



**Progression and expectation
in calculations;
a guide for parents.**



Addition and subtraction.

ADDITION AND SUBTRACTION

A pre year 3 child would say:

Number bonds and counting.

I can recall and use addition and subtraction facts to 20 fluently, and derive and use related facts up to 100.

I can count in steps of 2, 3, and 5 from 0, and in tens from any number, forward or backward.

Reading and writing numbers, understanding place value and comparing numbers.

I can read and write numbers to at least 100 in numerals and in words.

I can recognise the place value of each digit in a two-digit number (tens, ones/units)

I can compare and order numbers from 0 up to 100; use $<$, $>$ and $=$ signs.

Mental Calculation.

I can add and subtract numbers using concrete objects, pictorial representations, and mentally strategies including:

TU + 1; TU + 10; TU - 1; TU - 10

TU + U; TU - U

TU + TU (begin with largest number first e.g. change $23 + 36$ to $36 + 23$ and then calculate)

U + U + U (use number bonds to add first e.g. $3 + 5 + 7 = 10 + 5 = 15$).

Mental Calculation continued.

I can use known facts to, and derive related facts, up to 100 including:

Number pairs to 100 (If $3 + 7 = 10$ then $30 + 70 = 100$).

If $7 + 5 = 12$ then $37 + 5 = 42$.

If $15 + 10 = 25$ then $15 + 9 = 24$.

If $35 - 10 = 25$ then $35 - 9 = 26$.

Problem solving.

I can solve problems with addition and subtraction:

I can use concrete objects and pictorial representations, including those involving numbers, quantities and measures.

I can apply my increasing knowledge of mental and written methods.

I can solve simple problems in a practical context involving addition and subtraction of money of the same unit, including giving change.

Written Calculations, identifying, representing and estimating numbers, and checking answers.

I can read, write and interpret mathematical statements involving addition (+), subtraction (-) and equals (=) signs.

I can identify, represent and estimate numbers using different representations, including the number line.

I can recognise and use the inverse relationship between addition and subtraction and use this to check calculations and solve missing number problems.

Many practical manipulatives are used to make the link between the abstract and the concrete. This allows children to grasp the fundamentals of number.

Imagine one more spot

$$6 + 3 + 4 = 13$$

$24p + 10p = 34p$
 $34p - 10p = 24p$

Numicon for adding 10 more and 1 more

$14 + 10 = 24$

$19 + 1 = 20$

Hundred square for adding tens and units

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	100

$8 + 10 = 18$
 $18 + 10 = 28$
 $28 + 10 = 38$
 $38 + 1 = 39$

Numicon, arrow value cards and Dienes (Base 10) for understanding place value and exchanging 10 units for a ten

Dienes and Numicon used vertically in preparation for column addition

Tens Units → Tens Units

24 + 37

Recorded as:

20	4
30	7

50 + 11	= 61

Imagine one less spot

54p in the purse. Take 10p out, another 10p and so on

54p
44p, 34p...

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	100

$36 \dots 46, 56, 66$
 $76 \dots 66, 56, 46$

$6 + 10 = 16$
 $16 + 10 = 26$
 $26 + 10 = 36$
 $36 + 10 = 46$
 etc.

$96 - 10 = 86$
 $86 - 10 = 76$
 $76 - 10 = 66$
 etc.

$36 + 20 = 56$
 $76 - 30 = 46$

Which line has most money?
How much more?

The difference between 11 and 14 is 3.
 $14 - 11 = 3$
 $11 + \square = 14$

6 and how many more make 10?
 $6 + \square = 10$

The difference is?

$84 - 56 = \square$

$56 + \square = 84$

72 - 24 = 48

Using the number line – counting back (taking away)

Using the number line counting on (finding the difference)

ADDITION AND SUBTRACTION

A year 3 child would say:

Number bonds and counting.

I can recall and use addition and subtraction facts to 20 fluently.

I know number pairs that total 100.

I know number pairs that total 1,000 in multiples of 100.

I can count in steps of 4, 8, 50 and 100 forward and backward.

Find 10 and 100 more and less than a given number.

Reading and writing numbers, understanding place value and comparing numbers.

Read and write numbers to at least 1,000 in numerals and in words

Tell and write the time from an analogue clock, including using Roman numerals for I to XII and use notation for 12 and 24 hour clocks

I can recognise the place value of each digit in a three-digit number (hundreds, tens, ones/units)

I can compare and order numbers up to 1,000; use <, > and = signs

Mental Calculation.

I can add and subtract numbers mentally, including:

HTU + 1, HTU + 10, HTU + 100

HTU - 1, HTU - 10, HTU - 100

I will consolidate:

Using known facts to add and derive related facts up to 1,000 including:

- If $7 + 5 = 12$, then $397 + 5 = 402$ (crossing the hundreds boundary)

- If $95 + 10 = 105$, then $95 + 9 = 104$ (crossing the hundreds boundary)

- If $205 - 10 = 195$, then $205 - 9 = 196$ (crossing the hundreds boundary)

Use my knowledge of doubles to derive related facts:

- $15 + 16 = 31$ because double 15 = 30 and $30 + 1 = 31$

Number pairs that total 1,000 (in multiples of 100)

- $180 + 50 = 230$ because $18 + 5 = 23$

- $180 - 50 = 130$, because $18 - 5 = 13$.

Mental Calculation continued.

I can find the difference between two numbers that are close to each other by counting on using knowledge of the inverse:

- $86 - 45 = 41$ because $45 + 41 = 86$.

I can use my knowledge of the inverse to find missing numbers:

- $37 - \quad = 12$

Or round to nearest pence and adjust:

- $3 \times 99\text{p} = £1 + £1 + £1 - 3\text{p} = £2.97$.

Problem solving.

I can solve problems including missing number problems, using number facts, place value and addition and subtraction.

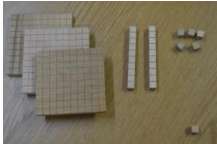
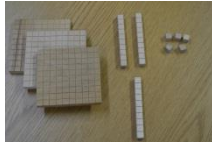



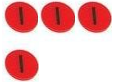


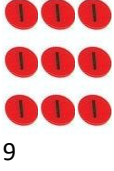


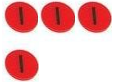


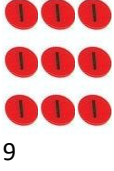


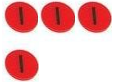


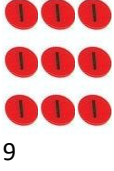
I can apply knowledge of mental and written methods to improve efficiency.

