to find the difference)</p> <p>Reordering</p> <p>12 + 17 + 8 + 3 = 12 + 8 + 17 + 3 = 45 - 7 - 5 = 45 - 5 - 7 = 5 + 7 + 9 + 11 + 13 =</p> <p>Partitioning: Place Value (Partitioning 2nd no. is best as subtraction can't always be done by partitioning both)</p> <p>365 - 44 = 365 - 40 - 4 = 325 - 4 = 55 + 33 = 55 + 30 + 3 85 + 30 + 3 =</p> <p>Partitioning: Bridging through a multiple of 10 or 100</p> <p>57 + 34 = 57 + 30 + 3 + 1 = 85 - 37 = 85 - 30 - 5 - 2 = 84 - 35 = 35 + 5 + 40 + 4 = 607 - 288 (Count up - bridging through 10s/100s) 288 + 12 + 307</p> <p>Compensating</p> <p>95 - 78 95 - 80 + 2 138 + 69 138 + 70 - 1</p> <p>Partitioning: Near Doubles</p> <p>15 + 16 = 15 + 15 + 1 9 + 8 = 8 + 8 - 1 160 + 170 = 160 + 160 + 10 (Using 16 + 16 to help)</p> <p>Adjusting both numbers</p> <p>1265 - 997 = 1268 - 1000 = (Add three to each number) 5 - 2.98 = 5.02 - 3 = (Add 0.02 on to each number) 98 + 297 = 100 + 300 - 2 - 3</p>	<p>Doubling and Halving</p> <p>16 x 2 = Double 16 62 ÷ 2 = Half of 62 18 x 4 = 18 x 2 x 2 (double then double again)</p> <p>Using Factors</p> <p>35 x 6 = 35 x 3 x 2 = 240 ÷ 6 = 240 ÷ 3 ÷ 2 = 4 x 200 = 4 x 100 x 2 =</p> <p>Nearby Facts</p> <p>8 x 8 = 64 so 9 x 8 = 64 + (1 x 8) 10 x 6 = 60 so 9 x 6 will be one less group of 6 100 x 6 = 600 so 99 x 6 will be one less group of 6 (take 6 from previous product)</p> <p>Distributive Law (partitioning)</p> <p>18 x 6 = (10 x 6) + (8 x 6) 21 x 7 = (11 x 7) + (10 x 7)</p> <p>Commutativity (commute move around)</p> <p>I know 9 groups of 5 is 45 (5x9=45) so 5 groups of 9 also equal 45 (9x5=45) Arrays should be used to illustrate this.</p> <p>Using equivalent/related facts to multiply & divide by multiples of 10 & 100</p> <p>4 x 5 = 20 so 40 x 5 = 200 7 x 8 = 56 so 700 x 8 = 5600</p> <p>Moving the digits to make a number 10/100/1000 times larger or smaller.</p> <p>23 x 10 = 230 (20 x 10 = 200 3 x 10 = 30)</p> <p>Check using the inverse (particularly division)</p> <p>350 ÷ 5 = 70 70 x 5 = 350</p>



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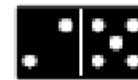
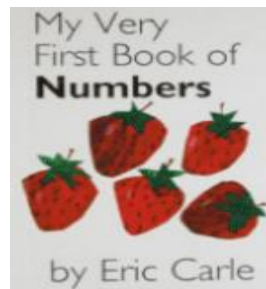


RECEPTION	COUNTING AND PLACE VALUE	ADD	SUBTRACT	MULTIPLY	DIVIDE
<p>RAPID RECALL</p> <p>Add/subtract 1 within 10</p> <p>Number bonds to 5</p>	<p>Count numbers 1 to 20, place them in order</p> <p>Say number one more or one less than a given number</p>	<p>Calculate simple additions mentally.</p> <p>Using quantities/objects, add and subtract</p> <p>2 single-digit numbers count on or back to find the answer.</p>	<p>Calculate simple subtractions mentally.</p> <p>Using quantities/objects add and subtract</p> <p>2 single-digit numbers count on or back to find the answer.</p>	<p>Solve problems, including doubling.</p>	<p>Solve problems, including halving and sharing.</p>

Potential resources/representations:



1 2 3 4 5



$$2 + 5 = 7$$

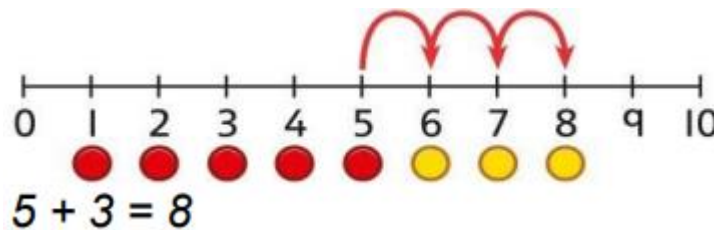
2 count on 5



$$5 + 2 = 7$$



5 count on 2





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Following NCTEM guidance post Covid Lockdown, learning is prioritised and explicit connections between tables taught.

