

# Year 5

## Small Steps Guidance and Examples

Block 1 – Multiplication & Division

**White**  **RoseMaths**

# Year 5 – Yearly Overview

|        | Week 1                               | Week 2 | Week 3 | Week 4                            | Week 5                         | Week 6     | Week 7 | Week 8                               | Week 9                        | Week 10                         | Week 11         | Week 12       |
|--------|--------------------------------------|--------|--------|-----------------------------------|--------------------------------|------------|--------|--------------------------------------|-------------------------------|---------------------------------|-----------------|---------------|
| Autumn | Number – Place Value                 |        |        | Number – Addition and Subtraction |                                | Statistics |        | Number – Multiplication and Division |                               | Perimeter and Area              |                 | Consolidation |
| Spring | Number – Multiplication and Division |        |        | Number – Fractions                |                                |            |        |                                      |                               | Number – Decimals & Percentages |                 | Consolidation |
| Summer | Number – Decimals                    |        |        |                                   | Geometry- Properties of Shapes |            |        | Geometry- Position and Direction     | Measurement- Converting Units |                                 | Measures Volume | Consolidation |

# Overview

## Small Steps

- ▶ Multiply 4-digits by 1-digit
- ▶ Multiply 2-digits (area model)
- ▶ Multiply 2-digits by 2-digits
- ▶ Multiply 3-digits by 2-digits
- ▶ Multiply 4-digits by 2-digits
- ▶ Divide 4-digits by 1-digit
- ▶ Divide with remainders



## NC Objectives

Multiply and divide numbers mentally drawing upon known facts. Multiply numbers up to 4 digits by a one or two digit number using a formal written method, including long multiplication for 2 digit numbers.

Divide numbers up to 4 digits by a one digit number using the formal written method of short division and interpret remainders appropriately for the context.

Solve problems involving addition and subtraction, multiplication and division and a combination of these, including understanding the use of the equals sign.

# Multiply 4-digits by 1-digit

## Notes and Guidance

Children build on previous steps to represent a four-digit number multiplied by a one-digit number with concrete manipulatives.

Teachers should be aware of misconceptions arising from 0 in the hundreds, tens or ones column.

Children then move on to explore multiplication with exchange in first one column and then more than one column.

## Mathematical Talk

Why is it important to set out using columns?

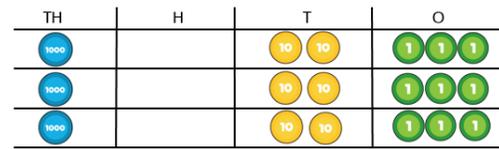
Explain the value of each digit in your calculation.

What happens when there is a 0 in the ones column, tens column or hundreds column?

What do we do if there are ten counters in a column?

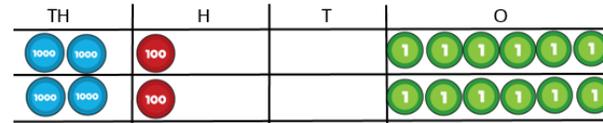
## Varied Fluency

1 Complete the calculation.



| TH | H | T | O |
|----|---|---|---|
| 1  | 0 | 2 | 3 |
| ×  |   |   | 3 |
|    |   |   |   |

2 Write the multiplication calculation represented and find the answer.



Remember if there are ten or more counters in a column, make an exchange.

3 Sam earns £1,325 per week. How much would he earn in 4 weeks?



| TH | H | T | O |
|----|---|---|---|
| 1  | 3 | 2 | 5 |
| ×  |   |   | 4 |
|    |   |   |   |

Use the place value counters to solve the problem.

## Multiply 4-digits by 1-digit

## Reasoning and Problem Solving

Megan worked out the answer to  $1,432 \times 4$

Here is her answer:

| TH | H  | T  | O |
|----|----|----|---|
| 1  | 4  | 3  | 2 |
| ×  |    |    | 4 |
| 4  | 16 | 12 | 8 |

$$1,432 \times 4 = 416,128$$

Can you explain what Megan has done wrong?

Megan has not exchanged when she has got 9 or more in the tens and hundreds columns.

