White Rose Maths

Spring - Block 1

Multiplication & Division

Overview

Small Steps

- Comparing statements
- Related calculations
- Multiply 2-digits by 1-digit (1)
- Multiply 2-digits by 1-digit (2)
- Divide 2-digits by 1-digit (1)
- Divide 2-digits by 1-digit (2)
- Divide 2-digits by 1-digit (3)
- Scaling
- How many ways?

NC Objectives

Recall and use multiplication and division facts for the 3, 4 and 8 multiplication tables.

Write and calculate mathematical statements for multiplication and division using the multiplication tables they know, including for two-digit numbers times one-digit numbers, using mental and progressing to formal written methods.

Solve problems, including missing number problems, involving multiplication and division, including positive integer scaling problems and correspondence problems in which n objects are connected to m objects.

Comparing Statements

Notes and Guidance

Children use their knowledge of multiplication and division facts to compare statements using inequality symbols.

It is important that children are exposed to a variety of representations of multiplication and division, including arrays and repeated addition.

Mathematical Talk

What other number sentences does the array show?

If you know your 4 times-table, how can you use this to work out your 8 times-table?

What's the same and what's different about 8 × 3 and 7 × 4?

Varied Fluency

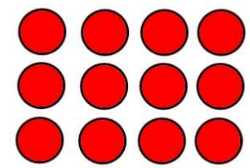
- Use the array to complete the number sentences.

$3 \times 4 = \square$

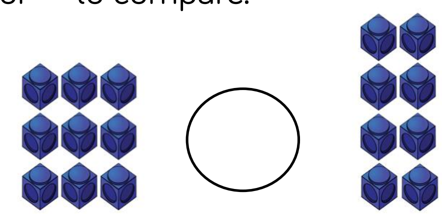
$4 \times 3 = \square$

$\square \div 3 = \square$

$\square \div 4 = \square$



- Use <, > or = to compare.



$\square \times \square = \square$ $\quad\quad$ $\square \times \square = \square$

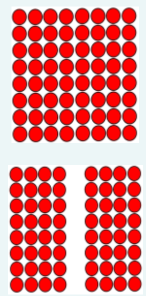
$8 \times 3 \bigcirc 7 \times 4$ $\quad\quad$ $36 \div 6 \bigcirc 36 \div 4$

- Complete the number sentences.

$5 \times 1 <$ _____ $\times$ _____ $\quad\quad$ $4 \times 3 =$ _____ $\div 3$

Comparing Statements

Reasoning and Problem Solving

Whitney says,  8 × 8 is greater than two lots of 4 × 8 Do you agree? Can you prove your answer?	Possible answer: She is wrong because they are equal. 
True or false? $6 \times 7 < 6 + 6 + 6 + 6 + 6 + 6 + 6$ $7 \times 6 = 7 \times 3 + 7 \times 3$ $2 \times 3 + 3 > 5 \times 3$	 False True False

Can you find three different ways to complete each number sentence? $\_\_\_ \times 3 + \_\_\_ \times 3 < \_\_\_ \div 3$ $\_\_\_ \div 4 < \_\_\_ \times 4 < \_\_\_ \times 4$ $\_\_\_ \times 8 > \_\_\_ \div 8 > \_\_\_ \times 8$	Possible answers include: $1 \times 3 + 1 \times 3 < 21 \div 3$ $1 \times 3 + 1 \times 3 < 24 \div 3$ $1 \times 3 + 1 \times 3 < 27 \div 3$ $24 \div 4 < 8 \times 4 < 12 \times 4$ $16 \div 4 < 5 \times 4 < 7 \times 4$ $8 \div 4 < 3 \times 4 < 4 \times 4$ $4 \times 8 > 88 \div 8 > 1 \times 8$ $2 \times 8 > 80 \div 8 > 1 \times 8$ $6 \times 8 > 96 \div 8 > 1 \times 8$

Related Calculations

Notes and Guidance

Children use known multiplication facts to solve other multiplication problems.

They understand that because one of the numbers in the calculation is ten times bigger, then the answer will also be ten times bigger.

It is important that children develop their conceptual understanding through the use of concrete manipulatives.

Mathematical Talk

What is the same and what is different about the place value counters?

