



# Chater Junior School



Written Methods for addition,  
subtraction, multiplication and  
division.

## Chater Junior School.



Dear Parents/Carers,

In this booklet you will find the written methods for addition, subtraction, multiplication and division.

These are the written methods taught throughout the school. Ask your child to show you which method they are learning at the moment.

If you have any further questions, please speak to your child's class teacher.

Yours Sincerely,

Mrs Raj Khindey

Maths Co-ordinator.

## Written methods for addition of whole numbers.



The aim is that children use **mental methods** when appropriate, but for calculations that they cannot do in their heads they use an efficient written method accurately and with confidence. Children will be taught to acquire secure mental methods of calculation and one efficient written method of calculation for addition which they know they can rely on when mental methods are not appropriate.

**To add successfully**, children need to be able to:

- recall all addition pairs to  $9 + 9$  and complements in 10;
- add mentally a series of one-digit numbers, such as  $5 + 8 + 4$ ;
- add multiples of 10 (such as  $60 + 70$ ) or of 100 (such as  $600 + 700$ ) using the related addition fact,  $6 + 7$ , and their knowledge of place value;
- partition two-digit and three-digit numbers into multiples of 100, 10 and 1 in different ways.

**Note:** It is important that children's mental methods of calculation are practised and secured alongside their learning and use of an efficient written method for addition.

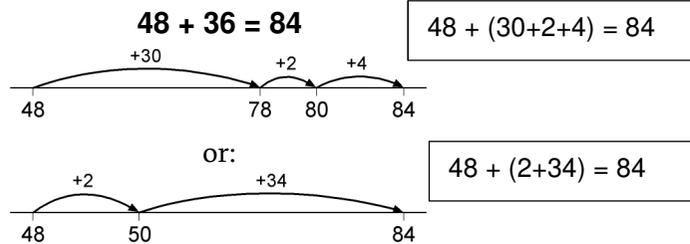
## Addition

### YEAR 3

Children are expected to be adding numbers with up to **3 digits** by the **end** of Year 3.

#### The Empty Number line

Steps in addition can be recorded on a number line.



#### Partitioning (*New Learning*).

Record steps in addition using partitioning  
Partitioned numbers are then written under one another:

	<b>T</b>	<b>O</b>	
47 →	40 +	7	
<u>+76</u>	<u>70 +</u>	<u>6</u>	
	110 +	13	= 123

Leading to:

#### Column Method with carrying (*New Learning*).

$$\begin{array}{r} \text{TO} \\ 47 \\ + 76 \\ \hline 123 \\ 11 \end{array}$$

**Teaching Point: Children need to know that ones line up under ones, tens under tens etc.**

### YEAR 4

Children are expected to be adding numbers with up to **4 digits** by the **end** of Year 4.

#### Column Method with carrying

$\begin{array}{r} 258 \\ + 87 \\ \hline 345 \\ 11 \end{array}$	$\begin{array}{r} 366 \\ + 458 \\ \hline 824 \\ 11 \end{array}$
--	---

Column addition remains efficient when used with larger whole numbers and decimals. Once learned, the method is quick and reliable.

**Teaching Point:**

**Start by adding the ones column first.**

**Children need to know that ones line up under ones, tens under tens hundreds under hundreds etc.**

## Addition

### YEAR 5

Children are expected to be adding numbers with **more than 4 digits and to begin to add decimals** by the **end** of Year 5.

#### Column Method with carrying

$$\begin{array}{r} 6584 \\ +5848 \\ \hline 12432 \\ 111 \end{array}$$

$$\begin{array}{r} 34787 \\ + 6723 \\ \hline 41510 \\ 1111 \end{array}$$

#### **Extend to decimals.**

Use the same method to add two or more decimal fractions with up to 3 digits and the same number of decimal places.

*A Decimal Fraction is a fraction where the denominator (the bottom number) is a number such as 10, 100, 1000, etc*

For example:

2.3 would look like this:  $2 \text{ and } \frac{3}{10}$

**Teaching Point: Know that decimal points should line up under each other particularly when adding mixed amounts.**

### YEAR 6

Children are expected to extend the carrying method of addition with **any number of digits** by the **end** of Year 6.