Written Calculations, identifying, representing and estimating numbers, and checking answers.

I can add and subtract numbers with up to three digits using **expanded column addition and subtraction**.

I can identify, represent and estimate numbers using **different representations**

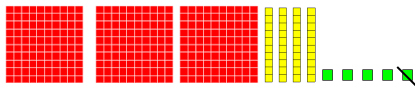

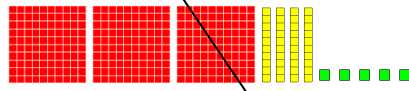
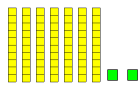
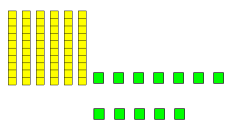


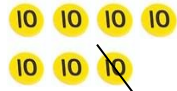
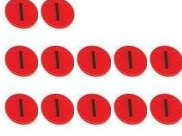
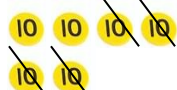
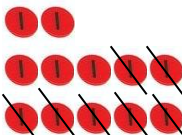


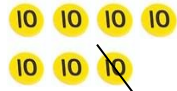
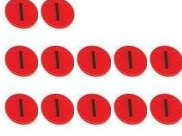
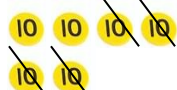
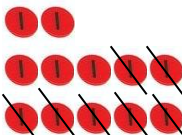


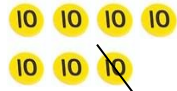
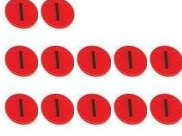
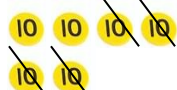
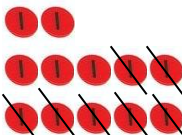
I can estimate the answer to a calculation using rounding, and use inverse operation to check answers

Children need to continue to learn using concrete resources, models, representations and images to develop their conceptual understanding alongside their fluency with number and knowledge and use of procedures.																				
<div>HTU + 1</div> <div></div> <div>325 + 1 = 326</div>	<div>HTU + 10</div> <div></div> <div>325 + 10 = 335</div>	<div>HTU + 100</div> <div></div> <div>325 + 100 = 425</div>																		
<div>Continue with expanded column addition using partitioning, adding 2- and then 3-digit numbers, using Dienes</div> <div>347 + 122 =</div> <div>Recorded as</div> <div><table><tr><td>300</td><td>40</td><td>7</td></tr><tr><td>100</td><td>20</td><td>2</td></tr></table></div> <div>400 + 60 + 9 = 469</div>	300	40	7	100	20	2	<div>Cross the tens and then the hundreds boundary</div> <div>264 + 159 =</div> <div>Recorded as</div> <div><table><tr><td>200</td><td>60</td><td>4</td></tr><tr><td>100</td><td>50</td><td>9</td></tr></table></div> <div>300 + 110 + 13 = 423</div>	200	60	4	100	50	9	<div>When children have an image of 1-ness, 10-ness and 100-ness, place value counters can be used to represent the numbers.</div> <div><table><tr><td><div></div><div>200</div></td><td><div></div><div>60</div></td><td><div></div><div>4</div></td></tr><tr><td><div></div><div>100</div></td><td><div></div><div>50</div></td><td><div></div><div>9</div></td></tr></table></div>	<div></div> <div>200</div>	<div></div> <div>60</div>	<div></div> <div>4</div>	<div></div> <div>100</div>	<div></div> <div>50</div>	<div></div> <div>9</div>
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The key difference is that Year 3 start to record more formally, albeit in an expanded version of the column method.

This allows a visual representation of the whole number split into its place value parts, which are easier to manage.

Removing the manipulatives means we can represent in a more abstract way – still with a visual representation but now moving away from the concrete. This will only happen when a child is secure.

Children need to continue to learn using concrete resources, models, representations and images to develop their conceptual understanding alongside their fluency with number and knowledge and use of procedures.																																								
Recap using number lines for counting back and counting on																																								
<div>HTU – 1</div> <div></div> <div>345 – 1 =344</div>	<div>HTU – 10</div> <div></div> <div>345 – 10 -- 335</div>	<div>HTU – 100</div> <div></div> <div>345 – 100 = 245</div>																																						
<div>Introduce expanded method with 3 digit numbers</div> <div>HTU – HTU using partitioning and Dienes</div> <div>398 – 136 =</div> <div><table><tr><td>300</td><td>90</td><td>8</td></tr><tr><td>100</td><td>30</td><td>6</td></tr></table></div> <div>200 + 60 + 2 = 262</div>	300	90	8	100	30	6	<div>Then exchange from other columns using partitioning and Dienes</div> <div>72 – 47 =</div> <div></div> <div>Becomes:</div> <div></div> <div><table><tr><td>70</td><td>2</td></tr><tr><td>40</td><td>7</td></tr><tr><td colspan="2"><hr/></td></tr><tr><td>20</td><td>5</td></tr></table></div>	70	2	40	7	<hr/>		20	5	<div>When children have an image of the numbers, use place value counters to represent the numbers</div> <div><table><tr><td> 70</td><td> 2</td></tr></table></div> <div>Becomes:</div> <div><table><tr><td> 60</td><td> 12</td></tr></table></div> <div>Becomes:</div> <div><table><tr><td> 20</td><td> 5</td></tr></table></div> <div>Recorded in the same way as before:</div> <div><table><tr><td><table><tr><td>70</td><td>12</td></tr><tr><td>40</td><td>7</td></tr><tr><td colspan="2"><hr/></td></tr><tr><td>20</td><td>5</td></tr></table></td><td><table><tr><td>60</td><td>12</td></tr><tr><td>40</td><td>7</td></tr><tr><td colspan="2"><hr/></td></tr><tr><td>20</td><td>5</td></tr></table></td></tr></table></div>	 70	 2	 60	 12	 20	 5	<table><tr><td>70</td><td>12</td></tr><tr><td>40</td><td>7</td></tr><tr><td colspan="2"><hr/></td></tr><tr><td>20</td><td>5</td></tr></table>	70	12	40	7	<hr/>		20	5	<table><tr><td>60</td><td>12</td></tr><tr><td>40</td><td>7</td></tr><tr><td colspan="2"><hr/></td></tr><tr><td>20</td><td>5</td></tr></table>	60	12	40	7	<hr/>		20	5
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ADDITION AND SUBTRACTION

A year 4 child would say:

Number facts and counting.

