Released October 2017

Years 3/4

Small Steps Guidance and Examples

Block 3: Multiplication & Division

White Rose Maths

Overview

Small Steps

Year 3	Year 4
Multiplication – equal groups	Multiply by 10
	Multiply by 100
	Divide by 10
	Divide by 100
	Multiply by 1 and 0
	Divide by 1
Multiplying by 3	Multiply and divide by 6
Dividing by 3	
The 3 times-table	The 6 times-table and division facts
Multiplying by 4	Multiply and divide by 9
Dividing by 4	
The 4 times-table	The 9 times-table and division facts
Multiplying by 8	Multiply and divide by 7
Dividing by 8	
The 8 times-table	The 7 times-table and division facts

Multiplication – Equal Groups

Notes and Guidance

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

Mathematical Talk

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

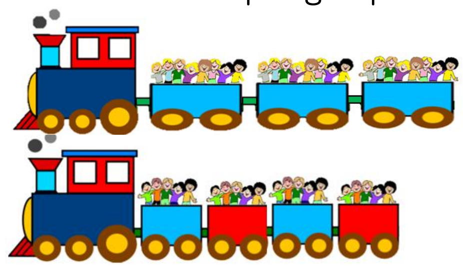
What does the 3 represent?

What does the 8 represent?

How can we represent the groups?

Varied Fluency

1. Describe the equal groups.



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

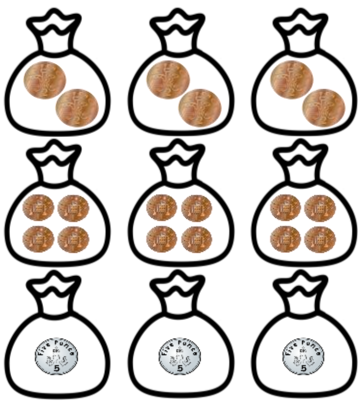
3. Complete.

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

Multiplication – Equal Groups

Reasoning and Problem Solving

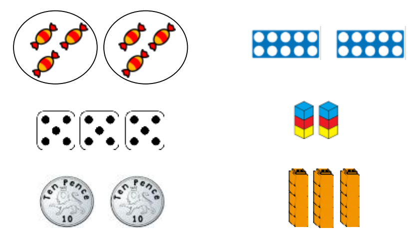
Which group of money bags is the odd one out?



Explain why.

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

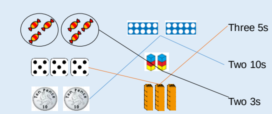
Match the equal groups together.



Three 5s

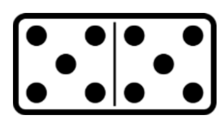
Two 10s

Two 3s



Which is the odd one out?

Explain why.



Two 5s

5 + 5 =

Ten

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

Multiply by 10

Notes and Guidance

Children need to focus on and visualise making a number ten times bigger. The language of ‘ten lots of’ is vital to use in this step. The understanding of the commutative law is essential because children need to see calculations such as 10 × 3 and 3 × 10 are related and must be represented differently if posed as a worded question.

Mathematical Talk

Can you represent these with concrete objects or a drawing?

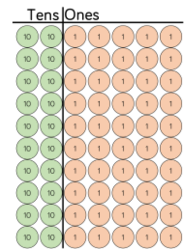
Can you explain what you did to a partner?

What is the rule when multiplying by 10? Why does it work?

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

Varied Fluency

1. Write the calculation shown by the place value counters.



Each row has ___ tens and ___ ones so each row has a value of ___.
There are ___ rows.
The calculation is ___ × ___ = ___

2. Use place value counters to work out:
   - 10 × 3
   - 4 × 10
   - 12 × 10

3. Match the statement to the correct bar model.

5 buses have 10 passengers.

8 pots each have 10 pencils.

10 chickens lay 5 eggs each.

10	10	10	10	10

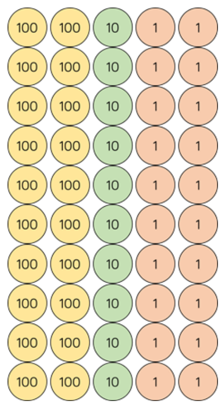
5	5	5	5	5	5	5	5	5	5

10	10	10	10	10	10	10	10

Multiply by 10

Reasoning and Problem Solving

Complete using <, > or =
Explain how you know.



221 × 10 ◯

> because the counters show 10 lots of 212, which is less than 10 lots of 221.

◯ 1,320 × 10

< because the counters show 132 × 10 (= 1,320) so it must be less than 1,320 × 10

Katya has multiplied a whole number by 10
Her answer is between 440 and 540

What could her original calculation be?

How many possibilities can you find?

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

Multiply by 100

Notes and Guidance

Build on the previous step by showing a concrete representation as ten times bigger so children have a clear image. This can be shown like a 100 square grid, as this is familiar to children.
Use place value counters and Dienes to explore what is happening to the value of the digits in the calculation and encourage children to see a rule so they can begin to move away from concrete representations.

Mathematical Talk

How do the Dienes show multiplying by 100?

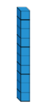
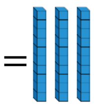
Can you think of a time when you would need to multiply by 100?

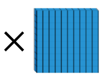
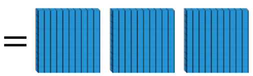
Will you produce a greater number if you multiply by 100 rather than 10? Why?

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

Varied Fluency

1. If 3 ×  =  = 3 ones = 3
   Complete:

   3 ×  =  = $\boxed{}$ tens = $\boxed{}$

   3 ×  =  = $\boxed{}$ hundreds = $\boxed{}$

2. Work out

7 × 10	63 × 10	80 × 10
7 × 100	63 × 100	80 × 100

   What do you notice?
   Write an explanation of this rule.

