Castle Primary School – Calculation Policy

| Reception			
Addition	Subtraction	Multiplication	Division
Practical counting objects and relating addition to combining two groups of objects. Children will use dice, number cards, whiteboards and pens for recording and number lines to aid counting. Reception children will begin to learn that + means addition and = means 'is the same as' or 'equals'. Counting on … practically on spots and later on number lines.	Teacher modelling, pictorial representation Practical demonstrations of subtraction relating to 'take away'. Use of number tracks. Children will experience practical approaches such as sorting objects and removing them to find answers to subtraction questions. Children will use dice, number cards, whiteboards and pens for recording and number lines to aid counting. Vocabulary of subtraction in practical activities. Reception children will begin to learn that – means subtraction and that = means 'is the same as' or 'equals'. Counting back.	Jumping along number lines in steps of ... 100 square to look at patterns of multiples Grouping – counting groups of the same size	Reception children will use their counting skills learnt during multiplication activities to aid them in practical sessions when sharing amounts equally eg through role play, games or play. Sharing objects into equal groups and count how many in each group, such as 10 biscuits on two plates.

Castle Primary School – Calculation Policy

Year 1

Addition	Subtraction	Multiplication	Division
+ = signs and missing numbers Children need to understand the concept of equality before using the '=' sign. Calculations should be written either side of the equality sign so that the sign is not just interpreted as 'the answer'. 2 = 1+ 1 2 + 3 = 4 + 1 3 = 3 2 + 2 + 2 = 4 + 2 Missing numbers need to be placed in all possible places. 3 + 4 = ▢ ▢ = 3 + 4 3 + ▢ = 7 7 = ▢ + 4 ▢ + 4 = 7 7 = 3 + ▢ ▢ + ∇ = 7 7 = ▢ + ∇ **Activities** Children should have access to a wide range of counting equipment, everyday objects, as well as hoops, sorting trays, number tracks and numbered number lines. **Teacher modelling** Drawing jumps on numbered number lines to support understanding of the mental method **Children** To create their own jumps using rulers, fingers, pens, bodies etc. 7+ 4	**- = signs and missing numbers** 7 - 3 = ▢ ▢ = 7 - 3 7 - ▢ = 4 4 = ▢ - 3 ▢ - 3 = 4 4 = 7 - ▢ ▢ - ∇ = 4 4 = ▢ - ∇ - Understand subtraction as 'take away' - Find a 'difference' by counting up; I have saved 5p. The socks that I want to buy cost 11p. How much more do I need in order to buy the socks? + 6 0 1 2 3 4 5 6 7 8 9 10 11 12 - Use practical and informal written methods to support the subtraction of a one-digit number from a one digit or two-digit number and a multiple of 10 from a two-digit number. I have 11 toy cars. There are 5 cars too many to fit in the garage. How many cars fit in the garage? -5 6 11 Use the vocabulary related to addition and subtraction and symbols to describe and record addition and subtraction number sentences Recording by - drawing jumps on prepared lines - constructing own lines	Multiplication is related to doubling and counting groups of the same size. Looking at columns Looking at rows 2 + 2 + 2 3 + 3 3 groups of 2 2 groups of 3 **Counting using a variety of practical resources** Counting in 2s e.g. counting socks, shoes, animal's legs… Counting in 5s e.g. counting fingers, fingers in gloves, toes… Counting in 10s e.g. fingers, toes… **Pictures / marks** There are 3 sweets in one bag. How many sweets are there in 5 bags? *(Recording on a number line modelled by the teacher when solving problems)* Use of bead strings to model groups of.	**Sharing** Requires secure counting skills -see counting and understanding number strand Develops importance of one-to-one correspondence See appendix for additional information on x and ÷ and aspects of number Sharing – 6 sweets are shared between 2 people. How many do they have each? Practical activities involving sharing, distributing cards when playing a game, putting objects onto plates, into cups, hoops etc. **Grouping** Sorting objects into 2s / 3s/ 4s etc How many pairs of socks are there? There are 12 crocus bulbs. Plant 3 in each pot. How many pots are there? Jo has 12 Lego wheels. How many cars can she make?
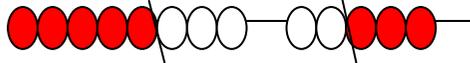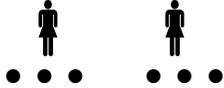
Castle Primary School – Calculation Policy

