Released January 2018

Years 5/6

Small Steps Guidance and Examples

Block 2 – Decimals & Percentages

White Rose Maths

Year 5/6 – Yearly Overview

	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8	Week 9	Week 10	Week 11	Week 12
Autumn	Number – Place Value			Number – Addition and Subtraction		Number – Multiplication and Division			Statistics		Measurement: Perimeter, Area and Volume	
Spring	Number – Fractions					Number- Decimals and Percentages			Year 5: Multiplication and Division Year 6: Algebra and Ratio			
Summer	Measurement: Converting Units		Geometry: Position and Direction	Geometry: Properties of Shape			Investigations					Consolidation

Week 6 to 9 – Number: Decimals & Percentages

Overview

Small Steps

Year 5	Year 6
Decimals up to 2 d.p.	
Decimals as fractions (1)	
Decimals as fractions (2)	
Understand thousandths	Three decimal places
Thousands as decimals	
Rounding decimals	
Compare and order decimals	
	Multiply by 10, 100 and 1,000
	Divide by 10, 100 and 1,000
	Multiply decimals by integers
	Divide decimals by integers
	Division to solve problems
	Decimals as fractions
	Fractions to decimals (1)
	Fractions to decimals (2)

Week 6 to 9 – Number: Decimals & Percentages

Overview

Small Steps

Year 5	Year 6
Understand percentages	
Percentages as fractions and decimals	Fractions to percentages
Equivalent F.D.P	Equivalent F.D.P
	Percentage of an amount (1)
	Percentage of an amount (2)
	Percentages – missing values
	Percentage increase and decrease
	Order F.D.P

Decimals up to 2 d.p

Notes and Guidance

Children use place value counters and a place value grid to make numbers with up to two decimal places.

They read and write decimal numbers and understand the value of each digit.

They show their understanding of place value by partitioning decimal numbers in different ways.

Mathematical Talk

How many ones/tenths/hundredths are in the number?

How do we write this as a decimal? Why?

What is the value of the ____ in the number _____?

When do we need to use zero as a place holder?

How can we partition decimal numbers in different ways?

Varied Fluency

1 What number is represented on the place value chart?

Ones	Tenths	Hundredths
	0.1	0.01 0.01
0	1	2

There are ____ ones, _____ tenths and _____ hundredths.
The number is _____

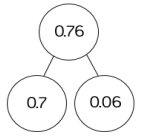
Represent these numbers on a place value chart

0.28 0.65 0.07 1.26

2 Make these numbers with place value counters and write the value of the underlined digit.

2.45 3.05 0.6 23.32

3 0.76 = 0.7 + 0.06 = 7 tenths and 6 hundredths



Fill in the missing numbers.

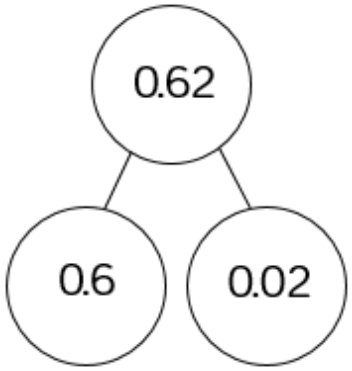
0.83 = ☐ + 0.03 = ☐ and 3 hundredths.

0.83 = 0.7 + ☐ = 7 tenths and ☐

Decimals up to 2 d.p

Reasoning and Problem Solving

Sally says there is only one way to partition 0.62



Prove Sally is incorrect by finding at least 3 different ways of partitioning 0.62

0.62 = 0.5 + 0.12

0.62 = 0.4 + 0.22

0.62 = 0.3 + 0.32

0.62 = 0.2 + 0.42

0.62 = 0.1 + 0.52

0.62 = 0 + 0.62

Match each description to the correct number.

Charlie

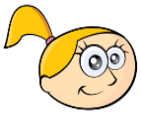
My number has the same amount of tens and tenths

Dylan

My number has one decimal place.

Megan

My number has two hundredths.



Jess

My number has six tenths.

46.2	2.64	46.02	40.46

Charlie – 40.46

Dylan – 46.2

Megan – 46.02

Jess – 2.64

Decimals as Fractions (1)

Notes and Guidance

Children explore the relationship between decimals and fractions. They start with a fraction convert it into a decimal and as they progress, children will see the direct link between fractions and decimals.

Children use their previous knowledge of fractions to aid this process.

Mathematical Talk

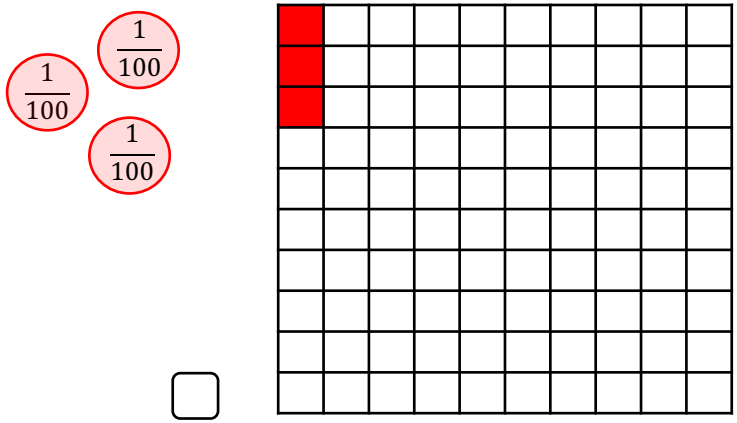
What does the whole grid represent?

What can we use to describe the equal parts of the grid (fractions and decimals)

How would you convert a fraction to a decimal?
What does the decimal point mean?
Can the fraction be simplified?
How can you prove that the decimal ____ and the fraction ____ are the same?

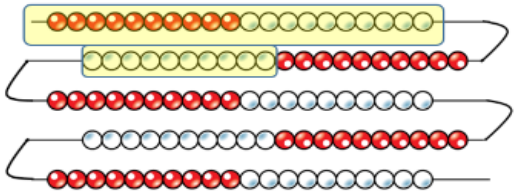
Varied Fluency

1 What fraction is being shown in both representations? Can you convert this in to a decimal?



The fraction $\frac{\square}{\square}$ is the same as the decimal _____

2 If the whole bead string represents one whole, what decimal is represented by the highlighted part? Can you represent this on a 100 square?

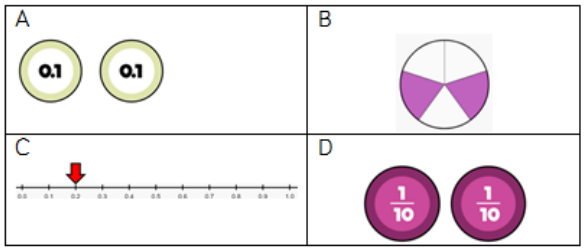


Decimals as Fractions (1)

Reasoning and Problem Solving

Odd one out.

Which of the images below is the odd one out?



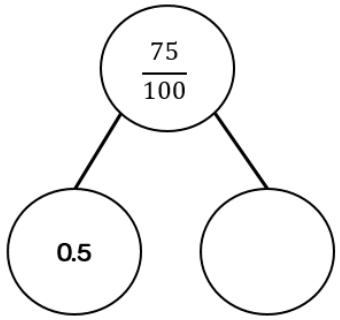
Explain why.

Possible answer:

B is the odd one out because it shows $\frac{2}{5}$, which is $\frac{4}{10}$

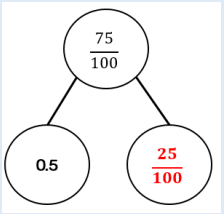
The other images show $\frac{2}{10}$

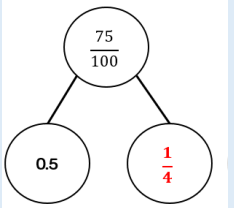
How many different ways can you complete the part whole model using fractions and decimals?

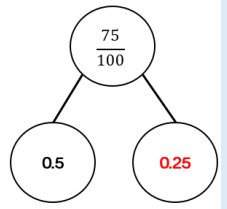


Can you create another part whole model like the one above for a partner?

Possible answers:







Decimals as Fractions (2)

Notes and Guidance

Children concentrate on more complex decimals numbers e.g. (0.96, 0.03, 0.27) and numbers greater than 1.
They represent them as fractions and as decimals.

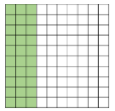
Children record the number in multiple representations, including expanded form and in words.

Mathematical Talk

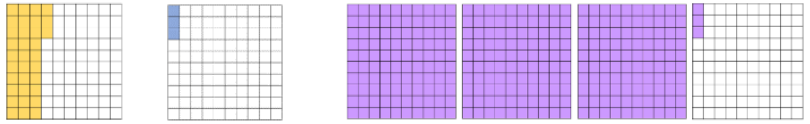
In the number 1.34 what does the 1 represent, what does the 3 represent, what does the 4 represent?
Can we represent this number in a different way, and another, and another?
On the number line, where can we see tenths? Where can we see hundredths?
Tell me another that would come in between c and d as a fraction. Tell me a number that would not come in between c and d.

Varied Fluency

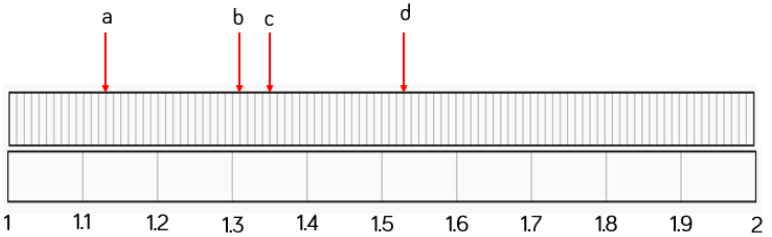
1 Use the models to record equivalent decimals and fractions.



