Mathematics Policy

Our Vision

'An International community of learners striving for excellence and celebrating success'

Our Mission

We aim to provide the highest quality of education possible for students of all abilities. In doing so, we aim to positively encourage each student to achieve academic excellence, enjoy creative diversity, develop critical thinking skills and become lifelong learners and responsible citizens.

To achieve this, we will provide a diverse education in a safe, supportive environment that promotes self-discipline and motivation. We will provide and maintain a calm, trusting and caring atmosphere where teaching and learning are meaningful and developed. We will work in partnership with our staff, students, parents and wider community to achieve our vision.

Purpose

Mathematics is a tool for everyday life. It is a network of concepts and relationships which provide a way of viewing and making sense of the world. It is used to analyse and communicate information and ideas and to tackle a range of practical tasks and real life problems.

"A girl said to me, 'math- I thought this would be times tables.' They see math as sitting down and doing worksheets, times tables or subtraction. They are still surprised that this math is so fun and active and part of their lives." - Library Educator, Westchester Library System.

At Newton British School we want to deliver a more interactive and problem solving approach to Mathematics. This will enable children to grow in confidence and will therefore encourage them to achieve their full potential. It is the school's priority to provide individual learning and therefore, if a child shows understanding of one particular method they will be encouraged to develop further and move to the next strategy in that particular operation. It is our aim to give children lifelong skills that they can apply to any given situation.

Policy Aims and Objectives

- ✓ To create a stimulating learning environment that offers breadth and balance.
- ✓ To develop competence and confidence in mathematical knowledge, concepts and skills.
- ✓ To enhance pupil's understanding of Mathematics through a process of enquiry and experiment.
- ✓ To develop an ability to use and apply Mathematics across the curriculum and in real life.
- ✓ To give teachers appropriate training on Interactive Mental Mathematics Starters from the White Rose scheme of learning, which will then enable them to teach Mathematics in a more enjoyable, interactive and problematic way.
- ✓ To distribute appropriate Mathematics resources to all Year Groups throughout the school. These resources should be used during lessons to ensure children are engaged throughout. They can also be used as an aid to help Lower Ability children.
- ✓ To arrange Mathematics workshops for parents, providing them with extra support so that they're able to assist their children at home.
- ✓ To provide parents with White Rose workbooks that can aid the children's learning, knowledge and understanding.

Application

Mathematics is to be taught for 5-7 hours a week in each class. A Mathematics lesson should always begin with a 5-10 minute 'flashback four' starter and should finish with an interactive or problem solving plenary from the Whiterose Maths scheme of learning. Children are then monitored on their learning from the previous week through Mathematics homework.

Planning

The White Rose Maths is the current scheme that forms the basis of the school's Mathematics planning. The Scheme of Work comes with a Teaching File, Resources, interactive tools and 'End of Block' and 'End of Year' Assessments. Teachers plan in accordance to this scheme and the National Curriculum from Years 1-6.

Schedule for the Scheme of Work

Mathematics curriculum planning is undertaken at three levels -

Long term planning is based on the yearly teaching programmes set out in the National Mathematics Strategy Framework.

Medium term planning is carried out each term. Teachers detail their main teaching objectives for the term.

Short term planning is carried out on a weekly basis. These plans include learning objectives for the main activity, resources to be used and three levels of differentiation (LA [lower ability], MA [medium ability] and HA [higher ability])

Assessment

At Newton British School we are continually assessing our pupils and recording their progress. We see assessment as an integral part of the teaching process and endeavour to make our assessment purposeful; allowing us to match the correct level of work to the needs of the pupils, thus benefiting students and ensuring progress.

Day-to-day assessments are an informal part of every lesson and are closely matched to the teaching objectives. These tend not to be recorded because they are for the teacher's immediate attention and action. However, pertinent comments are occasionally recorded for future planning. End of unit weekly check-ups are used to identify any further consolidation that may be required and to inform future planning.

Children in Key Stage 2 carry out weekly Mental Mathematics Assessments. Teachers keep a record of these results and the questions/answers are posted on the Fusion website for parents to access.

End of Term assessment tasks - at the end of Term 1, 2 & 3 the children from Y1-Y6 will complete the statutory White Rose Maths 'End of Term/Block' assessments to monitor progress.

