September 2020

Number Talks- Mental Calculation Strategies- Multiplication and Division

Year 1

Apply counting in twos, fives and tens to solve multiplication problems with a repeated addition context. *Concrete – real items to model the context of the problem* *Pictorial – images of the items in the context of the problem*	How much money is the total of six 5p coins? How many fingers would seven children have altogether? How many boots are lined up after five children take them off?
Share an amount into equal parts. *Concrete – real items to model the context of the problem* *Pictorial – images of the items in the context of the problem*	A bunch of 20 grapes are shared equally between two children? How many grapes do they each get? Five children are given £50 to share equally by their grandma. How much money do they each get?

Separate an amount into equal groups. *Concrete – real items to model the context of the problem* *Pictorial – images of the items in the context of the problem*	Each sandwich needs two slices of bread. How many sandwiches can be made using 20 slices of bread? Five seeds need to be planted in each pot. How many pots can be planted if there are 30 seeds altogether?

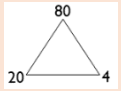
Year 2

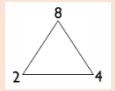
Apply counting in twos, threes, fives and tens to solve multiplication problems with a repeated addition context. *Concrete – real items to model the context of the problem, Multilink arrays, beadstring* *Pictorial – images of the items in the context of the problem, jottings, arrays, number line*	5 x 4 count in fives until fact is known 3 x 10 count in tens until fact is known 7 x 3 using a representation then count in threes 2 x 9 count in twos until fact is known
Share an amount into equal parts. *Concrete – real items to model the context of the problem* *Pictorial – images of the items in the context of the problem*	24 ÷ 2 share out until fact is known 40 ÷ 10 share out until fact is known 18 ÷ 3 using a representation to share 18 into 3 equal parts
Separate an amount into equal groups using repeated subtraction.	24 ÷ 2 repeated subtraction until fact is known 40 ÷ 10 repeated subtraction until fact is known 18 ÷ 3 repeated subtraction to find how many 3s are in 18

Concrete – real items to model the context of the problem, Multilink arrays, beadstring *Pictorial – images of the items in the context of the problem, arrays, jottings, number line*	I have 24 sweets. How many children would get 2 sweets? There are 30 bears who live on one street. Three bears live in every house. How many houses are on the street?
Derive and use doubles of simple two-digit numbers. (of which the ones total less than 10) *Concrete – Diennes equipment, place value counters* *Pictorial – Diennes jottings*	Double 43 is double 40 (80) plus double 3 (6) = 86 24 add 24 is double 20 (40) plus double 4 (8) = 48 2 x 33 (two lots of 33) is double 30 (60) plus double 3 (6) = 66
Derive and use halves of simple two-digit number even numbers. (of which the tens are even) *Concrete – Diennes equipment, place value counters* *Pictorial – Diennes jottings*	Half of 64 is half of 60 (30) plus half of 4 (2) = 32 Halve of 28 is half of 20 (10) plus half of 8 (4) = 14 46 ÷ 2 is half of 40 (20) plus half of 6 (3) = 23

Year 3

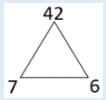
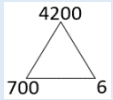
Derive and use doubles of all numbers to 100 and corresponding halves. *Concrete - Diennes equipment, place value counters* *Pictorial – part – part – whole diagram*	Double 46 29 + 29 38 x 2 Halve 86 Find half of 54 92 ÷ 2
Derive and use doubles of all multiples of 50 to 500 *Concrete - Diennes equipment, place value counters* *Pictorial – part – part – whole diagram*	Double 350 400 + 400 450 x 2
Multiply a one- or two-digit number by 10 and a one-digit number by 100 *Concrete - Diennes equipment, place value counters* *Pictorial - place value chart*	3 x 10 7 x 100 62 x 10
Within known tables, use related facts to multiply T0 by a one-digit number NB T0 represents a two-digit multiple of ten.	60 x 3 related to 6x3 because 60 x 3 = 10 x 6 x 3 which can be reordered to 6 x 3 x 10

Concrete – Diennes equipment, place value counters *Pictorial – Diennes jottings*	50 x 4 related to 5 x 4 because 50 x 4 = 10 x 5 x 4 which can be reordered to 5 x 4 x 10 30 x 8 related to 3 x 8 because 30 x 8 = 10 x 3 x 8 which can be reordered to 3 x 8 x 10
Within known tables, use partitioning to multiply T1 by a one-digit number *Pictorial - Show array using squared paper.*	31 x 4 = 30 x 4 add 1 x 4 (said as '*thirty fours add one four*') 31 x 4 = 120 + 4 31 x 4 = 124 61 x 4 31 x 8
Use compensation to multiply 19 by a one-digit number *Pictorial - Show array using squared paper.*	19 x 4 = 20 x 4 subtract 1 x 4 (said as '*twenty fours subtract one four*') 19 x 4 = 80 – 4 19 x 4 = 76 19 x 3 19 x 5 19 x 8
Use partitioning to double any two-digit number *Concrete – Diennes equipment, place value counters* *Pictorial – Diennes jottings, part-part-whole diagram to double e.g. double 76*	Double 39, double 52, double 85
Use related facts or partitioning to double any multiple of 50 to 500 *Concrete – Diennes equipment, place value counters* *Pictorial – Diennes jottings, part-part-whole diagram to double e.g. double 350*	Double 250, double 450, double 150
Use related facts to divide T0 by a one-digit number NB T0 represents a multiple of ten *Concrete – Diennes equipment, place value counters* 	60 ÷ 3 related to 6 ÷ 3 80 ÷ 40 related to 8 ÷ 4 90 ÷ 3 related to 9 ÷ 3

Pictorial – Diennes jottings, division trio e.g. 8 ÷ 2 = 4 then 80 ÷ 20 = 4 	
Use partitioning to halve even numbers up to 200 *Concrete – Diennes equipment, place value counters* *Pictorial – Diennes jottings, part-part-whole diagram to halve e.g. halve 154*	Find half of 162 by partitioning into 160 and 2 Find half of 94 by partitioning into 80 and 14 Find half of 136 by partitioning into 120 and 16

Year 4

Multiply a one- or two-digit number by 10 and 100 *Concrete – Diennes equipment, place value counters* *Pictorial – place value chart*	7 x 10 9 x 100 71 x 10 63 x 100

Use related facts to multiply H00 by a one-digit number *Concrete – Diennes equipment, place value counters* *Pictorial – place value chart, related facts multiplication trio e.g. 7 x 6 = 42 then 700 x 6 = 4200*  	600 x 7 related to 6 x 7 = 42 *This should be understood as 'six hundred sevens'.* *As the number of 7s is 100 times greater than six sevens, so the product is 100x greater.* 500 x 8 related to 5 x 8 = 40 900 x 6 related to 9 x 6 = 54
Use factor pairs to multiply H00 by a one-digit number. *Pictorial – place value chart for multiplying by 100*	600 x 7 becomes 6 x 100 x 7 reordered as 6 x 7 x 100 500 x 8 becomes 5 x 100 x 8 reordered as 5 x 8 x 100 900 x 6 becomes 9 x 100 x 6 reordered as 9 x 6 x 100

Use compensation to multiply T9 by a one-digit number. NB T9 represents a two-digit number with 9 ones *Pictorial – rectangular array or a rectangle with given dimensions*	49 x 3 considered as 50 x 3 – 1 x 3 (read as '*fifty threes subtract one three*') 29 x 7 considered as 30 x 7 – 1 x 7 (read as '*thirty sevens subtract one seven*') 89 x 6 considered as 90 x 6 – 1 x 6 (read as '*ninety sixes subtract one six*')
Use related facts to multiply TU x 5 (by multiplying by 10 and halving). *Concrete – Diennes equipment, place value counters* *Pictorial – place value chart and a part-part-whole diagram, rectangular arrays on squared paper*	28 x 5 becomes 28 x 10 = 280 then 280 ÷ 2 = 140 81 x 5 becomes 81 x 10 = 810 then 810 ÷ 2 = 405 54 x 5 becomes 54 x 10 = 540 then 540 ÷ 2 = 270
Use related facts to multiply TU x 20 (by multiplying by 10 and doubling). *Concrete – Diennes equipment, place value counters* *Pictorial – place value chart and a part-part-whole diagram, rectangular arrays on squared paper*	34 x 20 becomes 34 x 10 = 320 then 320 x 2 = 640 47 x 20 becomes 47 x 10 = 470 then 470 x 2 = 940 68 x 20 becomes 68 x 10 = 680 then 680 x 2 = 1360
Use partitioning to multiply TU by a one-digit number. *Pictorial – partitioning diagram using grid method strategy*	57 x 4 becomes 50 x 4 + 7 x 4 (read as '*fifty fours add seven fours*') 36 x 7 becomes 30 x 7 + 6 x 7 (read as '*thirty sevens add six sevens*') 93 x 6 becomes 90 x 6 + 3 x 6 (read as '*ninety sixes add three sixes*')
Multiply together three numbers. *Concrete – rectangular arrays created with counters or cubes* *Pictorial – rectangular arrays on squared paper*	3 x 4 x 6 (read as '*three lots of four sixes*') 7 x 3 x 9 (read as '*seven lots of three nines*') 5 x 6 x 8 (read as '*five lots of six eights*')
Use place value, known and derived facts to divide mentally. *Concrete – Diennes equipment, place value counters* *Pictorial – place value chart*	120 ÷ 10 600 ÷ 100 850 ÷ 10

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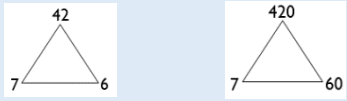
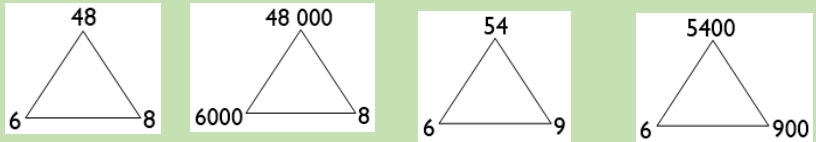
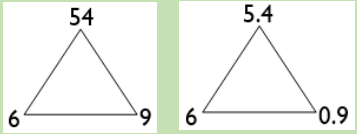
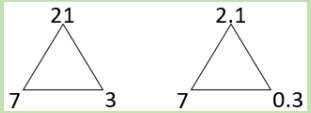
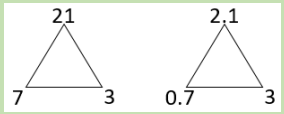
Use related facts to divide HT0 by a one-digit number. *Pictorial – place value chart, related facts division trio e.g. 42 ÷ 6 = 7* *then 420 ÷ 60 = 7* 	480 ÷ 8 related to 48 ÷ 8 630 ÷ 9 related to 63 ÷ 9 300 ÷ 6 related to 30 ÷ 5
Use partitioning to divide TU by a one-digit number. *Concrete – Diennes equipment, place value counters* *Pictorial – part-part-whole diagram*	68 ÷ 4 by partitioning into 40 and 28 (both multiples of 4) 95 ÷ 5 by partitioning into 50 and 45 (both multiples of 5) 84 ÷ 6 by partitioning into 60 and 24 (both multiples of 6)
Use partitioning to double or halve any number, including decimals to one decimal place. *Concrete – place value counters* *Pictorial – partitioning diagram*	Double 374 Halve 468 Double 4524 Find half of 7602 Double 7.6 What is half of 8.2?

Year 5

Multiply/divide whole numbers and decimals by 10, 100 and 1000 *Concrete (if necessary) – Diennes equipment, place value counters* *Pictorial – place value chart*	75.91 x 10 874 ÷ 10 5.07 x 10 60.1 ÷ 10 670.4 x 100 7043 ÷ 100 360 x 1000 48 750 ÷ 1000 0.76 x 1000
Use related facts to multiply Th000 by a one-digit number and divide a ThH00 by a one-digit number *Pictorial – place value chart for multiplying/dividing by 1000,*	3000 x 3 related to 3 x 3 = 9 *This should be understood as 'three thousand threes'.* *As the number of 3s is 1000x greater than three threes, so the product is 1000x greater.*

