



# **West Rainton Primary School**

## **Subject policy for Mathematics**

**(including written calculation methods, ready to progress  
policy and times tables progression)**



## Aims

The 2014 national curriculum for Mathematics aims to ensure that all pupils:

- become fluent in the fundamentals of mathematics, including 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 by 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 National Curriculum for mathematics

Mathematics is an interconnected subject in which pupils need to be able to move fluently between representations of mathematical ideas. The 2014 National Curriculum programmes of study are, by necessity, organised into apparently distinct domains, but pupils should make rich connections across mathematical ideas to develop fluency, mathematical reasoning and competence in solving increasingly sophisticated problems. They should also apply their mathematical knowledge to science and other subjects.

The expectation is that the majority of pupils will move through the programmes of study at broadly the same pace. However, decisions about when to progress should always be based on the security of pupils' understanding and their readiness to progress to the next stage. Pupils who grasp concepts rapidly should be challenged through being offered rich and sophisticated problems before any acceleration through new content. Those who are not sufficiently fluent with earlier material should consolidate their understanding, including through additional practice, before moving on.

## Cross curricular

Mathematics teaches children how to make sense of the world around them through developing their ability to calculate, reason and solve problems. It is a core subject with a range of cross-curricular links but most often, is best taught discretely, using opportunities from other subjects to rehearse skills in a context. Numeracy involves developing confidence and competence in number work; shape, space and measure; handling data and the using and applying of these skills.



## Health and Safety

Equipment will be used safely and appropriately. Specifically:

- Short pencils on compasses
- Pupils will not lift heavy objects or multiple weights in excess of 5kg to avoid strain to back muscles.
- Food products will be in date.

## ICT

Information and Communication Technology can enhance the teaching of mathematics significantly. It has ways of impacting on learning that are not possible with conventional methods. Teachers can use software to present information visually, dynamically and interactively, so that children understand concepts more quickly. A range of software and resources are available to support work with the computers.

## Assessment and recording

Assessment for learning is fundamental to raising standards and enabling children to reach their potential. Assessment in mathematics takes place daily using a range of strategies such as marking and feedback of work and verbal discussions with children. This information informs subsequent planning and next steps in teaching and learning. Planning is annotated to demonstrate adaptations and provide feedback about children's individual/group progress.

The mathematics subject leader keeps samples of children's work in a portfolio. This demonstrates work at various levels of achievement in mathematics from across the school to help support teacher's in making their own judgements of levels. Teachers meet regularly to review individual samples of work against year group expectation statements and moderate judgements.

Targets are set at the beginning of each year and progress towards them are regularly reviewed throughout the year. Records are collated to inform the school's School Improvement Plan (SIP) and maths action plan. This tracking also includes half termly tracking of standards for each child. This data is used by the maths subject leader and headteacher to review progress towards end of year targets.

The outcomes of regular assessments including termly written tests are recorded and forwarded to the maths leader.



Formal assessments specific to year groups:

Year	Assessment
Foundation stage	Attainment on entry Attainment on exit
Year 1	Teacher assessment informed by formative and summative assessment
Year 2	KS1 SATs
Years 3, 4, 5	Teacher assessment informed by formative and summative assessment
Year 6	KS2 SATs

### Reporting

Parents' evenings are held in each term and children's progress and achievement will be discussed at each of these occasions. All parents receive a termly written report on which there is a summary of their child's achievements and progress, together with a comment on the child's effort and engagement with mathematics.

### Resources

The school is equipped with a wide range of practical resources for teaching and learning mathematics. Often resources will be housed in a classroom for a short period of time when needed. There is a whole school calculation policy (APPENDIX 1).

### Equalities

We believe that equality at our school should permeate all aspects of school life and is the responsibility of every member of the school and wider community. We will always strive to ensure equality of access to maths for all pupils irrespective of their gender, ethnicity, disability, religious beliefs/faith tradition, sexual orientation, age or any other of the protected characteristics (Single Equalities Act 2010)

### Inclusion

Wherever possible we aim to fully include all pupils in maths teaching. Through our maths teaching we provide learning opportunities that enable **all** pupils to make progress. We set suitable learning challenges and respond to each child's individual needs.