I will continue to practise and improve fluency for:

addition and subtraction facts to 20,
number pairs that total 100,
number pairs that total 1,000 in multiples of 100,

count backwards through zero to include negative numbers,

count in multiples of 6, 7, 9, 25 and 1,000

Find 1,000 more or less than a given number.

Reading and writing numbers, understanding place value and comparing numbers.

I will consolidate:

Reading and writing numbers to at least 1,000 in numerals and in words.

I can use Roman numerals to 100 (I to C).

I can recognise the place value of each digit in a four-digit number (thousands, hundreds, tens, ones/units).

Recognise decimals as parts of a whole number

I can compare and order numbers beyond 1,000; use <, > and = signs.

I can compare numbers with the same number of decimal places up to 2 decimal places.

Mental Calculation (addition)

I can add and subtract numbers mentally, including:

HTU + 1, HTU + 10, HTU + 100

HTU - 1, HTU - 10, HTU - 100

I will consolidate:

Using known facts to and derive related facts up to 1,000 including:

If $7 + 5 = 12$, then $397 + 5 = 412$ (crossing the hundreds boundary)

If $95 + 10 = 105$, then $95 + 9 = 104$ (cross the hundreds boundary)

If $205 - 10 = 195$, then $205 - 9 = 196$ (crossing the hundreds boundary)

I can use knowledge of doubles to derive related facts:

$15 + 16 = 31$ because double 15 = 30 and $30 + 1 = 31$

Number pairs that total 1,000 (in multiples of 100)

$180 + 50 = 230$ because $18 + 5 = 23$

$180 - 50 = 130$, because $18 - 5 = 13$.

Mental Calculation (subtraction).

I can find the difference between two numbers that are close to each other by counting on using knowledge of the inverse:

• $86 - 45 = 41$ because $45 + 41 = 86$

Use knowledge of the inverse to find missing numbers:

• $37 - \quad = 12$

Round to nearest pence and adjust:

• $3 \times 99\text{p} = £1 + £1 + £1 - 3\text{p} = £2.97$

Problem solving.

I can solve two-step addition and subtraction problems in context, deciding which operations and methods to use and explain why.

I can apply my knowledge of mental and written methods to improve efficiency.

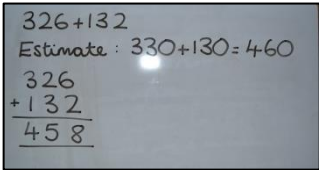
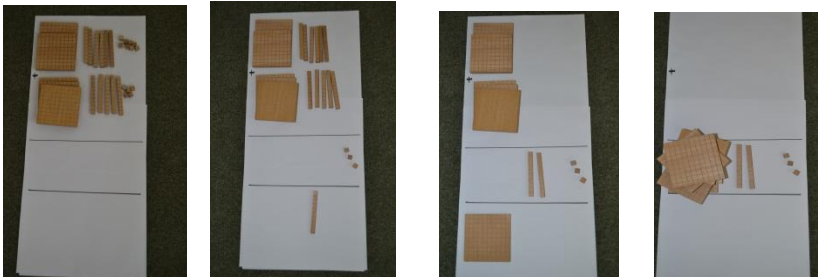
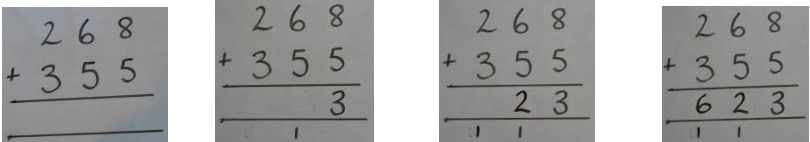
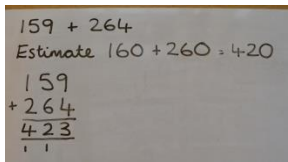
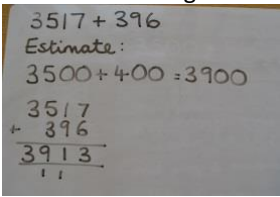
Written Calculations, identifying, representing and estimating numbers, and checking answers.

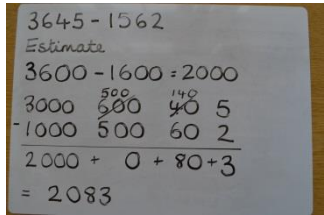
I can add and subtract numbers with up to four digits using formal written methods of columnar addition and expanded column subtraction where appropriate

I can identify, represent and estimate numbers using different representations

I can estimate the answer to a calculation using rounding, and use inverse operation to check answers

The main differences here in Year 4 are reasoning and explaining rather than just doing and the introduction of the decimal number system and negatives. This extends place value knowledge through 0 and to parts of the whole.

Children need to continue to learn using concrete resources, models, representations and images to develop their conceptual understanding alongside their fluency with number and knowledge and use of procedures.		
Secure recording of more formal column addition, continuing to use resources to calculate, prove the answer is correct and explain. $\begin{array}{r} 347 \\ + 122 \\ \hline 9 \text{ (7 + 2)} \\ 60 \text{ (40 + 20)} \\ 400 \text{ (300 + 100)} \\ \hline 469 \end{array}$	Move to compacted method (no carrying) 	Column addition with up to 4 digit numbers using estimating to check. $1,435 + 2,362$ Estimation: $1,400 + 2,400 = 3,800$ $\begin{array}{r} 1435 \\ + 2362 \\ \hline \end{array}$
Then with carrying – show this using Dienes and then place value counters  		
Extend to four digit numbers 	Use and apply these methods throughout especially in the context of appropriate amounts of money and measures.	

