City Academy Whitehawk Calculation Policy

January 2018

CAW Calculation Policy

Aims

The national curriculum for mathematics aims to ensure that all pupils:

become fluent in the fundamentals of mathematics, through varied and frequent practice with increasingly complex problems over time, So that pupils develop conceptual understanding and the ability to recall and apply knowledge rapidly and accurately

reason mathematically following a line of enquiry, conjecturing relationships and generalisations, and developing an argument, justification or proof using mathematical language

can solve problems by applying their mathematics to a variety of routine and non-routine problems with increasing sophistication, including breaking down problems into a series of simpler steps and persevering in seeking solutions.

The purpose of the CAW Calculation Policy is to share with our community how we aim for our children to achieve fluency in the four operations.

CAW Addition Facts

Our aim is for children to be able to recall all single digit addition facts as quickly as they can tell you their name.
They should also be able to recall their 2, 5 and 10 times tables.

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

CAW Multiplication Facts

By the end of Year 4 your child is expected to know their times tables.
These multiplication facts should be hardwired just like the addition facts.

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

At City Academy Whitehawk, we are in our Mathematics Mastery Launch Year. Our Early Years and Year 1 cohorts are committed to the Mathematics Mastery principles and adhere to the Mathematics Mastery Progression in Calculations Policy. This will be made available on our school's website.

Written Calculation

Mental Strategy

I can add 2 digit numbers to 2 digit numbers without exchanging.

$$\begin{array}{r} 36 \\ +\ 43 \\ \hline 79 \end{array}$$

23 + 46

60 + 9 = 69

I can mentally add 2 digit numbers without exchanging

Fact Families

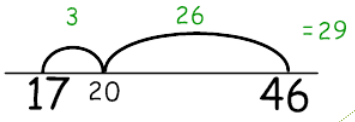
110	
30	80

80 + 30 = 110
30 + 80 = 110
110 - 30 = 80
110 - 80 = 30

Mental Strategy

I can subtract from a 2 digit number using two 'jumps' (the first jump must be to the next 'ten')

46 - 17 = 29



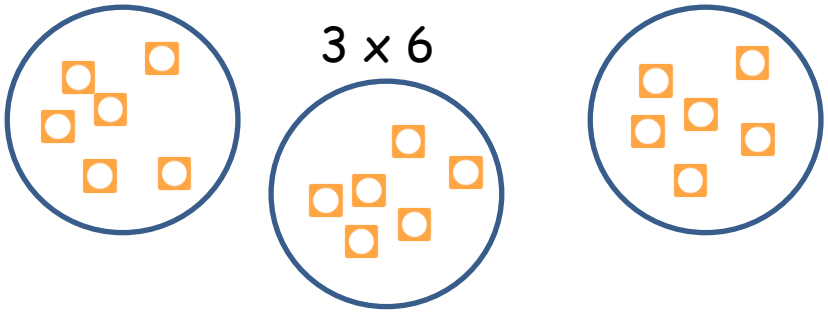
Written Calculation

I can take away 2 digit numbers from 2 digit numbers without exchanging.

$$\begin{array}{r} 79 \\ -\ 36 \\ \hline 43 \end{array}$$

Year 2

I can solve 1 digit by 1 digit multiplications (2, 3, 4 and 5 times tables)



3 lots of 6/3x6/6+6+6 = 18

I can instantly recall the 2, 5 and 10 times table

I can use table facts to find a division fact with remainders.

17 ÷ 5

5, 10, 15… That's three lots of 5.
How many are left?
16, 17…That's 2.
Three lots of 5 and 2 left over.
17 ÷ 5 = 3 r 2

Written Calculation

+

$$\begin{array}{r} 537 \\ +\ 383 \\ \hline 920 \\ \scriptstyle 1\ \ 1 \end{array}$$

I can add 3 digit numbers to 3 digit numbers with exchanging.