$0.3 = \frac{3}{10} = \frac{30}{100}$



2 Record the value of a. b. c and d as fraction and as a decimal.



3 Complete the table.

Pictorial Representation	Decimal	Decimal – expanded form	Fraction	Fraction – expanded form	In words
	3.24	3 + 0.2 + 0.04	$3\frac{24}{100}$	$3+\frac{2}{10}+\frac{4}{100}$	Three ones, two tenths and four hundredths
	3.01		$3\frac{1}{100}$		
				$3+\frac{4}{10}+\frac{2}{100}$	
					Two ones, three tenths and two hundredths.

Decimals as Fractions (2)

Reasoning and Problem Solving

2.25 = 2 ones, 2 tenths, and 5 hundredths

Can you write the following numbers in at least three different ways?

23. 7	2.37	9.08	0.98

Possible response:

Children may represent it in words, decimals, fractions, expanded form but also other ways of partitioning.

Sam says,

To convert a fraction to a decimal, take the numerator and put it after the decimal point.

E.g. $\frac{21}{100} = 0.21$

Write two examples of converting fractions to decimals to prove this does not always work.

Possible responses could include where there are no tenths in a number or where there is an improper fraction:

$\frac{1}{100}$ is not equal to 0.1

Use the digits 3, 4 and 5 to complete the decimal number.

List all the possible numbers you can make.

Can you write all the decimals as fractions?

Choose three of the numbers and write them as words.

30.45, 30.54, 40.35, 40.53, 50.43, 50.34

$30\frac{45}{100}$, $30\frac{54}{100}$, $40\frac{35}{100}$, $40\frac{53}{100}$, $50\frac{43}{100}$, $50\frac{34}{100}$

]:

Understand Thousandths

Notes and Guidance

Children build on previous learning of tenths and hundredths and apply this to understanding thousandths. They convert decimals to fractions.

Children develop their knowledge of exchange and apply it to the concept of decimals. For example 3 tenths = 30 hundredths = 300 thousandths)

Mathematical Talk

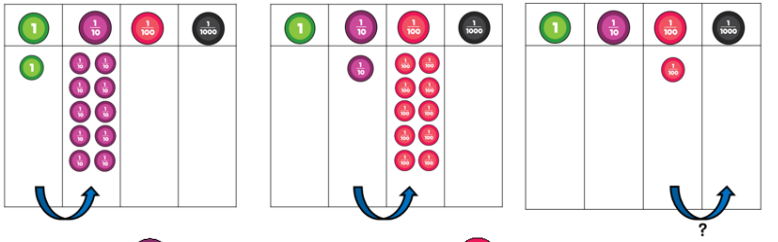
How many tenths are in a whole?
How many hundredths are there in 10 tenths?
How many thousandths are there in 2 tenths?

How many different ways can this number be written?

Are seven hundredths equal to seven tenths? Why?

Varied Fluency

1 Use the images to help you fill in the third model and the blanks.



1 = ___ tenths $\frac{1}{10}$ = ____ hundredths $\frac{1}{100}$ = ____ thousandths

2 June is converting decimals to thousandths

$0.345 = \frac{\square}{1000}$

O	t	h	th
0	3	4	5

$\frac{3}{10}$ $\frac{4}{100}$ $\frac{5}{1000}$

$\frac{300}{1000} + \frac{40}{1000} + \frac{5}{1000} = \frac{345}{1000}$

Use June's method to convert the decimals to thousandths

0.276

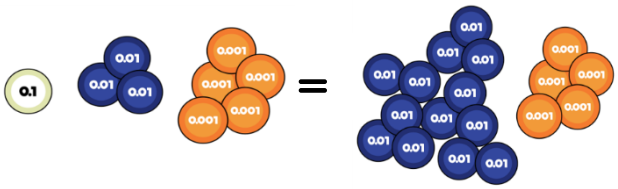
0.029

1.286

Understand Thousandths

Reasoning and Problem Solving

Tim thinks the 2 values below are equal.



Do you agree?
Explain your thinking.
Can you write each amount as a decimal and a fraction?

Can you represent Tim's amount in at least three different ways?

Possible answers

$0.135 = \frac{1}{10} + \frac{30}{1000} + \frac{5}{1000}$

$0.135 = \frac{100}{1000} + \frac{30}{1000} + \frac{5}{1000}$

$0.135 = \frac{13}{100} + \frac{5}{1000}$

0.394

= 3 tenths, 9 hundredths and 4 thousandths

$= \frac{3}{10} + \frac{9}{100} + \frac{4}{1000}$

= 0.3 + 0.09 + 0.004

Can you write three other ways of saying the numbers below?

0.472 0.529 0.307

0.472 = 4 tenths, seven hundredths and 2 thousandths $= \frac{4}{10} + \frac{7}{100} + \frac{2}{1000} =$ 0.4 + 0.07 + 0.002

0.529 = 5 tenths, two hundredths and 9 thousandths $= \frac{5}{10} + \frac{2}{100} + \frac{9}{1000} =$ 0.5 + 0.02 + 0.009

0.307 = 3 tenths and 7 thousandths $= \frac{3}{10} + \frac{7}{1000} =$ 0.3 + 0.007

Three Decimal Places

Notes and Guidance

Children recap their understanding of numbers with up to 3 decimal places. They look at the value of each place value column and describe the columns in words and digits.

Children use concrete resources to investigate exchanging between columns e.g. 3 tenths is the same as 30 hundredths.

Mathematical Talk

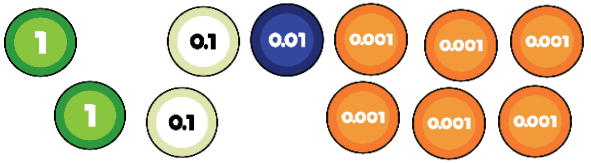
How many tenths are in the number? How many hundredths?

Can you make the number on the place value chart?

How many hundredths are the same as 5 tenths?

Varied Fluency

1 Complete the sentences.



There are ____ ones, ____ tenths, ____ hundredths and ____ thousandths.
The number in digits is _____

2 Use counters and a place value chart to make these numbers.

3.456 72.204 831.07

Hundreds	Tens	Ones	Tenths	Hundredths	Thousandths

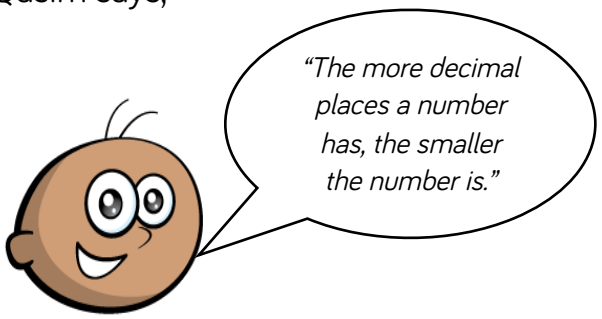
3 Write down the value of the 3 in the following numbers.

0.53 362.44 739.8 0.013 3,420.98

Three Decimal Places

Reasoning and Problem Solving

Qasim says;



Do you agree?
Explain why.

Possible answer:

I do not agree with this as the number 4.39 is smaller than the number 4.465, which has more decimal numbers.

Tina says that 3.24 can be written as 2 ones, 13 tenths and 4 hundredths.

Do you agree?

How else can you partition 3.24? Think about exchanging between columns.

Possible answer:

I disagree; Tina's numbers would make 3.34 rather than 3.24.
I can make 3.24 by having 1 one, 22 tenths and 4 hundredths.

Four children are thinking of four different numbers.

3.454	4.445
4.345	3.54

Yvonne: "My number has four hundredths."
Alex: "My number has the same amount of ones, tenths and hundredths."
Louise: "My number has more tenths and hundredths than ones."
Emily: "My number has 2 decimal places."

Match each number to the correct child.

Yvonne: 4.345

Alex: 4.445

Louise: 3.454

Emily: 3.54

Thousandths as Decimals

Notes and Guidance

Children build on their understanding of decimals and start to understand the link between tenths, hundredths and thousandths and write a thousandth as a decimal e.g. 0.001

Children use concrete materials to understand the connection between one tenth, one hundredth, one thousandth.

They will continue to represent decimals in different ways and will also explore deeper connections such as $\frac{100}{1000}$ is the same as $\frac{1}{10}$

Mathematical Talk

What number is represented? How will we show this on the place value chart? How many ones/ tenths/hundredths/thousandths do I have?

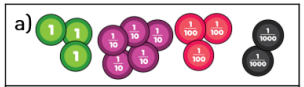
What does 0.21 represent? How do we record this as a fraction? How many thousandths do I have?

How can I record this number differently? How will it look in expanded form?

Do we record 0 in the thousandth column? Why?

