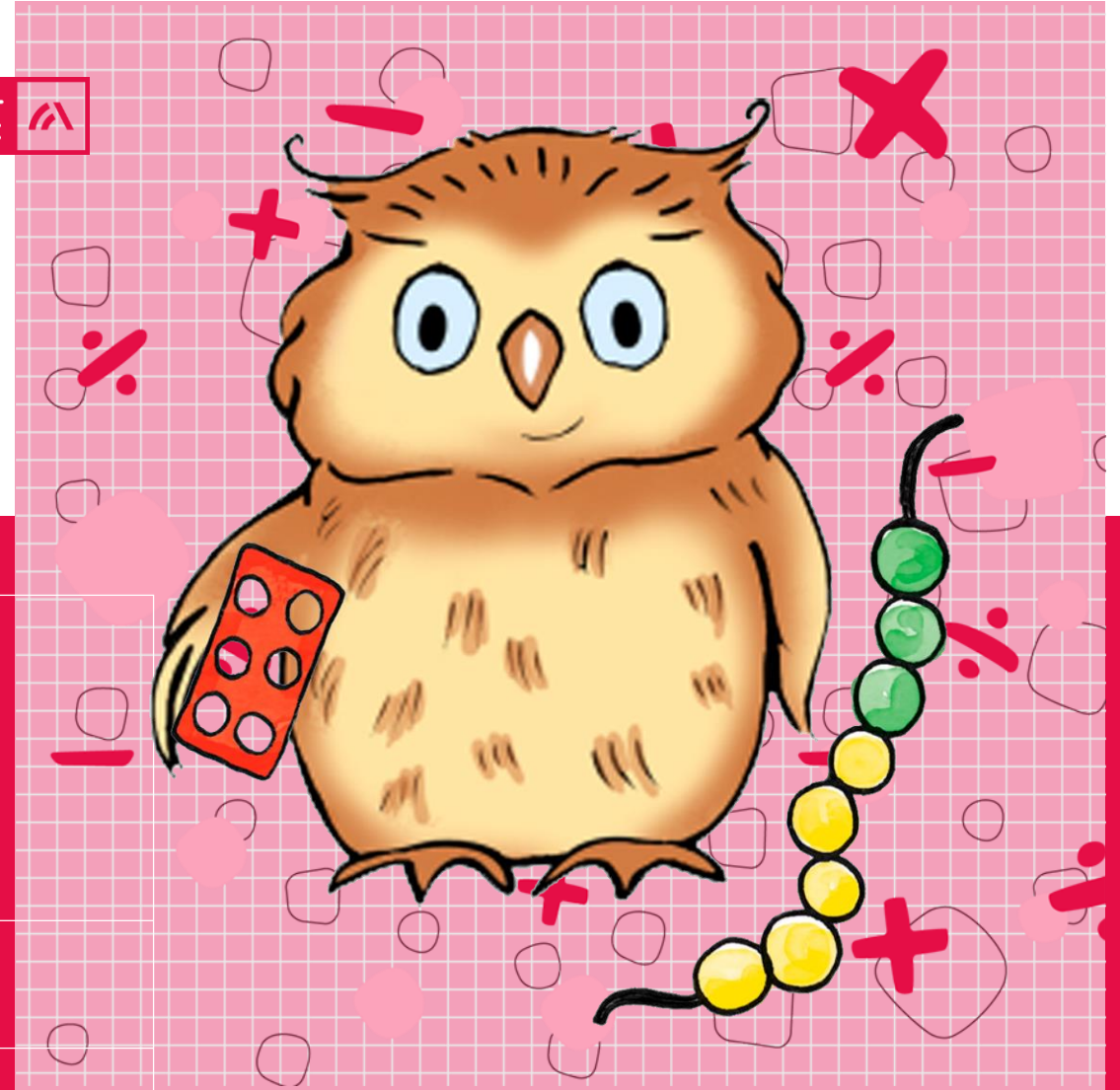Ark**Curriculum+**

Year 3 Unit 7: Deriving multiplication and division facts

Week 1: Using place value

Mathematics
Mastery

Year 3 Unit 7: Deriving multiplication and division facts

Mathematics **Mastery**

Lesson 1: Multiplication structures

- To compare multiplication structures

Lesson 2: Multiplying with place value

- To multiply numbers by 10 and 100 using place-value charts

Lesson 3: Linking place value and multiplication

- To understand the values of adjacent place-value columns

Lesson 4: Dividing by ten using place value

- To divide multiples of 10 and 100 by 10 using place value

Lesson 5: Multiplying and dividing by ten or 100

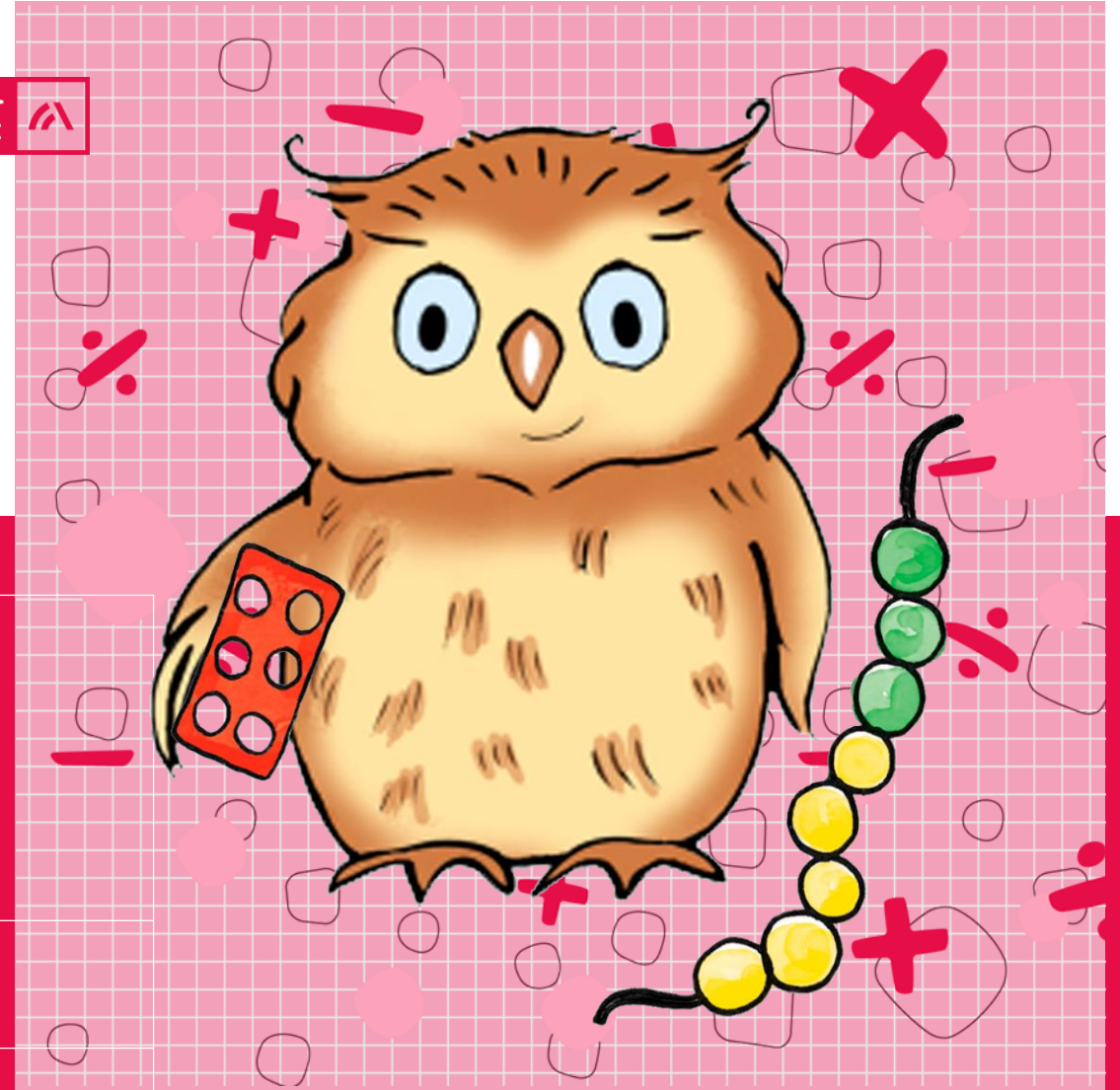- To multiply and divide by 10 and 100 using place value