Children need to continue to learn using concrete resources, models, representations and images to develop their conceptual understanding alongside their fluency with number and knowledge and use of procedures.		
Continue to secure expanded method with 3 digit numbers and appropriate resources/representations	Children should begin to estimate their answers through applying their knowledge of rounding and mental subtraction $368 - 214$ Estimation: $370 - 210 = 160$	Continue expanded subtraction method with up to 4 digit numbers 
Use and apply these methods throughout especially in the context of appropriate amounts of money and measures.		

ADDITION AND SUBTRACTION

A year 5 child would say:

Number facts and counting.

I will continue to practise and improve fluency for:
addition and subtraction facts to 20,
number pairs that total 100,
number pairs that total 1,000 in multiples of 100,
number pairs that total 1,000 in multiples of 10,
Interpret negative numbers in context, count forwards and backwards with positive and negative whole numbers through zero .
Count forwards or backwards in **steps of powers of 10 up to 1,000,000** from any given number.

Reading and writing numbers, understanding place value and comparing numbers.

I can read, write, order and compare numbers to at least 1,000,000 and understand the value of each digit
I can read Roman numerals to 1,000 (M) and recognise years written in Roman numerals
I can recognise the place value of each digit in a four-digit number (thousands, hundreds, tens, ones/units)
Recognise decimals as parts of a whole number
I can read, write, order and compare numbers to at least **1,000,000** and understand the value of each digit; use <, > and = signs
I can compare numbers with the same number of decimal places up to 2 decimal places.

Mental Calculation.

I can consolidate previous year's mental calculations.

Do not be concerned about this small box. It is indeed a lot to cover.

Mental Calculation continued.

I can calculate with increasingly large numbers
I can add and subtract decimals using knowledge of whole numbers
 $5.6 + 3.5 = 9.1$ because $56 + 35 = 91$
 $6.4 - 3.8 = 2.6$ because $64 - 38 = 26$
I can round to the nearest pound and compensate:
 $£2.97 + £2.97 + £2.97 = £3 + £3 + £3 - 9p = £8.91$

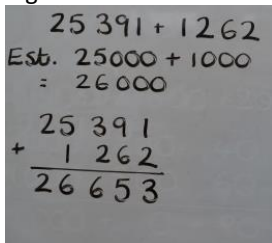
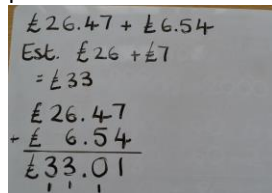
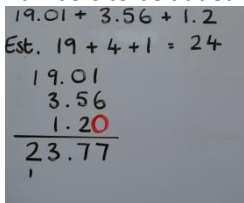
Problem solving.

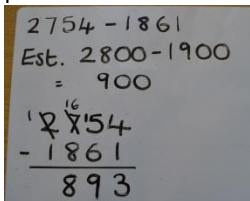
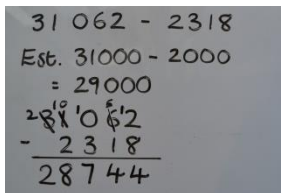
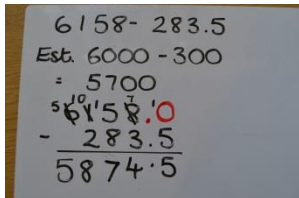
I can solve multi-step addition and subtraction problems in context, deciding which operations and methods to use and explain why.
I can apply my knowledge of mental and written methods to improve efficiency.

Written Calculations, identifying, representing and estimating numbers, and checking answers.

I can add and subtract whole numbers with more than four digits including **using formal written methods** of columnar addition and subtraction
I can use rounding to check answers to calculations in the context of a problem

Year 5 move on towards more formal written methods. These allow children to consolidate and apply mental strategies on a range of written methods. Fluency and accuracy, as well as estimation and checking become natural.

Children need to continue to learn using concrete resources, models, representations and images to develop their conceptual understanding alongside their fluency with number and knowledge and use of procedures.		
Secure understanding of formal column addition with carrying, continuing to use resources to calculate, prove the answer is correct and explain.	Move on to numbers exceeding 4 digits 	Apply method to addition of numbers with the same number of decimal places 
Then to addition of numbers with different number of decimal places gradually increasing the number of numbers to be added 	Use and apply these methods throughout especially in the context of appropriate amounts of money and measures.	

Children need to continue to learn using concrete resources, models, representations and images to develop their conceptual understanding alongside their fluency with number and knowledge and use of procedures.		
Continue to secure expanded subtraction method with 4 digit numbers and appropriate resources/representations	Use compacted decomposition method supported by Dienes and place value counters 	Increase complexity of calculations 
Begin to use decimals and use zero as a place holder 	Use and apply these methods throughout especially in the context of appropriate amounts of money and measures.	

ADDITION AND SUBTRACTION

A year 6 child would say:

Number facts and counting.

I can continue to practise and improve fluency for:
addition and subtraction facts to 20
number pairs that total 100
number pairs that total 1,000 in multiples of 100
number pairs that total 1,000 in multiples of 10.
I can use negative numbers in context, and calculate intervals across zero.

Reading and writing numbers, understanding place value and comparing numbers.

I can read, write, order and compare numbers to 10,000,000 and determine the value of each digit
Identify the value of each digit to three decimal places

Mental Calculation.

I can consolidate previous years mental calculations.
I can perform mental calculations including mixed operations and large numbers.
use knowledge of the order of operations to carry out calculations involving the four operations
 $[(4 \times 3) \div 6] + 50 = ?$

Written Calculations, identifying, representing and estimating numbers, and checking answers.

As for Year 5 but with increasing complexity of numbers, steps, problems and investigations

I can round any whole number to a required degree of accuracy.

I can solve problems which require answers to be rounded to specified degrees of accuracy

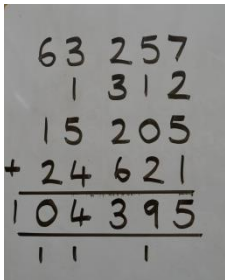
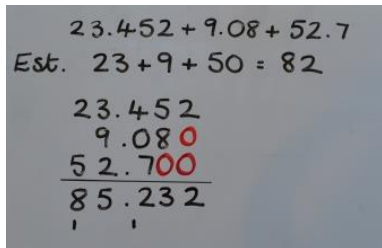
I can use rounding to check answers to calculations in the context of a problem.

