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Year 4

Small Steps Guidance and Examples

Block 4: Multiplication & Division

White Rose Maths

Overview

Small Steps

- Multiply by 10
- Multiply by 100
- Divide by 10
- Divide by 100
- Multiply by 1 and 0
- Divide by 1
- Multiply and divide by 6
- 6 times-table and division facts
- Multiply and divide by 9
- 9 times-table and division facts
- Multiply and divide by 7
- 7 times-table and division facts

NC Objectives

Recall and use multiplication and division facts for multiplication tables up to 12 × 12.

Count in multiples of 6, 7, 9. 25 and 1000

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.

Solve problems involving multiplying and adding, including using the distributive law to multiply two digit numbers by one digit, integer scaling problems and harder correspondence problems such as n objects are connected to m objects.

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?

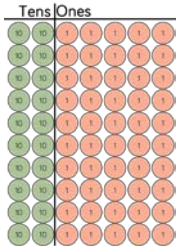
Can you explain what you did to a partner?

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.

10	10	10	10	10

8 pots each have 10 pencils.

5	5	5	5	5	5	5	5	5	5

10 chickens lay 5 eggs each.

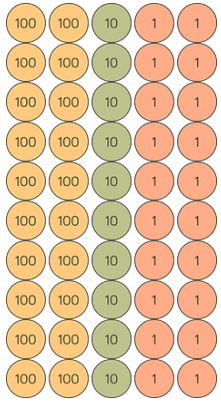
10	10	10	10	10	10	10	10

Multiply by 10

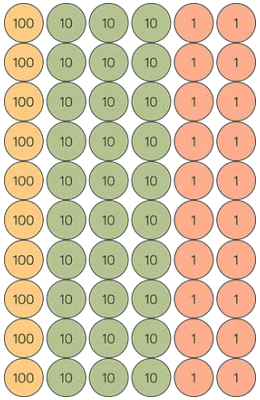
Reasoning and Problem Solving

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

221 × 10 ◯



◯ 1,320 × 10



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

< 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?

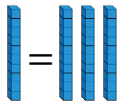
Will you produce a greater number if you multiply by 100 rather than 10? Why?

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

Varied Fluency

1 If 3 ×  =  = 3 ones = 3

Complete:

3 ×  = =  tens = 

3 ×  =  =  hundreds = 

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.

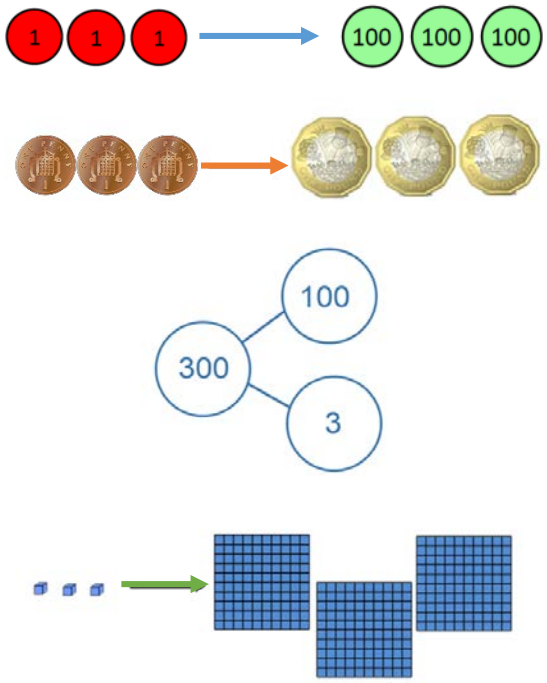
75 × 100	○	75 × 10
100 × 47	○	47 × 100
39 × 100	○	39 × 10 × 10

Multiply by 100

Reasoning and Problem Solving

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

Explain your answer.



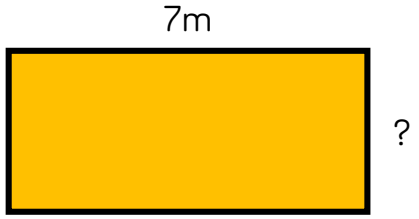
The part whole model does not represent multiplying by 100 because it is incorrect. It is used for addition and subtraction so there should be 100 parts with 3 in each.

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

$6 \times 100 = 600\text{cm}$

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

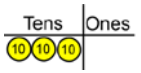
What has happened to the value of the digits?

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?

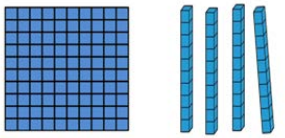
Varied Fluency

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

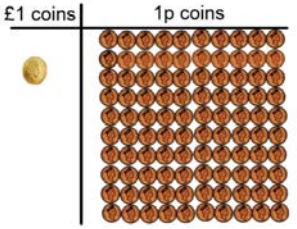
How can you use dividing by 10 to support you dividing by 100?

