Fractions

This document is part of a set that forms the subject knowledge content audit for Key Stage 1 and Key Stage 2 maths. Each document contains: audit questions with tick boxes that you can select to show how confident you are (1 = not at all confident, 2 = not very confident, 3 = fairly confident, 4 = very confident), exemplifications; explanations; and further support links. At the end of each document, there is space to type notes to capture your learning and implications for practice. The document can then be saved for your records.

Question 12

How confident are you that you understand and can support children to convert some fractions into decimals and use these to simplify calculations?

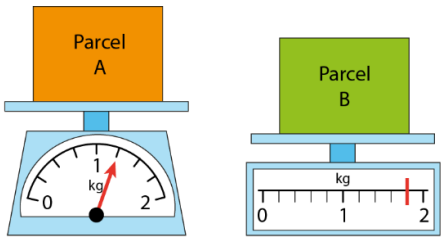
1 ☑ 2 ☐ 3 ☐ 4 ☐

How would you respond …?

a. What symbol (equals, less than or more than) should go in the box?

$0.6 \square \frac{4}{5}$

b. What is the total combined weight of the parcels?



c. Solve this calculation.

$$\begin{array}{r} 4\ 7\ 6 \\ \times\ 0\ .\ 2\ 5 \end{array}$$

Responses

Note your responses to the questions here before you engage with the rest of this section:

Did you notice that…?

a. This expression needs to be completed with a less than sign (<).

We know that $\frac{1}{5}$ is equal to 0.2, so 0.6 is equivalent to $\frac{3}{5}$. We know that $\frac{3}{5} < \frac{4}{5}$, so $0.6 < \frac{4}{5}$.

$0.6 \lessdot \frac{4}{5}$

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

$\frac{3}{5} < \frac{4}{5}$

Or, $\frac{4}{5}$ is equivalent to 0.8. We know that $0.6 < 0.8$, so $0.6 < \frac{4}{5}$.

$0.6 \lessdot \frac{4}{5}$

$\frac{4}{5} = 0.8$

$0.6 < 0.8$

b. In this example, the interval of the scales needs to be worked out. Parcel A weighs $1\frac{1}{4}$ or 1.25 kg and Parcel B weighs $1\frac{4}{5}$ or 1.8 kg.

c. If children are solely taught a process, they will look at this calculation and carry out a long multiplication.

