Autumn - Block 2

Four Operations

Overview

Small Steps

- Add and subtract integers
- Multiply up to a 4-digit number by 2-digit number
- Short division
- Division using factors
- Long division (1)
- Long division (2)
- Long division (3)
- Long division (4)
- Common factors
- Common multiples
- Primes to 100
- Squares and cubes
- Order of operations
- Mental calculations and estimation
- Reason from known facts

NC Objectives

Solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why.

Multiply multi-digit numbers up to 4 digits by a 2-digit number using the formal written method of long multiplication.

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.

Divide numbers up to 4 digits by a 2-digit number using the formal written method of short division, interpreting remainders according to the context.

Perform mental calculations, including with mixed operations and large numbers.

Identify common factors, common multiples and prime numbers.

Use their knowledge of the order of operations to carry out calculations involving the four operations.

Solve problems involving addition, subtraction, multiplication and division.

Use estimation to check answers to calculations and determine in the context of a problem, an appropriate degree of accuracy.

Add & Subtract Integers

Notes and Guidance

Children consolidate their knowledge of column addition and subtraction, reinforcing the language of 'exchange' etc. After showing confidence with smaller numbers, children should progress to multi-digit calculations. Children will consider whether the column method is always appropriate e.g. when adding 999, it is easier to add 1,000 then subtract 1
They use these skills to solve multi-step problems in a range of contexts.

Mathematical Talk

What happens when there is more than 9 in a place value column?

Can you make an exchange between columns?

How can we find the missing digits? Can we use the inverse?

Is the column method always the best method?

When should we use mental methods?

Varied Fluency

- Calculate.

	3	4	6	2	1
+	2	5	7	3	4

67,832 + 5,258

	4	7	6	1	3	2	5
–		9	3	8	0	5	2

834,501 – 299,999

- A four bedroom house costs £450,000
A three bedroom house costs £201,000 less.
How much does the three bedroom house cost?
What method did you use to find the answer?

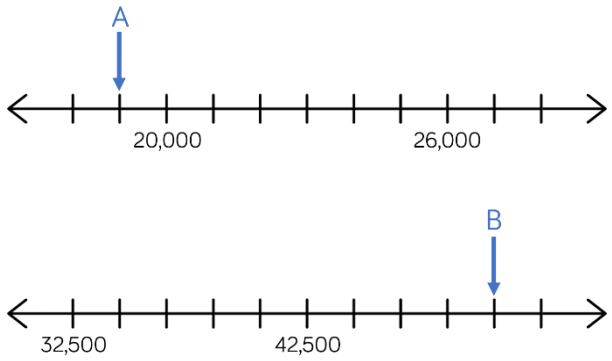
- Find the missing digits. What do you notice?

	5	2	2	4	7	?
+	3	?	5	9	0	4
	9	0	?	3	?	2

Add & Subtract Integers

Reasoning and Problem Solving

Find the difference between A and B.

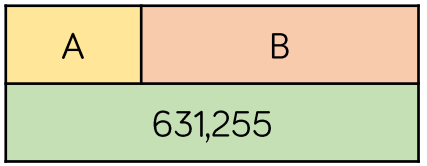


A = 19,000

B = 50,500

The difference is 31,500

Here is a bar model.



A is an odd number which rounds to 100,000 to the nearest ten thousand.
It has a digit total of 30

B is an even number which rounds to 500,000 to the nearest hundred thousand.
It has a digit total of 10

A and B are multiples of 5.

What are possible values of A and B?

Possible answer:

A = 99,255

B = 532,000

Multiply 4-digits by 2-digits

Notes and Guidance

Children consolidate their knowledge of column multiplication, multiplying numbers with up to 4 digits by a 2-digit number. It may be useful to revise multiplication by a single digit first, and then 2- and 3- digit numbers before moving on when ready to the largest calculations.
They use these skills to solve multi-step problems in a range of contexts.

Mathematical Talk

What is important to remember as we begin multiplying by the tens number?

How would you draw the calculation?

Can the inverse operation be used?

Is there a different strategy that you could use?

Varied Fluency

- Calculate.

	4	2	6	7
×			3	4

	3	0	4	6
×			7	3

5,734 × 26

- Jack made cookies for a bake sale.
He made 345 cookies.
The recipe says that he should have 17 raisins in each cookie.

How many raisins did he use altogether?