Using Assessment for Learning (Formative Assessment) in the Classroom -

Give the children a good finished example of a calculation that they will be completing and question them about the different steps of working out that they can see, for example:

23 + 24
20 + 20 = 40
3 + 4 = 7
40 + 7 = 47

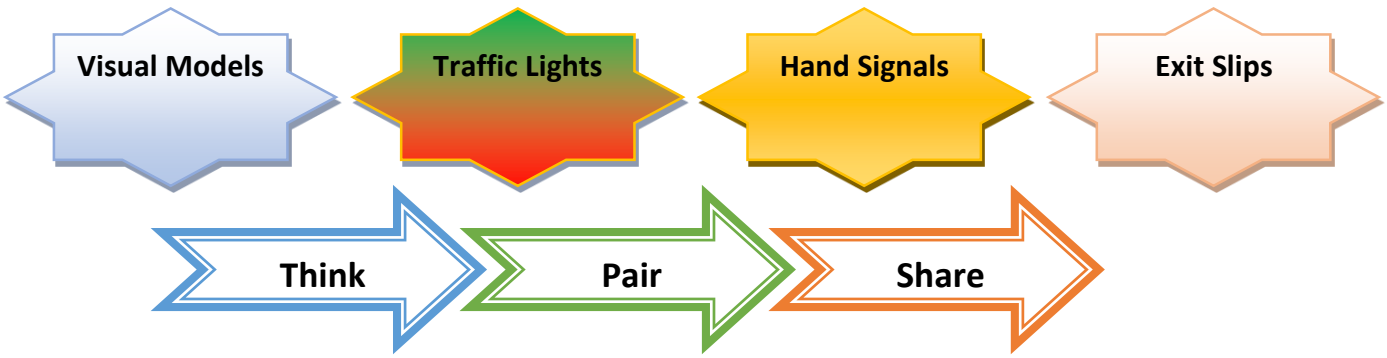
The teacher could also demonstrate this visually while the children are talking with their talk partners; deciding what the steps consist of as they watch the teacher. This could then be used to generate the success criteria of the lesson.

Compare two pieces of finished work like above and ask which is best and why. The analysis via talking partners will generate the success criteria, by focusing on what the insufficient example was. Maybe the answer was wrong? How should it have been done? This would then lead onto a discussion on methods used and could be used as an introduction to the lesson.

Get the children to *complete* one example of a calculation first in mixed ability groups. They would then tell you what steps they followed which would lead to method discussion and an introduction to the lesson.

Challenge the children by getting them to add another number to their answer, for example: "Can you add 9 more to this answer?" question them: "What do you need to do first? What do you do after? Is there an easier way to work out this answer?"

Demonstrate how to create a question and complete the steps of the answer incorrectly. The pupils will then correct you which will therefore create the success criteria.



Information Communication Technology (ICT)

ICT is used to support teachers in their teaching and children in their learning. Each villa throughout the school is equipped with an interactive smart board and a projector. Teachers have been given a list of Interactive Mathematics Games Websites that they can access to aid the learning of children. Teachers can seek help from the Mathematics coordinator if they are finding it difficult to find or load these games.

Teachers to use interactive resources which are located on White Rose scheme of learning for each unit. This is aimed at EYFS – Year 6.

Equal Opportunities

In the daily Mathematics lesson we support children with English as an additional language in a variety of ways, including: repeating of instructions, emphasising key words, using picture cues and playing mathematical games.

Marking

(Review – Jamie)

Teachers mark with a pink (correct), green (growth) markers for children's work on a daily basis. Children are using purple pens to self-assess their own work while giving them their own approach to marking.

Ideas to limit the amount of comments written by teachers

- N.S (Next step) – Provide children with a next step 1 or 2 times a week to push their learning.

- S.A (Self-Assessment) – Children write S.A on their books when work is self-marked.
- P.A (Peer-Assessment) – See above.

- P (Practical Lesson) – Using whiteboards or other forms of resources not put into the children's books. (Keep in line of planning and books have uniformity).

-V.F (Verbal Feedback) – Teachers can write VF to children who they give Verbal feedback too.

-Teachers only give 1 comment a week in maths books (Teachers to choose which lesson).

- KS2 Children must respond to that 1 comment a week (Responding with a few words).

Calculation Guidelines

Year 1

Addition

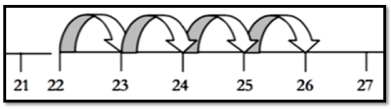
- In Year 1 children start addition by using pictorial representation, for example:

2 + 1 = 3

Children count the pictures they have drawn to find the answer.