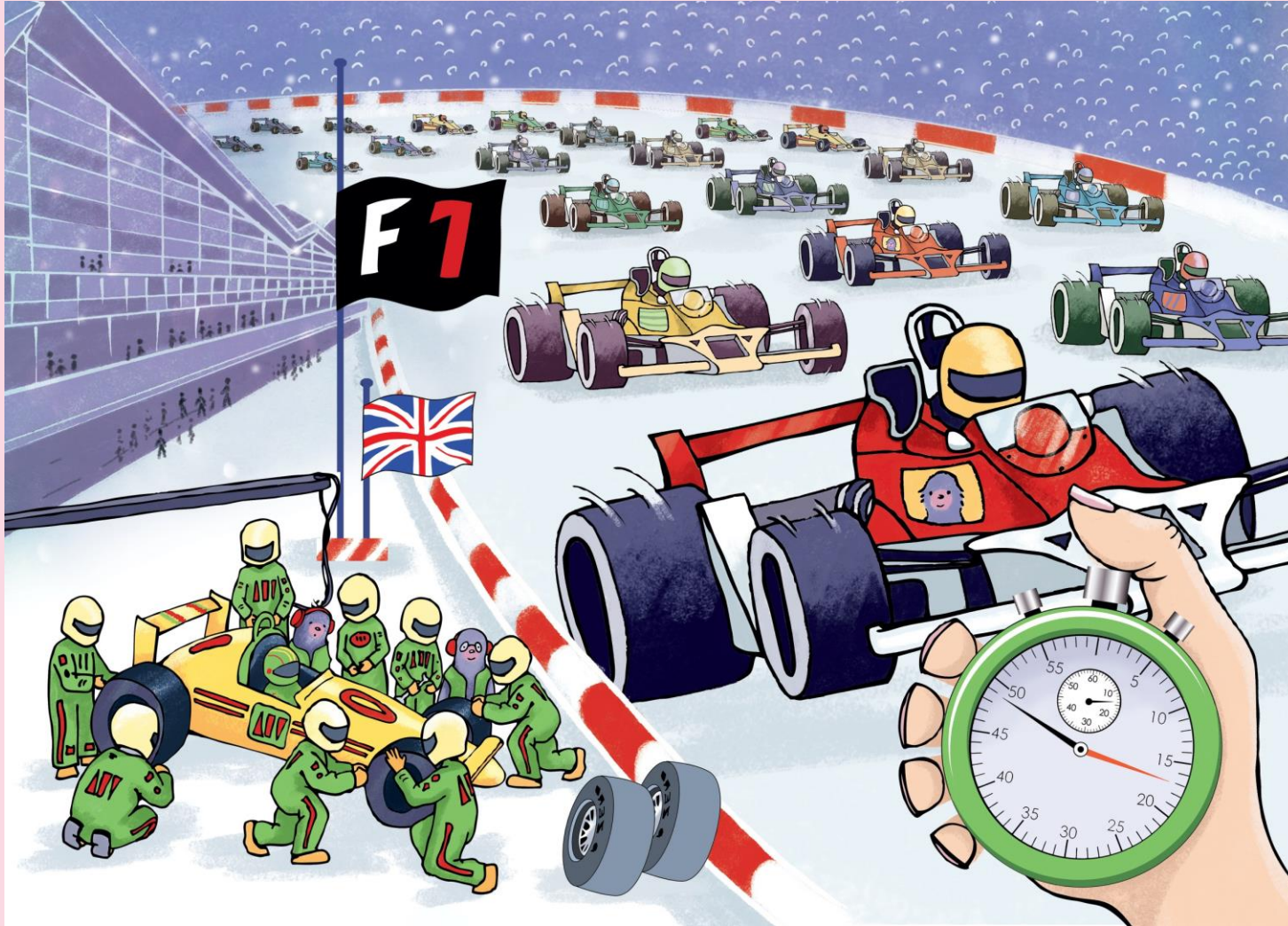
This Week

Ark Curriculum+

Year 3 Unit 7: Deriving multiplication and division facts

Lesson 1: Multiplication structures

Mathematics
Mastery

Exploring the big picture

What maths can you see?

What maths knowledge might anybody in the picture need?

Star Words

equal parts

whole

__ times as many

__ times as much

__ times greater

efficient

Zara has three dogs. Each dog eats five biscuits. How many biscuits do the dogs eat altogether?
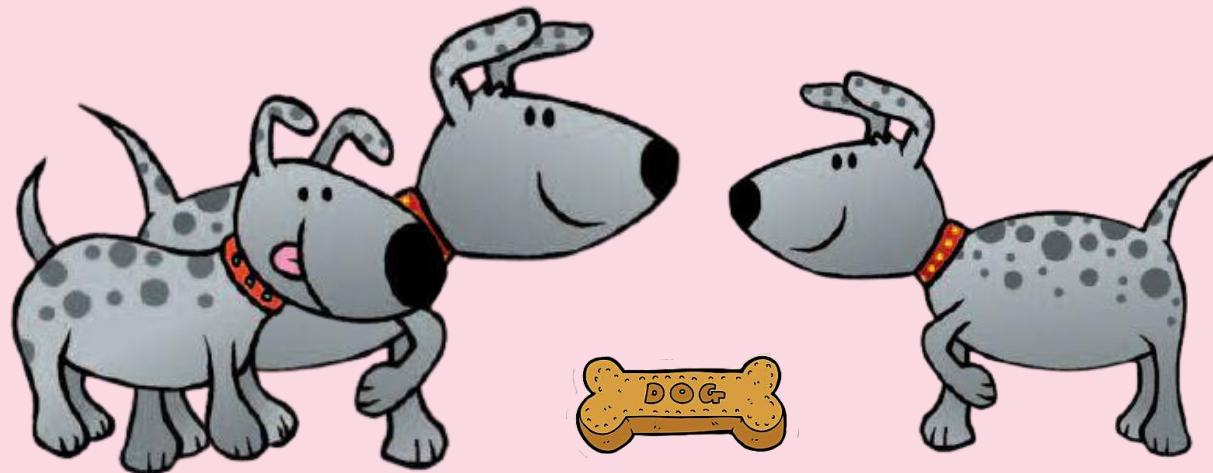
Comparing different structures for the same calculations
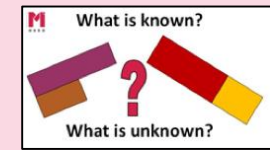
Michael gives his dog three times as many biscuits as Zara gives to one of her dogs.
How many biscuits does Michael's dog get?

Matching word problems

- Solve the word problems, using bar models to help you identify the calculations.

- Match the word problems with matching calculations.

- Identify which problem has an 'equal parts' structure and which has a 'times greater' structure.

Match the word problems with the same calculations

One has been done for you

Ella bought five packs of Christmas cards. If each pack contained five cards, how many cards did she buy altogether?

Stu spent £2 on a present for his sister. He spent three times as much on a present for his mum. How much did his mum's present cost?

Each day Milo eats two sandwiches for his lunch. After three days, how many sandwiches has he eaten?

On my first go at a new game, I only scored three points! The second time, my score was ten times greater. How many points did I score the second time?

Sam bought two packs of erasers with four erasers in each pack. How many erasers did Sam buy?

One Sunday, Arun found five conkers in his Grandma's garden. The week after, he found five times as many. How many conkers did he find the second time?

The teacher asked children to work in groups of three. There were exactly ten groups. How many children in the class?

Four children walked to school on Monday. Twice as many children walked to school on Tuesday. How many children walked on Tuesday?

Mathematics Mastery

Comparing strategies

How many ways could you solve these calculations?

4×2 5×5 3×2 3×10

Applying strategies to solve word problems

- Solve the word problems, using bar models to help you identify the calculation.

- Identify the structure of each problem.

- Choose a strategy to solve it.

A sunflower was 3 cm tall in June Then it grew six times taller in July. How tall was the sunflower in July?

Solving word problems with different structures

For each problem…
-Identify the structure ('equal parts' or 'times greater')
-Choose a strategy to solve the problem

My Lego kit is designed to make three cars. If each car has four wheels, how many wheels should the kit have altogether?

There are 8 girls in my class. There are twice as many boys as girls. How many boys are there in my class?

Nick ran 5 m in the egg and spoon race before his egg fell off. Amna managed to run ten times as far before her egg fell off. How far did Amna run before her egg fell off?

The school bus stops five times before it gets to school. Each time it stops, three people get on. How many people get on altogether?

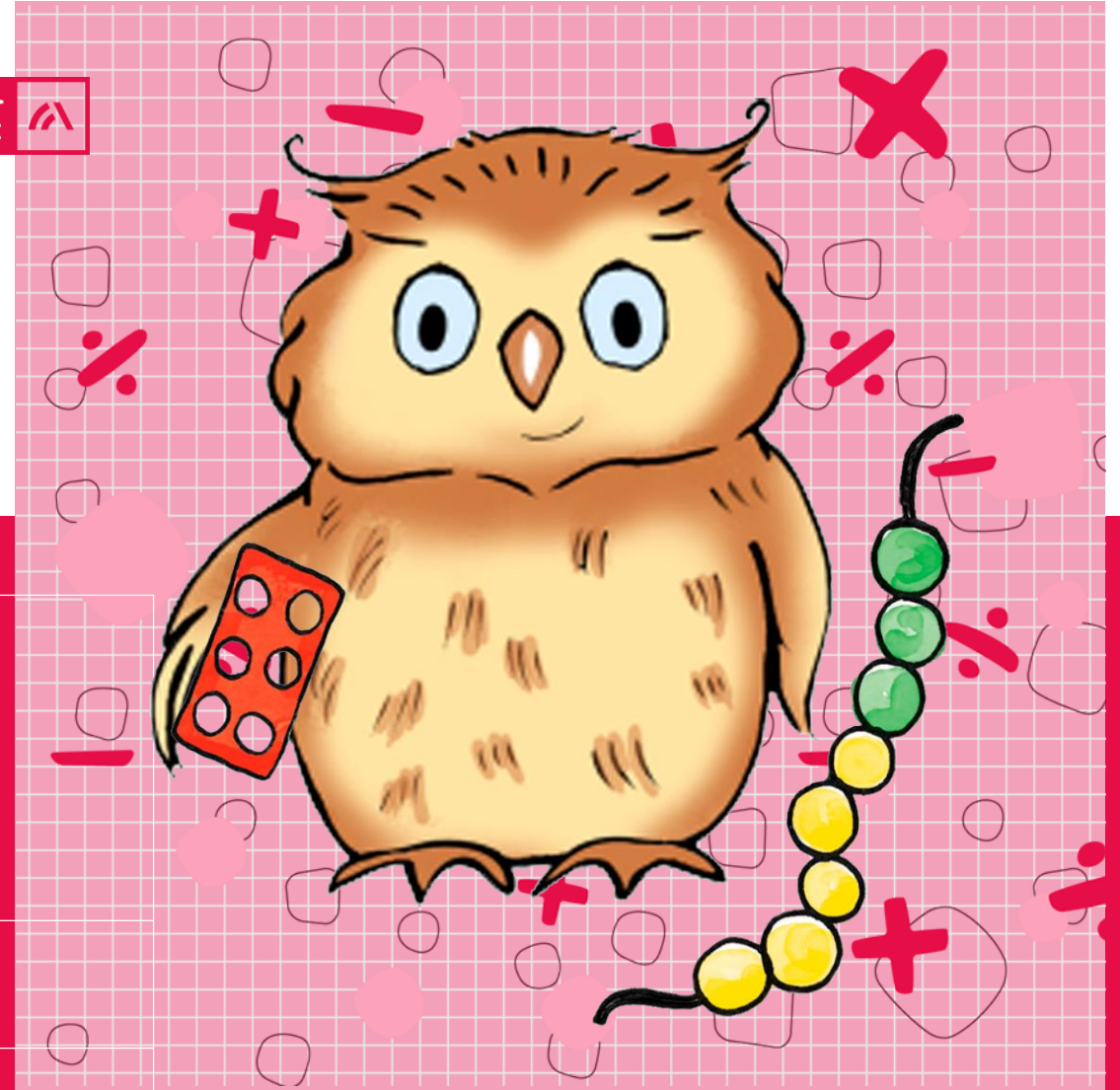# Comparing the efficiency of strategies

Nick ran 5m in the egg and spoon race before his egg fell off. Anna managed to run ten times as far before her egg fell off. How far did Anna run before her egg fell off?

ArkCurriculum+

Year 3 Unit 7: Deriving multiplication and division facts

Lesson 2: Multiplying with place value

Mathematics
Mastery

'Follow Me' multiplication game

START	15	18	20	32	16
3×4	6 lots of 3	Five fours	8×4	4 groups of 4	Three threes
9	28	21	8	0	27
7×4	Seven threes	2 lots of 4	3×0	Nine threes	10×3
30	32	15	24	24	6
8×4	3 lots of 5	Four times six	Eight threes	Two threes	FINISH

Star Words

multiply

equal parts

whole

__ times as many

__ times greater (than)
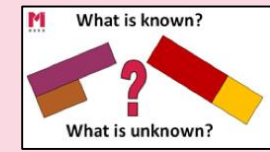
Using place value to multiply by ten
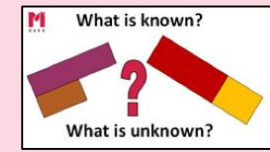
A bike can carry one person to Silverstone. How many people can travel to Silverstone on five bikes?

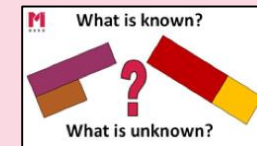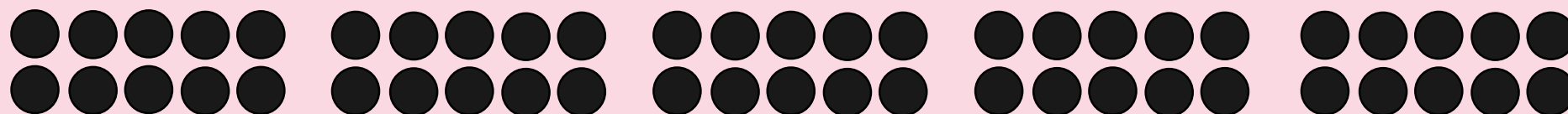$5 \times 1 =$
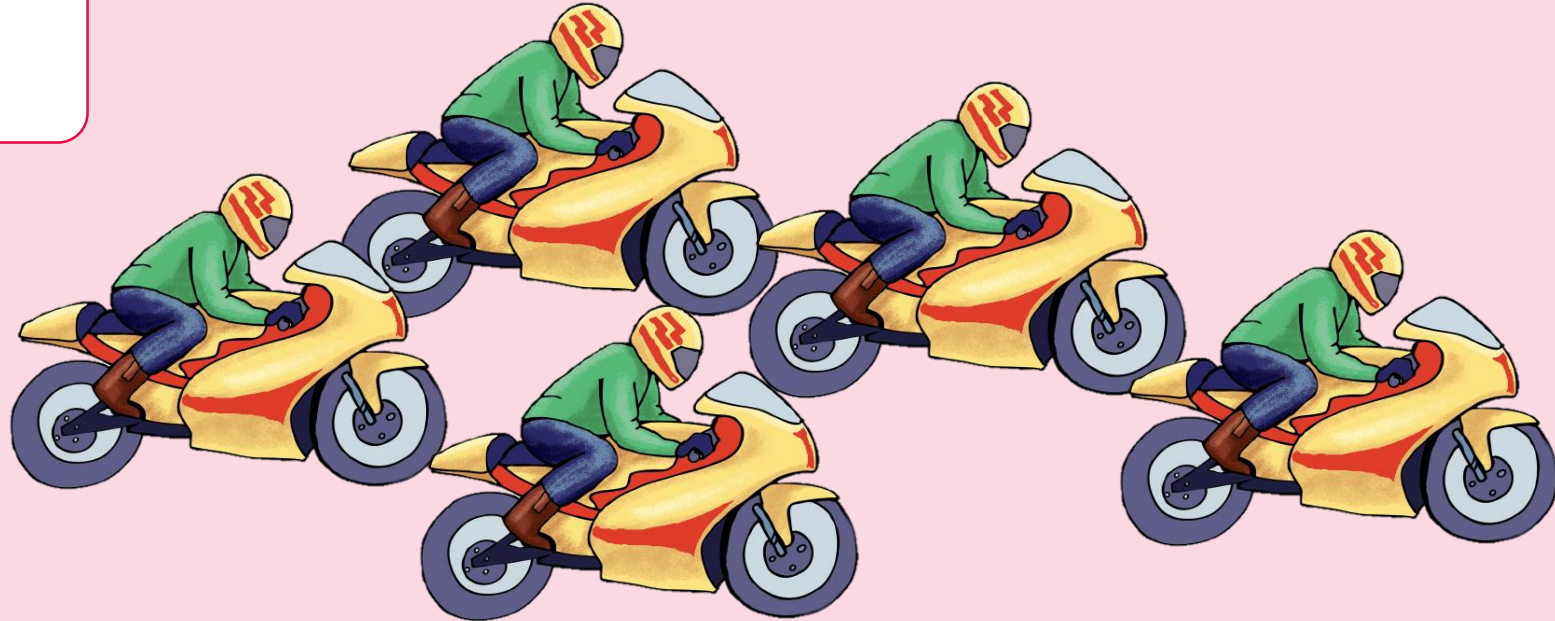
Using place value to multiply by ten

A minibus can carry ten times as many people as a motorbike. How many people can travel to Silverstone in five minibuses?

Using place value to multiply by ten

A minibus can carry ten times as many people as a motorbike. How many people can travel to Silverstone in five minibuses?

$5 \times 10 =$ $5 \times 10 =$ $5 \times 10 =$ $5 \times 10 =$ $5 \times 10 =$

$5 \times 10 =$

Making parts ten times greater

Draw Dienes blocks on the place-value chart to explore the effect of making parts ten times greater.

Pupil A: Select a number card and create the value in Dienes ones on the place-value chart.

Pupil B: Multiply the value by ten, replacing the Dienes ones with Dienes tens. Say the calculation aloud.

Pupil A: Multiply the value by ten again, replacing the Dienes tens with Dienes hundreds. Say the calculation aloud.

Swap roles and repeat the exercise.

Hundreds	Tens	Ones

I have made each part ten times greater.

__ multiplied by ten is equal to ___.

___ is ten times greater than ___.

Making parts ten times greater

Hundreds	Tens	Ones

Hundreds	Tens	Ones

Hundreds	Tens	Ones
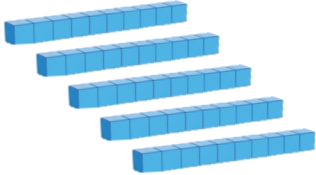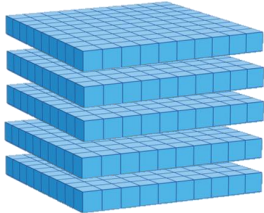
Hundreds	Tens	Ones

Using place value to multiply by ten and 100

$$5 \times 1 = 5$$

$$5 \times 10 = 5$$

$$50 \times 10 = 5$$

Hundreds	Tens	Ones
		5
	5	
5		

Develop Learning

# Using place value to multiply by ten and 100

A double-decker bus carries 100 times as many people as a motorbike. If five motorbikes can carry five people, how many people can travel to Silverstone in five buses?

Using place value to multiply by ten and 100

A double-decker bus carries 100 times as many people as a motorbike. If five motorbikes can carry five people, how many people can travel to Silverstone in five buses?

$5 \times 100 =$
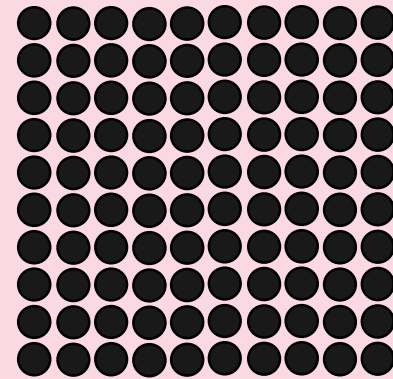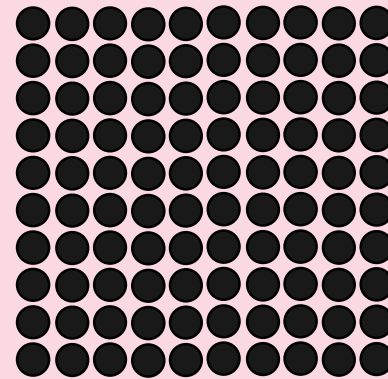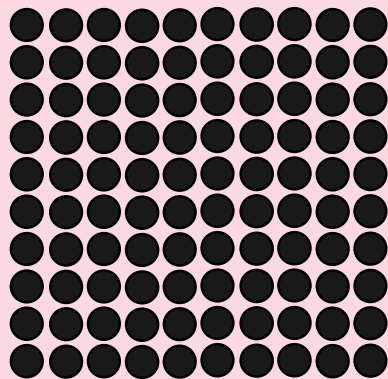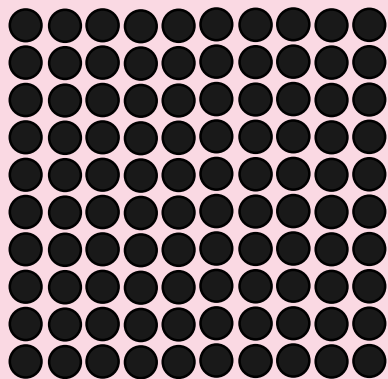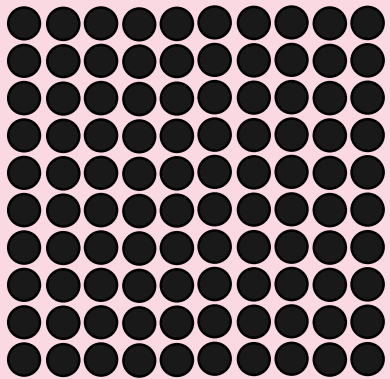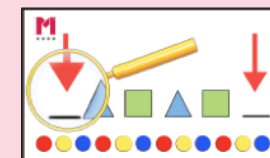
Making parts ten and 100 times greater

Explore any patterns that you can see. What might be happening? Why is that?

Hundreds	Tens	Ones
		🟦🟦🟦 🟦🟦🟦

6 × 1 =

6 × 10 =

60 × 10 =

6 × 100 =

Making parts 10 and 100 times greater

Represent each calculation using Dienes blocks on a place value chart and solve the missing number problems.

What patterns can you spot and what happens to the Dienes blocks?

$6 \times 1 = \boxed{}$ $6 \times 10 = \boxed{}$ $60 \times 10 = \boxed{}$ $6 \times 100 = \boxed{}$

$3 \times 1 = \boxed{}$ $3 \times 10 = \boxed{}$ $30 \times 10 = \boxed{}$ $3 \times 100 = \boxed{}$

$\boxed{} = 1 \times 1$ $\boxed{} = 1 \times 10$ $\boxed{} = 10 \times 10$ $\boxed{} = 1 \times 100$

$\boxed{} = 2 \times 1$ $\boxed{} = 2 \times 10$ $\boxed{} = 20 \times 10$ $\boxed{} = 2 \times 100$

$4 \times 1 = \boxed{}$ $\boxed{} = 4 \times 10$ $\boxed{} = 40 \times 10$ $4 \times 100 = \boxed{}$
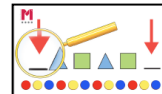
Record your patterns below:

Mathematics Mastery

Sharing patterns

- What happens when we multiply by ten?

- What happens when we multiply by ten then multiply by ten again?

- How does this compare to when we multiply by 100? Why is that?

ArkCurriculum+

Year 3 Unit 7: Deriving multiplication and division facts

Lesson 3: Linking place value and multiplication

Mathematics
Mastery
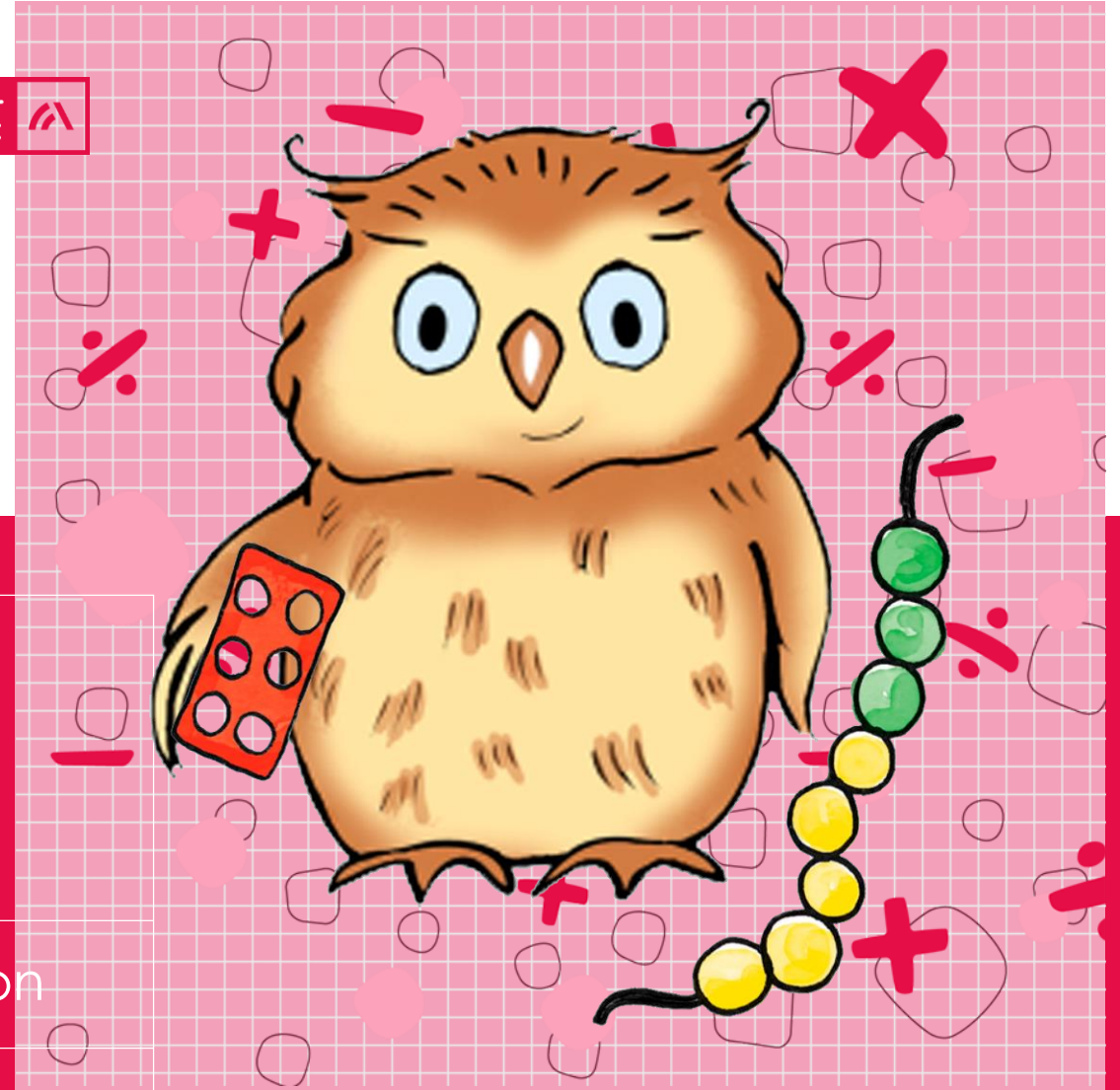
Multiplying by ten and 100

Work with a partner on this activity.

- Represent each calculation on a place-value chart using Dienes.
- Afterwards, solve the calculations.
- Think about the patterns you noticed in the previous lesson and discuss any new patterns you notice.

$6 \times 10 =$

$= 6 \times 100$

$= 60 \times 10$

$70 \times 10 =$

$= 7 \times 10$

$7 \times 100 =$

multiplication

place holder

ten times greater

column

digit

place value
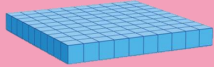
Star Words

Multiplying two-digit numbers (beyond multiples of ten)

What happens to the digits when you multiply by 10?

Hundreds	Tens	Ones
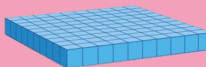
Exploring the relationship between place-value columns

Choose a pair of calculations.

Pupil A: Represent one calculation with Dienes on a place-value chart.

Pupil B: Represent the other calculation with Dienes on the place-value chart.

Both: Compare the two calculations.

Hundreds	Tens	Ones

I make the ones ten times greater so …

I make the tens ten times greater so …

The digits from the ones …

The digits from the tens …

Exploring the relationship between place value columns

Choose a pair of calculations. Each represent one of the calculations with Dienes on a place value chart. Compare the two calculations.

What do you notice? What's the same and what's different?

13×10 **and** 31×10	41×10 **and** 14×10
51×10 **and** 15×10	51×10 **and** 15×10

Mathematics Mastery

Representing with place-value counters

Hundreds	Tens	Ones
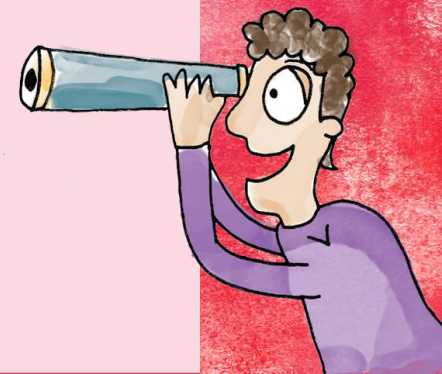
Multiplying two-digit numbers using place value

Draw a place value chart.

Represent each calculation with place value counters before completing the written calculation.

Hundreds	Tens	Ones
100	10	1

Independent Task

Multiplying 2-digit numbers using place value

Draw a place value chart on your whiteboard.

Represent each calculation using place value counters.

Write the digits beneath the counters to show the number that is represented – remember the place holders!
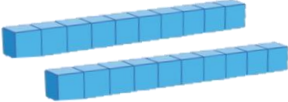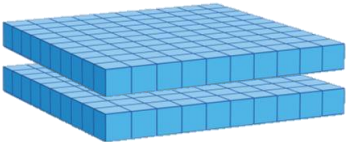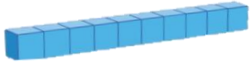
Complete the written calculations after you represent each calculation.

$17 \times 10 =$	$21 \times 10 =$
$= 19 \times 10$	$= 24 \times 10$
$23 \times 10 =$	$= 33 \times 10$
$= 18 \times 10$	$32 \times 10 =$

Mathematics Mastery

What's the same and what's different?

Hundreds	Tens	Ones
	2	1
2	1	0

Year 3 Unit 7: Deriving multiplication and division facts

Lesson 4:   Dividing by ten using place value

Mathematics Mastery
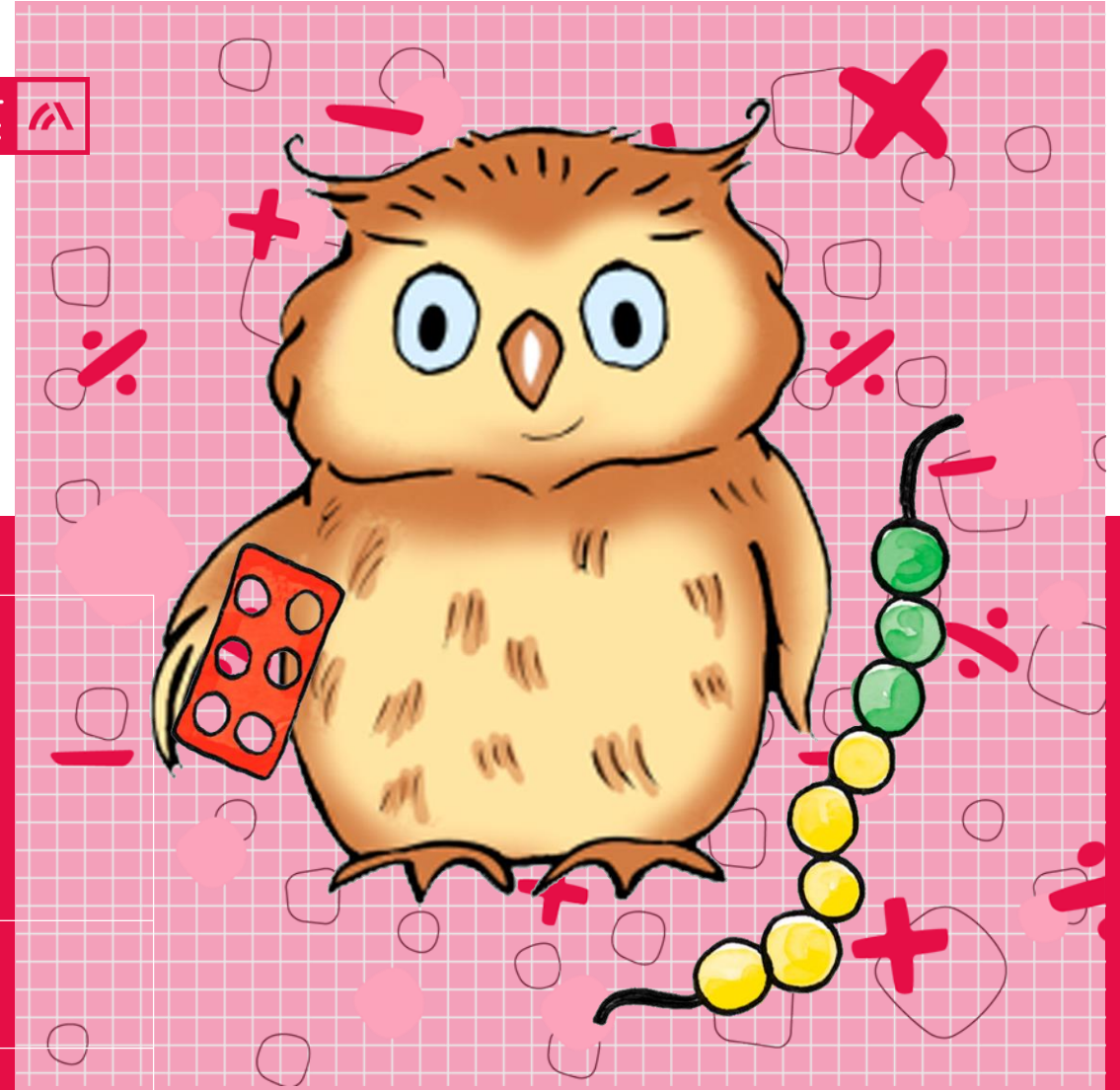
Multiplying two-digit numbers by ten

