Autumn

Scheme of learning

Year 3/4

#MathsEveryoneCan

Y3/4 yearly overview

The yearly overview provides suggested timings for each block of learning, which can be adapted to suit different term dates or other requirements.

	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 A**			Measurement **Area**
Spring	Number **Multiplication and division B**			Measurement **Length and perimeter**		Number **Fractions A**			Measurement **Mass and capacity**		Number **Fractions B**	
Summer	Measurement **Time**		Number **Decimals**			Measurement **Money**		Geometry **Shape**		Geometry **Position and direction**	**Statistics**	

White Rose MATHS

Autumn Block 3

Multiplication and division A

White Rose MATHS

Small steps

Step 1	Use arrays
Step 2	Sharing and grouping
Step 3	The 2, 5 and 10 times-tables
Step 4	The 4 times-table
Step 5	The 8 times-table
Step 6	The 2, 4 and 8 times-tables
Step 7	The 3 times-table
Step 8	The 6 times-table

Small steps

Step 9	The 9 times-table
Step 10	The 3, 6 and 9 times-tables
Step 11	The 7 times-table
Step 12	The 11 times-table
Step 13	The 12 times-table
Step 14	Multiply by 1 and 0
Step 15	Divide a number by 1 and itself

Use arrays

Notes and guidance

In Key Stage 1, children explored equal groups in various ways, recognising, making and adding equal groups together. In this small step, they apply this understanding to arrays.

Children build and use arrays to write calculations, supporting them to make the link between repeated addition and multiplication. They explore commutativity, in which the numbers can be multiplied in any order to create the same product. Concrete resources, such as counters, and pictorial representations of objects arranged in arrays are useful for children to see what an array reveals mathematically. Key mathematical language of "lots of" and "groups of" should be used in conjunction with describing the features of an array (rows and columns), so that children can make the link between equal groups and arranging arrays.

Year 3 children first explore arrays relating to their times-table knowledge from Key Stage 1. Year 4 children may extend their understanding by exploring division facts within an array, as well as considering other times-tables.

Things to look out for

- Children may not draw arrays accurately, with straight rows and columns that clearly show repeated addition.

Key questions

- How can you tell if the groups are equal? How can you show the groups?
- How many lots of _____ do you have?
- What does this array show?
- What number sentences can you write to describe the array?

Possible sentence stems

- There are _____ lots of _____

  _____ × _____ = _____ × _____

Single age small step links

- Multiplication – equal groups (Y3)
- Use arrays (Y3)

- N/A

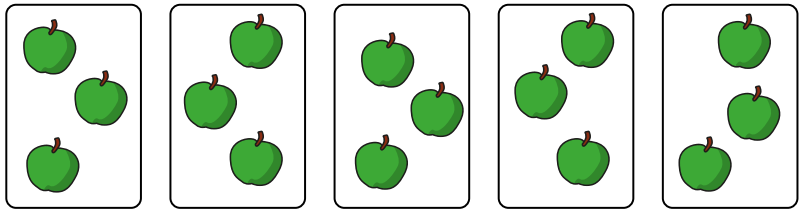
National Curriculum links

- Write and calculate mathematical statements for multiplication and division using the multiplication tables that they know, including for 2-digit numbers times 1-digit numbers, using mental and progressing to formal written methods (Y3)

Use arrays

Key learning

- Complete the sentences to describe the groups.



There are _____ equal groups with _____ in each group.

There are _____ altogether.

_____ + _____ + _____ + _____ + _____ = _____

_____ × _____ = _____

- Use counters to make the groups.

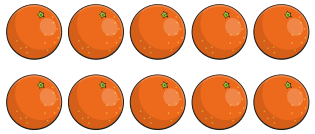
2 equal groups of 6	6 equal groups of 2

What is the same and what is different about the groups?

- Use 20 counters.

How many different ways can you make equal groups?

- Complete the sentences.



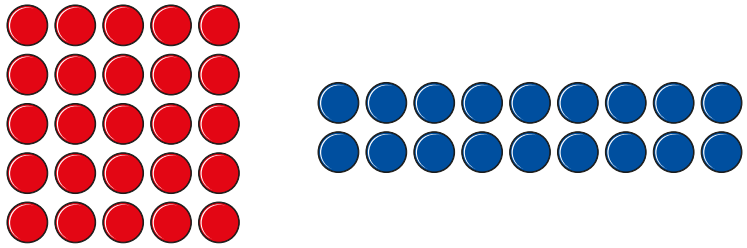
There are _____ rows of _____ oranges.

There are _____ columns of _____ oranges.

_____ × _____ = _____

_____ × _____ = _____

- Write two additions and two multiplications for each array.



- Make and draw an array to match the statement.

6 × 3 = 3 × 6

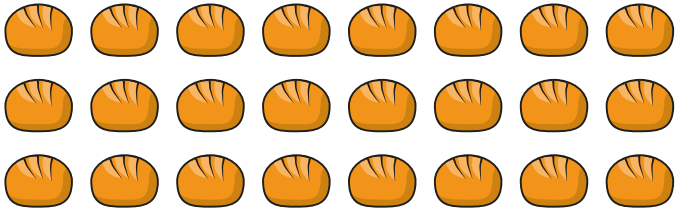
What division facts can you see?

Use arrays

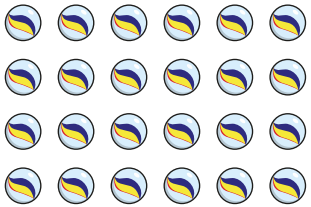
Reasoning and problem solving

Which array of objects is the odd one out?

A



B



C

Explain your answer.

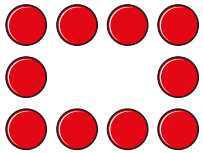
multiple possible answers, e.g.

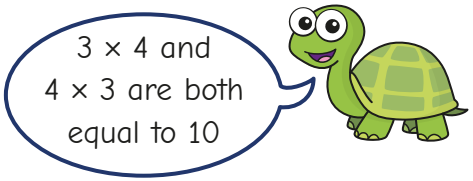
array A, because B and C have equal groups of 4

array B, because A and C have equal groups of 3

array C, because A and B have a total of 24

Tiny is making arrays.

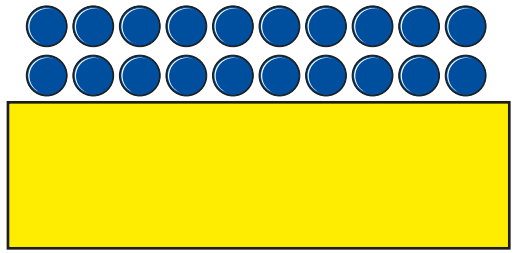




Do you agree with Tiny?

No

Part of the array is hidden.



What could the array be?

10 × 3

10 × 4

10 × 5

Sharing and grouping

Notes and guidance

In Key Stage 1, children experienced division as both grouping and sharing. In this small step, they deepen their understanding of these structures of division.

Children have previously explored the differences in context for grouping and sharing, for example both grouping 15 counters equally into 3s and sharing 15 counters equally between 3 groups. Encourage discussions regarding the choice of language and representations that they use to explain their thinking regarding the two different division structures. The use of concrete resources, such as counters, as well as pictorial representations, is useful for children to make sense of whether the question is grouping or sharing, as well as what the answer represents.

Learning for Year 3 children should predominantly focus on their current understanding of the 2, 5 and 10 times-tables. Year 4 children may extend this learning by considering grouping and sharing questions that link to other times-tables.

Things to look out for

- Children may struggle to understand the difference between sharing and grouping, and the language used to describe them.

Key questions

- How can you share _____ into _____ equal groups?
- How can you put the number of _____ into equal groups of _____?
- What is the difference between sharing and grouping?

Possible sentence stems

- _____ has been shared equally into _____ equal groups.
- There are _____ groups of _____ in _____

Single age small step links

- Sharing and grouping (Y3)
- N/A

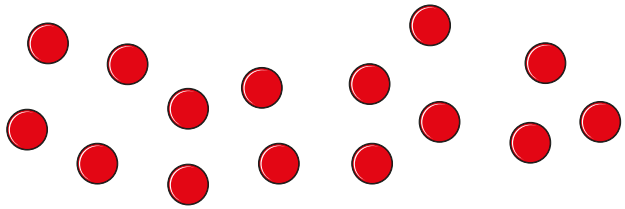
National Curriculum links

- Write and calculate mathematical statements for multiplication and division using the multiplication tables that they know, including for 2-digit numbers times 1-digit numbers, using mental and progressing to formal written methods (Y3)
- Recall multiplication and division facts for multiplication tables up to 12 × 12 (Y4)

Sharing and grouping

Key learning

- Here are 15 counters.



  - Share the counters equally into 5 groups.

    Complete the sentences.

    There are _____ counters altogether.

    There are _____ groups.

    There are _____ counters in each group.

    15 ÷ _____ = _____

  - Put the counters into groups of 3

    Complete the sentences.

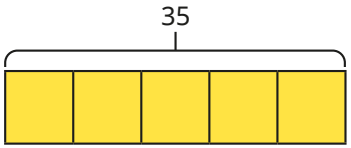
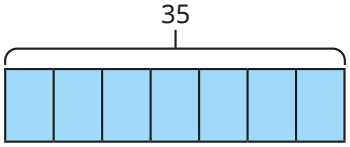
    There are _____ counters altogether.

