



# PHASE 3 MATHS WORKSHOP

#### ADDITION, SUBTRACTION, MULTIPLICATION AND DIVISION

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# AIMS:

- To review the stages of the calculation policy taught in phase 3.
- To explain how the children are expected to apply the skills to problem solving activities.
- To provide parents/carers with the information that they need to support their children at home.





#### What is taught in school?

Primary mathematics is divided into four areas:

- Using and applying mathematics (problem solving, reasoning and communicating)
- Number (addition, subtraction, multiplication, division, decimals, fractions, percentages, algebra, estimation)
- Shape, space and measures (properties of flat and solid shapes, standard units of time, length, weight, capacity)
- Data handling (recording and interpreting information using lists, tables, graphs, diagrams)



## ADDITION



and the second second	ession across the year groups	
Additio	n	
	Typical calculations	Suitable methods
Y1	U+U	Practical
	TU + U (to 20 including zero)	Numberline
Y2	TU+U	Practical
	TU + multiples of 10	Number line
	TU + TU	Expanded columnar
	U+U+U	
Y3	HTU+U	Numberline
	HTU + TU	Expanded columnar
	HTU + HTU	Column
Y4	THTU + HTU	Expanded columnar
	THTU + THTU	Column
Y5	THTU.t + THTU.t	Expanded columnar
	THTU.th + THTU.th	Column
Y6	THTU.tht + THTU.tht	Column





#### Stage 3: Partitioning (expanded columnar method)

4	48 + 3	86 = 1	84			148	+ 36	= 184	1	This builds on children's mental maths
	40	8				100	40	8		skills of partitioning and
+	30	6			+		30	6		recombining 40 + 30 = 70
	80	04	84			100	80	4	184	8 + 6 = 14 48 + 36 = 84
	10			Carry	2		10			





# Stage 4: Column (efficient)

Children should be encouraged to estimate their answers first



# SUBTRACTION

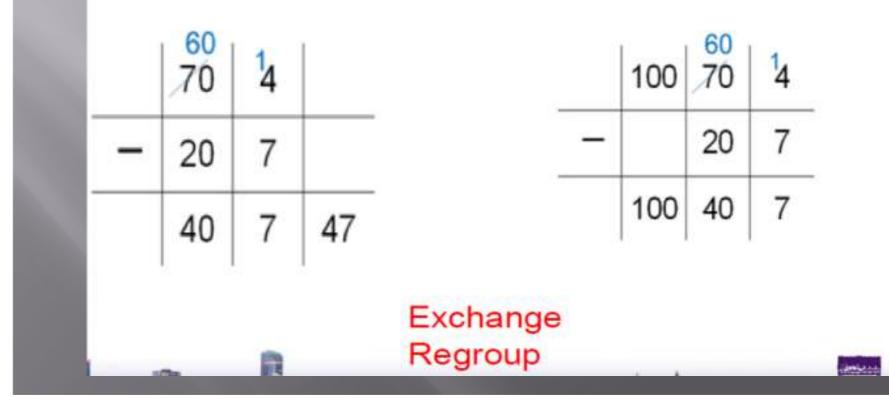


Subtr	action	
	Typical calculations	Suitable methods
Y1	U-U	Practical
	TU - U (to 20 including zero)	Numberline
Y2	TU-U	Practical
	TU - multiples of 10	Number line
	τυ - τυ	Expanded columnar
	U-U-U	
Y3	HTU-U	Numberline
	HTU-TU	Expanded columnar
	HTU-HTU	Column
Y4	THTU - HTU	Expanded columnar
	THTU - THTU	Column
Y5	THTU: + THTU:	Expanded columnar
	THTU.th - THTU.th	Column
Y6	THTU.tht - THTU.tht	Column





### Stage 3: Partitioning (expanded columnar method)







### Stage 4: Column (efficient)

Children should be encouraged to estimate their answers first



# MULTIPLICATION



	ression across the year groups	
Mealtin	plication	
	Typical calculations	Suitable methods
Y1	UxU	Practical (repeated addition) Practical and pictorial arrays
Y2	UXU	Practical (repeated addition) Practical and pictorial arrays
Y3	TUXU	Grouping on a number line progressing into Expanded (grid) and into Short
Y4	TU X U HTU X U	Expanded (grid) progressing into Short
Υ5	HTU X U THTU X U TU X TU	Expanded (grid) progressing into Short Expanded (grid) progressing into Long
710	THTUXU	Short
	TU×TU	Expanded (grid) progressing into Long
	HTU× TU THTU× TU	Long
	U.t.x.U U.th.x.U	Expanded (grid) progressing into Short
	U.T.X.TU U.T.X.TU	Expanded (grid) progressing into Long