## Marking and Feedback

(For full guidance please see our current marking and feedback policy.) All maths tasks are marked daily in order to inform planning for the next day. Teachers mark in black and comment on the learning intention. Pupils are to be given a FIT (focused improvement time) task on 50% of occasions; this acts to either address a misconception or challenge a pupil to widen their thinking or apply their skills in a different way. FIT tasks are identified by a black FIT stamp used consistently across the school. Pupils may also require side by side feedback when a misconception or learning issue is discovered during a lesson; teacher and pupil will work together in the child's book to move learning on. This should be evident in 33% of tasks. Side by side feedback is identified with a green stamp used consistently across the school. In addition to this, teachers may identify a piece of work as evidencing greater depth standard by using a purple stamp. This immediately points out to anyone viewing the books where the child has been challenged to show working with a sophisticated and broad grasp of the year group expectation.

## Ready to Progress Policy

This policy highlights the most important conceptual knowledge and understanding that pupils need as they progress from year 1 to year 6. The 6 criteria strands include specific concepts which have been identified as key; these concepts will enable pupils to more easily access many of the elements of the whole mathematics curriculum that are not covered by this policy.

Each pupil will be assessed against the ready-to-progress criterion. Teachers will follow the guidance, specifically for their year group, which includes the following:

- guidance for each ready-to-progress criterion which includes core mathematical representations, language structures and discussion of connections to other criteria.
- example assessment questions for each ready-to-progress criterion.
- guidance on the development of calculation and fluency.

*The table below shows the 6 ready-to-progress criteria strands.*

Ready-to-progress criteria strands	Code
Number and place value	NPV
Number facts	NF
Addition and Subtraction	AS
Multiplication and division	MD
Fractions	F
Geometry	G



## **Roles and Responsibilities**

### **The headteacher**

- To actively support and encourage staff, praising good practise and supporting staff development, in-service training and resources.
- To monitor teaching and learning through lesson observations, learning walks and book review analysis and to give informative and constructive feedback.
- Support staff development through training and provision of resources.

### **Subject Leader**

- To work with the headteacher and the senior leadership team to monitor, plan and develop the subject to allow for progression, continuity and high standards of attainment in mathematics.
- To support colleagues in the teaching of mathematics and provide a strategic lead and direction in the subject.
- To manage fortnightly book reviews to ensure the curriculum is being covered and the marking policy is adhered to.
- To monitor progress in mathematics, highlight and plan actions required.
- To take responsibility for auditing and organising mathematics resources.
- To keep up to date with developments in mathematics education and to inform colleagues as appropriate.
- To draw up an annual action plan for mathematics.
- To review the school policy for mathematics as appropriate.

### **The Class Teacher**

- To be responsible for the planning, teaching and assessment of mathematics.
- To manage and supervise their class' use of mathematics equipment.

### **The Governors**

- To appoint a named governor who has responsibility to oversee mathematics. They will meet regularly with the subject leader to review development plans and progress towards meeting objectives.



**Appendix one – calculation policy**

**Addition**

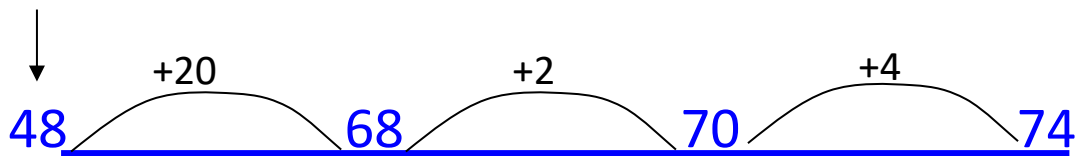
**Stage 1 The number line (Reception onwards)**