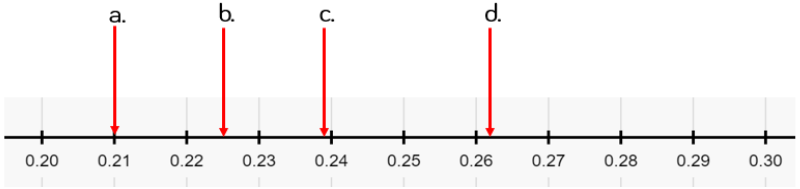
Varied Fluency

1 Use the place value chart and counters to represent these numbers as a decimal. Record the numbers as decimal.

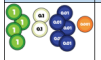
a) 
b) 4 ones, 6 tenths, 0 hundredths and 2 thousandths
c) $3\frac{34}{1000}$

1	$\frac{1}{10}$	$\frac{1}{100}$	$\frac{1}{1000}$

2 Estimate the value that each letter is pointing to.



3 Write your answer as a fraction and a decimal.
Complete the table.

Pictorial Representation	Decimal	Decimal – expanded form	Fraction	Fraction – expanded form	In words
	4.251	4 + 0.2 + 0.05 + 0.001	$4\frac{251}{1000}$	$4+\frac{2}{10}+\frac{5}{100}+\frac{1}{1000}$	four ones, two tenths, five hundredths and one thousandth
	4.512				
			$4\frac{25}{1000}$		
				$4+\frac{5}{10}+\frac{1}{1000}$	

Thousandths as Decimals

Reasoning and Problem Solving

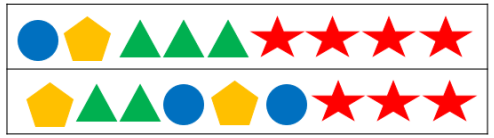
Johnny has 8 counters. He makes numbers using the place value chart. At least 3 columns have counters in. What is the largest and the smallest number he can make with 8 counters?

1	$\frac{1}{10}$	$\frac{1}{100}$	$\frac{1}{1000}$

Can you record the numbers in a different way e.g. as a fraction, decimal, in expanded form?

Smallest: 0.116

Largest: 6.11



In this problem decimal numbers have been replaced with symbols. What is the value in each box if:

● =1 ★ $=\frac{1}{10}$ ▲ $=\frac{1}{100}$ ⬟ $=\frac{1}{1000}$

1.431

2.322

Three children are representing the number 0.504

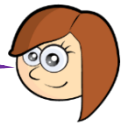
$0.504 = \frac{504}{1000}$

Lucinda

Terry

$0.504 = \frac{3}{10} + \frac{2}{10} + \frac{4}{1000}$

$0.504 = \frac{5}{10} + \frac{4}{1000}$



Sophie

Who is correct?
Explain why.

Possible answer:

They are all correct. Lucinda has recorded it as a fraction. Terry and Sophie have partitioned it differently.

Rounding Decimals

Notes and Guidance

Children are introduced to numbers with two decimal places and develop their understanding of rounding to the nearest whole number and to the nearest tenth.

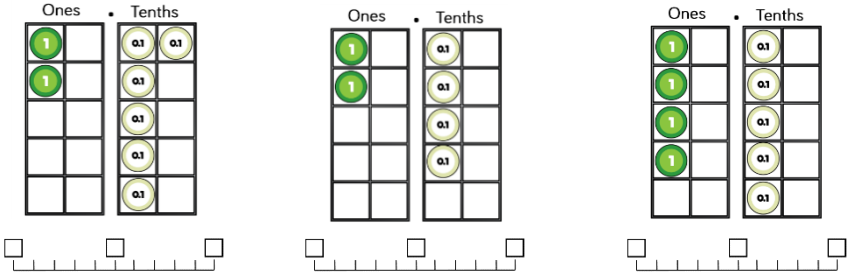
Number lines support children to understand where numbers appear in relation to other numbers and are important to developing conceptual understanding of rounding.

Mathematical Talk

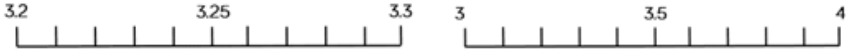
What number is represented?
How many decimal places does it have?
When rounding to the nearest one decimal place, how many decimals will the answer have?
Where would 3.25 appear on both number lines?
What is the same and what is different about the two number lines?

Varied Fluency

1 Complete the number lines and round the representations to the nearest whole number:



2 Use the number lines to round 3.24 to the nearest tenth and the nearest whole number.



3 Complete the table and use the number lines to help you round to the nearest tenth and the nearest whole number:

Pictorial representation	Number line	Rounded to the nearest tenth	Number line	Rounded to the nearest whole number

Rounding Decimals

Reasoning and Problem Solving

Simon is measuring a box of chocolates with a ruler that measures in centimetres and millimetres.

He measures it to the nearest cm and writes the answer 28cm.
What is the smallest length the box of chocolates could be?
What is the largest length the box of chocolates could be?

Smallest: 27.5cm

Largest 28.49cm

Rounded to the nearest 0.1, A is 3.5 and B is 3.0

What is the smallest possible difference between A and B?

What is the largest possible difference?
Explain your strategy to a partner.

A can be between 3.45 and 3.54
B can be between 2.95 and 3.04
Smallest difference: 0.41
Largest difference: 0.59

A number between 11 and 20 with 2 decimal places rounds to the same number when rounded to one decimal place and when rounded to the nearest whole number?

What could this be?
Is there more than one option?
Explain why.

The whole number can range from 11 to 19 and the decimal places can range from ___ .95 to ___ .99.

Can children explain why this works?

Order and Compare Decimals

Notes and Guidance

Children order and compare numbers with up to three decimal places. They use place value counters to represent the numbers they are comparing.

Number lines support children to understand where numbers appear in relation to other numbers.

Mathematical Talk

What number is represented?

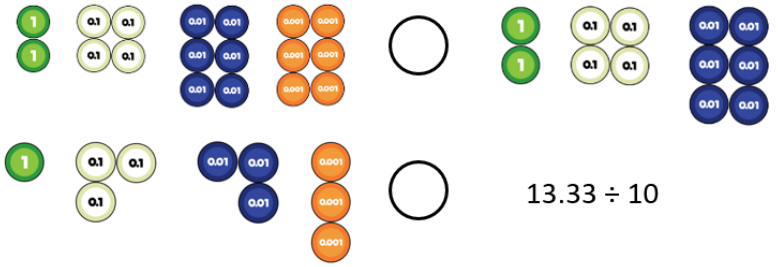
_____ is greater/less than _____ because...

Explain how you know.

Can you build the number using place value counters?

Varied Fluency

1 Compare using <, > or =



2 Place the numbers in ascending order on the number line:

3.115 $3\frac{113}{1000}$ Three and 11 hundredths

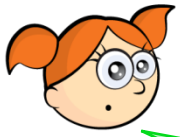
3 Order in descending order:

- 0.123 0.321 0.231 0.103
- 3.2 km 3.21 km 3.212 km 3202 m
- 65.394 65. 309 63.999 65. 493

Order and Compare Decimals

Reasoning and Problem Solving

Jess says,

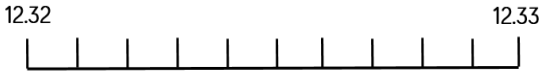


3.105 is greater than 3.2 because it has more digits

Do you agree? Explain why.

Jess is wrong because 3.2 has more tenths than 3.105 so it is greater.

Three children are thinking of 3 different numbers that appear somewhere on this number line:



Child A: My number is the largest number able to round to 12.32 to the nearest hundredth.

Child B: My number is 2 thousandths more than Child Cs.

Child C: My number has a digit total of 15.

Plot Child A, B and C's numbers on the number line.

A = 12.324

B = 12.329

C = 12. 327

Multiply by 10, 100 and 1,000

Notes and Guidance

Children multiply numbers with up to three decimal places by 10, 100 and 1,000
They discover that digits move to the left when they are multiplying and look at when to use zero as a place value holder.
Once children are confident in multiplying by 10, 100 and 1,000, they use these skills to investigate multiplying by multiples of these numbers. E.g. 2.4 × 20

Mathematical Talk

What number is represented on the place value chart?

Why is 0 important when multiplying by 10, 100 and 1,000?

What patterns do you notice?

What is the same and what is different when multiplying by 10, 100, 1,000 on the place value chart compared with the Gattegno chart?

Varied Fluency

1 Identify the number represented on the place value chart.

Thousands	Hundreds	Tens	Ones	Tenths	Hundredths
			● ●	●	

Multiply it by 10, 100 and 1,000 and complete the sentences.
Which direction do the counters move?
When multiplied by ____ the counters move ____ places to the _____.

2 Use a place value chart to multiply the following decimals by 10, 100 and 1,000

6.4 6.04 6.004

3 Fill in the missing numbers in these calculations

32.4 × ☐ = 324

1.562 × 1,000 = ☐

☐ × 100 = 208

4.3 × ☐ = 86

Multiply by 10, 100 and 1,000

Reasoning and Problem Solving

Using the digit cards 0-9 create a number with up to 3 decimal places, for example, 3.451.
Cover the number using counters on your Gattegno chart.

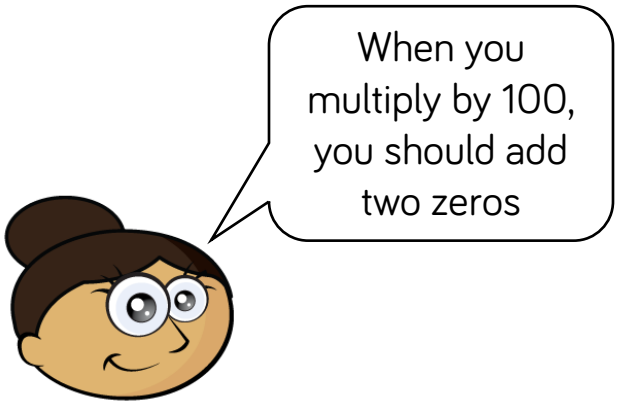
10,000	20,000	30,000	40,000	50,000	60,000	70,000	80,000	90,000
1,000	2,000	3,000	4,000	5,000	6,000	7,000	8,000	9,000
100	200	300	400	500	600	700	800	900
10	20	30	40	50	60	70	80	90
1	2	3	4	5	6	7	8	9
0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
0.001	0.002	0.003	0.004	0.005	0.006	0.007	0.008	0.009

Explore what happens when you multiply your number by 10, then 100, then 1,000

What patterns do you notice?