### Stage 3: Partitioning (grid method) 24 x 3 = 72 24 x 32 = 768

X	20	4	
3	60	12	72

Х	20	4	
30	600	120	720
2	40	8	48
			768





### Grid method and decimals

Х	7 •	• 0.4	0.02	
7	49	2.8	0.14	

49.0 <u>2.94</u> 51.94





Stage 4: Short (column)				
24 x 3 = 72	241 x 3 = 723	1241 x 3 = 3723		
$\frac{24}{\frac{x  3}{72}}$	241 <u>x 3</u> 723	1241 <u>x 3</u> 3723		





#### Stage 5: Long (column)

24 x 32 = 768	1245 x 13

24	1245	
x 32	x 13	
48	3735	
720	12450	
1	16185	
768	1	

In the examples given, it is also correct to multiply starting with the tens digit (ie multiplying by the most significant digit first)

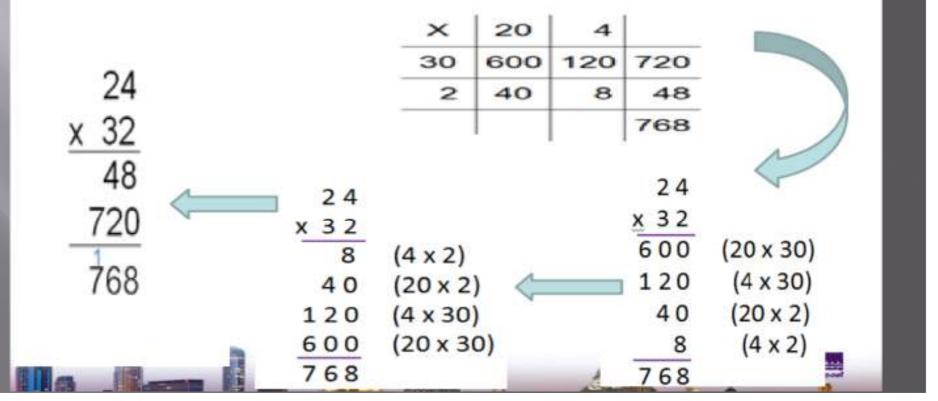




#### Stage 5: Long (column)

24 x 32 = 768

#### 24 x 32 = 768

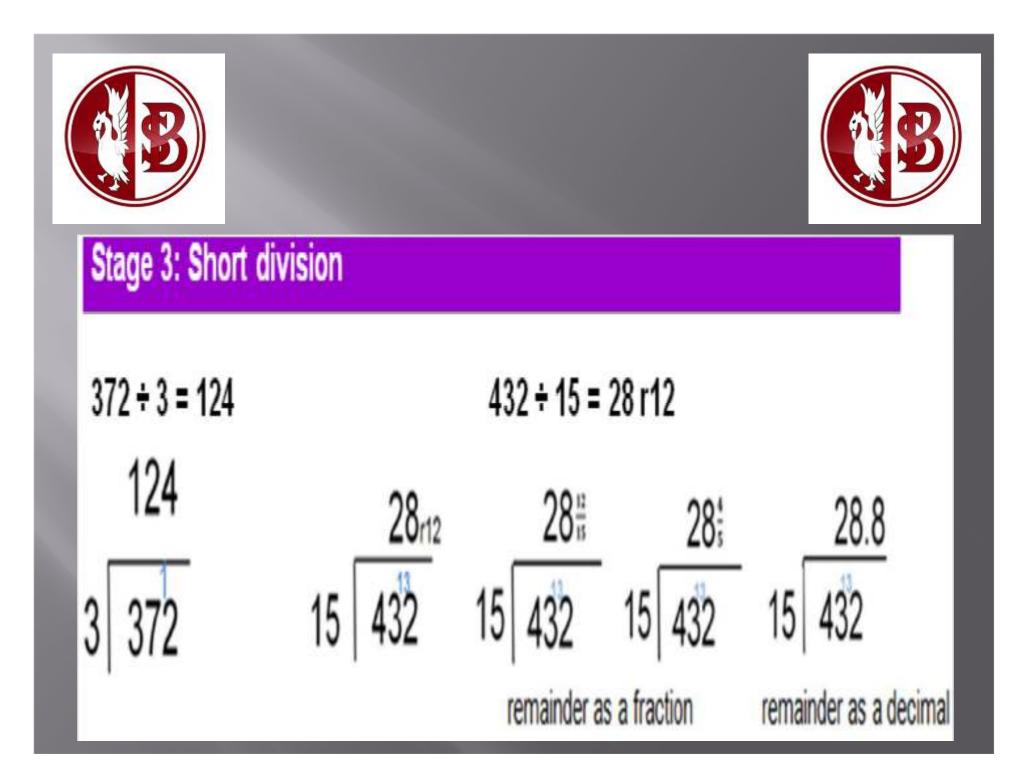




## DIVISION



Divis	ession across the year groups ion	
	Typical calculations	Suitable methods
¥1	U + U TU + U	Practical sharing Number-line grouping