#### Column Method with carrying

$$\begin{array}{r} 6432 \\ 4681 \\ 786 \\ + \quad 42 \\ \hline 11941 \\ 1121 \end{array}$$

#### **Extend to decimals. *(New Learning)*.**

Use the same method to add two or more decimal fractions with up to 4 digits and either one or two decimal places.

**Teaching Point: Know that decimal points should line up under each other particularly when adding mixed amounts.**

$$401.2 + 26.85 + 0.71 =$$

$$\begin{array}{r} 401.2 \\ 26.85 \\ + \quad 0.71 \\ \hline 428.76 \\ 1 \end{array}$$

## Written methods for subtraction of whole numbers



The aim is that children use **mental methods** when appropriate, but for calculations that they cannot do in their heads they use an efficient written method accurately and with confidence. Children will be taught to acquire secure mental methods of calculation and one efficient written method of calculation for subtraction which they know they can rely on when mental methods are not appropriate.

To **subtract successfully**, children need to be able to:

- recall all addition and subtraction facts to 20;
- subtract multiples of 10 (such as  $160 - 70$ ) using the related subtraction fact,  $16 - 7$ , and their knowledge of place value;
- partition two-digit and three-digit numbers into multiples of one hundred, ten and one in different ways (e.g. partition 74 into  $70 + 4$  or  $60 + 14$ ).

**Note:** It is important that children's mental methods of calculation are practised and secured alongside their learning and use of an efficient written method for subtraction.

## Subtraction

<b>YEAR 3</b>	<b>YEAR 4</b>																								
<p>Children are expected to be subtracting numbers with up to <b>3 digits</b> by the <b>end</b> of Year 3.</p>	<p>Children are expected to be subtracting numbers with up to <b>4 digits</b> by the <b>end</b> of Year 4.</p>																								
<p><b><u>The Empty Number line</u></b></p> <p>Steps in subtraction can be recorded on a number line.  <math>74 - 27 = 47</math>                      worked by counting back:</p>	<p><b><u>Expanded Subtraction method with adjustment.</u></b></p> <table style="margin-left: auto; margin-right: auto;"> <tr> <td></td> <td style="text-align: center;">H</td> <td style="text-align: center;">T</td> <td style="text-align: center;">O</td> </tr> <tr> <td></td> <td style="text-align: center;">4</td> <td style="text-align: center;">0</td> <td style="text-align: center;">1</td> </tr> <tr> <td style="text-align: right;">563</td> <td style="text-align: center;">→</td> <td style="text-align: center;"><del>500</del></td> <td style="text-align: center;">+ 60 + 3</td> </tr> <tr> <td style="text-align: right;"><u>-271</u></td> <td></td> <td style="text-align: center;"><u>200</u></td> <td style="text-align: center;">+ 70 + 1</td> </tr> <tr> <td></td> <td></td> <td style="text-align: center;">200</td> <td style="text-align: center;">+ 90 + 2 = <u>292</u></td> </tr> </table> <p style="color: red; font-weight: bold;">Teaching Point: We say to the children: “we don’t have enough hundreds to subtract 70 from 60 so you have to take hundred from 500. Never say’ borrow’; after all, you don’t give it back.</p>		H	T	O		4	0	1	563	→	<del>500</del>	+ 60 + 3	<u>-271</u>		<u>200</u>	+ 70 + 1			200	+ 90 + 2 = <u>292</u>				
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## Subtraction