↓ = starting point

**Example 1**  $6 + 8 = 14$  (start at 6 and count on 8)



**Example 2**  $48 + 26 = 74$  (start at 48, add 20, add 2, add 4)



**Stage 2 The number square (Y1onwards)**

**Example 3**  $6 + 8 = 14$   
(start at 6 and count on 8)

0	1	2	3	4	5	6	7	8	9
10	11	12	13	14	15	16	17	18	19
20	21	22	23	24	25	26	27	28	29
30	31	32	33	34	35	36	37	38	39
40	41	42	43	44	45	46	47	48	49
50	51	52	53	54	55	56	57	58	59
60	61	62	63	64	65	66	67	68	69
70	71	72	73	74	75	76	77	78	79
80	81	82	83	84	85	86	87	88	89
90	91	92	93	94	95	96	97	98	99

**Example 4**  $48 + 26 = 74$   
(start at 48, move down 2 tens, count along 6)

0	1	2	3	4	5	6	7	8	9
10	11	12	13	14	15	16	17	18	19
20	21	22	23	24	25	26	27	28	29
30	31	32	33	34	35	36	37	38	39
40	41	42	43	44	45	46	47	48	49
50	51	52	53	54	55	56	57	58	59
60	61	62	63	64	65	66	67	68	69
70	71	72	73	74	75	76	77	78	79
80	81	82	83	84	85	86	87	88	89
90	91	92	93	94	95	96	97	98	99



**Stage 3 The expanded method (Year 2 onwards)**

**Example 4**

Always complete expanded method calculations from left to right

**Stage 4 The carrying method (Year 2 onwards)**

	↓																		
	1	2					1	6	8					2	.	7			
+	2	6					+	3	5	7				+	4	.	5		
	3	0						4	0	0					6	.	0		
		8						1	1	0					1	.	2		
	3	8							1	5					7	.	2		
								5	2	5									

**Example 5**

Always complete carrying method calculations from right to left **NB- in any decimal calculation, the decimal point gets its own square. Ensure this is modelled to pupils.**

		↓																	
	1	2						1	6	8				2	.	7			
+	2	6					+	3	5	7			+	4	.	5			
	3	8						5	2	5				7	.	2			
								1	1					1					





## Written addition progression

Progression in written addition (it is of vital importance that children are secure in all steps prior to moving them on at any stage)

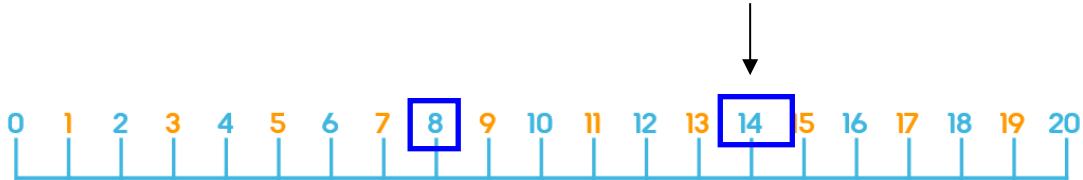
- 1 digit add 1 digit that don't bridge 10
- 1 digit add 1 digit that do bridge 10 (to see place value positioning)
- 2 digit add 1 digit that don't bridge a 10
- 2 digit add 1 digit that do bridge a 10
- 2 digit add 2 digit that don't bridge a 10
- 2 digit add 2 digit that do bridge a 10
- 2 digit add 2 digit add 2 or 1 digit that do bridge a 10 (to see there can be more than 2 numbers in a sum!)
- 3 digit add 2 digit that do bridge a 10
- 3 digit add 3 digit that do bridge a 10 but not a 100
- 3 digit add 3 digit that can bridge a 10 or a 100
- 3 digit add 3 digit add 2 digit that can bridge 10s 100s or 1000s
- 4 digit add 4 digit that bridge 10s or 100s
- 4 digit add 4 digit that bridge 1000s or 10,000s
- Whole number calculation into the 1,000,000s
- Decimal addition to one decimal place that don't bridge (stress dec point having its own square that never moves from its column even in the answer)
- Decimal addition to one decimal place that do bridge 1
- Decimal addition to two decimal places that bridge tenths and/or 1
- 5 digit add 5 digit
- 6 digit add 6 digit
- Multiple numbers added together (eg. 3 digit + 5 digit + 4 digit + 6 digit)