¥2	U + U TU + U	Practical sharing Number-line grouping
Y3	TU + U	Grouping on a number line progressing into Short
¥4	TU + U	Grouping on a number line progressing into Short
	HTU+U	Short (remainders to be expressed as r)
¥5	HTU+U THTU+U	Short (remainders to be expressed as r, then as a fraction and as a decimal)
ΥÐ	THTU + U	Short (remainders to be expressed as r, then as a fraction and as a decimal)
	HTU+TU THTU+TU	Long (remainders to be expressed as r, then as a fraction and as a decimal)
	U.th + U TU.th + U HTU.th + U THTU.th + U	Short (remainders to be expressed as a decimal)



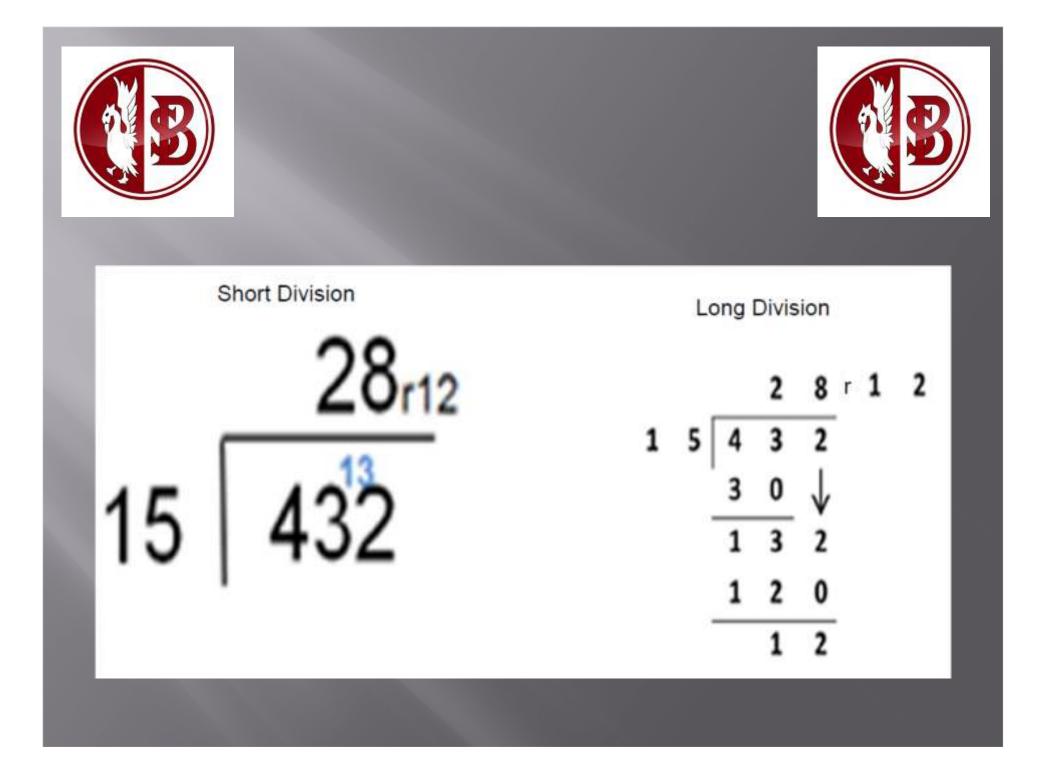




## Short Division

### 432 ÷ 15 = 28 r12

02 • 10 - 2011		20	$\frac{\text{Jottings}}{30 = 15 \times 2}$
Table of facts $15 \times 1 = 15$		<b>ZO</b> r12	$75 = 15 \times 5$ $45 = 15 \times 3$
$15 \times 1 = 15$ $15 \times 2 = 30$ $15 \times 3 = 45$		13	<u>120</u> 8
15 x 5 = 75 15 x 10 = 150	15	432	