    There are _____ groups of 3 in 15

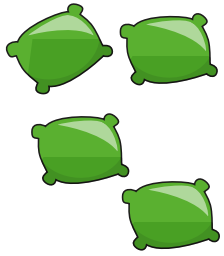
    15 ÷ _____ = _____

  What is the same? What is different?

- Match the statements to the bar models.

35 sweets are shared equally between 5 people.	
35 sweets are grouped into bags of 5	

- Esther has 40 bean bags.



  - She shares them equally between 10 hoops.

    How many bean bags are there in each hoop?

    Draw a bar model to show the problem.

  - She now shares the bean bags equally between 8 hoops.

    How many are there in each hoop now?

Sharing and grouping

Reasoning and problem solving

Are the statements about sharing or grouping?

Rosie has 32 cherries.
She puts the same number of cherries in each basket.

Tom puts flowers into vases.
He has 9 flowers and puts 3 flowers in each vase.

The pet shop has 40 fish.
The staff move the fish into an equal number of tanks.

Explain your reasoning.

sharing

grouping

sharing

Filip has 24 stickers.

He groups the stickers, so that there is the same number of stickers in each group.

What groups could Filip have made?

Talk about it with a partner.

multiple possible answers, e.g.

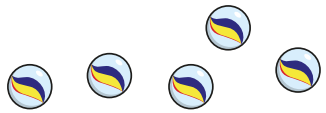
1 group of 24
12 groups of 2
3 groups of 8
4 groups of 6
6 groups of 4

Mo has 27 marbles and shares them equally between 3 friends.

Dani has 40 marbles and shares them equally between 5 friends.

Whose friends get more marbles?

How do you know?



Mo's friends

The 2, 5 and 10 times-tables

Notes and guidance

In this small step, children bring together their knowledge of multiplying and dividing by 2, 5 and 10 from previous learning, in order to become more fluent in these times-tables.

Children construct fact families and use manipulatives and pictorial representations, such as arrays and bar models, to make links between multiplication and division. Year 3 children may require greater exposure to multiple representations to help them understand the structure of each times-table and the related division facts.

Within this step, give children the opportunity to spot patterns between the 5 and 10 times-tables. Guide them to identify that all the numbers in the 10 times-table are also in the 5 times-table, but only some of the numbers in the 5 times-table are also in the 10 times-table. They should recognise that the 10 times-table is double the 5 times-table.

Encourage children to find efficient strategies, rather than always counting from 1 × _____ For example, to work out 5 × 8, they could do 5 × 4 × 2 or 5 × 10 – 5 × 2

Things to look out for

- Children may be over-reliant on inefficient methods for multiplying.

Key questions

- How can you show this multiplication/division using an array?
- Is _____ a multiple of 2/5/10? How can you tell?
- Are all the numbers in the 10 times-table also in the 5 times-table? How do you know?
- If you know what 5 × 2 is, how can you work out 6 × 2?

Possible sentence stems

- I know that _____ × 2 = _____, so I can add/subtract 2 to work out _____ × 2
- _____ multiplied by 2/5/10 is equal to _____

Single age small step links

- Multiples of 2 (Y3)
- Multiples of 5 and 10 (Y3)

- N/A

National Curriculum links

- Recall multiplication and division facts for multiplication tables up to 12 × 12 (Y4)

The 2, 5 and 10 times-tables

Key learning

- Here are some flowers.

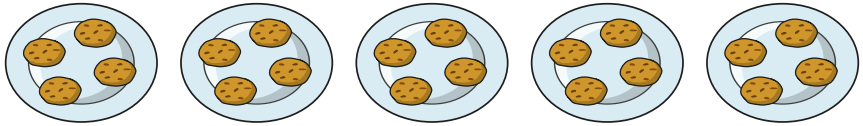
Complete the sentences.

There are _____ equal groups with _____ in each group.

There are _____ altogether.

_____ × _____ = _____

- Here are some cookies.



Complete the sentences.

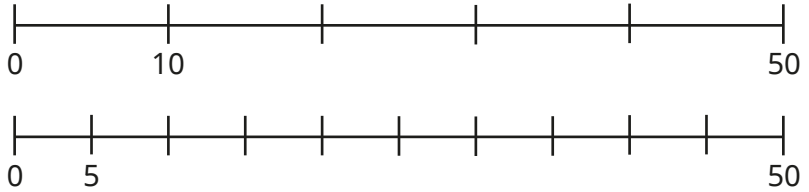
There are _____ cookies altogether.

There are _____ plates.

There are _____ cookies on each plate.

_____ ÷ _____ = _____

- Complete the number lines.



What do you notice?

- Work out the missing numbers.
  - 3 × 2 = _____
  - 5 × 12 = _____
  - _____ = 10 × 11
  - 2 × _____ = 22
  - 35 ÷ 5 = _____
  - _____ × 2 = 10

- Write three multiples of 2 that are between 100 and 120

  Write three multiples of 5 that are between 200 and 250

- Work out the missing numbers.
  - 4 × 5 = _____ × 10
  - 8 × 5 = _____ × 10
  - _____ × 5 = 6 × 10
  - 3 × 10 = 5 × _____

What do you notice?

The 2, 5 and 10 times-tables

Reasoning and problem solving

Write <, > or = to compare the calculations.

2×7 ◯ 7×2

$4 \times 5 + 2 \times 5$ ◯ 7×5

$2 \times 2 + 6 \times 2$ ◯ $10 \times 2 - 2 \times 2$

Explain your reasoning.

=

<

=

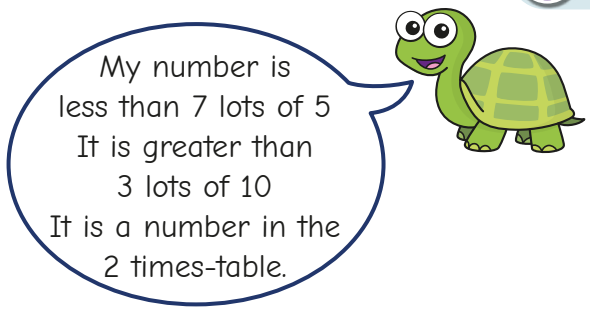
Is the statement true or false?

A multiple of 5 cannot be a multiple of 2

Explain your answer.

False

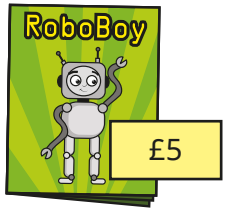
Tiny thinks of a number.



What number could Tiny be thinking of?

32 or 34

Scott buys 3 teddies and 6 comics.



How much does he spend?

£60

The 4 times-table

Notes and guidance

In this small step, children apply their knowledge of equal groups to explain the link between counting in 4s and multiplying by 4. They also explore dividing by 4 through sharing into 4 equal groups and grouping into 4s.

Children should recognise that if multiplying by 4 is the same as doubling the number and then doubling again, then dividing by 4 is the same as halving the number and halving it again.

Children continue to use concrete manipulatives and pictorial representations. They use arrays to support their understanding of partitioning, for example $13 \times 4 = 10 \times 4 + 3 \times 4$. Children continue to explore the commutativity of multiplication: if $3 \times 4 = 12$, then $4 \times 3 = 12$

Links could be made between the 4 times-table and the 5 times-table. Children should recognise that multiplying a number by 4 is the same as multiplying that number by 5 and then subtracting 1 lot of it.

Things to look out for

- Children may need support using a range of terminology to describe multiplication and division, such as "equal groups", "lots of", "times", "multiples", "sharing", "grouping" and "equal groups".

Key questions

- How many equal groups of 4 do you have?
- How can you share _____ into 4 equal groups?
- How can you put _____ into equal groups of 4?
- What methods can you use when multiplying/dividing by 4?

Possible sentence stems

- There are _____ groups of 4 in _____
- There are 4 groups of _____ in _____

Single age small step links

- Multiply by 4 (Y3)
- Divide by 4 (Y3)
- The 4 times-table (Y3)

- N/A

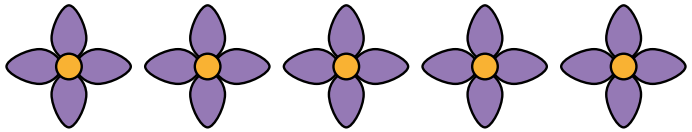
National Curriculum links

- Recall and use multiplication and division facts for the 3, 4 and 8 multiplication tables (Y3)
- Recall multiplication and division facts for multiplication tables up to 12 × 12 (Y4)

The 4 times-table

Key learning

- Complete the sentences.



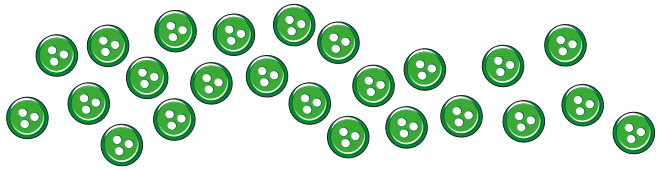
There are _____ flowers with _____ petals on each flower.

There are _____ petals altogether.

_____ + _____ + _____ + _____ + _____ = _____

_____ × _____ = _____

- Here are 24 buttons.



  - Share the buttons into 4 equal groups and complete the sentence.

    24 shared into 4 equal groups is _____

  - Circle groups of 4 buttons and complete the sentence.

    There are _____ groups of 4 in 24

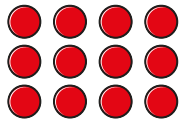
What is the same? What is different?

- Colour the multiples of 4

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

What do you notice?

- What multiplications and divisions does the array show?



Complete the number sentences.