Written Calculation

−

$$\begin{array}{r} \overset{6}{\cancel{7}}\ \overset{15}{\cancel{6}}\ \overset{1}{5} \\ -\ 3\ 8\ 6 \\ \hline 3\ 7\ 9 \end{array}$$

I can take away 3 digit numbers from 3 digit numbers with or without exchanging.

Fact Families

100	
37	63

37 + 63 = 100
63 + 37 = 100
100 − 37 = 63
100 − 63 = 37

Year 3

I can solve 1 digit by 2 digit multiplications (2, 3, 4 and 5 times tables)

×

$$\begin{array}{r} 35 \\ \times\ \ 5 \\ \hline 175 \\ \scriptstyle 2 \end{array}$$

Written Calculation

I can solve a 2d ÷ 1d (using x2, 3, 4, 5) with no remainders inside the question

÷

$$3\overline{)69} \quad 23$$

69÷3=23

Written Calculation

Fact Families

210						
30	30	30	30	30	30	30

7 x 30 = 210
30 x 7 = 210
120 ÷ 7 = 30
120 ÷ 30 = 7

Mental Strategy

+

623 + 146

700 + 60 + 9 = 769

I can mentally add 3 digit numbers without exchanging.

I can solve any 1 digit by 2 digit multiplications

x	20	3
4	80	12

4 x 23 = 80 + 12

80 + 12 = 92

×

Mental Strategy

Fact Families

100	
37	63

37 + 63 = 100
63 + 37 = 100
100 - 37 = 63
100 - 63 = 37

Can I make a sensible adjustment?

Eg. to subtract nine it is more efficient to subtract ten and add one to my answer.

Year 3

Mental Strategy

−

Hold the bigger number. Subtract the hundreds, subtract the tens, subtract the ones.

I can subtract from 3 digit numbers

I can use table facts to find a division fact with or without remainders

68 ÷ 5

"50! 18 remain.
15! 3 remain.
10 lots, 3 lots. 3 remaining.
68 ÷ 5 = 13 remainder 3."

Fact Families

210						
30	30	30	30	30	30	30

7 x 30 = 210
30 x 7 = 210
120 ÷ 7 = 30
120 ÷ 30 = 7

÷

Mental Strategy

Written Calculation

$$\begin{array}{r} 7,453 \\ +\ 2,175 \\ \hline 9,628 \\ \scriptstyle 1 \end{array}$$

I can add 4 digit numbers to 4 digit numbers with exchanging.

Written Calculation

$$\begin{array}{r} \overset{6}{\cancel{7}},\overset{13}{\cancel{4}}\,\overset{14}{\cancel{5}}\,\overset{1}{3} \\ -\ 3,464 \\ \hline 3,989 \end{array}$$

I can subtract from 4 digit numbers without exchanging.

Fact Families

100	
37	63

37 + 63 = 100
63 + 37 = 100
100 - 37 = 63
100 - 63 = 37

I can solve any 3 digit by 1 digit multiplication

$$\begin{array}{r} 374 \\ \times\ \ \ 6 \\ \hline 2,244 \\ \scriptstyle 2\ \ 4\ \ 2 \end{array}$$

I can solve any 4d ÷ 1d with remainders within the question but not the answer

$$7\overline{)2,247} = 321$$

Fact Families

210						
30	30	30	30	30	30	30

7 x 30 = 210
30 x 7 = 210
120 ÷ 7 = 30
120 ÷ 30 = 7

Written Calculation

Written Calculation

Mental Strategy

+

688 + 345

900 + 120 + 13 = 1,033

Also as money... eg. £6.88 + £3.45 = £10.33

I can mentally add 3 digit numbers with exchanging.

Fact Families

100	
37	63

37 + 63 = 100
63 + 37 = 100
100 − 37 = 63
100 − 63 = 37

Mental Strategy

−

Hold the bigger number. Subtract the hundreds, subtract the tens, subtract the ones.