Complete the calculations using place-value counters and a place-value chart.

$21 \times 10 =$

$= 14 \times 10$

$= 13 \times 10$

$22 \times 10 =$

$= 15 \times 10$

$12 \times 100 =$

ten times less

divide

division

value

ten times fewer

inverse

Star Words
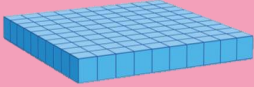
Connecting multiplying and dividing by ten

If I know this, what else do I know?

$$4 \times 2 = 8$$

Connecting multiplying and dividing by ten

Hundreds	Tens	Ones

Ten times less as the inverse of ten times greater

Choose a digit 1–9. Represent the value using Dienes, recording the digits in the correct columns underneath.

Pupil A: Represent making the number ten times greater. Explain what you have done.

Pupil B: Represent making the newly created number ten times less. Explain what you have done.

Both: Describe what has happened to the value of the number. What do you notice?

> When we multiplied / divided by ten, the value became …
> When we multiplied / divided by ten the digits …
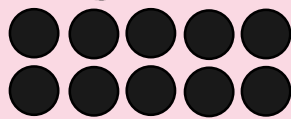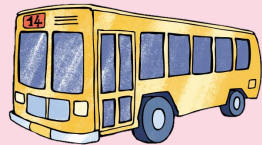> When we multiplied / divided by ten the place holder …

Dividing larger numbers by ten

Five double-decker buses can carry 500 people to Silverstone. We know that minibuses carry ten times fewer people. How many people can travel to Silverstone in five minibuses?
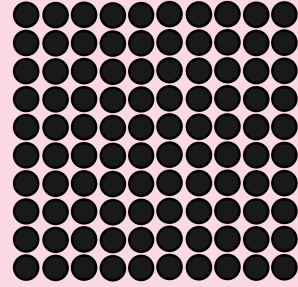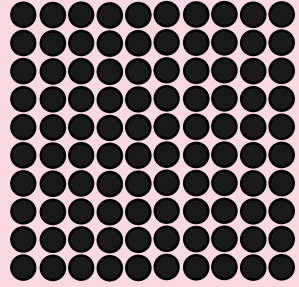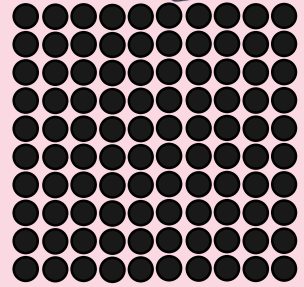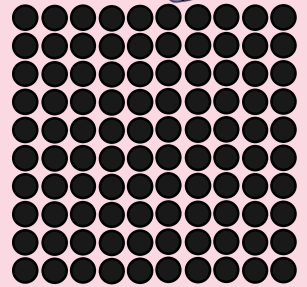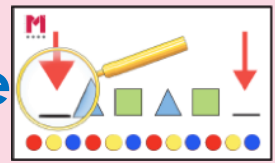
Dividing larger numbers by ten

Five double-decker buses can carry 500 people to Silverstone. We know that minibuses carry ten times fewer people. How many people can travel to Silverstone in five minibuses?

$$500 \div 10 =$$

Making parts ten times less

- Take a set of calculations and solve them using Dienes on your place-value chart.

- Each time, make the value ten times less.

- Record the digits in the correct columns before writing the equation in your book.

What do you notice about the digits each time you divide by 10?

What patterns do you spot?

$100 \div 10 =$	$= 10 \div 10$	$110 \div 10 =$
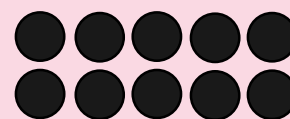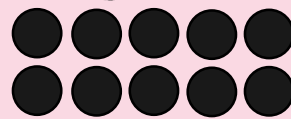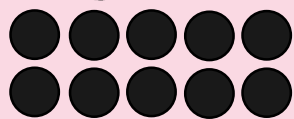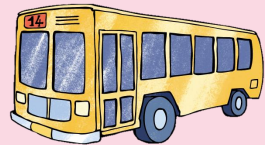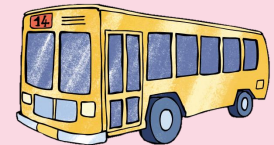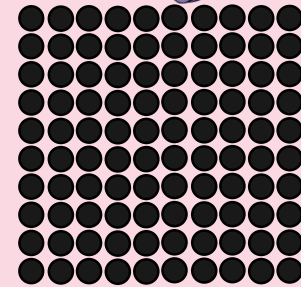
Learning to divide multiples of 10 and 100 by ten using place value.

Dividing larger numbers by ten

Draw a place value chart on your whiteboard.
Choose a row of division calculations and represent each division using Dienes blocks on your chart.
What happens to the value of the number? What happens to the digits each time?

$200 \div 10 =$	$20 \div 10 =$	$220 \div 10 =$

$= 400 \div 10$	$40 \div 10 =$	$440 \div 10 =$

$300 \div 10 =$	$30 \div 10 =$	$330 \div 10 =$

Mathematics Mastery

Sharing patterns

What patterns did you spot?

