Autumn Scheme of Learning

Year 3/4

#MathsEveryoneCan

2019-20

White Rose Maths

How to use the mixed-age SOL

In this document, you will find suggestions of how you may structure a progression in learning for a mixed-age class.

Firstly, we have created a yearly overview.

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Year 1: Weight and Volume
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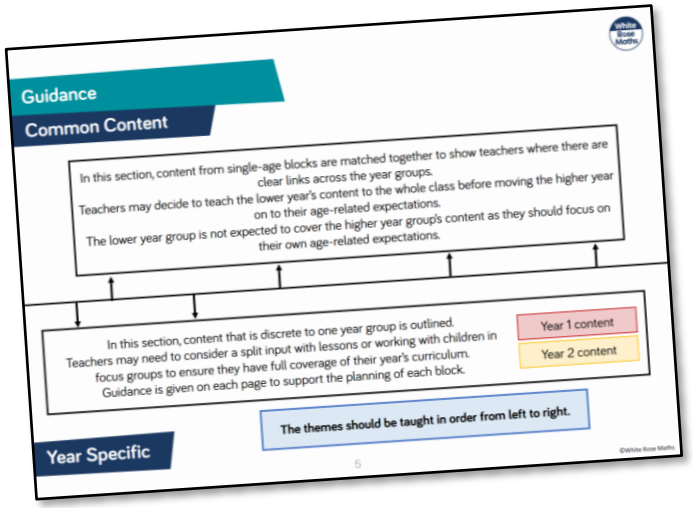
</table>

Each term has 12 weeks of learning. We are aware that some terms are longer and shorter than others, so teachers may adapt the overview to fit their term dates.

The overview shows how the content has been matched up over the year to support teachers in teaching similar concepts to both year groups. Where this is not possible, it is clearly indicated on the overview with 2 separate blocks.

For each block of learning, we have grouped the small steps into themes that have similar content. Within these themes, we list the corresponding small steps from one or both year groups. Teachers can then use the single-age schemes to access the guidance on each small step listed within each theme.

The themes are organised into common content (above the line) and year specific content (below the line). Moving from left to right, the arrows on the line suggest the order to teach the themes.



How to use the mixed-age SOL

Here is an example of one of the themes from the Year 1/2 mixed-age guidance.

Subtraction

Year 1 (Aut B2, Spr B1)
- How many left? (1)
- How many left? (2)
- Counting back
- Subtraction - not crossing 10
- Subtraction - crossing 10 (1)
- Subtraction - crossing 10 (2)

Year 2 (Aut B2, B3)
- Subtract 1-digit from 2-digits
- Subtract with 2-digits (1)
- Subtract with 2-digits (2)
- Find change - money

In order to create a more coherent journey for mixed-age classes, we have re-ordered some of the single-age steps and combined some blocks of learning e.g. Money is covered within Addition and Subtraction.

The bullet points are the names of the small steps from the single-age SOL. We have referenced where the steps are from at the top of each theme e.g. Aut B2 means Autumn term, Block 2. Teachers will need to access both of the single-age SOLs from our website together with this mixed-age guidance in order to plan their learning.

Points to consider

- Use the mixed-age schemes to see where similar skills from both year groups can be taught together. Learning can then be differentiated through the questions on the single-age small steps so both year groups are focusing on their year group content.
- When there is year group specific content, consider teaching in split inputs to classes. This will depend on support in class and may need to be done through focus groups .
- On each of the block overview pages, we have described the key learning in each block and have given suggestions as to how the themes could be approached for each year group.
- We are fully aware that every class is different and the logistics of mixed-age classes can be tricky. We hope that our mixed-age SOL can help teachers to start to draw learning together.

Guidance

Common Content

In this section, content from single-age blocks are matched together to show teachers where there are clear links across the year groups.
Teachers may decide to teach the lower year's content to the whole class before moving the higher year on to their age-related expectations.
The lower year group is not expected to cover the higher year group's content as they should focus on their own age-related expectations.

In this section, content that is discrete to one year group is outlined.
Teachers may need to consider a split input with lessons or working with children in focus groups to ensure they have full coverage of their year's curriculum.
Guidance is given on each page to support the planning of each block.

Year 3 content

Year 4 content

Year Specific

The themes should be taught in order from left to right.

	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			
Spring	Number: Multiplication and Division		Measurement: Length, Perimeter and Area		Number: Fractions				Y3: Measurement: Mass and Capacity			Consolidation
									Y4: Number: Decimals			
Summer	Number: Decimals (including Money)			Measurement: Time	Statistics		Geometry: Properties of Shape (including Y4 Position and Direction)					Consolidation

Multiplication and Division

Common Content

Times-tables

Year 3 (Aut B3)
- Multiply by 3
- Divide by 3
- 3 times-table
- Multiply by 4
- Divide by 4
- 4 times-table
- Multiply by 8
- Divide by 8
- 8 times-table

Year 4 (Aut B4, Spr B1)
- Multiply and divide by 6
- 6 times table and division facts
- Multiply and divide by 9
- 9 times table and division facts
- Multiply and divide by 7
- 7 times table and division facts
- 11 and 12 times table

Comparing and applying

Year 3 (Spr B1)
- Comparing statements
- Related calculations

Year 4 (Spr B1)
- Multiply 3 numbers
- Efficient multiplication

Equal groups

Year 3 (Aut B3)
- Multiplication-equal groups

Multiplying and dividing by 10,100, 1 and 0

Year 4 (Aut B4)
- Multiply by 10
- Multiply by 100
- Divide by 10
- Divide by 100
- Multiply by 1 and 0
- Divide by 1

Factors

Year 4 (Spr B1)
- Factor pairs

Year Specific

In this block, children have a focus on times tables. Once introduced, children should practice every day to improve their fluency.

Year 4 also look at how place value is affected when multiplying and dividing by multiples of 10

Both year groups apply their knowledge of times tables by looking at related calculations and efficient multiplication.

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Multiplication & Division

Theme 1 – Equal Groups

Multiplication – Equal Groups

Notes and Guidance

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

Mathematical Talk

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

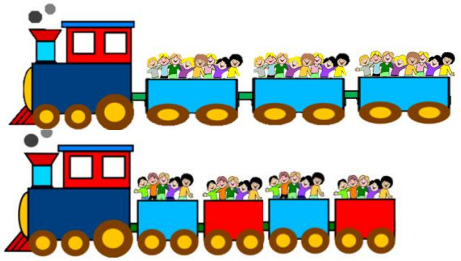
What does the 3 represent?

What does the 8 represent?

How can we represent the groups?

Varied Fluency

- Describe the equal groups.



____ equal groups of ____

____ equal groups of ____

- How many different ways can you represent:
  Six equal groups with 4 in each group?
  Six 4s?

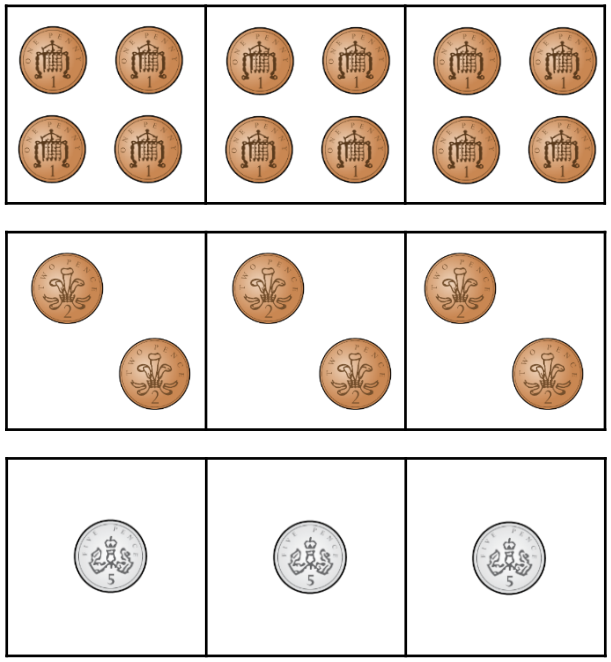
- Complete:

	Add It
Say it There are ___ equal groups with ____ in each group. There are ____ altogether.	Multiply it

Multiplication – Equal Groups

Reasoning and Problem Solving

Which row of money is the odd one out?



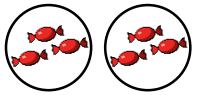
Explain why.

The first two rows have 4p in each group, and 12p in total.

The third row has 5p in each group, so 15p in total.

The third group is therefore the odd one out.

Match the equal groups together.



Three 5s

Two 10s

Two 3s

Sweets, squares, two 3s

Dice, cubes, three 5s

Coins, number pieces, two 10s.

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Multiplication & Division

Theme 2 – Times tables

Multiply by 3

Notes and Guidance

Children draw on their knowledge of counting in threes in order to start to multiply by 3

They use their knowledge of equal groups to use concrete and pictorial methods to solve questions and problems involving multiplying by 3

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?