Can you work out the missing numbers using the clues?

$$\begin{array}{cccc}
 \square & \square & \square & \square \\
 \times & & & 5 \\
 \hline
 \square & \square & \square & \square & \square \\
 \hline
 \end{array}$$

- The 4 digits being multiplied by 6 are consecutive numbers.
- The first 2 digits of the answer are the same.
- The 4th and 5th digits in the answer add to make the 3rd.

$$2345 \times 5 = 11,725$$

# Multiply 2-digits (Area model)

## Notes and Guidance

Children use base ten to represent the area model of multiplication. The base ten will enable children to see the size and scale linked to multiplying.

Children will then move on to representing this more abstractly with place value counters and just numbers.

## Mathematical Talk

How can we represent this calculation?  
What are we multiplying?

Where can we see  $20 \times 20$ ? What does the 40 represent?

What's the same and what is different between the three representations (base ten, place value, grid)?

## Varied Fluency

1 Joshua uses the Base 10 to solve  $23 \times 22$

| Step 1 – build the length and the width using the multiplication calculation | Step 2 – Multiply the length by the width | Step 3 – Find the total of your area |
|--|---|--------------------------------------|
| $23 \times 22 =$<br>   | $23 \times 22 =$<br>                      | $23 \times 22 =$<br>                 |

2 Use Base 10 to solve  $32 \times 24$ ,  $25 \times 31$ ,  $34 \times 23$   
Sammy adapts the Base 10 method to solve  $44 \times 32$

| Step 1 – build the length and the width using the multiplication calculation   | Step 2 – Multiply the length by the width | Step 3 – Find the total of your area |       |    |  |  |   |  |  |  |  |    |   |    |      |     |   |    |   |  |  |    |   |  |    |      |     |      |   |    |   |     |  |  |  |      |  |  |  |     |  |  |  |       |  |  |  |   |  |  |  |      |
|--|---|--------------------------------------|-------|----|--|--|---|--|--|--|--|----|---|----|------|-----|---|----|---|--|--|----|---|--|----|------|-----|------|---|----|---|-----|--|--|--|------|--|--|--|-----|--|--|--|-------|--|--|--|---|--|--|--|------|
| $44 \times 32 =$<br><table border="1"> <tr><td></td><td>40</td><td>4</td></tr> <tr><td>30</td><td></td><td></td></tr> <tr><td>2</td><td></td><td></td></tr> </table> |   | 40                                   | 4     | 30 |  |  | 2 |  |  | $44 \times 32 =$<br><table border="1"> <tr><td></td><td>40</td><td>4</td></tr> <tr><td>30</td><td>1200</td><td>120</td></tr> <tr><td>2</td><td>80</td><td>8</td></tr> </table> |  | 40 | 4 | 30 | 1200 | 120 | 2 | 80 | 8 | $44 \times 32 =$<br><table border="1"> <tr><td></td><td>40</td><td>4</td><td></td></tr> <tr><td>30</td><td>1200</td><td>120</td><td>1200</td></tr> <tr><td>2</td><td>80</td><td>8</td><td>120</td></tr> </table><br><table border="0"> <tr><td></td><td></td><td></td><td>1200</td></tr> <tr><td></td><td></td><td></td><td>120</td></tr> <tr><td></td><td></td><td></td><td>+ 180</td></tr> <tr><td></td><td></td><td></td><td>8</td></tr> <tr><td></td><td></td><td></td><td>1400</td></tr> </table> |  | 40 | 4 |  | 30 | 1200 | 120 | 1200 | 2 | 80 | 8 | 120 |  |  |  | 1200 |  |  |  | 120 |  |  |  | + 180 |  |  |  | 8 |  |  |  | 1400 |
|  | 40  | 4                                    |       |    |  |  |   |  |  |  |  |    |   |    |      |     |   |    |   |  |  |    |   |  |    |      |     |      |   |    |   |     |  |  |  |      |  |  |  |     |  |  |  |       |  |  |  |   |  |  |  |      |
| 30   |   |                                      |       |    |  |  |   |  |  |  |  |    |   |    |      |     |   |    |   |  |  |    |   |  |    |      |     |      |   |    |   |     |  |  |  |      |  |  |  |     |  |  |  |       |  |  |  |   |  |  |  |      |
| 2  |   |                                      |       |    |  |  |   |  |  |  |  |    |   |    |      |     |   |    |   |  |  |    |   |  |    |      |     |      |   |    |   |     |  |  |  |      |  |  |  |     |  |  |  |       |  |  |  |   |  |  |  |      |
|  | 40  | 4                                    |       |    |  |  |   |  |  |  |  |    |   |    |      |     |   |    |   |  |  |    |   |  |    |      |     |      |   |    |   |     |  |  |  |      |  |  |  |     |  |  |  |       |  |  |  |   |  |  |  |      |
| 30   | 1200                                      | 120                                  |       |    |  |  |   |  |  |  |  |    |   |    |      |     |   |    |   |  |  |    |   |  |    |      |     |      |   |    |   |     |  |  |  |      |  |  |  |     |  |  |  |       |  |  |  |   |  |  |  |      |
| 2  | 80  | 8                                    |       |    |  |  |   |  |  |  |  |    |   |    |      |     |   |    |   |  |  |    |   |  |    |      |     |      |   |    |   |     |  |  |  |      |  |  |  |     |  |  |  |       |  |  |  |   |  |  |  |      |
|  | 40  | 4                                    |       |    |  |  |   |  |  |  |  |    |   |    |      |     |   |    |   |  |  |    |   |  |    |      |     |      |   |    |   |     |  |  |  |      |  |  |  |     |  |  |  |       |  |  |  |   |  |  |  |      |
| 30   | 1200                                      | 120                                  | 1200  |    |  |  |   |  |  |  |  |    |   |    |      |     |   |    |   |  |  |    |   |  |    |      |     |      |   |    |   |     |  |  |  |      |  |  |  |     |  |  |  |       |  |  |  |   |  |  |  |      |
| 2  | 80  | 8                                    | 120   |    |  |  |   |  |  |  |  |    |   |    |      |     |   |    |   |  |  |    |   |  |    |      |     |      |   |    |   |     |  |  |  |      |  |  |  |     |  |  |  |       |  |  |  |   |  |  |  |      |
|  |   |                                      | 1200  |    |  |  |   |  |  |  |  |    |   |    |      |     |   |    |   |  |  |    |   |  |    |      |     |      |   |    |   |     |  |  |  |      |  |  |  |     |  |  |  |       |  |  |  |   |  |  |  |      |
|  |   |                                      | 120   |    |  |  |   |  |  |  |  |    |   |    |      |     |   |    |   |  |  |    |   |  |    |      |     |      |   |    |   |     |  |  |  |      |  |  |  |     |  |  |  |       |  |  |  |   |  |  |  |      |
|  |   |                                      | + 180 |    |  |  |   |  |  |  |  |    |   |    |      |     |   |    |   |  |  |    |   |  |    |      |     |      |   |    |   |     |  |  |  |      |  |  |  |     |  |  |  |       |  |  |  |   |  |  |  |      |
|  |   |                                      | 8     |    |  |  |   |  |  |  |  |    |   |    |      |     |   |    |   |  |  |    |   |  |    |      |     |      |   |    |   |     |  |  |  |      |  |  |  |     |  |  |  |       |  |  |  |   |  |  |  |      |
|  |   |                                      | 1400  |    |  |  |   |  |  |  |  |    |   |    |      |     |   |    |   |  |  |    |   |  |    |      |     |      |   |    |   |     |  |  |  |      |  |  |  |     |  |  |  |       |  |  |  |   |  |  |  |      |