- Once the children feel more confident with addition they move onto finding out the answer by counting on (with the use of a number line), e.g.

22 + 4 =



- Then, Children learn to put the large number in their head (for example 9) and count on the amount that is needed to complete the sum (for example 6):

"Put 9 in your head and count 6 more fingers 9... 10 11 12 13 14 15"

Addition - Partitioning

- The children are introduced to the concept of 'Partitioning' towards the end of Year 1.
- The children look at adding 2 two digit numbers together by breaking down numbers into tens and units. For example:
  - 21 + 32 (20 + 30 = 50) and (1 + 2 = 3) then 50 + 3 = 53!

OR

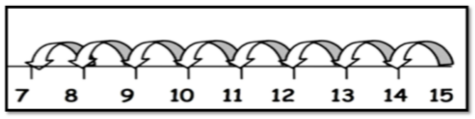
T	U	
2	1	
3	2	+
5	3	

Subtraction

- Children in Year 1 start with solving simple subtraction problems or recording with pictorial representations and numbers, for example:

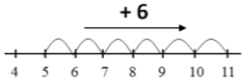
7 – 3 = 4

- They must understand subtraction as 'take away'.
- When children have an understanding of simple subtraction with pictorial representations they start to use number lines and number tracks to count backwards to solve a problem, e.g.



Subtraction

- Children are asked to 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?"



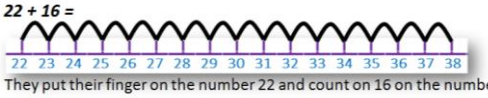
- Use practical and informal written methods to support the subtraction of a one-digit number from a one-digit or two-digit number;
  - "I have 11 toy cars. There are 5 cars too many to fit in the garage. How many cars fit in the garage?"

Year 2

Addition

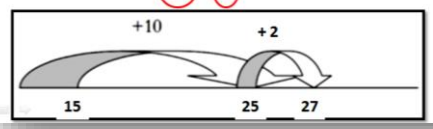
- The children initially find the answer to addition sums by counting on (with the use of a number line), e.g.

22 + 16 =



- They put their finger on the number 22 and count on 16 on the number line.
- The children also learn to put the large number in their head (for example 15) and count on the amount that is needed to complete the sum (for example 12):
- *"Put 15 in your head and count 12 more fingers. 15... 16 17 18 19 20 21 22, etc."*
- Children should be able to use empty and marked number lines to record calculation strategies in addition by the end of Year 2.
- They begin to record mental calculations using partitioning and recombining skills, for example:

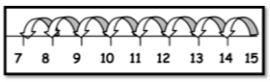
15 + 12 = 15 + 10 + 2 = 27



Subtraction

- Children initially use a number line to count backwards to solve a problem, for example:

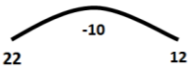
15 – 8



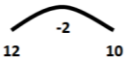
- They then use their partitioning skills (of Tens and Units) to subtract, e.g.

22 – 12

22 – 10 (Tens) = 12



12 – 2 (Units) = 10



Multiplication

- Children begin to understand the concept of multiplication by using arrays, for example:

5 x 3 =

- They then begin to present their calculations of repeated addition to an unmarked number line.

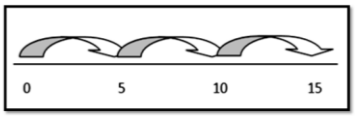
Example:

5 x 3 *OR*

5 multiplied by 3 *OR*

5 times 3 *OR*

3 times 5.



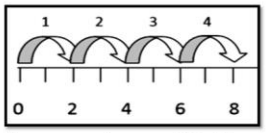
Division

- Children in Year 2 understand the operation of sharing equally and the grouping of objects.
- They can also use the grouping practically (in P.E):

"12 children get into teams of 4 to play a game. How many teams are there?"

- They will use grouping as a strategy for solving division problems and begin to record on a marked number line, e.g.

8 ÷ 2 =



How many jumps of 2 did you take to get to 8?

Year 3

Addition

➢The children in Year 3 continue using a range of equations as in Year 1 and 2 but with appropriate, larger numbers:

- •How many ways can you make the number 20?
- •How many ways can you make the number 50? Etc.