- Work out the missing number.

$6 \times 35 = \_\_\_ \times 5$

Multiply 4-digits by 2-digits

Reasoning and Problem Solving

True or False?

- $5{,}463 \times 18 = 18 \times 5{,}463$
- I can find the answer to $1{,}100 \times 28$ by calculating $1{,}100 \times 30$ and subtracting 2 lots of 1,100
- $702 \times 9 = 701 \times 10$

True

True

False

2	3	4	5	7	8

Place the digits in the boxes to make the largest product.

	□	□	□	□
×			□	□

$$\begin{array}{r} 7532 \\ \times \quad 84 \\ \hline 632688 \end{array}$$

Short Division

Notes and Guidance

Children build on their understanding of dividing up to 4-digits by 1-digit by now dividing by up to 2-digits. They use the short division method and focus on the grouping structure of division. Teachers may encourage children to list multiples of the divisor (number that we are dividing by) to help them solve the division more easily. Children should experience contexts where the answer "4 r 1" means both 4 complete boxes or 5 boxes will be needed.

Mathematical Talk

In the hundreds column, how many groups of 5 are in 7? Are there are any hundreds remaining? What do we do next?

In the thousands column, there are no groups of three in 1 What do we do?

Why is the context of the question important when deciding how to round the remainders after a division?

Varied Fluency

- Calculate using short division.

5	7	2	5

3	1	9	3	8

1	2	6	0	3	6

3,612 ÷ 14

List the multiples of the divisors to help you calculate.

- A limousine company allows 14 people per limousine.

  How many limousines are needed for 230 people?

- Year 6 has 2,356 pencil crayons for the year.

  They put them in bundles, with 12 in each bundle.

  How many complete bundles can be made?

Short Division

Reasoning and Problem Solving

Find the missing digits.

$$\begin{array}{r} 041\square r3 \\ 4\overline{)1\square59} \end{array}$$

$$\begin{array}{r} 041\square r3 \\ 4\overline{)1\square59} \end{array}$$

Here are two calculations.

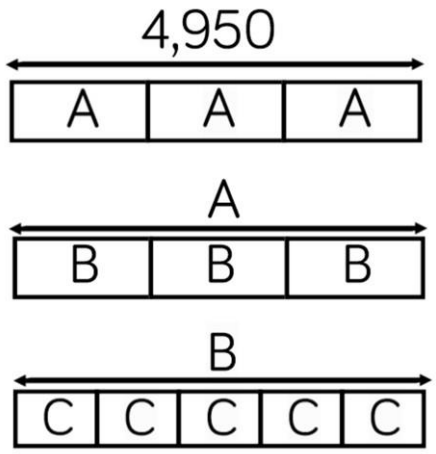
$A = 396 \div 11$

$B = 832 \div 13$

Find the difference between A and B.

$396 \div 11 = 36$
$832 \div 13 = 64$
$64 - 36 = 28$

Work out the value of C.
(The bar models are not drawn to scale)



$4{,}950 \div 3 = 1{,}650$

$1{,}650 \div 3 = 550$

$550 \div 5 = 110$

Division using Factors

Notes and Guidance

Children use their number sense, specifically their knowledge of factors, to be able to see relationships between the dividend (number being divided) and the divisor (number that the dividend is being divided by).

Beginning with multiples of 10 will allow children to see these relationships, before moving to other multiples.

Mathematical Talk

What is a factor?

How does using factor pairs help us to answer division questions?

Do you notice any patterns?

Does using factor pairs always work?

Is there more than one way to solve a calculation using factor pairs?

What methods can be used to check your working out?

Varied Fluency

- Calculate 780 ÷ 20

  Now calculate 780 ÷ 10 ÷ 2

  What do you notice? Why does this work?

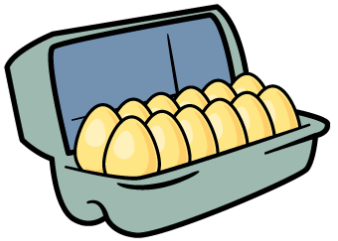
  Use the same method to calculate 480 ÷ 60

- Use factors to help you calculate.

  4,320 ÷ 15

- Eggs are put into boxes.
  Each box holds 12 eggs.
  A farmer has 648 eggs that need to go in the boxes.

  How many boxes will he fill?