Use place value counters and a grid to solve  $45 \times 42$ ,  $52 \times 24$ ,  $34 \times 43$

# Multiply 2-digits (Area model)

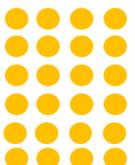
## Reasoning and Problem Solving

Tabby says,  
 “If I multiply  $23 \times 57$ , I can just do these calculations,  $20 \times 50$  and  $3 \times 7$  and then add the totals.”

Do you agree? Convince me!

Children may prove they disagree with concrete or pictorial representations.

Ryan hasn't finished his calculation. Can you complete the missing information and record his calculation with an answer?

|    |   |   |
|----|---|---|
|    | 40  | 2   |
| 40 |  |  |
| 6  |  |  |

Possible response:  
 Ryan needs 8 more hundreds.  
 $40 \times 40 = 1600$   
 and he only has 800.

His calculation is  
 $42 \times 46 = 1,932$

Farmer Joe has a field that measures 53 m long by 25 m wide.

Farmer Sally has a field that measures 52 m long by 24 m wide.

Max thinks they will have the same area because the numbers have only changed by one digit each.

Do you agree? Prove it!

Children may prove this with concrete or pictorial representations.

## Multiply 2-digits by 2-digits

### Notes and Guidance

Children will move on from the area method and work towards more formal multiplication.

