

MEON
JUNIOR SCHOOL

CALCULATION POLICY

Your child will be taught the strategies in this calculation policy throughout their time at Meon Junior School.

Please keep this booklet to help you when working with your child at home.

About our Calculation Policy

The following calculation policy has been devised to meet requirements of the National Curriculum 2014 for the teaching and learning of mathematics, and is also designed to give pupils a consistent and smooth progression of learning in calculations across the school.

Age stage expectations

The calculation policy is organised according to age stage expectations as set out in the National Curriculum 2014, however it is vital that pupils are taught according to the stage that they are currently working at, being moved onto the next level as soon as they are ready, or working at a lower stage until they are secure enough to move on.

Providing a context for calculation:

It is important that any type of calculation is given a real life context or problem solving approach to help build children's understanding of the purpose of calculation, and to help

them recognise when to use certain operations and methods when faced with problems. This must be a priority within calculation lessons.

Choosing a calculation method:

Children need to be taught and encouraged to use the following processes in deciding what approach they will take to a calculation, to ensure they select the most appropriate method for the numbers involved:

Can I do it in my head using a mental strategy?

Could I use some jottings to help me?

Should I use a written method to work it out?

To work out a tricky calculation:

Approximate

Calculate

Check it

Addition

Introduce (from Year 3) **expanded column addition** method:

$$\begin{array}{r} 786 \\ + 642 \\ \hline 8 \\ 120 \\ \hline 1300 \\ \hline 1428 \end{array}$$

Add the ones first, in preparation for the compact method.

Move to the compact **column addition** method, with 'carrying':

2. Teach the children that they are adding '8 tens and 4 tens' which equals 12 tens, not $8 + 4 = 12$.

1. Add the ones first.

3. 'Carry' numbers underneath the bottom

$$\begin{array}{r} 7 \\ + 642 \\ \hline 1428 \\ \hline 1 \end{array}$$

Subtraction

Introduce (from Year 3) compact **column subtraction** method with no 'exchanging':

2. Teach the children that they are subtracting '2 tens from 7 tens' which equals 5 tens, not $7 - 2 = 5$.

$$\begin{array}{r} 874 \\ - 523 \\ \hline 351 \end{array}$$

1. Subtract the ones first.

Move to the compact **column subtraction** method, with 'exchanging':

2. 'Exchange' a ten from the 'ten's column' to make 11 ones.

$$\begin{array}{r} 9 \overset{4}{\cancel{5}} \overset{1}{1} \\ - 427 \\ \hline 524 \end{array}$$

1. Subtract the ones first.

Multiplication

Introduce (from Year 3) the **grid method** for multiplication:

Column addition to be completed alongside.

X	40	2
20	800	40
3	120	15

$$\begin{array}{r}
 800 \\
 120 \\
 40 \\
 + 15 \\
 \hline
 975
 \end{array}$$

Move to the **short multiplication** method:

2. Then, multiply the tens column (6 x 2)

1. First, multiply the ones column

3. 'Carry' numbers underneath the bottom line

$$\begin{array}{r}
 24 \\
 \times 6 \\
 \hline
 144 \\
 \hline
 2
 \end{array}$$

Move to the **long multiplication** method (Year 5 and 6):

1. 'Carry' to the next column; cross through once added to avoid confusion.

2. Add a placeholder (0) because you are multiplying by a multiple of ten.

$$\begin{array}{r}
 124 \\
 \times 26 \\
 \hline
 744 \\
 2480 \\
 \hline
 3224 \\
 \hline
 11
 \end{array}$$

DIVISION

Introduce (from Year 3) short division method:

2. Teach children that it is 6 hundreds divided by 3 equals 2 hundreds.

1. Always start with the column on the left.

3. Carry the remainder onto the digit in the next column.

$$\begin{array}{r} 215 \text{ r}1 \\ \underline{3 \overline{) 6416}} \end{array}$$

Move to the **long division** method when dividing by a 2-digit number (Year 6):

Work out the remainder as a decimal.

$$\begin{array}{r} 28 \text{ r}12 \\ 15 \overline{) 432} \\ \underline{300} \quad 15 \times 20 \\ 132 \\ \underline{120} \quad 15 \times 8 \\ 12 \end{array}$$

$$\begin{array}{r} 28.8 \\ 5 \overline{) 432.0} \\ \underline{30} \quad \downarrow \\ 132 \\ \underline{120} \quad \downarrow \\ 120 \\ \underline{120} \\ 0 \end{array}$$

Use jottings to support chunking.