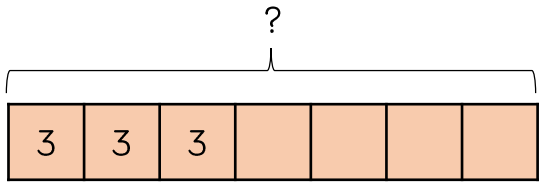
Varied Fluency

There are five towers with 3 cubes in each tower.
How many cubes are there altogether?

___ + ___ + ___ + ___ + ___ = ___

___ × ___ = ___

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



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

___ lots of ___ = ___

___ × ___ = ___

Multiply by 3

Reasoning and Problem Solving

There are 8 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 24 sweets altogether.

Children may use items such as counters or cubes.

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 $3 \times 6 = 6 \times 3$ (because multiplication is commutative).

Divide by 3

Notes and Guidance

Children explore dividing by 3 through sharing into three equal groups and grouping in threes.

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

Mathematical Talk

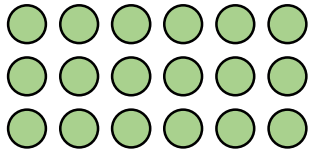
Can you put the counters into groups of three?

Can you share the number into three groups?

What is the difference between sharing and grouping?

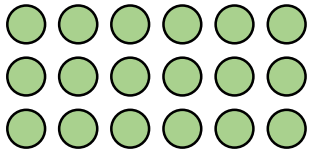
Varied Fluency

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



___ ÷ 3 = ___

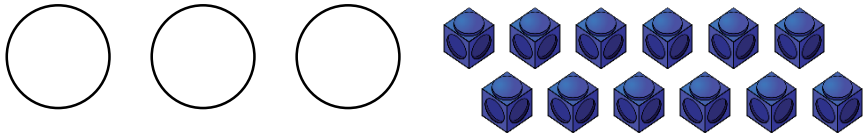
Circle the counters in 3 equal groups and complete the division.



___ ÷ 3 = ___

What's different about the ways you have circled the counters?

There are 12 pieces of fruit. They are shared equally between 3 bowls. How many pieces of fruit are in each bowl?
Use cubes/counters to represent fruit and share between 3 circles.



Bobbles come in packs of 3
If there are 21 bobbles altogether, how many packs are there?

Divide by 3

Reasoning and Problem Solving

Share 33 cubes between 3 groups.

Complete:
There are 3 groups with _____ cubes in each group.
33 ÷ 3 = _____

Put 33 cubes into groups of 3

Complete:
There are _____ groups with 3 cubes in each group.
33 ÷ 3 = _____

What is the same about these two divisions?
What is different?

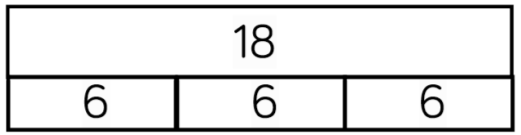
The number sentences are both the same.
The numbers in each number sentence mean different things.
In the first question, the '3' means the number of groups the cubes are shared into because the cubes are being shared.
In the second question, the '3' means the size of each group.

Jack has 18 seeds.

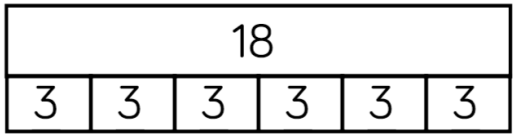
He plants 3 seeds in each pot.

Which bar model matches the problem?

A



B



Explain your choice.

Bar model B matches the problem because Jack plants 3 seeds in each pot, therefore he will have 6 groups (pots), each with 3 seeds.

The 3 Times Table

Notes and Guidance

Children draw together their knowledge of multiplying and dividing by three in order to become more fluent in the three times table.

Children apply their knowledge to different contexts.

Mathematical Talk

Can you use concrete or pictorial representations to help you?

What other facts can you link to this one?

What other times table will help us with this question?

Varied Fluency

Complete the number sentences.

1 triangle has 3 sides.	1 × 3 = 3
3 triangles have ___ sides in total.	3 × ___ = ___
___ triangles have 6 sides in total.	___ × ___ = 6
5 triangles have ___ sides in total.	___ × ___ = ___

Tick the number sentences that the image shows.

- 12 ÷ 3 = 4
- 12 = 4 × 3
- 3 ÷ 4 = 12
- 3 = 12 ÷ 4
- 3 × 12 = 4
- 3 × 4 = 12

Fill in the missing number facts.

1 × 3 = ___	___ × 3 = 30
2 × ___ = 6	8 × ___ = 24
___ = 3 × 3	6 × 3 = ___
9 × 3 = ___	21 = ___ × 3

The 3 Times Table

Reasoning and Problem Solving

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

Start at 18 – 3
Calculate the answer to this calculation.
The next card needs to be begin with this answer.

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

Order:

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

Start this rhythm:

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

Carry on the rhythm, what will you do 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 15 is a multiple of 3

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

Multiply by 4

Notes and Guidance

Building on their knowledge of the two times table, children multiply by 4
They link multiplying by 4 to doubling then doubling again.
Children connect multiplying by 4 to repeated addition and counting in 4s.
To show the multiplication of 4, children may use number pieces, 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?

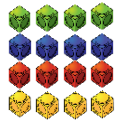
Varied Fluency

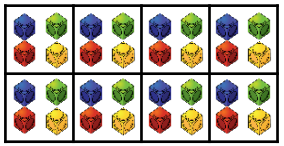
Match the multiplication to the representation.

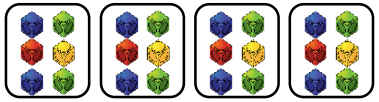
4 × 4

4 × 6

8 × 4







How many dots are there altogether?

There are ____ dice with ____ dots on each.

There ____ fours.

____ × ____ = ____ dots.

There are 4 pens in a pack.
How many pens are there in 7 packs?

Multiply by 4

Reasoning and Problem Solving

Tommy has four bags with five sweets in each bag.

Annie 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.

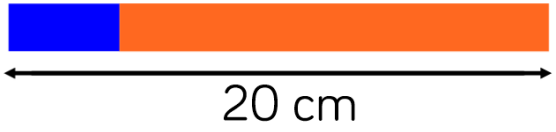
Annie has more sweets.

She has four more sweets than Tommy.

Here is a blue strip of paper.

An orange strip is four times as long.

The strips are joined end to end.



How long is the blue strip?

How long is the orange strip?

Explain how you know.

The blue strip is 4 cm long.

The orange strip is 16 cm long.

The orange strip is 4 times as long as the blue strip, so there are 5 equal parts in total, and the length of each part is:

$20 \div 5 = 4$ cm long.

To find the length of the orange part:

$4 \times 4 = 16$ cm.

Divide by 4

Notes and Guidance

Children explore dividing by 4 through sharing into four equal groups and grouping in fours.

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

Mathematical Talk

Can you put the buttons into groups of fours?

Can you share the number into four groups?

What is the difference between sharing and grouping?

Varied Fluency

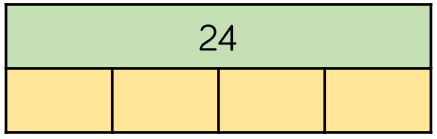
Circle the buttons in groups of 4.

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

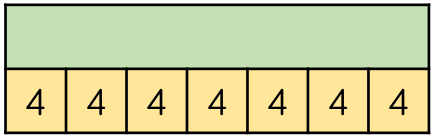
There are some cars in a car park.
Each car has 4 wheels.
In the car park there are 32 wheels altogether.
How many cars are there?

___ ÷ ___ = ___

Complete the bar models and the calculations.



24 ÷ 4 = ___



___ ÷ 4 = ___

Divide by 4

Reasoning and Problem Solving

Which of the word problems can be solved using 12 ÷ 4?

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

No, the calculation is 12 × 4 = 48 sweets

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

Yes, 12 is being grouped into 4s.

I have 12 crayons and share them equally between 4 people.
How many crayons does each person receive?

Yes, 12 is being shared equally into 4 groups.

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

No, the calculation is 12 – 4 = 8 buns

Explain your reasoning for each.

Five children are playing a game.

They score 4 points for every bucket they knock down.

Mo	16
Eva	28
Tommy	12
Amir	32
Dora	8

How many buckets did they knock down each?

How many buckets did they knock down altogether?

How many more buckets did Eva knock down than Mo?

Mo = 4 buckets.

Eva = 7 buckets.

Tommy = 3 buckets.

Amir = 8 buckets.

Dora = 2 buckets.

They knocked down 24 buckets altogether.

Eva knocked 3 more buckets down than Mo.

The 4 Times Table

Notes and Guidance

Children use knowledge of known multiplication tables (2, 3, 5 and 10 times tables) and understanding of key concepts of multiplication to develop knowledge of the 4 times table.

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

Mathematical Talk

What do you notice about the pattern?

Can you use concrete or pictorial representations to help you?

What other facts can you link to this one?

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

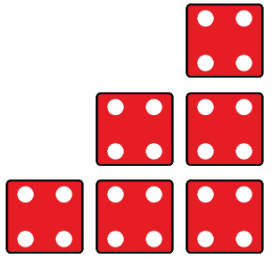
Varied Fluency

Use the pictorial representations to complete the calculations.