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

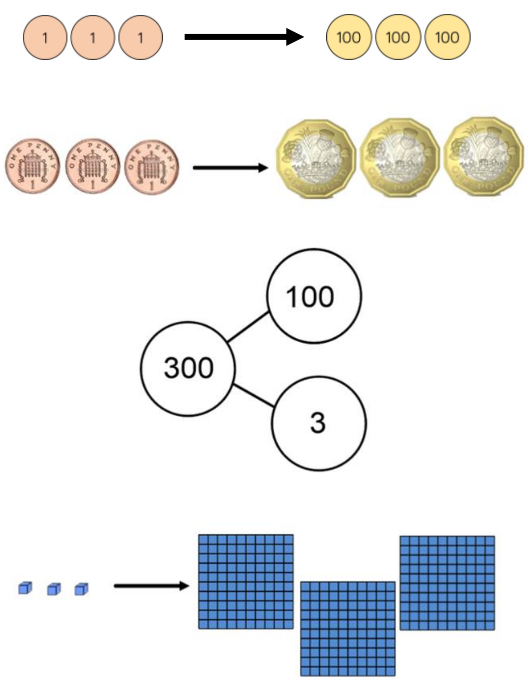
75 × 100	◯	75 × 10
100 × 47	◯	47 × 100
39 × 100	◯	39 × 10 × 10

Multiply by 100

Reasoning and Problem Solving

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

Explain your answer.



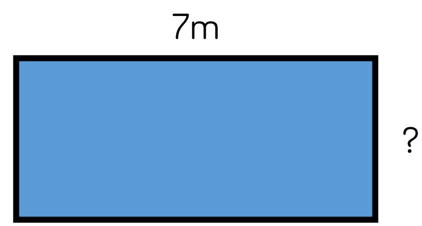
The part whole model does not represent multiplying by 100 because it is incorrect. It is used for addition and subtraction so there should be 100 parts with 3 in each.

The whole is wrong in the part whole model, it should be 103

The perimeter of the rectangle is 26m.

Find the length of the missing side.

Give your answer in cm.



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

$6 \times 100 = 600$cm

Divide by 10

Notes and Guidance

Here children see the inverse, dividing by 10, instead of multiplying by 10. Using whole number answers only, children link to real life contexts of units of measure.

Build the number with place value counters. Model how to exchange a 10 for ten ones. Repeat with each 10. Explain that the reason we are exchanging is because we don't have enough counters to make 10 groups at the moment.

Mathematical Talk

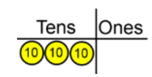
What has happened to the value of the digits?

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

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

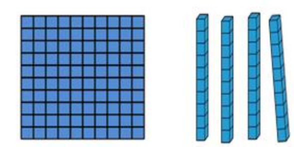
Varied Fluency

1. Use place value counters to show the steps that you would take to divide 30 by 10



Can you do this for a 3-digit number like 210?

2. Use Dienes to divide 140 by 10
Explain what you have done.



3. Ten friends empty a money box that had lots of £1 coins in it. They share the money between them. How much would they have each if the box had:

- 12 £1 coins
- 14 £1 coins
- £19

If each person had 90p, how much money would have been in the box?

Divide by 10

Reasoning and Problem Solving

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

350	35
3500	53

Can you work out which clue matches to which child?

- Jack's number is ten times smaller than Rio's.
- Emma's number is not ten times smaller than Jack's or Anya's or Rio's.
- Anya's number is ten times smaller than Jack's.

Emma – 53

Jack – 350

Anya – 35

Rio - 3500

Alice in Wonderland drank a potion and shrank. Everything around her became ten times smaller!
Are these measurements correct?

Item	Original measurement	After shrinking
Height of a door	1200cm	12cm
Her height	160cm	1600cm
Length of a book	310mm	31mm
Height of a mug	220mm	?

Can you fill in the missing measurement?
Can you explain what Alice did wrong?

Write a calculation to help you explain each item.

Height of a door: wrong; should be 120cm; Alice has divided by 100.

Her height: wrong; should be 16cm; Alice has multiplied by 10.

Length of a book: correct

Height of a mug: 22mm

Divide by 100

Notes and Guidance

Building on the last step, children divide by 100 with whole number answers.

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

Mathematical Talk

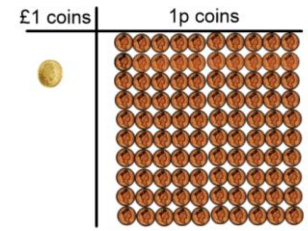
How can you use dividing by 10 to support you dividing by 100?

How are multiplying and dividing by 100 related?

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

Varied Fluency

1. Is it possible for £1 to be shared between 100 people? How does this picture explain it?



2. Match the calculation with the correct answer.

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

3. Use <, > or = to make the statement correct.

3,600 ÷ 10 ◯ 3,600 ÷ 100

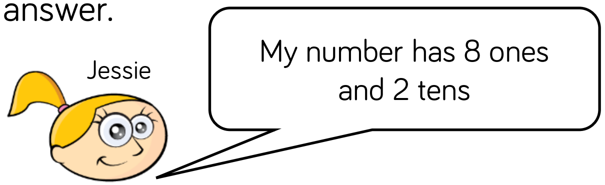
2,700 ÷ 100 ◯ 270 ÷ 10

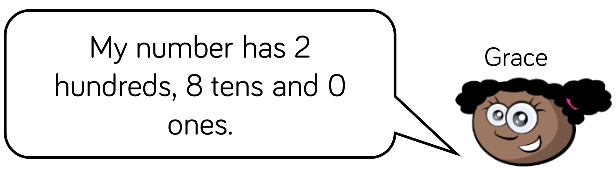
1,500 ÷ 100 ◯ 150 ÷ 10

Divide by 100

Reasoning and Problem Solving

Jessie and Grace are dividing numbers by 10 and 100.
They start with the same 4 digit number.
Both of them give some clues about their answer.





What number did they start with?
Who divided by what?
Prove it.

2,800
Jessie divided by 100 to get 28 and Grace divided by 10 to get 280

Use the number cards to fill in the missing digits.