Division using Factors

Reasoning and Problem Solving

Calculate:

- 1,248 ÷ 48
- 1,248 ÷ 24
- 1,248 ÷ 12

What did you do each time? What was your strategy?
What do you notice? Why?

26
52
104
Children should recognise that when the dividend is halved, the answer (quotient) is doubled.

Tommy says,

To calculate 4,320 ÷ 15 I will first divide 4,320 by 5 then divide the answer by 10

Do you agree?
Explain why.

Tommy is wrong: he has partitioned 15 when he should have used factor pairs. He could have used factor pairs 5 and 3 and divided by 5 then 3 (or 3 then 5).

Class 6 are calculating 7,848 ÷ 24

The children decide which factor pairs to use. Here are some of their suggestions:

- 2 and 12
- 1 and 24
- 4 and 6
- 10 and 14

Which will not give them the correct answer? Why?

Use the correct factor pairs to calculate the answer.
Is the answer the same each time?

Which factor pair would be the least efficient to use? Why?

10 and 14 is incorrect because they are not factors of 24 (to get 10 and 14, 24 has been partitioned).

The correct answer is 327

Children should get the same answer using all 3 factor pairs methods.

Using the factor pair of 1 and 24 is the least efficient.

Long Division (1)

Notes and Guidance

Children are introduced to long division as a different method of dividing by a 2-digit number.

They divide 3-digit numbers by a 2-digit number without remainders, starting with a more expanded method (with multiples shown), before progressing to the more formal long division method.

Mathematical Talk

How can we use multiples to help us divide by a 2-digit number?

Why are we subtracting the totals from the dividend (starting number)? This question supports children to see division as repeated subtraction.

In long division, what does the arrow represent? (The movement of the next digit coming down to be divided).

Varied Fluency

		0	3	6
1	2	4	3	2
	–	3	6	0
			7	2
	–		7	2
				0

(×30)

(×6)

Multiples of 12:

$12 \times 1 = 12$
$12 \times 2 = 24$
$12 \times 3 = 36$
$12 \times 4 = 48$
$12 \times 5 = 60$
$12 \times 6 = 72$
$12 \times 7 = 84$
$12 \times 8 = 96$
$12 \times 7 = 108$
$12 \times 10 = 120$

Use this method to calculate:

765 ÷ 17 450 ÷ 15 702 ÷ 18

		0	3	6
1	2	4	3	2
	–	3	6	↓
			7	2
	–		7	2
				0

Use the long division method to calculate:

836 ÷ 11
798 ÷ 14
608 ÷ 19

Long Division (1)

Reasoning and Problem Solving

Odd One Out

Which is the odd one out?
Explain your answer.

$512 \div 16$

$672 \div 21$

$792 \div 24$

$792 \div 24 = 33$ so this is the odd one out as the other two give an answer of 32

Spot the Mistake

$855 \div 15 =$

		0	5	1	0	
1	5	8	5	5		
	–	7	5		(×	4)
		1	0	5		
	–	1	0	5	(×	10)
				0		

The mistake is that $105 \div 15$ is not equal to 10

$105 \div 15 = 7$ so the answer to the calculation is 57

Long Division (2)

Notes and Guidance

Building on using long division with 3-digit numbers, children divide 4-digit numbers by 2-digits using the long division method.

They use their knowledge of multiples and multiplying and dividing by 10 and 100 to calculate more efficiently.

Mathematical Talk

How can we use multiples to help us divide by a 2-digit number?

Why are we subtracting the totals from the dividend (starting number)? This question supports children to see division as repeated subtraction.

In long division, what does the arrow represent? (The movement of the next digit coming down to be divided).

Varied Fluency

Here is a division method.

	0	4	8	9	
15	7	3	3	5	
–	6	0	0	0	(×400)
	1	3	3	5	
–	1	2	0	0	(×80)
		1	3	5	
–		1	3	5	(×9)
				0	

Use this method to calculate:

2,208 ÷ 16 1,755 ÷ 45 1,536 ÷ 16

There are 1,989 footballers in a tournament.
Each team has 11 players and 2 substitutes.
How many teams are there in the tournament?

Long Division (2)

Reasoning and Problem Solving

Which calculation is harder?

$1{,}950 \div 13$

$1{,}950 \div 15$

Explain why.