$1 \times 4 =$ ___

$2 \times 4 =$ ___

$3 \times 4 =$ ___



Continue the pattern.

2 cars have eight wheels. How many wheels do four cars have?

$2 \times 4 = 8$ $4 \times 4 =$ ___

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

$3 \times$ ___ $= 12$ $6 \times$ ___ $=$ ___

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.

Jack says,
"The answer is more than 3×4"

Complete the calculation to prove this.
$4 \times 4 = 3 \times 4 + \_\_$

Mo says,
"The answer is 4 less than 5×4"

Complete the calculation to prove this.
$4 \times 4 = \_\_ \times 4 - \_\_$

Teddy says,
"The answer is double 2×4"

Complete the calculation to prove this.
$4 \times 4 = \_\_ \times 4 \times \_\_$

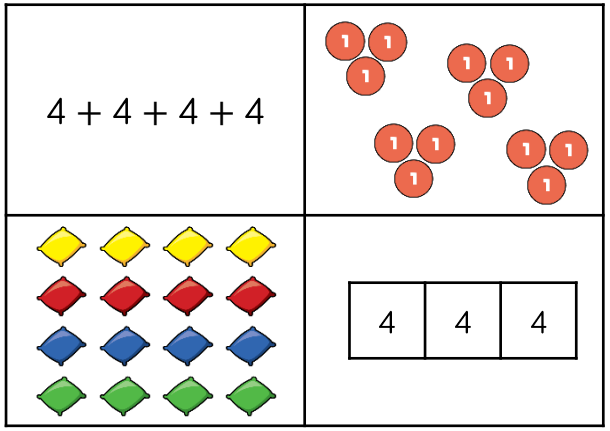
Whose idea do you prefer? Why?

4×4
$= 3 \times 4 + 4$
$= 12 + 4$
$= 16$

4×4
$= 5 \times 4 - 4$
$= 20 - 4$
$= 16$

4×4
$= 2 \times 4 \times 2$
$= 16$

Which part below does not show counting in fours?



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 4 times table, children start to multiply by 8, understanding that each multiple of 8 is double its equivalent multiple of 4

They link multiplying by eight to previous knowledge of equal groups and repeated addition. Children explore the concept of multiplying by 8 in different ways, when 8 is the multiplier (first number in the multiplication calculation) and where 8 is the multiplicand (second number).

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?

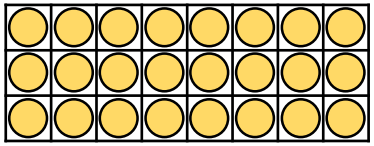
Varied Fluency

How many legs altogether do four spiders have?
There are ___ legs on each spider.

___ + ___ + ___ + ___ = ___

___ × 8 = ___

If there are ___ spiders, there will be ___ legs altogether.



Arrange 24 counters in an array as shown and complete the calculations.

___ + ___ + ___ = ___ × ___

___ + ___ + ___ + ___ + ___ + ___ + ___ + ___ + ___ = ___ × ___

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 × 2 = ___		6 × 2 = ___		6 × 2 = ___		6 × 2 = ___	
___ × 2 = ___				___ × 2 = ___			
___ × 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?

All of the answers are equal.
8 has been split (factorised) into 2 and 4 in the second question and 2, 2 and 2 in the third.

Jack calculates 8×6 by doing 5×6 and 3×6 and adding them.

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

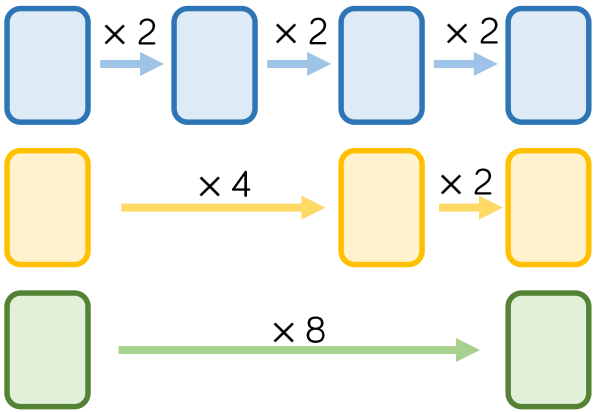
Ron calculates 8×6 by doing $4 \times 6 \times 2$

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

Whose method do you prefer?
Explain why.

Possible answers:
I prefer Jack's method because I know my 5 and 3 times tables.
I prefer Ron'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?

Tommy knows the 4 times table table, but is still learning the 8 times table table.

Which colour row should he use? Why?

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

Tommy should use the yellow row because he can double each multiple of 4 to calculate a number multiplied by 8 e.g. $4 \times 6 = 24$ so 8×6 is double that (48).

Divide by 8

Notes and Guidance

Children explore dividing by 8 through sharing into eight equal groups and grouping in eights.

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

Mathematical Talk

What concrete/pictorial representations might help you?

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

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

There are ____ teams with ____ children in each team.

Crayons are sold in packs of 8.
Year 3 need 48 crayons.
How many packs should be ordered?

They should order ____ packs of crayons.

Complete:

$80 \div 8 = \_\_\_\_$ $\quad$ $8 = 72 \div \_\_\_\_$

$64 \div 8 = \_\_\_\_$ $\quad$ $8 \times \_\_\_\_ = 40$

$\_\_\_\_ \times 8 = 24$ $\quad$ $\_\_\_\_ \div 8 = 7$

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?

The answers (quotients) halve and the divisors double.

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

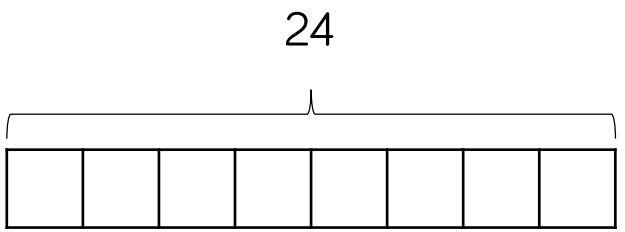
3

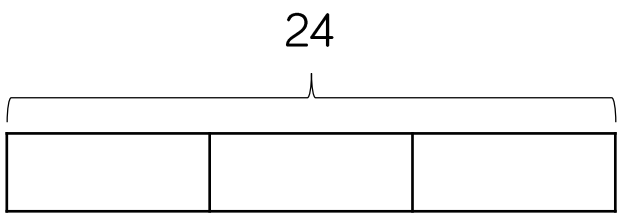
Which numbers can be divided by 8 without a remainder?

64	32	800
18	200	42

64, 32, 800, 200

Amir 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, because 24 has been split into 8 parts, 1 part shows 1 friend.

The 8 Times Table

Notes and Guidance

Children use prior knowledge of multiplication facts for 2, 3, 4 and 5 times tables along with the distributive law in order to calculate unknown multiplication facts.

Mathematical Talk

Why is it helpful to partition the number you are multiplying by?

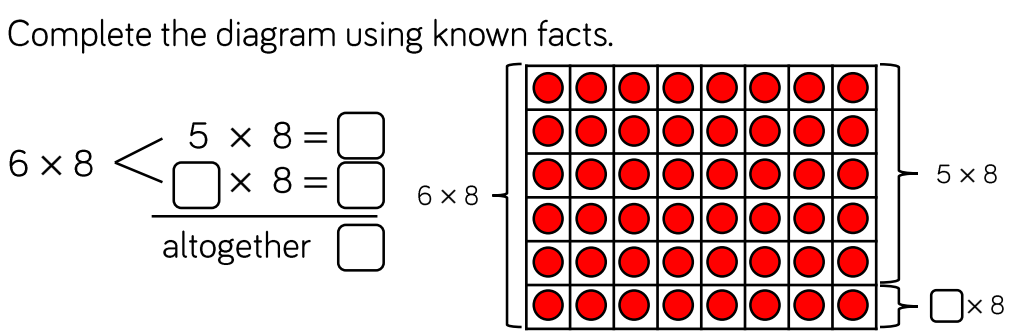
Can you use concrete or pictorial representations to help you?

What other facts can you link to this one?

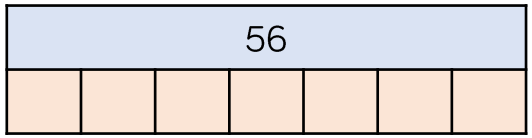
What other times tables will help you with this times table?

Varied Fluency

- Complete the diagram using known facts.



- Complete the bar model.



- Complete the table.

×	2	4	8
3	6		
	10	20	
			72

Can you spot a pattern in 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.

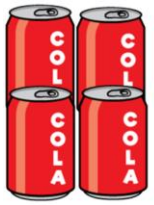
Always, Sometimes, Never

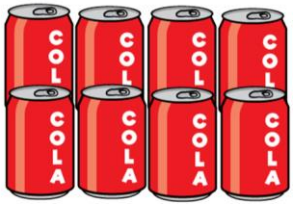
- Multiples of 4 are also multiples of 8
- Multiples of 8 are also multiples of 4

1) Sometimes, every other multiple of 4 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

Rosie has some packs of cola which are in a box.