Year 1: Counting in groups of 2 / groups of 10 / groups of 5

Year 2: 2, 10, 5, 0, 1

Year 3: 10, 5, 3, 2, 4, 8 3, 6, 9

Year 4: 3, 6, 9, 12, 7 and 11 multiplication tables revising 0, 1, 10, 25, 50 and 100

MULTIPLICATION TABLES CHECK

Year 5: Concentrate on 6, 7, 8, 9, 12 revising 0, 1, 2, 4, 8, 5, 10, 25, 50 and 100

Year 6: Revise all multiplication tables, extending to multiples of 10 and decimals

The connections and patterns will help pupils to develop fluency and understanding. Pupils must also be able to apply their automatic recall of multiplication tables facts to solve division problems, for example solving

$28 \div 7$, by recalling that $28 = 4 \times 7$

$70 \times 4 = 280$ by recalling that $7 \times 4 = 28$

$70 \times 40 = 2800$ by recalling that $7 \times 4 = 28$

$0.7 \times 4 = 2.8$ by recalling that $7 \times 4 = 28$



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Rapidly recall the x and division facts for the 1-12 x tables.

	1	2	3	4	5	6	7	8	9	10	11	12
1	1x1	2x1	3x1	4x1	5x1	6x1	7x1	8x1	9x1	10x1	11x1	12x1
2	1x2	2x2	3x2	4x2	5x2	6x2	7x2	8x2	9x2	10x2	11x2	12x2
3	1x3	2x3	3x3	4x3	5x3	6x3	7x3	8x3	9x3	10x3	11x3	12x3
4	1x4	2x4	3x4	4x4	5x4	6x4	7x4	8x4	9x4	10x4	11x4	12x4
5	1x5	2x5	3x5	4x5	5x5	6x5	7x5	8x5	9x5	10x5	11x5	12x5
6	1x6	2x6	3x6	4x6	5x6	6x6	7x6	8x6	9x6	10x6	11x6	12x6
7	1x7	2x7	3x7	4x7	5x7	6x7	7x7	8x7	9x7	10x7	11x7	12x7
8	1x8	2x8	3x8	4x8	5x8	6x8	7x8	8x8	9x8	10x8	11x8	12x8
9	1x9	2x9	3x9	4x9	5x9	6x9	7x9	8x9	9x9	10x9	11x9	12x9
10	1x10	2x10	3x10	4x10	5x10	6x10	7x10	8x10	9x10	10x10	11x10	12x10
11	1x11	2x11	3x11	4x11	5x11	6x11	7x11	8x11	9x11	10x11	11x11	12x11
12	1x12	2x12	3x12	4x12	5x12	6x12	7x12	8x12	9x12	10x12	11x12	12x12


1 x facts Doubles Squares New Facts Known Facts

The 38 new multiplication (and division) facts that children need to know by the end of Year 4.



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Year 1 Recall +/-/x/÷	Example Mental Calculations ... jottings if needed	Mental Strategies +/-/x/÷ ...how & when to apply strategies
<ul style="list-style-type: none"> • number pairs within 20 • know what to add to a single-digit number to make 16, e.g. $7 + ? = 16$ • addition facts for totals to 20, • addition doubles for all numbers to 20, • doubles of all numbers to 10, • odd and even numbers to 20 <div style="text-align: center;">  </div>	<ul style="list-style-type: none"> add or subtract a pair of single-digit numbers, e.g. $4 + 5$, $8 - 3$ • add or subtract a single-digit number to or from a teens number, e.g. $13 + 5$, $17 - 3$ • add or subtract a single-digit to or from 20, and add a multiple of 10 to a single-digit number, e.g. $10 + 7$, $7 + 20$ • add near doubles, e.g. $6 + 7$ • count on from and back to zero in ones, twos, fives or tens 	<ul style="list-style-type: none"> • reorder numbers when adding e.g. larger number first • count on or back in ones, twos or tens • partition small numbers, e.g. $8 + 3 = 8 + 2 + 1$ • partition and combine tens and ones • partition: double and adjust, e.g. $5 + 6 = 5 + 5 + 1$ • use patterns of last digits, e.g. 0 and 5 when counting in fives