Children will be able to see how the counter will move up a row for multiplying by 10, two rows for 100 and three rows for 1,000. They can see that this happens to each digit regardless of the value.
For example, 3.451 × 10 becomes 34.51
Each counter moves up a row but stays in the same column.

Gemma says,



Do you agree?
Explain your thinking.

Children should explain that when you multiply by 10 the digits move one place to the left, two places to the left when you multiply by 100 and three places to the left when you multiply by 1,000

For example:

0.34 × 100 = 0.3400 is incorrect as 0.34 is the same as 0.3400

Divide by 10, 100 and 1,000

Notes and Guidance

Once children understand how to multiply decimals by 10, 100 and 1,000, they can apply this knowledge to division, then later apply these skills to converting between units of measure.
It is important that children continue to understand the importance of 0 as a place holder. Children also need to be aware that 2.4 and 2.40 are the same, but the zero is not needed in this case.

Mathematical Talk

What happens to the counters/digits when you divide by 10, 100 or 1000?

Why is the zero important?
What is happening to the value of the digit each time it moves one column to the right?

What is the relationship between tenths, hundredths and thousandths?

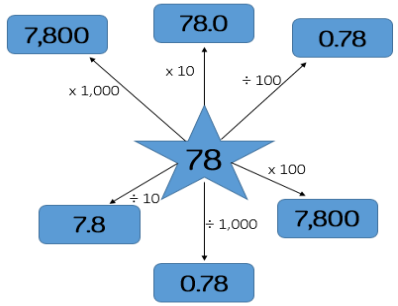
Varied Fluency

1 Use the place value chart to divide the following numbers by 10, 100 and 1,000

Hundreds	Tens	Ones	Tenths	Hundredths	Thousandths

44 1.36 107 5

2 Tick the correct answers. Can you explain the mistakes with the incorrect answers?



3 Complete the table.

	÷ 10	÷ 100	÷ 1000
789			
14			
60			
101			
		2.09	
3Kg			
	345.1		

Divide by 10, 100 and 1,000

Reasoning and Problem Solving

Using the following rules, how many ways can you make 70?

- Use a number from column A,
- Use an operation from column B.
- Use number from column C.

A	B		C
0.7			0.1
7			1
70	×	÷	10
700			100
7000			1000

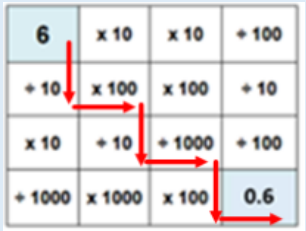
Possible answers:

0.7 × 100
7 × 10
70 × 1
700 ÷ 10
7000 ÷ 100
70 ÷ 1

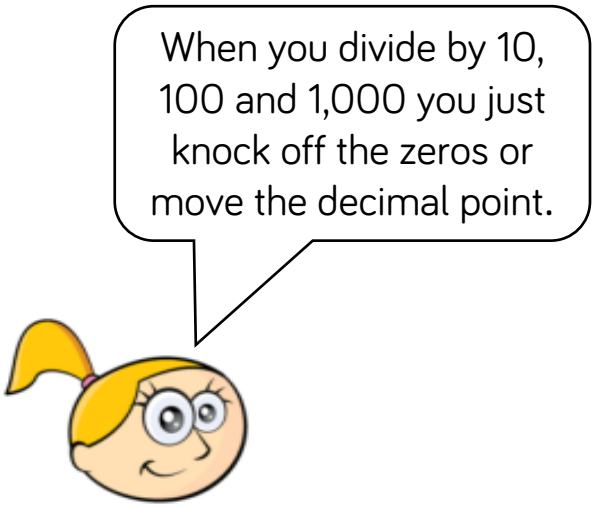
Can you find a path from 6 to 0.6?
You cannot make diagonal moves.

6	**x 10**	**x 10**	**÷ 100**
÷ 10	**x 100**	**x 100**	**÷ 10**
x 10	**÷ 10**	**÷ 1000**	**÷ 100**
÷ 1000	**x 1000**	**x 100**	**0.06**

Is there more than one way?



Kate says,



Do you agree?
Explain why

Kate is wrong, the decimal point never moves. When dividing, the digits move to the right and each time they move one column to the right they get 10 times smaller.

You cannot just get rid of zeros as sometimes a number being divided by 10, 100 or 1,000 does not have any zeros to begin with e.g. 24

Multiply Decimals by Integers

Notes and Guidance

Children use concrete resources to multiply decimals and explore what happens when you exchange with decimals.

Children use their skills in context and make links to money and measures.

Mathematical Talk

Which is bigger, 0.1, 0.01 or 0.001. Why?

How many 0.1s do you need to exchange for a whole one?

Can you draw a bar model to represent the problem?

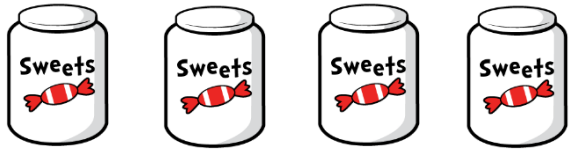
Can you think of another way to multiply by 5? (multiply by 10 and divide by 2).

Varied Fluency

1 Use the place value counters to multiply 1.212 by 3
Complete the calculation alongside the concrete

Tens	Ones	Tenths	Hundredths	Thousandths
	1	0.1 0.1	0.01	0.001 0.001
	1	0.1 0.1	0.01	0.001 0.001
	1	0.1 0.1	0.01	0.001 0.001

2 A jar of sweets weighs 1.23 kg.
How much would 4 jars weigh?



3 Jess is saving her pocket money. Her mum says,

"Whatever you save, I will give you five times the amount."

If Jess saves £2.23, how much will her mum give her?
If Jess saves £7.76, how much will her mum give her?

Multiply Decimals by Integers

Reasoning and Problem Solving

Amy says,

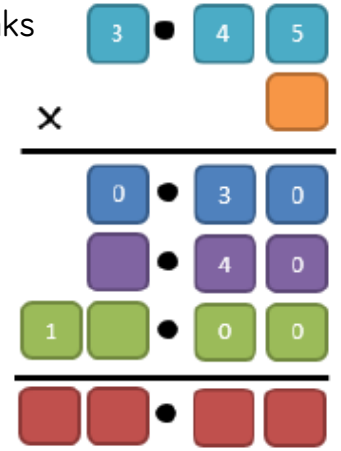
When you multiply a number with 2 decimal places by an integer, the answer will always have more than 2 decimal places.

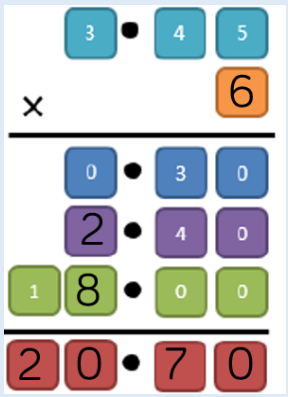
Do you agree?
Explain why.

Possible answer:

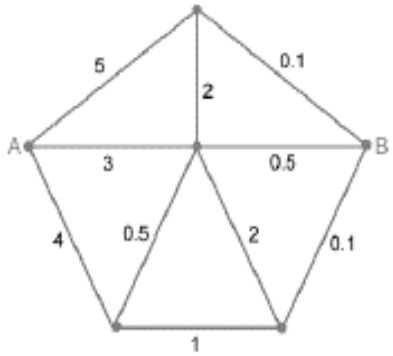
I do not agree because there are examples such as 2.23 x 2 that gives an answer with only two decimal places.

Fill in the blanks





You need to travel from point A to point B. You can only travel through each point once.



What's the largest product you can make from A to B?

What's the smallest product you can make from A to B?

Largest product:

$5 \times 2 \times 2 \times 0.1 = 2$

Smallest product:

$3 \times 0.5 \times 1 \times 0.1 = 0.15$

Divide Decimals by Integers

Notes and Guidance

Children continue to use concrete resources to divide decimals and explore what happens when exchanging with decimals.

Children build on their prior knowledge of sharing and grouping when dividing and apply this skill in context.

Mathematical Talk

Are we grouping or sharing? Explain why. How are these different? How are they the same?

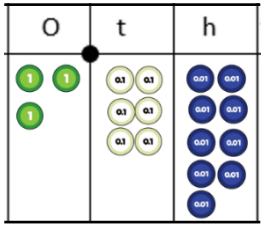
How else could we partition the number 3.69? (For example, 2 ones, 16 tenths and 9 hundredths.)

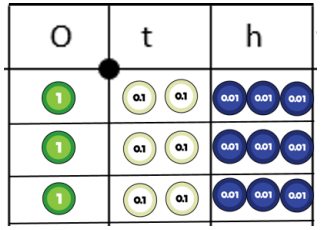
How could we check that our answer is correct using the inverse? Which method, sharing or grouping, shows the inverse more clearly?

Varied Fluency

1 Divide 3.69 by 3

Can you show this by grouping and by sharing?





Use these methods to complete the sentences.

3 ones divided by 3 is _____ ones.

6 tenths divided by 3 is _____ tenths.

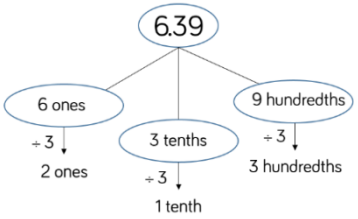
9 hundredths divided by 3 is _____ hundredths.

3.69 divided by 3 is _____.