Calculation Progression for Column Addition:

- 1 digit + 1 digit (eg. $3 + 3$) – no carrying
- 1 digit + 1 digit (eg. $8 + 3$) – carrying
- 2 digit + 1 digit (eg. $14 + 3$) – no carrying – below 20
- 2 digit + 1 digit (eg. $14 + 8$) – carrying – below 20
- 2 digit + 1 digit (eg. $34 + 3$) – no carrying – below 50
- 2 digit + 1 digit (eg. $34 + 7$) – carrying – below 50
- 2 digit + 1 digit (eg. $64 + 3$) – no carrying – up to 100
- 2 digit + 1 digit (eg. $66 + 5$) – carrying – up to 100
- 2 digit + 2 digit (eg. $23 + 14$) – no carrying – below 50
- 2 digit + 2 digit (eg. $23 + 18$) – carrying – below 50
- 2 digit + 2 digit (eg. $23 + 64$) – no carrying - up to 100
- 2 digit + 2 digit (eg. $28 + 64$) – carrying - up to 100
- 3 digit + 2 digit (eg. $134 + 23$) – no carrying
- 3 digit + 2 digit (eg. $164 + 73$) – carrying
- 3 digit + 3 digit (eg. $164 + 123$) – no carrying
- 3 digit + 3 digit (eg. $378 + 459$) – carrying
- 4 digit + 3 digit (eg. $1264 + 123$) – no carrying
- 4 digit + 3 digit (eg. $3578 + 459$) – carrying
- 4 digit + 4 digit (eg. $2164 + 1523$) – no carrying
- 4 digit + 4 digit (eg. $3578 + 4659$) – carrying
- 5 digit + 3 digit (eg. $23164 + 123$) – no carrying
- 5 digit + 3 digit (eg. $35278 + 459$) – carrying
- 5 digit + 4 digit (eg. $23164 + 1523$) – no carrying
- 5 digit + 4 digit (eg. $35278 + 6459$) – carrying
- 5 digit + 5 digit (eg. $23164 + 15323$) – no carrying
- 5 digit + 5 digit (eg. $52378 + 62459$) – carrying
- Numbers with more than 5 digits
- Number with 1 decimal place + number with 1 decimal place (eg. $3.2 + 4.1$)
- Number with 2 decimal places + number with 2 decimal places (eg. $3.23 + 4.21$)
- Number with 2 decimal places + number with 1 decimal place (eg. $3.23 + 4.1$)
- Number with 3 decimal places + number with 1 or 2 decimal places (eg. $3.213 + 4.1$ or $3.213 + 4.12$)

Year 3

Year 4

Years 5 and 6

Addition

Calculation Progression for Column Subtraction:

- 1 digit - 1 digit (eg. $6 - 3$) – no exchanging
- 2 digit - 1 digit (eg. $14 - 3$) – no exchanging – below 20
- 2 digit - 1 digit (eg. $14 - 8$) – exchanging – below 20
- 2 digit - 1 digit (eg. $34 - 3$) – no exchanging – below 50
- 2 digit - 1 digit (eg. $34 - 7$) – exchanging – below 50
- 2 digit - 1 digit (eg. $64 - 3$) – no exchanging – up to 100
- 2 digit - 1 digit (eg. $66 - 8$) – exchanging – up to 100
- 2 digit - 2 digit (eg. $27 - 14$) – no exchanging – below 50
- 2 digit - 2 digit (eg. $23 - 18$) – exchanging – below 50
- 2 digit - 2 digit (eg. $65 - 24$) – no exchanging - up to 100
- 2 digit - 2 digit (eg. $65 - 48$) – exchanging - up to 100
- 3 digit - 2 digit (eg. $134 - 23$) – no exchanging
- 3 digit - 2 digit (eg. $164 - 73$) – exchanging
- 3 digit - 3 digit (eg. $164 - 123$) – no exchanging
- 3 digit - 3 digit (eg. $378 - 299$) – exchanging
- 4 digit - 3 digit (eg. $1264 - 123$) – no exchanging
- 4 digit - 3 digit (eg. $3523 - 459$) – exchanging
- 4 digit - 4 digit (eg. $2764 - 1523$) – no exchanging
- 4 digit - 4 digit (eg. $3523 - 4659$) – exchanging
- 5 digit - 3 digit (eg. $23164 + 123$) – no exchanging
- 5 digit - 3 digit (eg. $35223 + 459$) – exchanging
- 5 digit - 4 digit (eg. $23964 - 1523$) – no exchanging
- 5 digit - 4 digit (eg. $35278 + 6459$) – exchanging
- 5 digit - 5 digit (eg. $28864 + 15323$) – no exchanging
- 5 digit - 5 digit (eg. $52321 + 32459$) – exchanging
- Numbers with more than 5 digits
- Number with 1 decimal place - number with 1 decimal place (eg. $4.6 - 3.2$)
- Number with 2 decimal places - number with 2 decimal places (eg. $4.56 - 2.41$)
- Number with 2 decimal places - number with 1 decimal place (eg. $5.61 - 2.7$)
- Number with 3 decimal places - number with 1 or 2 decimal places (eg. $4.345 - 2.1$ or $4.345 - 2.64$)

Year 3

Year 4

Years 5 and 6

Subtraction

Multiplication

Calculation Progression for multiplication:

- 1 digit x 1 digit (eg. 3×3)
- 2 digit x 1 digit (eg. 14×3)
- 3 digit x 1 digit (eg. 264×4)
- 4 digit x 1 digit (eg. 3578×4)
- 2 digit x 2 digit (eg. 43×21) – Long multiplication
- 3 digit x 2 digit (eg. 352×45) – long multiplication
- 4 digit x 2 digit (eg. 2316×15) – long multiplication
- Number with 1 decimal place x 1 digit whole number (eg. 3.4×7)
- Number with 2 decimal places x 1 digit whole number (eg. 3.56×4)
- Number with 1 decimal places x 2 digit whole number (eg. 34.2×16)
- Number with 2 decimal places x 2 digit whole number (eg. 34.26×16)

Children should know their times tables up to 12×12 by the end of Year 4

Any calculations should only use numbers where the child is fluent with the corresponding times table.

Division

Calculation Progression for division:

- 1 digit \div 1 digit (eg. $6 \div 3$)
- 2 digit \div 1 digit (eg. $14 \div 3$)
- 3 digit \div 1 digit (eg. $264 \div 4$)
- 4 digit \div 1 digit (eg. $3578 \div 4$)
- 2 digit \div 2 digit (eg. $43 \div 21$) – Long division
- 3 digit \div 2 digit (eg. $352 \div 45$) – long division
- 4 digit \div 2 digit (eg. $2316 \div 15$) – long division
- Number with 1 decimal place \div 1 digit whole number (eg. $6.4 \div 2$)
- Number with 2 decimal places \div 1 digit whole number (eg. $9.56 \div 4$)
- Division calculations where the answer has up to 2 decimal places

Any calculations should only use numbers where the child is fluent with the corresponding times table.

Year 3

Year 4

Years 5 and 6

Year 6

Strategies to use if children are not at Year 3 age expectation

Addition

Record steps in addition using partitioning:

$$76 + 47 = 76 + 40 + 7 = 116 + 7 = 123$$

$$76 + 47 = 70 + 40 = 110$$

$$6 + 7 = 13$$

$$110 + 13 = 123$$

Partitioned numbers are then written under one another:

$$\begin{array}{r}
 47 = 40 + 7 \\
 + 76 \quad \underline{70 + 6} \\
 110 + 13 = 123
 \end{array}$$

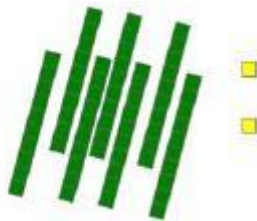
Introduce this method with examples where there is no exchanging:

$$89 - 35 = \underline{54}$$

$$\begin{array}{r}
 80 + 9 \\
 - 30 + 5 \\
 \hline
 50 + 4
 \end{array}$$

Introduce exchanging through practical subtraction:

$$72 - 47$$



$$\begin{array}{r}
 60 \\
 \cancel{70} + 2 \\
 - 40 + 7 \\
 \hline
 20 + 5 = \underline{25}
 \end{array}$$

Use partitioned column method to subtract 2 and 3 digit numbers:

$$238 - 146 = 92$$

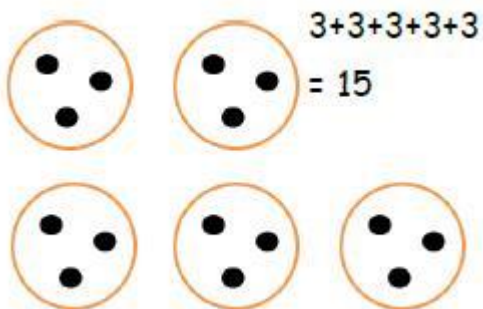
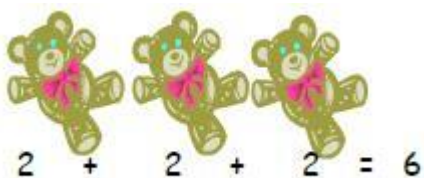
$$\begin{array}{r}
 100 \\
 \cancel{200} + 30 + 8 \\
 - 100 + 40 + 6 \\
 \hline
 0 + 90 + 2
 \end{array}$$