Dividing by 13 is harder because 13 is prime so we cannot use factor knowledge to factorise it into smaller parts. The 13 times table is harder than the 15 times table because the 15 times table is related to the 5 times table whereas the 13 times table is not related to a more common times table (because 13 is prime).

$6{,}120 \div 17 = 360$

Explain how to use this fact to find

$6{,}480 \div$  $= 360$

6,480 is 360 more than 6,120, so there is 1 group of 360 more.

Therefore, there are 18 groups of 360, so the answer is 18

Long Division (3)

Notes and Guidance

Children now divide using long division where answers have remainders. After dividing, they check that the remainder is smaller than the divisor.

Children start to understand how to interpret the remainder e.g. **380 ÷ 12 = 31 r 8 could mean 31 full packs, or 32 packs needed depending on context.**

Mathematical Talk

How can we use multiples to help us divide?

What happens if we cannot divide the ones exactly by the divisor? How do we show what is left over?

Why are we subtracting the totals from the dividend (starting number)?

Why is the context of the question important when deciding how to round the remainders after a division?

Varied Fluency

Tommy uses this method to calculate 372 divided by 15
He has used his knowledge of multiples to help.

			2	4	r	1	2
1	5	3	7	2			
	–	3	0	0			
			7	2			
	–		6	0			
			1	2			

$1 \times 15 = 15$
$2 \times 15 = 30$
$3 \times 15 = 45$
$4 \times 15 = 60$
$5 \times 15 = 75$
$10 \times 15 = 150$

Use this method to calculate:

$271 \div 17$ $623 \div 21$ $842 \div 32$

A school needs to buy 380 biscuits for parents' evening.
Biscuits are sold in packs of 12

How many packets will the school need to buy?

Long Division (3)

Reasoning and Problem Solving

Here are two calculation cards.

$A = 396 \div 11$

$B = 832 \div 11$

Whitney thinks there won't be a remainder for either calculation because 396 and 832 are both multiples of 11

Rosie disagrees, she has done the written calculations and says **one** of them has a remainder.

Who is correct? Explain your answer.

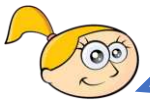
Rosie is correct because 832 is not a multiple of 11

$396 \div 11 = 36$

$832 \div 11 = 75$ r 7

576 children and 32 adults need transport for a school trip.
A coach holds 55 people.

Dora: We need 10 coaches.



Eva: We need 11 coaches.

Alex: We need 12 coaches.

Who is correct? Explain how you know.

How many spare seats will there be?

Alex is correct.

There are 608 people altogether, $608 \div 55 = 11$ r 3, so 12 coaches are needed.

On 12 coaches there will be 660 seats, because $55 \times 12 = 660$
$660 - 608 = 52$ spare seats.

Long Division (4)

Notes and Guidance

Children now divide four-digit numbers using long division where their answers have remainders. After dividing, they check that their remainder is smaller than their divisor.

Children start to understand when rounding is appropriate to use for interpreting the remainder and when the context means that it is not applicable.

Mathematical Talk

How can we use multiples to help us divide?

What happens if we cannot divide the ones exactly by the divisor? How do we show what is left over?

Why are we subtracting the totals from the dividend (starting number)? This question supports children to see division as repeated subtraction.

Does the remainder need to be rounded up or down?

Varied Fluency

Amir used this method to calculate 1,426 divided by 13

			1	0	9	r	9	
1	3	1	4	2	6			
	–	1	3	0	0			(× 100)
			1	2	6			
	–		1	1	7			(×9)
					9			

Use this method to calculate:

2,637 ÷ 16 4,453 ÷ 22 4,203 ÷ 18

A large bakery produces 7,849 biscuits in a day which are packed in boxes.
Each box holds 64 biscuits.

How many boxes are needed so all the biscuits are in a box?

Long Division (4)

Reasoning and Problem Solving

Class 6 are calculating three thousand, six hundred and thirty-three divided by twelve.

Rosie says that she knows there will be a remainder without calculating.

Is she correct?
Explain your answer.

What is the remainder?

Rosie is correct because 3,633 is odd and 12 is even, and all multiples of 12 are even because 12 is even.

3,633 ÷ 12 = 302 r 9, so the remainder is 9

Which numbers up to 20 can 4,236 be divided by without having a remainder?

What do you notice about all the numbers?