2 Decide whether you will use grouping or sharing and use the place value chart and counters to solve:

7.55 ÷ 5 = 8.16 ÷ 3 = 3.3 ÷ 6 =

3 Danny solves 6.39 ÷ 3 using a part whole method.



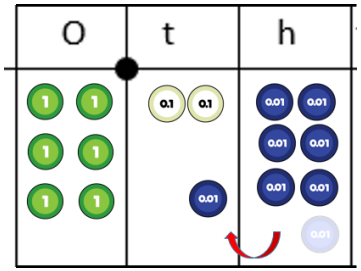
Use this method to solve:

- 8.48 ÷ 2 =
- 6.9 ÷ 3 =
- 6.12 ÷ 3 =

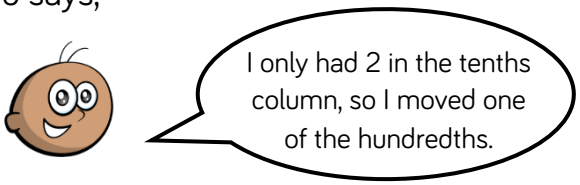
Divide Decimals by Integers

Reasoning and Problem Solving

When using the counters to answer 6.27 divided by 3, this is what Bob did:



Bob says,

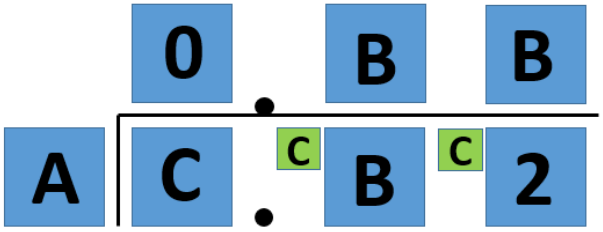


Do you agree with what Bob has done? Explain why.

Possible answer:
Bob is incorrect because he should have exchanged both of the tenths for 20 hundredths to get an answer of 2.09
Children may explain that you cannot just move one hundredth into the tenths column as in order to exchange hundredths for tenths you need to have ten hundredths.

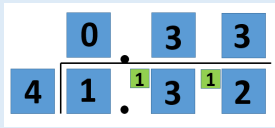
$$C \text{ is } \frac{1}{4} \text{ of } A$$
$$B = C + 2$$

Use the clues to complete the division:



Children may try A as 8 and C as 2 but will realise that this cannot complete the whole division.

Therefore A is 4, B is 3 and C is 1



Division to Solve Problems

Notes and Guidance

Children will apply their understanding to use division to solve problems in cases where the answer has up to 2 decimal places.

Children will continue to show division using place value counters and exchanging where needed.

Mathematical Talk

How can we represent this problem using a bar model?

How will we calculate what this item costs?

How will we use division to solve this?

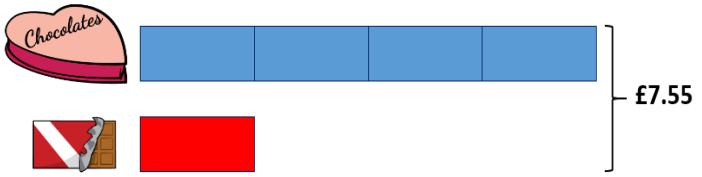
How will we label our bar model to represent this?

Varied Fluency

1 Mrs Forbes has saved £4,960
She shares the money between her 15 grandchildren.
How much do they each receive?

2 Playdoh is sold in two different shops.
Shop A sells four pots of Playdoh for £7.68
Shop B sells three pots of Playdoh for £5.79
Which shop has the better deal?
Explain your answer.

3 A box of chocolates costs 4 times as much as a chocolate bar.
Together they cost £7.55



How much does each item cost?
How much more does the box of chocolates cost?

Division to Solve Problems

Reasoning and Problem Solving

Each division sentence can be completed using the digits below. If there is more than one digit missing from the division, it must be filled with the same digit.
For example, 44 ÷ 5 = 8.8

3 ÷ ☐ = 10.33

12☐ ÷ ☐ = 18.14

☐34 ÷ ☐ = 104.25

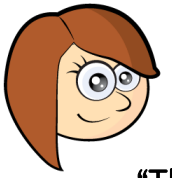
93 ÷ 9 = 10.33
127 ÷ 7 = 18.14
834 ÷ 8 = 104.25

Stefan and Tilly are both calculating the answer to 147 ÷ 4

Stefan says,

"The answer is 36 remainder 3"

Tilly says,



"The answer is 36.75"

Who do you agree with?

They are both correct.

Tilly has continued to divide into the decimal place value columns whereas Stefan has recorded his as a remainder.

Decimals as Fractions

Notes and Guidance

Children explore the relationship between decimals and fractions. They start with a decimal and use their place value knowledge to help them convert it into a fraction. Children will use their previous knowledge of exchanging between columns, for example, 3 tenths is the same as 30 hundredths.
Once children convert from a decimal to a fraction, they simplify the fraction to help to show patterns.

Mathematical Talk

How would you record your answer as a decimal and a fraction? Can you simplify your answer?

How would you convert the tenths to hundredths?

What do you notice about the numbers that can be simplified in the table?

Can you have a unit fraction that is larger than 0.5? Why?

Varied Fluency

1 What decimal is shaded?
Can you write this as a fraction?

0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1

2 Complete the table.

Decimal	Fraction in Tenths or hundredths	Simplified fraction
0.6	$\frac{6}{10}$	$\frac{3}{5}$
0.92		
		–
0.25		
0.5		

3 Three friends share a pizza. Sam ate 0.25 of the pizza, Mark ate 0.3 of the pizza and Jill ate 0.35 of the pizza.

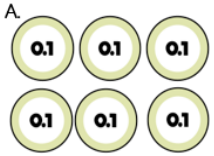
- Can you write the amount each child ate as a fraction?
- What fraction of the pizza is left?

Decimals as Fractions

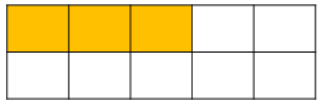
Reasoning and Problem Solving

Odd one out.

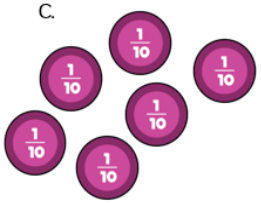
A.



B.



C.



D.

Which is the odd one out and why?

Possible response:

B is the odd one out because it represents $\frac{3}{10}$

A represents 0.6 which is the same as 6 tenths or $\frac{6}{10}$

C also shows this.

D represents $\frac{3}{5}$ which is equivalent to $\frac{6}{10}$

Alex says,

0.84 is equivalent to $\frac{84}{10}$

Do you agree?
Explain why.

Possible response:

I disagree because there are 8 tenths and 4 hundredths. Also 0.84 is smaller than one whole but $\frac{84}{10}$ is larger than one because the numerator is larger than the denominator.

As a mixed number $\frac{84}{10}$ would be 8.4 not 0.84.

Fractions to Decimals (1)

Notes and Guidance

At this point children should know common fractions as decimals, including thirds, quarters, fifths and eighths. Children learn that finding an equivalent fraction where the denominator is 10, 100 or 1,000 makes it easier to convert from a fraction to a decimal.
They investigate the most efficient method to convert fractions to decimals, for example, converting twentieths to hundredths or tenths depending on the numerator.

Mathematical Talk

How many tenths are equivalent to one hundredth?

How would you convert a fraction to a decimal?

Which is the most efficient method? Why?

Varied Fluency

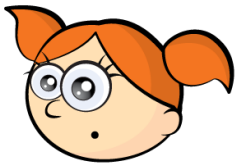
1 Match the fractions to the equivalent decimals.

$\frac{4}{10}$	0.09
$\frac{37}{100}$	0.4
$\frac{9}{100}$	0.37

2 Use your knowledge of known fractions to convert the fractions to decimals. Show your method for each one.

$\frac{7}{20}$ $\frac{3}{4}$ $\frac{2}{5}$ $\frac{6}{200}$

3 Eva says that $\frac{63}{100}$ is less than 0.65



Do you agree with Eva?
Explain your answer.

Fractions to Decimals (1)

Reasoning and Problem Solving

Josh says,

The decimal 0.42 can be read as 'four tenths and two hundredths'.

Bix says,

The decimal 0.42 can be read as 'forty-two hundredths'.

Who do you agree with?
Explain your answer.

Both are correct. Four tenths are equivalent to forty hundredths, plus the two hundredths equals forty-two hundredths.

True or False?

0.3 is bigger than $\frac{1}{4}$

Explain your reasoning.

0.3 is bigger than one quarter because one quarter is equivalent to 0.25

Hannah and Alex are converting $\frac{30}{500}$ into a decimal.

- Hannah doubles the numerator and denominator, then divides by 10
- Alex divides both the numerator and the denominator by 5
- Both get the answer $\frac{6}{100}$ = 0.06

Which method would you use to work out each of the following?

$\frac{25}{500}$ $\frac{125}{500}$ $\frac{40}{500}$ $\frac{350}{500}$

Explain why you have used a certain method.

$\frac{25}{500}$ - divide by 5, known division fact.

$\frac{125}{500}$ - double, easier than dividing 125 by 5

$\frac{40}{500}$ - divide by 5, known division fact.

$\frac{350}{500}$ - double, easier than dividing 350 by 5

Fractions to Decimals (2)

Notes and Guidance

It is important that children recognise that $\frac{3}{4}$ is the same as $3 \div 4$. They can use this understanding to find fractions as decimals by then dividing the numerator by the denominator.
In the example provided, we cannot make any equal groups of 5 in the ones column so we have exchanged the 2 ones for 20 tenths. Then we can divide 20 into groups of 5

Mathematical Talk

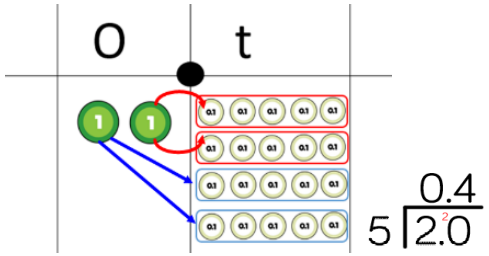
Do we divide the numerator by the denominator or divide the denominator by the numerator? Explain why.