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





Rosie'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

Multiply and Divide by 6

Notes and Guidance

Children draw on their knowledge of times tables facts in order to multiply and divide by 6

They use their knowledge of equal groups in using concrete and pictorial methods to solve multiplication and division problems.

Mathematical Talk

How many equal groups do we have? How many are in each group? How many do we have altogether?

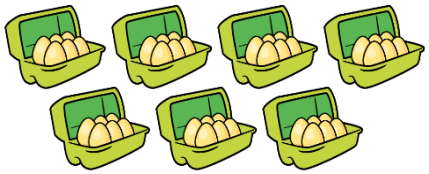
Can you write a number sentence to show this?

Can you represent the problem in a picture?

What does each number in the calculation represent?

Varied Fluency

Complete the sentences.



There are ____ lots of ____ eggs.

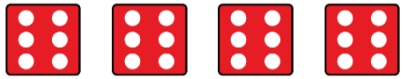
There are ____ eggs in total.

____ × ____ = ____

First there were ____ eggs. Then they were shared into ____ boxes.
Now there are ____ eggs in each box.

____ ÷ ____ = ____

Complete the fact family.



____ × ____ = ____
____ × ____ = ____
____ ÷ ____ = ____
____ ÷ ____ = ____

There are 9 baskets.
Each basket has 6 apples in.
How many apples are there in total?
Write a multiplication sentence to describe this word problem.

Multiply and Divide by 6

Reasoning and Problem Solving

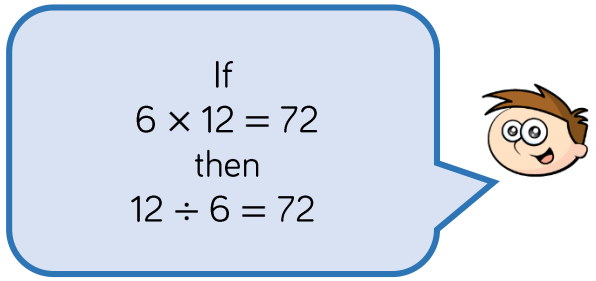
Always, Sometimes, Never

When you multiply any whole number by 6 it will always be an even number.

Explain your answer.

Always, because 6 itself is even and odd × even and even × even will always give an even product.

Teddy says,



Is Teddy correct?
Explain your answer.

Teddy is not correct because 12 ÷ 6 = 2 not 72

He should have written
72 ÷ 6 = 12 or
72 ÷ 12 = 6

6 Times Table & Division Facts

Notes and Guidance

Children use known table facts to become fluent in the six times table.
For example, applying knowledge of the 3 times table by understanding that each multiple of 6 is double the equivalent multiple of 3
Children should also be able to apply this knowledge to multiplying and dividing by 10 and 100 (for example, knowing that 30 × 6 = 180 because they know that 3 × 6 = 18).

Mathematical Talk

What do you notice about the 3 times table and the 6 times table?

Can you use 3 × ___ to work out 6 × ___?

Can you use 7 × 5 to work out 7 × 6?

Which known fact did you use?

Varied Fluency

Complete the number sentences.

1 × 3 = ___	1 × ___ = 6
2 × ___ = 6	2 × 6 = ___
3 × 3 = ___	3 × 6 = ___

What do you notice about the 5 times table and the 6 times table?

5 times table:	5	10	15	20	25	30
6 times table:	6	12	18	24	30	36

Use your knowledge of the 6 times table to complete the missing values?

6 × 2 = ___	___ × 6 = 12	6 × 2 × 10 = ___
___ × 20 = 120	20 × ___ = 120	6 × 2 × ___ = 1,200
6 × ___ = 1,200	200 × 6 = ___	10 × ___ × 6 = 120

6 Times Table and Division Facts

Reasoning and Problem Solving

I am thinking of 2 numbers where the sum of the numbers is 15 and the product is 54

What are my numbers?

Think of your own problem for a friend to solve?

6 and 9 because

$9 \times 6 = 54$
$6 \times 9 = 54$
$6 + 9 = 15$
$9 + 6 = 15$

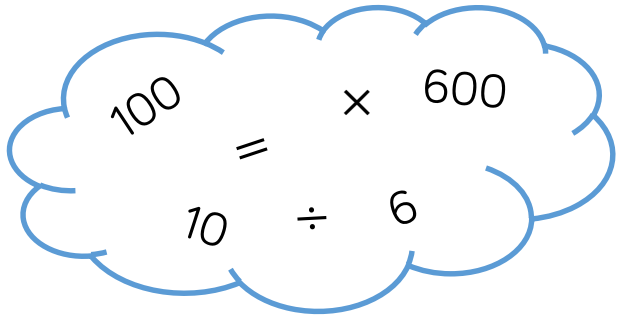
Always, Sometimes, Never

If a number is a multiple of 3 it is also a multiple of 6

Explain why you think this.

Sometimes.
Every even multiple of 3 is a multiple of 6, but the odd multiples of 3 are not multiples of 6

Choose the correct number or symbol from the cloud to fill in the boxes.



___ ÷ ___ = 6

60 = 600 ___ 10

$600 \div 100 = 6$
$60 = 600 \div 10$

Multiply and Divide by 9

Notes and Guidance

Children use their previous knowledge of multiplying and dividing to become fluent in the 9 times table.

They apply their knowledge in different contexts.

Mathematical Talk

Can you use concrete or pictorial representations to help you answer the questions?

What other facts can you link to this fact?

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

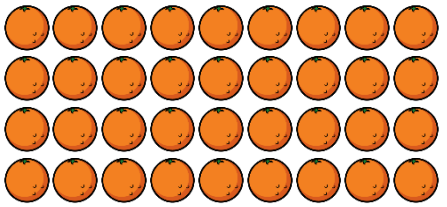
What does each number in the calculation represent?

How many lots of 9 do we have?

How many groups of 9 do we have?

Varied Fluency

Complete the sentences to describe the oranges:

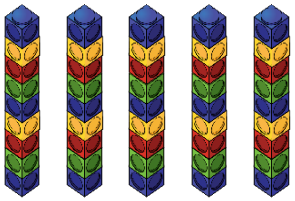


There are ___ lots of 9

There are ___ nines.

4 × ___ = ___

Complete the fact family.



___ × ___ = ___

___ × ___ = ___

___ ÷ ___ = ___

___ ÷ ___ = ___

Complete the sentences.

There are ___ lots of ___.

___ × ___ = ___

___ ÷ ___ = ___

9	9	9

There are ___ lots of ___.

___ × ___ = ___

___ ÷ ___ = ___

3	3	3	3	3	3	3	3	3

What's the same about each question? What's different?

Multiply and Divide by 9

Reasoning and Problem Solving

True or False?

$6 \times 9 = 9 \times 3 \times 2$

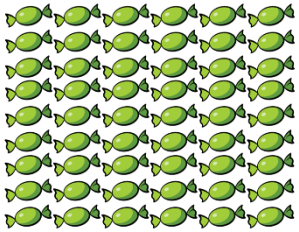
$9 \times 6 = 3 \times 9 + 9$

Explain your answer.

$6 \times 9 = 9 \times 3 \times 2$ is true because $6 \times 9 = 54$ and $9 \times 3 = 27$ $27 \times 2 = 54$

$9 \times 6 = 3 \times 9 + 9$ is false because $6 \times 9 = 54$ and $3 \times 9 = 27$ $27 + 9 = 36$

Amir and Whitney both receive some sweets.

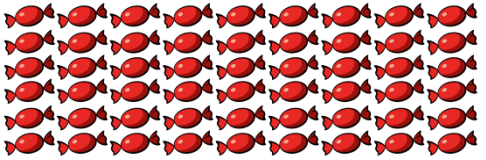


Amir

I have more sweets because I have more rows.

Whitney

I have more sweets because I have more in each row.



Who has more sweets? Explain your reasoning.

They both have 54 sweets, arranged in two different arrays.

9 Times Table & Division Facts

Notes and Guidance

Children use known times table facts to become fluent in the 9 times table.

For example, knowing that each multiple of 9 is one less than the equivalent multiple of 10, and using that knowledge to derive related facts.

Children should also be able to apply the knowledge of the 9 times table when multiplying and dividing by 10 and 100

Mathematical Talk

How did you work out the missing numbers?

What do you notice about the multiples of 9?

What do you notice about the 9 times table and the 10 times table?

Varied Fluency

What are the missing numbers from the 9 times table?

9	18	27	___	45
54	___	72	81	90

Circle the multiples of 9.

54 108 18 24 9 67 72 37

Use your knowledge of the 9 times table to complete the missing values.

$1 \times 9 =$ ___	___ $\times 1 = 9$	$1 \times 9 \times$ ___ $= 90$
___ $\times 9 = 90$	$900 = 100 \times$ ___	$9 \times 1 \times 10 =$ ___
$9 \times$ ___ $= 900$	$4 \times 9 =$ ___	$9 \times 1 \times$ ___ $= 900$

What do you notice about the 9 times table and the 10 times table?

9 times table:	9	18	27	36	45	54
10 times table:	10	20	30	40	50	60

9 Times Table and Division Facts

Reasoning and Problem Solving

Can you complete the calculations using some of the symbols or numbers in the box?