_____ × _____ = _____ _____ × _____ = _____

_____ ÷ _____ = _____ _____ ÷ _____ = _____

- Use counters to show that 6 × 4 is the same as 6 × 2 × 2

Now work out the multiplications.

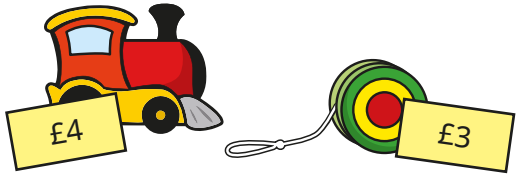
  - 4 × 4
  - 7 × 4
  - 9 × 4

The 4 times-table

Reasoning and problem solving

Sam buys 7 trains and 4 yo-yos.

How much does she spend altogether?

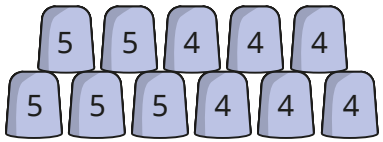


£40

Amir is playing a game.

He scores points for every cup he knocks down.

The points are shown on the cups.



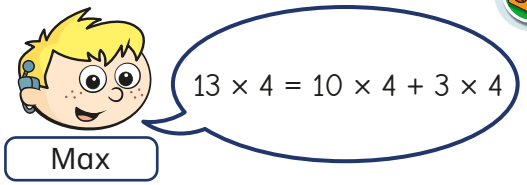
Amir scores 24 points.

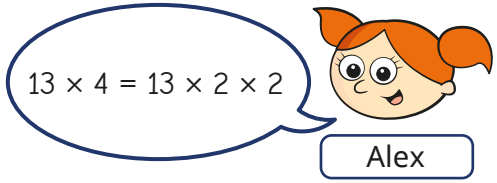
Which cups could he have knocked down?

possible answers:

6 × 4 points

4 × 5 points
+ 1 × 4 points





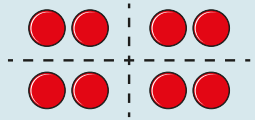
Use counters to show that Max and Alex are both correct.

What other methods could you use to work out 13 × 4?

arrays of counters showing the multiplications

Use counters to show that

$$8 \div 4 = 8 \div 2 \div 2$$



The 8 times-table

Notes and guidance

In this small step, children build on their knowledge of the 4 times-table to multiply and divide by 8

Children apply their knowledge of equal groups and use concrete manipulatives and pictorial representations to explain the link between counting in 8s and multiplying by 8. They also explore dividing by 8 through sharing into 8 equal groups and grouping into 8s.

Children should recognise that each multiple of 8 is double its equivalent multiple of 4, and may take this further to realise that multiplying by 8 is the same as doubling three times and dividing by 8 is the same as halving three times. They use arrays to support their understanding of partitioning, for example $6 \times 8 = 5 \times 8 + 1 \times 8$. They continue to explore commutativity; for example, if $3 \times 8 = 24$, then $8 \times 3 = 24$

Children in Year 4 could be stretched to find numbers in the 8 times-table that are greater than 96. They should use their understanding of partitioning to support them with this, for example $10 \times 8 + 9 \times 8 = 152$, so 152 is in the 8 times-table.

Things to look out for

- Children may think that to divide by 8, they can divide by 4 twice.

Key questions

- How can you share _____ into 8 equal groups?
- How can you put _____ into equal groups of 8?
- What methods can you use when multiplying/dividing by 8?

Possible sentence stems

- _____ × 8 = _____ × 8 + _____ × 8
- If _____ × 4 = _____, then _____ × 8 = _____

Single age small step links

- Multiply by 8 (Y3)
- Divide by 8 (Y3)
- The 8 times-table (Y3)

- N/A

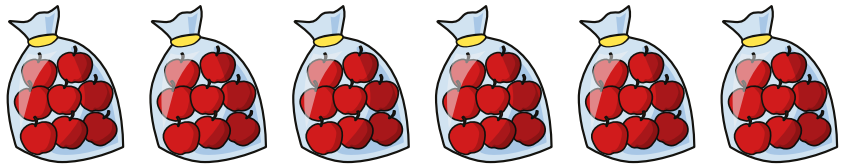
National Curriculum links

- Recall and use multiplication and division facts for the 3, 4 and 8 multiplication tables (Y3)
- Recall multiplication and division facts for multiplication tables up to 12 × 12 (Y4)

The 8 times-table

Key learning

- Complete the sentences.



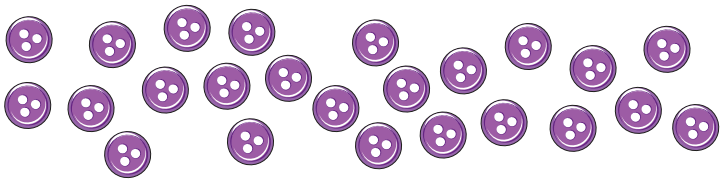
There are _____ bags with _____ apples in each bag.

There are _____ apples altogether.

_____ + _____ + _____ + _____ + _____ + _____ = _____

_____ × _____ = _____

- Here are 24 buttons.



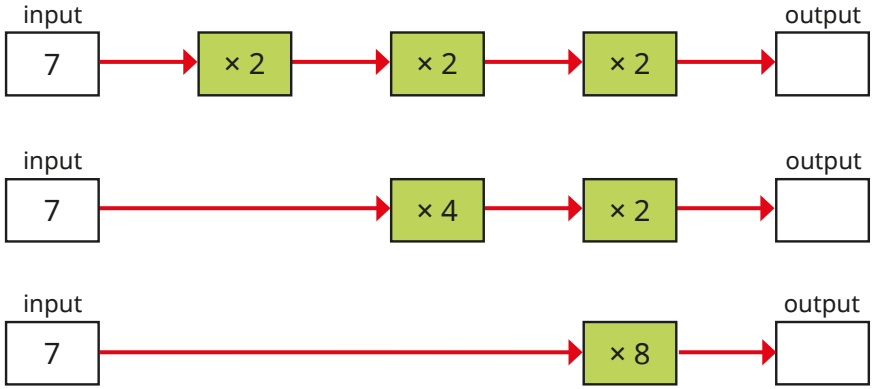
  - Share the buttons into 8 equal groups and complete the sentence.

    24 shared into 8 equal groups is _____

  - Circle groups of 8 buttons and complete the sentence.

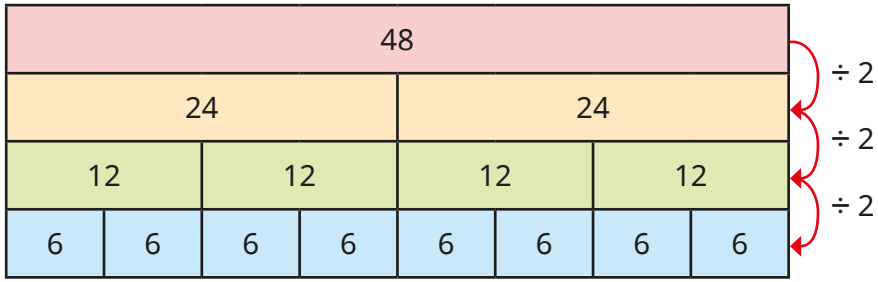
    There are _____ groups of 8 in 24

- Complete the function machines.



What do you notice about the outputs?

- Jack is using a bar model to work out 48 ÷ 8



Use Jack's method to work out the divisions.

56 ÷ 8	96 ÷ 8	128 ÷ 8	400 ÷ 8

The 8 times-table

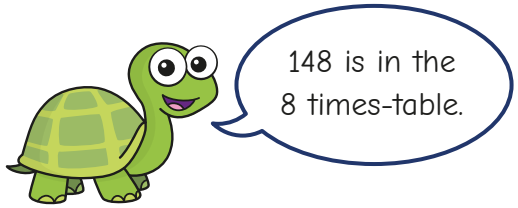
Reasoning and problem solving

Huan has £50

He buys some of these books and gets £2 change.

How many books does he buy?

6



Do you agree with Tiny?

Explain your answer.

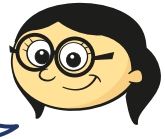
No

Mo and Annie are working out 14 × 8

14 × 8 = 10 × 8 + 4 × 8

Mo

14 × 8 = 14 × 2 × 2 × 2



Annie

Use counters to show that Mo and Annie are both correct.

What other methods could you use to work out 14 × 8?

Use your preferred method to work out the multiplications.

16 × 8	19 × 8	24 × 8

arrays of counters showing the multiplications

128 152 192

The 2, 4 and 8 times-tables

Notes and guidance

In previous steps, children explored multiplying by 2, 4 and 8 in detail, focusing on one particular skill at a time. Although they may have begun to make links between them, this small step provides children with explicit opportunities to make connections between the 2, 4 and 8 times-tables.

Children link multiplying by 4 to doubling then doubling again, and multiplying by 8 to doubling three times. They should also recognise that dividing by 4 is the same as halving then halving again, and dividing by 8 is the same as halving three times.

By the end of this step, children will be able to apply their knowledge of known facts to support them; for example, to work out 7 × 8, children can do 7 × 2 × 2 × 2, or to calculate 56 ÷ 8, they can do 56 ÷ 2 ÷ 2 ÷ 2

Children in Year 4 could be given the opportunity to work with greater numbers, using known facts to explore whether or not they are multiples of 4 and 8. For example, 200 is a multiple of 8 because it can be halved three times to give a whole number.

Things to look out for

- When multiplying by 8, children may multiply by 4 and then by 4 again, or multiply by 2 four times.

Key questions

- How does knowing _____ × 2 help you to work out _____ × 4 and _____ × 8?
- What is the relationship between multiplying by 4 and multipying by 8?
- How can you show that multiplying by 4 is the same as multiplying by 2 and then by 2 again?

Possible sentence stems

- _____ × 4 = _____ × 2 × 2
- _____ × 8 = _____ × 2 × 2 × 2

Single age small step links

- The 2, 4 and 8 times-tables (Y3)

- N/A

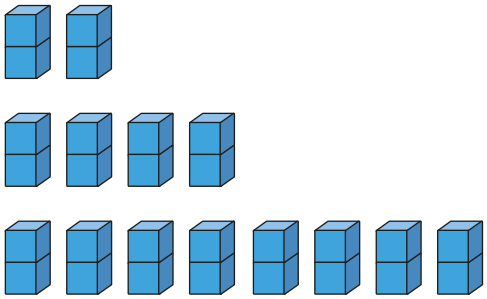
National Curriculum links

- Recall and use multiplication and division facts for the 3, 4 and 8 multiplication tables (Y3)
- Recall multiplication and division facts for multiplication tables up to 12 × 12 (Y4)

The 2, 4 and 8 times-tables

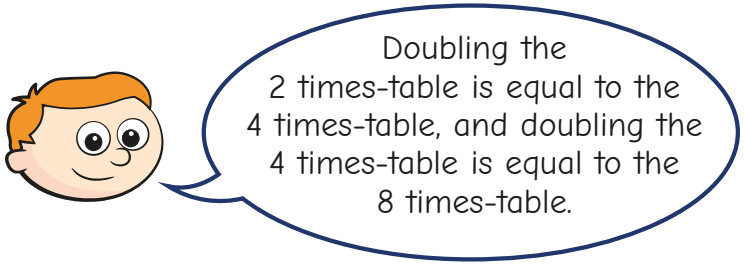
Key learning

- Complete the multiplications.
  - 2 × 2 = _____
  - 2 × 4 = _____
  - 2 × 8 = _____



What do you notice?

- Ron is looking at the 2, 4 and 8 times-tables.



Use Ron's method to complete the calculations.

- 6 × 2 = _____
  6 × 4 = _____
  6 × 8 = _____
- 8 × 2 = _____
  8 × 4 = _____
  8 × 8 = _____
- 11 × 2 = _____
  11 × 4 = _____
  11 × 8 = _____

- Complete the table.

×	2	4	8
5	10		
		28	
			72

What do you notice?

- Here are some number cards.

100	200	50	25

Choose a number to complete the sentence.

400 ÷ 2 = 200, so 400 ÷ 8 = _____

- Match the equivalent calculations.

7 × 8	halve 72, then halve it again
7 × 4	2 × 7 × 4
72 ÷ 4	2 × 7 × 2
72 ÷ 8	72 ÷ 2 ÷ 4

The 2, 4 and 8 times-tables

Reasoning and problem solving

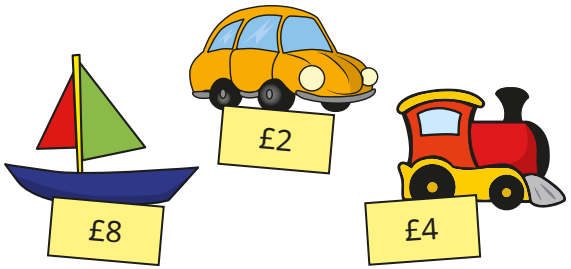
Is the statement true or false?

All multiples of 4 are multiples of 2 and 8

Explain your answer.

False

A shop sells toy boats, cars and trains.



Whitney spends exactly £24 in the shop.

What could Whitney have bought?

Is there more than one answer?

multiple possible answers, e.g.

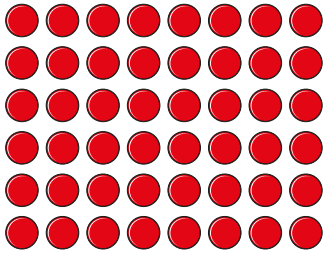
3 boats

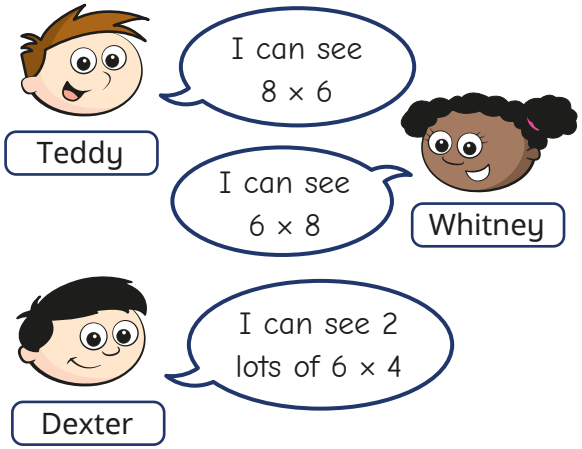
2 boats and 2 trains

12 cars

5 trains and 2 cars

Here is an array.





Use counters to make the array.

What else can you see?

multiple possible answers, e.g.

2 lots of 24

24 lots of 2

4 lots of 12

4 lots of 2 × 6

The 3 times-table

Notes and guidance

In this small step, children apply their knowledge of equal groups to explain the link between counting in 3s and multiplying by 3. They also explore dividing by 3 through sharing into 3 equal groups and grouping into 3s.

Children continue to use concrete manipulatives and pictorial representations. They use arrays to support their understanding of partitioning, for example $7 \times 3 = 5 \times 3 + 2 \times 3$. They continue to explore commutativity: if $6 \times 3 = 18$, then $3 \times 6 = 18$

It is important that children understand the structure of the times-table and can derive unknown facts from known facts by using strategies such as doubling/halving and partitioning, as well as using commutativity and inverse operations.

Examples focus on number facts up to 3×12. If appropriate, this may be extended to other 2-digit numbers, such as 3×17, when Year 4 children are exploring strategies.

Things to look out for

- When judging inequalities, such as deciding which is greater, 5×3 or 7×3, children may try to calculate each separately and then compare, rather than recognising how many groups of 3 there are.

Key questions

- How many equal groups of 3 do you have?
- How can you share _____ into 3 equal groups?
- How can you put _____ into equal groups of 3?

Possible sentence stems

- There are _____ lots of 3, so there are _____ altogether.
- There are _____ groups of _____ in _____

Single age small step links

- Multiply by 3 (Y3)
- Divide by 3 (Y3)
- The 3 times-table (Y3)
- Multiples of 3 (Y4)

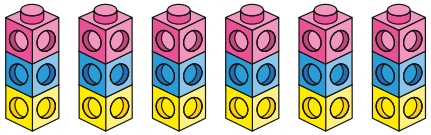
National Curriculum links

- Recall and use multiplication and division facts for the 3, 4 and 8 multiplication tables (Y3)
- Recall multiplication and division facts for multiplication tables up to 12×12 (Y4)

The 3 times-table

Key learning

- There are 6 towers.

  Each tower has 3 cubes.

  Complete the sentences.

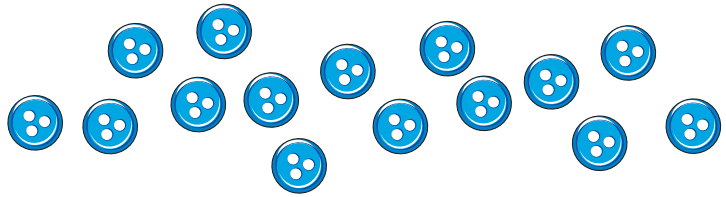
  There are _____ equal groups with _____ in each group.

  There are _____ altogether.

  _____ + _____ + _____ + _____ + _____ + _____ = _____

  _____ × _____ = _____

- Here are 15 buttons.

  - Share the buttons into 3 equal groups and complete the sentence.

    15 shared into 3 equal groups is _____

  - Circle groups of 3 buttons and complete the sentence.

    There are _____ groups of 3 in 15

- Work out the missing numbers.
  - 0 × 3 = _____
  - 4 × 3 = _____
  - 18 = _____ × 3
  - _____ × 3 = 30
  - 21 ÷ _____ = 3
  - _____ = 3 × 12
  - 30 ÷ 3 = _____
  - 3 = 1 × _____
  - _____ = 27 ÷ 3

- Match the statements.

6 × 3	half of 10 × 3
3 × 8	10 × 3 – 1 × 3
9 × 3	3 × 2 × 2 × 2
5 × 3	5 × 3 + 1 × 3

- Write <, > or = to complete the statements.

3 × 7 ◯ 7 × 3

18 ÷ 3 ◯ 19 × 3

3 × 5 + 3 × 3 ◯ 10 × 3 – 2 × 3

The 3 times-table

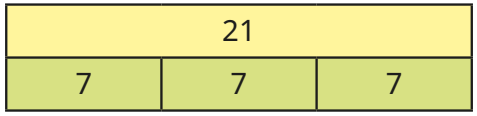
Reasoning and problem solving

Tommy has 21 seeds and some plant pots.

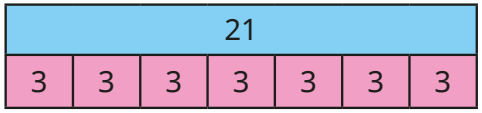
He plants 3 seeds in each pot.

Which bar model shows this?

A



B



Write a word problem to match the other bar model.

Compare answers with a partner.