When do we need to exchange?

Are we grouping or are we sharing? Explain why.

Varied Fluency

1 Deena has used place value counters to write $\frac{2}{5}$ as a decimal. She has divided the numerator by the denominator.



Use this method to convert the fractions to decimals:
Give your answers to 2 decimal places.

$\frac{1}{4}$ $\frac{2}{9}$

2 Use the short division method to convert the fractions to decimals.
Write the decimals to three decimal places.

$\frac{4}{7}$ $\frac{5}{9}$ $\frac{5}{6}$

3 8 friends share 7 pizzas.
How much pizza does each person get?
Give your answer as a decimal fraction.

Fractions to Decimals (2)

Reasoning and Problem Solving

Charlotte and Stephen have both attempted to convert $\frac{2}{8}$ into a decimal.

I converted $\frac{2}{8}$ into 0.25

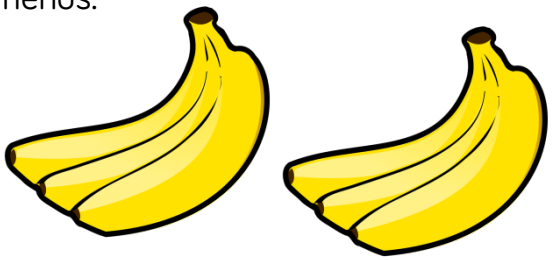
I converted $\frac{2}{8}$ into 4

Who is correct?
Prove it.

Charlotte is correct and Stephen is incorrect.

Stephen has divided 8 by 2 rather than 2 divided by 8 to find the answer.

Pete shares 6 bananas between some friends.



Each friend gets 0.75 of a banana.

How many friends does he share the bananas with?
Show your method.

Pete shares his 6 bananas between 8 friends because 6 divided by 8 equals 0.75

Children may show their methods in different ways.
Method 1: Children add 0.75 until they reach 6. This may involve spotting that 4 lots of 0.75 equals 3 and then they doubling this to find 8 lots of 0.75 equals 6.
Method 2: Children use their knowledge that 0.75 is equivalent to $\frac{3}{4}$ to find the equivalent fraction of $\frac{6}{8}$

Understand Percentages

Notes and Guidance

Children are introduced to 'per cent' for the first time and will understand that 'per cent' relates to 'number of parts per hundred'.

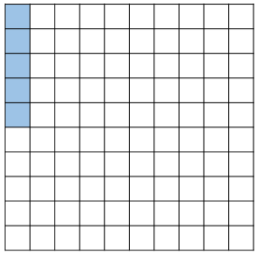
They will explore this through different representations which show different parts of a hundred. Children will use 'number of parts per hundred' alongside the % symbol.

Mathematical Talk

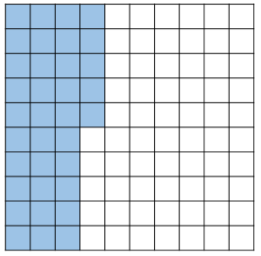
How many parts is the square split in to?
How many parts per hundred are shaded/not shaded?
Can we represent this percentage differently?
Look at the bar model, how many parts is it split into? If the bar is worth 100, what is each part worth? How would we say this as a percentage?
In the table, what does the score represent? How many parts per hundred did ___ score?

Varied Fluency

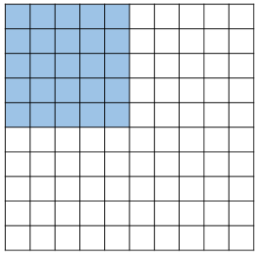
1 Complete the sentence stems to describe how many parts per hundred are shaded.



There are ___ parts per hundred shaded.
This is ___ %



There are ___ parts per hundred shaded.
This is ___ %



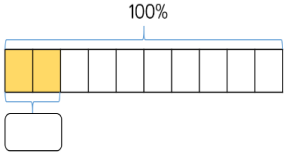
There are ___ parts per hundred shaded.
This is ___ %

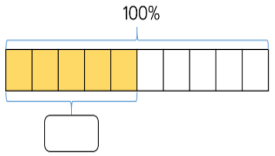
2 Complete the table.

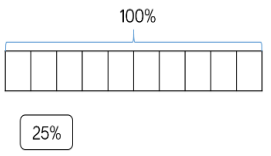
Shade in the parts and record the missing information.

Pictorial representation	Parts per hundred	Percentage
	There are 51 parts per hundred	
		75%

3 Record the percentages shown.



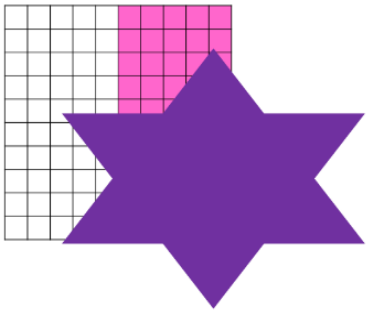




Understand Percentages

Reasoning and Problem Solving

Here is a representation of a percentage.
Part of it has been covered by a star.

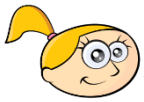


There is less than 60%

Rhys

There is less than 50%

Ellis



There is less than 30%

Evie

Explain why each child could be correct.

Rhys could be correct because you can clearly see 30% and 2 lots of 5%. Ellis could be correct because it looks like there is 50% hidden but it could be more as we do not know if all of the parts are shaded under the star. Evie could be correct because there might only be 25% shaded.

Max, Isla and Ethan all did a test with 100 questions.

- Ethan got 6 less questions correct than Max.

Name	Score	Percentage
Max	56 out of 100	
Isla		65%
Ethan		

Can you complete the table?
How many more marks did each child need to get 100%?

Name	Score	Percentage
Max	56 out of 100	56%
Isla	65 out of 100	65%
Ethan	50 out of 100	50%

Max needs 44 marks.

Isla needs 35 marks

Ethan needs 50 marks

Jenny and Gurpreet each have 100 sweets.
Jenny eats 65% of hers. Gurpreet has 35 sweets left.
Who has more sweets left?

Neither. They have the same.

% as Fractions & Decimals

Notes and Guidance

Children represent percentages as fractions using the denominator 100 and make the connection to decimals and hundredths.

Children will recognise percentages, decimals and fractions are different ways of expressing proportions.

Mathematical Talk

What do you notice about the percentage and the decimal?

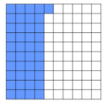
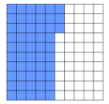
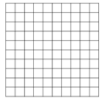
What's the same? What's different about percentages, decimals and fractions?

How can we record this proportion as a fraction? How can we turn it into a percentage?

Explain your method.

Varied Fluency

1 Complete the table.

Pictorial representation	Percentage	Fraction	Decimal
	There are 41 parts per hundred 41%	41 out of 100 $\frac{41}{100}$	41 hundredths 0.41
		___ out of 100 $\frac{\square}{100}$	___ hundredths
	There are 31 parts per hundred 31%		

2 Kate has read 93 pages of her book. Her book has 300 pages in total. What proportion of her book has she read? Give your answer as a percentage and as a decimal.

$$\frac{93}{300} = \frac{\square}{100} = \square\,\% = \square$$

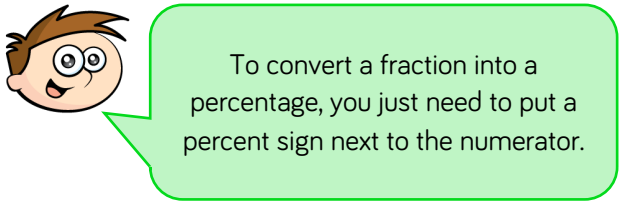
3 Record the fractions as a percentage and as a decimal.

$$\frac{120}{300} \qquad \frac{320}{400} \qquad \frac{20}{200}$$

% as Fractions & Decimals

Reasoning and Problem Solving

Paulo says,



Is Paulo correct? Explain your answer.

Paulo is incorrect, this only works when the denominator is 100 because percent means per hundred.

At a cinema, 0.4 of the audience are adults.
The rest of the audience is made up of boys and girls.
There are twice as many girls as boys.

What percentage of the audience are girls?

40%

Children may use a bar model to represent this problem.

Three children have each read 360 pages of their own book.

Kenny's book has 500 pages.
Lenny's book has 400 pages.
Penny's book has 600 pages.

What fraction of their books have they each read?

How much of their books have they each read as a decimal?

Who has read the most of their book?

Kenny has read 72% or 0.72

Lenny has read 90% or 0.9

Penny has read 60% or 0.6

Lenny has read the most of his book.

Fractions to Percentages

Notes and Guidance

It is important that children understand that 'percent' means 'out of 100', therefore they will need to use their knowledge of equivalent fractions to make the denominator 100

Children will recall and use equivalences between simple fractions and percentages in different contexts.

Mathematical Talk

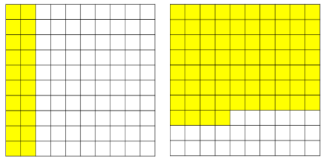
What does the word 'percent' mean? How can you represent this?

Which denominator is the easiest to convert into a percentage? Why is this easiest? Which other denominators are easier to convert into percentages?

If the denominator is 50, 25, 20 or 10 how would you convert it in to 100? What would you need to do to the numerator?

Varied Fluency

1 What fraction of the 100 square is shaded?
Can you write this as a percentage?



Shade in another 100 square to show 50%
Can you write this as two different fractions?

2 What numbers have been covered by the splats?

$\frac{12}{100} = \_\_\_\_\%$.

$\frac{\_\_\_\_}{100} = 35\ \%$

$\frac{12}{50} = \_\_\_\_\%$.