÷		9		100
	10		900	=

___ ÷ ___ = 9

90 = 900 ___ 10

900 ÷ 100 = 9

90 = 900 ÷ 10

I am thinking of two numbers.
The sum of the numbers in 17.
The product of the numbers is 72.
What are my secret numbers?

Can you choose your own two secret numbers from the 9 times table and create clues for your partner?

8 and 9 because
8 × 9 = 72 or
9 × 8 = 72
and
8 + 9 = 17 or
9 + 8 = 17

Always, Sometimes, Never

All multiples of 9 have digits that have a sum of 9.

Always.

Multiply and Divide by 7

Notes and Guidance

Children use their knowledge of multiplication and division to multiply by 7

They count in 7s, and use their knowledge of equal groups supported by use of concrete and pictorial methods to solve multiplication calculations and problems.

They explore commutativity and also understand that multiplication and division are inverse operations.

Mathematical Talk

How many do we have altogether?

What do you notice?

Can you work out the answers by partitioning 7 into 4 and 3?

Which multiples of 7 do you already know from your other tables?

Varied Fluency

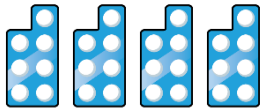
Use a number stick to support counting in sevens.
What do you notice?

Write down the first five multiples of 7

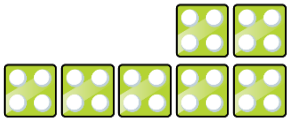
___ ___ ___ ___ ___

Rosie uses number pieces to represent seven times four. She does it in two ways.

4 sevens
4 lots of 7
4 × 7



7 fours
7 lots of 4
7 × 4



Use Rosie's method to represent seven times six in two ways.

Seven children share 56 stickers. How many stickers will they get each?
Use a bar model to solve the problem.

One apple costs 7 pence. How much would 5 apples cost?
Use a bar model to solve the problem.

Multiply and Divide by 7

Reasoning and Problem Solving

Mrs White's class are selling tickets at £2 each for the school play.

The class can sell one ticket for each chair in the hall.

There are 7 rows of chairs in the hall.
Each row contains 9 chairs.

How much money will they make?

Number of tickets (chairs):

$7 \times 9 = 63$

$63 \times £2 = £126$

What do you notice about the pattern when counting in 7s from 0?
Does this continue beyond 7 times 12?

Can you explain why?

In which other times tables will you see the same pattern?

Odd, even pattern because
odd + odd = even.
Then
even + odd = odd,
and this will continue throughout the whole times table.

The same pattern will occur in all other odd multiplication tables (e.g. 1, 3, 5, 9).

7 Times Table & Division Facts

Notes and Guidance

Children apply the facts from the 7 times table (and other previously learned tables) to solve calculations with larger numbers.

They need to spend some time exploring links between multiplication tables and investigating how this can help with mental strategies for calculation.

e.g. $7 \times 7 = 49, 5 \times 7 = 35$ and $2 \times 7 = 14$

Mathematical Talk

If you know the answer to three times seven, how does it help you?

What's the same and what's different about the number facts?

How does your 7 times table help you work out the answers?

Varied Fluency

Complete.

$3 \times 7 = \_\_\_$

$30 \times 7 = \_\_\_$

$300 \times 7 = \_\_\_$

Use your knowledge of the 7 times table to calculate.

$80 \times 7 = \_\_\_$ $\quad\quad$ $\_\_\_ = 60 \times 7$

$70 \times 7 = \_\_\_$ $\quad\quad$ $7 \times 500 = \_\_\_$

How would you use times tables facts to help you calculate how many days there are in 15 weeks? Complete the sentences.

There are ___ days in one week.

___ × 10 = ___
There are ___ days in 10 weeks.

___ × 5 = ___
There are ___ days in 5 weeks.

___ + ___ = ___
There are ___ days in 15 weeks.

7 Times Table & Division Facts

Reasoning and Problem Solving

True or False?

$7 \times 6 = 7 \times 3 \times 2$

$7 \times 6 = 7 \times 7 + 8$

Explain your answer to a friend. Prove using a drawing.

True.

False, because $7 \times 6 = 42$ whereas $7 \times 7 = 49$ then $49 + 8 = 57$

Children could draw a bar model or bundles of straws.

Children were arranged into rows of seven.
There were 5 girls and 2 boys in each row.

Use your times table knowledge to show how many girls would be in 10 rows and in 100 rows.

Show as many number sentences using multiplication and division as you can which are linked to this picture.

How many children in total are there in 200 rows? How many girls? How many boys?

10 rows

$5 \times 10 = 50$ girls

100 rows

$5 \times 100 = 500$ girls

200 rows

Children in total: $7 \times 200 = 1{,}400$

Girls: $5 \times 200 = 1{,}000$

Boys: $2 \times 200 = 400$

11 and 12 Times-table

Notes and Guidance

Building on their knowledge of the 1, 2 and 10 times-tables, children explore the 11 and 12 times-tables through partitioning.
They use Base 10 equipment to build representations of the times-tables and use them to explore the inverse of multiplication and division statements.
Highlight the importance of commutativity as children should already know the majority of facts from other times-tables.

Mathematical Talk

Which multiplication and division facts in the 11 and 12 times-tables have not appeared before in other times-tables?

Can you partition 11 and 12 into tens and ones? What times-tables can we add together to help us multiply by 11 and 12?

If I know 11 × 10 is equal to 110, how can I use this to calculate 11 × 11?

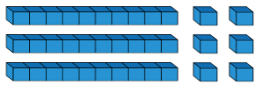
Varied Fluency

Fill in the blanks.

2 × 10 = ___ 2 × 1 = ___

2 lots of 10 doughnuts = ___ 2 lots of 1 doughnut = ___
2 lots of 11 doughnuts = ___
2 × 10 + 2 × 1 = 2 × 11 = ___

Use Base 10 to build the 12 times-table. e.g.



3 × 12 = ☐

Complete the calculations.

12 × 5 = ☐ 5 × 12 = ☐ 48 ÷ 12 = ☐ 84 ÷ 12 = ☐

12 × ☐ = 120 12 × ☐ = 132 ☐ ÷ 12 = 8 ☐ = 9 × 12

There are 11 players on a football team.
7 teams take part in a tournament.
How many players are there altogether in the tournament?

11 and 12 Times-table

Reasoning and Problem Solving

Here is one batch of muffins.

Teddy bakes 11 batches of muffins.
How many muffins does he have altogether?

In each batch there are 3 strawberry, 3 vanilla, 4 chocolate and 2 toffee muffins.
How many of each type of muffin does Teddy have in 11 batches?

Teddy sells 5 batches of muffins.
How many muffins does he have left?

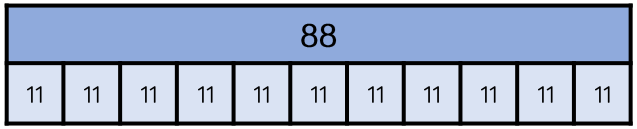
Teddy has 132 muffins altogether.

Strawberry: 33
Vanilla: 33
Chocolate: 44
Toffee: 22

$132 - 55 = 77$

Teddy has 77 muffins left.

Rosie uses a bar model to represent 88 divided by 11



Explain Rosie's mistake.

Can you draw a bar model to represent 88 divided by 11 correctly?

Rosie has divided by grouping in 11s but has found 11 groups of 11 which is equal to 121

To divide 88 by sharing into 11 equal groups, there would be 8 in each group.

To divide 88 by grouping in 11s, there would be 8 groups of 11

White Rose Maths

Multiplication & Division

Theme 3 – Multiplying and dividing by 10, 100, 1 and 0

Multiply by 10

Notes and Guidance

Children need to be able to visualise and understand making a number ten times bigger and that 'ten times bigger' is the same as 'multiply by 10'

The language of 'ten lots of' is vital to use in this step. The understanding of the commutative law is essential because children need to see calculations such as 10 × 3 and 3 × 10 as equal.

Mathematical Talk

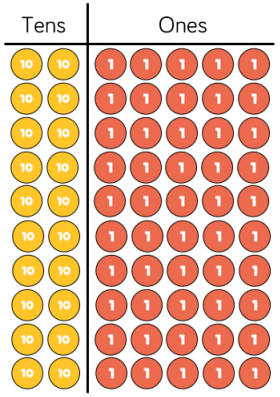
Can you represent these calculations with concrete objects or a drawing?

Can you explain what you did to a partner?

What do you notice when multiplying by 10? Does it always work?

What's the same and what's different about 5 buses with 10 passengers on each and 10 buses with 5 passengers on each?

Varied Fluency



Write the calculation shown by the place value counters.

Each row has ____ tens and ____ ones.

Each row has a value of ____.

There are ____ rows.

The calculation is ____ × ____ = ____.

Use place value counters to calculate:

10 × 3 4 × 10 12 × 10

Match each statement to the correct bar model.

5 buses have ten passengers.

10	10	10	10	10

8 pots each have ten pencils.

5	5	5	5	5	5	5	5	5	5

10 chickens lay 5 eggs each.