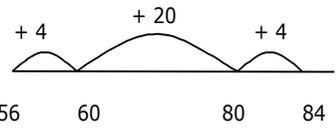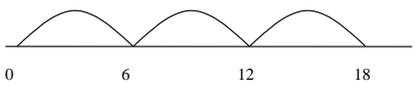|	Year 2		
Addition	Subtraction	Multiplication	Division

+ = signs and missing numbers
Continue using a range of equations as in Year 1 but with appropriate, larger numbers.
Extend to
$14 + 5 = 10 + \square$
and
$32 + \square + \square = 100$ $35 = 1 + \square + 5$

Partition into tens and ones and recombine
$12 + 23 = 10 + 2 + 20 + 3$ $1\ 2 + 2\ 3 = 35$
$\qquad\qquad = 30 + 5$
$\qquad\qquad = 35$ $10 + 20 = 30 - 35$
$\qquad\qquad\qquad 2 + 3 = 5$
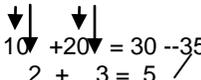
Count on in tens and ones
$23 + 12 = 23 + 10 + 2$
$\qquad\qquad = 33 + 2$
$\qquad\qquad = 35$

Partitioning and bridging through 10.
The steps in addition often bridge through a multiple of 10

e.g.

Children should be able to partition the 7 to relate adding the 2 and then the 5.

$8 + 7 = 15$

8   10   15

Add 9 or 11 by adding 10 and adjusting by 1
e.g.
Add 9 by adding 10 and adjusting by 1
$35 + 9 = 44$ $+10$
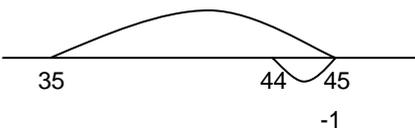
35   44 45
                              -1

- = signs and missing numbers
Continue using a range of equations as in Year 1 but with appropriate numbers.
Extend to $14 + 5 = 20 - \square$

Find a small difference by counting up
$42 - 39 = 3$

$\quad + 1 \qquad\qquad + 2$

39   40   42
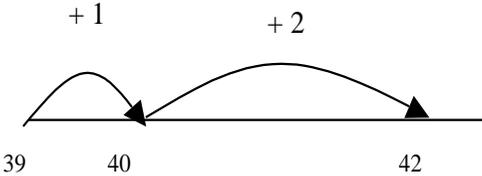
Subtract 9 or 11. Begin to add/subtract 19 or 21
$35 - 9 = 26$

$\quad +1$

25   26   35
            -10
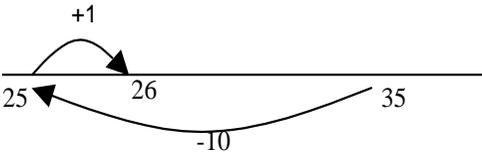
Use known number facts and place value to subtract
(partition second number only)
$37 - 12 = 37 - 10 - 2$
$\qquad\qquad = 27 - 2$
$\qquad\qquad = 25$

25   27   37

-2 -10

---
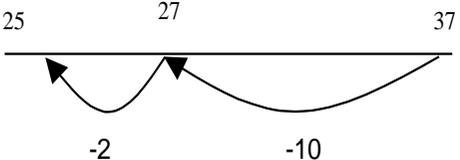
x = signs and missing numbers
$7 \times 2 = \square$ $\qquad$ $\square = 2 \times 7$
$7 \times \square = 14$ $\qquad$ $14 = \square \times 7$
$\square \times 2 = 14$ $\qquad$ $14 = 2 \times \square$
$\square \times \nabla = 14$ $\qquad$ $14 = \square \times \nabla$