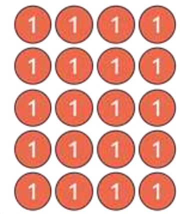
How does this fact help us solve this problem?

If we know these facts, what other facts do we know?

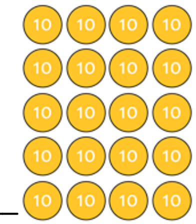
Can you prove your answer using manipulatives?

Varied Fluency

- Complete the multiplication facts.



___ × ___ = ___



___ × ___ = ___

- The number pieces represent 5 × ___ = ____

If each hole is worth ten, what do the pieces represent?

- If we know $2 \times 6 = 12$, we also know $2 \times 60 = 120$

Use this to complete the fact family.

$2 \times 60 = 120$	$\square \times \square = \square$
$\square \div \square = \square$	$\square \div \square = \square$

Complete the fact families for the calculations.

$3 \times 30 = \square$

$\square = 4 \times 80$

$160 \div 2 = \square$

Related Calculations

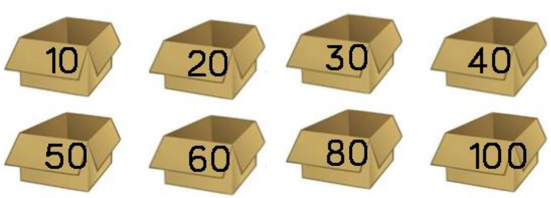
Reasoning and Problem Solving

> I know that when multiplying 3 by 40, 40 is ten times bigger than 4, so my answer will be ten times bigger than 3 × 4

Is Mo correct?
Explain your answer.

Mo is correct. I know $3 \times 4 = 12$, so if he has 3×40 then his answer will be ten times bigger because 4 has become ten times bigger.

Rosie has 240 cakes to sell.
She puts the same number of cakes in each box and has no cakes left over.
Which of these boxes could she use?



She could use 10, 20, 30, 40, 60, 80 because 240 is a multiple of all of these numbers.
$10 \times 24 = 240$
$20 \times 12 = 240$
$30 \times 8 = 240$
$40 \times 6 = 240$
$60 \times 4 = 240$
$80 \times 3 = 240$

True or false?

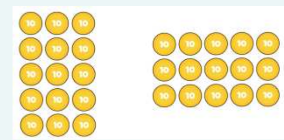
$$5 \times 30 = 3 \times 50$$

Prove it.

Possible response:

Children may represent it with place value counters.

True because they are equal.



Children may explore the problem in a context.

e.g. 5 lots of 30 apples compared to 3 lots of 50 apples.

Multiply 2-digits by 1-digit (1)

Notes and Guidance

Children use their understanding of repeated addition to represent a two-digit number multiplied by a one-digit number with concrete manipulatives. They use the formal method of column multiplication alongside the concrete representation. They also apply their understanding of partitioning to represent and solve calculations.
In this step, children explore multiplication with no exchange.

Mathematical Talk

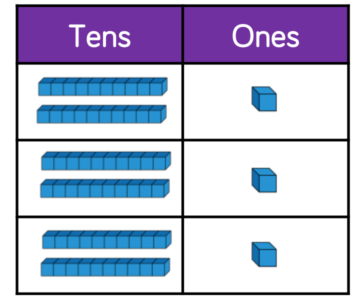
How does multiplication link to addition?

How does partitioning help you to multiply 2-digits by a 1-digit number?

How does the written method match the concrete representation?

Varied Fluency

- There are 21 coloured balls on a snooker table.
How many coloured balls are there on 3 snooker tables?



Use Base 10 to calculate:
21×4 and 33×3

- Complete the calculations to match the place value counters.

Tens	Ones
10 10	1 1
10 10	1 1
10 10	1 1
10 10	1 1

$\square + \square + \square + \square = \square$

$\square \times \square = \square$

- Annie uses place value counters to work out 34×2

Tens	Ones
10 10 10	1 1 1 1
10 10 10	1 1 1 1

	T	O
	3	4
×		2
	6	8

Use Annie's method to solve:
23×3
32×3
42×2

Multiply 2-digits by 1-digit (1)

Reasoning and Problem Solving

Alex completes the calculation:

$$43 \times 2$$

Can you spot her mistake?

