Spring Block 4

Decimals A

Small steps

Step 1 Tenths as fractions

Step 2 Tenths as decimals

Step 3 Tenths on a place value chart

Step 4 Tenths on a number line

Step 5 Divide a 1-digit number by 10

Step 6 Divide a 2-digit number by 10

Step 7 Hundredths as fractions

Step 8 Hundredths as decimals

Small steps

| Step 9 | Hundredths on a place value chart |

| Step 10 | Divide a 1- or 2-digit number by 100 |

Tenths as fractions

Notes and guidance

In Year 3, children were introduced to unit and non-unit fractions and learnt to compare and order these. They also explored dividing 100 into 10 equal parts on a number line, so they should already be familiar with the idea of tenths. In this small step, children explore the idea of a tenth as a fraction.

Children explore tenths through different representations of 1 whole split into ten equal parts, including place value counters, straws, counters on a ten frame and bead strings. Number lines are another useful representation of tenths as fractions, and are covered again in a later step.

At this stage, children explore tenths as fractions only – the concept of tenths as decimals is introduced later in the block.

Things to look out for

- Children may see the pattern of $\frac{1}{10}, \frac{2}{10}, \frac{3}{10}$ … without understanding each part's worth and how it fits in with the whole.

- Seeing one-tenth in an unfamiliar place can confuse children, for example a bar split into 10 with the 9th bar shaded. Children may see this as $\frac{9}{10}$

Key questions

- What is a fraction?

- What is a tenth?

- If a whole is divided into 10 equal parts, what is the value of each part?

- How can you represent the fraction _____ using a model?

- When you are counting up in tenths, what comes before/after _____?

- When you are counting up in tenths, what comes after $\frac{9}{10}$?

- How are tenths similar to ones?

Possible sentence stems

- When a whole is split into _____ equal parts, one of those parts is worth _____

- When counting in tenths, the number before/after _____ is _____
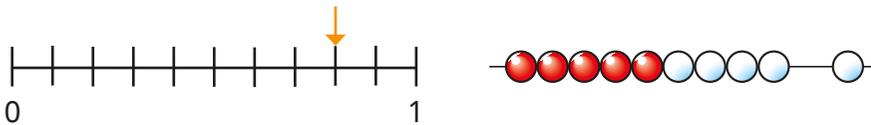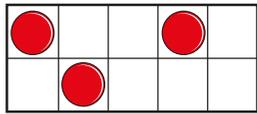
National Curriculum links

- Count up and down in tenths; recognise that tenths arise from dividing an object into 10 equal parts and in dividing 1-digit numbers or quantities by 10 (Y3)
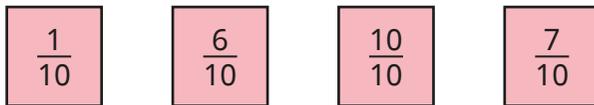
Tenths as fractions

Key learning

- What fraction does each picture show?

  $\frac{1}{10}$ $\frac{1}{10}$ $\frac{1}{10}$ $\frac{1}{10}$

- Draw pictures to show the fractions.

  $\frac{1}{10}$ $\frac{6}{10}$ $\frac{10}{10}$ $\frac{7}{10}$

  Compare drawings with a partner.

- Scott is counting up in tenths.

  0   $\frac{1}{10}$ $\frac{2}{10}$ $\frac{3}{10}$ 1
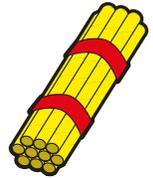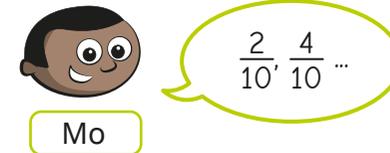
  Continue Scott's counting until you reach 1

  With a partner, count back from 1 to 0 in tenths.

- Dora has a bundle of 10 straws.

  She says that this bundle represents 1 whole.

  She gives 3 straws to Kim and 1 straw to Tommy.

  What fraction of the straws does Dora have left?

- Mo is counting up in $\frac{2}{10}$s.

  $\frac{2}{10}, \frac{4}{10}$ ...

  Mo

  What will be the next three fractions he says?

- Annie is counting down in $\frac{3}{10}$s.
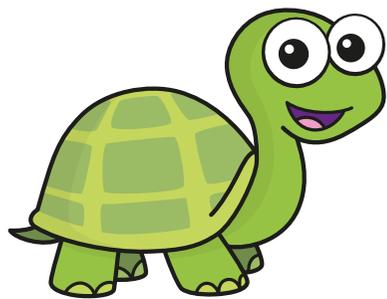
  $\frac{10}{10}, \frac{7}{10}$ ...

  Annie

  What will be the next two fractions she says?

Tenths as fractions
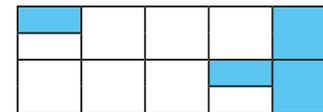
Reasoning and problem solving
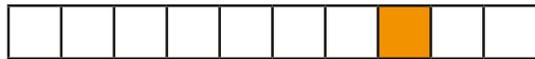
The bar model shows $\frac{8}{10}$ because the 8th part is shaded.

No

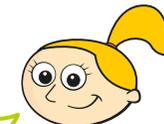Do you agree with Tiny?

Explain your answer.

Amir: $\frac{2}{10}$ of the shape is shaded, because only 2 parts out of 10 are fully shaded.

Eva: $\frac{4}{10}$ of the shape is shaded, because 4 parts are shaded.

Dexter: $\frac{3}{10}$ of the shape is shaded, because altogether 3 full parts out of 10 are shaded.

Dexter

Who do you agree with?

Explain your answer.

Tenths as decimals

Notes and guidance

Now that children have an understanding of tenths as fractions, they move on to looking at them as decimals.

This is the first time that children have encountered decimal numbers and the decimal point. Model making, drawing and writing decimal numbers, showing that the decimal point is used to separate whole numbers from decimals.

Children look at a variety of representations of tenths as decimals, up to the value of 1 whole. This leads to adding the tenths column to a place value chart for children to see how tenths fit with the rest of the number system and to understand the need for the decimal point. This will be developed further in the next step, which explores decimal numbers beyond 1 whole.

Things to look out for

- Children may forget to include the decimal point.

- If the number of tenths reaches 10, children may call this "zero point ten" and write 0.10 rather than exchanging for 1 one.

- Children may confuse the words "tens" and "tenths".

Key questions

- What is a decimal?

- What is a tenth?

- If a whole is divided into 10 equal parts, what is the value of each part?

- How can you represent the decimal _____ using a model?

- How are decimals similar to fractions?

- How can you convert between tenths as fractions and tenths as decimals?

- How is $\frac{1}{10}$ similar to 0.1? How is it different?

Possible sentence stems

- If a whole is split into 10 equal parts, then each part is worth _____

- Zero point _____ is equal to _____ tenths.
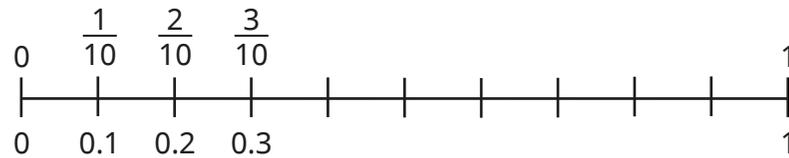
- _____ as a fraction/decimal is _____

National Curriculum links

- Recognise and write decimal equivalents of any number of tenths or hundredths
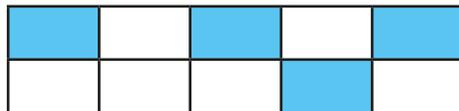
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Tenths as decimals

Key learning

- Complete the number line counting in tenths.

- What decimal numbers are shown by each picture?

- Draw a picture to show each number.

  | 0.4 | 0.8 | 0.2 | 0.7 |

- Complete the table.

Picture	Words	Fraction	Decimal
	one tenth	$\frac{1}{10}$	0.1
			0.9

- What number is shown on the place value chart?

Ones	Tenths
	0.1 0.1 0.1

  Use a place value chart to show the numbers.

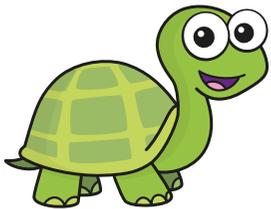 | 0.6 | $\frac{7}{10}$ | 0.5 | $\frac{1}{10}$ |

- Esther puts 10 tenths into the tenths column of a place value chart.

  What number has she made?

  What does she need to do?

Tenths as decimals

Reasoning and problem solving

Tiny is counting up in 0.1s.

0.8, 0.9, 0.10

Do you agree with Tiny?

Explain your answer.

No

Rosie thinks of a number.

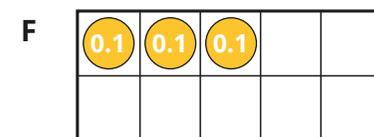$\frac{1}{10}$ more than her number is $\frac{7}{10}$

What is Rosie's number?
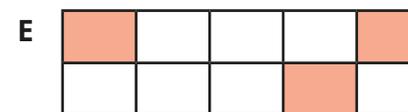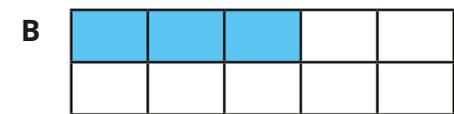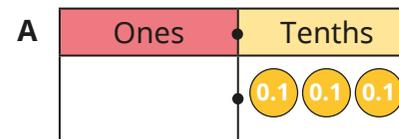
Give your answer as a decimal.

0.6

Which is the odd one out?

A

Ones	Tenths
	0.1 0.1 0.1

B

C

D

E

F

0.1	0.1	0.1		

Explain your answer.

D

Tenths on a place value chart

Notes and guidance

In this small step, children continue to explore the tenths column in a place value chart, extending their previous learning to include numbers greater than 1

It is important that children understand that 10 tenths are equivalent to 1 whole, and therefore 1 whole is equivalent to 10 tenths. Children use this knowledge when counting both forwards and backwards in tenths. When counting forwards, children should know that 1 comes after 0.9, and when counting backwards that 0.9 comes after 1. Links can be made to the equivalence of 10 ones and 1 ten to support understanding.

Things to look out for

- If the number of tenths reaches 10, children may call this "zero point ten" and write 0.10 rather than exchanging for 1 one.

- When counting up in tenths, children may go from 9 tenths to 0 tenths, but then forget to increase the value of the ones column, for example 1.8, 1.9, 1.0, 1.1 ...

- Similarly, when counting down in tenths, children may forget to subtract a 1 to exchange, for example 2.2, 2.1, 2.0, 2.9, 2.8 ...

Key questions

- What is a tenth?

- What is a decimal point?

- If you have _____ in the tenths column, what number do you have?

- How many tenths make 1 whole?

- If you have 10 in the tenths column, can you make an exchange?

- How many wholes/tenths are in the number _____?

Possible sentence stems

- There are _____ tenths in 1 whole.

- 1 whole is equivalent to _____ tenths.

- There is/are _____ whole/wholes and _____ tenths.
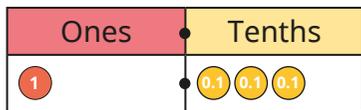
- The number is _____

National Curriculum links

- Recognise and write decimal equivalents of any number of tenths or hundredths

Tenths on a place value chart

Key learning

- Teddy uses place value counters and a place value chart to represent the number 1.3

Ones	Tenths
①	0.1 0.1 0.1

> There is 1 whole and 3 tenths.
> The number is 1.3

  ▶ Use Teddy's method to represent the numbers.

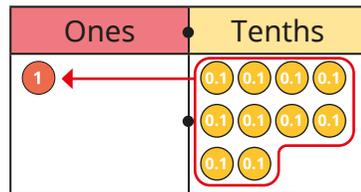| 1.6	3.5	0.3	9.8

  ▶ Complete the sentences for each number.

  There is/are _____ whole/wholes and _____ tenths.

  The number is _____

- Mo is counting up in tenths.

  When he gets to 10 tenths, he exchanges them to make 1 one.

Ones	Tenths
① ←	0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1

  ▶ Use place value counters to count up in 0.1s from 1 whole.

  ▶ Complete the number track.

1	1.1									

- Complete the sentences for the number in the place value chart.
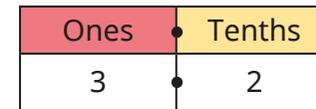
Ones	Tenths
3	2

  There are _____ ones and _____ tenths.

  _____ ones + _____ tenths = 3 + 0.2

  = 3.2

- Use a place value chart and sentences to describe the decimals.

4.0	5.9	2.2	7.6

- Complete the number tracks.

	0.7		0.9		1.1	1.2

2.2	2.4		2.8		3.2

7.4	7.3		7.1			6.8

2.8	2.6			2	
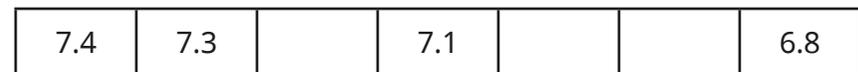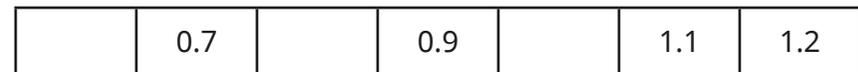
Tenths on a place value chart

Reasoning and problem solving

Jack uses the digit cards and the place value chart to make a number.

3	4	5	6	7
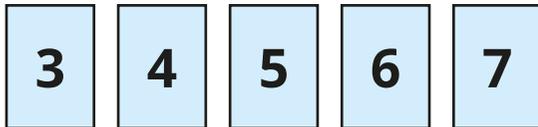
Ones	Tenths

My number is greater than 1 but less than 5

What number could Jack have made?

Find as many possibilities as you can.

ten possible numbers:

3, 3.4, 3.5, 3.6, 3.7, 4, 4.3, 4.5, 4.6, 4.7

Rosie, Whitney and Amir are counting up in 0.1s. They get to this number.

Tens	Ones	Tenths
	1 1	0.1 0.1
	1 1	0.1 0.1
	1 1	0.1 0.1
	1 1	0.1 0.1
	1	0.1
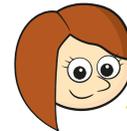
Rosie: The next number will be 9.10

Amir: The next number will be 10

Whitney: The next number will be 10.9

Who do you agree with?

Explain your answer.

Amir

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Tenths on a number line

Notes and guidance

In this small step, children extend their understanding of tenths by exploring them on a number line.

Number lines help children to see the relationship between tenths and whole numbers. They find missing decimal numbers in a sequence, deepening their understanding of the value of 1 tenth. The sequences initially go up and down in steps of 1 tenth and then in varying intervals, including crossing the whole. Seeing this modelled on a number line helps children with their understanding.

From their learning in the fractions block earlier in Year 4, children should be able to see fractions greater than 1 as mixed numbers, but for this step the numbers will be kept as decimals.

Things to look out for

- Children may assume each interval is 0.1 without checking other numbers on the number line to see if the interval is greater than 0.1

- When counting past the whole in 0.1s, children may say "0.9, 0.10, 0.11 ..."

- When crossing the whole, children may miss out the whole number, for example 0.8, 0.9, 1.1, 1.2 ...

Key questions

- How can you show these numbers on a number line?

- If there are 10 intervals between two whole numbers, what is each interval worth?

- How can you work out the missing number in the sequence?

- What intervals does the number line go up in?

- How do you count in 0.1s past a whole number?

Possible sentence stems

- The start point is _____
  The end point is _____
  The number line is counting up in _____

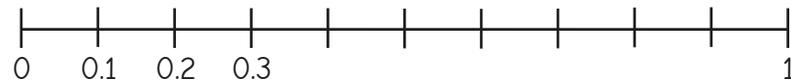- The missing number is _____ because ...

National Curriculum links

- Recognise and write decimal equivalents of any number of tenths or hundredths
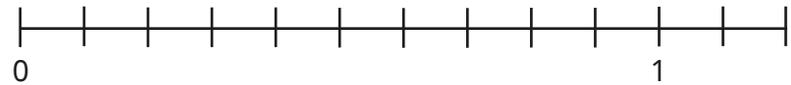- Compare numbers with the same number of decimal places up to 2 decimal places

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Tenths on a number line

Key learning

- Dani is counting in tenths on a number line.

  | | | | | | | | | | | |
  0   0.1   0.2   0.3   1

  Finish labelling Dani's number line.

- Label the numbers on the number line.

  | 0 .5 | | 0.9 | | 1.1 |

  | | | | | | | | | | | |
  0   1

- Complete the number line.

  | | | | | | | | | | | | | | | | | | | | |
  1   2   3
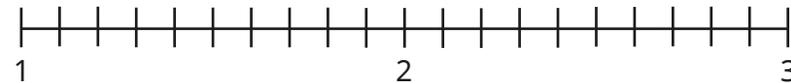
- What number is the arrow pointing to?

  ↓

  | | | | | | | | | | | |
  4   5
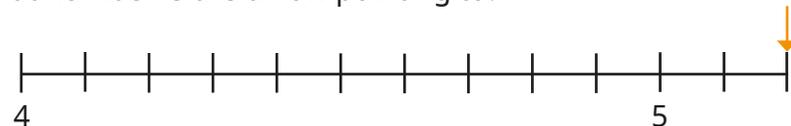
- How long is the ribbon?

  | | | | | | | | | | | |
  0 m   1 m

- Brett has drawn this number line.

  | | | | | |
  0   0.2   0.4   1
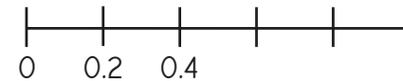
  ► Complete the sentences to describe Brett's number line.

    The start point is _____

    The end point is _____

    The number line is counting up in _____

  ► Label the missing numbers on the number line.

- How much longer is the blue ribbon than the red ribbon?

  | | | | | | | | | | | |
  3 m   5 m
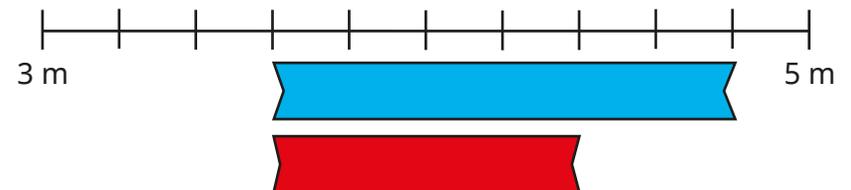
Tenths on a number line

Reasoning and problem solving

Tiny has drawn arrows to two numbers, A and B, on two number lines.

A

6 — — — — — — — — — — 7

B

6 — — — — — — — — — — 8
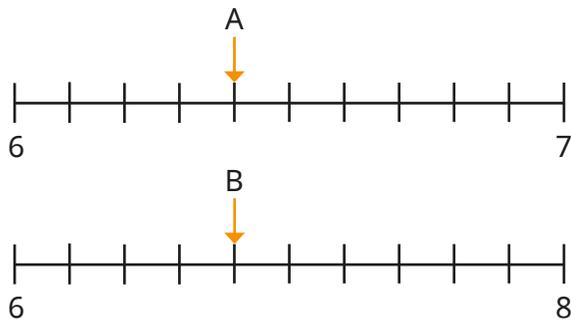
A and B are equal, because the arrows are pointing to the same place.

Do you agree with Tiny?

Explain your answer.

No

Estimate the positions of the numbers on the number line.

2.7	2.3
3.9	2.5
2.9	3.2

2 ————————————————— 4

arrows pointing approximately to the correct positions
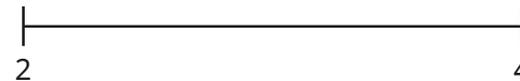
Talk about your method with a partner.

In which order did you place your numbers on the number line?

Divide a 1-digit number by 10

Notes and guidance

In this small step, children divide a 1-digit number by 10, resulting in a decimal number with 1 decimal place.

To begin with, they see that the number is shared into 10 equal parts. This can be shown by exchanging each place value counter worth 1 for ten 0.1 counters.

They recognise that when using a place value chart, they move all of the digits one place to the right when dividing by 10. Any misconceptions around "tricks" that work for this step, such as moving the decimal point to the beginning of the number or adding "zero point" in front of the word should be addressed at this stage. This will help to prevent errors later on, when children progress to dividing 2-digit numbers by 10 and then move on to dividing by 100 and dividing by decimals.

Key questions

- What number is represented on the place value chart?
- When dividing a number by 10, how many equal parts is the number split into?
- How many tenths are there in 1 whole/2 wholes/3 wholes?
- How can you use counters and a place value chart to show dividing a number by 10?
- What is the same and what is different before and after a 1-digit number is divided by 10?

Possible sentence stems

- _____ is 10 times the size of _____
- _____ is one-tenth the size of _____

Things to look out for

- Children may overgeneralise and see dividing by 10 as putting the decimal point in front of the number.
- Children may move the digits in the wrong direction.

National Curriculum links

- Find the effect of dividing a 1- or 2-digit number by 10 and 100, identifying the value of the digits in the answer as ones, tenths and hundredths

Divide a 1-digit number by 10

Key learning

- Huan is dividing 1 by 10

  He exchanges 1 whole for 10 tenths and uses a ten frame to share the counters.

  He knows that one of these counters is the answer to 1 ÷ 10
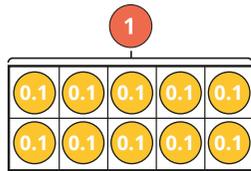
  ▶ Use Huan's model to work out the answer to 1 ÷ 10

  ▶ Use Huan's method to work out 2 ÷ 10
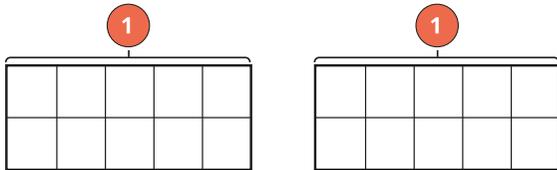
- Use counters to help you work out the divisions.

  | 3 ÷ 10 | 4 ÷ 10 | 7 ÷ 10 | 9 ÷ 10 |

  What do you notice about your answers?

- Dora uses a place value chart to work out that 2 ÷ 10 = 0.2
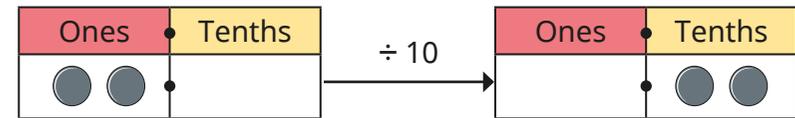
  ▶ What is the value of the 2 in the question?

  ▶ What is the value of the 2 in the answer?

- Use a place value chart to find the missing numbers.

  ▶ 8 ÷ 10 = _____   ▶ _____ = 9 ÷ 10   ▶ 0.4 = _____ ÷ 10

- Write <, > or = to make the statements correct.

  5 ÷ 10 ◯ 10 ÷ 5

  3 tens ◯ 3 ÷ 10

  7 tenths ◯ 7 ÷ 10

  3 ÷ 10 ◯ 4 ÷ 10

Divide a 1-digit number by 10

Reasoning and problem solving

Choose a digit card from 1 to 9 and place a counter over the top of that number on the Gattegno chart.

10	20	30	40	50	60	70	80	90
1	2	3	4	5	6	7	8	9
0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9

To divide by 10, I need to move the counter to the right.

Do you agree with Tommy?

Use the Gattegno chart to explain your answer.

No

Complete the number sentences.

$4 ÷ 10 = 8 ÷ \underline{\hspace{1cm}} ÷ 10$

$15 ÷ 3 ÷ 10 = \underline{\hspace{1cm}} ÷ 10$

$64 ÷ \underline{\hspace{1cm}} ÷ 10 = 32 ÷ 4 ÷ 10$

$\underline{\hspace{1cm}} × 10 = 6$

2

5

8

0.6

Max thinks of a number and divides it by 10

The answer is equal to 4 wholes and 7 tenths.

What number was Max thinking of?

47

Divide a 2-digit number by 10

Notes and guidance

In this small step, children divide 2-digit numbers by 10, building on their learning from the previous step.

Counters on a place value chart are a good resource for this concept. Children make the number using counters, then move all the counters one place to the right. The key learning is that both digits of the number move in the same direction by the same number of places. The digits are together before dividing and are still together after dividing.

Children may think that certain "tricks" always work, such as placing a decimal point between the digits. Reinforce with children that this does not always work and so is not a method they should rely on. Also discuss that if a multiple of 10 is divided by 10, then nothing is needed in the tenths column, for example 50 ÷ 10 = 5, not 5.0

Things to look out for

- If children are not using a place value chart, they may move the digits an incorrect number of places.
- Children may move only one of the digits one place to the right.
- Children may forget to add the decimal point to their answer, in effect leaving the original number unchanged.

Key questions

- How can you show this 2-digit number on a place value chart?
- How can you show this 2-digit number in a part-whole model?
- When dividing a number by 10, how many equal parts are you splitting it into?
- How can you use a part-whole model to help you divide a 2-digit number by 10?
- What could a 2-digit number look like once it has been divided by 10?
- What happens to a number when you divide it by 10?

Possible sentence stems

- _____ divided by 10 is equal to _____

National Curriculum links

- Recognise and write decimal equivalents of any number of tenths or hundredths
- Find the effect of dividing a 1- or 2-digit number by 10 and 100, identifying the value of the digits in the answer as ones, tenths and hundredths

Divide a 2-digit number by 10

Key learning

- Kim knows that to divide a number by 10, she must split it into 10 equal groups.

  She uses partitioning to divide 21 by 10
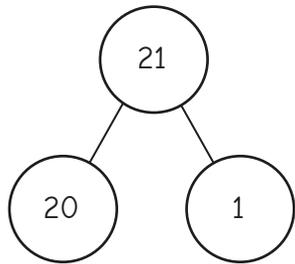
  $$20 \div 10 = 2$$
  $$1 \div 10 = 0.1$$
  $$\text{So } 21 \div 10 = 2 + 0.1 = 2.1$$

  Use Kim's method to work out the divisions.

  | 52 ÷ 10 | 27 ÷ 10 | 19 ÷ 10 | 37 ÷ 10 |

- Filip uses a place value chart to find that 34 ÷ 10 = 3.4

  | Tens | Ones | Tenths |
  | Tens | Ones | Tenths |

  ÷ 10
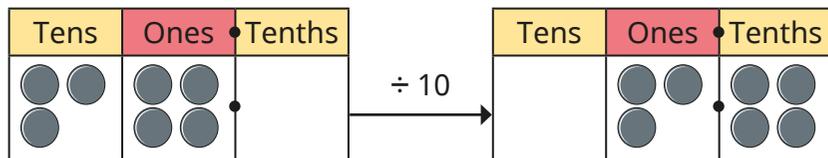
  Use Filip's method to work out the divisions.

  | 12 ÷ 10 | 45 ÷ 10 | 90 ÷ 10 | 80 ÷ 10 | 78 ÷ 10 |

- Jack uses a Gattegno chart to work out that 23 ÷ 10 = 2.3

10	20	30	40	50	60	70	80	90
1	2	3	4	5	6	7	8	9
0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9

  Use Jack's method to work out the divisions.

  | 27 ÷ 10 | 65 ÷ 10 | 91 ÷ 10 | 30 ÷ 10 |

- Write <, > or = to make the statements correct.

  50 ÷ 10 ◯ 45 ÷ 10

  85 ÷ 10 ◯ 90 ÷ 10

  double 0.2 ◯ 22 ÷ 10

  halfway between 4 and 5 ◯ 46 ÷ 10

- Eva has 34 cm of ribbon.

  She cuts it up to share equally between her 10 friends.

  What length of ribbon do they each get?

Divide a 2-digit number by 10

Reasoning and problem solving

Max is thinking of a 2-digit number.

> I am going to divide my number by 10

> I know that Max's answer must have some ones and some tenths.

Do you agree with Tiny?

Explain your answer.

No

Max might be thinking of a multiple of 10, e.g. 50

50 ÷ 10 = 5 and 5 does not have a digit in the tenths column.

Jo has used a Gattegno chart to divide a 2-digit number by 10

Here is her answer.

10	20	30	40	50	60	70	80	90
1	2	3	4	5	6	7	8	9
0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9

What was Jo's original number?

How does the Gattegno chart help?

26

Sam thinks of a 2-digit number.

When she divides it by 10, the answer has 4 tenths.

Is Sam's number even or odd?

How do you know?

even

Hundredths as fractions

Notes and guidance

In this small step, children build on their previous learning of tenths as they begin to explore hundredths. They learn that a hundredth is 1 whole split into 100 equal parts. This idea can be explored using a variety of representations, including hundred squares, bead strings, Rekenreks and number lines. Place value charts representing hundredths are introduced in a later step.

Children relate this learning to the previous steps by understanding that 1 tenth is equivalent to $\frac{10}{100}$. They partition hundredths into tenths and hundredths, for example $\frac{21}{100}$ is made up of $\frac{2}{10}$ and $\frac{1}{100}$, or $\frac{1}{10}$ and $\frac{11}{100}$

Things to look out for

- Children may incorrectly partition a fraction and think that, for example, $\frac{12}{100}$ is made up of $\frac{1}{100}$ and $\frac{2}{100}$

- Children may confuse the words "hundred" and "hundredth".

- Children may think that hundredths are greater than tenths because 1 hundred is greater than 1 ten.

Key questions

- How many hundredths are there in 1 whole?

- How is a hundredth similar to/different from a tenth?

- How can you represent hundredths in a hundred square?

- How many hundredths are equivalent to 1 tenth?

- How can you use base 10 to represent both tenths and hundredths?

- How can you partition _____ into tenths and hundredths?

Possible sentence stems

- There are _____ hundredths in _____ tenths.

- _____ hundredths is equivalent to _____ tenths and _____ hundredths.

National Curriculum links

- Count up and down in hundredths; recognise that hundredths arise when dividing an object by 100 and dividing tenths by 10

- Recognise and show, using diagrams, families of common equivalent fractions
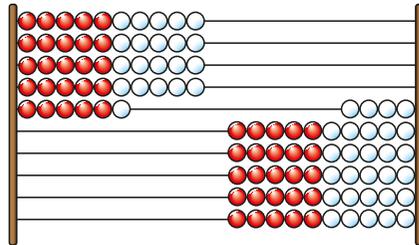
Hundredths as fractions

Key learning

- Each part of a hundred square is worth $\frac{1}{100}$

  What fraction of each hundred square is shaded?
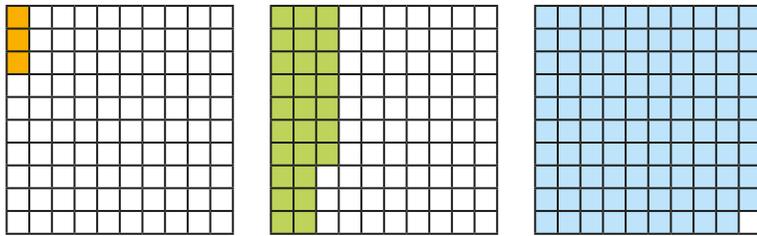
- This Rekenrek is made up of 100 beads.

  If the Rekenrek represents 1 whole, what fraction is shown on the left?

  What fraction is shown on the right?

- Use a hundred square to help fill in the missing numbers.

  ▸ $\frac{3}{10} = \frac{\square}{100}$ ▸ $\frac{70}{100} = \frac{\square}{10}$ ▸ $\frac{90}{100} = \frac{\square}{10}$

- Eva uses a hundred square to see that $\frac{23}{100}$ is equivalent to $\frac{2}{10} + \frac{3}{100}$
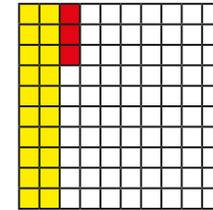
  Use Eva's method to help fill in the missing numbers.

  ▸ $\frac{45}{100} = \frac{\square}{10} + \frac{\square}{100}$ ▸ $\frac{59}{100} = \frac{\square}{10} + \frac{\square}{100}$ ▸ $\frac{\square}{100} = \frac{7}{10} + \frac{73}{100}$

- Dexter has partitioned $\frac{34}{100}$ into $\frac{2}{10}$ and $\frac{14}{100}$
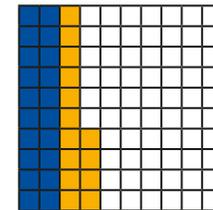
  Use Dexter's method to partition the numbers in two different ways.

  $\frac{52}{100}$ $\frac{81}{100}$ $\frac{39}{100}$

Hundredths as fractions

Reasoning and problem solving

45 hundredths is greater than 5 tenths, because 45 is greater than 5

Do you agree with Tiny?

Explain your answer.

No

Work out the missing number.

$$\frac{3}{10} + \frac{12}{100} = \frac{\square}{100}$$

How did you work it out?

42

Fill in the missing numbers.

$$\frac{3}{10} + \frac{2}{100} = \frac{2}{10} + \frac{\square}{100}$$

$$\frac{14}{100} + \frac{3}{10} = \frac{4}{10} + \frac{\square}{100}$$

$$\frac{5}{10} + \frac{1}{100} < \frac{5}{10} + \frac{\square}{100}$$

$$\frac{5}{10} + \frac{1}{100} > \frac{\square}{10} + \frac{5}{100}$$

$$\frac{37}{100} + \frac{\square}{100} = \frac{100}{100}$$

$$\frac{2}{10} + \frac{\square}{100} = 1$$

Is there more than one answer for each number sentence?

12

4

any number greater than 1

0, 1, 2, 3 or 4

63

80

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Hundredths as decimals

Notes and guidance

Now that children have an understanding of hundredths as fractions, in this small step they explore hundredths as decimals.

Representations such as hundred squares, Rekenreks and bead strings continue to be used to help understanding, and in this step 0.01 decimal place value counters are also introduced. Children explore the idea that ten 0.01s are equivalent to 0.1, meaning that decimal numbers can be partitioned into tenths and hundredths, for example 0.12 = 0.1 + 0.02. When confident with this, they also explore flexible partitioning of numbers, for example 0.23 = 0.2 + 0.03 or 0.1 + 0.13. Encourage children to think back to the learning from the previous step and to make links between hundredths as fractions and hundredths as decimals.