They will start by exploring the role of the zero in the calculation and why it's important. Children should understand what is happening through each step of the calculation process.

### Mathematical Talk

Why is the zero important?

What numbers are being multiplied in the first line and the second line?

What do we do with an exchange? What happens if the exchange is more than 1?

If we know what  $38 \times 12$  is, how else could we work out  $39 \times 12$ ?

### Varied Fluency

- 1 Complete the following to calculate  $23 \times 14$ :

$$\begin{array}{r} 23 \\ \times 14 \\ \hline 92 \quad (23 \times 4) \\ \underline{230} \quad (23 \times 10) \\ \hline \end{array}$$

Use the method to calculate:  
 $34 \times 26$     $58 \times 15$     $72 \times 35$

- 2 Complete the following to solve the calculation.

$$\begin{array}{r} 46 \\ \times 27 \\ \hline 322 \quad (\square \times \square) \\ \underline{920} \quad (\square \times \square) \\ \hline \end{array}$$

Answer the following:  
 $27 \times 39$     $46 \times 55$     $94 \times 49$

- 3 Calculate the following:

$$38 \times 12$$

$$39 \times 12$$

$$37 \times 11$$

What's the same and what's different?

# Multiply 2-digits by 2-digits

## Reasoning and Problem Solving

Craig says,

It is not possible to make 999 by multiplying 2 two-digit numbers.



Do you agree with him? Prove it.

Children may use a trial and error approach during which they'll further develop their multiplication skills.

They will find that Craig is wrong as  $999 = 27 \times 37$

Joe has answered  $47 \times 36$



$$\begin{array}{r} 47 \\ \times 36 \\ \hline 282 \\ \phantom{2}4 \\ 141 \\ \phantom{2}2 \\ \hline 323 \end{array}$$

Alice says:



The answer should be 1,692, not 323

Who is correct? Explain how you know.

Joe has forgotten to place a zero when he multiplied by ten

It should look like this:

...

$$\begin{array}{r} 47 \\ \times 36 \\ \hline 282 \\ \phantom{2}4 \\ 1410 \\ \phantom{2}2 \\ \hline 1692 \end{array}$$

## Multiply 3-digits by 2-digits

### Notes and Guidance

Children will extend their multiplication skills to multiplying three-digit numbers by two-digit numbers.

They will use multiplication to find area and solve multi step problems.

### Mathematical Talk

Why is the zero important?

What numbers are being multiplied in the first line and the second line?

What do we do with an exchange? What happens if there is an exchange at the end of the number?

### Varied Fluency

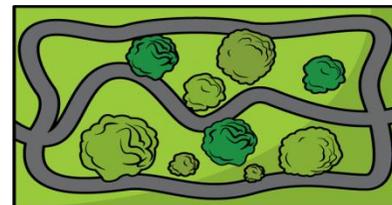
- 1 Complete the following

$$\begin{array}{r}
 132 \\
 \times 14 \\
 \hline
 528 \quad (132 \times 4) \\
 1320 \quad (132 \times 10) \\
 \hline
 \end{array}
 \qquad
 \begin{array}{r}
 563 \\
 \times 29 \\
 \hline
 \quad \quad \quad (\square \times \square) \\
 \quad \quad \quad (\square \times \square) \\
 \hline
 \end{array}$$

- 2 Complete the following

$$\boxed{637 \times 24} \qquad \boxed{573 \times 28} \qquad \boxed{426 \times 35}$$

- 3 A playground is 128 yards by 73 yards. Calculate the area of the playground.



# Multiply 3-digits by 2-digits

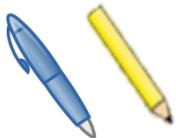
## Reasoning and Problem Solving

Tiffany has spilt paint on her maths homework. Can you work out the digits that have been covered by paint?

$$\begin{array}{r}
 9 \blacksquare 9 \\
 \times 95 \\
 \hline
 4845 \\
 + 87 \blacksquare 1 \blacksquare \\
 \hline
 92055
 \end{array}$$

$$\begin{array}{r}
 969 \\
 \times 95 \\
 \hline
 4845 \\
 + 87210 \\
 \hline
 92055
 \end{array}$$

Pencils come in boxes of 64 and a school bought 270 boxes. The school ordered 720 boxes of handwriting pens and there are 46 pens per box. How many more pens are there than pencils?



