Autumn Scheme of Learning

Year 2/3

#MathsEveryoneCan

2019-20
Notes and Guidance

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.

<table>
<thead>
<tr>
<th>Term</th>
<th>Week 1</th>
<th>Week 2</th>
<th>Week 3</th>
<th>Week 4</th>
<th>Week 5</th>
<th>Week 6</th>
<th>Week 7</th>
<th>Week 8</th>
<th>Week 9</th>
<th>Week 10</th>
<th>Week 11</th>
<th>Week 12</th>
</tr>
</thead>
<tbody>
<tr>
<td>Autumn</td>
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<tr>
<td></td>
<td>Number: Place Value Year 1: Numbers to 20 Year 1: Numbers to 100</td>
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<tr>
<td></td>
<td>Year 2: Numbers within 100</td>
<td>Number: Addition and Subtraction Year 1: Numbers within 20 (including recognising money) Year 2: Numbers within 100 (including money)</td>
<td></td>
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<tr>
<td></td>
<td>Number: Year 1: Place Value to 50 and Multiplication Year 2: Multiplication</td>
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<td>Spring</td>
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</tr>
<tr>
<td></td>
<td>Number: Year 1: Division Year 2: Consolidation</td>
<td>Year 1: Place Value to 100</td>
<td>Year 2: Statistics</td>
<td>Measurement: Length</td>
<td>Measurement: Angle and Height</td>
<td>Consolidation</td>
<td>Year 2: Properties of Shape</td>
<td>Measurement: Year 1: Fractions Year 2: Consolidation Year 2: Fractions</td>
<td>Year 2: Properties of Shape</td>
<td>Measurement: Year 1: Fractions Year 2: Consolidation Year 2: Fractions</td>
<td>Year 2: Properties of Shape</td>
<td>Measurement: Year 1: Fractions Year 2: Consolidation Year 2: Fractions</td>
</tr>
</tbody>
</table>

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.

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.
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.
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.

The themes should be taught in order from left to right.
<table>
<thead>
<tr>
<th>Week 1</th>
<th>Week 2</th>
<th>Week 3</th>
<th>Week 4</th>
<th>Week 5</th>
<th>Week 6</th>
<th>Week 7</th>
<th>Week 8</th>
<th>Week 9</th>
<th>Week 10</th>
<th>Week 11</th>
<th>Week 12</th>
</tr>
</thead>
</table>
| Autumn | Number: Place Value  
Y2 – Numbers to 100  
Y3 – Numbers to 1,000 | Number: Addition and Subtraction  
Year 2- Numbers within 100 (including money)  
Year 3- Numbers within 1,000 (including money) | Number: Multiplication |
| Spring | Number: Division | Statistics | Measurement: Length and Height | Geometry: Year 2: Shape, Position and Direction  
Year 3: Shape and Perimeter | Number: Year 2: Fractions & Consolidation  
Year 3: Fractions |
| Summer | Measurement: Time | Problem solving and efficient methods | Measurement: Year 2: Mass, Capacity and Temperature  
Year 3: Mass and Capacity | Consolidation and Investigations |
In this block, children start exploring multiplication through counting in multiples. It will support both year groups to count in 2s, 5s, 10s and 3s.

Year 2 will focus on representing multiplication and clearly seeing the link with repeated addition. They look at the 2, 5 and 10 times-tables.

Year 3 build on their Year 2 understanding and look at the 3, 4 and 8 times-tables as well as recapping previous learning. They move on to using Base 10 and place value counters to explore formal multiplication as they start to use the written column multiplication method.
Block 3 - Multiplication

Theme 1 – Counting in multiples
Count in 2s, 5s and 10s

Notes and Guidance

Children count forwards and backwards in 2s, 5s and 10s. It is important that children do not always start from zero, however they should start on a multiple of 2 or 5 when counting in 2s and 5s but can start from any number when counting in 10s. For example when counting in 2s they should not start at 3. Encourage children to look for patterns as they count.

Mathematical Talk

What do you notice? Are the numbers getting larger or smaller?

Are the numbers getting bigger or smaller each time? By how many?

Can you spot a pattern?

Why is it the odd one out? Can you correct the mistake?

Varied Fluency

- Continue each number sequence.
- Circle the odd one out in each number sequence.
  - 2, 4, 6, 8, 9, 10, 12........
  - 0, 5, 10, 20, 30, 40........
  - 35, 30, 25, 20, 12, 10......
- Count forwards and backwards in jumps of 10 from fifty-seven.
## Count in 2s, 5s and 10s

### Reasoning and Problem Solving

Eva says,  

If you count in 5s from any number in the five times table, your numbers will end in 5 or 0

Do you agree with Eva?

Prove it.

<table>
<thead>
<tr>
<th>Agree. Each number in the 5 times table does end in a 5 or 0 5, 10, 15, 20, 25, 30, 35, 40, 45, 50 etc.</th>
</tr>
</thead>
</table>

### Always, Sometimes, Never

- When counting in 2s from zero the numbers are even.
- When counting in 5s from zero the numbers are even.
- When counting in 10s from zero the numbers are even.