Things to look out for

- Children may confuse tenths and hundredths by missing out a zero from their decimal number, e.g. $\frac{3}{100}$ = 0.3

- Children may think that a larger number of hundredths is greater than a smaller number of tenths, e.g. 0.06 > 0.1

- Children may confuse the words "hundred" and "hundredth".

Key questions

- How is a decimal similar to/different from a fraction?

- How many hundredths are there in 1 whole?

- How can you write 1 hundredth as a decimal number?

- Are $\frac{1}{100}$ and 0.01 the same or different?

- Is _____ greater or smaller than _____?

- How many hundredths are equivalent to 1 tenth?

Possible sentence stems

- _____ hundredths as a decimal is _____

- There are _____ hundredths in 1 tenth.

- _____ hundredths can be partitioned into _____ tenths and _____ hundredths.
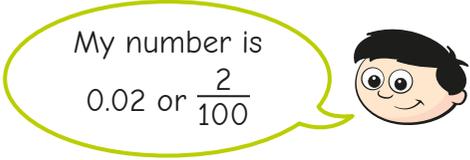
National Curriculum links

- Recognise and write decimal equivalents of any number of tenths or hundredths

- Compare numbers with the same number of decimal places up to 2 decimal places

Hundredths as decimals

Key learning

- Dexter makes a number using place value counters.

  (0.01) (0.01)

  My number is 0.02 or $\frac{2}{100}$

  ► What do these place value counters represent?

  (0.01) (0.01) (0.01) (0.01)

  Give your answer as a fraction and as a decimal.

  ► Make a number using hundredth place value counters for a partner to write as a decimal and as a fraction.

- Annie makes 0.23 using place value counters.

  (0.1) (0.1) (0.01) (0.01) (0.01)

  What numbers do these counters represent?

  ► (0.1) (0.1) (0.1) (0.01)

  ► $(\frac{1}{10})$ $(\frac{1}{10})$ $(\frac{1}{10})$ $(\frac{1}{10})$ $(\frac{1}{100})$ $(\frac{1}{100})$ $(\frac{1}{100})$ $(\frac{1}{100})$ $(\frac{1}{100})$ $(\frac{1}{100})$

  Give your answers as decimals.

- Complete the table.

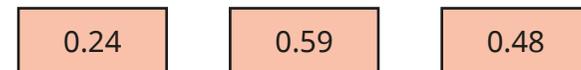| Picture	Words	Fraction	Decimal
	fifty-six hundredths		
		$\frac{17}{100}$	

- Dani uses a bead string to partition 0.34 into 0.3 and 0.04

  0.3   0.04

  She can also partition 0.34 into 0.2 and 0.14

  0.2   0.14

  Find different ways to partition the numbers.

  | 0.24 | | 0.59 | | 0.48 |

  Compare answers with a partner.

Hundredths as decimals

Reasoning and problem solving

8 hundredths is the same as 800

Do you agree with Tiny?

Explain your answer.

No

| 0 | 1 | 2 | 3 | 4 |
| 5 | 6 | 7 | 8 | 9 |

0.8 ☐ < 0.☐5

Which of the digit cards can be used to make this statement correct?

multiple possible answers, e.g.
7 and 9
3 and 8

Alex and Amir have been asked what decimal is shown on the hundred square.
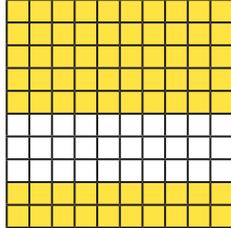
The square shows 0.70

Alex

The square shows 0.7

Amir

Who do you agree with?

Explain your answer.

They are both correct, but the zero is not needed as a placeholder in the hundredths column.

Hundredths on a place value chart

Notes and guidance

In this small step, children continue to explore hundredths as decimals by looking at the hundredths column in a place value chart.

Children should be confident with the understanding that 10 hundredths make up 1 tenth. Exchanging ten 0.01 counters for one 0.1 counter in a place value chart will help to reinforce this understanding. It is important that children understand that 0.1 is greater than 0.09 even though 1 is less than 9. This can be seen when putting both numbers in a place value chart and considering the value of each column.

Children use place value counters to flexibly partition decimal numbers involving tenths and hundredths.

Discuss with children why no zero placeholder is needed in the hundredths column if there are no digits after the tenths, for example 1.5, not 1.50

Things to look out for

- Children may not realise that, for example, 0.3 = 0.30

- Children may see numbers such as 0.45 as greater than 0.5 because 45 is greater than 5

- Children may confuse the words "hundred" and "hundredth".

Key questions

- What is a hundredth?

- How many hundredths are equivalent to 1 tenth?

- How many hundredths are equivalent to 1 whole?

- Is _____ greater/smaller than _____?

- How can you represent this decimal number on a place value chart?

- How is the hundredths column on a place value chart similar to/different from the _____ column?

Possible sentence stems

- _____ is equal to _____ ones, _____ tenths and _____ hundredths.

National Curriculum links

- Recognise and write decimal equivalents of any number of tenths or hundredths

- Compare numbers with the same number of decimal places up to 2 decimal places

Hundredths on a place value chart

Key learning

- Write the decimal numbers shown in the place value charts.

  How many ones, tenths and hundredths are there in each number?

Ones	Tenths	Hundredths
1	0.1 0.1	0.01 0.01 0.01

Ones	Tenths	Hundredths
1 1		0.01 0.01 0.01

Ones	Tenths	Hundredths
1 1 1		0.01 0.01 0.01 0.01

- Use a place value chart and counters to make the numbers.

0.34	2.15	0.03	1.01

  Complete the sentences to describe each number.

  There are _____ ones.

  There are _____ tenths.

  There are _____ hundredths.

  The number represented is _____

- Brett uses place value counters to partition 0.23

  0.1 0.1   0.01 0.01 0.01

  $$0.23 = 0.2 + 0.03$$

  0.1   0.1 0.01 0.01 0.01

  $$0.23 = 0.1 + 0.13$$

  Use Brett's method to help you partition the numbers in three different ways.

0.34	0.68	0.92	0.51

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

  $0.01 \bigcirc \dfrac{1}{100}$

  $0.4 \bigcirc 0.05$

  $\dfrac{3}{10} \bigcirc 0.31$

  eleven hundredths $\bigcirc$ 0.11

Hundredths on a place value chart

Reasoning and problem solving

0.09 is greater than 0.1 because 9 is greater than 1

Do you agree with Dora?

Use a place value chart to help you explain your answer.

No

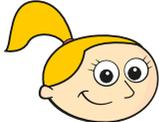Is the statement always true, sometimes true or never true?

A number with 5 in the hundredths column is smaller than a number with 6 in the tenths column.

sometimes true

Explain your answer.

Eva and Max are each thinking of a number.

My number can be partitioned into 3 tenths and 24 hundredths.

Eva

My number has 5 tenths, so my number must be greater than Eva's.

Max

No

Do you agree with Max?

Explain your answer.

Divide a 1- or 2-digit number by 100

Notes and guidance

Building on their learning from the multiplication and division block and the earlier steps in this block, in this small step children divide 1-and 2-digit numbers by 100

Children should build numbers using place value counters and use exchanges to support their understanding. Once confident working with place value counters, they could move to using place value charts and recognise that dividing a number by 100 moves all the counters two places to the right. Exploring the difference between moving two places for 100 and one place for 10 is important at this stage.

Things to look out for

- Children may move just one of the digits rather than all of them.
- Children may move the digits one place instead of two places.
- Children may move the decimal point two places as well as the digits and so keep the original number.
- Children may spot "tricks" that work for some questions and they should be reminded that these do not work in all cases, so are not a reliable method.

Key questions

- What exchanges can you make?
- How can you use a place value chart to show dividing a number by 100?
- How is dividing by 100 similar to/different from dividing by 10?
- What happens to a number when you divide it by 100?
- Does the decimal point ever move?
- If you divide by 10 twice, what do you notice?

Possible sentence stem§s

- To divide something by _____ , split it into _____ equal parts.
- When dividing a number by 100, move all the digits _____ places to the _____

National Curriculum links

- Recognise and write decimal equivalents of any number of tenths or hundredths
- Find the effect of dividing a 1- or 2-digit number by 10 and 100, identifying the value of the digits in the answer as ones, tenths and hundredths

Divide a 1- or 2-digit number by 100

Key learning

- Rosie uses a place value chart to divide 21 by 100

  She divides it first by 10, and then by 10 again.

T	O	•	Tths	Hths
●●	●			

  ↓ ÷ 10

T	O	•	Tths	Hths
	●●		●	

  ↓ ÷ 10
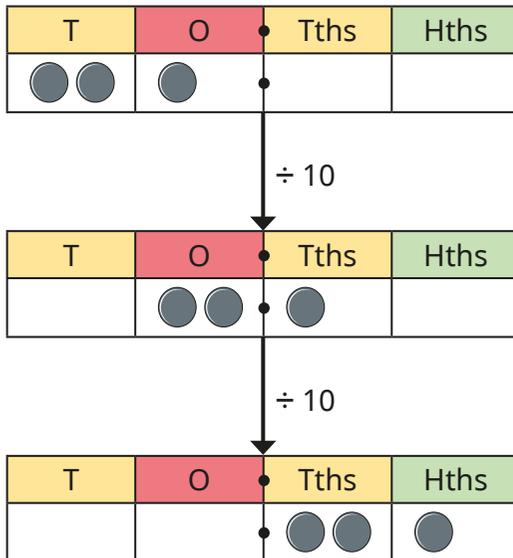
T	O	•	Tths	Hths
			●●	●

  > 21 ÷ 10 = 2.1
  > 2.1 ÷ 10 = 0.21
  > So 21 ÷ 100 = 0.21

  Use Rosie's method to work out the divisions.

26 ÷ 100	52 ÷ 100	4 ÷ 100

35 ÷ 100	78 ÷ 100	9 ÷ 100

  What do you notice about the divisions and the answers?

- Here is a 2-digit number on a place value chart.

T	O	•	Tths	Hths
7	2			

  ▶ Complete the sentences.

  When dividing by 100, move the digits two places to the _____

  72 ÷ 100 = _____

  ▶ Use this method to fill in the missing numbers.

  82 ÷ 100 = _____

  _____ = 93 ÷ 100

  0.23 = _____ ÷ 100

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

  99 ÷ 100 ◯ 100 ÷ 100

  86 ÷ 100 ◯ 26 ÷ 10

  4 ÷ 10 ◯ 50 ÷ 100

  24 ÷ 6 ◯ 40 ÷ 100

Divide a 1- or 2-digit number by 100

Reasoning and problem solving

Is the statement true or false?

> When you divide any whole 2-digit number by 100, there will be a zero in the ones column.

Explain your answer.

True

Tiny is working out $45 \div 100$

> The answer is 40.05 because the 5 moves two places to the right.

Do you agree with Tiny?

Explain your answer.

No

Fill in the missing numbers.

$62 \div \underline{\hspace{1cm}} = 0.62$

$\underline{\hspace{1cm}} \div 100 = 0.62$

$\underline{\hspace{1cm}} \div 10 = 6.2$

$\underline{\hspace{1cm}} \div 10 = 2.4$

$\underline{\hspace{1cm}} \div 10 = 0.24$

$\underline{\hspace{1cm}} \div 100 = 0.24$

100
62
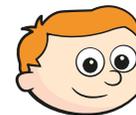62

24
2.4
24

> I can see patterns.

What patterns can Ron see?