Subtraction

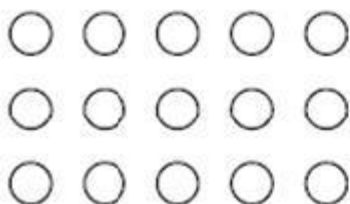
Multiplicatio

n

Repeated addition (calculate with concrete objects):



Arrays:



$3 \times 5 = 15$

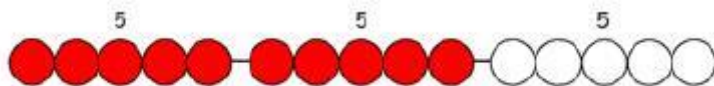
$5 \times 3 = 15$

$5 \times 3 = 3 + 3 + 3 + 3 = \underline{15}$

$3 \times 5 = 5 + 5 + 5 = \underline{15}$

Use practical apparatus:

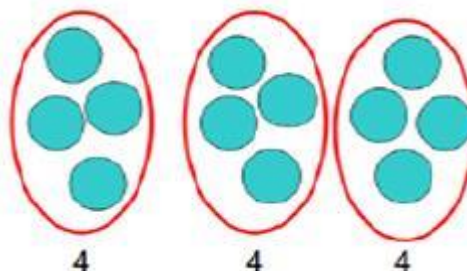
$5 \times 3 = 5 + 5 + 5 = 15$



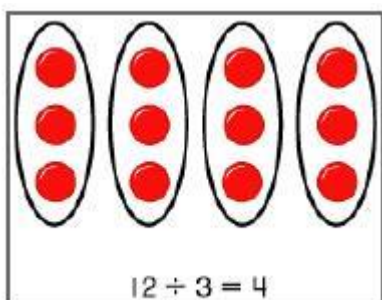
Use objects, diagrams and pictorial representations to solve problems involving both grouping and sharing.

Grouping: How many groups of 4 can be made with 12 stars? = 3

Sharing: 12 shared between 3 is 4



Use objects, arrays, diagrams and pictorial representations:

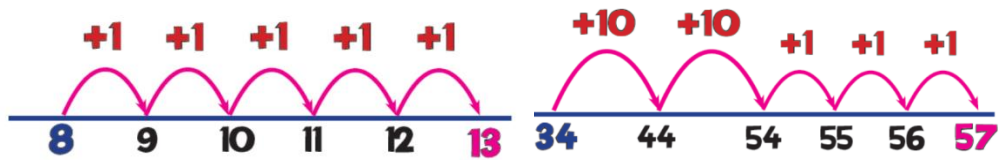
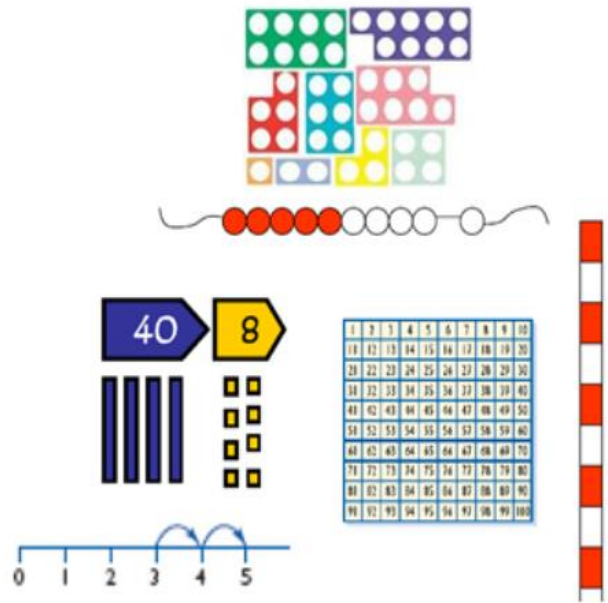