## Subtraction

### Stage 1 Counting backwards using a number line (Rec onwards)

**Example 1**  $14 - 6 = 8$  (Start at 14 and count backwards 6)



### Stage 2 The number square (Year 1 onwards)

**Example 3**  $14 - 6 = 8$

(start at 14 and count back 6)

0	1	2	3	4	5	6	7	8	9
10	11	12	13	14	15	16	17	18	19
20	21	22	23	24	25	26	27	28	29
30	31	32	33	34	35	36	37	38	39
40	41	42	43	44	45	46	47	48	49
50	51	52	53	54	55	56	57	58	59
60	61	62	63	64	65	66	67	68	69
70	71	72	73	74	75	76	77	78	79
80	81	82	83	84	85	86	87	88	89
90	91	92	93	94	95	96	97	98	99

**Example 4**  $74 - 26 = 48$

(start at 74, move back 2 tens then count back 6)

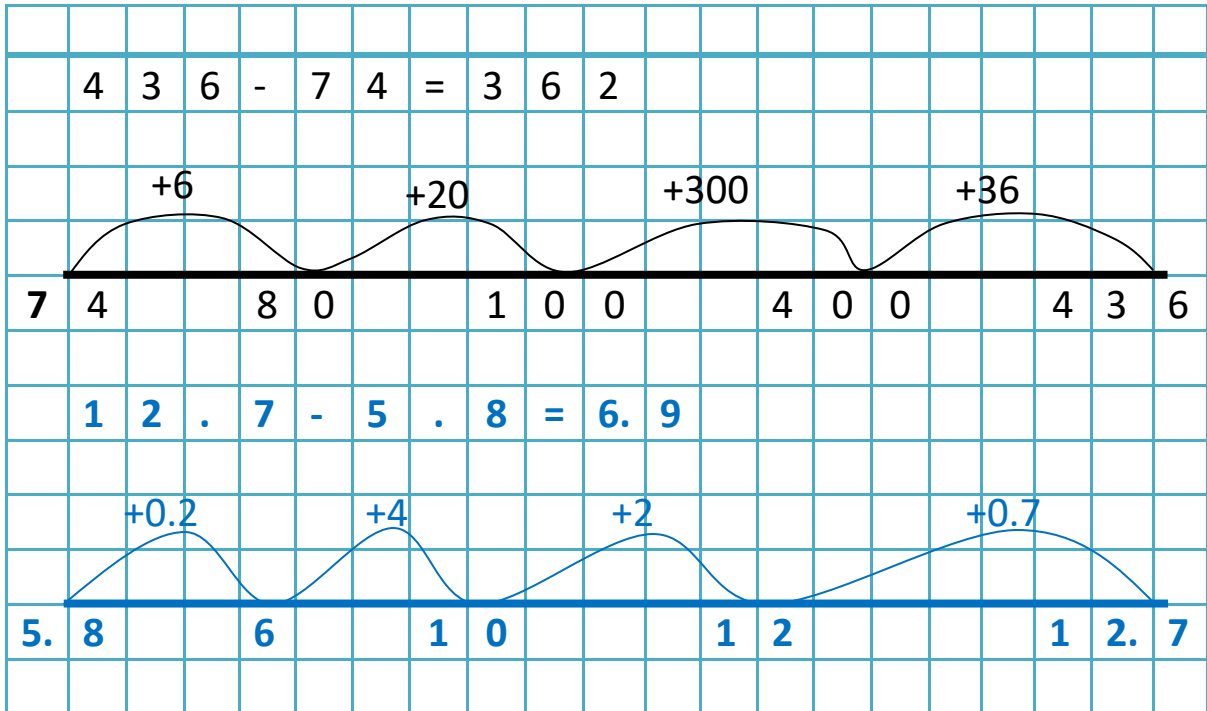
0	1	2	3	4	5	6	7	8	9
10	11	12	13	14	15	16	17	18	19
20	21	22	23	24	25	26	27	28	29
30	31	32	33	34	35	36	37	38	39
40	41	42	43	44	45	46	47	48	49
50	51	52	53	54	55	56	57	58	59
60	61	62	63	64	65	66	67	68	69
70	71	72	73	74	75	76	77	78	79
80	81	82	83	84	85	86	87	88	89
90	91	92	93	94	95	96	97	98	99