Arrays and repeated addition

● ● ● ● 4×2 or $4 + 4$
● ● ● ●
2 x 4
or repeated addition

$2 + 2 + 2 + 2$

0 1 2 3 4 5 6 7 8

Doubling multiples of 5 up to 50

$15 \times 2 = 30$
Partition
Children need to be secure with partitioning numbers into 10s and 1s and partitioning in different ways: $6 = 5 + 1$ so
e.g. Double 6 is the same as double five add double one.

And double 15
10   +   5

20   +   10 = 30
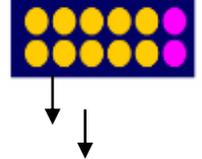
÷ = signs and missing numbers
$6 \div 2 = \square$ $\qquad$ $\square = 6 \div 2$
$6 \div \square = 3$ $\qquad$ $3 = 6 \div \square$
$\square \div 2 = 3$ $\qquad$ $3 = \square \div 2$
$\square \div \nabla = 3$ $\qquad$ $3 = \square \div \nabla$

Grouping
Link to counting and understanding number strand
Count up to 100 objects by grouping them and counting in tens, fives or twos;…

Find one half, one quarter and three quarters of shapes and sets of objects
$6 \div 2$ can be modelled as:
There are 6 strawberries.
How many people can have 2 each? How many 2s make 6?

$6 \div 2$ can be modelled as:

0   1   2   3   4   5   6
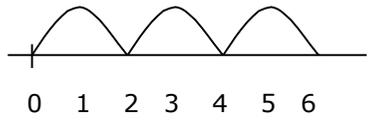
In the context of money count forwards and backwards using 2p, 5p and 10p coins

Practical grouping e.g. in PE

12 children get into teams of 4 to play a game. How many teams are there?
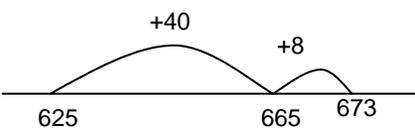
# Castle Primary School – Calculation Policy

Year 3			
Addition	Subtraction	Multiplication	Division

+ = signs and missing numbers
Continue using a range of equations as in Year 1 and 2 but with appropriate, larger numbers.
 	
Partition into tens and ones
• Partition both numbers and recombine.
• Count on by partitioning the second number only e.g.
36 + 53 = 53 + 30 + 6
        = 83 + 6
        = 89
 	
Add a near multiple of 10 to a two-digit number
Secure mental methods by using a number line to model the method. Continue as in Year 2 but with appropriate numbers
 e.g. 35 + 19 is the same as 35 + 20 – 1.
 	
Children need to be secure adding multiples of 10 to any two-digit number including those that are not multiples of 10.
48 + 36 = 84
 	
       +30
               +2   +4
 48   78 80   84
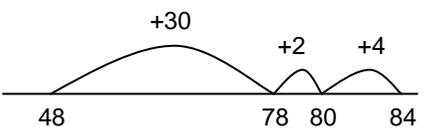 	
Pencil and paper procedures
83 + 42 = 125
 	
Partition both numbers
83 + 42 = (80 + 40) + (3+2) = 120 + 5 = 125
	- = signs and missing numbers
	Continue using a range of equations as in Year and 2 but with appropriate numbers.
	