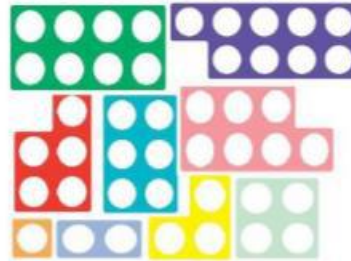


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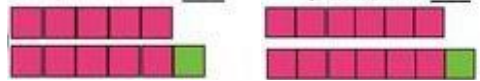


$9 + 5 =$

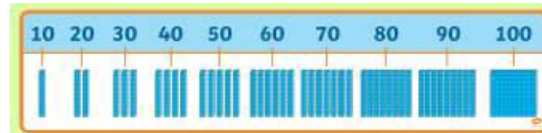
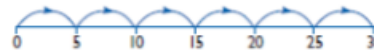
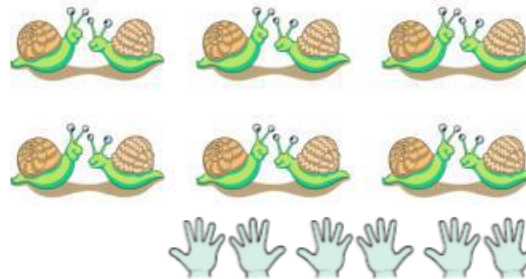
$_ + _ = _$



If you know $5 + 5 = _$ If you know $6 + 6 = _$
 then $5 + 6 = _$. then $6 + 7 = _$.



Count the snails by 2s.



$2 + 5 = 7$ 2 count on 5

$5 + 2 = 7$ 5 count on 2

EVEN numbers have a 0, 2, 4, 6, or 8 in the ones place.

ODD numbers have a 1, 3, 5, 7, or 9 in the ones place.



Counting in 5s

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



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Year 2 Recall +/-/x/÷	Ex. Mental Calculations ... jottings if needed	Mental Strategies +/-/x/÷ ...how & when to apply strategies
<ul style="list-style-type: none"> • + & - facts for all numbers up to at least 20, • number pairs with totals to 20 • all pairs of multiples of 10 with totals up to 100, • derive and use related facts up to 100 • what must be added to any two-digit number to make the next multiple of 10, • addition doubles for all numbers to 20, (17+17) & multiples of 10 to 50, (30 + 30) • + & - mentally a 2 digit and a 1 digit, 2 digit and 10's, 2 digit and 2 digit • doubles of all numbers to 20, e.g. double 13, and corresponding halves • doubles of multiples of 10 to 50, e.g. double 40, and corresponding halves 	<ul style="list-style-type: none"> • + or - a pair of single-digit numbers, including crossing 10, e.g. 5 + 8, 12 - 7 • add any single-digit number to or from a multiple of 10, e.g. 60 + 5 • subtract any single-digit number from a multiple of 10, e.g. 80 - 7 • + or - a single-digit number to or from a two-digit number, including crossing the tens boundary, e.g. 23 + 5, 57 - 3, then 28 + 5, 52 - 7 • + or - a multiple of 10 to or from any two-digit number, e.g. 27 + 60, 72 - 50 • add 9, 19, 29, ... or 11, 21, 31, ... • add near doubles, e.g. 13+14, 39+40 • double any multiple of 5 up to 50, e.g. double 35 • halve any multiple of 10 up to 100, e.g. halve 90 • find half of even numbers to 40 	<ul style="list-style-type: none"> • reorder numbers when adding • partition: bridge through 10 and multiples of 10 when adding and subtracting • partition and combine multiples of tens and ones • use knowledge of pairs making 10 • partition: count on in Ts & Os to find total • partition: count on or back in Ts & Os to find difference • partition: add a multiple of 10 and adjust by 1 • partition: double and adjust • partition: double the Ts and Os separately, then recombine • use knowledge that halving = inverse of doubling and that doubling is equivalent to multiplying by two • use knowledge of multiplication facts



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- multiplication facts for the 2, 5 and 10 times-tables, and corresponding division facts ...introducing 3 times tables and 4 times table (double 2x tables)

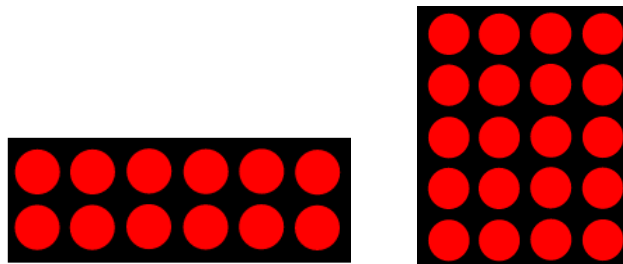
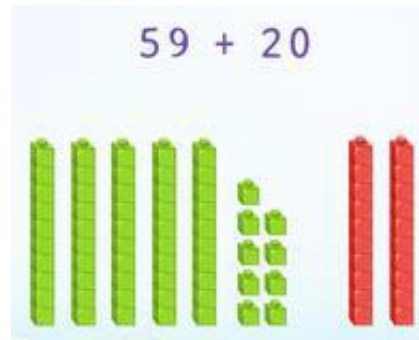
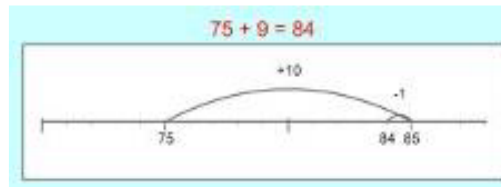
- odd and even numbers to 100