**Stage 3 Counting on using a number line (Year 2 onwards)**

**Example 3**

In the first example below, the first jump along the number line rounds up to the next 10. The second jump to the next 100. The third jump to the target 100. The final jump completes the calculation. Use the expanded/carrying method of addition to add the jumps together.

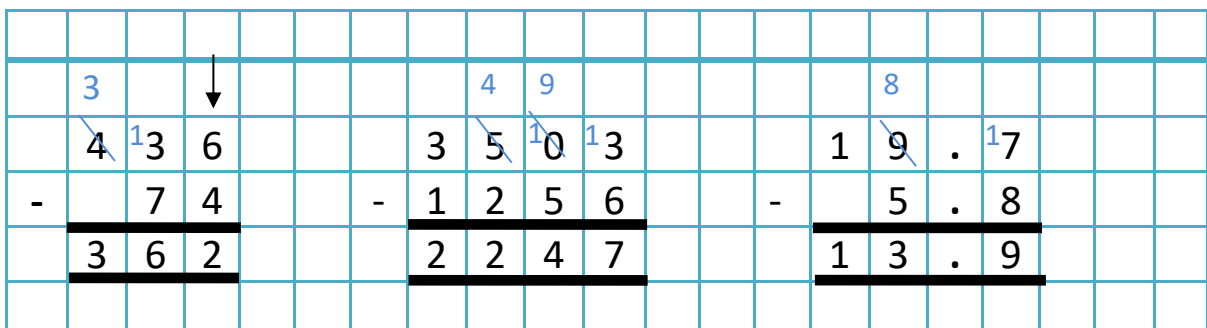


**Stage 4 The borrowing method (Year 2 onwards)**

**Example 4**

Always complete borrowing method calculations from right to left.

The top number must be equal to or greater than the bottom number, otherwise borrow from the next column with available numbers.





## Written subtraction progression

Progression in written subtraction (it is of vital importance that children are secure in all steps prior to moving them on at any stage)

- 2 digit take away 1 digit (find next ten, target ten then target number)
- 2 digit take away 2 digit up to 99 (find next ten, target ten then target number)
- 3 digit take away 2 digit (find next ten, next hundred, target hundred, target number)
- 3 digit take away 3 digit (find next ten, next hundred, target hundred, target number)
- 4 digit take away 2, 3 or 4 digit (find next ten, next hundred, next thousand, target thousand, target number)
- Whole number subtraction up to the 1,000,000s
- Decimal to 1 decimal place eg 3.6 (find next whole number, target number)
- Decimal to 1 decimal place eg 23.6 (find next whole number, next ten, target number)
- Decimal to 2 decimal places eg 23.56 (find next tenth, next whole number, next ten, target number)

**NB the key to this is securing the next ten, next whole number or next tenth steps. Problematic areas are ensuring the 90/10 mental method is secure from mental maths targets. When children are on decimals to 2 places the first step of finding the next tenth and recording it accurately is vital- often they forget the 0 ( eg  $3.37 + .03$  is correct to get to 0.40 but children are used to only finding next whole number so will put 0.3 instead of .03)**