<table>
<thead>
<tr>
<th>Always, Sometimes, Never</th>
</tr>
</thead>
</table>
| - Always  
- Sometimes  
- Always |

| Teddy and Whitney are both counting from zero to twenty.  
- Teddy is counting in 2s.  
- Whitney is counting in 5s.  
Will they say any of the same numbers? What do you notice about your answer? |
|---|
| Yes they will both say 10 and 20  
The numbers that are the same are the tens. |
**Count in 3s**

**Notes and Guidance**

Children count forwards and backwards in 3s from any multiple of 3.

Encourage children to look for patterns as they count and use resources such as a number track, a counting stick and concrete representations.

**Mathematical Talk**

What do you notice about the numbers?

Are the numbers in the sequence getting larger or smaller?

Can you spot a pattern?

What are you counting up in?

**Varied Fluency**

What do you notice about the numbers that are circled? Continue the pattern.

0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18

Complete the number sequences.

Amir has 15 stickers. He collects 3 more each day. Complete the number track to show how many he will have in six days.
Count in 3s

Reasoning and Problem Solving

True or False?

I start at 0 and count in 3s I say the number 14

False. If I count in 3s I say 3, 6, 9, 12, 15....

Explain your answer.

Teddy is counting in 2s and Jack is counting in 3s.

<table>
<thead>
<tr>
<th></th>
<th>2</th>
<th>4</th>
<th>6</th>
<th>8</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teddy</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Jack</td>
<td>3</td>
<td>6</td>
<td>9</td>
<td>12</td>
</tr>
<tr>
<td>+</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Teddy says, If we add our numbers together as we count we can make a new number pattern.

What pattern do they make? What happens if both Teddy and Jack count in 5s and they add them together to make a new pattern?

If Teddy and Jack add their numbers together they will be counting in 5s.

If Teddy and Jack both count in 5s their new pattern would be counting in 10s.

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Count Money - Pence

Notes and Guidance

This block introduces the £ and p symbols for the first time.

Children will count in 1 p, 2 p, 5 p and 10 p coins. Children can also use related facts to count in 20 p coins.

Children do not convert between pounds and pence, therefore children will need to recognise the 50 p coin but they will not count up in 50 p coins.

Mathematical Talk

What is different about the coins you have counted?

Is the group with the most coins always the biggest amount? Why?

What do you notice about the totals?

Are silver coins always worth more than copper coins?

What different ways can you count the coins? Which is the quickest way?

Varied Fluency

Count the money.

= ___ p

= ___ p

= ___ p

= ___ p

Use <, > or = to compare the money.

Count the money.

= ___ p

= ___ p
Count Money - Pence

Reasoning and Problem Solving

Jack selects four of these coins. He can use the coins more than once.

What total could he make?

What is the lowest total?

What is the greatest total?

Example answers:
- 20 p, 10 p, 10 p and 1 p makes 41 p.
- 5 p, 5 p, 5 p and 5 p makes 20 p.
- 1 p, 20 p, 5 p and 2 p makes 28 p.

The lowest total would be 1 p, 1 p, 1 p and 1 p makes 4 p.

The greatest total would be 20 p, 20 p, 20 p and 20 p makes 80 p.

Draw coins to make the statements correct.

For the first one, any answer showing less than 30 p on the right is correct. E.g. two 10 p coins.

For the second one, any answer showing less than 25 p on the left. E.g. three 2 p coins.
Count Money - Pounds

Notes and Guidance

Children will continue counting but this time it will be in pounds, not pence. The £ symbol will be introduced.
Children must be aware that both coins and notes are used to represent amounts in pounds.
Children will count in £1, £2, £5, £10 and £20s.
In this year group, children work within 100, therefore they will not count in £50s.

Mathematical Talk

Do the notes have a greater value than the coins?
Which is the hardest to count? Which is the easiest? Why?
What do you notice about the amounts?
Does it matter which side the equals sign is?
Can you find the total in a different way?

Varied Fluency

Count the money.

£\[\text{___}\] = \[\text{___} \]

Complete the bar models.

\[ \begin{array}{c}
\qquad \\
\end{array} \]

| \[ \begin{array}{c}
\qquad \\
\end{array} \] |
<table>
<thead>
<tr>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>£30</td>
</tr>
</tbody>
</table>

Match the money to the correct total.

\[ \begin{array}{c}
\qquad \\
\end{array} \]

£25 £60 £10

Which is the odd one out? Explain why.
Count Money - Pounds

Reasoning and Problem Solving

Ron thinks he has £13

Is he correct?
Explain your answer.

No, because three £2 coins make £6 £10 and £6 is equal to £16
He has mistaken his £2 coins for £1 coins.

Explain the mistake.

£2, £4, £6, £7, £8, £10

£7 is the mistake. It is an odd number. The 2 times table are all even.

When counting in £2s, we would say £2, £4, £6, £8, £10
Count in 50s

Notes and Guidance

Children use their knowledge of the patterns in the 5 times table to count in steps of 50.

They should start from any given multiple of 50 and be able to count both forwards and backwards.

Mathematical Talk

What is the same and what is different between counting in 5s and counting in 50s?

Hence, what is the connection between the 5 times table and the 50 times table?

Can you notice a pattern as the numbers increase/decrease?

Can you correct the mistakes in each?

Varied Fluency

Look at the number patterns. What do you notice?

<table>
<thead>
<tr>
<th>5</th>
<th>10</th>
<th>15</th>
<th>20</th>
<th>25</th>
<th>30</th>
</tr>
</thead>
<tbody>
<tr>
<td>50</td>
<td>100</td>
<td>150</td>
<td>200</td>
<td>250</td>
<td>300</td>
</tr>
</tbody>
</table>

Complete the number tracks.

| 50 | 150 | 200 | 350 | 450 |

| 750| 700 | 650 | 500 | 350 |

Circle and explain the mistake in each sequence.

50, 100, 105, 200, 250, 300 ...

990, 950, 900, 850, 800 ...
## Count in 50s

### Reasoning and Problem Solving

| Odd One Out | 215 is the odd one out because it is not a multiple of 50  
If we were counting up in 50s from 100, it should have been 250 not 215 |
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>100, 150, 200, 215, 300</td>
<td>Circle the odd one out. Explain how you know.</td>
</tr>
<tr>
<td>Which is quicker: counting to 50 in 10s or counting to 150 in 50s?</td>
<td>It is quicker to count to 150 in 50s as it would only be 3 steps whereas counting to 50 in 10s would be 5 steps.</td>
</tr>
</tbody>
</table>

## Always, Sometimes, Never

Sort the statements into always, sometimes or never.

- When counting in 50s starting from 0, the numbers are all even.
- There are only two digits in a multiple of 50
- Only the hundreds and tens column changes when counting in 50s.

- Always
- Sometimes
Recognise Equal Groups

Notes and Guidance

Children describe equal groups using stem sentences to support them. It is important that children know which groups are equal and unequal, and why they are equal or unequal. The addition and multiplication symbols are not used within this small step but use of the language of addition and multiplication will support them in understanding repeated addition and multiplication. The examples included refer to the times tables facts that Year 2 children need to know.

Mathematical Talk

What does the 2 represent? What does the 3 represent?

What does the 5 represent? What does the 2 represent?

I have ___ equal groups, with ___ in each group. Which image am I describing?

Why are these groups equal/unequal?

Varied Fluency

Complete the stem sentences.

There are ___ equal groups with ___ in each group.

Complete the sentences.

There are ___ equal groups with ___ in each group.

There are _______ baguettes altogether.

Describe the equal groups.

What is the same and what is different in each group?
Recognise Equal Groups

Reasoning and Problem Solving

Which group of money is the odd one out?

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

Sort into equal and unequal groups.

<table>
<thead>
<tr>
<th>Equal Groups</th>
<th>Unequal Groups</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Create your own picture to go in each column.

Spot the mistake.

Alex says, “There are 10 equal groups with 2 in each group. There are ten 2s.”

Hearts and dots in unequal groups.
Stars and squares in equal groups.

There are 2 equal groups with 10 in each group
There are two 10s.
Make Equal Groups

Notes and Guidance

Children should be able to make equal groups to demonstrate their understanding of the word ‘equal’.

With the examples provided to the children, it is important that they are exposed to numerals and words, as well as multiple representations.

Varied Fluency

The Base 10 shows six equal groups with ten in each group. There are six tens.

How else can you represent these as equal groups?

How many ways can you represent ‘four equal groups with three in each group’?

What else do we need to show ‘five 3s’?

How else can we show five equal groups with 3 in each group? Compare your answer with a partner.

Mathematical Talk

How else could you represent these in equal groups?

How many ways can you represent this?

How have you grouped your items?
Make Equal Groups

Reasoning and Problem Solving

<table>
<thead>
<tr>
<th>Has Eva shown the equal groups correctly?</th>
<th>Children to draw or make 3 towers with 2 in each tower.</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1" alt="Apples" /></td>
<td><img src="image2" alt="Towers" /></td>
</tr>
<tr>
<td>Draw or use cubes to show what Eva should have done.</td>
<td>Various answers e.g. move one star from right to left box. Any answer that makes them equal.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Match the equal groups.</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image3" alt="Sweets" /></td>
</tr>
<tr>
<td><img src="image4" alt="Dice" /></td>
</tr>
<tr>
<td><img src="image5" alt="Coins" /></td>
</tr>
<tr>
<td>Three 5s</td>
</tr>
<tr>
<td>Two 10s</td>
</tr>
<tr>
<td>Two 3s</td>
</tr>
<tr>
<td>Sweets, squares, two 3s.</td>
</tr>
<tr>
<td>Dice, cubes, three 5s.</td>
</tr>
<tr>
<td>Coins, number pieces, two 10s.</td>
</tr>
</tbody>
</table>
Add Equal Groups

Notes and Guidance

Children begin to connect equal groups to repeated addition.

At this point children have added 3 one digit numbers together, therefore they can add up to 3 equal groups when each group is any one digit number.

If there are more than 3 equal groups, the examples must be limited to 2s, 5s, 10s and 3s.

Mathematical Talk

What do the two 3s represent?

Why are we using the addition symbol?

How else can we show the equal groups?

What is the total?

Varied Fluency

Complete:

There are ____ equal groups with ____ in each group.
There are ____ 3s.
___ + ___ = 6

Complete:

There are ____ equal groups with ____ in each group.
There are three ____s.
___ + ___ + ___ = 12

Complete the table.
Add Equal Groups

Reasoning and Problem Solving

True or False?

\[ 5 + 5 = 2 + 2 + 2 + 2 + 2 \]

This is true because they are both equal to 10 but the groups look different.

Draw an image or use cubes to help you explain your answer.

To the left of the ‘equal to’ sign are 2 equal groups of 2, and to the right of the ‘equal to’ sign are 5 equal groups of 2.

Which one does not belong?

- **Two 5s**
- **Ten**
- **5 + 5**

What do we need to change to make them all represent the same?

The three 5s do not belong. We would have to take away one five.
The Multiplication Symbol

Notes and Guidance

Children are introduced to the multiplication symbol for the first time. They should link repeated addition and multiplication together, using stem sentences to support their understanding. They should also be able to interpret mathematical stories and create their own involving multiplication. The use of concrete resources and pictorial representations is still vital for understanding.

Mathematical Talk

What does the 3 represent? What does the 6 represent?

What does ‘lots of’ mean?

Does 18 = 3 × 6 mean the same?

How is 6 + 6 + 6 the same as 3 × 6? How is it different?

Varied Fluency

Complete the sentences to describe the equal groups.

___ + ___ + ___ = 18

___ × ___ = 18

There are ___ equal groups with ___ in each group.
There are three ___.

Complete:

<table>
<thead>
<tr>
<th>Three 2s</th>
<th>Draw It</th>
<th>Addition</th>
<th>Multiplication</th>
</tr>
</thead>
<tbody>
<tr>
<td>There are 3 equal groups with 2 in each group.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Complete:

<table>
<thead>
<tr>
<th>Addition</th>
<th>Multiplication</th>
<th>Story</th>
</tr>
</thead>
<tbody>
<tr>
<td>10 + 10 + 10</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6 × 5</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### The Multiplication Symbol

#### Reasoning and Problem Solving

<table>
<thead>
<tr>
<th>Is Mo correct? Explain why.</th>
<th>He is correct because $3 + 3 + 3 = 3 \times 3$ and $3 \times 3 = 9$</th>
<th>Use $&lt;, &gt;$ or $=$ to make the statements correct.</th>
<th>Think of a multiplication to complete: $6 + 6 + 6 &gt; _ \times _$.</th>
<th>Any two numbers which multiply together to give an answer of less than 18</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>$3 \times 5 &lt; 5 + 5 + 5 + 5$</td>
<td>$6 + 6 = 2 \times 6$</td>
<td>$2 + 2 + 2 + 2 + 2 + 2 = 6 \times 2$</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$2 \times 2 = 2 + 2$</td>
<td>$3 + 3 + 3 + 3 = 4 \times 3$</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>$10 \times 2 &gt; 5 + 5 + 5$</td>
<td>$4 + 4 + 4 = 3 \times 4$</td>
<td>$12 = 1 \times 12$</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$5 + 5 + 5$</td>
<td></td>
<td>$1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 = 12 \times 1$</td>
</tr>
</tbody>
</table>
Year 2 | Autumn Term | Week 11 to 12 – Number: Multiplication & Division

**Multiplication from Pictures**

**Notes and Guidance**

Children will use the multiplication symbol and work out the total from pictures.

They should also be able to interpret a multiplication word problem by drawing images to help them solve it.

Coins could be used within this small step too.

**Mathematical Talk**

What does the 4 represent?

What does the 3 represent?

What does the 12 represent?

Can you think of your own story for $3 \times 4 = 12$?

**Varied Fluency**

Complete:

___ $\times$ ___ = ___

___ lots of 3 = ___

___ multiplied by ___ = 12

Complete:

4 lots of 3

$= 1 \times ___$

Complete the table:

<table>
<thead>
<tr>
<th>Picture</th>
<th>Multiplication</th>
<th>Sentence</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$4 \times 10 = 40$</td>
<td>4 lots of 10 is equal to 40</td>
</tr>
<tr>
<td></td>
<td>$35 = 7 \times 5$</td>
<td>6 lots of 3 is equal to 18</td>
</tr>
</tbody>
</table>
### Multiplication from Pictures

#### Reasoning and Problem Solving

<table>
<thead>
<tr>
<th>There are four baskets.</th>
<th>The image could be 4 circles with 3 dots in each.</th>
<th>There are 2 groups with 5 people in each group.</th>
</tr>
</thead>
<tbody>
<tr>
<td>There are three dolls in each basket.</td>
<td>The calculation: $4 \times 3 = 12$</td>
<td>There are 5 people in one group and 5 in the other.</td>
</tr>
<tr>
<td>How many dolls are there altogether?</td>
<td></td>
<td>There are 5 lots of 2 people.</td>
</tr>
<tr>
<td>Draw an image and write a calculation to represent the problem.</td>
<td>Stories with 4 groups and 10 in each group, for example: Four tables with ten children on each table. Four purses with 10p in each purse.</td>
<td></td>
</tr>
<tr>
<td>Write a story for the calculation $4 \times 10$</td>
<td>Each calculation could explain the image.</td>
<td></td>
</tr>
<tr>
<td>Draw an image to illustrate your story.</td>
<td>Explain why.</td>
<td></td>
</tr>
</tbody>
</table>
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:

<table>
<thead>
<tr>
<th>Add It</th>
</tr>
</thead>
<tbody>
<tr>
<td>Say it</td>
</tr>
<tr>
<td>Multiply it</td>
</tr>
</tbody>
</table>

There are ___ equal groups with ___ in each group.
There are ___ altogether.
Multiplication – Equal Groups

Reasoning and Problem Solving

Which row of money is the odd one out?

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.

Explain why.
The 2 Times-Table

Notes and Guidance

Children should be comfortable with the concept of multiplication so they can apply this to multiplication tables.

Images, as well as number tracks, should be used to encourage children to count in twos.

Resources such as cubes and number pieces are important for children to explore equal groups within the 2 times-table.

Mathematical Talk

If 16 p is made using 2 p coins, how many coins would there be?

How many 2s go into 16?

How can the images of the 5 bicycles help you to solve the problems?

Varied Fluency

Count in 2s to calculate how many eyes there are.

There are ___ eyes in total.

___ × ___ = ___

Complete the number track.

2 4 8 12

14 16 18 24

2 4 6 8

How many wheels are there on five bicycles?

If there are 14 wheels, how many bicycles are there?
## The 2 Times-Table

### Reasoning and Problem Solving

**Fill in the blanks.**

<table>
<thead>
<tr>
<th>Expression</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 × ___ = 6</td>
<td>2</td>
</tr>
<tr>
<td>___ × 2 = 20</td>
<td>10</td>
</tr>
<tr>
<td>___ = 8 × 2</td>
<td>16</td>
</tr>
</tbody>
</table>

**Tommy says that 10 × 2 = 22**

Is he correct?

**Explain how you know.**

No Tommy is wrong because 10 × 2 = 20
Children could draw an array or a picture to explain their answer.

**Eva says,**

Every number in the 2 times-table is even.

Is she correct? Explain your answer.

Yes, because 2 is even, and the 2 times-table is going up in 2s. When you add two even numbers the answer is always even.
The 5 Times-Table

Notes and Guidance

Children can already count in 5s from any given number. They will also have developed understanding of the 2 times-table.

This small step is focused on the 5 times table and it is important to include the use of zero. Children should see the = sign at both ends of the calculation to understand that it means ‘equals to’.

Mathematical Talk

If there are 30 petals, how many flowers? Can you count in 5s to 30? How many 5s go into 30?

How many 5s go into 35?

What does each symbol mean?

Varied Fluency

How many petals altogether?

Write the calculation.

There are 35 fingers. How many hands?

___ × 5 = 35

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

2 × 5 〇 5 × 2

3 × 2 〇 4 × 5

10 × 5 〇 5 × 5
The 5 Times-Table

Reasoning and Problem Solving

Is Mo correct?

Mo is incorrect because some of the multiples of the five times-table are even, e.g. 10, 20, 30

Every number in the 5 times table is odd.

Explain your answer.

Tommy and Rosie have both drawn bar models to show $7 \times 5$

The total shown is the same. Tommy's bar shows seven lots of 5 whereas Rosie's bar show five lots of 7

Children can choose either way to represent $4 \times 5$

The tubes of tennis balls come in packs of 2 and 5

Whitney has 22 tubes of balls.

How many of each pack could she have?

How many ways can you do it?

Whitney could have:
4 packs of 5 and 1 pack of 2,
11 packs of 2 and
0 packs of 5,
2 packs of 5 and 6 packs of 2

What's the same and what is different about their bar models?

Draw your own bar model to represent $4 \times 5$
The 10 Times-Table

Notes and Guidance

Children have counted in 10s from any given whole number. This small step is focused on the 10 times-table and it is important to include the use of zero.

Children should see the = sign at both ends of the calculation to understand what it means.

Mathematical Talk

What if there were 10 packs of crayons?

If there are 50 crayons altogether, how many packets are there? How do you know?

How many tens go into 30? Can you count in 10s to 30?

What does greater than mean? What does less than mean?

Varied Fluency

How many crayons are there altogether?

There are ____ crayons altogether.

____ × 10 = ____

Altogether there are 30 bottles, how many walls are there?

____ × 10 = 30

Think of a multiplication fact for 10s to go in each box.

- Smallest: 2 × 10, 1 × 10, 5 × 10
- Greatest: 9 × 10, 6 × 10, 10 × 10
The 10 Times-Table

Reasoning and Problem Solving

On sports day, Jack runs 10 metres, 7 times.

Which of these calculations do not describe this word problem?

- \(10 + 7\)
- \(7 \times 10\)
- \(7 + 7 + 7 + 7 + 7 + 7 + 7 + 7 + 7\)
- \(10 + 10 + 10 + 10 + 10 + 10 + 10\)

Explain why.

10 + 7 is incorrect because he has run 10 metres, 7 times, not 10 metres then 7 metres.

7 + 7 + 7 + 7 + 7 + 7 + 7 is incorrect because he does not run 7 metres each time but 10 metres.

Some Base 10 is hidden.

The total is less than 100

What could the calculation be?

\[\text{____} \times 10 = \text{____}\]

Tim says it could be \(10 \times 10\)
Is he correct? Explain your answer.

It could be
- \(6 \times 10 = 60\)
- \(7 \times 10 = 70\)
- \(8 \times 10 = 80\)
- \(9 \times 10 = 90\)

It can’t be \(10 \times 10\)
because 100 is not less than 100, it is equal to 100.
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.