related facts multiplication trio and related facts division trio 	7000 x 5 8000 x 9 7200 ÷ 9 related to 72 ÷ 9 *This should be understood as 'how many nines in 7200? Compared to how many nines in 72?'* *As the dividend is 100x greater, then the number of nines in it will be 100x greater.* 3000 ÷ 6 9600 ÷ 8
Use related facts to multiply 0.t by a one-digit number *Pictorial – related facts multiplication trio* 	0.3 x 7 related 3 x 7 = 21 *The number of 7s is 10x less, so the product will be 10x less.* 0.6 x 9 0.5 x 4
Use factor pairs to multiply T0 x T0 *Pictorial – place value chart for multiplying by 100*	30 x 60 becomes 3 x 10 x 6 x 10 reordered as 3 x 6 x 10 x 10 70 x 80 becomes 7 x 10 x 8 x 10 reordered as 7 x 8 x 10 x 10 50 x 40 becomes 5 x 10 x 4 x 10 reordered as 5 x 4 x 10 x 10
Use compensation to multiply H99 by a one-digit number NB H99 represents a three-digit number with 9 tens and 9 ones *Pictorial – rectangular array or a rectangle with given dimensions*	599 x 4 considered as 600 x 4 – 1 x 4 (read as '*six hundred fours subtract one four*') 399 x 6 considered as 400 x 6 – 1 x 6 (read as '*four hundred sixes subtract one six*') 699 x 9 considered as 700 x 9 – 1 x 9 (read as '*seven hundred nines subtract one nine*')
Use partitioning to multiply U.t by a one-digit number *Pictorial – partitioning diagram using grid method strategy*	6.7 x 4 becomes **6** x 4 + **0.7** x 4 3.2 x 7 becomes **3** x 7 + **0.2** x 7 8.5 x 6 becomes **8** x 6 + 0.**5** x 6
Use partitioning to double or halve numbers including those with two decimal places	Double 56.7 Find half of 4.62 Double 485.6 Find half of 18.46 Double 8.59 Find half of 8.94

Concrete (if necessary) – place value counters *Pictorial – partitioning diagram*	Double 36 742 Find half of 17.92 Find half of 32 784
Use related facts to divide U.t by a one-digit number *Pictorial – place value chart, related facts division trio* *e.g. 21 ÷ 7 = 3 then 2.1 ÷ 7 = 0.3* 	2.1 ÷ 7 related to 21 ÷ 7 = 3 *This should be understood as 'how many sevens in 2.1? Compared to how many sevens in 21?'* *As the dividend is 10x smaller, then the number of sevens in it will be 10x smaller.* 3.6 ÷ 9 4.8 ÷ 4
Use related facts to divide U.t by a 0.t *Pictorial – place value chart, related facts division trio* *e.g. 21 ÷ 7 = 3 then 2.1 ÷ 0.7 = 3* 	2.1 ÷ 0.7 related to 21 ÷ 7 = 3 *This should be understood as 'how many 0.7s in 2.1? Compared to how many sevens in 21?'* *As the dividend is 10x smaller and the divisor is 10x smaller, then the answer (quotient) will be the same.* 3.6 ÷ 0.9 4.8 ÷ 0.4
Use partitioning to divide HTU by a one-digit number *Concrete (if necessary) – Diennes equipment, place value counters* *Pictorial – part-part-whole diagram*	756 ÷ 9 By partitioning into 720 and 36 (two multiples of 9 totalling 756) 765 ÷ 5 By partitioning into 500 and 250 and 15 (three multiples of 5 totalling 765) 861 ÷ 7 By partitioning into 700 and 140 and 21 (three multiples of 7 totalling 861)

Year 6

Multiply whole numbers and decimals to three decimal places by 10, 100 and 1000 *Pictorial – place value chart*	4562 x 1000 9.682 x 10 25.784 x 100