**Encourage any addition to add up jumps to be the expanded method. Some children may require additional jumps for place value but just allow them to find what they are comfortable with.**



## Multiplication

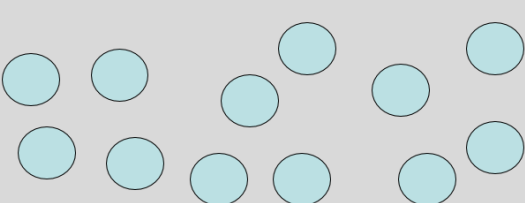
### Stage 1 Sharing and grouping (Rec onwards)

During the early stages of multiplication, children will concentrate on grouping objects and completing practical sharing activities. Children will start learning multiplication tables, all of which should be secure by the end of Year 4 in readiness for the statutory times tables test.

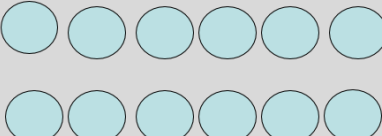
### Stage 2 Arrays (Year 1 onwards)

#### Example 1

I have 12 counters.



How could I arrange them into equal rows?

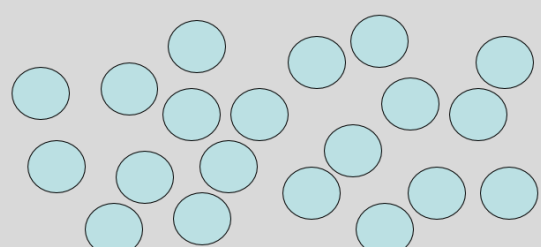
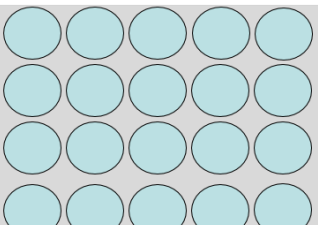


What number sentences could you write to go with this array?

$2 \times 6 = 12$        $6 \times 2 = 12$   
 $6 + 6 = 12$   
 $2 + 2 + 2 + 2 + 2 + 2 = 12$

#### Example 2

Could you arrange 20 counters?

$5 \times 4 = 20$        $4 \times 5 = 20$   
 $4 + 4 + 4 + 4 + 4 = 20$   
 $5 + 5 + 5 + 5 = 20$



**Stage 3 The grid method (Year 2 onwards)**

**Example 3**  $38 \times 5 =$

Use the expanded/carrying method of addition when adding together the answers from the grid.

	3	8	x	5	=	1	9	0								

X	30	8
5	150	40

	1	5	0
	+	4	0
	1	9	0

**Example 4**  $43 \times 57 = 2451$

	4	3	x	5	7	=	2	4	5	1						

X	40	3
50	2000	150
7	280	21

	2	0	0	0
		1	5	0
		2	8	0
	+		2	1
	2	4	5	1
		1		



**Stage 4 Written multiplication (Year 3 onwards)**

**Example 5**

- a) Multiply  $7 \times 5$  (35) – carry the 3; multiply  $4 \times 5$  (20) add the carried 3 (23)
- b) Repeat method described in a)
- c) Multiply 127 by 5 using the same method as a)

Add a zero ( ↘ ) into the ones column in the second row of the answer box

$7 \times 3$  (21) – write the 1 in the answer box and carry the 2 up to the next digit (2)

$2 \times 3$  (6) – add the carried 2 (8)

$1 \times 3$  (3)

Add the two rows of the answer box (4445)

a)	b)	c)
$\begin{array}{r} 47 \\ \times 5 \\ \hline 235 \end{array}$	$\begin{array}{r} 168 \\ \times 4 \\ \hline 672 \end{array}$	$\begin{array}{r} 127 \\ \times 5 \\ \hline 635 \\ 3810 \\ \hline 4445 \\ 1 \end{array}$



## Written multiplication progression

Progression in written multiplication (it is of vital importance that children are secure in all steps prior to moving them on at any stage)

- 2 digit by 1 digit
- 3 digit by 1 digit
- 2 digit by 2 digit
- 3 digit by 2 digit
- 4 digit by 2 digit
- Decimal to 1 decimal place by a 2 digit whole number

**Problematic areas in this progression are place value knowledge ie knowing  $2 \times 3 = 6$  so  $2 \times 30 = 60$ ,  $20 \times 30 = 600$**

**and  $2 \times 0.3 = 0.6$  therefore  $20 \times 0.3 = 6$**

**Children will also make errors when multiplying tenths by tenths after the security of whole number multiplication because they need to get in their minds that multiplying by a decimal actually makes a number smaller.**





## Division

### Stage 1 Grouping and repeated addition (Year 1 onwards)

During the early stages of division, children will concentrate on grouping/sharing objects and dividing using repeated addition.

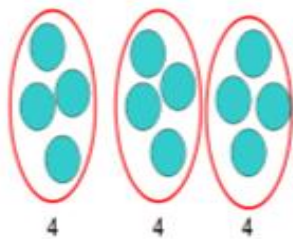
#### Example 1

I can share items  
into equal groups  
I can count in 2s,  
10s and 5s



#### Example 2

I can share items into equal  
groups

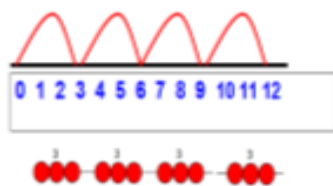


12 shared between 3 is 4

#### Example 3

I can understand division as  
repeated addition

$$12 \div 3 =$$



$$12 \div 3 = 4$$



**Stage 2 The chunking method (Year 2 onwards)**

**Example 4**

2	8	6	÷	1	2	=	2	3	r	1	0	1	0	x	=	1	2	0												
													5	x	=		6	0												
												2	0	x	=	2	4	0												
													2	x	=		2	4												
				X 20								X 3								r 10										
0							2	4	0								2	7	6									2	8	6

**Stage 3 Short division (Year 3 onwards)**

**Example 5**

**(Tip: Use multiplication facts at the side of the question)**

1	2	6	÷	5	=	3	4	8	÷	1	5	=		
		0	2	5	r1			0	2	3	r3	1	5	
5	1	12	26	1	5	3	34	48	4	5	6	0		
									7	5	9	0		
									1	0	5			



## Written division progression

Progression in written division (it is of vital importance that children are secure in all steps prior to moving them on at any stage)


- 2 digit divided by 1 digit
- 3 digit divided by 1 digit
- 3 digit divided by 2 digit
- 4 digit divided by 1 or 2 digit
- Decimal division



**Appendix two – times tables policy**

**Times Tables Rock Stars Progression**

Children move on to the next stage when **securely and consistently** averaging between **2-3 seconds** on individual heat map statistics.

Year group	Order of times tables with milestone checkpoints							
<b>2</b>	10 By Dec of Y2	5 By April of Y2	10 and 5 By April of Y2	2 By July of Y2	10, 5 and 2 By July of Y2			
<b>3</b>	3 By Oct of Y3	4 By Dec of Y3	3 and 4 By Dec of Y3	8 By April of Y3	6 By July of Y3	3, 4, 8 and 6 By July of Y3	10, 5, 2, 3, 4, 8 and 6 By July of Y3	
<b>4</b>	7 By Oct of Y4	9 By Dec of Y4	6, 7, 8 and 9 By Dec of Y4	11 By Feb of Y4	12 By April of Y4	7, 9, 11 and 12 By June of Y4	All tables By June of Y4	

If we inherit a pupil in Y3- 2, 5, 10 by Dec 3, 4 by April 8, 6 by July

If we inherit a pupil in Y4- 2,5, 10 by Oct 3, 4 by Dec 8, 6, 7 by April 9, 11, 12 by June