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

<table>
<thead>
<tr>
<th>Problem</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>There are 8 children. Each child has 3 sweets. How many sweets altogether?</td>
<td>There are 24 sweets altogether. Children may use items such as counters or cubes. They could draw a bar model for a pictorial representation.</td>
</tr>
<tr>
<td>Use concrete or pictorial representations to show this problem.</td>
<td><strong>If</strong> $5 \times 3 = 15$, which number sentences would find the answer to $6 \times 3$?</td>
</tr>
<tr>
<td>Write another repeated addition and multiplication problem and ask a friend to represent it.</td>
<td>- $5 \times 3 + 6$</td>
</tr>
<tr>
<td></td>
<td>- $5 \times 3 + 3$</td>
</tr>
<tr>
<td></td>
<td>- $15 + 3$</td>
</tr>
<tr>
<td></td>
<td>- $15 + 6$</td>
</tr>
<tr>
<td></td>
<td>- $3 \times 6$</td>
</tr>
<tr>
<td><strong>Explain how you know.</strong></td>
<td><strong>5 \times 3 + 3</strong> because one more lot of 3 will find the answer.</td>
</tr>
<tr>
<td></td>
<td><strong>15 + 3</strong> because adding one more lot of 3 to the answer to 5 lots will give me 6 lots.</td>
</tr>
<tr>
<td></td>
<td><strong>3 \times 6</strong> because $3 \times 6 = 6 \times 3$ (because multiplication is commutative).</td>
</tr>
</tbody>
</table>
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.

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

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.
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.

Complete:
There are 3 groups with ____ cubes in each group.
$33 \div 3 = ____$

Put 33 cubes into groups of 3

Complete:
There are ____ groups with 3 cubes in each group.
$33 \div 3 = ____$

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

Jack has 18 seeds.
He plants 3 seeds in each pot.
Which bar model matches the problem?

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 × ____ = ____
5 triangles have ____ sides in total. ____ × ____ = ____

Tick the number sentences that the image shows.

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

Fill in the missing number facts.

1 × 3 = ____ 9 × 3 = ____
2 × ____ = 6 ___ × 3 = 30
___ = 3 × 3 8 × ____ = 24
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.

<table>
<thead>
<tr>
<th>18</th>
<th>21</th>
<th>15</th>
<th>8</th>
</tr>
</thead>
<tbody>
<tr>
<td>$- 3$</td>
<td>$\div 3$</td>
<td>$\div 3$</td>
<td>$- 5$</td>
</tr>
<tr>
<td>5</td>
<td>10</td>
<td>20</td>
<td>4</td>
</tr>
<tr>
<td>$\times 2$</td>
<td>$\times 2$</td>
<td>$+ 1$</td>
<td>$\times 2$</td>
</tr>
<tr>
<td>14</td>
<td>12</td>
<td>3</td>
<td>7</td>
</tr>
<tr>
<td>$- 2$</td>
<td>$\div 3$</td>
<td>$\times 6$</td>
<td>$\times 2$</td>
</tr>
</tbody>
</table>

**Order:**
- $18 - 3$
- $15 \div 3$
- $5 \times 2$
- $10 \times 2$
- $20 + 1$
- $21 \div 3$
- $7 \times 2$
- $14 - 2$
- $12 \div 3$
- $4 \times 2$
- $8 - 5$
- $3 \times 6$

**Start this rhythm:**

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

Carry on the rhythm, what will you 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.

- $4 \times 4$
- $4 \times 6$
- $8 \times 4$

How many dots are there altogether?

There are ____ dice with ____ dots on each.
There ____ fours.
___ $\times$ ___ = ____ 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.

20 cm

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:

$$20 \div 5 = 4 \text{ cm long.}$$

To find the length of the orange part:

$$4 \times 4 = 16 \text{ cm.}$$
Year 3 | Autumn Term | Week 9 to 11 – Number: Multiplication & Division

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.

<table>
<thead>
<tr>
<th>24</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 4 4 4 4 4 4</td>
</tr>
</tbody>
</table>

24 ÷ 4 = ___

___ ÷ 4 = ___
**Divide by 4**

**Reasoning and Problem Solving**

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

- **There are 12 bags of sweets with 4 sweets in each bag. How many sweets are there altogether?**
  - Yes, 12 is being grouped into 4s.
  - No, the calculation is $12 \times 4 = 48$ sweets

- **A rollercoaster carriage holds 4 people. How many carriages are needed for 12 people?**
  - Yes, 12 is being shared equally into 4 groups.

- **I have 12 crayons and share them equally between 4 people. How many crayons does each person receive?**
  - No, the calculation is $12 - 4 = 8$ buns

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

Explain your reasoning for each.

Five children are playing a game.

They score 4 points for every bucket they knock down.

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Mo</td>
<td>16</td>
</tr>
<tr>
<td>Eva</td>
<td>28</td>
</tr>
<tr>
<td>Tommy</td>
<td>12</td>
</tr>
<tr>
<td>Amir</td>
<td>32</td>
</tr>
<tr>
<td>Dora</td>
<td>8</td>
</tr>
</tbody>
</table>

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 $4 \times 3 = 12$.

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?
- $3 \times ____ = 12$
- $6 \times ____ = ____$

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?

Colour in the multiples of 4

What pattern do you notice?
The 4 Times Table

Reasoning and Problem Solving

I have forgotten what $4 \times 4$ is.