	T	O
	4	3
×		2
		6
+		8
	1	4

Alex has multiplied 4 by 2 rather than 40 by 2

Teddy completes the same calculation as Alex.
Can you spot and explain his mistake?

	T	O
	4	3
×		2
8	0	6

Teddy has written 80 where he should have just put an 8 because he is multiplying 4 tens by 2 which is 8 tens. The answer should be 86

Dexter says,

$4 \times 21 = 2 \times 42$

Is Dexter correct?

True. Both multiplications are equal to 84

Children may explore that one number has halved and the other has doubled.

Multiply 2-digits by 1-digit (2)

Notes and Guidance

Children continue to use their understanding of repeated addition to represent a two-digit number multiplied by a one-digit number with concrete manipulatives.
They move on to explore multiplication with exchange. Each question in this step builds in difficulty.

Mathematical Talk

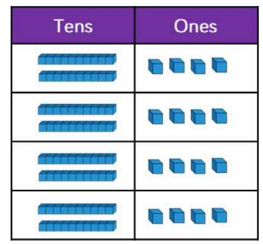
What happens when we have ten or more ones in a column?
What happens when we have twenty or more ones in a column?

How do we record our exchange?

Do you prefer Jack's method or Amir's method?
Can you use either method for all the calculations?

Varied Fluency

Jack uses Base 10 to calculate 24 × 4



	T	O
	2	4
×		4
	9	6
	1	

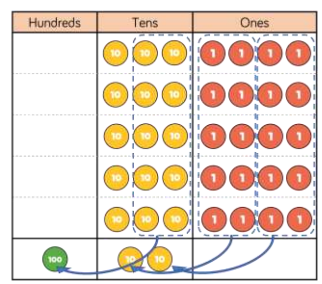
Use Jack's method to solve:
13 × 4
23 × 4
26 × 3

Amir uses place value counters to calculate 16 × 4

	T	O
	1	6
×		4
	6	4
	2	

Use Amir's method to solve:
16 × 6
17 × 5
28 × 3

Amir then calculates 5 × 34



	T	O
	3	4
×		5
1	7	0
1	2	

Use Amir's method to solve:
36 × 6
48 × 4

Multiply 2-digits by 1-digit (2)

Reasoning and Problem Solving

Always, Sometimes, Never?

A two-digit number multiplied by a one-digit number has a two-digit product.

Sometimes.

e.g.

$13 \times 5 = 65$

$31 \times 5 = 155$

Explain the mistake.

H	T	O
	2	7
×		3
6	2	1

They have not performed the exchange correctly.
6 tens and 2 tens should be added together to make 8 tens so the correct answer is 81

How close can you get to 100?
Use each digit card once in the multiplication.

2 3 4

$\square\square \times \square =$

You can get within 8 of 100

$23 \times 4 = 92$ this is the closest answer.

$24 \times 3 = 72$

$32 \times 4 = 128$

$34 \times 2 = 68$

Divide 2-digits by 1-digit (1)

Notes and Guidance

Children divide 2-digit numbers by a 1-digit number by partitioning into tens and ones and sharing into equal groups.

They divide numbers that do not involve exchange or remainders.

It is important that children divide the tens first and then the ones.

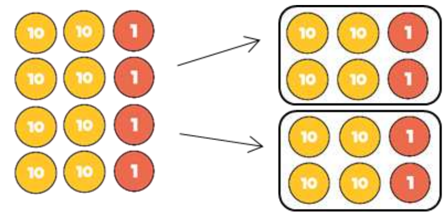
Mathematical Talk

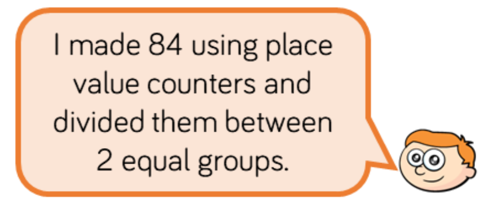
How can we partition the number?
How many tens are there?
How many ones are there?
What could we use to represent this number?
How many equal groups do I need?

How many rows will my place value chart have?
How does this link to the number I am dividing by?

