Scheme of Learning
Year 5
#MathsEveryoneCan
Year 5 | Spring Term | Week 10 to 11 – Number: Decimals & Percentages

Overview

Small Steps

- Decimals up to 2 d.p.
- Decimals as fractions (1)
- Decimals as fractions (2)
- Understand thousandths
- Thousandths as decimals
- Rounding decimals
- Order and compare decimals
- Understand percentages
- Percentages as fractions and decimals
- Equivalent F.D.P.

NC Objectives

Read, write, order and compare numbers with up to three decimal places.

Recognise and use thousandths and relate them to tenths, hundredths and decimal equivalents.

Round decimals with two decimal places to the nearest whole number and to one decimal place.

Solve problems involving number up to three decimal places.

Recognise the percent symbol (%) and understand that per cent relates to ‘number of parts per hundred’, and write percentages as a fraction with denominator 100, and as a decimal.

Solve problems which require knowing percentage and decimal equivalents of $\frac{1}{2}$, $\frac{1}{4}$, $\frac{1}{10}$, $\frac{1}{25}$ and those fractions with a denominator of a multiple of 10 or 25.
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.

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**Notes and Guidance**

**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?

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**Varied Fluency**

Which number is represented on the place value chart?

<table>
<thead>
<tr>
<th>Ones</th>
<th>Tenths</th>
<th>Hundredths</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0.1</td>
<td>0.01</td>
</tr>
<tr>
<td>0</td>
<td>1</td>
<td>2</td>
</tr>
</tbody>
</table>

There are ____ ones, ____ tenths and ____ hundredths.

The number is ____

Represent the numbers on a place value chart and complete the stem sentences.

0.28
0.65
0.07
1.26

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

2.45
3.04
4.44
43.34

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 ____________

How many other ways can you partition 0.83?
Dexter says there is only one way to partition 0.62

0.62

0.6 + 0.02

Prove Dexter is incorrect by finding at least three different ways of partitioning 0.62

0.62 = 0.12 + 0.5
0.62 = 0.4 + 0.22
0.62 = 0.3 + 0.32
0.62 = 0.42 + 0.2
0.62 = 0.1 + 0.52
0.62 = 0.03 + 0.59

etc.

Match each description to the correct number.

My number has the same amount of tens and tenths.
Teddy

Teddy – 40.46
Amir – 46.2
Rosie – 46.02
Eva – 2.64

My number has one decimal place.
Amir

My number has two hundredths.
Rosie

My number has six tenths.
Eva

46.2 2.64 46.02 40.46
Children explore the relationship between decimals and fractions. They start with a fraction (including concrete and pictorial representations of fractions) 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?
Decimals as Fractions (1)

Reasoning and Problem Solving

Odd one out

Which of the images below is the odd one out?

A

\[
\begin{array}{c}
0.1 \\
0.3 \\
\end{array}
\]

B

\[
\begin{array}{c}
\frac{2}{5}, \text{which is } 0.4 \\
\end{array}
\]

C

\[
\begin{array}{c}
\frac{1}{10} \\
\frac{1}{10} \\
\end{array}
\]

Possible answer:
B is the odd one out because it shows \(\frac{2}{5}\), which is \(\frac{4}{10}\) or 0.4

The other images show \(\frac{2}{10}\) or 0.2

Explain why.

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

Possible answers:
50
100
1
2
0.5

Create another part-whole model like the one above for your partner to complete.

Now complete the following part-whole models using fractions and decimals.

There are various possible answers when completing the part-whole models. Ensure both fractions and decimals are represented.
Children concentrate on more complex decimals numbers (e.g. 0.96, 0.03, 0.27) and numbers greater than 1 (e.g. 1.2, 2.7, 4.01).

They represent them as fractions and as decimals.

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

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?

On the number line, tell me another number that is between c and d. Now give your answer as a fraction. Tell me a number that is not between c and d.