1 2 3 4 5 6 7 8 9

170	÷	10	=	□□
□20	×	10	=	3□00
18□0	÷	10	=	1□6
□9	×	100	=	5□00
6□	=	6400	÷	100

$170 \div 10 = 17$
$320 \times 10 = 3200$
$1860 \div 10 = 186$
$59 \times 100 = 5900$
$64 = 6400 \div 100$

Multiply by 1 and 0

Notes and Guidance

In this step, children explore what happens when you multiply by one. Linking to this, they look at multiplying by 0 and use stem sentences to describe what has happened.

Mathematical Talk

Use Numicon to show me 9×1, 3×1, 5×1

What do you notice?

What does zero mean?

What does multiplying by 1 mean?

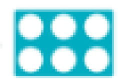
Write a word problem to show multiplying by 1 and multiplying by 0

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

Varied Fluency

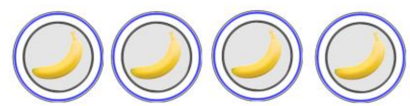
1. Complete the calculation shown by the Numicon.

There are ___ ones. ___ × ___ = ___



There is ___ six. ___ × ___ = ___

2. Complete the sentences.



There are ___ plates.
There is ___ banana on each plate.

Altogether there are ___ bananas. ___ × ___ = ___

3. Complete:

$4 \times \square = 4$ $\quad\quad$ $\square = 1 \times 7$

$0 = \square \times 42$ $\quad\quad$ $63 \times 1 = \square$

$\square \times 27 = 0$ $\quad\quad$ $50 \times \square = 50$

Multiply by 1 and 0

Reasoning and Problem Solving

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

$3 + 0 = \square$

$3 - 0 = \square$

$3 \times 0 = \square$

Explain why the answer is different.

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

Addition and subtraction have an answer of 3 because they started with that amount and added or subtracted nothing.

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

Circle the incorrect calculations and write them correctly.

5 x 0 = 50

7 x 0 = 7

19 x 1 = 19

1 x 1 = 2

0 x 35 = 0

0 x 0 = 1

1 x 8 = 9

Choose one to illustrate.

5 x 0 = 50

7 x 0 = 7

19 x 1 = 19

1 x 1 = 2

0 x 35 = 0

0 x 0 = 1

1 x 8 = 9

Example:

$5 \times 0 = 0$ because 5 lots of nothing total zero.

I have 5 bowls, each with nothing in them.

Divide by 1

Notes and Guidance

Children will explore what happens to a number when you divide it by 1 or by itself. Using concrete and pictorial representations, children demonstrate how both sharing and grouping can used to divide by 1 or the number itself.

Use stem sentence to encourage children to see this e.g.

5 grouped into 5s equals 1 ($5 \div 5 = 1$)

5 grouped into 1s equals 5 ($5 \div 1 = 5$)

Mathematical Talk

Use Cuisenaire rods or Numicon to explore dividing by 1 and itself with other numbers.

Explain what sharing means. Give an example.

Explain what grouping means. Give an example.

Write a worded question where you need to group.

Write a worded question where you need to share.

Varied Fluency

1. Use counters and hands to complete:
   - 4 counters **shared** between 4 hands $\boxed{} \div \boxed{} = \boxed{}$
   - 4 counters **shared** between 1 hand $\boxed{} \div \boxed{} = \boxed{}$
   - 9 counters **grouped** in 1s $\boxed{} \div \boxed{} = \boxed{}$
   - 9 counters **grouped** in 9s $\boxed{} \div \boxed{} = \boxed{}$

2. Choose the correct bar model for the worded question:
   Patsy has £4 in total. She gives away £4 at a time to her friends. How many friends receive £4?

£4			
£1	£1	£1	£1

£4
£4

3. Draw a bar model for each question and work out the answer
   - Alan baked 7 cookies and shared them between his 7 friends. How many cookies did each friend have?
   - There are 5 sweets. Children line up and take 5 sweets at a time. How many children have 5 sweets?

Divide by 1

Reasoning and Problem Solving

Use <, > or = to complete the following:

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

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

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

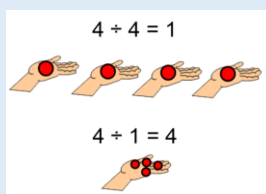
Explain how you know for each sentence. Draw an image or show it in a concrete way.

$$8 \div 1 > 7 \div 1$$

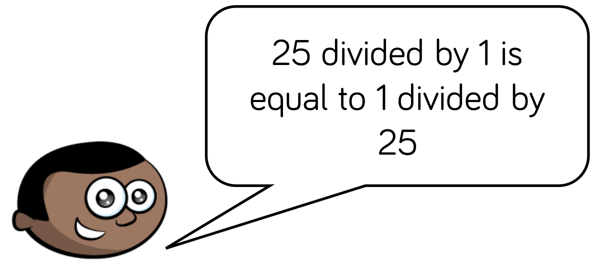
$$6 \div 6 = 5 \div 5$$

$$4 \div 4 < 4 \div 1$$

Possible answers:



Simon says:



Is he correct?

Explain your answer.

Possible answers:

A chew bar and a muffin.

A banana and a chocolate bar.

A banana and a bottle of pop.

An apple and a bar of chocolate.

An apple and a bottle of pop.

Etc.

Multiply by 3

Notes and Guidance

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

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

Mathematical Talk

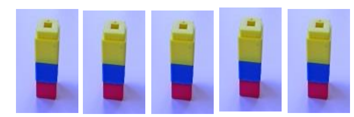
How many equal groups do we have?
How many are in each group?
How many do we have altogether?
Can you write a number sentence to show this?
Can you represent the problem in a picture?
Can you use concrete apparatus to solve the problem?
How many lots of 3 do we have?
How many groups of 3 do we have?