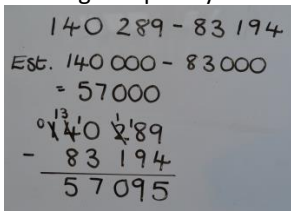
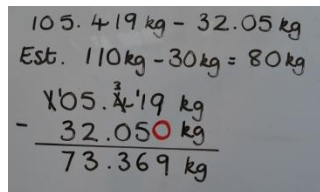
Problem solving.

I can solve multi-step addition and subtraction problems in context, deciding which operations and methods to use and explain why.

I can apply my knowledge of mental and written methods to improve efficiency.

As with year 5 there is a lot of consolidation of methods in calculation. Fluency and efficiency moves into problem solving with a larger emphasis on rounding for estimation and checking. Formal compact column methods are encouraged, but other methods can be used until the child is ready to tackle these.

Children need to continue to learn using concrete resources, models, representations and images to develop their conceptual understanding alongside their fluency with number and knowledge and use of procedures.		
Secure understanding of formal column addition with carrying, involving decimals, continuing to use resources to calculate, prove the answer is correct and explain.	Add several numbers of increasing complexity 	Add several numbers of increasing complexity including with decimals 
Use and apply these methods throughout especially in the context of appropriate amounts of money and measures.		

Children need to continue to learn using concrete resources, models, representations and images to develop their conceptual understanding alongside their fluency with number and knowledge and use of procedures.		
Continue to secure decomposition method with resources where appropriate	Use compacted decomposition method with increasing complexity 	Use compacted decomposition method with decimal numbers with different numbers of decimal places 
Use and apply these methods throughout, especially in the context of appropriate amounts of money and measures.		



**Progression and expectation
in calculations;
a guide for parents.**



Multiplication and division.

A pre year 3 child would say:

Multiplication and division facts.

I can count in steps of 2,3 and 5 from zero and in tens from any number, forwards or backwards.

I can recall and use multiplication and division facts from the 2, 5 and 10 multiplication tables.

I can recognise odd and even numbers.

I know that doubling is multiplying by 2 and halving is dividing by 2.

I know significant doubles involving doubling multiples of 5 up to 50 (10 + 10, 50 + 50, 25 + 25).

Mental Calculation.

I can show that multiplication of 2 numbers can be done in any order (commutative) and division of one number by another cannot

Written Calculation.

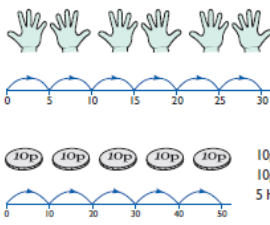
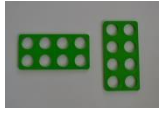
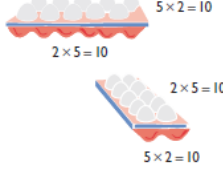
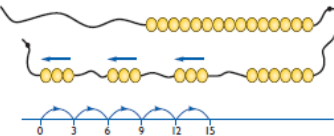

I can calculate mathematical statements for multiplication and division within the multiplication tables and write them using the \times , \div and $=$ signs.

Problem solving.



I can solve problems involving multiplication using resources, arrays, repeated addition, mental methods and multiplication and division facts, including problems in context.

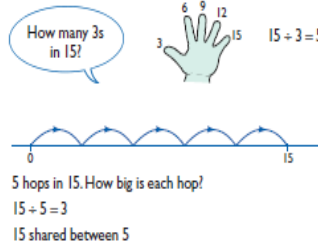
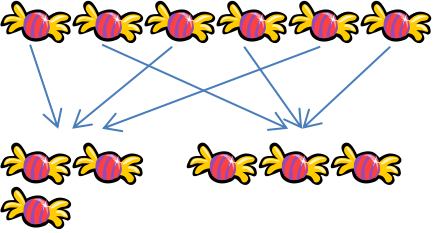


Inverse operations, estimating and checking.

I can understand that multiplication is the inverse of division and division is the inverse of multiplication

<p>Multiplication as repeated addition</p>  <p> $5 + 5 + 5 + 5 + 5 + 5 = 30$ $5 \times 6 = 30$ 5 multiplied by 6 6 groups of 5 6 hops of 5 </p> <p> $10p + 10p + 10p + 10p + 10p + 10p = 50p$ $10p \times 5 = 50p$ 5 hops of 10 </p>	<p>Use arrays to show commutativity</p>  <p> $2 \times 4 = 8$ $4 \times 2 = 8$ </p>	 <p> $5 \times 2 = 10$ $2 \times 5 = 10$ $2 \times 5 = 10$ $5 \times 2 = 10$ </p>
<p> $5 \times 3 = 3 + 3 + 3 + 3 + 3 = 15$ $3 \times 5 = 5 + 5 + 5 = 15$ </p>	<p>Counting in steps</p> 	<p>Relate multiplication to scaling</p>  <p> double 3 is 6 $3 \times 2 = 6$ </p>

		
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<p>How many 10ps are in 50p?</p>	<p>Using arrays to understand that division is the inverse of multiplication</p>
	
	<p>How many groups of 3 are in 15? How many groups of 5 are in 15? To represent $15 \div 3 = 5$ and $15 \div 5 = 3$</p>

Understand division and sharing and grouping		
<p>6 sweets shared between 2 people. How many do they each get?</p>	<p>There are 6 sweets. How many people can have 2 sweets each?</p>	
		
<p>Halving is dividing by 2 Half of 6 is 3 $6 \div 2 = 3$</p>		
		

A year 3 child would say:

Multiplication and division facts.

I can count in multiples of 4, 8, 50 and 100 from zero.

I can recall and use multiplication and division facts from the 3, 4 and 8 multiplication tables.

Mental Calculation.

I can write and calculate the mathematical statements for multiplication and division using the multiplication tables that I know, including for 2-digit numbers multiplied by 1 digit numbers

($4 \times 2 = 8$, so $4 \times 20 = 80$) using mental methods that will develop into more formal written methods.

I can connect the 2, 4, and 8 multiplication tables through doubling.

I can develop efficient methods using commutativity and associativity.

($4 \times 12 \times 5 = 4 \times 5 \times 12 = 20 \times 12 = 240$).