What is the same?

What is different?

B

Children's word problems will vary, but should represent 21 shared into 3 groups.

Filip has 3 times as much money as Jo.

Jo has 3 times as much money as Dani.

Jo has £9

How much money do Filip and Dani each have?

Filip: £27

Dani: £3

Packets of stickers cost £3

- Kim buys 4 packets.
- Amir buys 8 packets.
- Brett buys 7 packets.

How much does each person spend?

How much more does Brett spend than Kim?

How much do the children spend altogether?

Kim: £12

Amir: £24

Brett: £21

£9 more

£57 altogether

The 6 times-table

Notes and guidance

In this small step, children build on their knowledge of the 3 times-table to explore the 6 times-table.

The step aims to embed children's fluency with the 6 times-table, while also providing them with strategies to use the multiplication facts they know to find unknown facts. They explore the fact that the 6 times-table is double the 3 times-table. Children in Year 4 can also explore the link between the 5 and 6 times-tables.

Children could use arrays to support their understanding of partitioning, for example 7 × 6 = 7 × 5 + 7 × 1. They continue to explore commutativity: if 4 × 6 = 24, then 6 × 4 = 24

It is important that children practise the related division facts as well as the multiplication facts associated with the 6 times-table. Fluency with the 6 times-table will also help them to work out the 12 times-table in future steps.

Things to look out for

- Children may not see the link between 6 × _____ and other multiples such as 5 × _____ and 1 × _____

Key questions

- How many equal groups of 6 do you have?
- How can you share _____ into 6 equal groups?
- How can you put _____ into equal groups of 6?
- How can you use facts from the 3 times-table to work out facts in the 6 times-table?

Possible sentence stems

- There are _____ lots of 6, so there are _____ altogether.
- _____ has been shared equally into _____ equal groups.
- _____ × 6 = _____ × 3 × 2

Single age small step links

- N/A

- Multiply and divide by 6 (Y4)
- 6 times-table and division facts (Y4)

National Curriculum links

- Recall multiplication and division facts for multiplication tables up to 12 × 12 (Y4)

The 6 times-table

Key learning

- Complete the sentences.

There are _____ boxes.

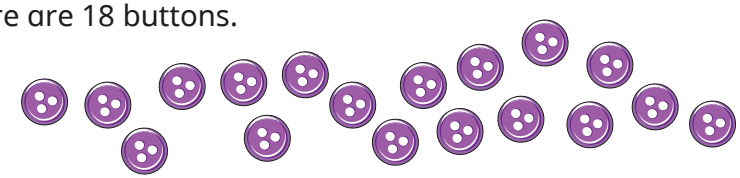
Each box contains _____ eggs.

There are _____ eggs in total.

_____ + _____ + _____ + _____ + _____ = _____

_____ × _____ = _____

- Here are 18 buttons.



  - Share the buttons into 6 equal groups and complete the sentence.

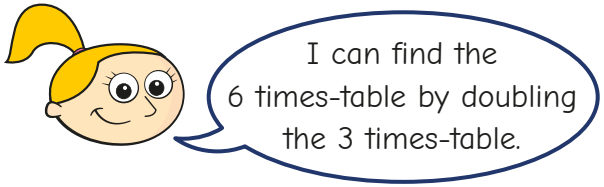
    18 shared into 6 equal groups is _____

  - Circle groups of 6 buttons and complete the sentence.

    There are _____ groups of 6 in 18

What is the same? What is different?

- Eva is working out facts in the 6 times-table.



Use Eva's method to complete the sentences.

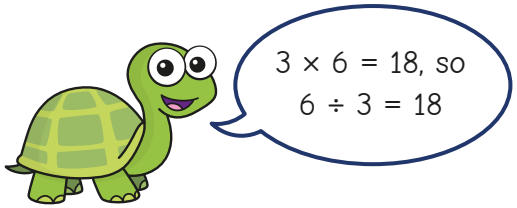
  - 4 × 6 = double 4 × 3 = double 12 = 24
  - 5 × 6 = double 5 × _____ = _____ = _____
  - 7 × 6 = double 7 × _____ = _____ = _____

- Match the inverse operations.

6 × 6 = 36	66 ÷ 6 = 11
3 × 6 = 18	36 ÷ 6 = 6
11 × 6 = 66	54 ÷ 6 = 9
9 × 6 = 54	18 ÷ 6 = 3

The 6 times-table

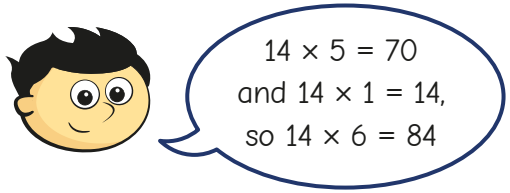
Reasoning and problem solving



Is Tiny correct?

Explain your answer.

No



Is Jack correct?

Explain your answer.

Yes

Is the statement true or false?

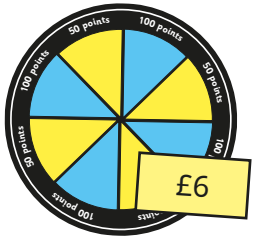
All multiples of 6 are multiples of 3

Explain your answer.

True

Mr Smith is buying items for a sports club.

A football costs £3 and a dartboard costs £6



Mr Smith spends exactly £30

What could he have bought?

Is there more than one answer?

multiple possible answers, e.g.

4 dartboards and 2 footballs

10 footballs

5 dartboards

The 9 times-table

Notes and guidance

In this small step, children explore the 9 times-table.

Children use a range of strategies to support their fluency, such as looking for number patterns and finding unknown number facts from known facts. For example, they can use their knowledge of the 10 times-table to derive the 9 times-table or apply their understanding that each multiple of 9 is triple the equivalent multiple of 3

Children explore the structure of the 9 times-table using a range of models and pictorial representations, and by looking at multiples of 9 in context. They also use commutativity with the facts they already know from other times-tables.

Year 4 children can investigate finding the digit sum and look for patterns that will support them in identifying multiples of 9: if the sum of the digits of a number is a multiple of 9, then the number itself is also a multiple of 9. This, and the corresponding rule for the 3 times-table, will support their learning in the next step, where they compare the 3, 6 and 9 times-tables.

Things to look out for

- Children may use tricks to find multiplication facts in the 9 times-table, but not be able to use these to find the related division facts.

Key questions

- How can you use the 3/10 times-table to work out the 9 times-table?
- How can you tell if a number is a multiple of 9?

Possible sentence stems

- _____ × 10 = _____, so _____ × 9 = _____ – _____ = _____
- Multiplying by 9 is the same as multiplying by _____ and then multiplying by _____ again.

Single age small step links

- N/A

- Multiply and divide by 9 (Y4)
- 9 times-table and division facts (Y4)

National Curriculum links

- Recall multiplication and division facts for multiplication tables up to 12 × 12 (Y4)
- Recognise and use factor pairs and commutativity in mental calculations (Y4)

The 9 times-table

Key learning

- Complete the sentences.

  - There are _____ rows of 9 strawberries.

    There are _____ strawberries in total.

    _____ + _____ + _____ = _____

    _____ × _____ = _____

  - The strawberries are shared into 9 boxes.

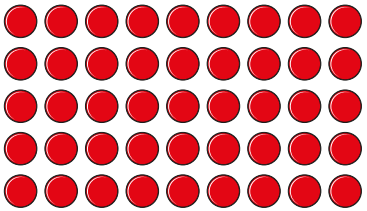
    There are _____ strawberries in each box.

    _____ ÷ _____ = _____

- Complete the number track.

9				45	54					

- Write the fact family to match the array.



- Scott is working out 9 × 6

$$\begin{aligned} 9 \times 6 &= 10 \times 6 - 6 \\ &= 60 - 6 \\ &= 54 \end{aligned}$$

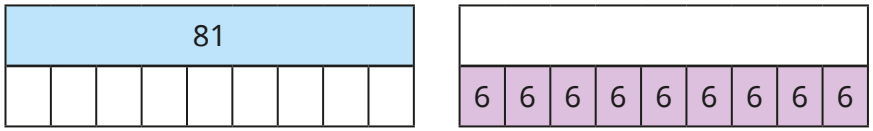
  Use Scott's method to work out the multiplications.

  - 9 × 3
  - 9 × 7
  - 9 × 5
  - 9 × 8

- Match the inverse operations.

6 × 9 = 54	27 ÷ 9 = 3
3 × 9 = 27	18 ÷ 9 = 2
11 × 9 = 99	54 ÷ 9 = 6
2 × 9 = 18	99 ÷ 9 = 11

- Complete the bar models.



  Write the fact family for each bar model.

The 9 times-table

Reasoning and problem solving

Is the statement always true, sometimes true or never true?

> Multiples of 9 are also multiples of 3

Explain your answer.

always true

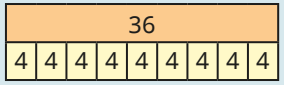
Rosie has 36 flowers and 9 vases.

She puts an equal number of flowers in each vase.

How many flowers does she put in each vase?

Show this information on a bar model.

4 flowers



Here are some multiples of 9

27	108	162
216	981	648

Find the digit sum of each number.

What do you notice?

9, 9, 9, 9, 18, 18

Use what you have learnt about adding the digits together to find out which of these numbers are multiples of 9

683	207	492
756	423	948

207, 756, 423

The 3, 6 and 9 times-tables

Notes and guidance

In this small step, children make links between the 3, 6 and 9 times-tables to deepen their understanding and embed fluency with these times-tables.

