Released December 2017

Year 3

Small Steps Guidance and Examples

Block 1 – Multiplication & Division

White Rose Maths

Year 3 – Yearly Overview

	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8	Week 9	Week 10	Week 11	Week 12
Autumn	Number – Place Value			Number – Addition and Subtraction					Number – Multiplication and Division			Consolidation
Spring	Number - Multiplication and Division			Measurement: Money	Statistics		Measurement: length and perimeter			Number - Fractions		Consolidation
Summer	Number – fractions			Measurement: Time			Geometry – Properties of Shapes		Measurement: Mass and Capacity			Consolidation

Week 1 to 3 – Number: 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 objectives.

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 4 ×, how can you use this to work out your 8 ×?

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

Varied Fluency

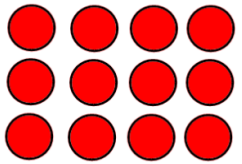
1 Use the array to complete the number sentences:

3 × 4 = ☐

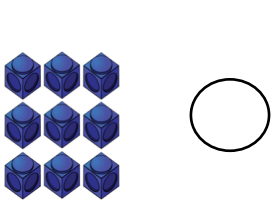
4 × 3 = ☐

☐ ÷ 3 = ☐

☐ ÷ 4 = ☐



2 Use < > or



___ × ___ = ___

8 × 3 ◯ 7 × 4

___ × ___ = ___

36 ÷ 6 ◯ 36 ÷ 4

3 Complete the number sentences:

5 × 1 < _____ × _____

4 × 3 = _____ ÷ 3

Comparing Statements

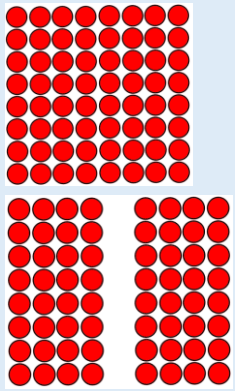
Reasoning and Problem Solving

Shadya says,

8 × 8 is greater than 4 × 8 twice

Do you agree?
Can you prove your answer?

Possible answer:
She is wrong because they are equal.



True or false

- 6 × 7 < 6 + 6 + 6 + 6 + 6 + 6 + 6
- 7 × 6 = 7 × 3 + 7 × 3
- 2 × 3 + 3 > 5 × 3

- False
- True
- False

Can you find three different ways to complete each number sentence?

___ × 3 + ___ × 3 < ___ ÷ 3

___ ÷ 4 < ___ × 4 < ___ × 4

___ × 8 > ___ ÷ 8 > ___ × 8

Possible answers:

1 × 3 + 1 × 3 < 21 ÷ 3

1 × 3 + 1 × 3 < 24 ÷ 3

1 × 3 + 1 × 3 < 27 ÷ 3

1 × 3 + 2 × 3 < 30 ÷ 3

24 ÷ 4 < 8 × 4 < 12 × 4

16 ÷ 4 < 5 × 4 < 7 × 4

8 ÷ 4 < 3 × 4 < 4 × 4

4 × 8 > 88 ÷ 8 > 1 × 8

2 × 8 > 80 ÷ 8 > 1 × 8

6 × 8 > 96 ÷ 8 > 1 × 8

Related Calculations

Notes and Guidance

Children use known multiplication facts to solve other multiplication problems. Children understand that because one of the numbers in the calculation has got ten times bigger, then the answer will also become 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?

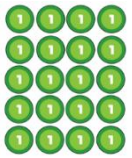
How does this fact help us solve this problem?

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

Can you prove your answer using manipulatives?

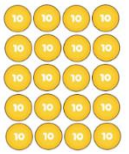
Varied Fluency

1 Complete the multiplication fact:



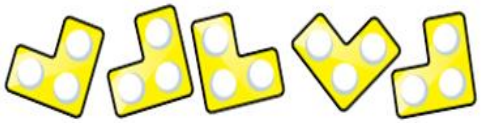
____ × ____ = ____

Use this to help you solve:



____ × ____ = ____

2 The number pieces represent 5 × ____ = _____



If each hole was worth ten, what would the pieces represent?

3 Complete the fact family for this calculation:

If we know that 2 × 6 = 12, we also know that...

