Copley Junior School
Believe Achieve, Succeed

Maths Calculation Policy for Multiplication

Mental Strategies

Year 2

Mental Strategies

Children should count regularly, on and back, in steps of 2, 3, 5 and 10.

Children should practise times table facts.
2 x 1 =
2 x 2 =
2 x 3 =

Use a clock face to support understanding of counting in 5s.
Use money to support counting in 2s, 5s, 10s, 20s, 50s.

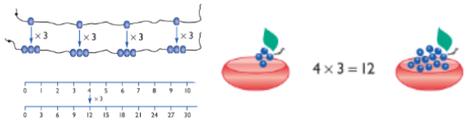
Express multiplication as a number sentence using x.

Use understanding of the inverse and practical resources to solve missing number problems.

7 x □ = 14	□ = 2 x 7
7 x □ = 14	14 = □ x 7
□ x 2 = 14	14 = 2 x □
□ x◯= 14	14 = □ x ◯

Develop understanding of multiplication using arrays and number lines. Include multiplications not in the 2, 5 or 10 times tables.

Begin to develop understanding of multiplication as scaling (3 times bigger/taller).



Doubling numbers up to 10.
Link with understanding scaling.
Using known doubles to work out double 2d numbers
e.g. double 15 =
double 10 + double 5.

Children should learn to **check their calculations**, including using the **inverse** if appropriate.

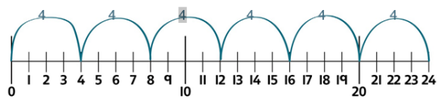
Year 3

Mental Strategies

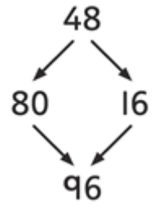
Children should continue to count regularly, on and back, now including multiples of 4, 8, 50 and 100, and using steps of 1 and 10.

Children should practise to become fluent and confident to recall times tables facts for:
x2 x3 x4 x5 x8 and x10.

The number line should continue to be used as an important image to support thinking and the use of informal jottings and drawings to solve problems should be encouraged.

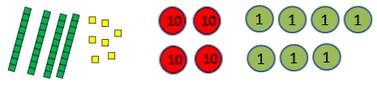


Doubling 2 digit numbers using **partitioning**.
e.g. double 48



Missing Number Problems
Continue with a range of equations as in Year 2 but with appropriate numbers.

Manipulatives can be used to support mental imagery and conceptual understanding. Children need to be shown how these images are related e.g. What's the same? What's different?



Year 4

Mental Strategies

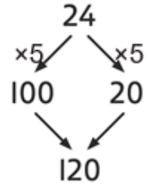
Children should continue to count regularly, on and back, now including multiples of 6, 7, 9, 25 and 1000 and using steps of 1, 10 and 100.

Children should practise to become fluent and confident to recall all times tables facts up to 12 x 12.

×	1	2	3	4	5	6	7	8	9	10
1	1	2	3	4	5	6	7	8	9	10
2	2	4	6	8	10	12	14	16	18	20
3	3	6	9	12	15	18	21	24	27	30
4	4	8	12	16	20	24	28	32	36	40
5	5	10	15	20	25	30	35	40	45	50
6	6	12	18	24	30	36	42	48	54	60
7	7	14	21	28	35	42	49	56	63	70
8	8	16	24	32	40	48	56	64	72	80
9	9	18	27	36	45	54	63	72	81	90
10	10	20	30	40	50	60	70	80	90	100

Use the context of a week and a calendar to support the 7 times table (e.g. how many days in 5 weeks?).
Use of finger strategy for 9 times table.

Use **partitioning** to multiply 2-digit numbers by 1-digit numbers.
e.g. 24 x 5



Multiply **3** numbers together.

Multiply multiples of 10, 100 and 1000 by 1-digit numbers using **known table facts**.
e.g. 400 x 8
4 x 8 = 32
32 x 100 = 3200

Multiply near multiples by **rounding and then adjusting**.
e.g. 24 x 19
24 x 20 = (2 x 24 x 10) 480
480 – 24 = 456

Year 5

Mental Strategies

Use practical resources and jottings to explore equivalent statements e.g. 4 x 35 = 2 x 2 x 35.