Jack says, “The answer is more than $3 \times 4$”

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

Mo says, “The answer is 4 less than $5 \times 4$”

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

Teddy says, “The answer is double $2 \times 4$”

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

Whose idea do you prefer? Why?

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

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

$4 \times 4$
$= 2 \times 4 \times 2$
$= 16$

Which part below does not show counting in fours?

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.

<p>| | | | | | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
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<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>6</td>
<td>6</td>
<td>6</td>
<td>6</td>
<td>6</td>
<td>6</td>
<td>6</td>
<td>6</td>
</tr>
</tbody>
</table>

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

___ × 2 = ___
___ × 2 = ___
___ × 2 = ___

© White Rose Maths
## Multiply by 8

### Reasoning and Problem Solving

<table>
<thead>
<tr>
<th>8 \times 3 = ___</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 \times 4 \times 3 = ___</td>
</tr>
<tr>
<td>2 \times 2 \times 2 \times 3 = ___</td>
</tr>
</tbody>
</table>

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 \times 6 by doing 5 \times 6 and 3 \times 6 and adding them.

\___ + \___ = \___

Ron calculates 8 \times 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.

Possible answers:
- Start each function machine with the same number.
- 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 \times 6 is double that (48).

What do you notice about each final answer?

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

Which colour row should he use? Why?
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:

\[ 80 \div 8 = ____ \]
\[ 64 \div 8 = ____ \]
\[ 8 \times ____ = 40 \]
\[ ____ \times 8 = 24 \]
\[ ____ \div 8 = 7 \]
## Divide by 8

### Reasoning and Problem Solving

<table>
<thead>
<tr>
<th>Calculation</th>
<th>Question</th>
</tr>
</thead>
<tbody>
<tr>
<td>$48 \div 2 = ___$</td>
<td>The answers (quotients) halve and the divisors double.</td>
</tr>
<tr>
<td>$48 \div 4 = ___$</td>
<td></td>
</tr>
<tr>
<td>$48 \div 8 = ___$</td>
<td></td>
</tr>
</tbody>
</table>

What do you notice about the answers to these questions?

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

<table>
<thead>
<tr>
<th>Numbers</th>
<th>Can be divided by 8 without a remainder?</th>
</tr>
</thead>
<tbody>
<tr>
<td>64</td>
<td></td>
</tr>
<tr>
<td>32</td>
<td></td>
</tr>
<tr>
<td>800</td>
<td></td>
</tr>
<tr>
<td>18</td>
<td></td>
</tr>
<tr>
<td>200</td>
<td></td>
</tr>
<tr>
<td>42</td>
<td></td>
</tr>
</tbody>
</table>

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?

![Bar model 1](image1)

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.

![Bar model 2](image2)
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.

\[ 6 \times 8 \quad \square \times 8 = \quad \square \]

altogether \[ \square \]

Complete the bar model.

56

Complete the table.

<table>
<thead>
<tr>
<th>×</th>
<th>2</th>
<th>4</th>
<th>8</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>6</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>10</td>
<td>20</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>72</td>
</tr>
</tbody>
</table>

Can you spot a pattern in the numbers?
### The 8 Times Table

#### Reasoning and Problem Solving

1. **All the numbers in the 8 times table are even.**
   - Explain why

2. **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.

![Cans of cola](image)

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
Use Arrays

Notes and Guidance

Children explore arrays to see the commutativity of multiplication facts e.g. $5 \times 2 = 2 \times 5$.

The use of the array could be used to help children calculate multiplication statements.

The multiplication symbol and language of ‘lots of’ should be used interchangeably.

Mathematical Talk

Where are the 2 lots of 3?

Where are the 3 lots of 2?

What do you notice?

What can we use to represent the eggs?

Can you draw an image?

Varied Fluency

On the image, find $2 \times 5$ and $5 \times 2$

Can you represent this array using another object?

Complete the number sentences to describe the arrays.

$\boxed{2 \times 3 \quad \text{and} \quad \_\_\_ \times \_\_\_}$

$\boxed{\_\_\_ \times \_\_\_ \quad \text{and} \quad \_\_\_ \times \_\_\_}$

Draw an array to show:

$4 \times 5 = 5 \times 4$

3 lots of 10 = 10 lots of 3
Use Arrays

Reasoning and Problem Solving

With 12 cubes, how many different arrays can you create?

Once you have created your array complete:

\[ \_ \times \_ = \_ \times \_ \]

\[ 1 \times 12 = 12 \times 1 \]
\[ 2 \times 6 = 6 \times 2 \]
\[ 3 \times 4 = 4 \times 3 \]

Find different ways to solve six lots of three.

Part of this array is hidden.

The total is less than 16

What could the array be?

Count in 3s
3 lots of 3 add 3
5 \times 3 add 1 \times 3
etc.

4 \times 2
5 \times 2
6 \times 2
7 \times 2
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 $8 \times 3$ and $7 \times 4$?

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.

$$5 \times 1 < \underline{\square} \times \underline{\square}$$

$$4 \times 3 = \underline{\square} \div 3$$
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.

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

___ × 3 + ___ × 3 < ___ ÷ 3

___ ÷ 4 < ___ × 4 < ___ × 4

___ × 8 > ___ ÷ 8 > ___ × 8

Possible answers include:

1 × 3 + 1 × 3 < 21 ÷ 3
1 × 3 + 1 × 3 < 24 ÷ 3
1 × 3 + 1 × 3 < 27 ÷ 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

True or false?