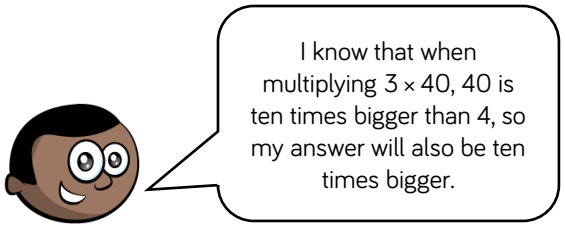
2 × 60 = 120	….. × ….. = …..
….. ÷ ….. = …..	….. ÷ ….. = …..

Can you do the same for these calculations:

- 3 × 30 = ☐
- ☐ = 4 × 80
- 160 ÷ 2 = ☐

Related Calculations

Reasoning and Problem Solving



Is Saif correct?
Prove it.

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

Chloe has 240 cakes to sell.
Boxes come in different sizes and can hold different multiples of 10
Which boxes could she use, making sure all boxes are full and there are no cakes left over?

Possible response:
She could use 10, 20, 30, 40, 60, 80 because 240 is a multiple of all of these numbers. E.g
10 × 24 = 240
20 × 12 = 240
30 × 8 = 240
40 × 6 = 240
60 × 4 = 240
80 × 3 = 240

True or false?

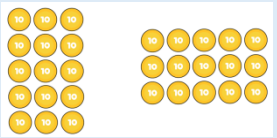
$$5 \times 30 = 3 \times 50$$

Prove it!

Possible response:

Children may represent it with place value counters.

True because they are equal.



Children may explore how it is different in a context though. For example, 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 also apply their understanding of partitioning to represent and solve calculations.
Children explore multiplication with no exchange on this step.

Mathematical Talk

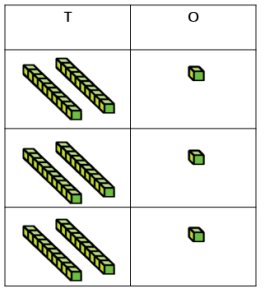
What is the value of each digit in my calculation?

If we have 21 and we are multiplying it by 3, what is this the same as?
Explain where the digits go in my answer to match the calculation.

Can you write a sensible story to represent the calculation?

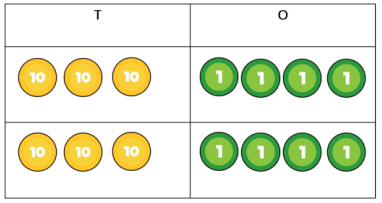
Varied Fluency

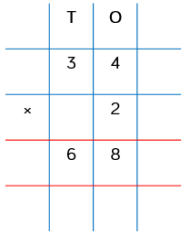
1 There are 21 chocolate bars in a vending machine.
How many chocolate bars will there be in 3 vending machines?
Use this method to solve:
21 × 4 and 33 × 3



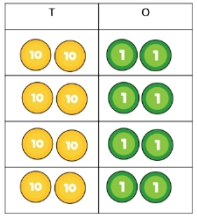
2 Complete the following calculations using place value counters:

- 34 × 2
- 23 × 3





3 Fill in the blanks and solve the calculation:



Multiply 2-digits by 1-digit (1)

Reasoning and Problem Solving

Martin completes the following calculation:

$$42 \times 2$$

Can you spot his mistake?

	T	O				
	4	2				
×		2				
		4		(2	×	2)
+		8		(4	×	2)
	1	2				

Martin has not understood the value of the digit 4 in the number 42. He has therefore multiplied 4 by 2 giving him an answer of 8, rather than multiplying 40 by 2 giving an answer of 80

Martin completes another calculation:

$$43 \times 2$$

Can you spot and explain his mistake?

	T	O
	4	3
x		2
8	0	6

Martin 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

I think of a number and multiply it by 3
My total is 99
What was my calculation?
Represent it with place value counters.

Children could begin by creating a place value grid with 3 rows and then use repeated addition to work out that the number would be 33

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. Children apply their understanding of place value to exchange when there are 10 or more in a place value column.

Mathematical Talk

How many ones are we multiplying? What will happen when I have more than 9 in my column?

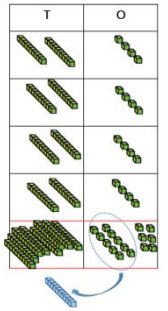
Will this calculation involve an exchange? Which column will the exchange take place?

Where can we see the exchange in the pictorial representation and the written method?