1, 2, 3, 4, 6, 12

They are all factors of 12

Common Factors

Notes and Guidance

Children find the common factors of two numbers.

Some children may still need to use arrays and other representations at this stage but mental methods and knowledge of multiples should be encouraged.

They can show their results using Venn diagrams and tables.

Mathematical Talk

How do you know you have found all the factors of a given number?

Have you used a systematic approach?

Can you explain your system to a partner?

How does a Venn diagram show common factors?

Where are the common factors?

Varied Fluency

- Find the common factors of each pair of numbers.

  24 and 36

  20 and 30

  28 and 45

- Which number's factors make it the odd one out?

  12, 30, 54, 42, 32, 48

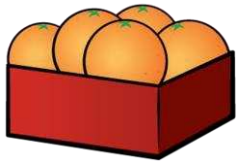
  Can you explain why?

- Two numbers have common factors of 4 and 9
  What could the numbers be?

Common Factors

Reasoning and Problem Solving

There are 49 pears and 56 oranges.



They need to be put into baskets of pears and baskets of oranges with an equal number of fruit in each basket.

Amir says,

There will be 8 pieces of fruit in each basket.

Jack says,

There will be 7 pieces of fruit in each basket.

Who is correct? Explain how you know.

Jack is correct. There will be seven pieces of fruit in each basket because 7 is a common factor of 49 and 56

Tommy has two pieces of string.

One is 160 cm long and the other is 200 cm long.

He cuts them into pieces of equal length.

What are the possible lengths the pieces of string could be?

The possible lengths are: 2, 4, 5, 8, 10, 20 and 40 cm.

Dora has 32 football cards that she is giving away to his friends.

She shares them equally between her friends.

How many friends could Dora have?

Dora could have 1, 2, 4, 8, 16 or 32 friends.

Common Multiples

Notes and Guidance

Building on knowledge of multiples, children find common multiples of numbers. They should continue to use visual representations to support their thinking.

They also use abstract methods to calculate multiples, including using numbers outside of those known in times table facts.

Mathematical Talk

Is the lowest common multiple of a pair of numbers always the product of them?

Can you think of any strategies to work out the lowest common multiples of different numbers?

When do numbers have common multiples that are lower than their product?

Varied Fluency

- On a 100 square, shade the first 5 multiples of 7 and then the first 8 multiples of 5

  What common multiple of 7 and 5 do you find?

  Use this number to find other common multiples of 7 and 5

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

- List 5 common multiples of 4 and 3

- Alex and Eva play football at the same local football pitches. Alex plays every 4 days and Eva plays every 6 days.

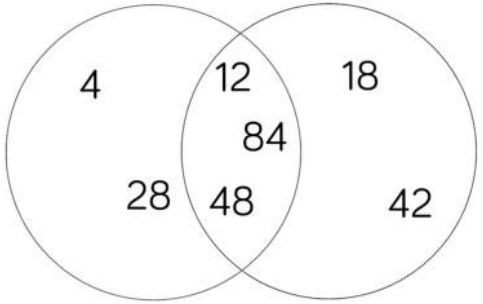
  They both played football today.

  After a fortnight, how many times will they have played football on the same day?

Common Multiples

Reasoning and Problem Solving

Work out the headings for the Venn diagram.



Add in one more number to each section.

Can you find a square number that will go in the middle section of the Venn diagram?

Multiples of 4
Multiples of 6

144 is a square number that can go in the middle.

Annie is double her sister's age.

They are both older than 20 but younger than 50

Their ages are both multiples of 7

What are their ages?

Annie is 42 and her sister is 21

A train starts running from Leeds to York at 7am.
The last train leaves at midnight.

Platform 1 has a train leaving from it every 12 minutes.
Platform 2 has one leaving from it every 5 minutes.

How many times in the day would there be a train leaving from both platforms at the same time?

18 times

Primes to 100

Notes and Guidance

Building on their learning in year 5, children should know and use the vocabulary of prime numbers, prime factors and composite (non-prime) numbers.

They should be able to use their understanding of prime numbers to work out whether or not numbers up to 100 are prime. Using primes, they break a number down into its prime factors.

Mathematical Talk

What is a prime number?

What is a composite number?

How many factors does a prime number have?

Are all prime numbers odd?

Why is 1 not a prime number?

Why is 2 a prime number?