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	

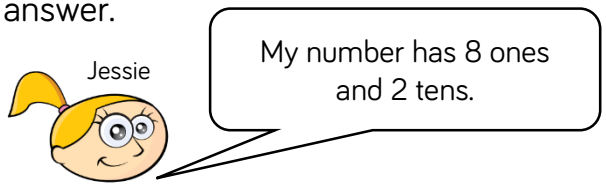
3 Use <, > or = to make the statement correct.

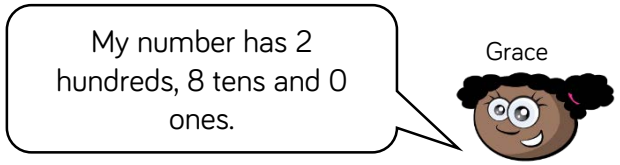
3,600 ÷ 10	○	3,600 ÷ 100
2,700 ÷ 100	○	270 ÷ 10
1,500 ÷ 100	○	150 ÷ 10

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□	=	6,400	÷	100

170 ÷ 10 = 17
320 × 10= 3,200
1,860 ÷ 10 = 186
59 × 100 = 5,900
64 = 6,400 ÷ 100

Multiply by 1 and 0

Notes and Guidance

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 × ☐ = 4

☐ = 1 × 7

0 = ☐ × 42

63 × 1 = ☐

☐ × 27 = 0

50 × ☐ = 50

Multiply by 1 and 0

Reasoning and Problem Solving

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

$3 + 0 =$ ☐

$3 - 0 =$ ☐

$3 \times 0 =$ ☐

Explain why the answer is different.

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

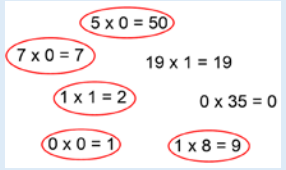
$5 \times 0 = 50$

$7 \times 0 = 7$ $\quad$ $19 \times 1 = 19$

$1 \times 1 = 2$ $\quad$ $0 \times 35 = 0$

$0 \times 0 = 1$ $\quad$ $1 \times 8 = 9$

Choose one to illustrate.



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.

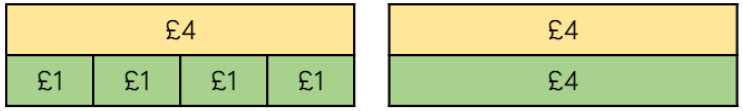
Write a worded question where you need to share.

Varied Fluency

1 Use counters and hands to complete:

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

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?



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 ÷ 1 ◯ 7 ÷ 1

6 ÷ 6 ◯ 5 ÷ 5

4 ÷ 4 ◯ 4 ÷ 1

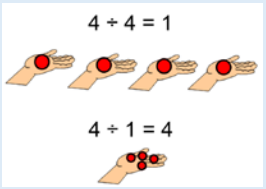
Explain how you know for each sentence. Draw an image or show it in a concrete way.

8 ÷ 1 (>) 7 ÷ 1

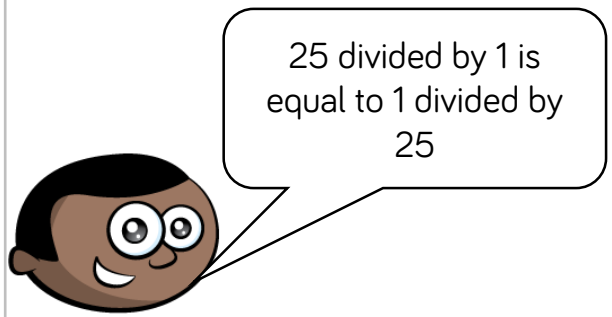
6 ÷ 6 (=) 5 ÷ 5

4 ÷ 4 (<) 4 ÷ 1

Possible answers:



Simon says:



Is he correct?

Explain your answer.

Answer:

No Simon is not correct because division is not 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?

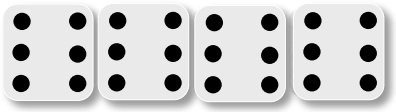
Varied Fluency

1 Complete the sentences to describe the eggs.

There are __ lots of __.
There are seven ____.
7 × __ = __

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.

Always 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 $72 \div 12 = 6$

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?

$6 \times 2 =$ ___

___ $\times 20 = 120$

$6 \times$ ___ $= 1200$

___ $\times 6 = 12$

$20 \times$ ___ $= 120$

$200 \times 6 =$ ___

$6 \times 2 \times 10 =$ ___

$6 \times 2 \times$ ___ $= 1200$

$10 \times$ ___ $\times 6 = 120$

___ $\times 2 \times 6 = 1200$

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?