Varied Fluency

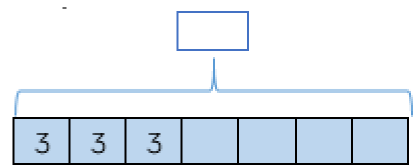
1. There are five towers of 3 cubes.
How many cubes are there altogether?

__ + __ + __ + __ + __ =

__ × __ =



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



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

__ lots of __ =

__ × __ =

Multiply by 3

Reasoning and Problem Solving

There are 6 children. Each child has 3 sweets. How many sweets altogether? Use concrete or pictorial representations to show this problem. Write another repeated addition and multiplication problem and ask a friend to represent it.	There are 18 sweets altogether. Children may use items such as counters or cube. They could draw a bar model for a pictorial representation.	If $5 \times 3 = 15$ Which number sentences would find the answer to 6×3? • $5 \times 3 + 6$ • $5 \times 3 + 3$ • $15 + 3$ • $15 + 6$ • 3×6 Explain how you know.	$5 \times 3 + 3$ because one more lot of 3 will find the answer. $15 + 3$ because adding one more lot of 3 to the answer to 5 lots will give me 6 lots. 3×6 because it is commutative.

Multiply and Divide by 6

Notes and Guidance

At this stage, children will draw on their knowledge of their times tables facts in order to multiply and divide by 6.
They will use their knowledge of equal groups to use concrete and pictorial methods to solve multiplication.

Mathematical Talk

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

Can you write a number sentence to show this?

Can you represent the problem in a picture?

What does each number in the calculation represent?

Varied Fluency

1. Complete the sentences to describe the eggs.

There are __ lots of __.
There are seven _____.
$7 \times$ __ = __

2. At first there were __ eggs. Then they were shared into __ boxes. Now there are __ eggs in each box.
__ ÷ __ = __

3. Complete the fact family.

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

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

Multiply and Divide by 6

Reasoning and Problem Solving

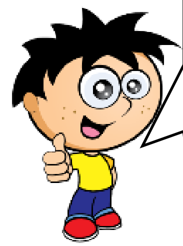
Always, sometimes, never.

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

Explain your answer.

This is true because odd × even and even × even will always give an even product.

Gary



If
$6 \times 12 = 72$
then
$12 \div 6 = 72$

Is Gary correct?

Explain your answer.

Gary is not correct because $12 \div 6$ is equal to 12 not 66. He should have written $72 \div 6 = 12$ or $72 \div 12 = 6$

Divide by 3

Notes and Guidance

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

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

Mathematical Talk

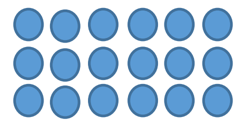
Can you group the numbers in threes?

Can you share the number into three groups?

What is the difference between sharing and grouping?

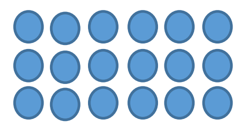
Varied Fluency

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



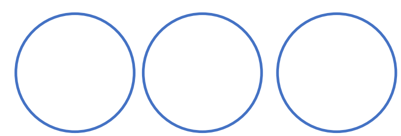
__ ÷ 3 = __

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



__ ÷ 3 = __

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



15 ÷ 3 = __

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

Divide by 3

Reasoning and Problem Solving

Share 33 cubes between 3 parts.

Complete:
There are 3 parts with _____ cubes in each part.
33 ÷ 3 = _____

Put 33 cubes into groups of 3

Complete:
There are _____ parts with 3 cubes in each part.
33 ÷ 3 = _____

What is the same about these two divisions?

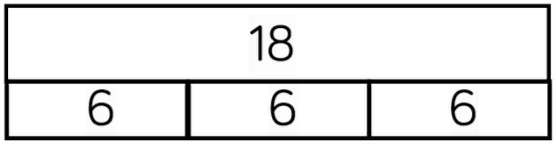
What is different?

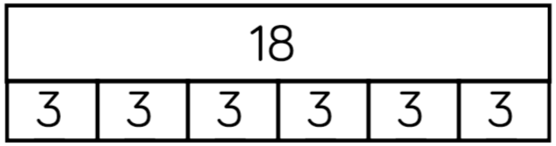
The divisors have the same numbers in.
The numbers in the divisions mean different things.
In the first question, the cubes are being shared. The 3 is the number of parts.
In the second question, the cubes are being grouped. The 3 is the amount in each part.

Jack has 18 seeds.

He plants 3 seeds in each pot.

Which bar model matches the problem?





Explain your choice.

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

The 3 Times-Table

Notes and Guidance

Here 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

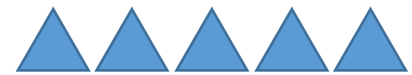
Can you use concrete or pictorial representations to help you solve the fact?

What other facts can you link to this one?

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

Varied Fluency

1. Complete the number sentences.



1 triangle has 3 sides.	1 × 3 = 3
3 triangles have __ sides.	__ × __ = __
__ triangles have 6 sides.	__ × __ = 6
__ triangles have 15 sides.	__ × __ = 15.

2. Tick the number sentences that can be solved using the image.

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

3. Fill in the missing number facts.

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

The 3 Times-Table

Reasoning and Problem Solving

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

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

Start at 18 – 3

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

Order:

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

Start this rhythm:
Clap, clap, click, clap, clap, click.

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

How do you know?

What will you be doing on the 20th beat?

Explain your answer.

Clicks are multiples of three.

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

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

6 Times Table & Division Facts

Notes and Guidance

Children use known table facts to become fluent in the six times table.
For example, knowing that the six times tables are double the sum of the three times tables and knowing their derived division facts.
Children should also be able to apply this knowledge to multiplying and dividing by 10 and 100.

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 write your own fact family?
Can you represent the problem in a picture?
Can you use concrete apparatus to solve the problem?
How many lots of 6 do we have?
How many groups of 6 do we have?