Varied Fluency

1 Calculate 24 × 4

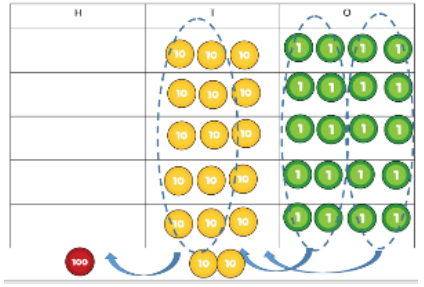
Use this method to work out the following.
28 × 3 16 × 6



	T	O	
	2	4	
×		4	
	9	6	
	1		

2 Use place value counters work out 5 × 35

Use this method to work out:
36 × 6
48 × 4



	T	O	
	3	5	
×		5	
1	7	5	
1	2		

3 There are 76 sweets in a bag. I buy 3 bags.
How many sweets do I have in total?

Multiply 2-digits by 1-digit (2)

Reasoning and Problem Solving

Always, Sometimes, Never

A two-digit number multiplied by a one-digit number makes a two-digit answer.

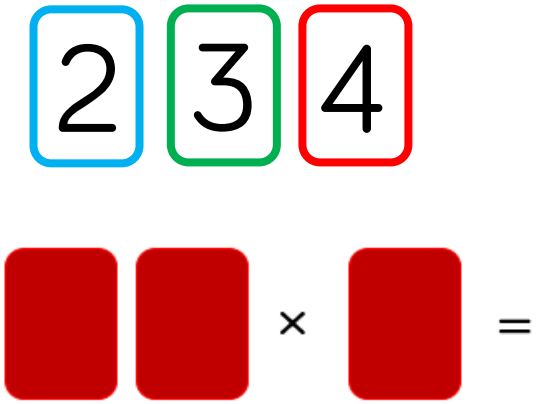
There are lots of solutions children may find. It will be sometimes as it can make a two or three digit answer depending on the number being multiplied.

Charlotte answered the question 27 × 3, her answer is 6021

What mistake could she have made?

Possible response: She has then put the 60 and 21 together to make 6021, rather than adding 21 and 60 to get the answer 81

Using the digit cards in the multiplication below how close can you get to 100?



23 × 4 = 92 this is the closest answer.

24 × 3 = 72

32 × 4 = 128

34 × 2 = 68

Children may also use estimation as part of their reasoning. For example, 23 is near 25 and there are 4 lots of 25 in 100

Divide 2-digits by 1-digit (1)

Notes and Guidance

Children build on their understanding of division from Year 2 and will continue to make connections with known multiplication facts to solve problems.
At this stage children will be using numbers that divide exactly without remainders.
Children will be exposed to different representations and will use concrete manipulatives to further their understanding.

Mathematical Talk

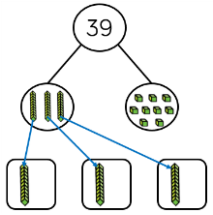
How can we partition the number?
How many tens are there?
How many ones are there?
What could we use to represent this number?

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

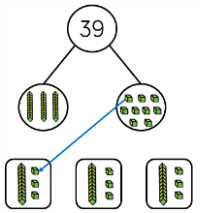
Varied Fluency

1 Using a part-whole model and Base 10 answer the following:
39 ÷ 3

Step 1: Share the tens

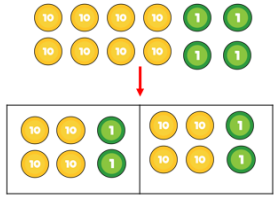


Step 2: Share the ones



Use this method to help you answer
48 ÷ 4 66 ÷ 6

2 Use counters to help you solve the following:



84 ÷ 2
69 ÷ 3
88 ÷ 4

3 Use place value counters to answer:

- 33 ÷ 3
- 86 ÷ 2
- 96 ÷ 3

T	O

Divide 2-digits by 1-digit (1)

Reasoning and Problem Solving

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

T	O
10 10	1 1
10 10	1 1

Is he correct?
Explain your reasoning.

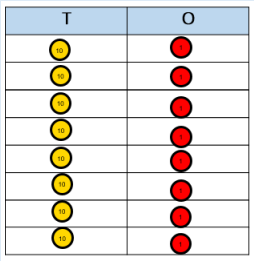
Jacob is incorrect. He has divided 44 by 2 instead of by 4

Prove it!