However, if they are presented with the calculation in the format **476 × 0.25 =** and encouraged to think about the numbers involved, selecting the most efficent method, they may think about what the 0.25 actually means. This may open up alternative calculation strategies.

```
   4 7 6
 × 0 . 2 5
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 2 3 . 8 0
 9 5 . 2 0
-------
1 1 9 . 0 0
  1
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If children have a solid understanding of the concepts they have learnt so far, then 0.25 should be instantly recognisable as a decimal that can easily be substituted for a fraction. Without this recognition, children may select an inefficient long multiplication method in order to solve it. Time can then be spent on discussing which methods were selected and which were the most efficient.

$\frac{1}{4}$ of 476

476 ÷ 4

$$4\overline{)476} = 119$$

When finding $\frac{1}{4}$, children may choose to use a mental strategy, finding half and half again.

Supporting calculation by converting some fractions to decimals

The initial focus on common fraction–decimal equivalences relates to children's previous work on the equivalence of $\frac{1}{10}$ and 0.1, and of $\frac{1}{100}$ and 0.01.

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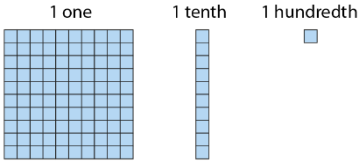


Expressing in written form

Fraction notation	Decimal notation	Name
$\frac{1}{10}$	0.1	one-tenth
$\frac{1}{100}$	0.01	one-hundredth

Seeing the place value connection on a Gattegno chart

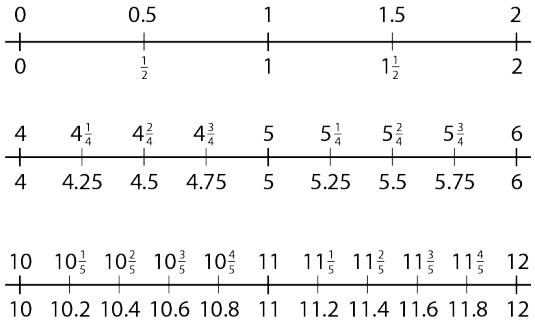
1,000	2,000	3,000	4,000	5,000	6,000	7,000	8,000	9,000
100	200	300	400	500	600	700	800	900
10	20	30	40	50	60	70	80	90
1	2	3	4	5	6	7	8	9
0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09

When children are secure with this, they will move on to explore decimal equivalents for $\frac{1}{2}$, $\frac{1}{4}$ and $\frac{1}{5}$ (and multiples of these unit fractions).

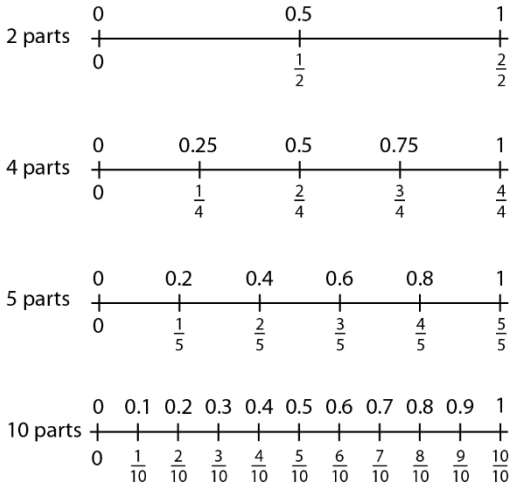
Being able to divide one – and indeed any other power of ten – into two, four, five and ten equal parts, is an essential skill for reading scales in graphing and measures. As such, emphasis is placed on ensuring children are able to instantly recall these key fraction–decimal equivalents. Developing a conceptual understanding of these is essential and is addressed in teaching sequences, to support the children in moving to having a quick recall of these equivalences. An ability to identify them in calculations as numbers that can easily be converted into different forms, will also be important moving forward.

For example, 0.5×86 can be very quickly solved if children recognise that 0.5 is equivalent to $\frac{1}{2}$ and therefore think of the calculation as 'half of 86'. Without identifying this equivalence, children may resort to using a less efficient, written multiplication algorithm to solve the calculation.

Children should also be given the opportunity to look at number lines divided in different ways to see where the key facts recur. This is helpful to draw their attention to the facts they should focus on as they can see they appear more frequently.



Once all the children have learnt the fraction–decimal equivalents within one, this understanding can be extended throughout the number system. Start with some counting practice using number lines marked in two, four, five and ten parts for support. Count by saying each number as both a fraction and a decimal.



When children have a solid understanding with the key fraction-decimal equivalences, calculations can be represented where they are asked to use this understanding to simplify calculations. Initially, calculations, such as multiplying by 0.5 or 0.25, are helpful to show how the long multiplication method is inefficient and using the fractional relationship is more helpful.

Children will then need the opportunity to look at calculations and consider the most efficient strategy; it is important to place the emphasis on this choice, not solely on getting the right answer. It is appropriate to have lessons where children analyse strategies and approaches. In these cases,

expressions are carefully chosen to allow for different strategies to be discussed and children are encouraged to find more than one way of solving them.

For example: 0.2 x 75.

Method 1:

I know 0.2 is the same as $\frac{1}{5}$ so: $0.2 \times 75 = \frac{1}{5} \times 75$

$$5 \overline{)\, 7\,{}^{2}5} \quad 1\ 5$$

Method 2:

I know that 0.2 is the same as $2/10$ so: $\frac{1}{10}$ **of 75 = 7.5**

$\frac{2}{10}$ of 75 = 15

Method 3:

I know the relationships between numbers in the place value system and how to use this relationship to make calculations equivalent so I will make the 0.2 ten times bigger, then make the product ten times smaller:

$2 \times 75 = 150$ $\div 10$
$0.2 \times 75 = \ \ 15$

Examples that children could use to consolidate this understanding may include:

0.25 × 6	**93 × 0.5**
0.75 × 396	**105 × 0.4**
5,250 × 0.2	**0.8 × 455**

Common errors in this area may include:

- children not recognising the difference between 0.1 and 0.01
- children over-relying on a written algorithm / process and not considering how to work in more efficient ways
- children not realising they can manipulate the calculation using their prior understanding, to make the calculation more efficient. This will not 'just happen' unless it is part of their regular experience in mathematics.

What to look for:

Can a child:

- identify key fraction-decimal equivalence?
- identify how to manipulate calculations to make them more efficient ?
- convert between fraction and decimal amounts to support them with making calculations more efficient?

Links to supporting materials:

NCETM Primary Professional Development materials, Spine 3: Fractions:

- Topic 3.10: Linking fractions, decimals and percentages

Notes:
Key learning from support material and self-study:
What I will focus on developing in my classroom practice: