

Year 3

Small Steps Guidance and Examples

Block 3 – Multiplication & Division

White Rose Maths

Overview

Small Steps

- ▶ Multiplication – equal groups
- ▶ Multiplying by 3
- ▶ Dividing by 3
- ▶ The 3 times-table
- ▶ Multiplying by 4
- ▶ Dividing by 4
- ▶ The 4 times-table
- ▶ Multiplying by 8
- ▶ Dividing by 8
- ▶ The 8 times-table

NC Objectives

Count from 0 in multiples of 4, 8, 50 and 100

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 objectives.

Multiplication – Equal Groups

Notes and Guidance

Children will recap their understanding of recognising, making and adding equal groups. This will allow them to build on prior understanding and prepare them for the next small steps.

Mathematical Talk

What is the same and what is different between each of the groups?

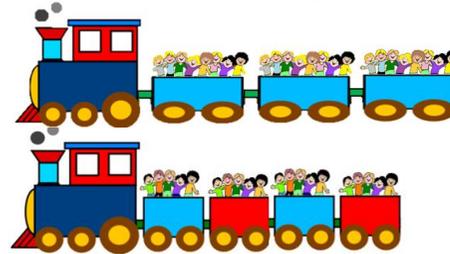
What does the 3 represent?

What does the 8 represent?

How can we represent the groups?

Varied Fluency

1 Describe the equal groups.



2 How many different ways can you represent 'six equal groups with four equal groups'; 'six 4s'?

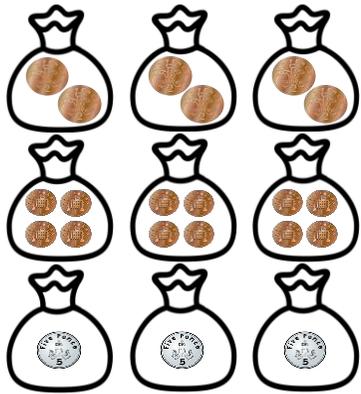
3 Complete.

	Draw it
Say it There are ___ equal groups with ___ in each group. There are ___	Add it

Multiplication – Equal Groups

Reasoning and Problem Solving

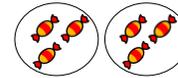
Which group of money bags is the odd one out?



The group with 5p bags in each because the 2ps and 1ps have 4p in each group.

Explain why.

Match the equal groups together.



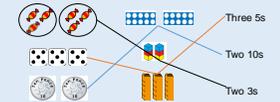
Three 5s



Two 10s

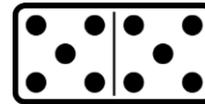


Two 3s



Which is the odd one out?

Explain why.



Two 5s

$$5 + 5 =$$



Ten

The red number pieces are the odd one out because the other groups are showing two fives and this shows three fives.

Multiply by 3

Notes and Guidance

At this stage, children will draw on their knowledge of counting in threes in order to start to multiply by 3.

They will use their knowledge of equal groups to use concrete and pictorial methods to solve multiplication.

Mathematical Talk

How many equal groups do we have?

How many are in each group?

How many do we have altogether?

Can you write a number sentence to show this?

Can you represent the problem in a picture?

Can you use concrete apparatus to solve the problem?

How many lots of 3 do we have?

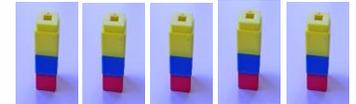
How many groups of 3 do we have?

Varied Fluency

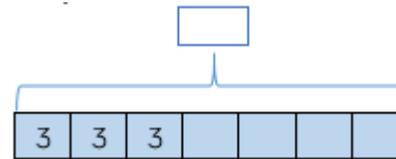
- 1 There are five towers of 3 cubes.
How many cubes are there altogether?

$$_ + _ + _ + _ + _ =$$

$$_ \times _ =$$



- 2 There are 7 tricycles in the playground.
How many wheels are there altogether?
Complete the bar model to find the answer.