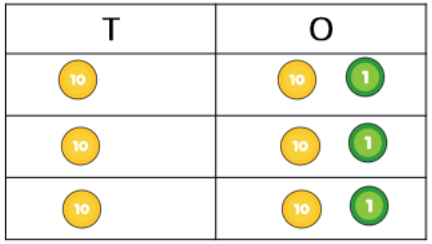
Lexi thinks that 88 sweets can be shared equally between eight people.

Is she correct?

Lexi is correct because 8 can be divided equally into 88 eleven times:



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

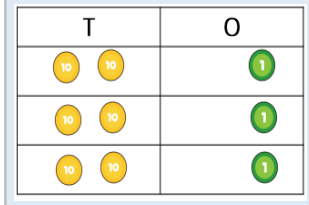


She gets an answer of 12
Is she correct?
Use place value counters to explain how you know.

Possible answer:

Grace is incorrect because she has not shared her ten counters in the tens column.

It should look like this:



The answer would be 21

Divide 2-digits by 1-digit (2)

Notes and Guidance

It is important that children know that there are multiple ways to partition a number.
Children will apply this partitioning knowledge and known multiplication facts to divide.
For example, 42 ÷ 3. 42 can be partitioned in to 30 and 12, these numbers are both multiples of 3 therefore they can be divided by 3 easily.

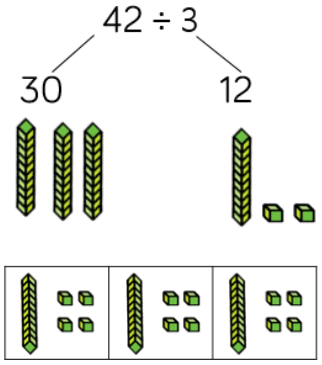
Mathematical Talk

How could you partition this number?
X can be partitioned into _____ and _____ .
Why did you choose to partition the number that way?
What do you notice about the partitioned numbers and the divisor?

Varied Fluency

1 Calculate 42 ÷ 3 using Base 10:

42 can be partitioned into _____ and _____.



30 ÷ 3 = _____

12 ÷ 3 = _____

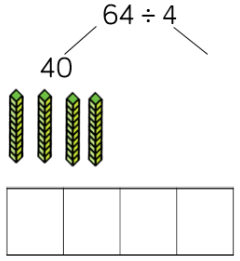
42 ÷ 3 = _____

2 64 can be partitioned into _____ and _____.

40 ÷ 4 = _____

16 ÷ 4 = _____

96 ÷ 8 = _____



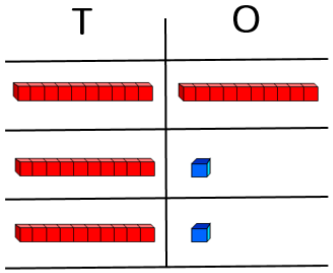
Use this method to calculate:

96 ÷ 8 96 ÷ 3 96 ÷ 6

Divide 2-digits by 1-digit (2)

Reasoning and Problem Solving

Jane is calculating 42 ÷ 3

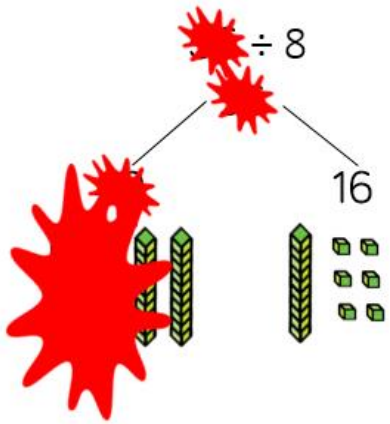


Can you spot and explain her mistake?

Jane should have partitioned 42 into 30 and 12 because both 30 and 12 are divisible by 3.
She has incorrectly placed one ten into the ones column.
She could exchange this ten for ten ones and then share the 12 ones equally between 3

Shadya partitioned a number to help her divide by 8

What number could Shadya have started with?



I know the answer would need to be in the 8 times tables.

I can see that one of the numbers used was 16, so my answer would need to end in a 6 and be in the 8 times table.

My answer could either be 56 or 96

Divide 2-digits by 1-digit (3)

Notes and Guidance

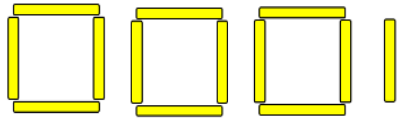
Children move onto solving division problems with a remainder. Children make links between division and repeated subtraction, which builds on learning in Year 2. They need to recognise that they don't have to start at the multiple when counting back from the dividend. Questions are designed to visually represent the concept of a reminder and will require the use of exchange.