Recall prime numbers up 19 and identify prime numbers up to 100 (with reasoning).

Solve practical problems where children need to scale up. Relate to **known number facts**.

Identify factor pairs for numbers.

Children should continue to count regularly, on and back, now including steps of powers of 10.

Multiply by 10, 100, 1000, including decimals.

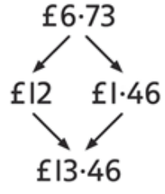
The **number line** should continue to be used as an important image to support thinking and the use of **informal jottings should be encouraged**.

Children should be encouraged to choose from a **range of strategies** to solve problems mentally:

- **Partitioning** using x10, x20 etc.
- **Doubling** to solve x2, x4, x8
- **Recall of times tables**
- **Use of commutativity** of multiplication

If children know the times tables facts to 12 x 12, can they use this knowledge to recite other times tables (e.g. the 13 times tables or the 24 times table)?

Doubling and Halving
Double amounts of money **using partitioning**.
e.g. double £6.73



Use doubling and halving as a strategy in multiplying by:
2, 4, 8, 5 and 20.
e.g. 58 x 5 is half of 58 x 10 (580 ÷ 2 = 290)

Year 6

Mental Strategies

Consolidate previous years.

Children should experiment with order of operations, investigating the effect of positioning the brackets in different places:
e.g. 20 – (5 x 3) = 5; (20 – 5) x 3 = 45

Children should be encouraged to choose from a **range of strategies** to solve problems mentally:

- **Partitioning** using x10, x20 etc.
- **Doubling** to solve x2, x4, x8
- **Recall of times tables**
- **Use of commutativity** of multiplication

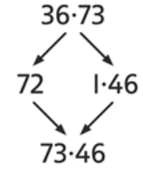
If children know the times table facts to 12 x 12, can they use this knowledge to recite other times tables (e.g. the 13 times table or the 24 times table)?

Identify common factors and multiples of given numbers.

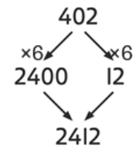
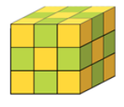
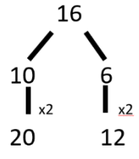
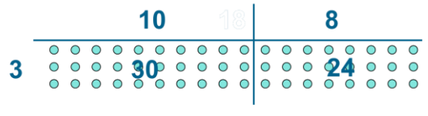
Solve practical problems where children need to scale up. Relate to known number facts.

Continue with a range of equations as in Year 5 but with appropriate numbers. Also include equations with missing digits.

Doubling and Halving
Double decimal numbers with up to 2 places **using partitioning**.
e.g. double 36.73



Use doubling and halving as strategies in mental multiplication.