Partitioning into Tens and Units

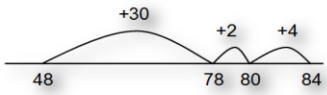
➢Children learn to partition both numbers and recombine, e.g.

34 + 53 = 30 + 50 + 4 + 3

Add a near multiple of 10 to a two-digit number

➢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



➢They also learn to secure mental methods in their head: 35 + 19 is the same as 35 + 20 – 1.

Addition

Pencil and paper procedures

83 + 42 =

➢The children can calculate this sum either by:

- •Vertical Expansion

T	U
8	3
4	2 +
12	5

- •Horizontal Expansion

T	U
80	+ 3
40	+ 2
120 + 5 = 125	

➢The children are given flexibility in Year 3. The different methods of partitioning are taught in class. However, the children are able to choose the method of working out that is easiest for them.

Subtraction

➢The children in Year 3 continue using a range of equations as in Year 1 and 2 but with appropriate, larger numbers:

- •What is 29 - 11?
- •What is 30 - 13? Etc.

➢They learn to find a small difference by counting up from the smaller to the larger number, e.g.

102 – 97 = 5

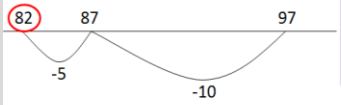
Subtract mentally a 'near multiple of 10' to or from a two-digit number

78 – 49 is the same as 78 – 50 + 1

Subtraction

Use known number facts and place value to subtract

97 – 15 =

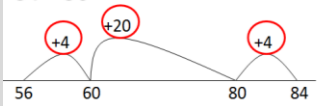


➢With practice, children will need to record less information and decide whether to count back or forward.

Pencil and paper procedures

Complementary addition

84 – 56 =



Another example:

99 – 68 =

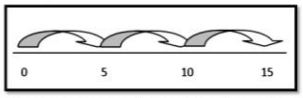
** Add jumps to find the answer.*

Multiplication

➢ ***By this stage, the children should be able to recall their 2s, 3s, 4s, 5s and 10s times tables with speed. Children should be practising the recall and speed of their times tables at home daily.***

➢ Children in Year 3 continue to understand multiplication as repeated addition and continue to use arrays:

5 x 3



➢ They use known facts and place value to carry out simple multiplications for a 2 digit number x a 1 digit number:

35 x 2 =

(Partitioning)

X	30	5
2	*60*	*10*

= 70

Division

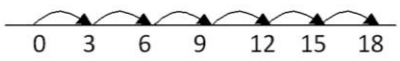
➢ ***The children in Year 3 should recognise that division is the inverse of multiplication.***

Understanding division as sharing and grouping

18 ÷ 3 can be modelled as:

- Sharing – 18 shared between 3

- Grouping- How many 3's make 18?



Year 4

Addition

Partitioning into Tens and Units

- Children in Year 4 learn to either partition both numbers and recombine or partition the second number only e.g.

55 + 37 = 55 + 30 + 7
= 85 + 7
= 92

Add the nearest multiple of 10, then adjust

- Example: ***63 + 29 is the same as 63 + 30 - 1***

Pencil and paper procedures

367 + 185 =

Leading to Carrying Over

1 1
367
+185
552

Either

367
+185
12 *U*
140 *T*
400 *H*
552

Or

300 + 60 + 7
100 + 80 + 5
400 +140+12 = 552
H T U

Subtraction

- The children in Year 4 learn to find a small difference by counting up from the smaller to the larger number, e.g.

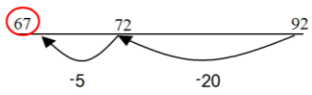
5003 – 4996 = 7

Subtract the nearest multiple of 10, then adjust

- Example: ***780 – 490 is the same as 780 – 500 + 10***

Use known number facts and place value to subtract

92 – 25 = 67

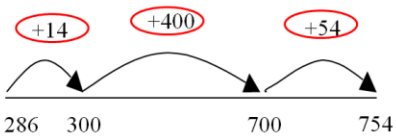


Subtraction

Pencil and paper procedures

- Complementary addition

754 – 86 = 668

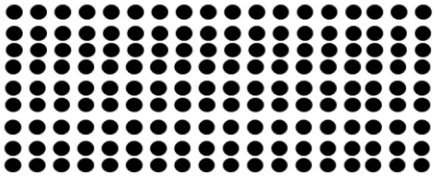


** Add jumps to find the answer.*

Multiplication

- Initially the children in Year 4 use arrays to work out more difficult multiplication equations, e.g.