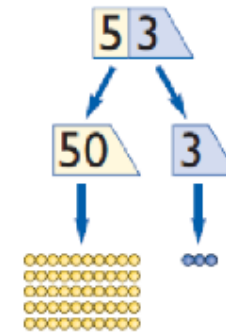
★ Odd and Even Numbers Chart

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

- find the total number of objects when they are organised into groups of 2, 5 or 10 (3 & 4)



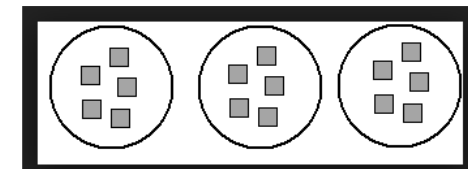
- from the 2, 5 and 10 times-tables, e.g. recognise there are 15 objects altogether because there are 3 groups of 5



41p could be made from 10p + 10p + 10p + 10p + 1p



or 20p + 20p + 1p





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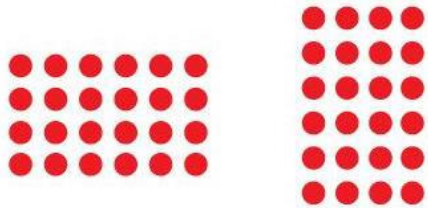
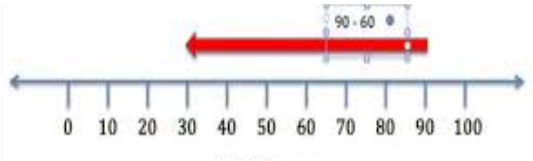
Year 3 Recall +/-/x/÷	Ex. Mental Calculations ... jottings if needed	Mental Strategies +/-/x/÷ ...how & when to apply strategies
<ul style="list-style-type: none"> • + & - facts for all numbers to 20, <u> </u> e.g. $9 + 8$, $17 - 9$, drawing on knowledge of inverse operations • sums & differences of multiples of 10, e.g. $50 + 80$, $120 - 90$ • pairs of two-digit numbers with a total of 100, • addition doubles for multiples of 10 to 100, e.g. $90 + 90$ • add and subtract mentally 3 digit and a 1 digit 3 digit and 10's 3 digit and 100's • multiplication facts for the 5, 10, 2, 4, 8 (as doubled times tables) and 3 and corresponding division facts • doubles of multiples of 10 to 100, e.g. double 90, and corresponding halves 	<ul style="list-style-type: none"> • + & - groups of small numbers, <u> </u> e.g. $5 - 3 + 2$ • + & - a two-digit number to or from multiple of 10, e.g. $50 + 38$, $90 - 27$ • + & - two-digit numbers e.g. $34 + 65$, $68 - 35$ • add near doubles, e.g. $18 + 16$, $60 + 70$ • double any multiple of 5 up to 100, e.g. double 35 • halve any multiple of 10 up to 200, e.g. halve 170 • multiply one-digit or two-digit numbers by 10 or 100, e.g. 7×100, 46×10, 54×100 • find unit fractions of numbers and quantities 	<ul style="list-style-type: none"> • re-order numbers when adding • identify pairs totalling 10 or multiples of 10 • partition: add Ts and Os separately, then recombine • partition: count on in Ts and Os to find the total • partition: count on or back in Ts and Os to find the difference • partition: + or - 10 or 20 and adjust • partition: double and adjust • partition: count on or back in minutes and hours, bridging through 60 (analogue time) • partition: when doubling, double the tens and ones separately, then recombine • partition: when halving, halve the tens and ones separately, then recombine • recognise that finding a unit fraction is equivalent to dividing by the denominator • halving and doubling are inverse operations and use knowledge of division facts • recognise that when multiplying by 10 or 100 the digits move one or two places to the



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• count from 0 in multiples of 2, 4, 8, 50 and 100 (revising 0, 1, 3, 5, and 10 multiplication tables).