			The **number line** should continue to be used as an important image to support thinking and the use of **informal jottings should be encouraged**. Children should be encouraged to choose from a **range of strategies**: - **Partitioning** - using x10, x20 etc. - **Doubling** to solve x2, x4, x8 - **Recall of times tables** - **Use of commutativity** of multiplication Solving practical problems where children need to scale up. Relate to known number facts (e.g. how tall would a 25cm sunflower be if it grew 6 times taller?). Continue with a range of equations as in Year 3 but with appropriate numbers. Also include equations with **missing digits**. □2 x 5 = 160	**Partitioning** Use partitioning to multiply 2-digit numbers and 3-digit numbers by 1-digit numbers. e.g. 402 × 6 400 × 6 (2400) and 2 × 6 (12) = 2412  Use partitioning to multiply decimal numbers by 1-digit numbers. e.g. 4·5 × 3 4 × 3 (12) and 0·5 × 3 (1·5) = 13·5 **Rounding** Multiply near multiples by rounding. e.g. 32 × 29 (32 × 30) - 32 = 928 **Use Number Facts** Use times tables facts up to 12 x 12 to multiply multiples of 10 or 100 of the multiplier. e.g. 4 x 6 = 24 so 40 x 6 = 240 (4 x 6 = 24 24 x 10 = 240) and 400 x 6 = 2400 (4 x 6 = 24 24 x 100 = 2400) Use knowledge of factors and multiples in multiplication. e.g. 43 x 6 is double 43 x 3 28 x 50 is half of 28 x 100 Know square numbers and cube numbers.  	**Partitioning** Use partitioning as a strategy in mental multiplication as appropriate. e.g. 3060 × 4 3000 × 4 (12000) 60 × 4 (240) 12000 + 240 = 12240 e.g. 8·4 × 8 8 × 8 (64) 0·4 × 8 (3·2) 64 + 3.2 = 67·2 **Factors** Use factors in mental multiplication. e.g. 421 x 6 421 x 3 = 1263 1263 doubled = 2526 e.g. 3.42 x 5 Half of 3.42 x 10 = 17.1 **Rounding** Multiply decimal numbers using near multiples by rounding. e.g. 4.3 x 19 (4.3 x 20) – 4.3 = 81.7 **Use Number Facts** Use times tables facts up to 12 x 12 in mental multiplication of large numbers or numbers with up to 2 decimal places. e.g. 6 x 4 = 24 so 0.06 x 4 = 0.24 (6 x 4 = 24 24 ÷ 100 = 0.24)
Written Methods	**Towards a Written Method** Use jottings to develop an understanding of doubling two digit numbers. 	**Written Methods** **(progressing to 2d x 1d)** Develop written methods using understanding of visual images. 	**Written Methods** Children to embed and deepen their understanding of the **grid method** to multiply up to **3d x 1d**. Ensure this is still linked back to their understanding of arrays and place value counters. e.g. 253 x 6 | ×	200	50	3	
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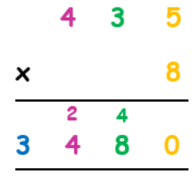
6	1200	300	18	= 1518		**Written Methods** **Short Multiplication** Use this method to multiply 2-, 3- and 4-digit numbers by 1-digit numbers. e.g. 435 x 8 	**Written Methods** Same as Year 5, progressing to larger numbers, aiming for both conceptual understanding and procedural fluency. **Short Multiplication** Use this method to multiply 2-, 3- and 4-digit numbers by 1-digit numbers.

Develop onto the **grid method**.
e.g. 23 x 4

×	20	3	
4	80	12	= 92

Give children opportunities to explore this and deepen understanding using Dienes apparatus and place value counters.

When ready, progress on to use a vertical written algorithm (**ladder method**) to multiply 3-digit numbers by 1-digit numbers.
e.g. 253 x 6

```
   2 5 3
 ×     6
 -------
     1 8   →  6 x 3
 + 3 0 0   →  6 x 50
 -------
 1 2 0 0   →  6 x 200
 -------
 1 5 1 8
```

Next, progress onwards to use this method to multiply an amount of money by a 1-digit number.

```
 £  4 • 3 5
 ×       6
 ---------
       3 0   →  6 x 5
 +   1 8 0   →  6 x 30
 ---------
   2 4 0 0   →  6 x 400
     1
 ---------
 £ 2 6 • 1 0
 ---------
```

Estimate by rounding, then check estimate against actual answer.
When possible, use the **inverse operation to check**.

Long Multiplication
Use this method to multiply 2-, 3- and 4-digit numbers by 'teen' numbers.
e.g. 46 x 16

```
     4 6
   × 1 6
   -----
   2 7 6
 + 4 6 0
   -----
 1
   -----
   7 3 0
   -----
```

Estimate by rounding, then check estimate against actual answer.
When possible use the **inverse operation to check**.

Continue calculating with decimals with up to 2 decimal places by 1-digit numbers e.g. with money.

Multiply fractions by 1-digit numbers.

e.g. $\frac{3}{4} \times 6 = \frac{18}{4} = 4\frac{2}{4} = 4\frac{1}{2}$

e.g. 3743 x 6

```
   3 7 4 6
 ×       6
 -------
   4 2 3
 2 2 4 7 6
 -------
```

Long Multiplication
Use this method to multiply 2-, 3- and 4-digit numbers by 2-digit numbers.
e.g. 456 x 38

```
     4 5 6
   ×   3 8
   -------
   3 6 4 4 8
 + 1 3 1 8 0
   -------
   1 1
   -------
 1 7 3 2 8
   -------
```