Children explore the structure of the times-tables using resources such as arrays and hundred squares, as well as through tasks that require them to reason and explore number facts to look for structural patterns.

Children can apply their knowledge of known facts to support them; for example, to work out 7 × 9, they can do 7 × 3 + 7 × 6, or to calculate 36 ÷ 9, they can do 36 ÷ 3 ÷ 3

Children in Year 4 could be given the opportunity to explore if greater numbers are multiples of 3, 6 and 9 using known facts. For example, 204 is a multiple of 6 because it is an even number and its digits sum to 6, which is a multiple of 3

Things to look out for

- Children may see the pattern of doubling 3 times-table facts to find 6 times-table facts, and then think that they can double the 6 times-table facts to find the 9 times-table facts.
- Children may rely on reciting the times-tables, rather than using more efficient strategies.

Key questions

- What links can you see between the 3 and 6/9 times-tables?
- What other times-tables can you use to help find the multiplication facts?
- How can you tell if a number is a multiple of 3/6/9?

Possible sentence stems

- Double _____ × 3 = _____ × 6
- Triple _____ × 3 = _____ × 9
- 3 lots of _____ + 6 lots of _____ = 9 lots of _____

Single age small step links

- N/A

- The 3, 6 and 9 times-tables (Y4)

National Curriculum links

- Recall and use multiplication and division facts for the 3, 4 and 8 multiplication tables (Y3)
- Recall multiplication and division facts for multiplication tables up to 12 × 12 (Y4)

The 3, 6 and 9 times-tables

Key learning

- Here is a hundred square.
  - Circle the multiples of 3 in one colour.
  - Circle the multiples of 6 in another colour.
  - Circle the multiples of 9 in a third colour.

  What 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
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

- Here are three number tracks for the 3, 6 and 9 times-tables.

  Complete the number tracks.

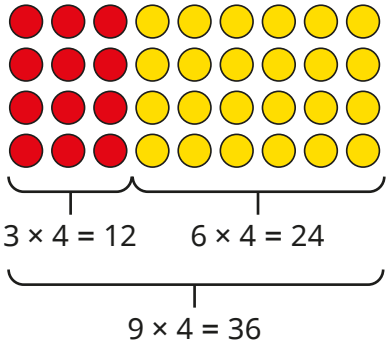
3	6		12					27		33	

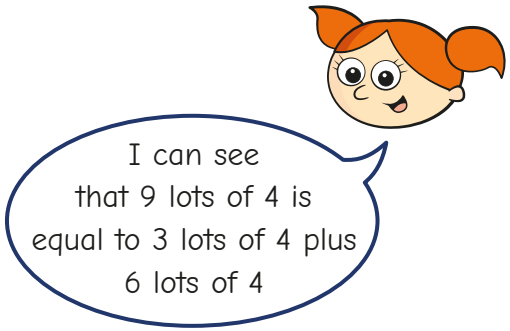
6	12	18				42				66	

9		27	36					81			

What do you notice?

- Alex has made an array to show 9 × 4





Draw and label an array to show that 9 × 7 = 3 × 7 + 6 × 7

- What does the bar model show about the connection between the 3 times-table and the 9 times-table?

3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
9			9			9			9			9		

- Tom has 9 bags of 8 pears.

  Write a multiplication to find the total number of pears.

  Write the fact family for this multiplication.

The 3, 6 and 9 times-tables

Reasoning and problem solving

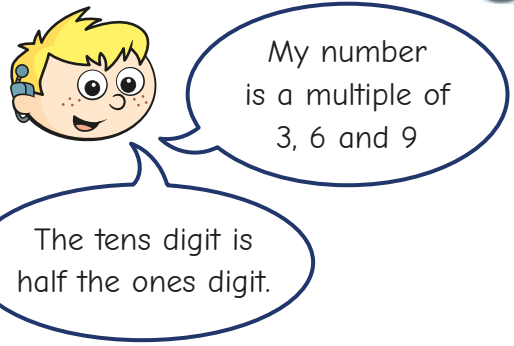
Is the statement always true, sometimes true or never true?

Multiples of 3 are also multiples of 6 and 9

Explain your answer.

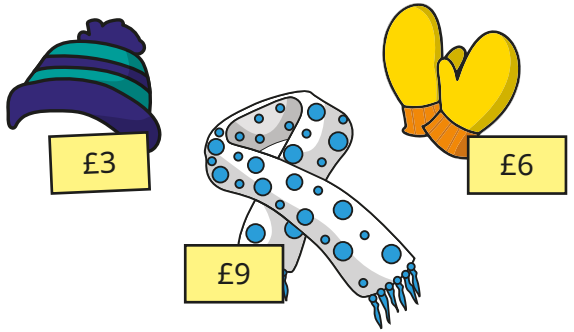
sometimes true

Max is thinking of a 2-digit number.



What is Max's number?

36



Esther buys 4 hats, 2 scarves and 3 pairs of gloves.

How much does Esther spend?

£48

Dani and Huan have £54 between them.

Huan has 5 times as much money as Dani.

Dani spends all her money on 3 books that all cost the same amount.

How much does each book cost?

£3

The 7 times-table

Notes and guidance

In this small step, children apply their knowledge of equal groups to explore the link between counting in 7s and multiplying by 7. They also explore dividing by 7 through sharing into 7 equal groups and grouping into 7s.

Children continue to use concrete manipulatives and pictorial representations. They use arrays to support their understanding of flexible partitioning, for example $8 \times 7 = 5 \times 7 + 3 \times 7$ or $8 \times 7 = 8 \times 5 + 8 \times 2$. They also continue to explore commutativity: if $6 \times 7 = 42$, then $7 \times 6 = 42$

It is important that children understand the structure of the times-table and can derive unknown facts from known facts.

This step could also be an opportunity to use the 6 and 8 times-tables to derive the 7 times-table, for example $9 \times 7 = 9 \times 8 - 9$ or $9 \times 7 = 9 \times 6 + 9$. Drawing arrays is a useful way of helping children to see these links.

Things to look out for

- Children may need support to use the multiplication facts that they are confident in, to find the ones that they do not know as well.

Key questions

- How many groups of 7 are there in _____?
- How can you use the 5/6/8 times-table to find a fact in the 7 times-table?

Possible sentence stems

- _____ × 7 = _____ × 5 + _____ × 2
- _____ × 7 = _____ × 8 – _____
- _____ × 7 = _____ × 6 + _____

Single age small step links

- N/A

- Multiply and divide by 7 (Y4)
- 7 times-table and division facts (Y4)

National Curriculum links

- Recall multiplication and division facts for multiplication tables up to 12 × 12 (Y4)
- Count in multiples of 6, 7, 9, 25 and 1,000 (Y4)

The 7 times-table

Key learning

- Ron draws pictures to represent 7 × 5 in two different ways.

5 sevens

5 lots of 7

7 fives

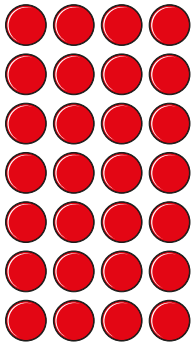
7 lots of 5

Use Ron's method to represent 7 × 9 in different ways.

- Complete the number track.

0	7	14									

- Write two multiplications and two divisions shown by the array.



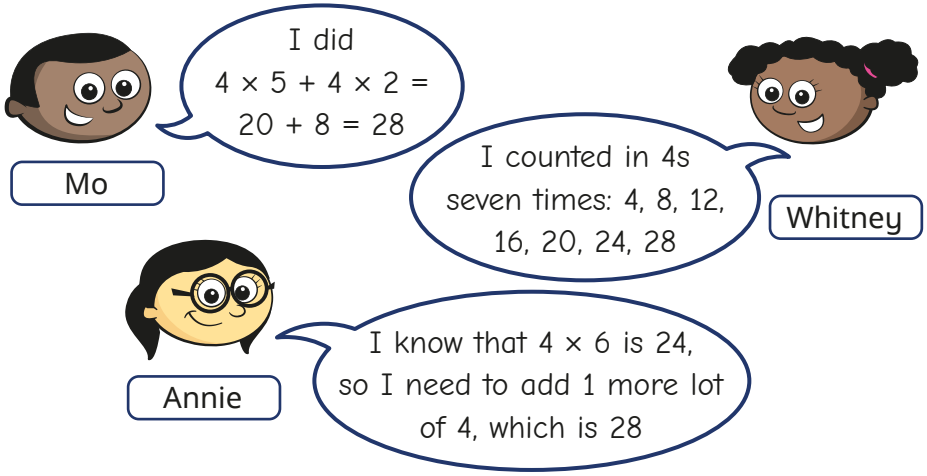
_____ × _____ = _____

_____ × _____ = _____

_____ ÷ _____ = _____

_____ ÷ _____ = _____

- Mo, Whitney and Annie are working out 4 × 7 and explaining their methods.



Whose method do you prefer?

Is one method more efficient than the others?

- Match the inverse operations.

8 × 7 = 56	21 ÷ 7 = 3
3 × 7 = 21	77 ÷ 7 = 11
11 × 7 = 77	56 ÷ 7 = 8

The 7 times-table

Reasoning and problem solving

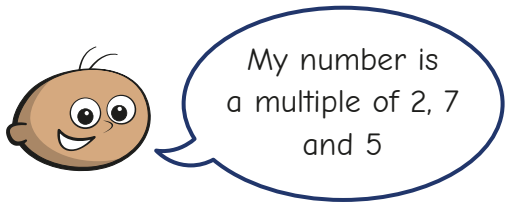
Is the statement true or false?