I can use existing knowledge to find related facts

($3 \times 2 = 6$, $6 \div 2 = 3$, $2 = 6 \div 3$).

Written Calculation.

I can write and calculate mathematical statements for multiplication and division, using the multiplication tables that I know, including 2-digit numbers multiplied by 1-digit numbers, using mental methods and progressing to more formal written methods.

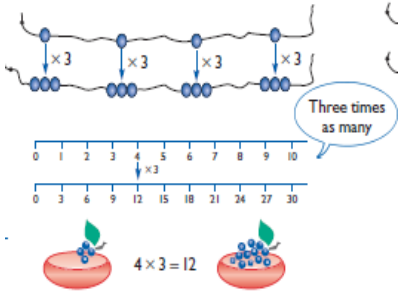
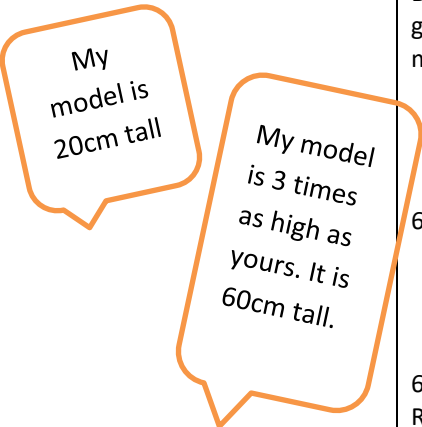
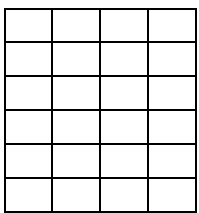
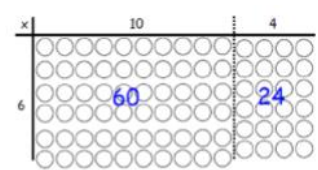
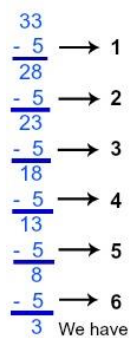
Inverse operations, estimating and checking.

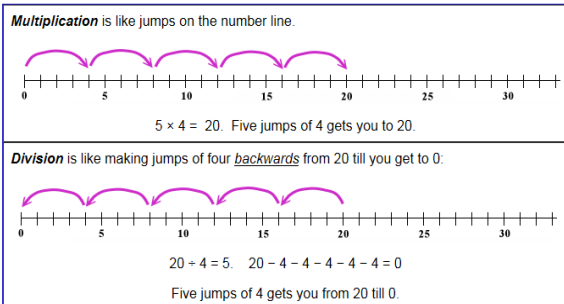
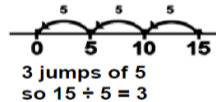
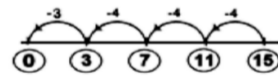
I can estimate the answer to a calculation and use inverse operations to check answers.

Problem solving.

I can solve problems including missing number problems, involving multiplication and division, including positive integer scaling problems and correspondence problems in which a number objects are connected to a multiple objects.

In year 3 the main focus is on finding facts for the 2, 3, 4, 5, 8 and 10 tables. Written calculations are used for facts known, but to find answers. This consolidates the relationship between multiplication tables and a written method.

Children need to continue to learn using concrete resources, models, representations and images to develop their conceptual understanding alongside their fluency with number and knowledge and use of procedures.		
Represent calculations as repeated addition, and arrays, and use number lines to calculate	Through doubling, connect the 2, 4 and 8 times tables	Use existing knowledge to find related facts If $4 \times 2 = 8$, then $4 \times 20 = 80$
Continue to relate multiplication to scaling 		Begin to use arrays to introduce the grid method, starting with 1 digit multiplied by 1 digit numbers 4  6 $6 \times 4 = 24$ Relate this to division
Move on to 2 digit multiplied by 1 digit for children who are ready 14×6  $60 + 24 = 84$	Also use partitioning to show this 14×6 $10 \times 6 = 60$ and $4 \times 6 = 24$ $\longrightarrow 84$	 Using Repeated Subtraction to Calculate $33 \div 5$ We subtract 5 from 33 six times, so our quotient is 6. We have 3 left over, so the remainder is 3.

Children need to continue to learn using concrete resources, models, representations and images to develop their conceptual understanding alongside their fluency with number and knowledge and use of procedures.		
Represent calculations as arrays and jumps on a number line Reinforce sharing and grouping	Use existing knowledge to find related facts $4 \times 2 = 8$, $8 \div 4 = 2$ and $2 = 8 \div 4$ So, $40 \times 2 = 80$, $80 \div 2 = 40$ and $40 = 80 \div 2$ 	Continue to use the number line to divide by a single digit divisor including with remainders Repeated subtraction using a horizontal number line: $15 \div 5$  With a remainder: $15 \div 4$  $15 \div 4 = 3 \text{ r } 3$

A year 4 child would say:

Multiplication and division facts.

I can count in multiples of 4, 6, 7, 9, 25 and 1,000 from zero

I can recall multiplication and division facts for table up to 12×12

I can find doubles and halves of numbers up to 50.

Properties of numbers.

I can recognise and use factor pairs and commutativity in mental calculations.

Mental Calculation.

I can use place value, known and derived facts to multiply and divide mentally including multiplying by 1 and 0, dividing by 1, multiplying together 3 numbers

I can recognise and use factor pairs and commutativity in mental calculations.

I can understand the impact on place value when a number is multiplied or divided by 10 and 100.

Halve whole numbers including odd numbers

I know that $\times 4$ is doubling twice and $\times 8$ is doubling 3 times.

Written Calculation.

I can multiply two- and three-digit numbers by one-digit using the grid method linked to arrays.

Inverse operations, estimating and checking.

I can estimate the answer to a calculation and use inverse operations to check answers.

Problem solving.

I can solve problems including missing number problems, involving multiplication and division, including positive integer scaling problems and harder correspondence problems in which a number of objects are connected to multiple objects.

Year 4 must learn all tables to 12×12 . They also start to look into the relationship between division and multiplication facts. The use of arrays (see diagram) show these facts explicitly and gives a clear visual representation. The grid method is now used to partition numbers and multiply, using multiples of ten.

Division is expressed on a number line using known facts to group multiples into chunks of known facts- e.g multiples of ten.