	Find a small difference by counting up
	Continue as in Year 2 but with appropriate numbers e.g. 102 – 97 = 5
	
	Subtract mentally a 'near multiple of 10' to or from a two-digit number
	Continue as in Year 2 but with appropriate numbers e.g. 78 – 49 is the same as 78 – 50 + 1
	
	Use known number facts and place value to subtract
	Continue as in Year 2 but with appropriate numbers e.g.
	97 – 15 = 72
	
	82 87 97
	
	   -5 -10
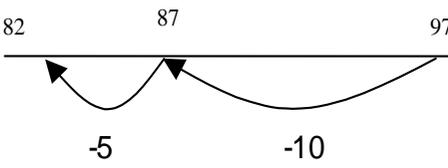	
	Pencil and paper procedures
	Complementary addition
	84 – 56 = 28
	
	 + 4 + 20 + 4
	56 60 80 84
	
	and check answers with inverse
		x = signs and missing numbers
		Continue using a range of equations as in Year 2 but with appropriate numbers.
		
		Number lines
		6 x 3
		
		0 6 12 18
		
		Arrays and repeated addition
		Continue to understand multiplication as repeated addition and continue to use arrays (as in Year 2).
		
		Doubling multiples of 5 up to 50
		35 x 2 = 70
		
		Partition
		
		| x
			30	5

2	60	10 | **Use known facts and place value to carry out simple multiplications** Use the same method as above (partitioning), e.g. 32 x 3 = 96	**÷ = signs and missing numbers** Continue using a range of equations as in Year 2 but with appropriate numbers. **Understand division as sharing and grouping** 18 ÷ 3 can be modelled as: Sharing – 18 shared between 3 (see Year 1 diagram) *OR* Grouping - How many 3's make 18? 0 3 6 9 12 15 18 **Remainders** 16 ÷ 3 = 5 r1 Sharing - 16 shared between 3, how many left over? Grouping – How many 3's make 16, how many left over? e.g. rem 1 0 3 6 9 12 15
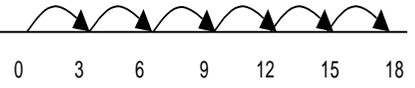
Then

either

1. Vertical expansion

```
   83
+  42
    5
  120
  125
```
and check answer

or

2. Horizontal expansion

```
  80 + 3
+ 40 + 2
  120 + 5 = 125
```

Decomposition in expanded format

84 – 56 =

```
                           70   14
 84  =  80   4  '4 take away  8̶0   4̶
-56  =  50   6   6 is tricky so  -50   6
                  exchange'  _____
                           20   8  = 28
```

and check answers with inverse

| x	30	2
3	90	6

Castle Primary School – Calculation Policy

Year 4

Addition	Subtraction	Multiplication	Division
+ = signs and missing numbers Continue using a range of equations as in Year 1 and 2 but with appropriate numbers.	**- = signs and missing numbers** Continue using a range of equations as in Year 1 and 2 but with appropriate numbers.	**x = signs and missing numbers** Continue using a range of equations as in Year 2 but with appropriate numbers	**÷ = signs and missing numbers** Continue using a range of equations as in Year 2 but with appropriate numbers.

Addition

Partition into tens and ones and recombine
Either partition both numbers and recombine or partition the second number only e.g.
$625 + 48 =$

+40

+8

625   665   673

$625 + 48 = 625 + 40 + 8 = 665 + 8 = 673$

Add the nearest multiple of 10, then adjust
Continue as in Year 2 and 3 but with appropriate numbers e.g. 63 + 29 is the same as 63 + 30 - 1

Pencil and paper procedures
$367 + 185 = 431$

either	or
367 +185 12 140 400 552	300 + 60 + 7 100 + 80 + 5 400 +140+12 = 552

leading to

367
+185
552
1 1

Extend to decimals in the context of money.
and use number line to check answer

Subtraction

Find a small difference by counting up
e.g. 5003 – 4996 = 7
This can be modelled on an empty number line (see complementary addition below).

Subtract the nearest multiple of 10, then adjust.
Continue as in Year 2 and 3 but with appropriate numbers.