- 3 There are 3 tables with 6 children on each table.
How many children are there altogether?

$$_ \text{ lots of } _ =$$

$$_ \times _ =$$

Multiply by 3

Reasoning and Problem Solving

There are 6 children.
Each child has 3 sweets.
How many sweets altogether?

Use concrete or pictorial representations to show this problem.

Write another repeated addition and multiplication problem and ask a friend to represent it.

There are 18 sweets altogether.

Children may use items such as counters or cube.

They could draw a bar model for a pictorial representation.

If $5 \times 3 = 15$
Which number sentences would find the answer to 6×3 ?

- $5 \times 3 + 6$
- $5 \times 3 + 3$
- $15 + 3$
- $15 + 6$
- 3×6

Explain how you know.

$5 \times 3 + 3$ because one more lot of 3 will find the answer.

$15 + 3$ because adding one more lot of 3 to the answer to 5 lots will give me 6 lots.

3×6 because it is commutative.

Divide by 3

Notes and Guidance

Here children will explore dividing by 3 through sharing into three groups and grouping in threes.

They will use concrete and pictorial representations and use their knowledge of the inverse to check their answers.

Mathematical Talk

Can you group the numbers in threes?

Can you share the number into three groups?

What is the difference between sharing and grouping?

Varied Fluency

- 1 Circle the counters in groups of 3 and complete the division.



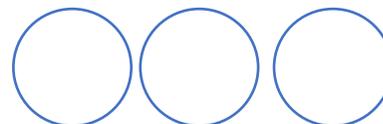
$$_ \div 3 = _$$

Circle the counters in 3 equal groups and complete the division.



$$_ \div 3 = _$$

- 2 There are 15 pieces of fruit. They are shared between 3 bowls equally. How many pieces of fruit in each bowl? Children use cubes to represent fruit and share between bowls.



$$15 \div 3 = _$$

- 3 Bubbles come in packs of 3. If there are 21 bubbles altogether, how many packs are there?

Divide by 3

Reasoning and Problem Solving

Share 33 cubes between 3 parts.

Complete:

There are 3 parts with ____ cubes in each part.

$$33 \div 3 = \underline{\quad}$$

Put 33 cubes into groups of 3

Complete:

There are ____ parts with 3 cubes in each part.

$$33 \div 3 = \underline{\quad}$$

What is the same about these two divisions?

What is different?

The divisors have the same numbers in.

The numbers in the divisions mean different things.

In the first question, the cubes are being shared.

The 3 is the number of parts.

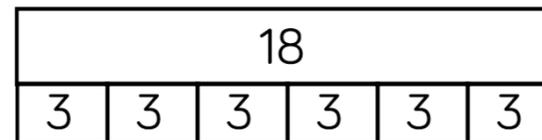
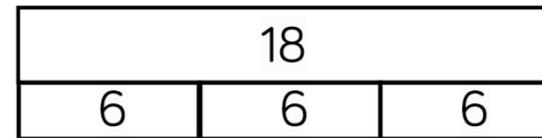
In the second question, the cubes are being grouped.

The 3 is the amount in each part.

Jack has 18 seeds.

He plants 3 seeds in each pot.

Which bar model matches the problem?



Explain your choice.

The second bar model matches the problem because Jack plants 3 seeds in each pot therefore there will be 6 parts.

The 3 Times-Table

Reasoning and Problem Solving

Sort the cards below so they follow round in a loop.

The number at the top is the answer.
Then follow the instruction at the bottom to get the next answer.

Start at $18 - 3$

18 - 3	21 ÷ 3	15 ÷ 3	8 - 5
5 x 2	10 x 2	20 + 1	4 x 2
14 - 2	12 ÷ 3	3 x 6	7 x 2

Order:

$$18 - 3$$

$$15 \div 3$$

$$5 \times 2$$

$$10 \times 2$$

$$20 + 1$$

$$21 \div 3$$

$$7 \times 2$$

$$14 - 2$$

$$12 \div 3$$

$$4 \times 2$$

$$8 - 5$$

$$3 \times 6$$

Start this rhythm:

Clap, clap, click, clap, clap, click.