Can I make a sensible adjustment?

Eg. to subtract nine it is more efficient to subtract ten and add one to my answer.

I can subtract **any** 2 digit number from 3 digit numbers

I can solve 1 digit by 2 digit multiplications (2, 3, 4 and 5 times tables)

x	80	6
7	560	42

7 x 86 = 560 + 42
560 + 42 = 602

I can combine 2 or more Tables Facts **from any time table** to solve division with remainders

92 ÷ 7

"70! 22 remain.
21! 1 remains.
10 lots, 3 lots. 1 remaining.
92 ÷ 7 = 13 remainder 1."

Fact Families

210						
30	30	30	30	30	30	30

7 x 30 = 210
30 x 7 = 210
120 ÷ 7 = 30
120 ÷ 30 = 7

×

Mental Strategy

÷

Mental Strategy

Written Calculation

+

$$\begin{array}{r} 12,583 \\ +\ 45,621 \\ \hline 58,204 \\ \ \ 1\ \ 1 \end{array}$$

I can add 5 digit numbers to 5 digit numbers with exchanging.

Written Calculation

−

$$\begin{array}{r} {}^{3}\cancel{4}\ {}^{1}2,{}^{7}\cancel{8}\ {}^{1}4\ 5 \\ -\ 1\ 3,6\ 7\ 4 \\ \hline 29,171 \end{array}$$

I can subtract from 5 digit numbers with and without exchanging.

Year 5

I can solve 1 digit by 4 digit multiplications

$$\begin{array}{r} 8,324 \\ \times\ \ \ \ \ 6 \\ \hline 49,944 \\ \ 1\ \ 1\ \ 2 \end{array}$$

I can solve any 4d ÷ 1d with remainders

$$6\overline{)7,209} = 1,201\ r3$$

7,209 ÷ 6 = 1,201 r3

Fact Families

1.1	
0.4	0.7

0.4 + 0.7 = 1.1
0.7+ 0.4 = 1.1
1.1 - 0.4 = 0.7
1.1 - 0.7 = 0.4

Fact Families

1.2			
0.3	0.3	0.3	0.3

4 x 0.3 = 1.2
0.3 x 4 = 1.2
1.2 ÷ 4 = 0.3
1.2 ÷ 0.3 = 4

×

Written Calculation

÷

Written Calculation

Mental Strategy

+

3.85 + 8.67

11 1.4 0.12

12.52

I can solve any addition with larger numbers and with numbers with 2 decimal places

Fact Families

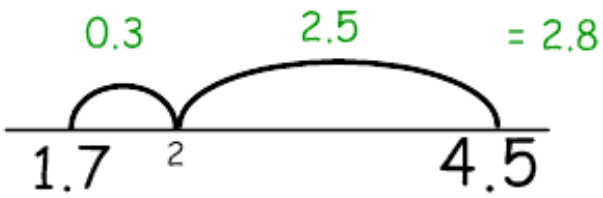
1.1	
0.4	0.7

0.4 + 0.7 = 1.1
0.7+ 0.4 = 1.1
1.1 - 0.4 = 0.7
1.1 - 0.7 = 0.4

Mental Strategy

−

4.5 - 1.7



I can subtract larger numbers and numbers with 1 decimal place using two sensible 'jumps'

Year 5

I can use jottings to solve 2 digit by 2 digit multiplications

x	60	9
30	1,800	270
8	480	72

I can use table facts to find a division fact with or without remainders

x	14
1	14
2	28
5	70
10	140
20	280

156 ÷ 14

Where does 156 come in?

After '10x14'

Enough left for any more 14s?

Yes, 1 more lot of 14 with 2 left over.

10 lots add 1 lot with 2 remaining.