$$\begin{aligned}
 270 \times 64 &= 17,280 \\
 720 \times 46 &= 33,120 \\
 33,120 - 17,280 &= 15,840 \\
 \dots
 \end{aligned}$$

Here are examples of Casey's maths work:

$$\begin{array}{r}
 987 \\
 \times 76 \\
 \hline
 5922 \\
 + 6909 \\
 \hline
 12,831
 \end{array}
 \qquad
 \begin{array}{r}
 324 \\
 \times 78 \\
 \hline
 592 \\
 + 2680 \\
 \hline
 (324 \times 8) \\
 (324 \times 70)
 \end{array}$$

Can you explain the mistakes she's made? Correct each calculation.

Casey has forgotten to add the zero when multiplying by the multiple of ten '70'

$$\begin{array}{r}
 987 \\
 \times 76 \\
 \hline
 5922 \\
 + 69090 \\
 \hline
 75,012
 \end{array}$$

Casey has not exchanged into the Thousands or Ten thousands column correctly.

$$\begin{array}{r}
 324 \\
 \times 78 \\
 \hline
 2592 \\
 + 22680 \\
 \hline
 25,272
 \end{array}$$

## Multiply 4-digits by 2-digits

### Notes and Guidance

Children will build upon previous learning of multiplying a 3-digit number by a 2-digit number and apply this to 4-digit numbers.

It is important that children remember the steps to take when using this multiplication method.

### Mathematical Talk

What steps do we need to go through when using this multiplication method?

Look at the numbers in each question, can they help you estimate which answer will be the largest?

### Varied Fluency

- 1 Use the method shown to complete.

|   |  |  |  |
|---|--|--|--|
| $\begin{array}{r} 3250 \\ \times 26 \\ \hline 19500 \\ + 65000 \\ \hline \end{array}$ | $(\square \times \square)$<br>$(\square \times \square)$ | $\begin{array}{r} 2456 \\ \times 34 \\ \hline \\ \hline \end{array}$ | $(\square \times \square)$<br>$(\square \times \square)$ |
|---|--|--|--|

- 2 Calculate:

$3,282 \times 32$

$7,132 \times 21$

$9,708 \times 38$

- 3 Put <, > or = in each circle to make the statements correct.

$4,458 \times 56 \bigcirc 4,523 \times 54$

$4,458 \times 55 \bigcirc 4,523 \times 54$

## Multiply 4-digits by 2-digits

## Reasoning and Problem Solving

Can you spot and correct the errors in the calculation below.

$$\begin{array}{r}
 2534 \\
 \times \quad 23 \\
 \hline
 7592 \\
 1 \quad 1 \\
 5068 \\
 \hline
 12660 \\
 \hline
 11
 \end{array}$$

There are 2 errors:

In the first answer, the extra ten has not been added.

In the second answer, the place holder is missing.

Correct answer should be:

$$\begin{array}{r}
 2534 \\
 \times \quad 23 \\
 \hline
 7602 \\
 50680 \\
 \hline
 58282
 \end{array}$$

Alex has spilt paint and covered the following calculation:



I remember they were all the same number.

$$\begin{array}{r}
 269 \\
 \times \quad 2 \\
 \hline
 22952 \\
 6 \quad 5 \quad 7 \\
 5730 \\
 \hline
 111 \\
 0332 \\
 \hline
 111
 \end{array}$$

What is the missing number?

The missing number is 8

$$\begin{array}{r}
 2869 \\
 \times \quad 28 \\
 \hline
 22952 \\
 57380 \\
 \hline
 80332
 \end{array}$$

## Divide 4-digits by 1-digit

### Notes and Guidance

Children use their knowledge from Year 4 of dividing three digits by 1-digit by dividing up to 4-digit numbers by a 1-digit number.

They use place value counters to group their number and develop their understanding of the short division method.

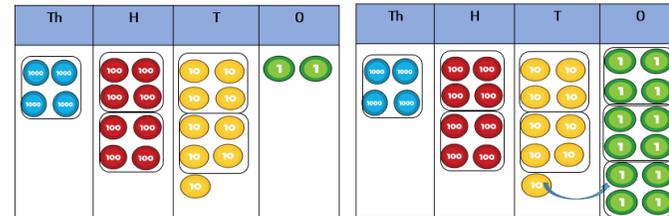
### Mathematical Talk

How many groups of 4 thousands are there in 4 thousands? How many groups of 4 hundreds are there in 8 hundreds? How many groups of 4 tens are there in 9 tens? How many groups of 4 ones are there in 12 ones?