<p style="text-align: center;"><b>YEAR 5</b></p> <p>Children are expected to be subtracting numbers with <b>more than 4 digits</b> by the <b>end</b> of Year 5</p>	<p style="text-align: center;"><b>YEAR 6</b></p> <p>Children are expected to extend the written method of subtraction with any number of digits by the <b>end</b> of Year 6.</p>
<p style="text-align: center;"><b><u>Decomposition method with adjustment.</u></b></p> $\begin{array}{r} 1 \\ 531 \\ \del{6467} \\ - \underline{2684} \\ \underline{3783} \end{array}$ <p><b>Extend to:</b></p> <ul style="list-style-type: none"><li>Subtracting numbers with different numbers of digits. For example: <math>5631 - 567 =</math></li><li>Begin to find the difference between two decimal fractions with up to three digits and the same number of decimal places. <b><i>(New Learning)</i></b>. For example: <math>24.9 - 13.7 =</math></li></ul> $\begin{array}{r} 24.9 \\ - \underline{13.7} \\ \underline{11.2} \end{array}$ <p><b>Teaching point: know that decimal points should line up under each other.</b></p>	<p style="text-align: center;"><b><u>Decomposition method.</u></b></p> $\begin{array}{r} 1 \\ 531 \\ \del{76467} \\ - \underline{2684} \\ \underline{73783} \end{array}$ <p><b>Extend to:</b></p> <ul style="list-style-type: none"><li>Subtracting two or more decimal fractions with up to three digits and either one or two decimal places.  For example: <math>56.91 - 24.1 - 11.71 =</math></li></ul> $\begin{array}{r} 56.91 \\ 24.1 \\ - \underline{11.71} \\ \underline{21.10} \end{array}$ <p><b>Teaching Point: Know that decimal points should line up under each other, particularly when subtracting mixed amounts.</b></p>

## Written methods for multiplication of whole numbers



The aim is that children use **mental methods** when appropriate, but for calculations that they cannot do in their heads they use an efficient written method accurately and with confidence. Children will be taught to acquire secure mental methods of calculation and one efficient written method of calculation for multiplication which they know they can rely on when mental methods are not appropriate.

To **multiply successfully**, children need to be able to:

- recall all multiplication facts to  $10 \times 10$ ;
- partition number into multiples of one hundred, ten and one;
- work out products such as  $70 \times 5$ ,  $70 \times 50$ ,  $700 \times 5$  or  $700 \times 50$  using the related fact  $7 \times 5$  and their knowledge of place value;
- add two or more single-digit numbers mentally;
- add multiples of 10 (such as  $60 + 70$ ) or of 100 (such as  $600 + 700$ ) using the related addition fact,  $6 + 7$ , and their knowledge of place value;

**Note:** It is important that children's mental methods of calculation are practised and secured alongside their learning and use of an efficient written method for multiplication.

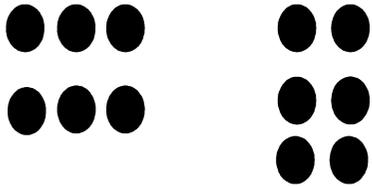
## Multiplication

### YEAR 3

Children are expected to be **multiplying two-digit** numbers by a **one-digit** number by the **end** of Year 3.

#### Multiplication using arrays.

An array is a series of symbols representing a multiplication.  
For example:  $3 \times 2 = 6$  can be represented as:



#### The Grid Method *(New Learning)*.

Teaching Point: Children must partition the numbers correctly.

$$23 \times 7 =$$

x	20	3
7	140	21



$$\begin{array}{r} 140 \\ + 21 \\ \hline 161 \end{array}$$

### YEAR 4

Children are expected to be **multiplying two or three-digit** numbers by a **one-digit** number by the **end** of Year 4.

#### The Grid Method.

$$346 \times 9 =$$

x	300	40	6
9	2700	360	54



$$\begin{array}{r} 2700 \\ 360 \\ + 54 \\ \hline 3114 \\ 11 \end{array}$$

Teaching Point: Children must partition the numbers correctly

Leading to: Expanded Short Multiplication *(New Learning)*.

$$\begin{array}{r} 346 \\ \times 9 \\ \hline 54 \quad (9 \times 6) \\ 360 \quad (9 \times 40) \\ + 2700 \quad (9 \times 300) \\ \hline 3114 \\ 11 \end{array}$$

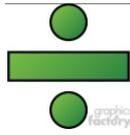
Teaching Points:

- Children must partition the numbers correctly.
- Always write the calculations in the brackets.
- Start by multiplying the ones columns first.