18 x 9 =



- They then begin to partition longer multiplication equations:

18 x 9 = (10 x 9 = 90) + (8 x 9 = 72) = 162

- Or they use the grid method of multiplication:

233 x 7 =

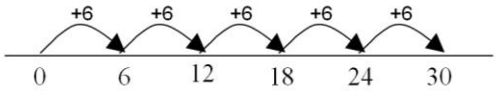
X	200	30	3
7	*1,400*	*210*	*21*

= 1,631

Division

Sharing and Grouping

- 30 ÷ 6 can be modelled as:
- Grouping – groups of 6 placed on number line and the number of groups counted e.g.

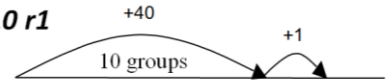


- Sharing – 30 shared between 6 people:

Division

Remainders

41 ÷ 4 = 10 r1



41 = (10 x 4) + 1

Pencil and paper procedures – chunking

72 ÷ 5

72 = 50 + 22
50 ÷ 5 = 10
22 ÷ 5 = 4 r2
10 + 4r2 = 14 r2

72	
-50	*(10 groups)*
22	
-20	*(4 groups)*
2	*= 14 r2*

Year 5

Addition

- The children in Year 5 then learn how to add up to two places of decimals (with the same number of decimals places).

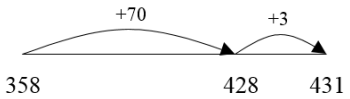
$$\begin{array}{r} {\scriptstyle 1} \\ 72.8 \\ +\ 54.6 \\ \hline 127.4 \end{array}$$

Addition

Partitioning into Hundreds, Tens and Units

- Children in Year 5 learn to either partition both numbers and recombine or partition the second number only e.g.

358 + 73 = 358 + 70 + 3
= 428 + 3
= 431



Add and subtract the nearest multiple of 10, then adjust

- Example: ***458 + 79 = is the same as 458 + 80 - 1***

Pencil and paper procedures

- The children begin to add numbers with at least four digits:

3587 + 675 =

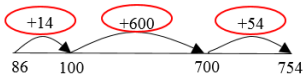
$$\begin{array}{r} {\scriptstyle 111} \\ 3587 \\ +\ 675 \\ \hline 4262 \end{array}$$

Subtraction

Pencil and paper procedures

- Complementary addition

754 – 286 = 468



**** Add jumps to find the answer.***

OR

- ***754 - 286 = 468***

14 (300)	can be refined to	**14 (300)**
400 (700)		**454 (754)**
54 (754)		**468**
468		

The children reduce the number of steps to make the calculation more efficient.

Subtraction

- The children in Year 5 learn to find a difference by counting up from the smaller to the larger number, e.g.

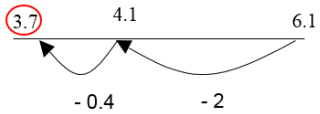
8006 – 2993 = 5013

Subtract the nearest multiple of 10 or 100, then adjust

- Example: ***780 – 490 is the same as 780 – 500 + 10***

Use known number facts and place value to subtract

6.1 – 2.4 = 3.7



Multiplication

- Initially the children in Year 5 use partitioning to multiply 2 digit x 1 digit numbers:

47 x 6 = (40 x 6) + (7 x 6) = 282

- Or they use the grid method of multiplication:

72 x 38 is approximately 70 x 40 = 2800

x	70	2
30	2,100	60
8	560	16

2100 + 60 = 2160
560 + 16 = 576

$$\begin{array}{r} 2160 \\ 576\ + \\ \hline 2736 \end{array}$$

Multiplication

Expanded Column Multiplication

- Children should describe what they do by referring to the actual values of the digits in the columns.
- For example, the first step in 38 × 7 is 'thirty multiplied by seven', not 'three times seven', although the relationship 3 × 7 should be stressed.