Continue calculating with decimals
e.g. 3.42 x 9.5

a) Use **rounding to estimate** the answer:
   3.42 → **3** 9.5 → **10**
   3 x 10 = **30**
b) Remove decimal points.
c) Carry out long multiplication.
d) Place decimal point correctly in answer.
e) Compare actual answer to estimated answer.

```
     3 4 2
   ×   9 5
   -------
   1 7 2 1 0
 + 3 0 3 7 1 8 0
   -------
     1
   -------
 3 2 • 4 9 0
   -------
```

Multiply simple pairs of proper fractions.
e.g. $\frac{1}{4} \times \frac{1}{4} = \frac{1}{16}$

Estimate by rounding, then check estimate against actual answer.
When possible use the **inverse operation to check**.

	Generalisations Understand 6 counters can be arranged as 3+3 or 2+2+2 Understand that when counting in twos, the numbers are always even. **Problem Solving** Teachers should ensure that pupils have the opportunity to apply their knowledge in a variety of contexts and problems (exploring cross curricular links) to deepen their understanding.	**Generalisations** Commutative law shown using arrays. Demonstrate e.g. 3 x 4 = 4 x 3 Realise that the numbers in a multiplication can be switched around but the answer will remain the same. Repeated addition can be shown mentally on a number line. Inverse relationship between multiplication and division. Use an array to explore how numbers can be organised into groups. **Problem Solving** Teachers should ensure that pupils have the opportunity to apply their knowledge in a variety of contexts and problems (exploring cross curricular links) to deepen their understanding.	**Generalisations** Children given the opportunity to investigate numbers multiplied by 1 and 0. When they know multiplication facts up to and including 12 x 12, do they know what x 13 is? (i.e. can they use 4 x 12 to work out 4 x 13 and 4 x 14 and beyond?) **Problem Solving** Teachers should ensure that pupils have the opportunity to apply their knowledge in a variety of contexts and problems (exploring cross curricular links) to deepen their understanding.	**Generalisations** Relating arrays to an understanding of square numbers and making cubes to show cube numbers. Understanding that the use of scaling by multiples of 10 can be used to convert between units of measure (e.g. metres to kilometres means to times by 1000). **Problem Solving** Teachers should ensure that pupils have the opportunity to apply their knowledge in a variety of contexts and problems (exploring cross curricular links) to deepen their understanding.	**Generalisations** Order of operations: brackets first, then indices (powers), followed by multiplication and division (left to right) before addition and subtraction (left to right). Children could learn an acrostic such as BIDMAS or could be encouraged to design their own ways of remembering. Understanding the use of multiplication to support conversions between units of measurement. **Problem Solving** Teachers should ensure that pupils have the opportunity to apply their knowledge in a variety of contexts and problems (exploring cross curricular links) to deepen their understanding.
Vocabulary	**Vocabulary** multiple, multiplication array, multiplication tables / facts groups of, lots of, times, columns, rows	**Vocabulary** *See Y2* partition grid method inverse	**Vocabulary** *See previous years* multiply factor ladder method commutative	**Vocabulary** *See previous years* short multiplication long multiplication cube numbers prime numbers square numbers common factors prime factors composite numbers	**Vocabulary** *See previous years*
Opportunities for Mastery	**NCETM/AET Challenges** Is this true or false? What do you notice? What patterns can you see?	**NCETM/AET Challenges** What's the same? What's different? Can you spot the mistake? Convince me? Always, Sometimes, Never Show Me Prove It Think (Abacus) Do, then explain True or false? Odd One Out The answer is… What is the question?	**NCETM/AET Challenges** What's the same? What's different? Can you spot the mistake? Convince me? Always, Sometimes, Never Show Me Undo Prove It Think (Abacus) Do, then explain True or false? Odd One Out The answer is… What is the question?	**NCETM/AET Challenges** What's the same? What's different? Can you spot the mistake? Convince me? Always, Sometimes, Never Show Me Undo Prove It Think (Abacus) Do, then explain True or false? Odd One Out The answer is… What is the question?	**NCETM/AET Challenges** What's the same? What's different? Can you spot the mistake? Convince me? Always, Sometimes, Never Show Me Undo Prove It Think (Abacus) Do, then explain True or false? Odd One Out The answer is… What is the question?