

Fractions, Decimals and Percentages

Fractions 5

Go deeper investigations

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Sorting investigation

Objectives

- Find equivalent fractions using patterns.
- Convert from mixed numbers to improper fractions.
- Convert from improper fractions to mixed numbers.



Introduction

Tell the pupils to cut out the fraction cards and arrange them in the table so that each row heading correctly describes the fractions. Explain that there must be the same number of cards in each row of the table. Challenge the pupils to find and record different solutions to the puzzle.



The maths

In order to correctly arrange the cards, the pupils must be able to convert mixed numbers to improper fractions and vice versa. They also need to be able to recognise families of equivalent fractions.

Ask:

- *In which section of the table could this card go? In which section or sections couldn't it go?*
- *How many fractions could go into this section?*
- *How many of the fractions are greater than 2? How can you be sure?*



Solutions

There are three correct solutions. There should be four cards in each row.

	solution 1	solution 2	solution 3
no fractions or mixed numbers whose values are less than 2	$2\frac{1}{2}, \frac{15}{6}, \frac{10}{4}, 3\frac{1}{6}$	$2\frac{1}{2}, \frac{15}{6}, \frac{10}{4}, 3\frac{1}{6}$	$2\frac{1}{2}, \frac{15}{6}, \frac{10}{4}, 3\frac{1}{6}$
no fractions equivalent to $\frac{3}{4}$	$1\frac{5}{6}, \frac{1}{6}, \frac{7}{10}, \frac{11}{9}$	$1\frac{5}{6}, \frac{1}{6}, \frac{7}{10}, \frac{7}{4}$	$1\frac{5}{6}, \frac{1}{6}, \frac{11}{9}, \frac{7}{4}$
no fractions or mixed numbers with the denominator 6	$\frac{6}{8}, \frac{30}{40}, \frac{21}{28}, \frac{7}{4}$	$\frac{6}{8}, \frac{30}{40}, \frac{21}{28}, \frac{11}{9}$	$\frac{6}{8}, \frac{30}{40}, \frac{21}{28}, \frac{7}{10}$



Support

If some pupils find this difficult, ask them to convert the improper fractions to mixed numbers and to write these next to the improper fractions on the cards.

The pupils could then sort the cards into two sets for each row of the table:

- those greater than 2 and those less than 2
- those equivalent to $\frac{3}{4}$ and those not equivalent to $\frac{3}{4}$
- those with the denominator 6 and those without the denominator 6.

Note that the sets will not be equal in size.



Extension

Challenge the pupils to create similar puzzles for their friends to solve. They could choose other fractions and mixed numbers to add to the set, or make up a new table with different row headings.

Sorting investigation

Cut out the fraction cards at the bottom of the page.
Sort them into the table so that each row heading is true.

There must be the same number of cards in each section of the table.

How many different solutions can you find?



no fractions or mixed numbers whose values are less than 2	
no fractions equivalent to $\frac{3}{4}$	
no fractions or mixed numbers with the denominator 6	



$\frac{6}{8}$	$2\frac{1}{2}$	$\frac{15}{6}$	$\frac{11}{9}$	$\frac{30}{40}$	$\frac{10}{4}$
$1\frac{5}{6}$	$\frac{7}{10}$	$3\frac{1}{6}$	$\frac{1}{6}$	$\frac{7}{4}$	$\frac{21}{28}$

Vegetable puzzles

Objectives

- Add or subtract fractions with different denominators.
- Find fractions of numbers and quantities.
- Understand decimals as fractions.



Introduction

Introduce the idea of vegetable boxes. Explain that in these puzzles, each box contains potatoes, carrots, onions and leeks. The pupils must use the information given on the worksheet to work out the number of potatoes, carrots and onions in each box. Discuss how they can use the number of leeks, which is given on the worksheet, to get started.



The maths

Encourage the pupils to change the fractions and decimals to fractions with a common denominator to help them solve each puzzle. Establish that they need to use addition and subtraction to find what fraction of the vegetables are leeks. They can then work out how many vegetables are in the box altogether, and hence the number of potatoes, carrots and onions. Encourage the pupils to add up their answers and make sure their total matches the total they found earlier.