Mathematical Talk

How can we share this amount equally?
When we are counting back are we grouping or sharing?
Do we have to start at a multiple of 4 when counting back in 4s?
Can we share the tens equally? Will we need to exchange?
How does this model show that we are sharing and not grouping?

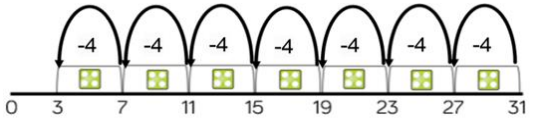
Varied Fluency

1 Use lollipop sticks to show how many squares you can make to answer 13 ÷ 4



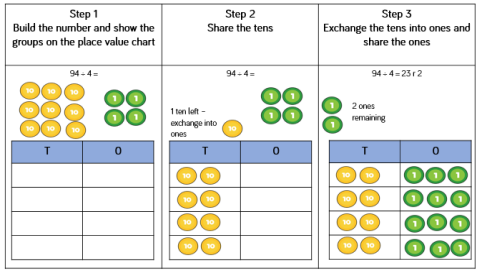
There are ___ lollipop sticks
There are ___ groups of 4
There is ___ lollipop remaining.
13 ÷ 4= ___ remainder ___
Use this method to see how many triangles you can make to answer 38 ÷ 3

2 31 ÷ 4
How many groups of 4 have you subtracted?



How many are remaining?
Use this method to solve 38 divided by 3

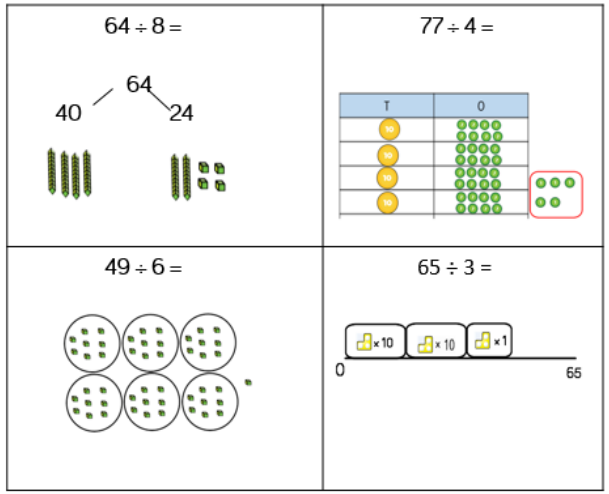
3 Here is a method to solve 94 divided by 4
Use this method to solve:
94 ÷ 7 94 ÷ 6



Divide 2-digits by 1-digit (3)

Reasoning and Problem Solving

Which calculation is the odd one out?
Explain how you know.



I know this because _____

64 ÷ 8 = 8 is the odd one out as it is the only calculation without a remainder.

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 to this, encourage a systematic approach. E.g.
2 groups of 7, remainder 1
3 groups of 4, remainder 3
2 groups of 6, remainder 3

Tami and Katie are planting bulbs. They have 76 bulbs altogether.

Tami plants her bulbs in rows of eight and has 4 left over.
Katie plants her bulbs in rows of 10 and has 2 left over.
How many bulbs does Tami have?
How many bulbs does Katie have?

Tami has 44 bulbs.
Katie has 32 bulbs.

Scaling

Notes and Guidance

Children explore multiplication and division involving scaling.
They use concrete and visual representations to understand scaling.
They connect the concept of scaling to multiplication and division facts. For example, 30 is 6 times bigger than 5 or 5 is 6 times smaller than 30

Mathematical Talk

How can we compare the two lines of cars? Can we link this to multiplication or division?
Can we represent this using other manipulatives?
_____ is _____ times bigger/smaller than _____.
How would we represent this using a bar model?
Is this bar ___ times smaller or larger than this bar?
Explain how you know.

Varied Fluency

1 Complete the sentences to describe Deacon's line of toy cars and Abigail's line of toy cars.

Deacon's line of cars is _____ times longer than Abigail's line of cars.
Abigail's line of cars is _____ times shorter than Deacon's line of cars.