$\frac{44}{\_\_\_\_} = 22\ \%$

3 Complete the table.

Fraction	Fraction in Hundredths	Percentage
$\frac{7}{10}$	$\frac{\_\_\_\_}{100}$	
$\frac{7}{\_\_\_\_}$	$\frac{35}{100}$	
$\frac{7}{\_\_\_\_}$	$\frac{\_\_\_\_}{100}$	28%

Fractions to Percentages

Reasoning and Problem Solving

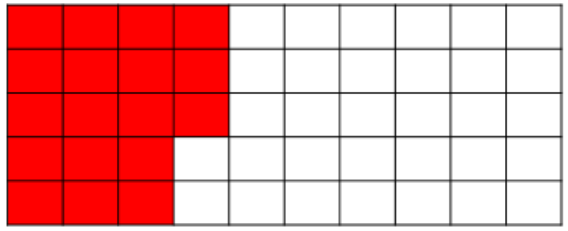
In a Maths test, Tom answered 62% of the questions correctly.

Lily answered $\frac{3}{5}$ of the questions correctly.

Who answered more questions correctly?

Explain your answer.

Tom answered more questions correctly because $\frac{3}{5}$ as a percentage is 60% and this is less than 62%



Mark thinks that $\frac{18}{100}$ of this grid has been shaded.
Nisha thinks that 36% of the grid has been shaded.

Who do you agree with?

Explain your reasoning.

Nisha is correct because the grid is 50 squares not 100 and 18 of them are shaded.

Equivalent FDP

Notes and Guidance

Children recognise simple equivalent fractions and represent them as decimals and percentages.

Children then solve problems which require knowing percentage and decimal equivalents of

$\frac{1}{2}, \frac{1}{4}, \frac{1}{5}, \frac{2}{5}, \frac{4}{5}$ and those fractions with a denominator of a multiple of 10 or 25

Mathematical Talk

Show these decimals on the bead string. What are they as a decimal? What are they as a fraction? Can you simplify the fraction?

How can we represent the fractions on a number line? What are they equivalent to?

Which is closer to 100%, $\frac{4}{5}$ or 70%? How do you know?

Varied Fluency

1 Use a bead string to show me

0.25 0.3 0.2 0.5

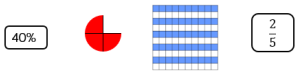
What are these decimals as a percentage?
What are they as a fraction? Can you simplify the fraction?

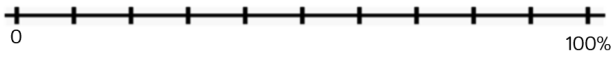
2 Use the bar models to convert the fractions into a percentage and a decimal.

$\frac{1}{2}$ is equivalent to ____ & ____ $\frac{1}{4}$ is equivalent to ____ & ____

$\frac{3}{10}$ is equivalent to ____ & ____ $\frac{1}{5}$ is equivalent to ____ & ____

3 Draw a line to show where each representation goes on a number line.





Equivalent FDP

Reasoning and Problem Solving

Sort the fractions, decimals and percentages into the correct column.

50%	100%	$\frac{30}{60}$
Seven tenths	60%	0.25
70 hundredths	$\frac{1}{4}$	0.5

Less than $\frac{1}{2}$	Equal to $\frac{1}{2}$	More than $\frac{1}{2}$

Less than $\frac{1}{2}$	Equal to $\frac{1}{2}$	More than $\frac{1}{2}$
$\frac{1}{4}$ 0.25	50% $\frac{30}{60}$ 0.5	Seven tenths 100% 60% 70 hundredths

Ash has £55

He spends $\frac{3}{5}$ of his money on a coat and 30% on shoes.

How much does he have left?

$\frac{3}{5} = 0.6 = 60\%$

60% + 30% = 90%

Ash has 10% left and 10% of £55 is £5.50

Tom is playing a maths game, here are his scores at three different levels.

Level A – 440 points out of 550

Level B – 210 points out of 300

Level C – 45 points out of 90

At which level did he have a higher success rate?

Level A – 80%

Level B – 70%

Level C – 50%

He had the higher success rate on level A.

Children may wish to compare using decimals instead.

Equivalent FDP

Notes and Guidance

Children convert between fractions, decimals and percentages. They use their knowledge of common equivalent fractions and decimals to find the equivalent percentage.

Children start by focusing on converting decimals to fractions and then to percentages. They then look at how a decimal can be multiplied by 100 in order to find the equivalent percentage.

Mathematical Talk

How does converting a decimal to a fraction help us to convert it to a percentage?

When I convert a decimal to a percentage, what do I need to multiply by? Can I use a place value grid to help me convert the decimal to a percentage?

Varied Fluency

1 Complete the table.

Decimal	Fraction	Percentage
0.35	$\frac{35}{100}$	35%
0.27		
0.6		

2 Fill in the missing boxes.

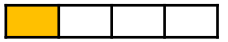
0.72 = ☐ %

89% = ☐ %

6% = ☐ %

0.4 = ☐ %

3 Complete the table. Can you record the fraction in its simplest form?

Representation	Fraction	Decimal	Percentage
			46%
			
		0.78	
	$\frac{2}{5}$		

Equivalent FDP

Reasoning and Problem Solving

Complete the missing information using a decimal and a percentage.
Can you find more than one solution?

$\frac{1}{4} = 75\% - \square -$ 3 tenths

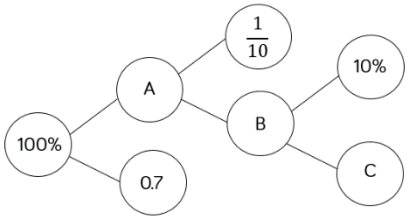
$40\% = \frac{1}{5} + \square + \square$

Possible answers:

1. 0.2 or 20%

2. 0.1 and 10%
   0.05 and 15%
   0.01 and 19%

Complete the part whole model. How many different ways can you complete it?



Can you create your own version with different values?

A = 0.3, 30% or $\frac{3}{10}$

B = 0.2, 20%, $\frac{2}{10}$ or $\frac{1}{5}$

C = 0.1, 10% or $\frac{1}{10}$

Use the digit cards to complete the missing information.
How many ways can you find?

1	2	3	4	5	6

$\frac{\square}{8} = 0.\square 25 = \square.\square\%$

Possible answers:

$\frac{1}{8} = 0.125 = 12.5\%$

or

$\frac{5}{8} = 0.625 = 62.5\%$

Percentage of an Amount (1)

Notes and Guidance

Children use different representations to find percentages of amounts. For example 50%, 25%, 10%, 1%.
Allow time for children to explore efficiency of methods and develop a deep understanding of why you can divide by ten to find 10%, but you do not divide by 25 to find 25%.
Children need to understand percentages as parts of 100 and that the whole amount is 100%, therefore when finding 1% we divide by 100.

Mathematical Talk

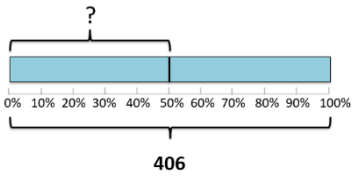
How many other ways could you find 25%? Which is the most effective?

If you know how to calculate 10%, how can you use this to calculate 1%?

What's the same and what's different about 10% of 300, 30 and 3? What do you notice?

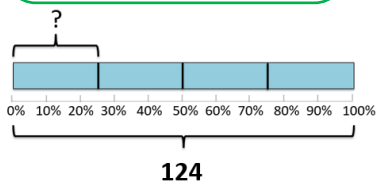
Varied Fluency

1 Find 50% of 406
50% is equal to a half so we can divide by 2 to find 50%



Calculations
$50\% = \frac{1}{2}$
$406 \div 2 = 203$

Use this to find 25% of 124
Which fraction is 124 equivalent to?



2 Complete the sentences:
To find 50%, I can divide by ___
To find 25%, I can divide by ___
To find 10%, I can divide by ___
To find 1%, I can divide by ___

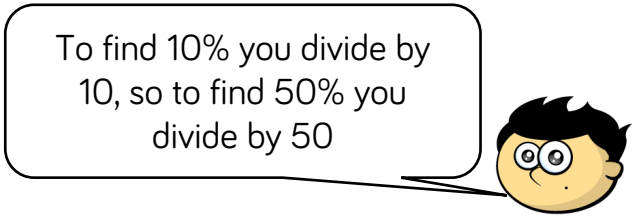
3 Find:

10% of 300	10% of 30	10% of 3
1% of 500	1% of 1 m	1% of 750 ml

Percentage of an Amount (1)

Reasoning and Problem Solving

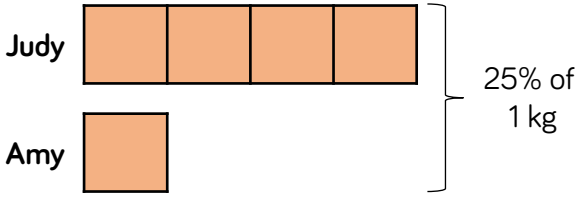
Henry says,



Do you agree? Explain why.

Possible answer: Henry is wrong because 50% is equivalent to a half so to find it you divide by 2

Amy and Judy shared 25% of a 1 kg bar of chocolate.
Amy ate a quarter of the amount that Jude ate.
How much did they each eat?



How much less did Amy eat than Judy?