Division

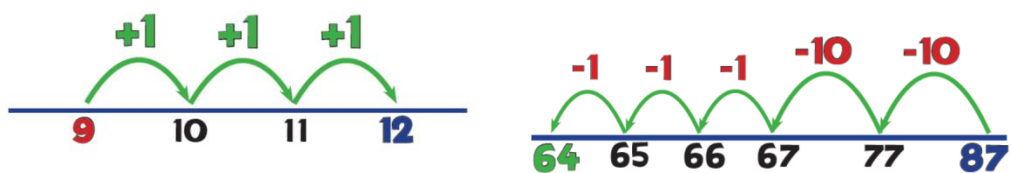
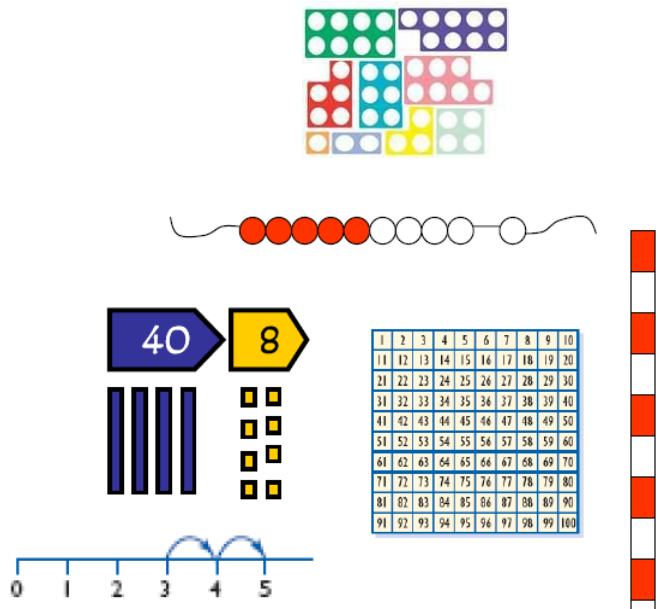
Models and Images to use when teaching and supporting conceptual understanding.

Addition

- Counting apparatus
- Place value apparatus
- Place value cards
- Number tracks
- Numbered number lines
- Empty number lines
- Hundred square
- Counting stick
- Bead string
- Place value apparatus
- Numicon



- Counting apparatus
- Place value apparatus
- Place value cards
- Number tracks
- Numbered number lines
- Empty number lines
- Hundred square
- Counting stick
- Bead string
- Place value apparatus
- Numicon



Subtraction

Multiplication

- Counting apparatus
- Place value apparatus
- Arrays
- 100 squares
- Number tracks
- Numbered number line
- Empty number lines
- Multiplication squares
- Counting stick
- Bead strings

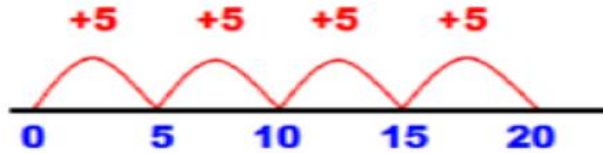
x	1	2	3	4	5	6	7	8	9	10
1	1	2	3	4	5	6	7	8	9	10
2	2	4	6	8	10	12	14	16	18	20
3	3	6	9	12	15	18	21	24	27	30
4	4	8	12	16	20	24	28	32	36	40
5	5	10	15	20	25	30	35	40	45	50
6	6	12	18	24	30	36	42	48	54	60
7	7	14	21	28	35	42	49	56	63	70
8	8	16	24	32	40	48	56	64	72	80
9	9	18	27	36	45	54	63	72	81	90
10	10	20	30	40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



$$4 \times 2$$

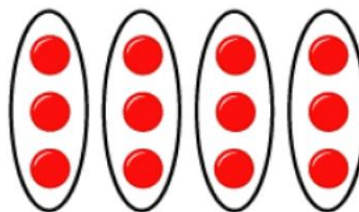
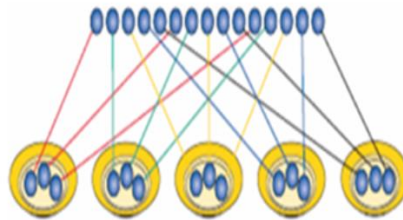


$$2 \times 4 = 8$$

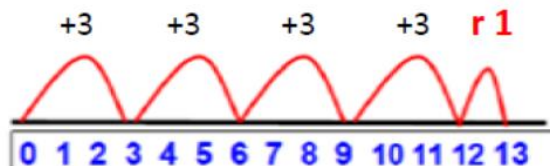
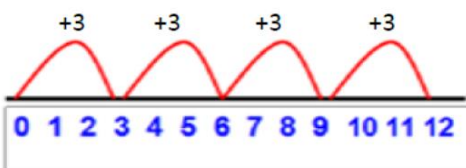


- Counting apparatus
- Place value apparatus
- Arrays
- 100 squares
- Number tracks
- Numbered number line
- Empty number lines
- Multiplication squares
- Counting stick
- Bead strings

15 shared between 5



$$12 \div 3 = 4$$



Division