156 ÷ 14 = 11r2

Fact Families

1.2			
0.3	0.3	0.3	0.3

4 x 0.3 = 1.2
0.3 x 4 = 1.2
1.2 ÷ 4 = 0.3
1.2 ÷ 0.3 = 4

72÷8=9
Know the inverse of all multiplication facts

Mental Strategy

×

Mental Strategy

÷

Written Calculation

+

$$\begin{array}{r} 7.341 \\ +\ 13.02 \\ \hline 20.361 \\ {\scriptstyle 1} \end{array}$$

I can add numbers with mixed decimal places

Written Calculation

−

$$\begin{array}{r} {\scriptstyle 1}\cancel{1}{\scriptstyle 1}2.764 \\ -\ \ 3.22 \\ \hline 9.544 \end{array}$$

I can subtract from numbers with 3 decimal places with and without exchanging.

Year 6

I can solve 2 digit by 4 digit multiplications

$$\begin{array}{r} 6,124 \\ \times\ \ \ \ 16 \\ \hline 36,744 \\ +\ 61,240 \\ \hline 97,984 \\ {\scriptstyle 1\ \ 2} \end{array}$$

Written Calculation

×

I can solve any 4d ÷ 1d with remainders

×	14
1	14
2	28
5	70
10	140
20	280

$$\begin{array}{r} 052\text{r}1 \\ 14\overline{)729} \\ -\ 70 \\ \hline 029 \\ -\ 28 \\ \hline 01 \end{array}$$

$$\begin{array}{r} 1,201.5 \\ 6\overline{)7,209.0} \\ {\scriptstyle 1\ \ \ 3} \end{array}$$

7,209 ÷ 6 = 1,201.5

Written Calculation

÷

Fact Families

5.4	
2.5	2.9

2.5 + 2.9 = 5.4
2.9 + 2.5 = 5.4
5.4 − 2.5 = 2.9
5.4 − 2.9 = 2.5

Fact Families

1.2			
0.3	0.3	0.3	0.3

4 x 0.3 = 1.2
0.3 x 4 = 1.2
1.2 ÷ 4 = 0.3
1.2 ÷ 0.3 = 4

Mental Strategy

+

Fact Families

5.4	
2.5	2.9

2.5 + 2.9 = 5.4
2.9 + 2.5 = 5.4
5.4 - 2.5 = 2.9
5.4 - 2.9 = 2.5

3.85 + 8.67

11 1.4 0.12

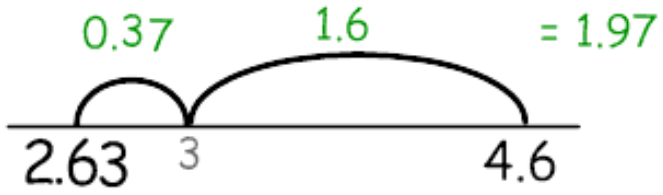
12.52

I can solve any addition with larger numbers and with numbers with 2 decimal places

Mental Strategy

−

4.6 - 2.63



I can subtract larger numbers and numbers with 1 decimal place using two sensible 'jumps'

I can use jottings to solve multiplications with decimal places

x	7	0.6	0.03
4	28	2.4	0.12

4 x 7.63 = 30.52

```
   26.52
 x    14
 ------
  106.08
+265.20
 ------
  371.28
   1
```

×

Mental Strategy

I can apply table facts to find a division fact
2.4 ÷ 8 = 0.3

x	14
1	14
2	28
5	70
10	140
20	280

156 ÷ 14

Where does 156 come in?

After '10x14'

Enough left for any more 14s?

Yes, 1 more lot of 14 with 2 left over.

10 lots add 1 lot with 2 remaining.

156 ÷ 14 = 11r2

Fact Families

1.2			
0.3	0.3	0.3	0.3

4 x 0.3 = 1.2
0.3 x 4 = 1.2
1.2 ÷ 4 = 0.3
1.2 ÷ 0.3 = 4

72÷8=9
Know the inverse of all multiplication facts

÷

Mental Strategy