10	10	10	10	10	10	10	10

Multiply by 10

Reasoning and Problem Solving

Always, Sometimes, Never

If you write a whole number in a place value grid and multiply it by 10, all the digits move one column to the left.

Always.

Discuss the need for a placeholder after the new rightmost digit.

Annie has multiplied a whole number by 10

Her answer is between 440 and 540

What could her original calculation be?

How many possibilities can you find?

45 × 10
46 × 10
47 × 10
48 × 10
49 × 10
50 × 10
51 × 10
52 × 10
53 × 10

(or the above calculations written as 10 × 45 etc.).

Multiply by 100

Notes and Guidance

Children build on multiplying by 10 and see links between multiplying by 10 and multiplying by 100

Use place value counters and Base 10 to explore what is happening to the value of the digits in the calculation and encourage children to see a rule so they can begin to move away from concrete representations.

Mathematical Talk

How do the Base 10 help us to show multiplying by 100?

Can you think of a time when you would need to multiply by 100?

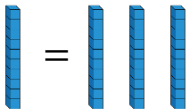
Will you produce a greater number if you multiply by 100 rather than 10? Why?

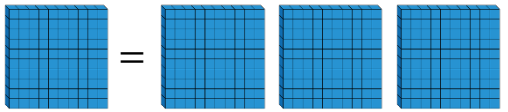
Can you use multiplying by 10 to help you multiply by 100? Explain why.

Varied Fluency

$3 \times$  $=$ $=$ 3 ones $= 3$

Complete:

$3 \times$  $=$ ___ tens $=$ ___

$3 \times$  $=$ ___ hundreds $=$ ___

Use a place value grid and counters to calculate:

7×10	63×10	80×10
7×100	63×100	80×100

What's the same and what's different comparing multiplying by 10 and 100? Write an explanation of what you notice.

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

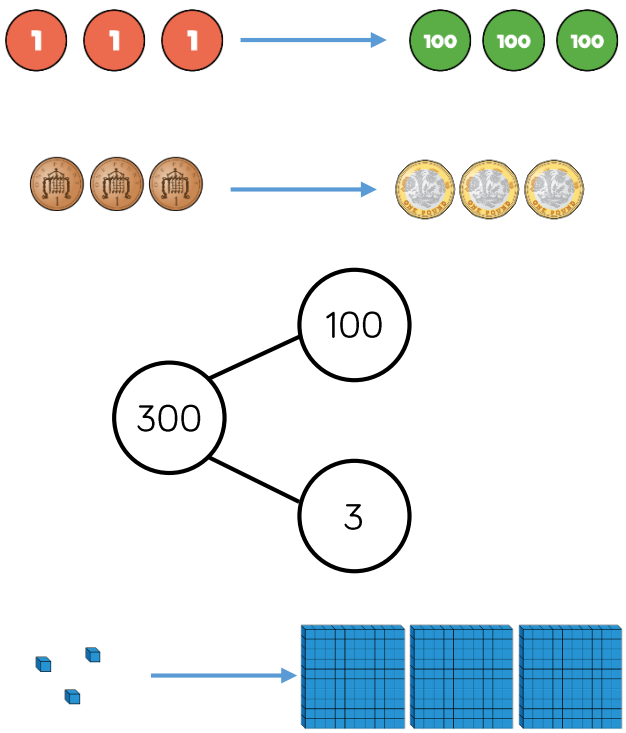
75×100	◯	75×10
39×100	◯	$39 \times 10 \times 10$
460×10	◯	100×47

Multiply by 100

Reasoning and Problem Solving

Which representation does **not** show multiplying by 100?

Explain your answer.



The part-whole model does not represent multiplying by 100

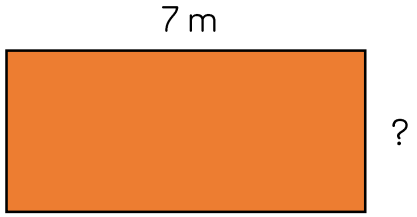
Part-whole models show addition (the aggregation structure) and subtraction (the partitioning structure), so if the whole is 300 and there are two parts, the parts added together should total 300 (e.g. 100 and 200, or 297 and 3). If the parts are 100 and 3, the whole should be 103.

To show multiplying 3 by 100 as a part-whole model, there would need to be 100 parts each with 3 in.

The perimeter of the rectangle is 26 m.

Find the length of the missing side.

Give your answer in cm.



The missing side length is 6 m so in cm it will be:

$6 \times 100 = 600$

The missing length is 600 cm.

Divide by 10

Notes and Guidance

Exploring questions with whole number answers only, children divide by 10
They should use concrete manipulatives and place value charts to see the link between dividing by 10 and the position of the digits before and after the calculation.
Using concrete resources, children should begin to understand the relationship between multiplying and dividing by 10 as the inverse of the other.

Mathematical Talk

What has happened to the value of the digits?

Can you represent the calculation using manipulatives?
Why do we need to exchange tens for ones?

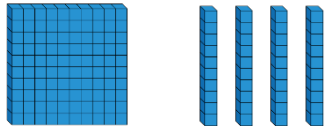
When dividing using a place value chart, in which direction do the digits move?

Varied Fluency

- Use place value counters to show the steps to divide 30 by 10

Can you use the same steps to divide a 3-digit number like 210 by 10?

- Use Base 10 to divide 140 by 10
Explain what you have done.



- Ten friends empty a money box. They share the money equally between them. How much would they have each if the box contained:
  - 20 £1 coins?
  - £120
  - £24?

After emptying the box and sharing the contents equally, each friend has 90 p.
How much money was in the box?

Divide by 10

Reasoning and Problem Solving

Four children are in a race. The numbers on their vests are:

350	35
3,500	53

Use the clues to match each vest number to a child.

- Jack's number is ten times smaller than Mo's.
- Alex's number is not ten times smaller than Jack's or Dora's or Mo's.
- Dora's number is ten times smaller than Jack's.

Alex – 53

Jack – 350

Dora – 35

Mo – 3,500

While in Wonderland, Alice drank a potion and everything shrank. All the items around her became ten times smaller! Are these measurements correct?

Item	Original measurement	After shrinking
Height of a door	220 cm	2,200 cm
Her height	160 cm	16 cm
Length of a book	340 mm	43 mm
Height of a mug	220 mm	?

Can you fill in the missing measurement?

Can you explain what Alice did wrong?

Write a calculation to help you explain each item.

Height of a door
Incorrect – Alice has multiplied by 10.

Her height
Correct

Length of a book
Incorrect – Alice has swapped the order of the digits. When dividing by 10 the order of the digits never changes.

Height of a mug
22 mm.

Divide by 100

Notes and Guidance

Children divide by 100 with whole number answers.

Money and measure is a good real-life context for this, as coins can be used for the concrete stage.

Mathematical Talk

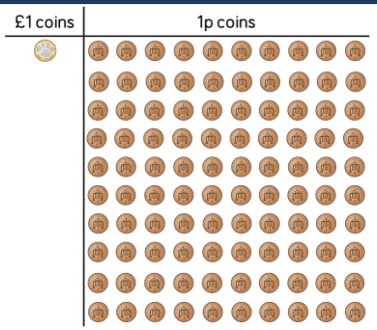
How can you use dividing by 10 to help you divide by 100?

How are multiplying and dividing by 100 related?

Write a multiplication and division fact family using 100 as one of the numbers.

Varied Fluency

- Is it possible for £1 to be shared equally between 100 people?
  How does this picture explain it?
  Can £2 be shared equally between 100 people?
  How much would each person receive?



- Match the calculation with the correct answer.

4,200 ÷ 10	420
4,200 ÷ 100	42
420 ÷ 10	

- Use <, > or = to make each statement correct.

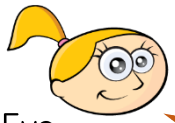
3,600 ÷ 10	◯	3,600 ÷ 100
2,700 ÷ 100	◯	270 ÷ 10
4,200 ÷ 100	◯	430 ÷ 10

Divide by 100

Reasoning and Problem Solving

Eva and Whitney are dividing numbers by 10 and 100
They both start with the same 4-digit number.

They give some clues about their answer.



Eva

My answer has 8 ones and 2 tens.

My answer has 2 hundreds, 8 tens and 0 ones.

Whitney

What number did they both start with?
Who divided by what?

They started with 2,800

Whitney divided by 10 to get 280 and Eva divided by 100 to get 28

Use the digit cards to fill in the missing digits.

1	2	3	4	5	6	7	8	9

170 ÷ 10 = __

__20 × 10 = 3,__00

1,8__0 ÷ 10 = 1__6

__9 × 100 = 5,__00

6__ = 6,400 ÷ 100

170 ÷ 10 = 17

320 × 10 = 3,200

1,860 ÷ 10 = 186

59 × 100 = 5,900

64 = 6,400 ÷ 100

Multiply by 1 and 0

Notes and Guidance

Children explore the result of multiplying by 1, using concrete equipment.

Linked to this, they look at multiplying by 0 and use concrete equipment and pictorial representations of multiplying by 0

Mathematical Talk

Use number pieces to show me 9 × 1, 3 × 1, 5 × 1

What do you notice?