30 + 8		38
x 7		x 7
56	(8 x 7 = 56)	56
210	(30 x 7 = 210)	210
266		266

Division

- The children in Year 5 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

Pencil and paper procedures - chunking

256 ÷ 7 lies between 210 ÷ 7 = 30 and 280 ÷ 7 = 40

* Partition the dividend into multiples of the divisor:

256 = 210 + 46

210 ÷ 7 = 30

46 ÷ 7 = **6 r 4** →

30 + 6r4 = **36 r 4**

OR

256	
- 210	210 ÷ 7 = 30 (30 groups)
46	
- 42	42 ÷ 7 = 6 (6 groups)
4	Ans: 36 r 4

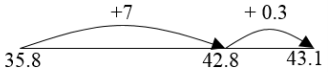
Year 6

Addition

Partitioning into Hundreds, Tens and Units and Decimal Fractions and Recombine

➢ Children in Year 6 learn to either partition both numbers and recombine or partition the second number only e.g.

35.8 + 7.3 = 35.8 + 7 + 0.3
= 42.8 + 0.3
= 43.1



Pencil and Paper Procedures

➢Extend to numbers with any number of digits and decimals with 1, 2 and/or 3 decimal places, e.g.

13.86 + 9.481 = 23.341

$$\begin{array}{r} {}^{1}\,{}^{1}\,{}^{1} \\ 13.86 \\ +\ 9.481 \\ \hline 23.341 \end{array}$$

Subtraction

➢ The children in Year 6 learn to find a difference by counting up from the smaller to the larger number, 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

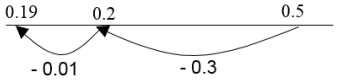
Subtract the nearest multiple of 10, 100 or 1000 then adjust

➢ Example: ***7800 – 4900 is the same as 7800 – 5000 + 100***

Subtraction

Use known number facts and place value to subtract

0.5 – 0.31 = 0.19

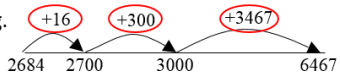


Pencil and Paper Procedures

e.g. 6467 – 2684 = 3783

**** Add jumps to find the answer.***

➢ Complementary addition, e.g.



OR 16 (2700) ***can be refined to*** 316 (3000)
300 (3000) 3467 (6467)
3467 (6467) 3783
3783

The children reduce the number of steps to make the calculation more efficient. *They then extend to 2 places of decimals.*

Multiplication

➢ Initially the children in Year 6 use partitioning to multiply 2 digit x 1 digit numbers:

87 x 6 = 522

87 x 6 = (80 x 6) + (7 x 6) = 522

➢ Or they use the grid method of multiplication:

372 x 24 is approximately 400 x 20 = 8000

x	300	70	2
20	6,000	1,400	40
4	1,200	280	8

6,000 + 1,400 + 40 = 7,440
1,200 + 280 + 8 = 1,488

$$\begin{array}{r} 7440 \\ 1488 + \\ \hline 8928 \end{array}$$

Multiplication

Short Column Multiplication

➢ The recording is reduced further, with carry digits recorded.

$$\begin{array}{r} {}^{5}38 \\ \times\ 7 \\ \hline 266 \end{array}$$

➢ Children who are already secure with multiplication for TU × U and TU × TU should have little difficulty in using the same method for HTU × TU or applying decimals.

$$\begin{array}{rl} {}^{7}{}^{5}\,{}^{1}2\,86 & \\ \times\ 29 & \\ \hline 2574 & (9 \times 286 = 2574) \\ 5720 & (20 \times 286 = 5720) \\ \hline 8294 & \end{array}$$

Division

Pencil and paper procedures – chunking

977 ÷ 36 is approximately 1000 ÷ 40 = 25

* Partition the dividend into multiples of the divisor:
e.g. 977 = 720 + 180 + 77
720 ÷ 36 = 20
180 ÷ 36 = 5
77 ÷ 36 = 2r5 → 20 + 5 + 2r5 = 27r5

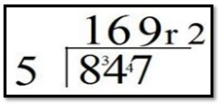
OR

977 720 ÷ 36 = 20
- 720 (20 groups)
257 180 ÷ 36 = 5
- 180 (5 groups)
77 72 ÷ 36 = 2
- 72 (2 groups)
5
Answer: 27 r 5

Division

Pencil and paper procedures – Short Division Method

- Write down how many times your divisor goes into the first number of the dividend. If there is a remainder, that's okay.
- Write down your remainder to the left of the next digit in the dividend.
- Continue. Repeat steps 1-3 until you are done.



- Both methods above are necessary at this stage.

Reviewed By: Mr. James Houston - Principal and Mr Conor Hayes – Deputy Principal
June 2021
Next Review Date: June 2022