Ask:

- *How did you find the total number of vegetables?*
- *What common denominator could you use to add these three fractions together?*
- *What number should you multiply by?*
- *Can you explain to the class how you solved this puzzle?*



Solutions

	potatoes	carrots	onions	leeks	total
veg box A	6	4	1	5	16
veg box B	6	20	25	9	60
veg box C	10	8	15	7	40



Support

Some pupils may find it useful to work more practically, using different coloured cubes to represent the potatoes, carrots, onions and leeks. You could help the pupils by telling them the total number of vegetables in each box, as given in the answers above, as this provides them with the common denominator. Alternatively, you could simplify the puzzles by changing the fractions and decimals to the following:

	potatoes	carrots	onions	leeks	total
veg box A	$\frac{1}{4} \rightarrow 5$	$\frac{1}{4} \rightarrow 5$	$\frac{1}{4} \rightarrow 5$	5	20
veg box B	$\frac{2}{10} \rightarrow 6$	$\frac{2}{10} \rightarrow 6$	$\frac{3}{10} \rightarrow 9$	9	30
veg box C	$\frac{1}{5} \rightarrow 7$	$\frac{1}{5} \rightarrow 7$	$\frac{2}{5} \rightarrow 14$	7	35

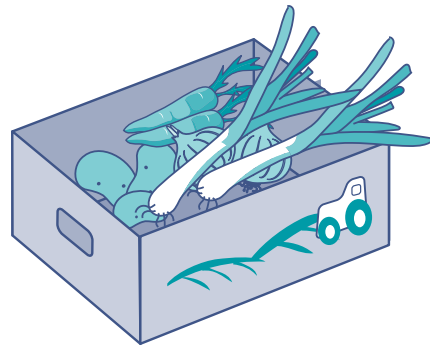


Extension

Invite the pupils to write similar vegetable puzzles of their own and to explain how each could be solved.

Vegetable puzzles

Use the information below to work out how many potatoes, carrots and onions there are in each veg box.



VEG BOX A

$\frac{3}{8}$ of the vegetables are potatoes,

$\frac{1}{4}$ of the vegetables are carrots,

$\frac{1}{16}$ of the vegetables are onions,

and there are 5 leeks.

totals

_____ potatoes

_____ carrots

_____ onions

5 leeks

_____ vegetables

VEG BOX B

0.1 of the vegetables are potatoes,

$\frac{1}{3}$ of the vegetables are carrots,

$\frac{5}{12}$ of the vegetables are onions,

and there are 9 leeks.

totals

_____ potatoes

_____ carrots

_____ onions

9 leeks

_____ vegetables

VEG BOX C

0.25 of the vegetables are potatoes,

0.2 of the vegetables are carrots,

$\frac{3}{8}$ of the vegetables are onions,

and there are 7 leeks.

totals

_____ potatoes

_____ carrots

_____ onions

7 leeks

_____ vegetables

Questionnaire investigation

Objectives

- Understand percentages as fractions.
- Understand percentages as fractions and as decimals.
- Relate percentages to 'finding fractions of'.
- Solve fraction, decimal and percentage problems.



Introduction

In this activity, the pupils write three survey questions for a number of their classmates to answer. The questions need to be simple and allow for numerous responses, for example, 'What is your favourite sport?' or 'Who is your favourite singer?'. Explain to the pupils that they need to give the responders a choice of five answers, one of which should be 'other' in case any pupils want to give an answer they have not written down.

The pupils then ask 10 people their first question, 20 people their second question and 25 people their third question. They should record responses by tallying on their record sheets.



The maths

Once the data has been collected, the pupils need to write equivalent fractions, decimals and percentages for each response. For the first question, where there will be 10 responses, fractions with the denominator 10 will be produced and therefore the equivalent decimals will be 0.1, 0.2 and so on and equivalent percentages will be multiples of 10%.

For the second question, where there will be 20 responses, fractions with the denominator 20 will be produced. The pupils may need to convert these to equivalent fractions with the denominator 100 to help them convert the fractions to decimals and percentages, for example $\frac{9}{20} = \frac{45}{100} = 0.45 = 45\%$.

Lastly, for the third question, where there will be 25 responses, the pupils will initially write fractions with the denominator 25. Similarly, these can be converted to equivalent fractions with the denominator 100 in order to work out the decimals and percentages, for example $\frac{9}{25} = \frac{36}{100} = 0.36 = 36\%$.

Ask:

- *What will the denominators be for your fraction answers?*
- *Can you simplify the fractions?*
- *What link can you see between the decimals and the percentages?*



Solutions

These will vary according to the survey results.



Support

If necessary, pupils could ask 10 classmates to respond to all the questions, thereby focusing on tenths only. Provide the pupils who may struggle with a fractions number line that is split into tenths.



Extension

Challenge the pupils to present their results in bar charts or as bar-line graphs.

Questionnaire investigation

Write three survey questions that you would like to ask others in your class. For example, you might ask "What is your favourite television programme?" or "What is your favourite football team?". Think of four possible answers for each question.

Ask people your questions and record your results as a tally.

Then write the proportion of each answer as a fraction, a decimal and a percentage.



Ask 10 people to respond to this question.

question:				
answer	tally	fraction	decimal	percentage
other				

Ask 20 people to respond to this question.

question:				
answer	tally	fraction	decimal	percentage
other				

Ask 25 people to respond to this question.

question:				
answer	tally	fraction	decimal	percentage
other				