What does 0 mean?

What does multiplying by 1 mean?

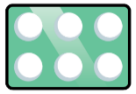
What's the same and what's different about multiplying by 1 and multiplying by 0?

Varied Fluency

Complete the calculation shown by the number pieces.

There are ___ ones.

___ × ___ = ___



There is ___ six.

___ × ___ = ___

Complete the sentences.

There are ___ plates. There is ___ banana on each plate.
Altogether there are ___ bananas.

___ × ___ = ___

Complete:

4 × ___ = 4 ___ = 1 × 7 0 = ___ × 42

63 × 1 = ___ ___ × 27 = 0 50 × ___ = 50

Multiply by 1 and 0

Reasoning and Problem Solving

Which answer could be the odd one out?
What makes it the odd one out?

$3 + 0 =$ ___

$3 - 0 =$ ___

$3 \times 0 =$ ___

Explain why the answer is different.

$3 \times 0 = 0$ is the odd one out because it is the only one with 0 as an answer.

The addition and subtraction calculations have an answer of 3 because they started with that amount and added or subtracted 0 (nothing).

3×0 means '3 lots of nothing', so the total is zero.

Circle the incorrect calculations and write them correctly.

$5 \times 0 = 50$

$19 \times 1 = 19$

$7 \times 0 = 7$

$1 \times 1 = 2$

$0 \times 35 = 0$

$0 \times 0 = 1$

$1 \times 8 = 9$

Choose one calculation and create a drawing to show it.

The incorrect calculations are:
$5 \times 0 = 50$
$7 \times 0 = 7$
$1 \times 1 = 2$
$0 \times 0 = 1$
$1 \times 8 = 9$

Corrected calculations:

$5 \times 0 = 0$
$7 \times 0 = 0$
$1 \times 1 = 1$
$0 \times 0 = 0$
$1 \times 8 = 8$

Divide by 1

Notes and Guidance

Children learn what happens to a number when you divide it by 1 or by itself. Using concrete and pictorial representations, children demonstrate how both the sharing and grouping structures of division can be used to divide a number by 1 or itself. Use stem sentence to encourage children to see this e.g.
5 grouped into 5s equals 1 (5 ÷ 5 = 1)
5 grouped into 1s equals 5 (5 ÷ 1 = 5)

Mathematical Talk

What does sharing mean? Give an example.

What does grouping mean? Give an example.

Can you write a worded question where you need to group?

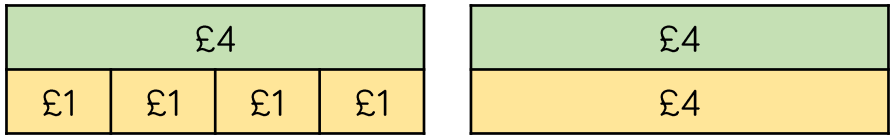
Can you write a worded question where you need to share?

Varied Fluency

Use counters and hands to complete.

- 4 counters **shared** between 4 hands ___ ÷ ___ = ___
- 4 counters **shared** between 1 hand ___ ÷ ___ = ___
- 9 counters **grouped** in 1s ___ ÷ ___ = ___
- 9 counters **grouped** in 9s ___ ÷ ___ = ___

Choose the correct bar model to help you answer this question.
Annie has £4 in total. She gives away £4 at a time to her friends.
How many friends receive £4?



Draw a bar model for each question to help you work out the answer.

- Tommy baked 7 cookies and shared them equally between his 7 friends. How many cookies did each friend receive?
- There are 5 sweets. Children line up and take 5 sweets at a time. How many children have 5 sweets?

Divide by 1

Reasoning and Problem Solving

Use <, > or = to complete the following:

$8 \div 1 \bigcirc 7 \div 1$

$6 \div 6 \bigcirc 5 \div 5$

$4 \div 4 \bigcirc 4 \div 1$

Draw an image for each one to show that you are correct.

>

=

<

Mo says,

25 divided by 1 is equal to 1 divided by 25

Do you agree?

Explain your answer.

No, Mo is incorrect because division is not commutative.

$25 \div 1 = 25$

$1 \div 25 = \frac{1}{25}$

White Rose Maths

Multiplication & Division

Theme 4 – Comparing and applying

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

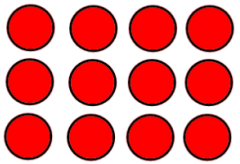
Use the array to complete the number sentences.

$3 \times 4 = \square$

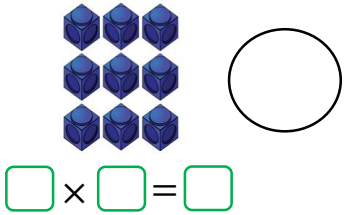
$4 \times 3 = \square$

$\square \div 3 = \square$

$\square \div 4 = \square$



Use <, > or = to compare.



$\square \times \square = \square$

$\square \times \square = \square$

$8 \times 3 \bigcirc 7 \times 4$

$36 \div 6 \bigcirc 36 \div 4$

Complete the number sentences.

$5 \times 1 < \_\_\_\_ \times \_\_\_\_$

$4 \times 3 = \_\_\_\_ \div 3$

Comparing Statements

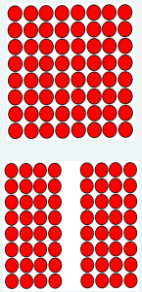
Reasoning and Problem Solving

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?

$6 \times 7 < 6 + 6 + 6 + 6 + 6 + 6 + 6$

False

$7 \times 6 = 7 \times 3 + 7 \times 3$

True

$2 \times 3 + 3 > 5 \times 3$

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?

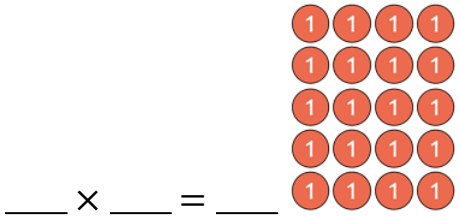
How does this fact help us solve this problem?

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

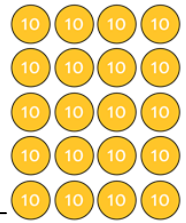
Can you prove your answer using manipulatives?

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 × 6 = 12, we also know 2 × 60 = 120
Use this to complete the fact family.

2 × 60 = 120	□ × □ = □
□ ÷ □ = □	□ ÷ □ = □

Complete the fact families for the calculations.

3 × 30 = □
□ = 4 × 80
160 ÷ 2 = □

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 × 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 × 24 = 240
20 × 12 = 240
30 × 8 = 240
40 × 6 = 240
60 × 4 = 240
80 × 3 = 240

True or false?

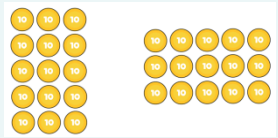
$$5 \times 30 = 3 \times 50$$

Prove it.

Possible response:

Children may represent it with place value counters.

True because they are equal.



Children may explore the problem in a context.

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

Multiply 3 Numbers

Notes and Guidance

Children are introduced to the 'Associative Law' to multiply 3 numbers. This law focuses on the idea that it doesn't matter how we group the numbers when we multiply
e.g. $4 \times 5 \times 2 = (4 \times 5) \times 2 = 20 \times 2 = 40$
or $4 \times 5 \times 2 = 4 \times (5 \times 2) = 4 \times 10 = 40$
They link this idea to commutativity and see that we can change the order of the numbers to group them more efficiently, e.g. $4 \times 2 \times 5 = (4 \times 2) \times 5 = 8 \times 5 = 40$

Mathematical Talk

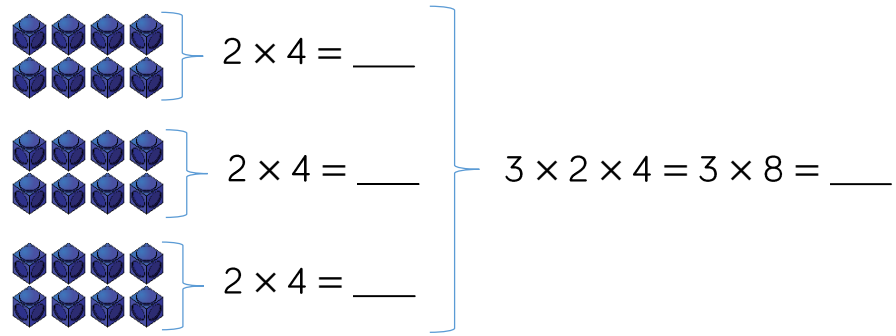
Can you use concrete materials to build the calculations?

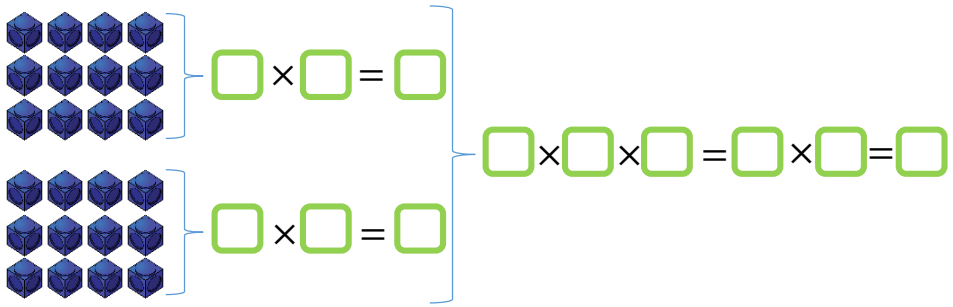
How will you decide which order to do the multiplication in?

