Multiplication
Year 6

Skills and Mental Strategies

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

They 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 to recite other times tables (e.g. the 13 times tables or the 24 times table).

Generalisations
Order of operations: brackets first, then multiplication and division (left to right) before addition and subtraction (left to right). Children could learn an acrostic such as BODMAS, or could be encouraged to design their own ways of remembering.
Understanding the use of multiplication to support conversions between units of measurement.

Some Key Questions
What do you notice?
What's the same? What's different?
Can you convince me?
How do you know?

Methods

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

Mental methods
Identify common factors and multiples of given numbers.
Solve practical problems where children need to scale up. Relate to known number facts.

Written methods
Continue to refine and deepen understanding of written methods including fluency for using long multiplication. Multiply multi-digit numbers up to 4 digits by a two-digit whole number using the formal written method of long multiplication.

```
  2 3 1
  1342
x   18
10736
13420
24156
  1
```

Multiplication
Year 5

Skills and Mental Strategies

Mental Strategies

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.
They 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 to recite other times tables (e.g. the 13 times tables or the 24 times table).

Generalisation

Relate arrays to an understanding of square numbers and making cubes to show cube numbers.
Understand 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).

Some Key Questions

What do you notice?
What's the same? What's different?
Can you convince me?
How do you know?
How do you know this is a prime number?

Methods

Continue with a range of equations as in Year 4 but with numbers up to 4 digits by a one or two digit number. Also include equations with missing digits.

Mental methods

X by 10, 100, 1000 using moving digits ITP.
Use practical resources and jottings to explore equivalent statements (e.g. 4 x 35 = 2 x 2 x 35).
Recall of 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.

Written methods (progressing to ThHTU x TU)

Long multiplication using place value counters.
Children to explore how the grid method supports an understanding of long multiplication (for ThHTU x TU).

x	1000	800	20	3
70	70000	56000	1400	210
2	2000	1600	40	6

70000
56000
2000
1600
1400
210
+ 46
131256

1823
x 72
6
40
1600
2000
210
1400
56000
70000
131256

1823
x 72
3646
127610
131256

Multiplication
Year 4

Skills and Mental Strategies

Mental Strategies

Children should continue to count regularly, on and back, now including multiples of 6, 7, 9, 25 and 1000, and steps of 1/100.
Become fluent and confident to recall all tables up to 12 x 12
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.

Multiply whole numbers by 10, 100 or 1000.

Multiply 3 numbers together.
The number line should continue to be used as an important image to support thinking, and the use of informal jottings should be encouraged.
They 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

Generalisations

Children should be given the opportunity to investigate numbers multiplied by 1 and 0.

When they know multiplication facts up to x12, do they know what x13 is? (I.e. can they use 4x12 to work out 4x13 and 4x14 and beyond?)

Some Key Questions

What do you notice?
What's the same? What's different?
Can you convince me?
How do you know?

Methods

Continue with a range of equations as in Year 3 but with appropriate numbers (progressing onto HTU x U). Also include equations with missing digits

- 2 x 5 = 160

Mental methods

Count in multiples of 6, 7, 9, 25 and 1000, and steps of 1/100.
Solve 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?)

Written methods (progressing to HTU x U)

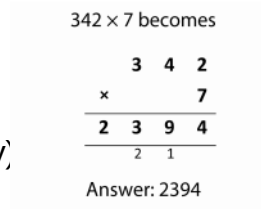
Children to embed and deepen their understanding of the grid method to multiply TU and HTU by U. Ensure this is still linked back to their understanding of arrays and place value counters.

123 x 5

x	100	20	3
5	500	100	15

500
+ 100
+ 15
615

If appropriate, introduce short multiplication for HTU x U. (Please note this is non-statutory)



Multiplication
Year 3

Skills and Mental Strategies

Mental Strategies

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

Children should recall and use multiplication facts for the 3, 4 and 8 multiplication tables:
3 x 1 =
3 x 2 =
3 x 3 =

Generalisations

Connect x2, x4 and x8 through multiplication facts.

Compare times tables with the same times tables which is ten times bigger. If 4 x 3 = 12, then we know 4 x 30 = 120. Use place value charts to demonstrate this.