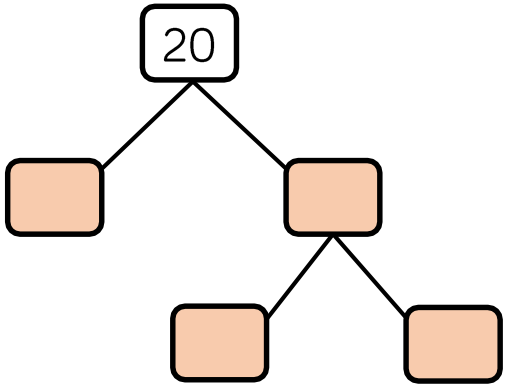
Varied Fluency

- List all of the prime numbers between 10 and 30

- The sum of two prime numbers is 36

  What are the numbers?

- All numbers can be broken down into prime factors.
  A prime factor tree can help us find them.
  Complete the prime factor tree for 20



Primes to 100

Reasoning and Problem Solving

Use the clues to work out the number.

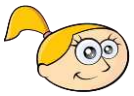
- It is greater than 10
- It is an odd number
- It is not a prime number
- It is less than 25
- It is a factor of 60

15

Shade in the multiples of 6 on a 100 square.

What do you notice about the numbers either side of every multiple of 6?

Eva says,



I noticed there is always a prime number next to a multiple of 6

Is she correct?

Both numbers are always odd.

Yes, Eva is correct because at least one of the numbers either side of a multiple of 6 is always prime for numbers up to 100

Square & Cube Numbers

Notes and Guidance

Children have identified square and cube numbers previously and now explore the relationship between them, and solve problems involving them.
They need to experience sorting the numbers into different diagrams and look for patterns and relationships. They explore general statements regarding square and cube numbers. This step is a good opportunity to practise efficient mental methods of calculation.

Mathematical Talk

What do you notice about the sequence of square numbers?

What do you notice about the sequence of cube numbers?

Explore the pattern of the difference between the numbers.

Varied Fluency

Use <, > or = to make the statements correct.

3 cubed ◯ 4 squared

8 squared ◯ 4 cubed

11 squared ◯ 5 cubed

This table shows square and cube numbers. Complete the table.
Explain the relationships you can see between the numbers.

		1			1
					8
	3×3		3^3		27
	4×4			$4 \times 4 \times 4$	
		25	5^3		
				$6 \times 6 \times 6$	
8^2					

___ + 35 = 99

210 − ___ = 41

Which square numbers are missing from the calculations?

Square & Cube Numbers

Reasoning and Problem Solving

Place 5 odd and 5 even numbers in the table.

	Not Cubed	Cubed
Over 100		
100 or less		

Possible cube numbers to use:

1, 8, 27, 64, 125, 216, 343, 512, 729, 1,000

Jack says,

The smallest number that is both a square number and a cube number is 64

Do you agree with Jack? Explain why you agree or disagree.

Jack is incorrect. 1 is the smallest number that is both a square number ($1^2 = 1$) and cube number ($1^3 = 1$).

Shade in all the square numbers on a 100 square.

Now shade in multiples of 4

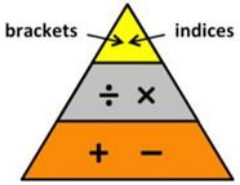
What do you notice?

Square numbers are always either a multiple of 4 or 1 more than a multiple of 4

Order of Operations

Notes and Guidance

Children will look at different operations within a calculation and consider how the order of operations affects the answer.
Children will learn that, in mixed operation calculations, calculations are not carried out from left to right.
Children learn the convention that when there is no operation sign written this means multiply e.g. $4(2 + 1)$ means $4 \times (2 + 1)$. This image is useful when teaching the order of operations.



Mathematical Talk

Does it make a difference if you change the order in a mixed operation calculation?

What would happen if we did not use the brackets?

Would the answer be correct?

Why?

Varied Fluency

- Alex has 7 bags with 5 sweets in each bag.
She adds one more sweet to each bag.
Which calculation will work out how many sweets she now has in total? Explain your answer.

$$7 \times (5 + 1)$$

$$7 \times 5 + 1$$

- Teddy has completed this calculation and got an answer of 5

$$14 - 4 \times 2 \div 4 = 5$$

Explain and correct his error.