Use the models to record equivalent decimals and fractions.

\[ 0.3 = \frac{3}{10} = \frac{30}{100} \]

Write down the value of a, b, c and d as a decimal and a fraction.

<table>
<thead>
<tr>
<th>Concrete</th>
<th>Decimal</th>
<th>Decimal - expanded form</th>
<th>Fraction</th>
<th>Fraction - expanded form</th>
<th>In words</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1" alt="Concrete" /></td>
<td>3.24</td>
<td>3 + 0.2 + 0.04</td>
<td>( \frac{324}{100} )</td>
<td>( 3 + \frac{2}{10} + \frac{4}{100} )</td>
<td>Three ones, two tenths and four hundredths.</td>
</tr>
<tr>
<td><img src="image2" alt="Concrete" /></td>
<td>3.01</td>
<td>( \frac{301}{100} )</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>( 3 + \frac{1}{10} + \frac{2}{100} )</td>
<td>Two ones, three tenths and two hundredths.</td>
</tr>
</tbody>
</table>
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

Amir 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 answer: Children may represent it in words, decimals, fractions, expanded form but also by partitioning the number in different ways.

Possible answers could include \( \frac{1}{100} \) 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.

Write these decimals as mixed numbers.

Choose three of the numbers and write them in words.

30.45, 30.54, 40.35, 40.53, 50.43, 50.34

1 \( \frac{45}{100} \), 30 \( \frac{54}{100} \), 40 \( \frac{35}{100} \), 40 \( \frac{53}{100} \), 50 \( \frac{43}{100} \), 50 \( \frac{34}{100} \)
Eva is using Base 10 to represent decimals.

= 1 whole
= 1 tenth
= 1 hundredth
= 1 thousandth

Use Base 10 to build:
• 4 wholes, 4 tenths, 4 hundredths, 4 thousandths
• 5 tenths, 7 hundredths and 5 thousandths
• 2.357

Use the place value counters to help you fill in the final chart.

Varied Fluency

Mathematical Talk

If 4 tenths = 0.4, 4 hundredths = 0.04, what is 4 thousandths equal to?

Using the place value charts:
• How many tenths are in a whole?
• How many hundredths are there in 1 tenth?
• Using place value counters complete the final chart.
• How many thousandths in 1 hundredth?

What has this hundred square been divided up into?
How many thousandths are there in one hundredth?
How many thousandths are in one tenth?
Rosie thinks the 2 values are equal.

Do you agree?
Explain your thinking.

Can you write this amount as a decimal and as a fraction?

Agree.

We can exchange ten hundredth counters for one tenth counter.

0.135 = $\frac{135}{1000}$

Write these numbers in three different ways:

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
Children build on their understanding of decimals and further explore the link between tenths, hundredths and thousandths.

They represent decimals in different ways and also explore deeper connections such as \( \frac{100}{1000} \) is the same as \( \frac{1}{10} \).

Use the place value chart and counters to represent these numbers.
Write down the numbers as a decimal.

a) \( 1 \ \text{ones}, 1 \ \text{tenths}, 1 \ \text{hundredths} \)

b) 4 ones, 6 tenths, 0 hundredths and 2 thousandths

c) \( 3 \ \frac{34}{1000} \)

The arrows are pointing to different numbers.
Write each number as a decimal and then as a mixed number.

Where would 2.015 be positioned on the number line? How many thousandths do I have? How do I record this as a mixed number?
Ron 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?

<table>
<thead>
<tr>
<th>1</th>
<th>(\frac{1}{10})</th>
<th>(\frac{1}{100})</th>
<th>(\frac{1}{1000})</th>
</tr>
</thead>
</table>

Can you record the numbers in different ways?

- Smallest: 0.116
- Largest: 6.11

Three children are representing the number 0.504

- Annie: \(0.504 = \frac{504}{1000}\)
- Alex: \(0.504 = \frac{3}{10} + \frac{2}{10} + \frac{4}{1000}\)
- Teddy: \(0.504 = \frac{5}{10} + \frac{4}{1000}\)

Possible answer:
They are all correct. Annie has recorded it as a fraction. Alex and Teddy have partitioned it differently.

In this problem symbols have been used to represent two different numbers. Write down the value of each, as a mixed number and as a decimal.

- \(\bigcirc = 1\)
- \(\bigstar = \frac{1}{10}\)
- \(\bigtriangleup = \frac{1}{100}\)
- \(\Box = \frac{1}{1000}\)
Year 5 | Spring Term | Week 10 to 11 – Number: Decimals & Percentages

Rounding Decimals

Notes and Guidance
Children 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 in developing conceptual understanding of rounding.

Mathematical Talk
What number do the ones and tenths counters represent? How many decimal places does it have? When rounding to the nearest one decimal place, how many digits will there be after the decimal point? Where would 3.25 appear on both number lines? What is the same and what is different about the two number lines?

Varied Fluency

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

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

Round each number to the nearest tenth and nearest whole number. Use number lines to help you.
Dexter 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 28 cm. What is the smallest length the box of chocolates could be?

Smallest: 27.5 cm

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?

Whitney is thinking of a number.

Rounded to the nearest whole her number is 4
Rounded to the nearest tenth her number is 3.8
Write down at least 4 different numbers that she could be thinking of.

Possible answers:
3.84
3.83
3.82 etc.

Some children might include answers such as 3.845
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 by the place value counters?

____ is greater/less than _____ because...

Explain how you know.

Can you build the numbers using place value counters? How can you use these concrete representations to compare sizes?

**Varied Fluency**

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

Place the numbers in ascending order on the number line.

Place in descending order.

Check your answers using place value chart.
Order & Compare Decimals

Reasoning and Problem Solving

Alex says,

3.105 is greater than 3.2 because 105 is greater than 2

Do you agree?
Explain your answer.

Alex is wrong because 2 tenths is larger than 105 thousandths.

Tommy says,

I have put some numbers into ascending order:

3.015
\[ \frac{3.51}{1000} \]
3.105
\[ \frac{3.51}{100} \]

Tommy has missed one number out. It should go in the middle of this list.
What could his number be?
What can’t his number be?

Could be:
3.052
3.053
3.054
3.104 etc.

It can’t be a number below 3.051 or above 3.105
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 into?

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?

**Varied Fluency**

1. Complete the sentence stem for each diagram.

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

2. Complete the table.

<table>
<thead>
<tr>
<th>Pictorial</th>
<th>Parts per hundred</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>[Diagram]</td>
<td>There are 51 parts per hundred.</td>
<td>75%</td>
</tr>
</tbody>
</table>

3. Complete the bar models.

   - [Bar model] 100%
   - [Bar model] 100%
   - [Bar model] 100% 25%
Oh no! Dexter has spilt ink on his hundred square.

Complete the sentence stems to describe what percentage is shaded.

It could be...
It must be...
It can’t be...

Some possible answers:
- It could be 25%
- It must be less than 70%
- It can’t be 100%

Mo, Annie and Tommy all did a test with 100 questions. Tommy got 6 fewer questions correct than Mo.

<table>
<thead>
<tr>
<th>Name</th>
<th>Score</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mo</td>
<td>56 out of 100</td>
<td>56%</td>
</tr>
<tr>
<td>Annie</td>
<td></td>
<td>65%</td>
</tr>
<tr>
<td>Tommy</td>
<td></td>
<td>50%</td>
</tr>
</tbody>
</table>

Complete the table. How many more marks did each child need to score 100%?

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

Dora needs 44
Annie needs 35
Tommy needs 50

Neither. They both have an equal number of sweets remaining.

Mo needs 44
Annie needs 35
Tommy needs 50

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Understand Percentages

Reasoning and Problem Solving
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.

### Notes and Guidance

**Mathematical Talk**

What do you notice about the percentages and the decimals?

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

How can we record the proportion of pages Alex has read as a fraction? How can we turn it into a percentage?

Can you convert any percentage into a decimal and a fraction?