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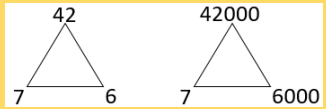
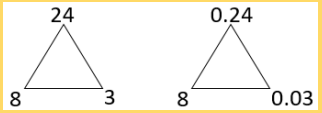
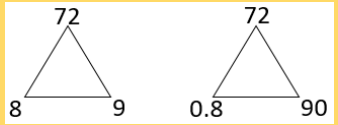
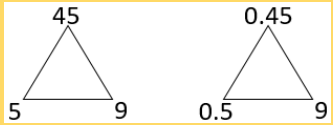
Use partitioning to double or halve any number *Concrete (if necessary) – place value counters* *Pictorial – partitioning diagram*	What is double 34.7? What is half of 456? 34.5 ÷ 2 = 409 x 2 =
Identify and use all related facts that link to tables *Pictorial – related facts multiplication trios* 	7000 x 6 becomes 7 x 1000 x 6 reordered as 7 x 6 x 1000 500 x 40 becomes 5 x 100 x 4 x 10 reordered as 5 x 4 x 100 x 10 900 x 300 becomes 9 x 100 x 3 x 100 reordered as 9 x 3 x 100 x 100 3000 x 80 becomes 3 x 1000 x 8 x 10 reordered as 3 x 8 x 1000 x 10
Use related facts to multiply 0.0t by a one-digit number *Pictorial – related facts multiplication trios* 	0.03 x 7 related to 3 x 7 = 21 0.06 x 9 related to 6 x 9 = 54 0.05 x 4 related to 5 x 4 = 20
Use related facts to divide TU by 0.t *Pictorial – related facts multiplication/division trios* 	56 ÷ 0.8 related to 56 ÷ 8 = 7 21 ÷ 0.7 related to 21 ÷ 7 = 3 36 ÷ 0.9 related to 36 ÷ 9 = 4 48 ÷ 0.4 related to 48 ÷ 4 = 12
Use related facts to divide 0.th by 0.t *Pictorial – related facts multiplication/division trios* 	0.32 ÷ 0.4 related to 32 ÷ 4 = 8 0.64 ÷ 0.8 related to 64 ÷ 8 = 8 0.45 ÷ 0.9 related to 45 ÷ 9 = 5

Use compensation to multiply U.9 and U.99 by a one-digit number *Pictorial – rectangle with given dimensions*	5.9 x 4 understood as 6 x 4 – 0.1 x 4 3.99 x 7 understood as 4 x 7 – 0.01 x 7 9.99 x 6 understood as 10 x 4 – 0.01 x 6

Use partitioning to multiply 0.th by a one-digit number *Pictorial – partitioning diagram*	0.76 x 3 0.28 x 7 0.54 x 6
Use partitioning to double numbers including those with three decimal places *Concrete (if necessary) – place value counters* *Pictorial – partitioning diagram*	Double 3.421 Double 6.705 Double 12.594 Double 54 672 Double 674 960
Divide whole numbers and decimals to three decimal places by 10, 100 and 1000 *Pictorial – place value chart*	356.7 ÷ 100 9.83 ÷ 10 7.04 ÷ 10 860.2 ÷ 100 56 789 ÷ 1000
Use related facts to divide by 50 *Pictorial – place value chart if necessary for initial step of ÷ 100*	4100 ÷ 50 understood as (4100 ÷ 100) x 2 7800 ÷ 50 understood as (7800 ÷ 100) x 2 530 ÷ 50 understood as (530 ÷ 100) x 2
Use related facts to divide by 25 *Pictorial – place value chart if necessary for initial step of ÷ 100*	3200 ÷ 25 understood as (3200 ÷ 100) x 4 7600 ÷ 25 understood as (7600 ÷ 100) x 4 360 ÷ 25 understood as (360 ÷ 100) x 4
Use partitioning to divide ThHTU by a one-digit number *Concrete (if necessary) – place value counters* *Pictorial – partitioning diagram*	5035 ÷ 5 by partitioning into 5000 and 35 (multiples of 5 totalling 5035) 1236 ÷ 4 by partitioning into 1200 and 36 (multiples of 4 totalling 1236) 9240 ÷ 6 by partitioning into 6000 and 3000 and 240 (multiples of 6 totalling 9240)