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

Explain your reasoning.

False

Tommy is thinking of a number less than 80

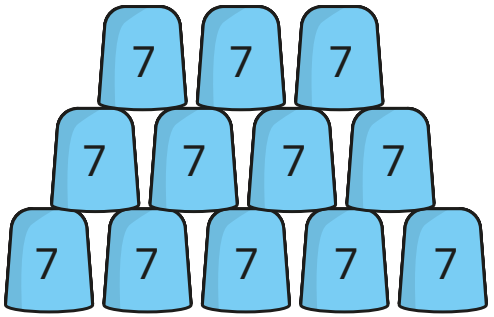


What number is Tommy thinking of?

70

Three children are playing a game.

They score 7 points for every cup they knock down.



Here are their scores.

Eva	49
Jo	84
Teddy	56

How many cups did each child knock down?

Eva: 7 cups

Jo: 12 cups

Teddy: 8 cups

The 11 times-table

Notes and guidance

In this small step, children build on their knowledge of the 1 and 10 times-tables to explore the 11 times-table. They recognise that they can partition 11 into 10 and 1 and use known facts to support their understanding, for example $7 \times 11 = 7 \times 10 + 7 \times 1 = 77$

Children use a range of concrete and pictorial representations to deepen their understanding of multiplying by 11 and to make links between multiplying and dividing by 11. They explore dividing by 11 through sharing into 11 equal groups and grouping into 11s.

It is important that children understand the structure of the times-table and can derive unknown facts from known facts. As children should know the majority of facts from other times-tables, highlighting the importance of commutativity is key.

Key questions

- How many lots of 11 do you have?
- How many groups of 11 are there in _____?
- What can you partition 11 into to help you?

Possible sentence stems

- _____ × 11 = _____ × 10 + _____ × 1
- There are 11 groups of _____ in _____
- There are _____ groups of 11 in _____

Single age small step links

- N/A

- 11 times-table and division facts (Y4)

Things to look out for

- Children may need support to use the multiplication facts that they are confident in, to find the ones that they do not know as well.

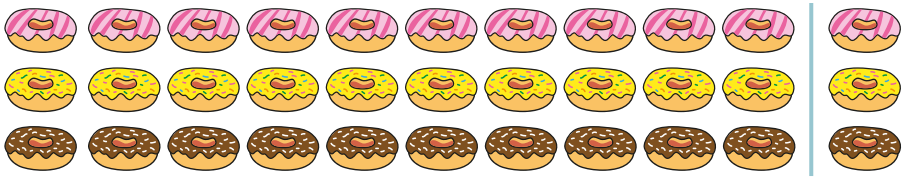
National Curriculum links

- Recall multiplication and division facts for multiplication tables up to 12 × 12 (Y4)
- Recognise and use factor pairs and commutativity in mental calculations (Y4)

The 11 times-table

Key learning

- Complete the sentences.

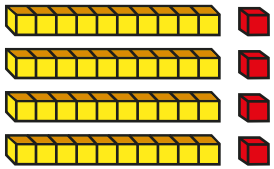


3 × 10 = _____ 3 × 1 = _____

3 lots of 10 doughnuts = _____ 3 lots of 1 doughnut = _____

3 × 10 + 3 × 1 = 3 × 11 = _____ There are _____ doughnuts.

- Ron is using base 10 to help him work out 4 × 11



4 × 11 = 44

Use Ron's method to work out the multiplications.

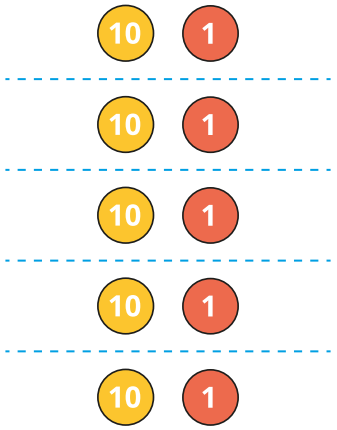
2 × 11	5 × 11	7 × 11
10 × 11	9 × 11	11 × 11

What do you notice?

- There are 11 players in a football team.

How many players are there in 6 teams?

- Rosie is using place value counters to help her work out 55 ÷ 11



Use Rosie's method to work out the divisions.

44 ÷ 11	77 ÷ 11	99 ÷ 11

- 11 children can sit around one table.

There are 132 children.

How many tables are needed?

The 11 times-table

Reasoning and problem solving

Here is one batch of muffins.

Amir bakes 11 batches of muffins.

How many muffins does he bake altogether?

In each batch there are 2 chocolate, 4 vanilla and 3 strawberry muffins.

How many of each type of muffin does Amir have in 11 batches?

99

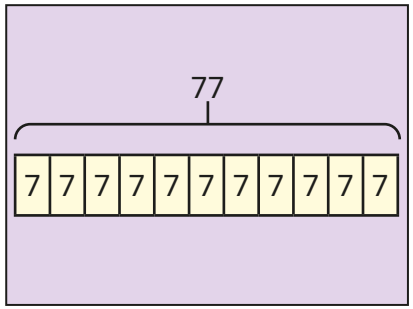
chocolate: 22

vanilla: 44

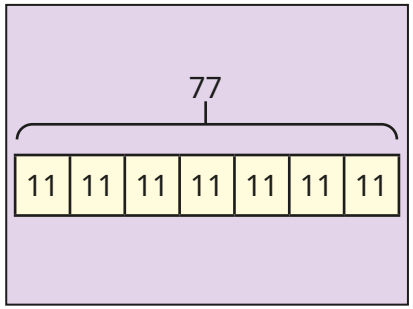
strawberry: 33

Match the word problems to the bar models.

Sam has 77 footballs.
She shares them equally into 11 bags.
How many footballs are in each bag?



Sam has 77 footballs.
She wants to put them into bags with 11 footballs in each bag.
How many bags does she use?



Explain your reasoning.

The first problem goes with the first bar model, and the second problem with the second bar model.

The 12 times-table

Notes and guidance

In this small step, children build on their knowledge of the 2 and 10 times-tables to explore the 12 times-table. They recognise that they can partition 12 into 10 and 2 and use known facts to support their understanding, for example 7 × 12 = 7 × 10 + 7 × 2 = 84. Children in Year 4 should also build on their knowledge of the 6 times-table, recognising that multiplying by 12 is the same as multiplying by 6 and then doubling.

Children use a range of concrete and pictorial representations to deepen their understanding of multiplying by 12 and to make links between multiplying and dividing by 12. They explore dividing by 12 through sharing into 12 equal groups and grouping into 12s.

At this stage, children should already know multiplication facts from other times-tables, so highlighting the importance of commutativity is key in this step.

Things to look out for

- Children may need support to use known multiplication facts to find new ones.
- Children may find all multiplication facts by starting from 1 × 12 and then reciting their times-table facts, rather than using facts that they know.

Key questions

- How many lots of 12 do you have?
- How many groups of 12 are there in _____?
- What can you partition 12 into to help you?

Possible sentence stems

- _____ × 12 = _____ × 10 + _____ × 2
- _____ × 12 = double _____ × 6

Single age small step links

- N/A

- 12 times-table and division facts (Y4)

National Curriculum links

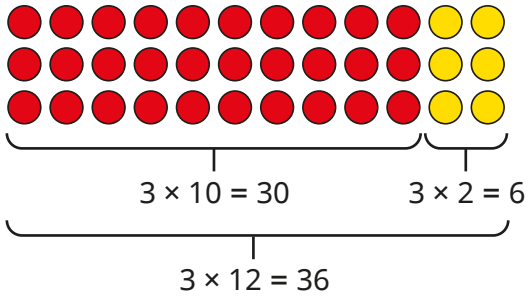
- Recall multiplication and division facts for multiplication tables up to 12 × 12 (Y4)
- Recognise and use factor pairs and commutativity in mental calculations (Y4)

The 12 times-table

Key learning

- Mo has made an array to help him work out 3 × 12

  He has partitioned 12 into 10 and 2



  Use Mo's method to work out the multiplications.

2 × 12	9 × 12	7 × 12
4 × 12	6 × 12	12 × 12

- There are 12 people on a lacrosse team.

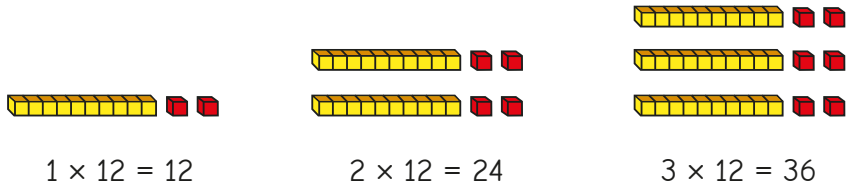
  There are 8 teams in a tournament.

  How many players are there altogether?

- A box holds 12 eggs.

  How many boxes are needed for 60 eggs?

- Amir is building the 12 times-table.



  Use base 10 to help you complete the calculations.

  - 12 × 5 = ___
  - 5 × 12 = ___
  - 48 ÷ 12 = ___
  - 96 ÷ 12 = ___
  - 12 × ___ = 120
  - 12 × ___ = 144
  - ___ ÷ 12 = 7
  - ___ = 11 × 12

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

5 × 12 ◯ 6 × 12

7 × 10 + 7 × 2 ◯ 7 × 12

7 × 12 ◯ 12 × 7

132 ÷ 12 ◯ 12 × 11

36 ÷ 12 ◯ 84 ÷ 12

4 × 12 ◯ 4 × 2 × 6

The 12 times-table

Reasoning and problem solving

Is the statement true or false?