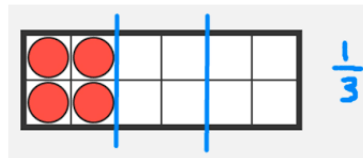
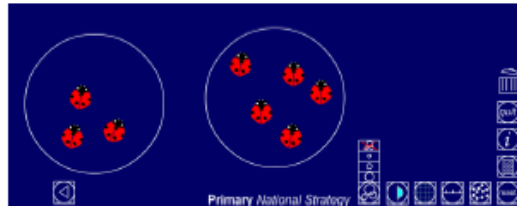


$$4 \times 6 = 24$$

$$6 \times 4 = 24$$

$$\begin{array}{r} 18 \\ \div \\ 6 \\ \hline 3 \end{array}$$

involving halves, thirds, quarters, fifths and tenths



1) Find $\frac{1}{3}$ of 18 by sharing out the number equally into the three boxes.

18		
$\frac{1}{3}$	$\frac{1}{3}$	$\frac{1}{3}$

$$\frac{1}{3} \text{ of } 18 = 18 \div 3 = \underline{\quad}$$

larger left and zero is used as a place value holder

TH	H	T	U



$$\begin{array}{r} 14 \\ + \\ 14 \\ \hline \end{array} =$$



$$16 \div 2 = 8$$



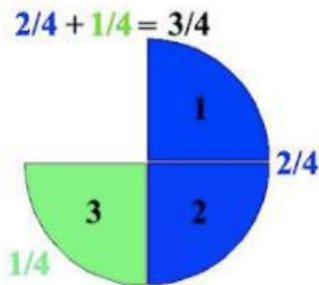
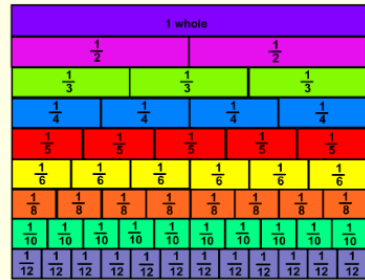
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Year 4 Recall +/ - / x / ÷	Ex. Mental Calculations ... jottings if needed	Mental Strategies +/ - / x / ÷ ...how & when to apply strategies
<ul style="list-style-type: none"> • sums and differences of pairs of multiples of 10, 100 or 1000 • addition doubles of numbers 1 to 100, e.g. 38 + 38, and corresponding halves • what must be added to any three-digit number to make the next multiple of 100, • pairs of fractions that total 1 • multiplication facts to 12 × 12 and the corresponding division facts • count in multiples of 6, 7, 9, 25 and 1000 • doubles of numbers 1 to 100, e.g: double 58, and corresponding halves • doubles of multiples of 10 and 100 and corresponding halves • fraction and decimal equivalents of one-half, quarters, tenths and hundredths, e.g. 3/10 is 0.3 and 3/100 is 0.03 	<ul style="list-style-type: none"> • add or subtract any pair of two-digit numbers, including crossing the tens and 100 boundary, e.g. 47 + 58, 91 - 35 • add or subtract a near multiple of 10, e.g. 56 + 29, 86 - 38 • add near doubles of two-digit numbers, e.g. 38 + 37 • add or subtract two-digit or three-digit multiples of 10, e.g. 120 - 40, 140 + 150, 370 - 180 • double any two-digit number, e.g. double 39, • double any multiple of 10 or 100, e.g. double 340, double 800, and halve the corresponding multiples of 10 and 100, • halve any even number to 200 • find unit fractions and simple non-unit fractions of numbers and quantities, e.g. 3/8 of 24, • multiply and divide numbers to 1000 by 10 and then 100 (whole-number answers, e.g. 325 × 10, 42 × 100, 120 ÷ 10, 600 ÷ 100, 850 ÷ 10), 	<ul style="list-style-type: none"> • count on or back in Hs, Ts and Os • partition: add tens and ones separately, then recombine • partition: subtract tens and then ones, e.g. subtracting 27 by subtracting 20 then 7 • subtract by counting up from the smaller to the larger number • partition: + or - a near multiple of 10 and adjust, e.g. 56 + 29 = 56 + 30 - 1, or 86 - 38 = 86 - 40 + 2 • partition: double and adjust • use knowledge of place value and related calculations, e.g. work out 140 + 150 = 290 using 14 + 15 = 29 • partition: count on or back in minutes and hours, bridging through 60 (analogue and digital times) • partition: double or halve the Ts & Os separately, then recombine • use understanding that when a number is multiplied or divided by 10 or 100, its digits



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12 X 12 Multiplication Table

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

- multiply a multiple of 10 to 100 by a single-digit number, e.g. 40×3 300×3
- multiply numbers to 20 by a single-digit, e.g. 17×3 ,
- identify the remainder when dividing by 2, 5 or 10
- give the factor pair associated with a multiplication fact, e.g. identify that if $2 \times 3 = 6$ then 6 has the factor pair 2 and 3

Factor Pairs

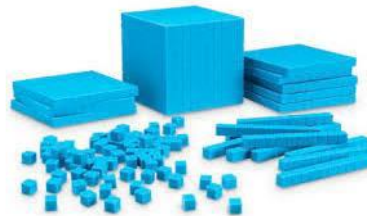
What are all the numbers you can multiply together to get your target number?