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

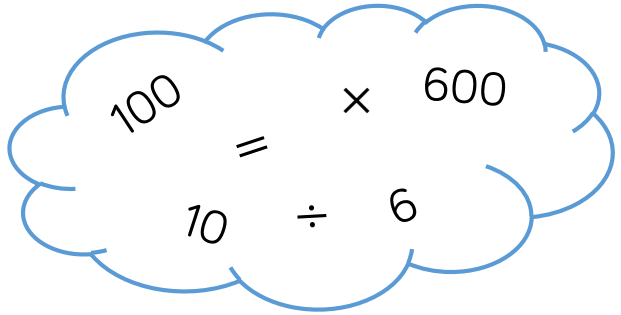
Always, sometimes, never.

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.



$\square \div \square = 6$

$60 = 600 \square 10$

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

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.

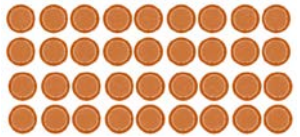
Mathematical Talk

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

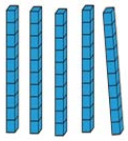
1 Oranges are stacked in 9s.
Complete the sentences to describe the oranges:

There are ____ lots of 9
There are ____ nines.
4 × ☐ = ☐



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

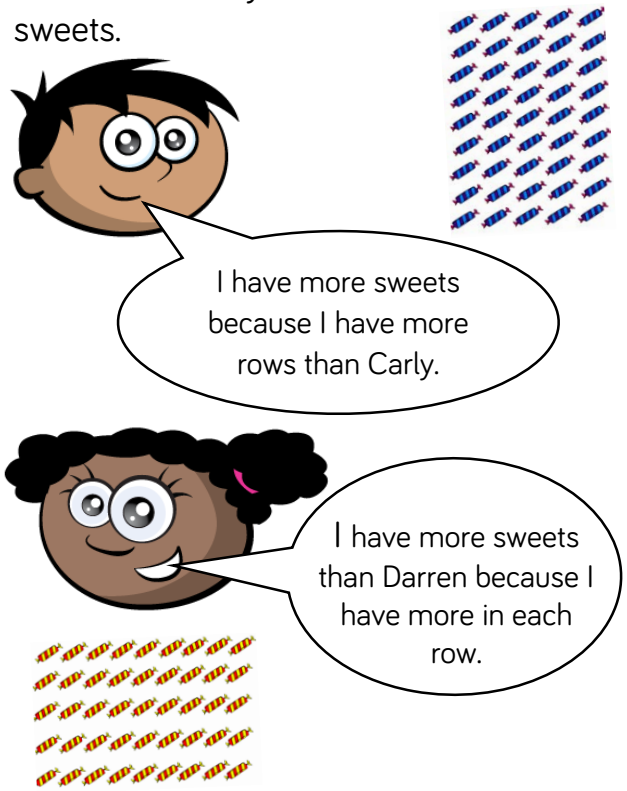
$6 \times 9 = 54$

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.

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?

□ ÷ □ = 9

90 = 900 □ 10

÷	10
900	=
9	100

900 ÷ 100 = 9
90 = 900 ÷ 10

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

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

8 and 9

Always, sometimes, never?

All multiples of 9 have digits that have a sum of 9 Prove it!

Always:
Proof by exhaustion e.g.
2 × 9 = 18
1 + 8 = 9
3 × 9 = 27
2 + 7 = 9
25 × 9 = 225
2 + 2 + 5 = 9

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.

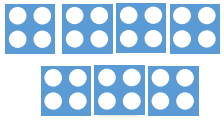
When counting in sevens, what would come here? (point to different intervals on the stick or number line) How do you know?

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



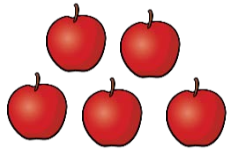
Use her method to represent 7 times 6

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

$56 \div 7 = \square$

8	8	8	8	8	8	8

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

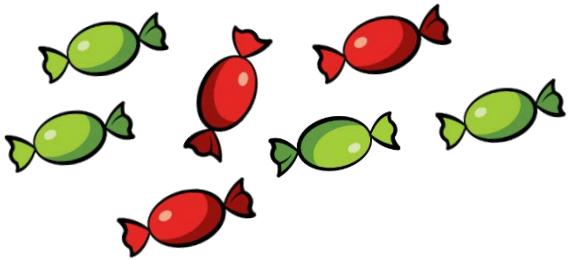


7p	7p	7p	7p	7p

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 ÷ 7 = 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 × 9 = 63

63 × £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.

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:

$300 \times 7 = \square$

$30 \times 7 = \square$

2 Explore the following pattern.

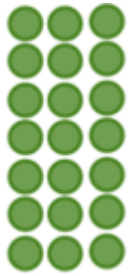
$80 \times 7 = \square$ $60 \times 7 = \square$

$70 \times 7 = \square$ $50 \times 7 = \square$

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.

1) True
2) 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.