Varied Fluency

Ron uses place value counters to solve 84 ÷ 2

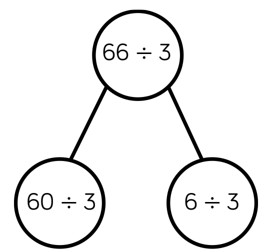




Use Ron's method to calculate:
84 ÷ 4 66 ÷ 2 66 ÷ 3

Eva uses a place value grid and part-whole model to solve 66÷ 3

Tens	Ones
10 10	1 1
10 10	1 1
10 10	1 1



Use Eva's method to calculate:
69 ÷ 3 96 ÷ 3 86 ÷ 2

Divide 2-digits by 1-digit (1)

Reasoning and Problem Solving

Teddy answers the question 44 ÷ 4 using place value counters.

Tens	Ones
10 10	1 1
10 10	1 1

Is he correct?
Explain your reasoning.

Teddy is incorrect. He has divided 44 by 2 instead of by 4

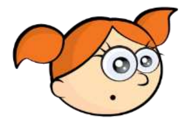
Dora thinks that 88 sweets can be shared equally between eight people.

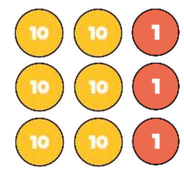
Is she correct?

Dora is correct because 88 divided by 8 is equal to 11

T	O
10	1
10	1
10	1
10	1
10	1
10	1
10	1
10	1

Alex uses place value counters to help her calculate 63 ÷ 3





Tens	Ones
10	10 1
10	10 1
10	10 1

She gets an answer of 12
Is she correct?

Alex is incorrect because she has not placed counters in the correct columns.

It should look like this:

Tens	Ones
10 10	1
10 10	1
10 10	1

The correct answer is 21

Divide 2-digits by 1-digit (2)

Notes and Guidance

Children divide 2-digit numbers by a 1-digit number by partitioning into tens and ones and sharing into equal groups.

They divide numbers that involve exchanging between the tens and ones. The answers do not have remainders.

Children use their times-tables to partition the number into multiples of the divisor.

Mathematical Talk

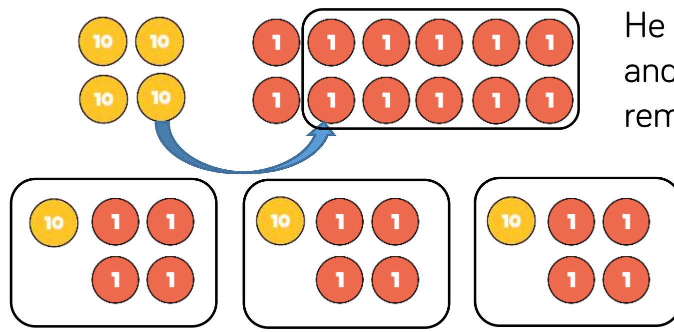
Why have we partitioned 42 into 30 and 12 instead of 40 and 2?

What do you notice about the partitioned numbers and the divisor?

Why do we partition 96 in different ways depending on the divisor?

Varied Fluency

- Ron uses place value counters to divide 42 into three equal groups.

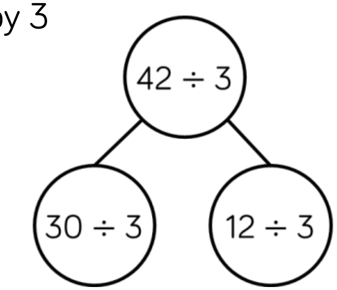


He shares the tens first and exchanges the remaining ten for ones.

Then he shares the ones.
$42 \div 3 = 14$

Use Ron's method to calculate $48 \div 3$, $52 \div 4$ and $92 \div 8$

- Annie uses a similar method to divide 42 by 3



Use Annie's method to calculate:

$96 \div 8$ $96 \div 4$ $96 \div 3$ $96 \div 6$

Divide 2-digits by 1-digit (2)

Reasoning and Problem Solving

Compare the statements using <, > or =

$48 \div 4$ ◯ $36 \div 3$

$52 \div 4$ ◯ $42 \div 3$

$60 \div 3$ ◯ $60 \div 4$

=

<

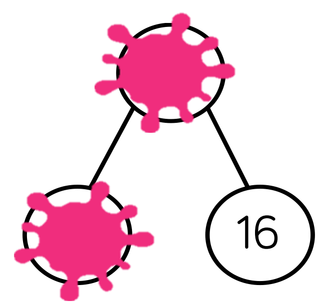
>

Amir partitioned a number to help him divide by 8

Some of his working out has been covered with paint.