Use known number facts and place value to subtract
$92 – 15 = 77$

77   82   92

-5   -10
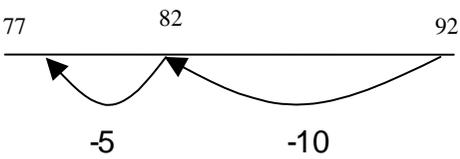
Pencil and paper procedures
Complementary addition
$754 – 86 = 668$

+14   +600   +54

86   100   700   754
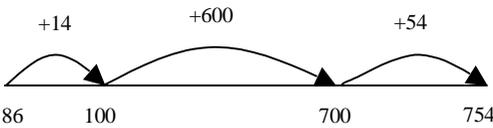
For those children with a secure mental image of the number line they could record the jumps only:
$754 – 86 = 668$

14 (100)
600 (700)
54 (754)
668

check with inverse, number lines or calculators

Multiplication

Partition
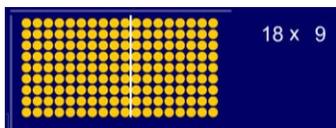
18 x 9

$18 \times 9 = 162$

$18 \times 9 = (10 \times 9) + (8 \times 9) = 162$

OR

Use the grid method of multiplication (as below)

Pencil and paper procedures
Grid method
23 x 7 is approximately 20 x 10 = 200

x	20	3
7	140	21

x	70	2
30	2100	60
8	560	16

Division

Sharing and grouping
30 ÷ 6 can be modelled as:
grouping – groups of 6 taken away and the number of groups counted e.g.

+6   +6   +6   +6   +6

0   6   12   18   24   30
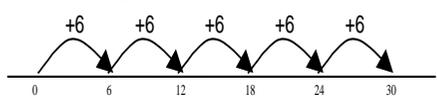
sharing – sharing among 6, the number given to each person

Remainders
$41 ÷ 4 = 10 r1$

+40

+1

10 groups

OR
0   1   41

10 x 4

-1   -40
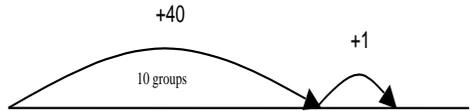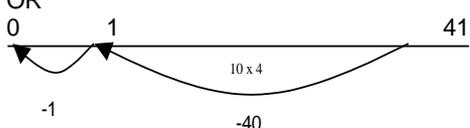
OR $41 = (10 \times 4) + 1$

Pencil and paper procedures
72 ÷ 5 lies between 50 ÷ 5 = 10 and 100 ÷ 5 = 20

     72
-   50   (10 groups) or (10 x 5)
     22
-   20   (4 groups) or (4 x 5)
     2

Answer : 14 remainder 2

Decomposition in expanded format

```
                70       1
784 =    700    80    4    adjust from T to U
- 56   -         50     6
         700    20    8   = 728
```

```
              7 1
leads to   7 8 4
         -   5 6
           7 2 8
```

```
              600      130
   734    700    30    4
 - 252  - 200    50    2
           400    80    2   = 482
```

```
            6 1
leads to   7 3 4
         - 2 5 2
           4 8 2
```

```
                      60           1
 then 8.75   = £8   .   70    5    adjust T to U
  - 4.38      - 4   .   30    8
               £4   .   30    7   = £4.37
```

```
             6 1
leads to   £ 8 . 7 5
         -   4 . 3 8
           £ 4 . 3 7
```

and check answers with inverse, number lines or calculators

Castle Primary School – Calculation Policy

Year 5

Addition	Subtraction	Multiplication	Division

Addition

+ = signs and missing numbers
Continue using a range of equations as in Year 1 and 2 but with appropriate numbers.

Partition into hundreds, tens and ones and recombine
Either partition both numbers and recombine or partition the second number only e.g.
587 + 475 = 587 + 400 + 70 + 5
$$= 987 + 70 + 5$$
$$= 1057 + 5$$
$$= 1062$$

Add or subtract the nearest multiple of 10 or 100, then adjust
Continue as in Year 2, 3 and 4 but with appropriate numbers e.g. 458 + 79 = is the same as 458 + 80 - 1

Pencil and paper procedures
Extend to numbers with at least four digits
3587 + 675 = 4262

```
  3587
+  675
  4262
  1 1 1
```

Revert to expanded methods if the children experience any difficulty.
Extend to up to two places of decimals (same number of decimals places) and adding several numbers (with different numbers of digits).

```
   72.8
  +54.6
  127.4
  1   1
```
and use number lines to check answer

Subtraction

- = signs and missing numbers
Continue using a range of equations as in Year 1 and 2 but with appropriate numbers.