Judy ate 200 g, Amy ate 50 g

Amy ate 150 g less than Judy

50% of 300	5% of 20	25% of 244
10% of 890	1% of 120,000	50% of 9402
25% of 225,000	10% of 85,610	5% of 600

Using the table above,

a) What's the biggest total you can make using only 3 amounts?

b) What's the smallest total you can make using 3 amounts?

c) Can you make exactly 300? How?

a) Largest: 146,561

b) Smallest: 153

c) 50% of 300 + 1% of 120,000 + 5% of 600 = 300

50% of 300 150	5% of 20 4	25% of 244 60
10% of 890 89	1% of 120,000 120	50% of 9402 4701
25% of 225,000 56,250	10% of 85,610 85,610	5% of 600 30

Percentage of an Amount (2)

Notes and Guidance

Children use concrete resources and visual representations to find compound percentages of amounts.
Allow time for children to explore efficiency of methods when finding any percentage. For example, when finding 20%, children could do:
$20\% = \frac{20}{100} = \frac{2}{10} = \frac{1}{5}$ then divide the amount by 5, or they could add two lots of 10%

Mathematical Talk

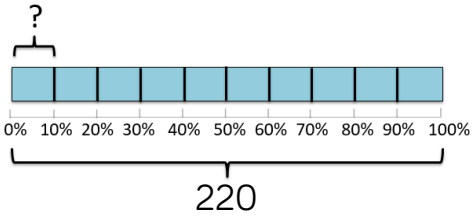
Why wouldn't the method of finding 10% of a number first be necessary when calculating 50%?

Is there a fraction you could use to help you work out 5%?

Which do you think is the most efficient method? Why?

Varied Fluency

1 If you know how to find 10% of 220, how could you use this to find 20%?



Calculations
10% of 220 = 22
To find 20%, we multiply 10% by 2
22 × 2 = 44

Use this method to find:
(a) 40% of 220 (b) 20% of 180 (c) 30% of 320

2 To find 5% of a number you could: Work out 10% and halve it, OR work out 1% and multiply it by 5
Use these methods to work out:
(a) 5% of 140 (b) 5% of 260 (c) 5% of 1 m 80 cm

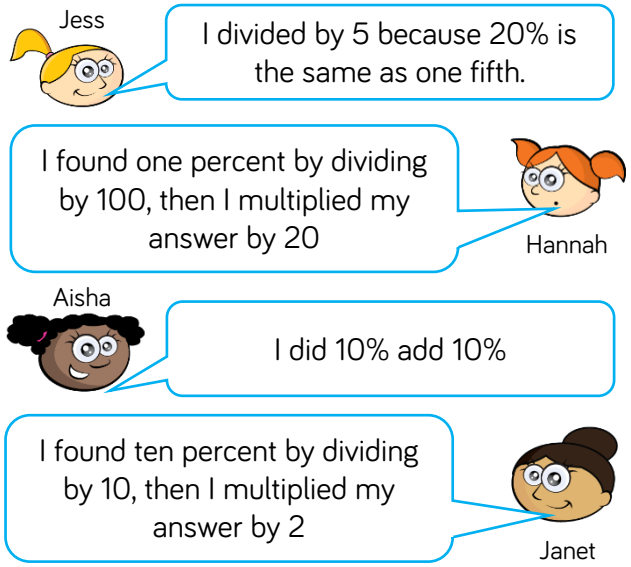
Which method do you find the most efficient?
How else could we work out 5%?

3 Calculate:
(a) 15% of 6 m (b) 35% of 3 kg (c) 65% of 2 hours

Percentage of an Amount (2)

Reasoning and Problem Solving

Four children in a class were asked to find 20% of an amount, this is what they did:



Who do you think has the most efficient method? Explain why.
Who do you think will end up getting the answer incorrect?

All methods are acceptable ways to finding 20%
Children may have different answers because they may find different methods easier.
Discussion could be had around whether or not their preferred method is always the most efficient.

Jack and Tara both have a string of beads.

They have red beads, blue beads, white beads and purple beads.

Jack's beads are 50% blue, 35% red, 10% white and 5% purple.

Tara's beads are 40% blue, 30% red, 20% white and 10% purple beads. Tara has 20 beads.

Jack and Tara have 4 purple beads between them.

How many of each colour does Jack have? How many does he have altogether?

Jack has 40 beads.

2 purple

20 blue

4 white

14 red

Percentages – Missing Values

Notes and Guidance

Children use their understanding of finding percentages of amounts to find missing values. They may choose to use a bar model to support their understanding and structure their ideas.

It is important that children see that there may be more than one way to solve a problem and that some methods are more efficient than others.

Mathematical Talk

Is there more than one way to solve the problem?

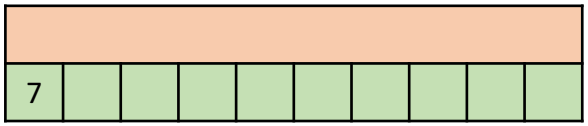
What is the most efficient way to find ___%?

What diagrams could help you visualise this problem?

Varied Fluency

1 If 7 is 10% of a number, what is the number?

Use the bar model to help you.



2 Complete:
Use a bar model to help you if you need.

10% of ☐ = 15 ☐ % of 150 = 45

30% of ☐ = 90 30% of ☐ = 900

Can you see a link between the questions?

3 350,000 people visited the Natural History Museum last week.
15% of people visited on Monday.
40% of people visited on Saturday.
How many people visited the Natural History Museum the rest of the week?

Percentages – Missing Values

Reasoning and Problem Solving

What percentage questions can you ask about this bar model?

Possible answer:
If 20% of a number is 3.5, what is the number?

25% of ☐ = ☐ % of 60

Possible answers:

25% of 120 = 50% of 60
25% of 24 = 10% of 60
25% of 2.4 = 1% of 60

A golf club has 200 members.

58% of the members are male.
50% of the female members are children.

(a) How many male members are in the golf club?
(b) How many female children are in the golf club?

116 male members

42 female children

Percentage Increase & Decrease

Notes and Guidance

Once children are secure in finding percentages of amounts and missing percentages, they move on to finding percentage increase and decrease.

They use a bar model to represent what increase and decrease will look like.

Mathematical Talk

What does increase/decrease mean?

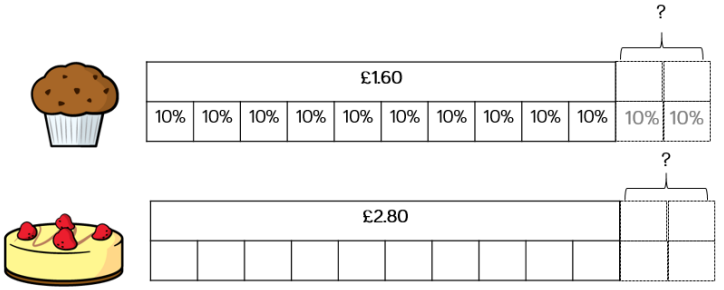
How does the bar model show the percentage increase/decrease?

If prices increase by 20%, what percentage will represent the new price?

If the percentage decrease is ___, how can we work out the original price? What will the new price be?

Varied Fluency

1 Janet is increasing the prices in her café by 20%
Calculate the percentage increase for the following items:



2 Use the same models to calculate the new cost for each item.

3 The price of houses has decreased by 10% in the last year.
Use a bar model to represent the percentage decrease and to complete the table.

House	Original Cost	10% decrease	New cost
A	£235, 650		
B	£145, 950		
C		£32, 760	

Percentage Increase & Decrease

Reasoning and Problem Solving

Football tickets cost £46.80 after a 20% decrease.

Cindy says,

The original tickets cost £56.16

Can you explain her mistake?

Cindy has found 20% of the reduced price rather than realising the reduced price is worth 80%

James says,

Decreasing a number by 13% is the same as finding 87% of that number.

Do you agree?

James is correct as the whole number would be worth 100% and 100 take away 17 is 83.

Children might calculate both and see that they are the same.

Tamzin has an amount of money saved.
The amount is increased by 25%
The new amount is then decreased by 25%

Does Tamzin have the same amount of money as she started with?

Explain your answer.

No she would not as the two 25%s are not of the same value so therefore they will be worth different things.

Children could explore doing these calculations using different values to convince themselves.

Order FDP

Notes and Guidance

Children build upon their previous learning on fractions, decimals and percentages to see that there are different ways of expressing proportions.

Children convert between fractions, decimals and percentages in order to order and compare them.

Mathematical Talk

What do you notice about the fractions, decimals or percentages? Can you compare any straight away?

What is the most efficient way to order them?

If you put them in ascending order, what will it look like?
If you put them in descending order, what will it look like?

Varied Fluency

1 Use <, > or = to complete the statements:

$0.23 \bigcirc 24\% \bigcirc \frac{1}{4}$

$37.6\% \bigcirc \frac{3}{8} \bigcirc 0.27$

2 Order from smallest to largest:

40%	$\frac{2}{5}$	0.45	$\frac{3}{10}$	54%	0.05

Can you place them on a number line?

3 Four friends share a pizza. Tyrone eats 35% of the pizza, Jasmine eats 0.4 of the pizza, Imran eats 12.5% of the pizza and Oliver eats 0.125 of the pizza.

Can you write the amount each child eats as a fraction?
Who eats the most? Who eats the least? Is there any left?

Order FDP

Reasoning and Problem Solving

In a Geography test, Sam scored 62% and Hamza scored $\frac{3}{5}$

Who got the highest score?

Explain your answer.

Sam scored more than Hamza because $\frac{3}{5}$ is equivalent to 60%, and 62% is greater.

In January, Rahima saves $\frac{3}{5}$ of her £20 pocket money.

In February, she saves 0.4 of her £10 pocket money.

In March, she saves 45% of her £40 pocket money.

Which month did she save the most money?

Estimate your answer first using your knowledge of fractions, decimals and percentages.
Explain why you have chosen that month.

She saved the most money in March.
Estimates:
Over £10 in January because $\frac{3}{5}$ is more than half.
Under £10 in February because she only had £10 to start with and 0.4 is less than half.
Nearly £20 in March because 45% is close to a half.