Varied Fluency

1. Look at the number sentences, what do you notice?

$1 \times 3 = 3$	$1 \times 6 = 6$
$2 \times 3 = 6$	$2 \times 6 = 12$
$3 \times 3 = 9$	$3 \times 6 = 18$

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

5	10	15	20	25	30
6	12	18	24	30	36

3. Can you use your knowledge of the 6 times table to complete the missing values?

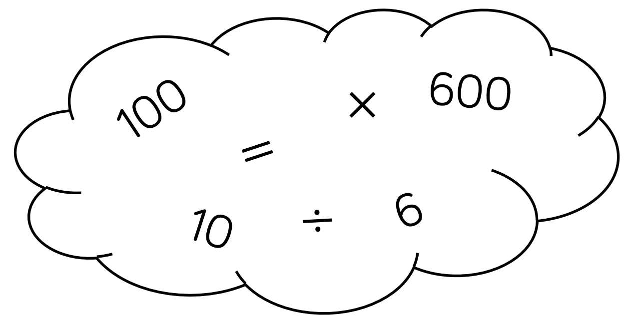
$6 \times 2 =$	$\times 6 = 12$	$6 \times 2 \times 10 =$
$\times 20 = 120$	$20 \times \quad = 120$	$6 \times 2 \times \quad = 1200$
$6 \times \quad = 1200$	$200 \times 6 =$	$10 \times \quad \times 6 = 120$
		$\times 2 \times 6 = 1200$

6 Times Table & Division Facts

Reasoning and Problem Solving

I am thinking of 2 numbers where the sum of the numbers is 15 and the product is 54. What are my numbers? Can you think of your own problem for a friend to solve?	9 x 6 = 54 6 x 9 = 54 6 + 9 = 15 9 + 6 = 15
Always, sometimes, never. If a number is a multiple of 6 it will always be a multiple of 3. What do you think? Convince me.	Always because the 6 times table is double the 3 times table. Children may list the times tables.

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



$\boxed{} \div \boxed{} = 6$

$60 = 600 \; \boxed{} \; 10$

600 ÷ 10 = 6
60 = 600 ÷ 10

Multiply by 4

Notes and Guidance

Building on their knowledge of the two times table, children start to multiply by four. They can link to the idea of doubling the number and doubling again.
They can link multiplying by four to repeated addition and counting in fours.
To show the multiplication of four, teachers may use Numicon, cubes, counters, bar models etc.

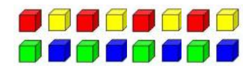
Mathematical Talk

How many equal groups do we have?
How many are in each group?
How many do we have altogether?
Can you write a number sentence to show this?
Can you represent the problem in a picture?
Can you use concrete apparatus to solve the problem?
How many lots of 4 do we have?
How many groups of 4 do we have?

Varied Fluency

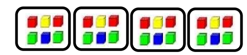
1. Match the multiplication to the representation.

8×4

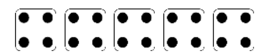


4×4

4×6

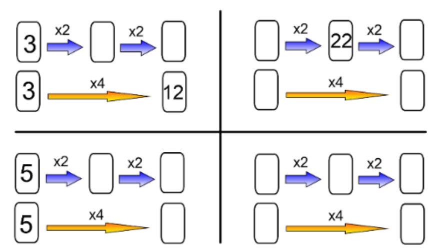


2. How many dots altogether?



There are __ dice with __ dots on each.
There are __ fours.
__ × __ = __ dots.

3. Complete the function machines.



Multiply by 4

Reasoning and Problem Solving

Gavin has four bags with five sweets in each bag.

Stacey has six bags with four sweets in each bag.

Who has more sweets?

How many more sweets do they have?

Draw a picture to show this problem.

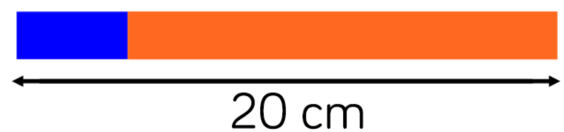
Stacey has more sweets.

She has four more sweets than Gavin.

Here is a blue strip of paper.

An orange strip is four times as long.

The strips are joined end to end.



How long is the blue strip?

How long is the orange strip?

Explain how you know.

The blue strip is 4cm long.

The orange strip is 16cm long.

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

$20 \div 5 = 4$

Multiply and Divide by 9

Notes and Guidance

Here children draw together their previous knowledge of multiplying and dividing become more fluent in the nine times tables.

Children apply their knowledge to different contexts

Mathematical Talk

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

What other facts can you link to this one?

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

Can you represent the problem in a picture?

Can you use concrete apparatus to solve the problem?

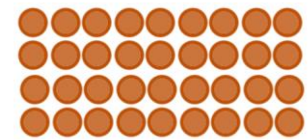
What does each number in the calculation represent?

How many lots of 9 do we have?

How many groups of 9 do we have?

Varied Fluency

1. Oranges are stacked in 9s.
   Complete the sentences to describe the oranges:

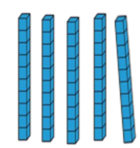
   There are _____ lots of 9

   There are _____ nines

   $4 \times \square = \square$

   At first there were ___ oranges. They were put into ___ groups.
   Now there are ___ oranges in each row

2. Complete the fact family:

   ____ × ____ = ____

   ____ × ____ = ____

   ____ ÷ ____ = ____

   ____ ÷ ____ = ____

3. Complete the sentences:

   There are ____ lots of _____

   ___ × ___ = ___

   ___ ÷ ___ = ___

9	9	9

   There are ____ lots of _____

   ___ × ___ = ___

   ___ ÷ ___ = ___

3	3	3	3	3	3	3	3	3

Multiply and Divide by 9

Reasoning and Problem Solving

True or false? Explain why.

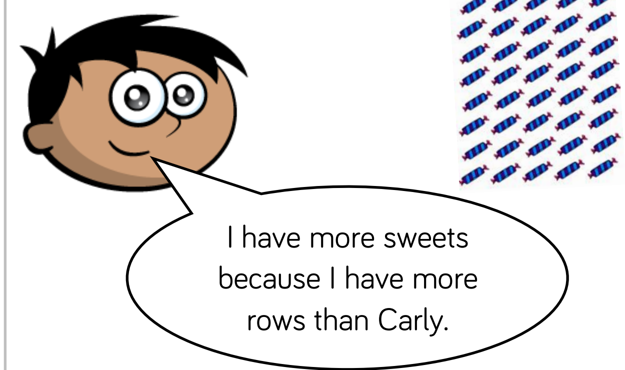
$6 \times 9 = 9 \times 3 \times 2$

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

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

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

Darren and Carly both receive some sweets.



Who has more sweets? Explain your reasoning.

They both have the same amount of sweets they are just arranged in a different way.

Divide by 4

Notes and Guidance

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

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

Mathematical Talk

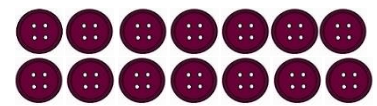
Can you group the numbers in fours?

Can you share the number into four groups?

What is the difference between sharing and grouping?

Varied Fluency

1. Circle the buttons in groups of 4



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

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

3. Complete the bar models and complete the calculations.

24			

$24 \div 4 = \square$

4	4	4	4	4	4	4

$\square \div 4 = \square$

Divide by 4

Reasoning and Problem Solving

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

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

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

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

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

Explain your reasoning for each.

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

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

Five children are playing a game.

They score 4 points for every bucket they knock down.

Ben	16
James	28
Amrit	12
Kaci	32
Jenna	8

How many buckets did they knock down each?
How many buckets did they knock down altogether?
How many more buckets did James knock down than Ben?

Ben = 4 buckets.

James = 7 buckets.

Amrit = 3 buckets.

Kaci = 8 buckets.

Jenna = 2 buckets.

They knocked down 24 buckets altogether.

James knocked 3 more buckets down than Ben.

The 4 Times-Table

Notes and Guidance

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

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

Mathematical Talk

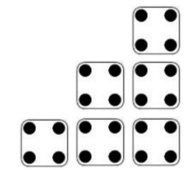
Can you use concrete or pictorial representations to help you solve the fact?

What other facts can you link to this one?

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

Varied Fluency

1. Use the pictorial representations to complete the calculations.



$4 = 1 \times 4 = \_\_$

$4 + 4 = 2 \times 4 = \_\_$

$4 + 4 + 4 = 2 \times 4 = \_\_$

Continue this pattern.

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

$2 \times 4 = 8$ $\qquad$ $4 \times 4 = \_\_$

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

$3 \times \_\_ = 12$ $\qquad$ $6 \times \_\_ = \_\_$

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

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50

The 4 Times-Table

Reasoning and Problem Solving

I have forgotten what 4×4 is

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

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

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

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

Jo says,
"The answer is double 2×4"

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

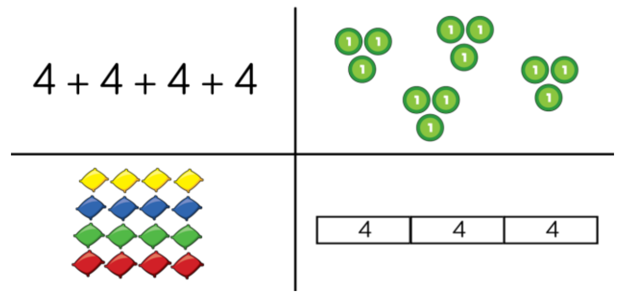
Whose idea do you prefer? Why?

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

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

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

Which part below does not show counting in fours?



Explain why.

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

9 Times Table & Division Facts

Notes and Guidance

Children use known times table facts to become fluent in the nine times table. For example knowing that the nine times table is one less than the ten times table and using that knowledge to derive related facts. Children should also be able to apply the knowledge of the 9 times table when multiplying and dividing by 10 and 100.

Mathematical Talk

How 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 write your own fact family?
Can you represent the problem in a picture?
Can you use concrete apparatus to solve the problem?
How many lots of 9 do we have?
How many groups of 9 do we have?

Varied Fluency

1. When you compare the 9 times table and the 10 times table what do you notice about the relationships between the two?

2. What are the missing numbers from the 9× table?

9 18 27 45

54 72 81 90

Circle the multiples of 9

54 108 18 9 24 67 37 72

3. Can you use your knowledge of the 9 times table to complete these missing values?

1 x 9 =
x 1 = 9
x 9 = 90
9 x = 90
100 x = 900
9 x 100 =
1 x 9 x = 90
9 x 1 x 10 =
x 9 x 100 = 900
9 x 1 x = 900

9 Times Table & Division Facts

Reasoning and Problem Solving

Can you complete the calculations using some of the symbols or numbers in the box? $\boxed{} \div \boxed{} = 9$ $90 = 900 \boxed{} 10$ Box: ÷ 10 900 = 9 100	$900 \div 100 = 9$ $90 = 900 \div 10$
I am thinking of two numbers. The sum of the numbers in 17. The product of the numbers is 72. What are my secret numbers? Can you choose your own two secret numbers from the 9 times table and create clues for your partner?	8 and 9
Always, sometimes, never? All multiples of 9 have digits that have a sum of 9. Prove it!	Always: Proof by exhaustion e.g. $2 \times 9 = 18$ $1 + 8 = 9$ $3 \times 9 = 27$ $2 + 7 = 9$ $25 \times 9 = 225$ $2 + 2 + 5 = 9$

Multiply by 8

Notes and Guidance

Building on their knowledge of the four times table, children start to multiply by eight. They can link to the idea of doubling the number twice and then doubling again.
They can link multiplying by eight to previous knowledge of equal groups and repeated addition.
Children will explore the concept of multiplying by 8 in different ways; when 8 is the multiplicand and where 8 is the multiplier.

Mathematical Talk

How many equal groups do we have?
How many are in each group?
How many do we have altogether?
Can you write a number sentence to show this?
Can you represent the problem in a picture?
Can you use concrete apparatus to solve the problem?
How many lots of 8 do we have?
How many groups of 8 do we have?
We have 8 groups, how many are in each group?

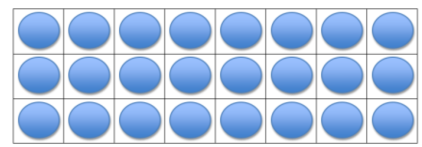
Varied Fluency

1

How many legs are there on four spiders?
__ + __ + __ + __ = __ × __ = __
There are __ legs on each spider.

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

2



Arrange 24 counters in an array as shown. Show:
__ + __ + __ = __
__ + __ + __ + __ + __ + __ + __ + __ = __

3

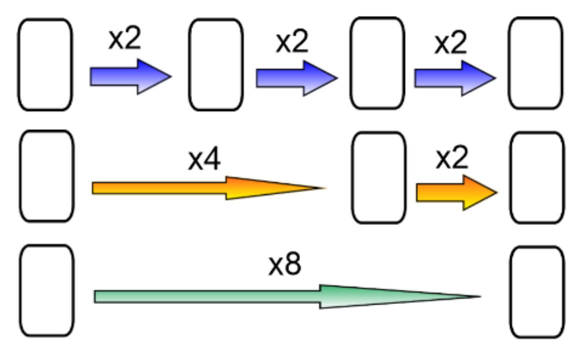
Fill in the table to show that multiplying by 8 is the same as double, double and double again.

6	6	6	6	6	6	6	6
6 × 2 = __		6 × 2 = __		6 × 2 = __		6 × 2 = __	
__ × 2 = __				__ × 2 = __			
__ × 2 = __							

Multiply by 8

Reasoning and Problem Solving

$8 \times 3 =$ $2 \times 4 \times 3 =$ $2 \times 2 \times 2 \times 3 =$ What do you notice? Why do you think this has happened?	All of the answers are equal. Eight has been split into numbers that times together to make it.
Max calculates 8×6 by doing 5×6 and $3 \times 6 =$ ____ + ____ = ____ Paddy calculates 8×6 by doing $4 \times 6 \times 2$ _____ $\times 2 =$ Whose method do you prefer? Explain why.	Possible answers: I prefer Max's method because I know my 5 and 3 times tables. I prefer Paddy's method because I know my 4 times table and can double numbers.

Start each function machine with the same number.  What do you notice about each final answer? James knows the $4\times$ table off by heart, but is still learning the $8\times$ table. Which colour method should he use? Why?	Each time the final number is 8 times greater than the starting number. Yellow – because he can double $4\times$ to calculate $8\times$. E.g. I know $4 \times 6 = 24$ so 8×6 is double that (48).

Multiply and Divide by 7

Notes and Guidance

In this step, children will use their prior of knowledge of multiplication and division to multiply by 7. They will count in 7s, use their knowledge of equal groups and use concrete and pictorial methods to solve multiplication calculations and problems. They will also explore commutativity and also understand that multiplication and division are inverse operations. .

Mathematical Talk

How can you tell if your answer is sensible?

How many do we have altogether?

How many groups can you see?

Write fact families for another multiplication.

When counting in sevens, what would come here? (point to different intervals on the stick or number line) How do you know?

Varied Fluency

1. Gemima uses number shapes to represent 7 times 4. She does it in two ways:

   4 sevens
   4 lots of 7
   4×7

   7 fours
   7 lots of 4
   7×4

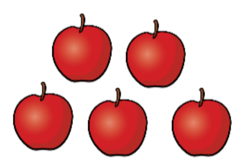
   Use her method to represent 7 times 6.

2. Seven children share 56 stickers. How many stickers will they get each?

   $56 \div 7 = \boxed{}$

8	8	8	8	8	8	8

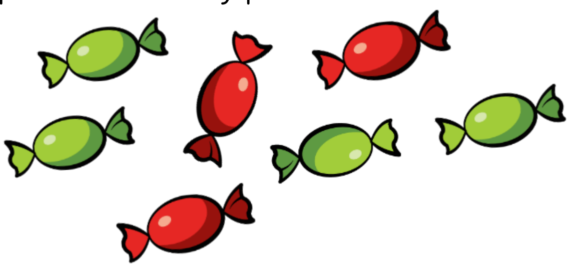
3. One apple costs 7p. How much would 5 apples cost? .

7p	7p	7p	7p	7p

Multiply and Divide by 7

Reasoning and Problem Solving

Billy has 56 sweets. There are 7 sweets in a pack. How many packets does he have? 	$56 \div 7p = 8$ Billy has 8 packets of sweets.
Mrs White's class is selling tickets at £2 each for the school play. The class can sell one ticket for each chair in the hall. There are 7 rows of chairs in the hall. Each row contains 9 chairs. How much money will they make?	Number of tickets (chairs): $7 \times 9 = 63$ $63 \times £2 = £126$ (use doubling strategy for this one)

What do you notice about the pattern when counting in 7s from 0? Does this continue beyond ×12? Can you explain why?	Odd, even pattern because odd + odd = even Then even + odd = odd and this will continue throughout the whole times table.
Which numbers can be divided equally by 7? How do you know? Prove it. 54 42 17 78 35 32	42 and 35 because they are in the seven times tables.

Divide by 8

Notes and Guidance

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

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

Mathematical Talk

Can you group the numbers in eights?

Can you share the number into eights groups?

Can you use any prior knowledge to check your answer?