Carry on the rhythm, what will you be doing on the 15th beat?

How do you know?

What will you be doing on the 20th beat?

Explain your answer.

Clicks are multiples of three.

On the 15th beat, I will be clicking because it is a multiple of 3

On the 20th beat, I will be clapping because it is not a multiple of 3

Multiply by 4

Notes and Guidance

Building on their knowledge of the two times table, children start to multiply by four. They can link to the idea of doubling the number and doubling again.

They can link multiplying by four to repeated addition and counting in fours.

To show the multiplication of four, teachers may use Numicon, cubes, counters, bar models etc.

Mathematical Talk

How many equal groups do we have?

How many are in each group?

How many do we have altogether?

Can you write a number sentence to show this?

Can you represent the problem in a picture?

Can you use concrete apparatus to solve the problem?

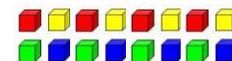
How many lots of 4 do we have?

How many groups of 4 do we have?

Varied Fluency

1 Match the multiplication to the representation.

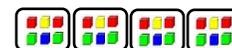
8×4



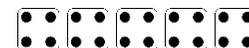
4×4



4×6



2 How many dots altogether?

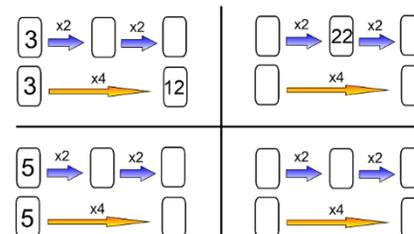


There are dice with dots on each.

There are fours.

 \times = dots.

3 Complete the function machines.



Multiply by 4

Reasoning and Problem Solving

Gavin has four bags with five sweets in each bag.

Stacey has six bags with four sweets in each bag.

Who has more sweets?

How many more sweets do they have?

Draw a picture to show this problem.

Stacey has more sweets.

She has four more sweets than Gavin.

Here is a blue strip of paper.



An orange strip is four times as long.



The strips are joined end to end.



20 cm

How long is the blue strip?

How long is the orange strip?

Explain how you know.

The blue strip is 4cm long.

The orange strip is 16cm long.

I know this because the orange strip is 4 times as long so there are 5 equal parts.

$$20 \div 5 = 4$$

Divide by 4

Notes and Guidance

Here children will explore dividing by 4 through sharing into four groups and grouping in fours.

They will use concrete and pictorial representations and use their knowledge of the inverse to check their answers.

Mathematical Talk

Can you group the numbers in fours?

Can you share the number into four groups?

What is the difference between sharing and grouping?

Varied Fluency

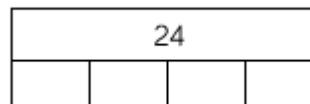
- 1 Circle the buttons in groups of 4



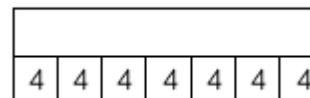
Can you also split the buttons into 4 equal groups?
How is it different? How is it the same?

- 2 There are some cars in a car park.
Each car has 4 wheels.
In the car park there are 32 wheels altogether.
How many cars are there?

- 3 Complete the bar models and complete the calculations.



$$24 \div 4 = \square$$



$$\square \div 4 = \square$$

Divide by 4

Reasoning and Problem Solving

Which of the word problems can be solved using $12 \div 4$?

There are 12 bags of sweets with 4 sweets in each.
How many altogether?

A rollercoaster carriage holds 4 people.
How many carriages are needed for 12 people?

I have 12 crayons and share them out so people have 4 crayons each.
How many people did I share them between?

I have 12 buns and I give 4 to my brother.
How many do I have left?