> When you multiply any whole number by 12, the answer will always be even.

Explain your answer.

True

Complete the table.

×	3	6	12
2			
4			
8			

What connections do you notice?

6, 12, 24

12, 24, 48

24, 48, 96

Tiny is thinking of a number less than 100

- It is a multiple of 5
- It is 1 more than a multiple of 12

What number could Tiny be thinking of?

Is there more than one answer?

25 or 85

A T-shirt costs £12

A pair of shorts costs £6

Jack spends exactly £60

What could he have bought?

How many possibilities are there?

T-shirt	Shorts
5	0
4	2
3	4
2	6
1	8
0	10

6

Multiply by 1 and 0

Notes and guidance

In this small step, children explore the effect of multiplying by 1 and zero.

Children have explored times-tables and corresponding division facts up to 12 in previous steps, so will have experience of multiplying by 1 and zero. They should notice that when they multiply a number by 1, the result is always the number itself. They also see that when multiplying any number by zero the result is always zero.

A common misconception is to confuse the result of multiplying by zero with multiplying by 1. Use pictorial representations to address this misconception, so that children can see that 4×0 is the same as 4 lots of zero, which is equal to zero.

Things to look out for

- Children may use addition instead of multiplication, for example $1 \times 1 = 2$ and $7 \times 1 = 8$
- When working out a longer multiplication, for example $2 \times 7 \times 9 \times 0$, children may start working from left to right rather than realising that as they are multiplying by zero, the answer must be zero.

Key questions

- What does "zero" mean? How can you multiply by zero?
- What happens when you multiply a number by zero?
- What does "multiplying by 1" mean?
- What happens when you multiply a number by 1?

Possible sentence stems

- Any number multiplied by zero is equal to _____
- Any number multiplied by 1 is equal to _____

Single age small step links

- N/A

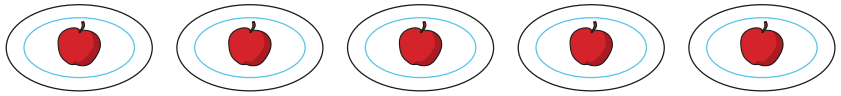
- Multiply by 1 and 0 (Y4)

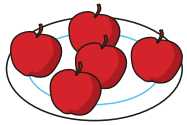
National Curriculum links

- Use place value, known and derived facts to multiply and divide mentally, including: multiplying by 0 and 1; dividing by 1; multiplying together three numbers (Y4)

Multiply by 1 and 0

Key learning

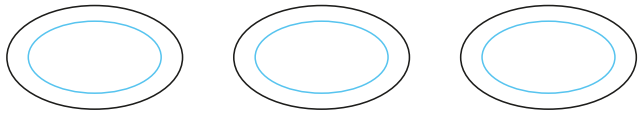
- Write a multiplication to work out the total number of apples.
  - 

    _____ × _____ = _____
  - 

    _____ × _____ = _____

- There are 3 plates.

  Each plate has zero apples on it.

  How many apples are there in total?

  Complete the multiplication.

  3 × _____ = _____

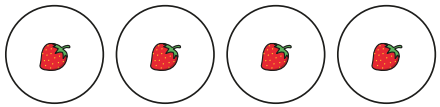
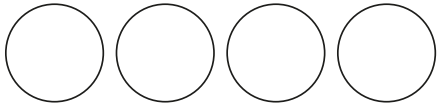
- Complete the multiplications.
  - 8 × 1 = ___
  - 1 × ___ = 11
  - 1 × 6 = ___
  - ___ × 1 = 9
  - 8 × 0 = ___
  - 11 × ___ = 0
  - 0 × 6 = ___
  - 0 = ___ × 9

- Which multiplications have an answer of zero?

56 × 1	0 × 29	1 × 1	0 × 0	7 × 0	12 × 1

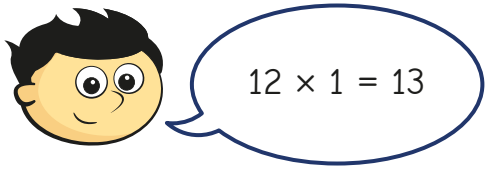
  What do you notice?

- Match the statements to the pictures.

4 lots of zero	
1 lot of 4	
4 lots of 1	

Multiply by 1 and 0

Reasoning and problem solving



Do you agree with Jack?

Explain your answer.

No

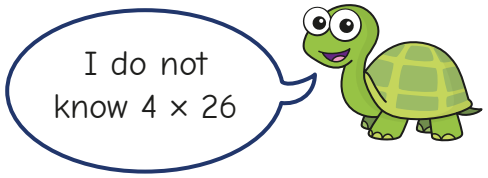
Which calculation is the odd one out?

4 × 0	4 + 0
1 × 4	4 × 1

Explain your choice.

multiple possible answers, e.g. 4 + 0 is the only addition, 4 × 0 is the only one that does not have an answer of 4

Tiny is working out 4 × 26 × 0 × 8

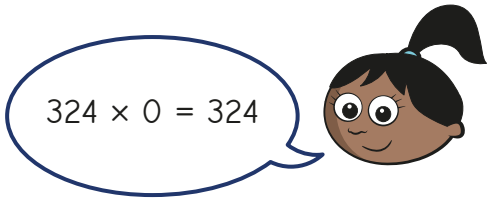


Explain why Tiny does not need to multiply the numbers one by one.

There is a zero in the calculation.

Any number multiplied by zero is zero.

Sam is multiplying numbers.



Is Sam correct?

Explain your answer.

No

Divide a number by 1 and itself

Notes and guidance

In this small step, children apply their knowledge of division and explore what happens to a number when they divide it by 1 or itself.

Children can sometimes confuse the result of dividing a number by 1 with dividing a number by itself. Use concrete and pictorial representations to address this misconception, including examples that involve both structures of division. Stem sentences can be used to encourage children to see this, for example: 4 grouped into 4s is equal to 1 ($4 \div 4 = 1$) and 4 grouped into 1s is equal to 4 ($4 \div 1 = 4$).

Following on from the previous step, children may try to divide a number by zero and it should be highlighted that this is not possible.

Things to look out for

- Children may assume that division is commutative and think that $8 \div 1 = 1 \div 8$
- Children may confuse the result of dividing a number by 1 with dividing the number by itself.
- Children may think that a number divided by itself is zero.

Key questions

- What is _____ shared equally into 1 group?
- What is _____ grouped into groups of 1?
- What is the same and what is different about multiplying by 1 and dividing by 1?
- What is the same and what is different about dividing a number by 1 and dividing a number by itself?

Possible sentence stems

- When I divide a number by itself, the answer is ...
- When I divide a number by _____, the number remains the same.

Single age small step links

- N/A

- Divide a number by 1 and itself (Y4)

National Curriculum links

- Use place value, known and derived facts to multiply and divide mentally, including: multiplying by 0 and 1; dividing by 1; multiplying together three numbers (Y4)

Divide a number by 1 and itself

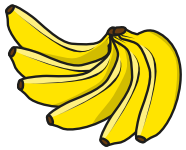
Key learning

- Complete the sentences.

  6 shared into 1 equal group is equal to _____

  6 grouped into groups of 1 is equal to _____

  6 ÷ 1 = _____

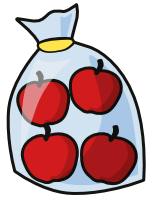


- Here is a bag of 4 apples.

  The apples are shared between 4 children.

  How many apples does each child get?

  4 ÷ 4 = _____



- Write a division sentence for each statement.

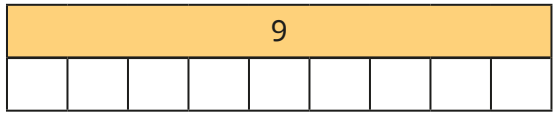
  Use counters to help you.

6 counters shared into 1 group
8 counters grouped into 1s
4 counters shared into 4 groups
7 counters grouped into 7s

- Tom bakes 9 muffins.

  He shares them equally between 9 friends.

  How many muffins does each friend get?



  9 ÷ _____ = _____

- A bag can hold 7 oranges.

  Kim has 7 oranges.

  How many bags can she fill?

9 ÷ 9 = 1	1 = 12 ÷ 12

  What do you notice?

  What other divisions can you write with an answer of 1?

- Which of the divisions have an answer of 1?

8 ÷ 1	80 ÷ 80	20 ÷ 10	5 ÷ 5

Divide a number by 1 and itself

Reasoning and problem solving

Without working out the divisions, write <, > or = to compare the statements.

8 ÷ 1 ◯ 9 ÷ 1

6 ÷ 1 ◯ 6 ÷ 6

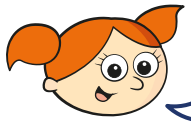
10 ÷ 10 ◯ 12 ÷ 12

Explain your reasoning.

<

>

=



6 ÷ 1 is less than 6 × 1, because I am dividing.

Do you agree with Alex?

Explain your reasoning.

No

15 ÷ 15 = 0

Do you agree with Max?

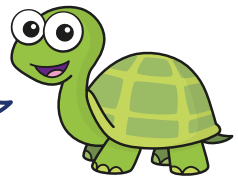
Explain your answer.

No

Tiny is looking at a division problem.

9 ÷ 1 ÷ 3

I only need to divide 9 by 3 to work out the answer.



Do you agree with Tiny?

Explain your answer.

Yes