Ark Curriculum+
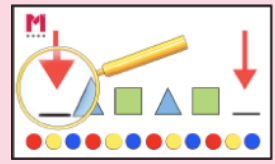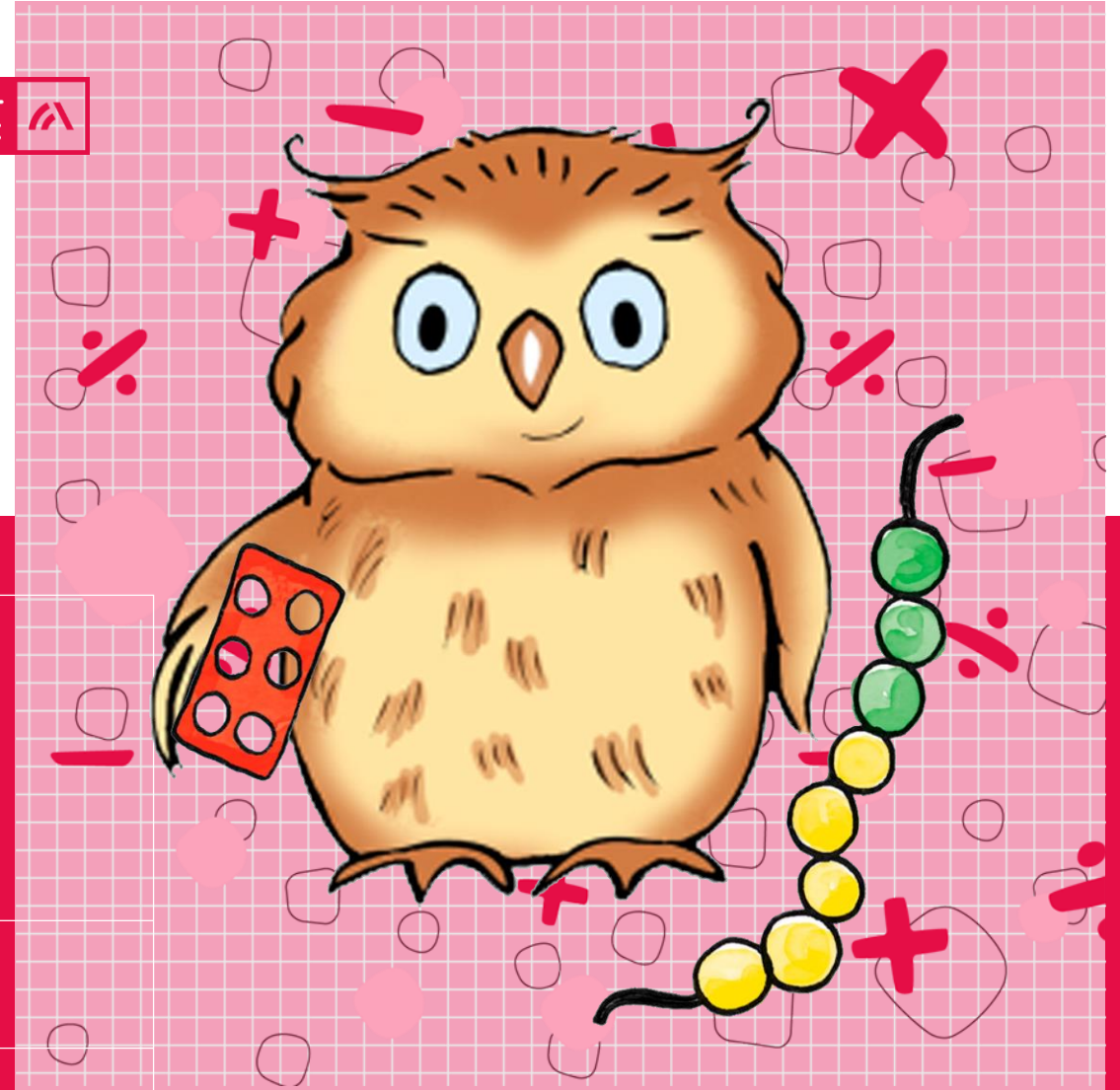
Year 3 Unit 7: Deriving multiplication and division facts

Lesson 5: Multiplying and dividing by ten or 100

Mathematics
Mastery

Dividing by ten using place-value counters

Complete the calculations using place-value counters and a place-value chart.

$6,000 \div 10 =$

$= 600 \div 10$

$= 60 \div 10$

$= 7,000 \div 10$

$700 \div 10 =$

$70 \div 10 =$

Learning to multiply and divide by ten and 100 using place value

Star Words

multiply

times greater

times as many

times more

times fewer

times less

divide

inverse

Relating multiplying by 100 to dividing by 100

How could you represent this calculation with Dienes and place-value counters?

$$3 \times 100 =$$

Relating multiplying by 100 to dividing by 100

$$3 \times 100 = 300$$

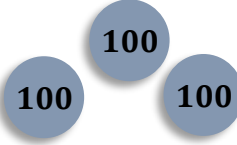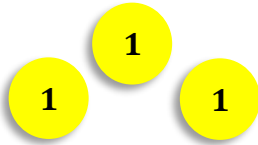$$3 \times 10 \times 10 =$$

Hundreds	Tens	Ones

Dividing by 100

Pupil A: Select a calculation and represent it with place-value counters, writing the digits underneath.

Pupil B: Divide by 100, representing this with place-value counters and write the digits underneath.

Both: Explain what happened to the value of the number, each digit and the place holders.

Hundreds	Tens	Ones
100 100 100 3	0	0
		1 1 1 3

___ is one hundred times smaller than ___ hundred.

The ___ digit has moved two columns to the right.

___ hundred divided by 100 is equal to ___.

Dividing by 100

Pupil A: Choose a calculation and represent the calculation with place value counters, writing the digits underneath

Pupil B: Divide by 100, representing with place value counters and writing the digits underneath
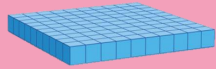
Both: Discuss what happened to the value of the number, each digits and the place holders

Look out for patterns. What did you notice?

700 ÷ 100	600 ÷ 100	200 ÷ 100
300 ÷ 100	800 ÷ 100	400 ÷ 100
500 ÷ 100	100 ÷ 100	900 ÷ 100

Mathematics Mastery

Multiplying and dividing by ten and 100

What patterns did you notice?

Hundreds	Tens	Ones

Multiplying and dividing by ten and 100

Complete the calculations, representing them with Dienes or place-value counters.

$= 13 \times 10$

$70 \div 10 =$

$= 600 \div 100$

Hundreds 100	Tens 10	Ones 1

Multiplying and dividing by 10 and 100

Solve the calculations, representing each with place value counters or Dienes on a place value chart.

$400 \div 10 =$	$60 \times 10 =$	$= 500 \div 100$
$90 \div 10 =$	$= 6 \times 100$	$= 170 \div 10$
$= 72 \times 10$	$= 23 \times 10$	$630 \div 10 =$

Mathematics Mastery

Celebrating success and addressing misconceptions

How did you solve the calculations from the Independent Task?