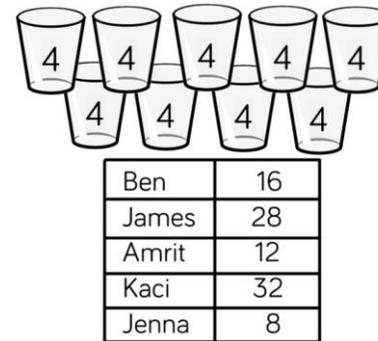
Explain your reasoning for each.

The rollercoaster question can be solved because there are 12 people grouped into fours.

The crayons questions can be solved because there are 12 crayons shared between 4 people.

Five children are playing a game.

They score 4 points for every bucket they knock down.



How many buckets did they knock down each?

How many buckets did they knock down altogether?

How many more buckets did James knock down than Ben?

Ben = 4 buckets.

James = 7 buckets.

Amrit = 3 buckets.

Kaci = 8 buckets.

Jenna = 2 buckets.

They knocked down 24 buckets altogether.

James knocked 3 more buckets down than Ben.

The 4 Times-Table

Notes and Guidance

Pupils will use knowledge of known multiplication tables (2, 3, 5 and 10× table) and understanding of key concepts of multiplication:

Pupils who have learnt $3 \times 4 = 12$ can use understanding of commutativity to know $4 \times 3 = 12$

Mathematical Talk

Can you use concrete or pictorial representations to help you solve the fact?

What other facts can you link to this one?

What other times tables will help you with this times table?

Varied Fluency

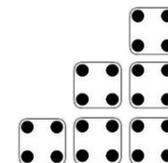
- 1 Use the pictorial representations to complete the calculations.

$$4 = 1 \times 4 = \underline{\quad}$$

$$4 + 4 = 2 \times 4 = \underline{\quad}$$

$$4 + 4 + 4 = 3 \times 4 = \underline{\quad}$$

Continue this pattern.



- 2 2 cars have eight wheels. How many wheels do 4 cars have?

$$2 \times 4 = 8$$

$$4 \times 4 = \underline{\quad}$$

Three cows have 12 legs. How many legs do six cows have?

$$3 \times \underline{\quad} = 12$$

$$6 \times \underline{\quad} = \underline{\quad}$$

- 3 Colour in the multiples of 4. What pattern do you notice?

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

The 4 Times-Table

Reasoning and Problem Solving

I have forgotten what 4×4 is



Saffi says,

“The answer is more than 3×4 ”

Complete the calculation to prove this.

$$4 \times 4 = _ \times 4 + _ = _$$

Izzy says,

“The answer is 4 less than 5×4 ”

Complete the calculation to prove this.

$$4 \times 4 = _ \times 4 + _ = _$$

Jo says,

“The answer is double 2×4 ”

Complete the calculation to prove this.

$$4 \times 4 = _ \times 4 + _ = _$$

Whose idea do you prefer? Why?

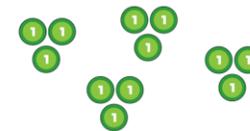
$$\begin{aligned} 4 \times 4 &= 3 \times 4 + 4 \\ &= 12 + 4 \\ &= 16 \end{aligned}$$

$$\begin{aligned} 4 \times 4 &= 5 \times 4 - 4 \\ &= 20 - 4 \\ &= 16 \end{aligned}$$

$$\begin{aligned} 4 \times 4 &= 4 \times 2 \times 2 \\ &= 16 \end{aligned}$$

Which part below does not show counting in fours?

$$4 + 4 + 4 + 4$$



Explain why.

The place value counters do not show counting in fours because each part has 3 in so it is counting in threes.

Multiply by 8

Notes and Guidance

Building on their knowledge of the four times table, children start to multiply by eight. They can link to the idea of doubling the number twice and then doubling again.

They can link multiplying by eight to previous knowledge of equal groups and repeated addition.

Children will explore the concept of multiplying by 8 in different ways; when 8 is the multiplicand and where 8 is the multiplier.

Mathematical Talk

How many equal groups do we have?

How many are in each group?