What number could Amir have started with?

 $\div 8$



The answer could be 56 or 96

Divide 2-digits by 1-digit (3)

Notes and Guidance

Children move onto solving division problems with a remainder.
Links are made between division and repeated subtraction, which builds on learning in Year 2
Children record the remainders as shown in Tommy's method.
This notation is new to Year 3 so will need a clear explanation.

Mathematical Talk

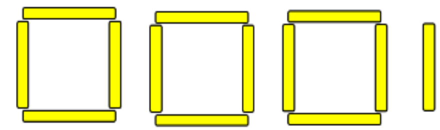
How do we know 13 divided by 4 will have a remainder?

Can a remainder ever be more than the divisor?

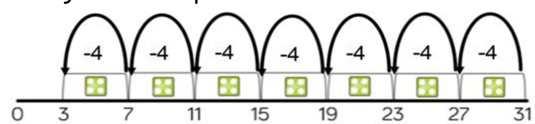
Which is your favourite method?
Which methods are most efficient with larger two digit numbers?

Varied Fluency

- How many squares can you make with 13 lollipop sticks?
  There are ___ lollipop sticks.
  There are ___ groups of 4
  There is ___ lollipop stick remaining.
  $13 \div 4 =$ ___ remainder ___
  Use this method to see how many triangles you can make with 38 lollipop sticks.



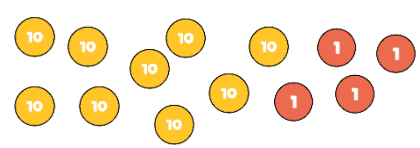
- Tommy uses repeated subtraction to solve $31 \div 4$



$31 \div 4 = 7 \text{ r } 3$

  Use Tommy's method to solve 38 divided by 3

- Use place value counters to work out $94 \div 4$
  Did you need to exchange any tens for ones?
  Is there a remainder?



Tens	Ones

Divide 2-digits by 1-digit (3)

Reasoning and Problem Solving

Which calculation is the odd one out? Explain your thinking. 64 ÷ 8 77 ÷ 4 49 ÷ 6 65 ÷ 3	64 ÷ 8 could be the odd one out as it is the only calculation without a remainder. Make sure other answers are considered such as 65 ÷ 3 because it is the only one being divided by an odd number.

Jack has 15 stickers.  He sorts his stickers into equal groups but has some stickers remaining. How many stickers could be in each group and how many stickers would be remaining?	There are many solutions, encourage a systematic approach. e.g. 2 groups of 7, remainder 1 3 groups of 4, remainder 3 2 groups of 6, remainder 3
Dora and Eva are planting bulbs. They have 76 bulbs altogether. Dora plants her bulbs in rows of 8 and has 4 left over. Eva plants her bulbs in rows of 10 and has 2 left over. How many bulbs do they each have?	Dora has 44 bulbs. Eva has 32 bulbs.

Scaling

Notes and Guidance

It is important that children are exposed to problems involving scaling from an early age.
Children should be able to answer questions that use the vocabulary “times as many”.
Bar models are particularly useful here to help children visualise the concept. Examples and non-examples should be used to ensure depth of understanding.

Mathematical Talk

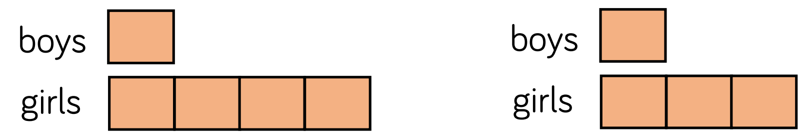
Why might someone draw the first bar model? What have they misunderstood?

What is the value of Amir’s counters? How do you know?

How many adults are at the concert? How will you work out the total?

Varied Fluency

- In a playground there are 3 times as many girls as boys.



Which bar model represents the number of boys and girls? Explain your choice.

- Draw a bar model to represent this situation.

In a car park there are 5 times as many blue cars as red cars.