2 Complete the sentence to describe the Cuisenaire rods.

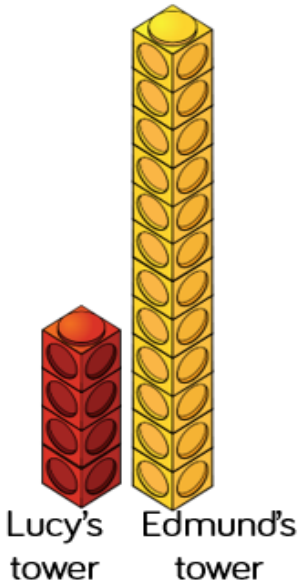
The white rod is _____ smaller than the yellow rod.
The yellow rod is _____ larger than the white rod.
Can you use other rods and compare them? How would you write this a multiplication or division sentence?

3 Complete the missing information:
30 is _____ times bigger than 5. _____ × _____ = _____
5 is _____ times smaller than 30. _____ ÷ _____ = _____
7 is _____ times smaller than 21. _____ ÷ _____ = _____
21 is _____ times bigger than 7. _____ × _____ = _____

Scaling

Reasoning and Problem Solving

Lucy says Edmund's tower is 3 times taller.
Edmund says his tower is 12 times taller.
Who do you agree with?
Explain why?



I agree with Lucy. Her tower is 4 cubes tall. Edmund's is 12 cubes tall. 12 is 3 times more than 4. Edmund has just counted his cubes and not compared them to Lucy's tower.

There are six eggs in an egg box.

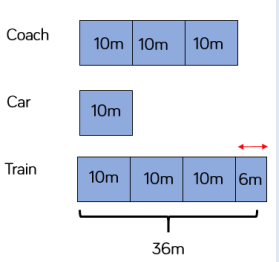
Stephen has 18 eggs.
He thinks he has 4 times more than one box.

Do you agree?

There will be 3 times as many eggs.
$3 \times 6 = 18$
There will be 18 eggs in total.

A coach is three times as long as a car.
A train is 6m longer than a coach.
The train is 36m long.
How long is the car?

The train is 36m
The coach:
$36 - 6 = 30$m
$30 \div 3 = 10$m
The car is 10m long.



How Many Ways?

Notes and Guidance

Pupils calculate the number of ways that an unknown number of objects can be connected to another unknown number of objects. For example, the number of ways that n objects are connected to m objects.

They use practical and visual representations to understand this relationship.

Mathematical Talk

What other number sentences does the image show?

How many other ways can you find to make 30?
Can you explain your method?

How many different solutions can you find?

Varied Fluency

1 Represent the number of wheels using multiplication sentences:

_____ × _____ =

_____ × _____ =

How many wheels are there in total?

2 The image shows that 6 × 2 + 6 × 3 = 30

Can you find another way of making 30 using multiplication facts for the 2 and 3 times tables?

3 Using the 3 and 4 times tables how can you make a total of 24?
Represent this with manipulatives.

How Many Ways?

Reasoning and Problem Solving

Tammy has £18.
She wants to buy some muffins and chocolate bars.
Muffins cost £3 and chocolate bars cost £4
How many muffins does she buy and how many chocolate bars does she buy?
Can you find more than one solution?

Tammy buys 3 chocolate bars and 2 muffins

Lottie is counting the number of wheels in a car park. Cars and bikes are in the car park. Cars have four wheels and bikes have two wheels. If there are 26 wheels altogether, how many cars and bikes might there be?

6 cars, 1 bike
6 × 4 = 24 1 × 2 = 2
24 + 2 = 26
5 cars, 3 bikes
5 × 4 = 20 3 × 2 = 6
20 + 6 = 26
4 cars, 5 bikes
4 × 4 = 16 5 × 2 = 10
16 + 10
3 cars, 7 bikes
3 × 4 = 12 7 × 2= 14
12 + 14 = 26
2 cars, 9 bikes
2 × 4 = 8 9 × 2 = 18
18 + 8 = 26
1 car, 11 bikes
1 × 4 = 4 11 × 2 = 22
22 + 4 = 26

William has 3 t-shirts and 4 pairs of trousers.

How many different outfits can he make?

There are 12 different outfits.

T-shirt	Trousers
Blue	Black
Blue	Green
Blue	Orange
Blue	Blue
Green	Black
Green	Green
Green	Orange
Green	Blue
Orange	Black
Orange	Green
Orange	Orange
Orange	Blue

For each t-shirt, there are four possible pairs of trousers. This is the same as 3 lots of 4 different