4

remainder as a fraction

remainder as a decimal

#### Stage 4: Long division

560÷24	= 23 r8	4
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#### 432 ÷ 15 = 28 r12

23r8				2	8	12				2	8	8				2	8 5
24 560	1	5	4	3	2		1	5	4	3	2	• 0	1	5	4	3	2
48			3	0	0	15×20			3	0	↓			- 6	3	0	$\downarrow$
			1	3	2				1	3	2				1	3	2
80			1		0	15×8			1	2	0	1		0.	1	2	0
		-	-	-	2					1	2	0				1	2
8				1	4					1	2	0				1	2
												0					
									(1	2 +	15	= 0.8)			(0.8	3 =	<u></u> ;)

With long division, there is the opportunity to teach an expanded method first (ie chunking)





	Lor	ng D	ivis	ion		
432 ÷ 15				2	<b>8</b> r	12
	1	5	4	3	2	
$\frac{\text{Table of Facts}}{15 \times 1 = 15}$ $15 \times 2 = 30$			3	0	0	15×20
15 x 3 = 45 15 x 10 = 150		-	1	3	2	
15 x 5 = 75 15 x 20 = 300			1	2	0	15×8
		-		1	2	





#### Long Division

Table of Facts  $24 \times 1 = 24$   $24 \times 2 = 48$   $24 \times 3 = 72$   $24 \times 10 = 240$  $24 \times 5 = 120$ 

Jottings

\*\*\*\*\*\*\*\*\*

 $560 \div 24 = 23 \text{ r8}$   $23_{r8}$  24 560 48 80 72 8



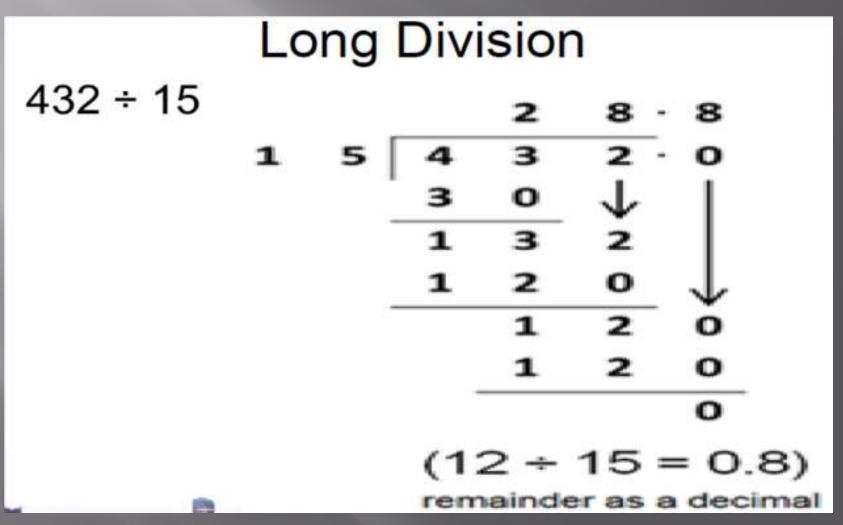


	Lc	ong [	Divis	ion		
432 ÷ 15				2	8	$\frac{4}{5}$
	1	5	4	з	2	-
15 x 1 = 15			з	ο	$\downarrow$	
15 x 2 = 30			1	з	ž	
$15 \times 3 = 45$ $15 \times 10 = 150$			1	2	ο	
15 x 5 = 75				1	2	-
				1	2	

**Remainder of 12 simplified – find the greatest common factor 15 that divides into both numerator and the denominator = 3** 











The Calculation Sequence - applying the skills					
The Sequence	Prompts	Planning			
Provide an estimate for the calculation	Using knowledge of number and the number system, rounding and approximating, make a reasonable estimate.				
Teach the calculation skill	What is the objective you are teaching? Include example questions, increasing in complexity, for both operations.				
Endure you have taught the inverse	Plan example questions, increasing in complexity. Ensure methods used are in line with school calculation policy. Check that children understand that inverse can also be used to check calculations				
Devise similar calculations but include units	Which units do you need to include? Check the measures applicable to your year group for length, weight, rapacity, money and time.				
complete missing box questions	Include units in these questions as above. The box may cover single digits or an entire number. Vary the position of the missing box within the calculation.				
Complete word problems, 1 and 2 step, including units	Write problems, ensuring the numbers are sized correctly in line with the objective and that units are also used.				
Provide opportunities for open ended investigations	Plan example questions and investigations. Ensure children are working with the correct operations, appropriate size of numbers and use of units for contest.				

A DEC MARK

Statement of the local division in the local





## THANK YOU