Target Number = 36

1, 2, 3, 4, 6, 9, 12, 18, 36

23 + 10 = 33

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



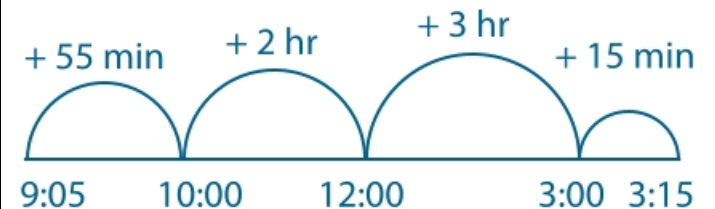
move one or two places to the left or the right and zero is used as a place holder

- use knowledge of multiplication facts and place value,

e.g. $7 \times 8 = 56$ to find 70×8 , 7×80

- use partitioning and the distributive law to multiply, e.g. $13 \times 4 = (10 + 3) \times 4 = (10 \times 4) + (3 \times 4) = 40$

$34 + 82 = 116$






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$\frac{1}{6}$ of 48

divide by
the denominator

divide by 6



H	T	U	1/10	1/100
	4	5		
		4	5	
		0	4	5

Red arrows indicate the movement of digits: from 4 in the T column to 4 in the U column, from 5 in the U column to 5 in the 1/10 column, from 4 in the U column to 4 in the 1/100 column, and from 5 in the 1/10 column to 5 in the 1/100 column.



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Year 5 Recall $+/ - / \times / \div$	Ex. Mental Calculations ... jottings if needed	Mental Strategies $+/ - / \times / \div$...how & when to apply strategies
<ul style="list-style-type: none"> • sums and differences of decimals, e.g. $6.5 + 2.7$, $7.8 - 1.3$ • doubles and halves of decimals, e.g. half of 5.6, double 3.4 • what must be added to any four- digit number to make the next multiple of 1000, • what must be added to a decimal with units and tenths to make the next whole number, • Recall squares to 12×12 • Recall division facts corresponding to tables up to 12×12, and the related unit fractions, e.g. $7 \times 9 = 63$ so one-ninth of 63 is 7 and one- seventh of 63 is 9 • Recall percentage equivalents of one-half, one-quarter, three-quarters, tenths and hundredths 	<ul style="list-style-type: none"> • + or - a pair of two-digit numbers or three-digit multiples of 10, e.g. $30 + 80$, $620 - 380$, $350 + 360$ • + or - a near multiple of 10 or 100 to any two-digit or three-digit number mentally, e.g. $230 + 190$ • find the difference between near multiples of 100, e.g. $607 - 588$, or of 1000, e.g. $6070 - 4087$ (Jottings to help this calculation: count up the difference on a number line, bridging through key multiples of 100): • + or - any pairs of decimal fractions each with units and tenths, e.g. $5.7 + 2.5$, $6.3 - 4.8$ • multiply and divide two-digit numbers by 4 or 8, e.g. 26×4, $96 \div 8$ • multiply two-digit numbers by 5 or 20, e.g. 320×5, 14×20 using doubling and halving • multiply by 25 or 50, e.g. 48×25, 32×50 • double three-digit multiples of 10 to 500, e.g. 380×2, and find the corresponding halves, 	<ul style="list-style-type: none"> • count on or back in Hs, Ts, Os and tenths (starting from any integer or decimal) • partition: add Hs, Ts or Os separately, then recombine • subtract by counting up from the smaller to the larger number (where efficient due to numbers close together or near multiples) • + or - a multiple of 10 or 100 and adjust (e.g. $235 + 198$ (+ 200 mentally and - 2); $964 + 88$ (+ 90, then - 2); $621 - 39$ (- 40 then + 1 back on) • partition: double and adjust • use knowledge of place value and related calculations, e.g. $6.3 - 4.8$, using $63 - 48$ • partition for calculation with time: count on or back in minutes and hours, bridging through 60 (analogue and digital times): Mental jottings as a 'time number line': • multiply or divide by 4 or 8 by repeated doubling or halving • form an equivalent calculation, e.g. to



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- Recall / find factor pairs to 100
- Recall prime numbers up to 19

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

Prime Numbers

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20

e.g. $760 \div 2$

- find the remainder after dividing a two-digit number by a single-digit number, e.g. $27 \div 4 = 6 \text{ R } 3$