When they know multiplication facts up to x12, do they know what x13 is? (I.e. can they use 4x12 to work out 4x13 and 4x14 and beyond?)

Some Key Questions

What do you notice?
What's the same? What's different?
Can you convince me?
How do you know?

Methods

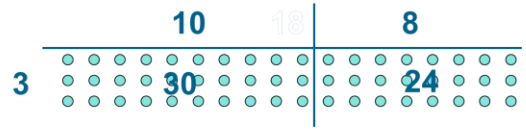
Missing number problems
Continue with a range of equations as in Year 2 but with appropriate numbers (progressing to TU x U).

Mental methods

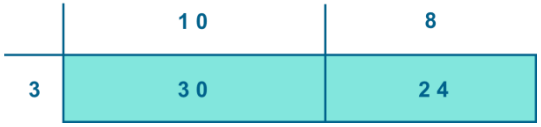
Double 2 digit numbers using partitioning.
Demonstrate multiplication on a number line – jump in larger groups of amounts.
13 x 4 = 10 groups 4 = 3 groups of 4

Written methods (progressing to TU x U)

Develope written methods using understanding of visual images



Develop onto the grid method



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

Multiplication
Year 2

Skills and Mental Strategies

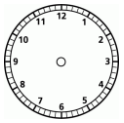
Mental Strategies

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

Number lines should continue to be an important image to support thinking, for example

Children should practise times table facts (2's,3's,5's & 10's)

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.

Generalisation

Commutative law shown on array (video).

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.

Some Key Questions

What do you notice?
What's the same? What's different?
Can you convince me?
How do you know?

Methods

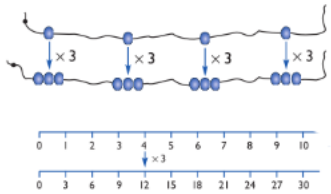
Express multiplication as a number sentence using x.

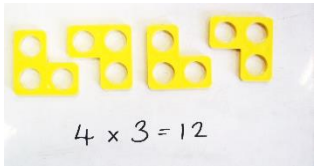
Use understanding of the inverse and practical resources to solve missing number problems.

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

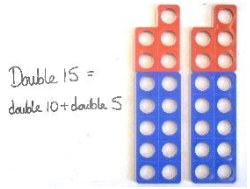
Develop understanding of multiplication using array and number lines (see Year 1). Include multiplications not in the 2, 5 or 10 times tables.

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



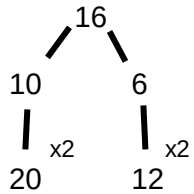


Double numbers up to 10 + 10
(Link with understanding scaling).
Use known doubles to work out double TU numbers.
(double 15 = double 10 + double 5).



Towards written methods

Use jottings to develop an understanding of doubling two digit numbers.



Multiplication
Year 1

Skills and Mental Strategies

Mental Strategies
Children should experience regular counting on and back from different numbers in 1s and in multiples of 2, 5 and 10.

Children should memorise and reason with numbers in 2, 5 and 10 times tables.
They should see ways to represent odd and even numbers. This will help them to understand the pattern in numbers.

Children should begin to understand multiplication as scaling in terms of double and half. (E.g. that tower of cubes is double the height of the other tower).

Generalisations
Understand 6 can be arranged as 3+3 or 2+2+2
Understand that when counting in twos, the numbers are always even.

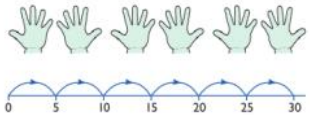
Some Key Questions
Why is an even number an even number?
What do you notice?
What's the same? What's different?
Can you convince me?
How do you know?

Methods

Understand multiplication is related to doubling and combining groups of the same size (repeated addition).

Washing line, and other practical resources for counting: concrete objects, Numicon, bundles of straws, bead strings, etc.

$2+2+2+2+2=10$
$2\times5=10$
2 multiplied by 5
5 pairs
5 hops of 2



$5+5+5+5+5+5=30$
$5\times6=30$
5 multiplied by 6
6 groups of 5
6 hops of 5

Problem solve with concrete objects (including money and measures.

Use cuissenaire and bar method to develop the vocabulary relating to 'times' –
Pick up five, 4 times.

Use arrays to understand multiplication can be done in any order (commutative).