Find a difference by counting up
e.g. 8006 – 2993 = 5013
This can be modelled on an empty number line (see complementary addition below).

Subtract the nearest multiple of 10 or 100, then adjust.
Continue as in Year 2, 3 and 4 but with appropriate numbers.

Use known number facts and place value to subtract
6.1 – 0.4 = 5.7

```
  5.7        6.0              6.1

     -0.3         -0.1
```
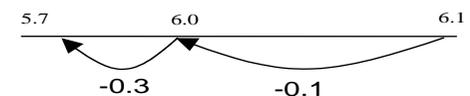
Pencil and paper procedures
Complementary addition
754 – 286 = 468

```
   +14      +400        +54

286   300              700      754
```
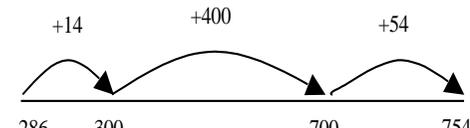
OR   **754 - 286 = 468**

```
  14 (300)    can be refined to    14  (300)
 400 (700)                        454 (754)
  54 (754)                        468
 468
```
and continue to use inverse ,number lines or n calculators to check answers as appropriate.

Multiplication

x = signs and missing numbers
Continue using a range of equations as in Year 2 but with appropriate numbers

Partition
47 x 6 = 92

47 x 6 = (40 x 6) + (7 x 6)
$$= (240) + (42)$$
$$= \qquad 282$$

OR

Use the grid method of multiplication (as below)

Pencil and paper procedures
Grid method
72 x 38 is approximately 70 x 40 = 2800

x	70	2
30	2100	60
8	560	16

Extend to simple decimals with one decimal place.

```
  12.5
 x  2
   1.0   (2.0 x 0.5 )
   4.0   (2.0 x 2.0 )
  20.0   (2.0 x 10.0 )
  25.0
```

Moving to formal methods of multiplication for decimals. Carrying numbers underneath

Division

÷ = signs and missing numbers
Continue using a range of equations as in Year 2 but with appropriate numbers.

Sharing and grouping
Continue to understand division as both sharing and grouping (repeated subtraction).

Remainders
Quotients expressed as fractions or decimal fractions
61 ÷ 4 = 15 ¼ or 15.25

```
            +40              +20     +1
        10 groups        5 groups
```

OR

```
0  1         21                        61

      5 groups          10 groups

-1      -20                    -40
```

Pencil and paper procedures
256 ÷ 7 lies between 210 ÷ 7 = 30 and 280 ÷ 7 = 40

```
     256
-     70    (10 groups)  or (10 x 7)
     186
-    140    (20 groups)  or (20 x 7)
      46
-     42     (6 groups)  or  (6 x 7)
       4    (36 groups) or (36)
```