Children need to continue to learn using concrete resources, models, representations and images to develop their conceptual understanding alongside their fluency with number and knowledge and use of procedures.

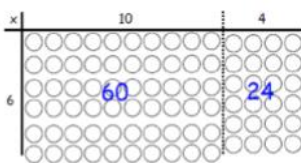
Use mental calculation and efficient strategies to find products and solve missing number problems

Use grid method for multiplying

Arrays.

Secure understanding of the grid representing an array for multiplying 2 and then 3 digit numbers by a single digit

$$14 \times 6$$



$$60 + 24 = 84$$

$$14 \times 6 = 84$$

$$84 \div 6 = 14$$

$$84 \div 14 = 6$$

Then use the grid as a representation for multiplying 2 and 3 digit numbers by a single digit

$$34 \times 6$$

x	30	4
6	180	24

$$180 + 24 = 204$$

Estimate answers first and use column addition if necessary to reach an answer

$$374 \times 6$$

Estimate: $400 \times 6 = 2400$

x	300	70	4
6	1800	420	24

$$1800$$

$$420$$

$$24$$

$$-----$$

$$2244$$

$$-----$$

$$1$$

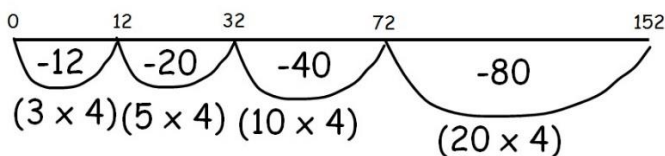
Children need to continue to learn using concrete resources, models, representations and images to develop their conceptual understanding alongside their fluency with number and knowledge and use of procedures.

Use mental calculation and efficient strategies to find products and solve missing number problems

Divide 2 and 3 digit numbers by a single digit on a number line using chunking in increasingly efficient steps

$$152 \div 4 = 38$$

Key facts	$10 \times 4 = 40$
$2 \times 4 = 8$	$20 \times 4 = 80$
$5 \times 4 = 20$	$50 \times 4 = 200$



Divide 2 and 3 digit numbers by a single digit, using chunking, where there is a remainder

$$172 \div 8 = 21r4$$

172	
- 80	(10 x 8)
92	
- 80	(10 x 8)
12	
- 8	(1 x 8)
4	r4

Encourage use of known and related facts to make increasingly efficient jumps

(I know that $4 \times 4 = 16$, so $40 \times 4 = 160$)

$$73 \div 5$$

5	73	
- 50	(10 x 5)	
23		
- 20	(4 x 5)	10 + 4 = 14
3		

How many 5s have been subtracted?
14 sets of 5, with 3 left over.

$$\text{Answer: } 73 \div 5 = 14 r3$$

A year 5 child would say:

Multiplication and division facts.

I can count forwards and backwards in steps of powers of 10 for any given number up to 1 000 000.

I can consolidate knowledge of all multiplication tables and related division facts.

Mental Calculation.

I can multiply and divide numbers, including decimals, mentally using know facts:

- $0.6 \times 7 = 4.2$ because $6 \times 7 = 42$
- $3.5 \div 5 = 0.7$ because $35 \div 5 = 7$.

I can multiply and divide whole numbers and those involving decimals by 10, 100 and 1,000.

I know that $TU \times 5$ is $TU \times 10$ and then halved ($\div 2$) e.g. $17 \times 5 = (17 \times 10) \div 2$.

I know that $TU \times 9$ is $TU \times 10$ then subtract TU number e.g. $17 \times 9 = (17 \times 10) - 17$.

I can round and adjust for near pounds e.g. $\pounds 3.98 \times 3 = \pounds 4 \times 3 - 6p = \pounds 11.94$.

I can use knowledge of doubles and halves of whole numbers to find doubles and halves of decimal numbers e.g. double 2.6 is 5.2 because double 26 is 52, half of 5.8 is 2.9 because half of 58 is 29.

Properties of numbers.

I can identify multiples and factors, including finding all factor pairs of a number and common factors of two numbers.

I know and use the vocabulary of prime numbers, prime factors and composite (non-prime) numbers.

I can establish whether a number up to 100 is prime and recall prime numbers up to 19.

I can recognise and use square numbers and cube numbers and the notation for squared (2) and cubed (3).

Written Calculation.

Multiply numbers up to 4 digits by a one or two-digit number using a **formal written method**

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

Problem solving.

Solve problems including missing number problems, involving multiplication and division, including using their knowledge of factors, multiples, squares and cubes
Solve problems involving addition, subtraction, multiplication and division and a combination of these, including understanding of the equals sign e.g. $320 \div 8 = 50 \times 0.8$

Solve problems involving multiplication and division including scaling by simple fractions and problems involving simple rates.

Inverse operations, estimating and checking.

I can estimate the answer to a calculation and use inverse operations to check

Year 5 move onto formal calculations. The grid method should still be used for larger numbers, HTU X TU, as well as the expanded column method. Once secure the compact column method can be used.

Children need to continue to learn using concrete resources, models, representations and images to develop their conceptual understanding alongside their fluency with number and knowledge and use of procedures.

Use mental calculation and efficient strategies to find products and solve missing number problems
Secure use of grid method for multiplying 2 and 3 digit numbers by 1 digit numbers

Introduce short multiplication

Use grid method with expanded short method alongside for comparison

$$352 \times 7$$

$$\text{Estimate: } 400 \times 7 = 2800$$

x	300	50	2
7	2100	350	14

$$2100$$

$$350$$

$$14$$

$$\hline 2464$$

$$352 \times 7$$

$$\text{Estimate: } 400 \times 7 = 2800$$

$$\begin{array}{r} 352 \\ \times 7 \\ \hline 14 \quad (2 \times 7) \\ 350 \quad (50 \times 7) \\ \underline{2100} \quad (300 \times 7) \\ 2464 \end{array}$$

3 digit numbers multiplied by 1 digit number

$$374 \times 6$$

$$\text{Estimate: } 400 \times 6 = 2400$$

Extend to short multiplication of 4 digit numbers

$$3742 \times 8$$

$$\text{Estimate: } 4000 \times 8 = 32\,000$$

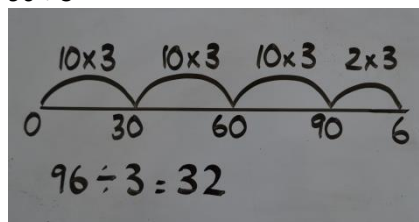
Division remains on a number line using chunking but now a relationship with short division is established. Manipulatives such as place value counters or Dienes cubes are used to show the relationship between groups and division.