Do I need to solve both calculations to compare the divisions?

### Varied Fluency

- 1 Here is a method to solve 4,892 divided by 4 using place value counters and short division.



$$4 \overline{) 4892} = 1223$$

Use this method to solve the following questions.  
 $6,610 \div 5$        $2,472 \div 3$        $9,360 \div 4$

- 2 Mr Porter has saved £8,934 pounds. He shares it between his three grandchildren. How much does each grandchild receive?

- 3 Use  $<$   $>$  or  $=$  to compare the statements

$3,495 \div 5$    $3,495 \div 3$

$8,064 \div 7$    $9,198 \div 9$

$7,428 \div 4$    $5,685 \div 5$

## Divide 4-digits by 1-digit

## Reasoning and Problem Solving

Sam is working out 2,240 divided by 7  
He says you can't do it because 7 is larger than all of the digits in the number.

Do you agree with Sam?  
Explain your answer.

Sam is incorrect because you can exchange between columns. When 2 thousands don't group into 7's, you can exchange 2 thousands for 20 hundreds. This will then divide by 7

2,240 divided by 7 is equal to 320

## Spot the mistake.

Explain and correct the working.

| Th    | H     | T | O     |
|-------|-------|---|-------|
| ● ● ● | ● ● ● | ● | ● ● ● |
| ● ● ● | ●     |   | ●     |
| ● ● ● |       |   |       |

$$\begin{array}{r} 3101 \\ 3 \overline{)9414} \end{array}$$

There is no exchanging within the calculation when there are remainders from a division. In the hundreds the hundred should have been exchanged for ten tens. There should have been two tens exchanged into the ones.

The final answer should have been 3,138

## Divide with Remainders

### Notes and Guidance

Children continue to use place value counters to group their number and develop their understanding of the short division method.

They start to focus on remainders and build on their learning from Year 4 to understand remainders in a context.

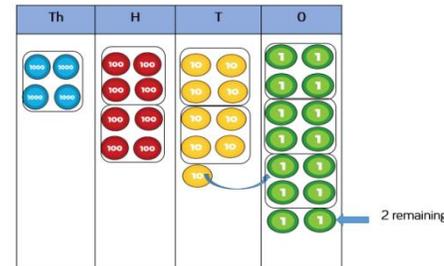
They do not represent remainders as a fraction at this point.

### Mathematical Talk

If I can't make a group in this column, what do I do?  
 What happens if we can group the one equally?  
 In this number story, what does this remainder mean?  
 When would we round the remainder up or down? What context would we just focus on the remainder?

### Varied Fluency

- 1 Here is a method to solve 4,894 divided by 4 using place value counters and short division.



$$\begin{array}{r} 1223 \\ 4 \overline{)4894} \text{ r}2 \end{array}$$

Use this method to solve the following questions.

$6,613 \div 5$

$2,471 \div 3$

$9,363 \div 4$

- 2 Muffins are packed in trays of 6 in a factory. In one day a factory makes 5,623 muffins.
- How many trays do they need per day?
  - How many full trays do they have at the end of the day?
- 3 For the calculation,  $8,035 \div 4$ , can you:
- Write a number story where you have to round the remainder up and one where you round down.
  - Write a number story where you have to find the remainder.

## Divide with Remainders

## Reasoning and Problem Solving

I am thinking of a three-digit number.

- When it is divided by 9, the remainder is 3.
- When it is divided by 2, the remainder is 1.
- When it is divided by 5, the remainder is 4.

What is my number?

If there is a remainder of 4 when dividing by 5, the ones digit must be 4 or 9. If there is a remainder of 1 when dividing by 2, the number must be odd so the ones digit must be 9. In a multiple of 9, the digits always add up to a multiple of 9. Possible answers: 129, 219, 309, 399, 489, 579, 669, 759, 849, 939

$$765 \div 4 = 191 \text{ remainder } 1$$

$$876 \div 5 = 175 \text{ remainder } 1$$

Does a three-digit number descending in digits divided by the next descending digit always have remainder 1?

Prove your answer.

This does not always have the remainder of 1.

$$543 \div 2 = 271 \text{ r}1$$

However:

$$987 \div 6 = 164 \text{ r}3$$

$$654 \div 3 = 218$$