Answer: 36 remainder 4

Castle Primary School – Calculation Policy

Year 6			
Addition	Subtraction	Multiplication	Division

Addition	Subtraction	Multiplication	Division
+ = signs and missing numbers Continue using a range of equations as in Year 1 and 2 but with appropriate numbers. **Partition into hundreds, tens, ones and decimal fractions and recombine** Either partition both numbers and recombine or partition the second number only e.g. $35.8 + 7.3 = 35.8 + 7 + 0.3$ $\qquad = 42.8 + 0.3$ $\qquad = 43.1$ $7648 + 1486 = 7648 + 1000 + 400 + 80 + 6$ $\qquad = 8648 + 400 + 80 + 6$ $\qquad = 9048 + 80 + 6$ $\qquad = 9128 + 6$ $\qquad = 9134$ **Add the nearest multiple of 10, 100 or 1000, then adjust** Continue as in Year 2, 3, 4 and 5 but with appropriate numbers including extending to adding 0.9, 1.9, 2.9 etc **Pencil and paper procedures** Extend to numbers with any number of digits and decimals with 1, 2 and/or 3 decimal places. $13.86 + 9.481 = 23.341$ $\quad 13.86$ $+\ \ 9.481$ $\quad \underline{23.341}$ $\quad {}^{1\ \ 1\ \ 1}$ Revert to expanded methods if the children experience any difficulty. and continue to use number lines appropriately	**- = signs and missing numbers** Continue using a range of equations as in Year 1 and 2 but with appropriate numbers. **Find a difference by counting up** e.g. $8000 – 2785 = 5215$ To make this method more efficient, the number of steps should be reduced to a minimum through children knowing: ▪ Complements to 1, involving decimals to two decimal places (0.16 + 0.84) ▪ Complements to 10, 100 and 100 **Subtract the nearest multiple of 10, 100 or 1000, then adjust** Continue as in Year 2, 3, 4 and 5 but with appropriate numbers. **Use known number facts and place value to subtract** $0.5 – 0.31 = 0.19$ **Pencil and paper procedures** Complementary addition $6467 – 2684 = 3783$ *OR* $6467 – 2684 = 3783$ $\quad 16\ (2700)$ can be refined to $316(3000)$ $\ 300\ (3000)$ $\qquad\qquad\qquad 3467(6467)$ $\underline{3467}\ (6467)$ $\qquad\qquad\qquad 3783$ $\ 3783$ Reduce the number of steps to make the calculation more efficient. *Extend to 2 places of decimals* and continue to use inverse, number lines or n calculators to check answers as appropriate.	**x = signs and missing numbers** Continue using a range of equations as in Year 2 but with appropriate numbers **Partition** $47 \times 6 = 92$ $47 \times 6 = (40 \times 6) + (7 \times 6)$ $\qquad = (\ 240\ )\ +\ (\ 42\ )$ $\qquad = \qquad 282$ *OR* Use the grid method of multiplication (as below) **Pencil and paper procedures** Grid method 72×38 is approximately $70 \times 40 = 2800$ | X	70	2
---	---	---
30	2100	60
8	560	16 | Extend to simple decimals with one decimal place. 12.5 $\underline{\times\ 2}$ $\ 1.0$ (2.0 x 0.5) $\ 4.0$ (2.0 x 2.0) $\underline{20.0}$ (2.0 x 10.0) 25.0 Moving to formal methods of multiplication for decimals. Carrying numbers underneath	**÷ = signs and missing numbers** Continue using a range of equations as in Year 2 but with appropriate numbers. **Sharing and grouping** Continue to understand division as both sharing and grouping (repeated subtraction). **Remainders** Quotients expressed as fractions or decimal fractions $676 \div 8 = 84.5$ $\qquad +640 \qquad\qquad +32 \qquad +4$ $\qquad$ 80 groups $\qquad$ 4 groups **Pencil and paper procedures** $977 \div 36$ is approximately $1000 \div 40 = 25$ ∗ Partition the dividend into multiples of the divisor: e.g. $\qquad 977 = 720 + 180 + 77$ $\qquad\qquad 720 \div 36 = 20$ $\qquad\qquad 180 \div 36 = 5$ $\qquad\qquad 77 \div 36 = 2r5$ $\qquad \rightarrow 20 + 5 + 2r5 = 27r5$ $\quad\ 977$ $-\ \underline{720}$ (20 groups) $\quad\ 257$ $-\ \underline{180}$ (5 groups) $\quad\ \ 77$ $-\ \ \underline{72}$ (2 groups) $\qquad 5$ Answer: $27\,^{5}/_{36}$