What's the same and what's different about the arrays?
Which order do you find easier to calculate efficiently?

Varied Fluency

Complete the calculations.





Use counters or cubes to represent the calculations.
Choose which order you will complete the multiplication.

$5 \times 2 \times 6$ $8 \times 4 \times 5$ $2 \times 8 \times 6$

Multiply 3 Numbers

Reasoning and Problem Solving

Choose three digit cards.
Arrange them in the calculation.

□ × □ × □ = □

How many different calculations can you make using your three digit cards?
Which order do you find it the most efficient to calculate the product?
How have you grouped the numbers?

Possible answers using 3, 4 and 7:

7 × 3 × 4 = 84
7 × 4 × 3 = 84
4 × 3 × 7 = 84
4 × 7 × 3 = 84
3 × 4 × 7 = 84
3 × 7 × 4 = 84

Children may find it easier to calculate 7 × 3 first and then multiply it by 4 as 21 multiplied by 4 has no exchanges.

Make the target number of 84 using three of the digits below.

7	5	3	4	6	2

□ × □ × □ = 84

Multiply the remaining three digits together, what is the product of the three numbers?

Is the product smaller or larger than 84?

Can you complete this problem in more than one way?

Possible answers:

7 × 2 × 6 = 84

4 × 3 × 5 = 60

60 is smaller than 84

7 × 3 × 4 = 84

2 × 6 × 5 = 60

60 is smaller than 84

Children may also show the numbers in a different order.

Efficient Multiplication

Notes and Guidance

Children develop their mental multiplication by exploring different ways to calculate.
They partition two-digit numbers into tens and ones or into factor pairs in order to multiply one and two-digit numbers.
By sharing mental methods, children can learn to be more flexible and efficient.

Mathematical Talk

Which method do you find the most efficient?

Can you see why another method has worked? Can you explain someone else's method?

Can you think of an efficient way to multiply by 99?

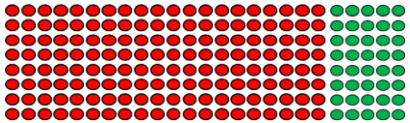
Varied Fluency

Class 4 are calculating 25 × 8 mentally.
Can you complete the calculations in each of the methods?

Method 1

$25 \times 8 = 20 \times 8 + 5 \times 8$

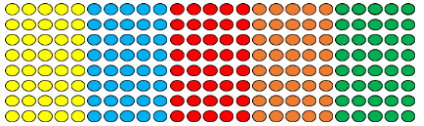
$= 160 + \square = \square$



Method 2

$25 \times 8 = 5 \times 5 \times 8$

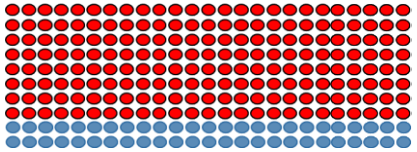
$= 5 \times \square = \square$



Method 3

$25 \times 8 = 25 \times 10 - 25 \times 2$

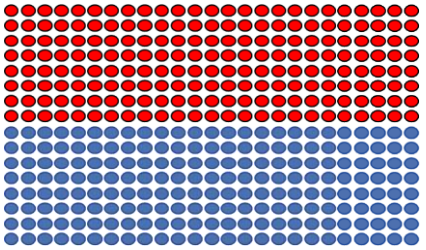
$= \square - \square = \square$



Method 4

$25 \times 8 = 50 \times 8 \div 2$

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

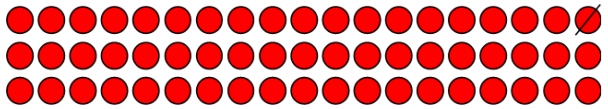


Can you think of any other ways to mentally calculate 25 × 8?
Which do you think is the most efficient?
How would you calculate 228 × 5 mentally?

Efficient Multiplication

Reasoning and Problem Solving

Teddy has calculated 19 × 3



20 × 3 = 60
60 – 1 = 59
19 × 3 = 59

Can you explain his mistake and correct the diagram?

Teddy has subtracted one, rather than one group of 3

He should have calculated,

20 × 3 = 60

60 – 1 × 3 = 57

Here are three number cards.

21 42 38

Dora, Annie and Eva choose one of the number cards each.
They multiply their number by 5

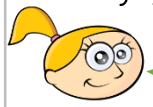
Dora says,

I did 40 × 5 and then subtracted 2 lots of five.

Annie says,

I multiplied my number by 10 and then divided 210 by 2

Eva says,



I halved my 2-digit number and doubled 5 so I calculated 21 × 10

Which number card did each child have?
Would you have used a different method to multiply the numbers by 5?

Dora has 38

Annie has 21

Eva has 42

Children can then discuss the methods they would have used and why.

White Rose Maths

Multiplication & Division

Theme 5 – Factors

Factor Pairs

Notes and Guidance

Children learn that a factor is a whole number that multiplies by another number to make a product e.g. 3 × 5 = 15, factor × factor = product.
They develop their understanding of factor pairs using concrete resources to work systematically, e.g. factor pairs for 12 – begin with 1 × 12, 2 × 6, 3 × 4. At this stage, children recognise that they have already used 4 in the previous calculation therefore all factor pairs have been identified.

Mathematical Talk

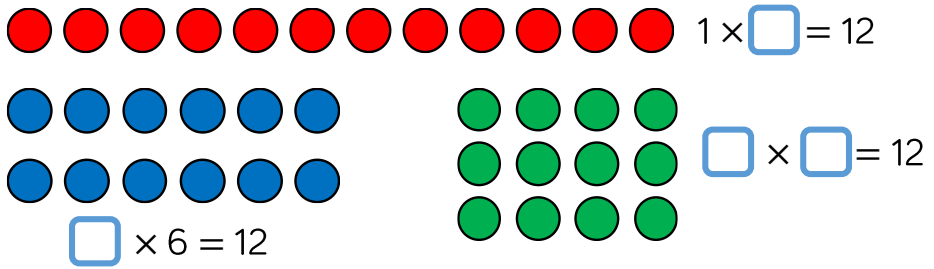
Which number is a factor of every whole number?

Do factors always come in pairs?
Do whole numbers always have an even number of factors?

How do arrays support in finding factors of a number?
How do arrays support us in seeing when a number is not a factor of another number?

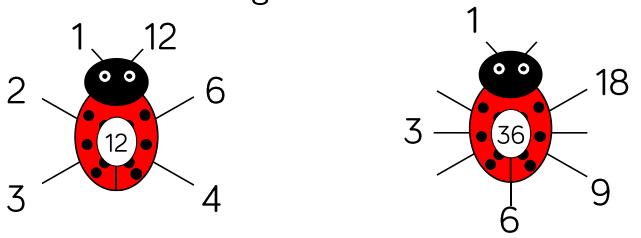
Varied Fluency

Complete the factor pairs for 12



12 has ____ factor pairs. 12 has ____ factors altogether.
Use counters to create arrays for 24
How many factor pairs can you find?

Here is an example of a factor bug for 12
Complete the factor bug for 36

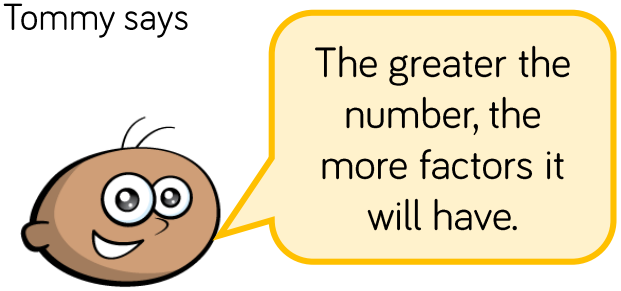


Are all the factors in pairs?
Draw your own factor bugs for 16, 48, 56 and 35

Factor Pairs

Reasoning and Problem Solving

Tommy says



Is Tommy correct?

Use arrays to explain your answer.

Tommy is incorrect.
Children explain by showing an example of two numbers where the greater number has less factors.
For example, 15 has 4 factors 1, 3, 5 and 15
17 has 2 factors 1 and 17

Some numbers are equal to the sum of all their factors (not including the number itself).
e.g. 6
6 has 4 factors, 1, 2, 3 and 6
Add up all the factors not including 6 itself.
$1 + 2 + 3 = 6$
6 is equal to the sum of its factors (not including the number itself)

How many other numbers can you find that are equal to the sum of their factors?
Which numbers are less than the sum of their factors?
Which numbers are greater than the sum of their factors?

Possible answers

$28 = 1 + 2 + 4 + 7 + 14$

28 is equal to the sum of its factors.

$12 < 1 + 2 + 3 + 4 + 6$

12 is less than the sum of its factors.

$8 > 1 + 2 + 4$

8 is greater than the sum of its factors.