- Eva has these counters 

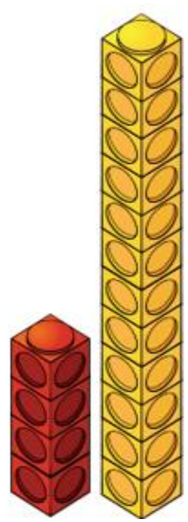
Amir has 4 times as many counters.
How many counters does Amir have?

- There are 35 children at a concert.
3 times as many adults are at the concert.
How many people are at the concert in total?

Scaling

Reasoning and Problem Solving

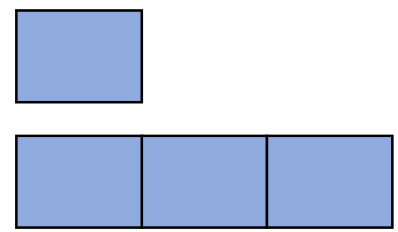
Dora says Mo's tower is 3 times taller than her tower.
Mo says his tower is 12 times taller than Dora's tower.
Who do you agree with?
Explain why?



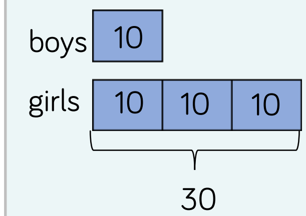
Dora's tower Mo's tower

I agree with Dora. Her tower is 4 cubes tall. Mo's tower is 12 cubes tall. 12 is 3 times as big as 4. Mo has just counted his cubes and not compared them to Dora's tower.

In a playground there are 3 times as many girls as boys.
There are 30 girls.
Label and complete the bar model to help you work out how many boys there are in the playground.



There are 10 boys in the playground.



A box contains some counters.
There are twice as many green counters as pink counters.
There are 18 counters in total.
How many pink counters are there?

There are 6 pink counters.

How Many Ways?

Notes and Guidance

Children list systematically the possible combinations resulting from two groups of objects. Encourage the use of practical equipment and ensure that children take a systematic approach to each problem.
Children should be encouraged to calculate the total number of ways without listing all the possibilities. e.g. Each T-shirt can be matched with 4 pairs of trousers so altogether $3 \times 4 = 12$ outfits.

Mathematical Talk

What are the names of the shapes on the shape cards?
How do you know you have found all of the ways?
Would making a table help?

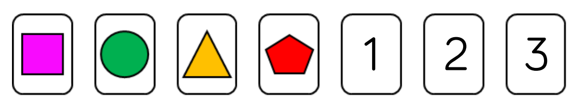
Without listing, can you tell me how many possibilities there would be if there are 5 different shape cards and 4 different number cards?

Varied Fluency

Jack has 3 T-shirts and 4 pairs of trousers. Complete the table to show how many different outfits he can make.

T-shirt	Trousers
Blue	Blue
Blue	Dark blue
Blue	Orange
Blue	Green

Alex has 4 shape cards and 3 number cards.

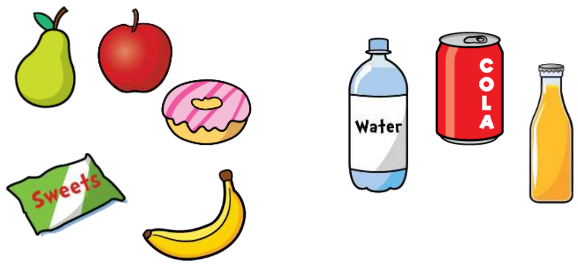


She chooses a shape card and a number card.
List all the possible ways she could do this.

How Many Ways?

Reasoning and Problem Solving

Eva chooses a snack and a drink.



What could she have chosen?
How many different possibilities are there?

_____ × _____ = _____

There are _____ possibilities.

How many of the ways contain an apple?

There are 15 possibilities.
AW
AC
AO
PW
PC
PO
SW
SC
SO
DW
DC
DO
BW
BC
BO

3 ways contain an apple.

Jack has some jumpers and pairs of trousers.
He can make 15 different outfits.
How many jumpers could he have and how many pairs of trousers could he have?

He could have:
1 jumper and 15 pairs of trousers.
3 jumpers and 5 pairs of trousers.
15 jumpers and 1 pair of trousers.
5 jumpers and 3 pairs of trousers.