Children need to continue to learn using concrete resources, models, representations and images to develop their conceptual understanding alongside their fluency with number and knowledge and use of procedures.

Use mental calculation and efficient strategies to find products and solve missing number problems

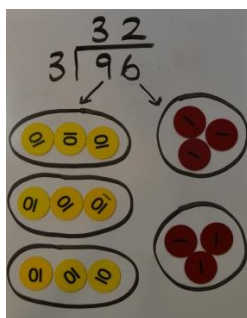
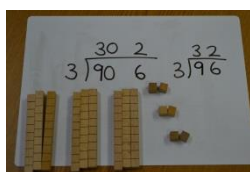
Use chunking on a number line to link with short division

$$96 \div 3$$



$$\begin{array}{r} 32 \\ 3 \overline{)96} \end{array}$$

Use Dienes and then place value counters to secure understanding of division



Extend to short division with 'carrying', dividing 2 and then three digit numbers by a single digit number, using place value counters to secure understanding

$$\begin{array}{r} 24 \\ 4 \overline{)96} \end{array}$$

$96 \div 4 = 24$

$$\begin{array}{r} 324 \\ 3 \overline{)972} \end{array}$$

Extend to short division with remainders, starting with 2, then 3, then 4 digit numbers dividing by a single digit number

$$\begin{array}{r} 0712 \text{ r } 3 \\ 6 \overline{)4275} \end{array}$$

A year 6 child would say:

Multiplication and division facts.

I can count forwards and backwards in steps of powers of 10 for any given number up to 1 000 000.

I can consolidate knowledge of all multiplication tables and related division facts.

Properties of numbers.

I can identify common factors, common multiples and prime numbers.

I can use common factors or simplify fractions; use common multiples to express fractions in the same denomination.

I can calculate, estimate and compare volume of cubes and cuboids using standard units including cm^3 and m^3 and extending to other units such as mm^3 and km^3 .

Mental Calculation.

I can perform mental calculations including with mixed operations and large numbers.

I can associate a fraction with division and calculate decimal fraction equivalents (e.g. 0.375) for a simple fractions (e.g. $\frac{3}{8}$).

Written Calculation.

I can multiply multi-digit numbers up to 4-digits by a two-digit number using **the formal written method of long multiplication**

I can divide numbers up to 4-digits by a 1-digit whole number using formal written method of short division were appropriate for the context

I can divide numbers up to 4 digits by a 2-digit whole number using the formal written method of long division and interpret remainders as whole number remainders, fractions or by rounding as appropriate for the context

Use written division methods in cases where the answer has up to two decimal places.

Problem solving.

I can solve problems involving addition, subtraction, multiplication and division

I can solve problems involving similar shapes where the scale factor is known or can be found.

Order of operations, estimating and checking using inverse.

I can use knowledge of the order of operations to carry out calculations involving the four operations. BODMAS.

I can solve problems involving addition, subtraction, multiplication and division.

Solve problems involving similar shapes where the scale factor is known or can be found.

Year 6 should now be fluent in multiplication facts and related division. They move onto a formal structure of calculations. The compact column method and long division methods are encouraged, however some may still need to use the grid for consolidation.

Children need to continue to learn using concrete resources, models, representations and images to develop their conceptual understanding alongside their fluency with number and knowledge and use of procedures.

Use mental calculation and efficient strategies to find products and solve missing number problems
Continue to secure and practise short multiplication

Use grid method to link to long multiplication for multiplying by 2 digit numbers

18 x 13

Estimate: 20 x 10 = 200

x	10	8
10	100	80
3	30	24



180

30

24

2 3 4

1

Extend to long multiplication of 4 digit numbers by 2 digit numbers

1325 x 17

Estimate: 1300 x 20 = 26 000

Use short and long multiplication to multiply numbers with 1 and then 2 decimal places

3.28 x 9

Estimate: 3 x 9 = 27

With division, remainders should now be expressed either as a fraction of the whole or as a decimal. Decimal remainders should be calculated with a degree of accuracy. Chunking division can be used alongside the long division method.

Children need to continue to learn using concrete resources, models, representations and images to develop their conceptual understanding alongside their fluency with number and knowledge and use of procedures.

Use mental calculation and efficient strategies to find products and solve missing number problems

Continue to secure and practise short division

Extend short division to include remainders expressed as decimals

$$2617 \div 8$$

$$\begin{array}{r} 327.125 \\ 8 \overline{) 2617.125} \\ \underline{8 } \\ 26 \\ \underline{24 } \\ 15 \\ \underline{16 } \\ 7 \\ \underline{8 } \\ 1 \end{array}$$

Introduce long division by chunking without and then with remainders

$$\begin{array}{r} 13 \\ 36 \overline{) 468} \\ \underline{360} \quad (10 \times 36) \\ 108 \\ \underline{108} \quad (3 \times 36) \\ 0 \end{array}$$

$$\begin{array}{r} 14 \text{ r } 10 \\ 24 \overline{) 346} \\ \underline{240} \\ 106 \\ \underline{96} \quad (4 \times 24) \\ 10 \end{array}$$

Introduce long division, without and then with remainders

$$\begin{array}{r} 28 \text{ r } 12 \\ 15 \overline{) 432} \\ \underline{30} \downarrow \\ 132 \\ \underline{120} \\ 12 \end{array}$$

Long division expressing remainders as fractions and decimals

$$\begin{array}{r} 28 \\ 15 \overline{) 432} \\ \underline{30} \downarrow \\ 132 \\ \underline{120} \\ 12 \end{array}$$

$\rightarrow 28 \frac{12}{15}$
 $\rightarrow 28 \frac{4}{5}$

$$\begin{array}{r} 28.8 \\ 15 \overline{) 432.0} \\ \underline{30} \downarrow \\ 132 \\ \underline{120} \\ 120 \\ \underline{120} \\ 0 \end{array}$$

$\rightarrow 28.8$