- multiply and divide whole numbers and decimals by 10, 100 or 1000, e.g. 4.3×10 , 0.75×100 , $25 \div 10$, $673 \div 100$, $74 \div 100$

- multiply pairs of multiples of 10,

e.g. 60×30 , and a multiple of 100 by a single digit number, e.g. 900×8

- divide a multiple of 10 by a single-digit number (whole number answers) e.g. $80 \div 4$, $270 \div 3$
- find fractions of whole numbers or quantities, e.g. $2/3$ of 27, $4/5$ of 70 kg
- find 50%, 25% or 10% of whole numbers or quantities,

e.g. 25% of 20 kg, 10% of £80

- find factor pairs for numbers to 100, e.g. 30 has the factor pairs 1×30 , 2×15 , 3×10 and 5×6

multiply by 5, multiply by 10, then halve; to multiply by 20, double, then multiply by 10

- use knowledge of doubles/halves and understanding of place value, e.g. when multiplying by 50 multiply by 100 and divide by 2
- use knowledge of division facts, e.g. when to find a remainder

• use understanding that when a number is multiplied or divided by 10 or 100, its digits move one or two places to the left or the right relative to the decimal point, and zero is used as a place holder

- use knowledge of multiplication and division facts and understanding of place value, e.g. calculating with multiples of 10
- use knowledge of equivalence between fractions and percentages,

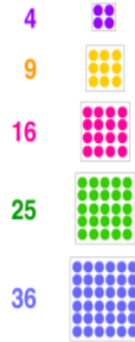
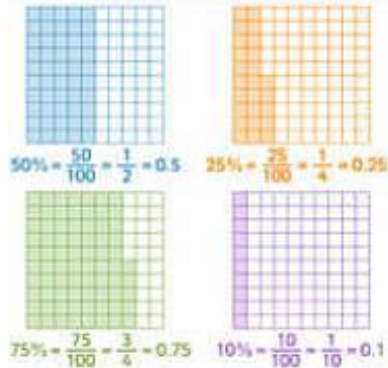
e.g. to find 50%, 25% and 10%

- use knowledge of multiplication and division facts to find factor pairs

('Factor pairs' - starts with 1 and the number itself, then all the other possible pairs in order)



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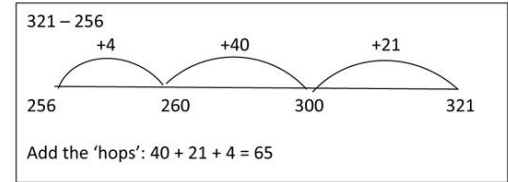
Introducing Decimals with Base Ten Blocks

Tens	Ones	Tenths	Hundredths

Multiplying and Dividing by 10, 100 and 1000

10 000	1000	100	10	1	●	1/10	1/100	1/1000
					●			

Multiplying		Dividing	
X 10	digits move LEFT 1 space	÷ 10	digits move RIGHT 1 space
X 100	digits move LEFT 2 spaces	÷ 100	digits move RIGHT 2 spaces
X 1000	digits move LEFT 3 spaces	÷ 1000	digits move RIGHT 3 spaces
←		→	



$$\begin{array}{r}
 128 + 214 = 342 \\
 \begin{array}{r}
 100 \quad 20 \quad 8 \\
 200 \quad 10 \quad 4
 \end{array} \\
 100 + 200 = 300 \\
 20 + 10 = 30 \\
 8 + 4 = 12 \\
 300 + 30 + 12 = 342
 \end{array}$$

Factoring

To find factors and factor pairs, make a list. **First, put the product at the top.** Next, multiply starting with 1. If a number can be multiplied with **another number** to make **the product** at the top of your list -BINGO! You've found a factor, or a factor pair! Your list is done when numbers repeat.