How many do we have altogether?

Can you write a number sentence to show this?

Can you represent the problem in a picture?

Can you use concrete apparatus to solve the problem?

How many lots of 8 do we have?

How many groups of 8 do we have?

We have 8 groups, how many are in each group?

Varied Fluency

1



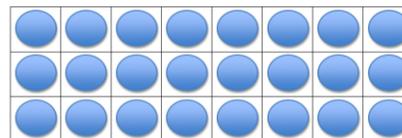
How many legs are there on four spiders?

$$_ + _ + _ + _ = _ \times _ = _$$

There are $_$ legs on each spider.

If there are $_$ spiders, there will be $_$ legs altogether.

2



Arrange 24 counters in an array as shown. Show:

$$_ + _ + _ = _$$

$$_ + _ + _ + _ + _ + _ + _ + _ = _$$

3

Fill in the table to show that multiplying by 8 is the same as double, double and double again.

6	6	6	6	6	6	6	6
$6 \times 2 = _$		$6 \times 2 = _$		$6 \times 2 = _$		$6 \times 2 = _$	
$_ \times 2 = _$				$_ \times 2 = _$			
$_ \times 2 = _$							

Multiply by 8

Reasoning and Problem Solving

$$8 \times 3 =$$

$$2 \times 4 \times 3 =$$

$$2 \times 2 \times 2 \times 3 =$$

What do you notice?
Why do you think this has happened?

Max calculates 8×6 by doing
 5×6 and $3 \times 6 =$
_____ + _____ = _____

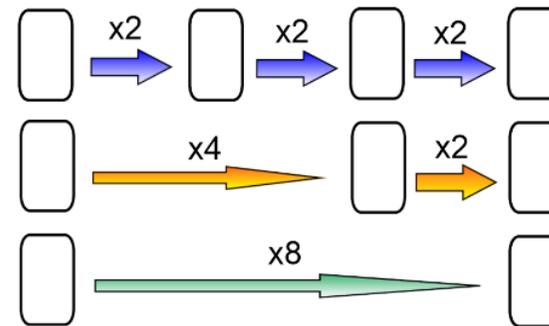
Paddy calculates 8×6 by doing
 $4 \times 6 \times 2$
_____ $\times 2 =$

Whose method do you prefer?
Explain why.

All of the answers
are equal.
Eight has been
split into numbers
that times together
to make it.

Possible answers:
I prefer Max's
method because I
know my 5 and 3
times tables.
I prefer Paddy's
method because I
know my 4 times
table and can
double numbers.

Start each function machine with the
same number.



What do you notice about each final
answer?

James knows the $4 \times$ table off by heart,
but is still learning the $8 \times$ table. Which
colour method should he use? Why?

Each time the final
number is 8 times
greater than the
starting number.

Yellow – because
he can double $4 \times$
to calculate $8 \times$.
E.g. I know 4×6
 $= 24$ so 8×6 is
double that (48).

Divide by 8

Notes and Guidance

Here children will explore dividing by 8 through sharing into eight groups and grouping in eights.

They will use concrete and pictorial representations and use their knowledge of the inverse to check their answers.

Mathematical Talk

Can you group the numbers in eights?

Can you share the number into eights groups?

Can you use any prior knowledge to check your answer?

Varied Fluency

- 1 There are 32 children in a PE lesson.
They are shared into 8 teams for a relay race.
How many children are in each team?
Use counters or multi-link to represent each child.
There are ___ teams and ___ children in each team.

- 2 Pens are sold in packs of 8.
Year 3 need 48 pens.
How many packs should be ordered?



- 3 Complete the missing numbers.

$$80 \div 8 = \square$$

$$24 \div \square = 8$$

$$64 \div 8 = \square$$

$$8 \times \square = 40$$

$$\square \times 8 = 16$$

$$\square \div 8 = 4$$

Divide by 8

Reasoning and Problem Solving

$48 \div 2 =$

$48 \div 4 =$

$48 \div 8 =$

What do you notice about the answers to these questions?