## Multiplication

<b>YEAR 5</b> Children are expected to be <b>multiplying up to four-digit</b> numbers by a <b>one or two digit</b> number by the <b>end</b> of Year 5.	<b>YEAR 6</b> Children are expected to <b>multiply multi-digit numbers up to four digits</b> by a <b>two-digit whole number</b> by the <b>end</b> of Year 6.			
<p style="text-align: center;"><b><u>Expanded Short Multiplication</u></b></p> <p style="text-align: center;">5632x 6</p> $  \begin{array}{r}  5632 \\  \times \quad 6 \\  \hline  12 \quad (6 \times 2) \\  180 \quad (6 \times 30) \\  3600 \quad (6 \times 600) \\  + 30000 \quad (6 \times 5000) \\  \hline  33792  \end{array}  $ <p>Leading to: <u>Short Multiplication</u> <i>(New Learning)</i></p> $  \begin{array}{r}  5632 \\  \times \quad 6 \\  \hline  33792 \\  311  \end{array}  $ <p><i>Children make this link quite quickly but they need to have understood what they are doing before learning a new trick!</i></p> <p><b><u>Expanded Long Multiplication</u></b> <i>(New Learning)</i></p> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 15%;"><math>\begin{array}{r} 23 \\ \times 82 \\ \hline 6 \\ 40 \\ 240 \\ +1600 \\ \hline 1886 \end{array}</math></td> <td style="width: 35%; border: 1px solid black; padding: 5px; text-align: center;"> <b>Teaching point: Always start multiplying from the 'ones column'.</b> </td> <td style="width: 50%;"></td> </tr> </table>	$\begin{array}{r} 23 \\ \times 82 \\ \hline 6 \\ 40 \\ 240 \\ +1600 \\ \hline 1886 \end{array}$	<b>Teaching point: Always start multiplying from the 'ones column'.</b>		<p style="text-align: center;"><b><u>Expanded Long Multiplication.</u></b></p> $  \begin{array}{r}  124 \\  \times 26 \\  \hline  24 \quad (6 \times 4) \\  120 \quad (6 \times 20) \\  600 \quad (6 \times 100) \\  80 \quad (20 \times 4) \\  400 \quad (20 \times 20) \\  + 2000 \quad (20 \times 100) \\  \hline  3224 \\  11  \end{array}  $ <p><b>Teaching Points:</b></p> <ul style="list-style-type: none"> <li>• <b>Children must partition the numbers correctly</b></li> <li>• <b>Always write the calculations in the brackets.</b></li> <li>• <b>Always start by multiplying the from the ones column.</b></li> </ul> <p>Leading to: <u>Long Multiplication</u> <i>(New Learning)</i></p> $  \begin{array}{r}  124 \\  \times 26 \\  \hline  744 \\  + 2480 \\  \hline  3224 \\  11  \end{array}  $ <p><b>Teaching point: Always start multiplying from the ones column.</b></p>
$\begin{array}{r} 23 \\ \times 82 \\ \hline 6 \\ 40 \\ 240 \\ +1600 \\ \hline 1886 \end{array}$	<b>Teaching point: Always start multiplying from the 'ones column'.</b>			

## Written methods for division of whole numbers



The aim is that children use **mental methods** when appropriate, but for calculations that they cannot do in their heads they use an efficient written method accurately and with confidence. Children will be taught and to acquire secure mental methods of calculation and one efficient written method of calculation for division which they know they can rely on when mental methods are not appropriate.

To **divide successfully in their heads**, children need to be able to:

- understand and use the vocabulary of division – for example in  $18 \div 3 = 6$ , the 18 is the dividend, the 3 is the divisor and the 6 is the quotient;
- partition two-digit and three-digit numbers into multiples of 100, 10 and 1 in different ways;
- recall multiplication and division facts to  $10 \times 10$ , recognise multiples of one-digit numbers and divide multiples of 10 or 100 by a single-digit number using their knowledge of division facts and place value;
- know how to find a remainder working mentally – for example, find the remainder when 48 is divided by 5;
- understand and use multiplication and division as inverse operations.

**Note:** It is important that children's mental methods of calculation are practised and secured alongside their learning and use of an efficient written method for division.

**To carry out written methods of division successful, children also need to be able to:**

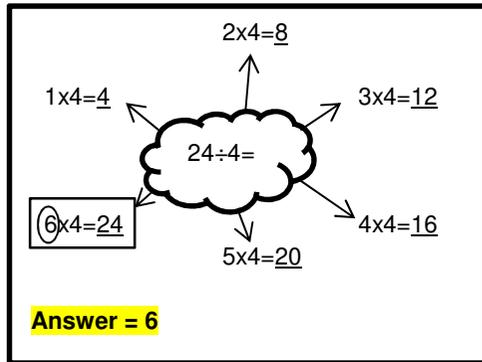
- estimate how many times one number divides into another – for example, how many sixes there are in 47, or how many 23s there are in 92;
- multiply a two-digit number by a single-digit number mentally;
- subtract numbers using the column method.