Varied Fluency

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

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

3. Complete the missing numbers.

$80 \div 8 = \boxed{}$ $\quad$ $24 \div \boxed{} = 8$

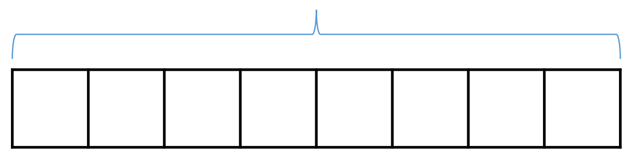
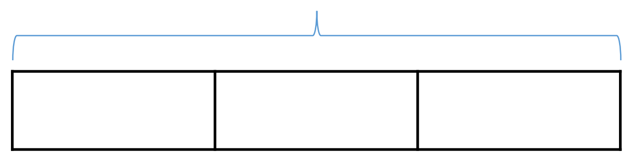
$64 \div 8 = \boxed{}$ $\quad$ $8 \times \boxed{} = 40$

$\boxed{} \times 8 = 16$ $\quad$ $\boxed{} \div 8 = 4$

Divide by 8

Reasoning and Problem Solving

48 ÷ 2 = 48 ÷ 4 = 48 ÷ 8 = What do you notice about the answers to these questions? Can you predict what 48 ÷ 16 would be?	The answers halve and the divisors double. 3
Which numbers can be divided by 8 without a remainder? 40 32 64 16 42 800	40, 32, 64, 16, 800

Rohan shares 24 sweets equally between 8 friends. How many do they get each? Which bar model would you use to represent this problem? Why? 24  24 	Although both can represent 24 ÷ 8 = 3, the first bar model fits this word problem best.

The 8 Times-Table

Notes and Guidance

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

Mathematical Talk

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

What other facts can you link to this one?

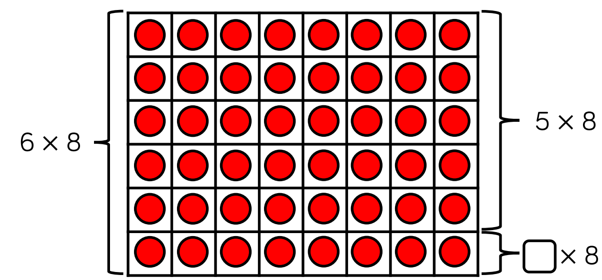
What other times tables will help you with this times table?

Varied Fluency

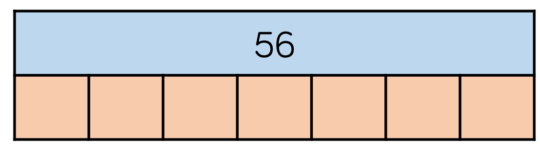
1. Complete the diagram using known facts.

6×8 < $5 \times 8 = \square$; $\square \times 8 = \square$

altogether $\square$



2. Complete the bar model.



3. Complete the table.

×	2	4	8
3	6		
	10	20	
			72

Can you spot a pattern between the numbers?

The 8 Times-Table

Reasoning and Problem Solving

All the numbers in the 8 times table are even.

Explain why.

When you add an even number to an even number you always make an even number.
The 8 times table is repeated addition so keeps adding an even number each time.

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

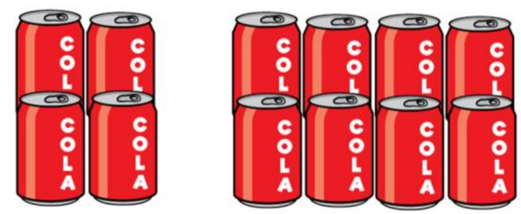
Always, sometimes, never.

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

1) Sometimes – every other multiple is also a multiple of 8
The ones in between aren't because the jumps are smaller than 8
2) Always – 8 is a multiple of 4 therefore all multiples of 8 will be multiples of 4

Megan has a box of pop that are in packs.

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



Megan's box contains 64 cans of pop.

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

Find all the possibilities.

Possible answers:

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

7 Times Table & Division Facts

Notes and Guidance

In this step, children need to apply the facts from the 7 times table (and other previously learned tables) to problem solving and to calculations with larger numbers.
They need to spend some time exploring links between multiplication tables and investigating how this can help with mental strategies for calculation.
e.g. $7 \times 7 = 49$ $5 \times 7 = 35$ and $2 \times 7 = 14$

Mathematical Talk

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

$4 \times 7 = 28$ $40 \times 7 = 280$ $400 \times 7 = 2800$

How does knowing your 7× table help?

Is this true or false?

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

Varied Fluency

1. How does 3×7 help to work out the following:

$300 \times 7 = \boxed{}$

$30 \times 7 = \boxed{}$

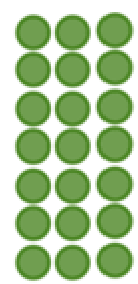
2. Explore the following pattern.

$80 \times 7 = \boxed{}$ $60 \times 7 = \boxed{}$

$70 \times 7 = \boxed{}$ $50 \times 7 = \boxed{}$

Explain what you notice to your partner.

3. There are 3 columns of 7
Write the fact family



___ × ___ = ___
___ × ___ = ___
___ ÷ ___ = ___
___ ÷ ___ = ___

7 Times Table & Division Facts

Reasoning and Problem Solving

How would you use times table facts to help you calculate how many days in 15 weeks? Complete the following sentences: ____ × 7 = ____ There are ____ days in 10 weeks ____ × 7 = ____ There are ____ days in 5 weeks So I can calculate there are _____ days in 15 weeks. Work out how many days in 18 weeks. Can you do it in more than one way?	$10 \times 7 = 70$ There are 70 days in 10 weeks. $5 \times 7 = 35$ There are 35 days in 5 weeks. $70 + 35 = 105$ There are 105 days in 15 weeks. Children could partition in different ways e.g. find 9 weeks and double it or find 10 and 8 weeks.

Is this true or false? $7 \times 6 = 7 \times 3 \times 2$ $7 \times 6 = 7 \times 3 + 3$ Explain your answer to a friend. Prove using a drawing	True False Children could draw a bar model or bundles of straws.
Children were arranged into rows of seven. There were 5 girls and 2 boy in each row.  Use your times table knowledge to show how many girls would be in 10 rows and in 100 rows. Show as many number sentences using multiplication and division as you can which are linked to this picture. How many children in total in 100 rows? How many girls? How many boys?	Possible answers: 2×10 5×10 7×10 2×100 5×100 7×100 Etc.