- Add brackets and missing numbers to make the calculations correct.

$$6 + \_\_\_ \times 5 = 30$$

$$25 - 6 \times \_\_\_ = 38$$

Order of Operations

Reasoning and Problem Solving

Countdown

Big numbers: 25, 50, 75, 100

Small numbers: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10

Children randomly select 6 numbers.

Reveal a target number.

Children aim to make the target number ensuring they can write it as a single calculation using order of operations.

Write different number sentences using the digits 3, 4, 5 and 8 before the equals sign that use:

- One operation
- Two operations with no brackets
- Two operations with brackets

Possible solutions:

$58 - 34 = 24$

$58 + 3 \times 4 = 60$

$5(8 - 3) + 4 = 29$

Mental Calculations

Notes and Guidance

We have included this small step separately to ensure that teachers emphasise this important skill. Discussions with children around efficient mental calculations and sensible estimations need to run through all steps.

Sometimes children are too quick to move to computational methods, when more efficient mental strategies should be used.

Mathematical Talk

Is there an easy and quick way to do this?

Can you use known facts to answer the problem?

Can you use rounding?

Does the solution need an exact answer?

How does knowing the approximate answer help with the calculation?

Varied Fluency

How could you change the order of these calculations to be able to perform them mentally?

$50 \times 16 \times 2$

$30 \times 12 \times 2$

$4 \times 17 \times 25$

Mo wants to buy a t-shirt for £9.99, socks for £1.49 and a belt for £8.99
He has £22 in his wallet.
How could he quickly check if he has enough money?

What number do you estimate is shown by arrow B when:

- A = 0 and C = 1,000
- A = 30 and C = 150
- A = −7 and C = 17
- A = 1 and C = 2
- A = 1,000 and C = 100,000

Mental Calculations

Reasoning and Problem Solving

Class 6 are calculating the total of 3,912 and 3,888

Alex says,

We can just double 3,900

Is Alex correct? Explain.

Alex is correct because 3,912 is 12 more than 3,900 and 3,888 is 12 less than 3,900

3,900 × 2 = 7,800

2,000 – 1,287

Here are three different strategies for this subtraction calculation:

I used the column method.

Dora

I used my number bonds from 87 to 100 then from 1,300 to 2,000

Tommy

I subtracted one from each number and then used the column method.

Jack

Whose method is most efficient?

Children share their ideas. Discuss how Dora's method is inefficient for this calculation because of the need to make multiple exchanges.

Jack's method is known as the 'constant difference' method and avoids exchanging.

Reason from Known Facts

Notes and Guidance

Children should use known facts from one calculation to determine the answer of another similar calculation without starting afresh.

They should use reasoning and apply their understanding of commutativity and inverse operations.

Mathematical Talk

What is the inverse?

When do you use the inverse?

How can we use multiplication/division facts to help us answer similar questions?

Varied Fluency

Complete.

$70 \div \_\_\_ = 7$ $3.5 \times 10 = \_\_\_$

$70 \div \_\_\_ = 3.5$ $\_\_\_ = 3.5 \times 20$

$70 \div \_\_\_ = 14$ $\_\_\_ = 3.5 \times 2$

Make a similar set of calculations using $90 \div 2 = 45$

$5{,}138 \div 14 = 367$

Use this to calculate 15×367

$14 \times 8 = 112$

Use this to calculate:

- 1.4×8
- 9×14

Reason from Known Facts

Reasoning and Problem Solving

$$3{,}565 + 2{,}250 = 5{,}815$$

Use this calculation to decide if the following calculations are true or false.

True or False?

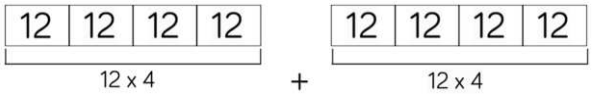
4,565 + 1,250 = 5,815	True
5,815 – 2,250 = 3,565	True
4,815 – 2,565 = 2,250	True
3,595 + 2,220 = 5,845	False

Which calculations will give an answer that is the same as the product of 12 and 8?

$$3 \times 4 \times 8$$

$$12 \times 4 \times 2$$

$$2 \times 10 \times 8$$



The product of 12 and 8 is 96

The 1st and 2nd calculations give an answer of 96
In the 1st calculation 12 has been factorised into 3 and 4, and in the 2nd calculation 8 has been factorised into 4 and 2

The third calculation gives an answer of 160