Can you predict what $48 \div 16$ would be?

Which numbers can be divided by 8 without a remainder?

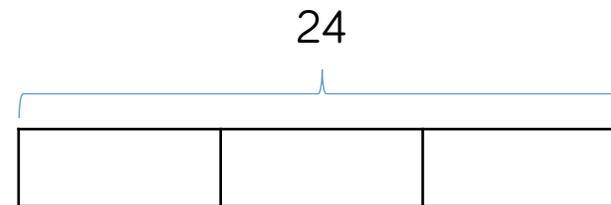
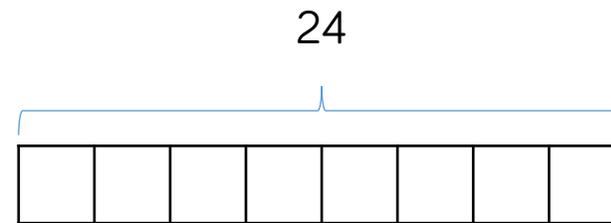
40 32
64 16 42
800

The answers halve and the divisors double.

3

40, 32, 64, 16, 800

Rohan shares 24 sweets equally between 8 friends. How many do they get each? Which bar model would you use to represent this problem? Why?



Although both can represent $24 \div 8 = 3$, the first bar model fits this word problem best.

The 8 Times-Table

Notes and Guidance

Pupils should use prior knowledge of multiplication facts for 2, 3, 4 and 5x tables (from prior learning) along with distributive law in order to calculate unknown multiplication facts.

Mathematical Talk

Can you use concrete or pictorial representations to help you solve the fact?

What other facts can you link to this one?

What other times tables will help you with this times table?

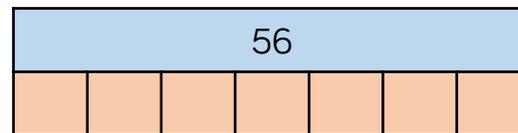
Varied Fluency

1 Complete the diagram using known facts.

$$6 \times 8 \begin{cases} 5 \times 8 = \square \\ \square \times 8 = \square \\ \hline \text{altogether } \square \end{cases}$$

6×8

2 Complete the bar model.



3 Complete the table.

×	2	4	8
3	6		
	10	20	
			72

Can you spot a pattern between the numbers?

The 8 Times-Table

Reasoning and Problem Solving



All the numbers in the 8 times table are even.

Explain why.

When you add an even number to an even number you always make an even number.

The 8 times table is repeated addition so keeps adding an even number each time.

On a blank hundred square colour multiples of 8 red and multiples of 4 blue.

Always, sometimes, never.

- Multiples of 4 are also multiples of 8
- Multiples of 8 are also multiples of 4

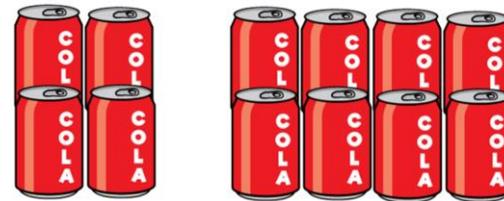
1) Sometimes – every other multiple is also a multiple of 8

The ones in between aren't because the jumps are smaller than 8

2) Always – 8 is a multiple of 4 therefore all multiples of 8 will be multiples of 4

Megan has a box of pop that are in packs.

Some packs have 4 cans in them and some packs have 8 cans in them.



Megan's box contains 64 cans of pop.

How many packs of 4 cans and how many packs of 8 cans could there be?

Find all the possibilities.

Possible answers:

- 2 packs of 4, 7 packs of 8
- 4 packs of 4, 6 packs of 8
- 6 packs of 4, 5 packs of 8
- 8 packs of 4, 4 packs of 8
- 10 packs of 4, 3 packs of 8
- 12 packs of 4, 2 packs of 8
- 14 packs of 4, 1 pack of 8