6 × 7 < 6 + 6 + 6 + 6 + 6 + 6
False

7 × 6 = 7 × 3 + 7 × 3
True

2 × 3 + 3 > 5 × 3
False
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.

\[
\begin{array}{ccc}
1 & 1 & 1 \\
1 & 1 & 1 \\
1 & 1 & 1 \\
\end{array}
\]

\[
\begin{array}{ccc}
1 & 1 & 1 \\
1 & 1 & 1 \\
1 & 1 & 1 \\
\end{array}
\]

\[
\begin{array}{ccc}
1 & 1 & 1 \\
1 & 1 & 1 \\
1 & 1 & 1 \\
\end{array}
\]

\[
\begin{array}{ccc}
1 & 1 & 1 \\
1 & 1 & 1 \\
1 & 1 & 1 \\
\end{array}
\]

___ × ___ = ___

___ × ___ = ___

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.

<table>
<thead>
<tr>
<th>2 × 60 = 120</th>
<th>2 × ___ = ___</th>
</tr>
</thead>
<tbody>
<tr>
<td>___ ÷ ___ = ___</td>
<td>___ ÷ ___ = ___</td>
</tr>
</tbody>
</table>

Complete the fact families for the calculations.

3 × 30 = ___

___ = 4 × 80

160 ÷ 2 = ___
## Related Calculations

### Reasoning and Problem Solving

**Is Mo correct? Explain your answer.**

- **Mo is correct.** I know that when multiplying 3 by 40, 40 is ten times bigger than 4, so my answer will be ten times bigger than $3 \times 4$.

**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 explore the problem in a context.
    - E.g., 5 lots of 30 apples compared to 3 lots of 50 apples.

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

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

Theme 5 – Formal multiplication
Multiply 2-digits by 1-digit (1)

Notes and Guidance

Children use their understanding of repeated addition to represent a two-digit number multiplied by a one-digit number with concrete manipulatives. They use the formal method of column multiplication alongside the concrete representation. They also apply their understanding of partitioning to represent and solve calculations.

In this step, children explore multiplication with no exchange.

Mathematical Talk

How does multiplication link to addition?

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

How does the written method match the concrete representation?

Varied Fluency

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

Use Base 10 to calculate:

21 \times 4 \text{ and } 33 \times 3

Complete the calculations to match the place value counters.

Annie uses place value counters to work out 34 \times 2

Use Annie’s method to solve:

23 \times 3

32 \times 3

42 \times 2
Multiply 2-digits by 1-digit (1)

Reasoning and Problem Solving

Alex completes the calculation:

\[ 43 \times 2 \]

Can you spot her mistake?

<table>
<thead>
<tr>
<th>T</th>
<th>O</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>×</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>6</td>
</tr>
<tr>
<td>+</td>
<td>8</td>
</tr>
<tr>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>1</td>
<td>4</td>
</tr>
</tbody>
</table>

Alex has multiplied 4 by 2 rather than 40 by 2.

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

<table>
<thead>
<tr>
<th>T</th>
<th>O</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>×</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>6</td>
</tr>
</tbody>
</table>

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

Dexter says,

\[ 4 \times 21 = 2 \times 42 \]

Is Dexter correct?

True. Both multiplications are equal to 84.

Children may explore that one number has halved and the other has doubled.
Multiply 2-digits by 1-digit (2)

Notes and Guidance

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

Mathematical Talk

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

How do we record our exchange?

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

Varied Fluency

Jack uses Base 10 to calculate \(24 \times 4\)

<table>
<thead>
<tr>
<th>Tens</th>
<th>Ones</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>\times 4</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>6</td>
</tr>
</tbody>
</table>

Use Jack’s method to solve:

- \(13 \times 4\)
- \(23 \times 4\)
- \(26 \times 3\)

Amir uses place value counters to calculate \(16 \times 4\)

<table>
<thead>
<tr>
<th>Tens</th>
<th>Ones</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td>\times 4</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>4</td>
</tr>
</tbody>
</table>

Use Amir’s method to solve:

- \(16 \times 6\)
- \(17 \times 5\)
- \(28 \times 3\)

Amir then calculates \(5 \times 34\)

<table>
<thead>
<tr>
<th>Hundreds</th>
<th>Tens</th>
<th>Ones</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>\times 5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>0</td>
<td></td>
</tr>
</tbody>
</table>

Use Amir’s method to solve:

- \(36 \times 6\)
- \(48 \times 4\)
Multiply 2-digits by 1-digit (2)

Reasoning and Problem Solving

Always, Sometimes, Never?

<table>
<thead>
<tr>
<th>Sometimes.</th>
</tr>
</thead>
<tbody>
<tr>
<td>e.g. 13 × 5 = 65</td>
</tr>
<tr>
<td>31 × 5 = 155</td>
</tr>
</tbody>
</table>

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

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

![Digit cards with numbers 2, 3, 4, and a blank space for multiplication]

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

You can get within 8 of 100

- 23 × 4 = 92 this is the closest answer.
- 24 × 3 = 72
- 32 × 4 = 128
- 34 × 2 = 68