## Division

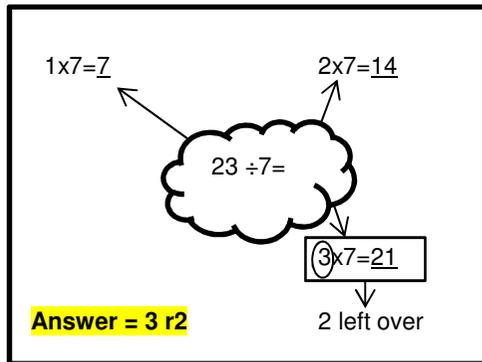
### YEAR 3

Children are expected to be dividing **two digit** numbers by a one-digit number with remainders by the **end** of Year 3.  
**(Children need to recall their multiplication tables accurately).**

#### Thinking Cloud



Leading to: Division with remainders (New Learning).



Leading to written method for short division-  
 \*only HA children will be taught this- See Year 4.\*

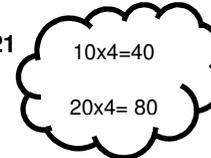
### YEAR 4

Children are expected to be dividing numbers with up to **two or three digits** by a **one-digit** number by the **end** of Year 4.

#### Short Division (New Learning)

$$84 \div 4 = 21$$

$$\begin{array}{r} \text{TO} \\ 21 \\ 4 \overline{)84} \end{array}$$



Thinking  
Cloud

1. How many 4s in 80/ 8 tens? Record answers in thinking cloud.
2. How many 4s in 4?

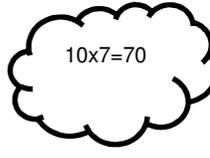
#### Teaching Points:

- Children need to remember that  $84 \div 4$  means: How many lots of 4 are there in 84? Children to record their answers in the thinking cloud.
- The children will also be reminded about place value for example how many lots of 4s are there in 80 or 8 tens?
- **Thinking Cloud: this is very important as it will help the children to work out known multiples.**
- Children need to know that ones line up under ones , tens under tens etc.

#### Short Division (New Learning)

$$98 \div 7 = 14$$

$$\begin{array}{r} \text{TO} \\ 14 \\ 7 \overline{)98} \end{array}$$



Thinking  
Cloud

1. How many lots of 7s in 90/ 9 tens? Record answers in thinking cloud.
2. There is one lot of 7 tens so you have 2 tens left over which move to the ones column.
3. How many 7s are there in 28?

#### Teaching Points:

- **Thinking Cloud: this is very important as it will help the children to work out known multiples in 'lots of ten.'**
- Children need to know that ones line up under ones , tens under tens etc.

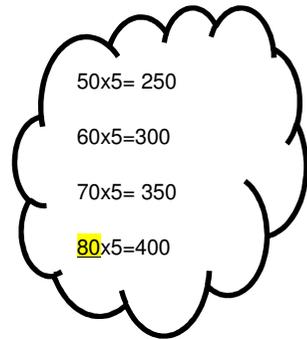
## YEAR 5

Children are expected to be dividing numbers **up to four digits** by a **one digit** number including **remainders** by the end of Year 5.

### Short Division with remainders. *(New Learning).*

$$432 \div 5 = 86r2$$

5	<table style="border-collapse: collapse; margin: 0 auto;"> <tr> <td style="padding: 0 5px;">H</td> <td style="padding: 0 5px;">T</td> <td style="padding: 0 5px;">O</td> </tr> <tr> <td style="padding: 0 5px;">8</td> <td style="padding: 0 5px;">6</td> <td style="padding: 0 5px;">r 2</td> </tr> </table>	H	T	O	8	6	r 2
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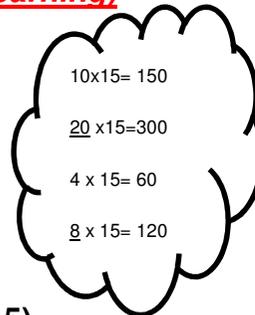
Thinking Cloud

1. How many 5s in 400? Record answers in thinking cloud.
2. There are 80 lots of 5. Record this in the tens column.
3. There are 3 tens left over which move to the ones column
4. How many 5s in 32? Doesn't work so 2 is the remainder.