24	
1	x 24
2	x 12
3	x 8
4	x 6

H	T	U	1/10	1/100
	4	5		
		4	5	
		0	4	5



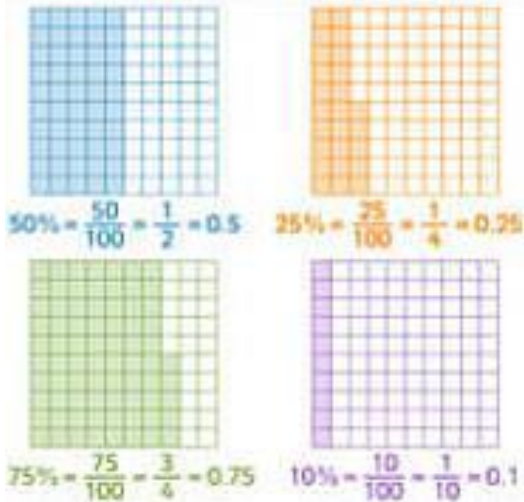
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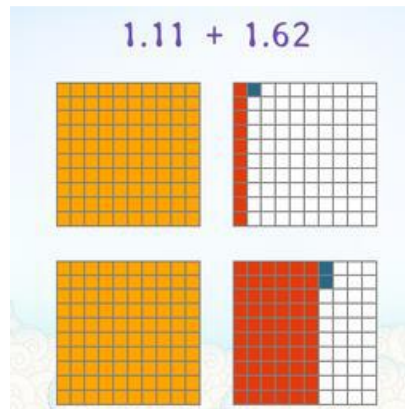
Year 6 Recall +/ -/x/÷	Ex. Mental Calculations ... jottings if needed	Mental Strategies +/ -/x/÷ ...how & when to apply strategies
<ul style="list-style-type: none"> • addition and subtraction facts for multiples of 10 to 1000 and decimal numbers with one decimal place, - 1.4 = 2.5 • what must be added to a decimal with units, tenths and hundredths to make the next whole number, • perform mental calculations with mixed operations and large numbers • prime numbers less than 100 • equivalent fractions, decimals and percentages for hundredths, e.g. 35% is equivalent to 0.35 or 35/100 	<ul style="list-style-type: none"> • add or subtract pairs of decimals with units, tenths or hundredths, e.g. 0.7 + 3.38 • find doubles of decimals each with units and tenths, e.g. 1.6 + 1.6 • add near doubles of decimals, e.g. 2.5 + 2.6 • add or subtract a decimal with units and tenths, that is nearly a whole number, e.g. 4.3 + 2.9 (Strategy to teach: do 4.3 + 3, then subtract 0.1); 6.5 - 3.8 (do 6.5 subtract 4, then add 0.2 back on) • multiply pairs of two-digit and single-digit numbers, e.g. 28 × 3 • divide a two-digit number by a single-digit number, e.g. 68 ÷ 4 • divide by 25 or 50, e.g. 480 ÷ 25, 3200 ÷ 50 • double decimals with units and tenths, e.g. double 7.6, and find the corresponding halves, e.g. half of 15.2 • multiply pairs of multiples of 10 and 100, e.g. 50 × 30, 600 × 20 	<ul style="list-style-type: none"> • count on or back in hundreds, tens, ones, tenths and hundredths • use knowledge of place value and related calculations, e.g. 680 + 430, 6.8 + 4.3, 0.68 + 0.43 can all be worked out using the related calculation 68 + 43 • use knowledge of place value and of doubles of two-digit whole numbers • partition: double and adjust • partition: add or subtract a whole number and adjust, e.g. 4.3 + 2.9 = 4.3 + 3 - 0.1, 6.5 - 3.8 = 6.5 - 4 + 0.2 • partition: count on or back in minutes and hours, bridging through 60 (analogue and digital times, 12-hour and 24-hour clock) <p>(Time number line jottings):</p> <ul style="list-style-type: none"> • partition: use partitioning and the distributive law to divide tens and ones separately, e.g. 92 ÷ 4 = (80 + 12) ÷ 4 = 20 + 3 = 23 • form an equivalent calculation, e.g. to divide by 25, divide by 100, then multiply by 4; to divide by 50, divide by 100, then double • use knowledge of the equivalence between



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- divide multiples of 100 by a multiple of 10 or 100 (whole number answers), e.g. $600 \div 20$, $800 \div 400$, $2100 \div 300$
- multiply and divide two-digit decimals such as 0.8×7 , $4.8 \div 6$ using place value knowledge (e.g. $0.8 \times 7 = 8 \times 7 = 56$, then $\div 10 = 5.6$)
- find 10% or multiples of 10%, of whole numbers and quantities, e.g. 30% of 50 ml, 40% of £30, 70% of 200
- simplify fractions by cancelling
- scale up and down using known facts, e.g. given that three oranges cost 24p, find the cost of four oranges
- identify numbers with odd and even numbers of factors and no factor pairs other than 1 and themselves



fractions and percentages and the relationship between fractions and division

- recognise how to scale up or down using multiplication and division, e.g. if three oranges cost 24p: one orange costs $24 \div 3 = 8$ p four oranges cost $8 \times 4 = 32$ p
- Use knowledge of multiplication and division facts to identify factor pairs and numbers with only two factors

$$3 \times 32 = (3 \times 30) + (3 \times 2) = 90 + 6 = 96$$

$$28 \times 5 = (5 \times 20) + (5 \times 8) = 100 + 40 = 140$$

$$\frac{8}{12} = \frac{2}{3}$$

$\div 4$ (top arrow)
 $\div 4$ (bottom arrow)