### Varied Fluency

**Complete the table.**

<table>
<thead>
<tr>
<th>Pictorial</th>
<th>Percentage</th>
<th>Fraction</th>
<th>Decimal</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>41 parts per</td>
<td>41 out of 100</td>
<td>41 hundredths</td>
</tr>
<tr>
<td></td>
<td>100</td>
<td></td>
<td>0.41</td>
</tr>
<tr>
<td></td>
<td>7 parts per</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>100</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>7%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Alex has read 93 pages of her book. Her book has 300 pages. What proportion of her book has she read? Give your answer as a percentage and a decimal.**

\[
\frac{93}{300} = \frac{?}{100} = ____ \% = ____
\]

**Record the fractions as decimals and percentages.**

<table>
<thead>
<tr>
<th>120</th>
<th>320</th>
<th>20</th>
<th>12</th>
</tr>
</thead>
<tbody>
<tr>
<td>300</td>
<td>400</td>
<td>200</td>
<td>50</td>
</tr>
</tbody>
</table>
### Percentages as Fractions & Decimals

#### Reasoning and Problem Solving

<table>
<thead>
<tr>
<th>Teddy says,</th>
<th>Teddy is incorrect, this only works when the denominator is 100 because percent means parts per hundred.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Is Teddy correct? Explain your answer.</td>
<td>60% are children, so 40% are girls and 20% boys. Children may use a bar model to represent this problem.</td>
</tr>
</tbody>
</table>

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

- What fraction of their books have they each read?
- What percentage of their books have they read?
- How much of their books have they each read as a decimal?
- Who has read the most of their book?

- Ron has read \(\frac{360}{500}\) or 72% or 0.72
- Dora has read \(\frac{360}{400}\) or 90% or 0.9
- Eva has read \(\frac{360}{600}\), 60% or 0.6

- Dora has read the most of her book.
Children recognise simple equivalent fractions and represent them as decimals and percentages.

When children are secure with the percentage and decimal equivalents of \( \frac{1}{2}, \frac{1}{4}, \frac{1}{5}, \frac{2}{5}, \frac{4}{5} \), they then consider denominators of a multiple of 10 or 25.

Use bar models and hundred squares to support understanding and show equivalence.

**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?

**Use the bar model to convert the fractions into a percentages and decimals.**

\[
\begin{array}{cccc}
\frac{1}{2} & \frac{1}{4} & \frac{3}{10} & \frac{1}{5} \\
10\% & 10\% & 10\% & 10\% \\
\end{array}
\]

Draw arrows to show the position of each representation on the number line.

How many hundredths is each bead worth? How does this help you convert the decimals to fractions and percentages?

How many hundredths is the same as 0.1?

What fractions does the bar model show? How does this help to convert them to percentages?

Which is closer to 100%, \( \frac{4}{5} \), or 50%? How do you know?
Sort the fractions, decimals and percentages into the correct column.

<table>
<thead>
<tr>
<th>Less than (\frac{1}{2}):</th>
<th>Equal to (\frac{1}{2}):</th>
<th>Greater than (\frac{1}{2}):</th>
</tr>
</thead>
<tbody>
<tr>
<td>(\frac{1}{4}), 0.25, 7%</td>
<td>50% and (\frac{30}{60})</td>
<td>Seven tenths, 70 hundredths, 60% and 100%</td>
</tr>
</tbody>
</table>

Jack has £55
He spends \(\frac{3}{5}\) of his money on a coat and 30\% on shoes.
How much does he have left?

Tommy is playing a maths game. Here are his scores at three different levels.

<table>
<thead>
<tr>
<th>Level A</th>
<th>Level B</th>
<th>Level C</th>
</tr>
</thead>
<tbody>
<tr>
<td>440 points out of 550</td>
<td>210 points out of 300</td>
<td>45 points out of 90</td>
</tr>
</tbody>
</table>

At which level did he have a higher success rate?

Tommy had a higher success rate on level A.

Children may wish to compare using decimals instead.