### Long Division with remainders *(New Learning)*

$$432 \div 15 = 28 r 12$$

15	<table style="border-collapse: collapse; margin: 0 auto;"> <tr> <td style="padding: 0 5px;">H</td> <td style="padding: 0 5px;">T</td> <td style="padding: 0 5px;">O</td> </tr> <tr> <td style="padding: 0 5px;">2</td> <td style="padding: 0 5px;">8</td> <td style="padding: 0 5px;">r 12</td> </tr> </table>	H	T	O	2	8	r 12
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- 3	0	0					
<table style="border-collapse: collapse; margin: 0 auto;"> <tr> <td style="padding: 0 5px;">1</td> <td style="padding: 0 5px;">3</td> <td style="padding: 0 5px;">2</td> </tr> </table>	1	3	2	(8 x 15)			
1	3	2					
<table style="border-collapse: collapse; margin: 0 auto;"> <tr> <td style="padding: 0 5px;">- 1</td> <td style="padding: 0 5px;">2</td> <td style="padding: 0 5px;">0</td> </tr> </table>	- 1	2	0	Answer: 20+8=28 r12			
- 1	2	0					
<table style="border-collapse: collapse; margin: 0 auto;"> <tr> <td style="padding: 0 5px;">1</td> <td style="padding: 0 5px;">2</td> </tr> </table>	1	2					
1	2						



Answer: 20+8=28 r12

1. How many 15s in 400? Record answers in thinking cloud.
2. How many 15s in 132? Record answers in thinking cloud.
3. How many 15s in 12? Doesn't work so 12 is the remainder.

#### Teaching Points:

- **Thinking Cloud: this is very important as it will help the children to work out known multiples in 'lots of ten and lots of hundred.'**

## YEAR 6

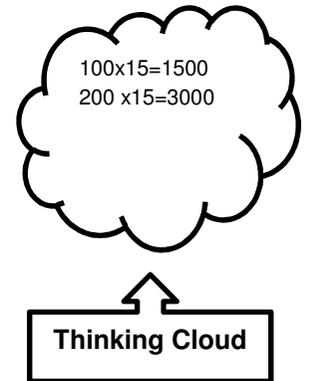
Children are expected to be dividing numbers **up to four digits** by a **two-digit** whole number including **remainders** by the end of Year 6. Interpret remainders as whole number remainders, fractions or by rounding.

### Long Division & interpreting remainders in different forms *(New Learning).*

$$4563 \div 15 = 304 r 3$$

15	<table style="border-collapse: collapse; margin: 0 auto;"> <tr> <td style="padding: 0 5px;">3</td> <td style="padding: 0 5px;">0</td> <td style="padding: 0 5px;">4</td> <td style="padding: 0 5px;">r 3</td> </tr> </table>	3	0	4	r 3
3	0	4	r 3		
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4	5	6	3		
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- 3	0	0	0		
<table style="border-collapse: collapse; margin: 0 auto;"> <tr> <td style="padding: 0 5px;">1</td> <td style="padding: 0 5px;">5</td> <td style="padding: 0 5px;">6</td> <td style="padding: 0 5px;">3</td> </tr> </table>	1	5	6	3	(100 x 15)
1	5	6	3		
<table style="border-collapse: collapse; margin: 0 auto;"> <tr> <td style="padding: 0 5px;">- 1</td> <td style="padding: 0 5px;">5</td> <td style="padding: 0 5px;">0</td> <td style="padding: 0 5px;">0</td> </tr> </table>	- 1	5	0	0	(4 x 15)
- 1	5	0	0		
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- 6	0				
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3					

Answer:  
200+100+4=304 r 3



Thinking Cloud

1. How many 15s in 4000? Record answers in thinking cloud.
2. How many 15s in 1563?
3. How many 15s in 63?
4. How many 15s in 3? Doesn't work so 3 is the remainder.

The **remainder** can also be interpreted as  $\frac{3}{15}$  simplified to  $\frac{1}{5}$ . The answer would be:  $304 \frac{1}{5}$

