MILL PARK SC - PRIME NIGHT
RECTANGLE FRACTIONS
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Learning Intentions

• To extend understanding of fractions
• To develop the concept of a simple fraction as part of a whole
• Visualisation of a common denominator
• To use basic number skills with fractions
• Be able to add and subtract fractions
Success Criteria

After this session you will be able to:

• Visualise and conceptualise common fractions
• Use rectangular arrays to describe fractions as part of a whole
• Use rectangular arrays to represent equivalent fractions and to compare fraction sizes
• Use of grids to add and subtract fractions

Fractions Terminology

• A fraction is part of a whole. We represent fractions using a specific form. Fractions are expressed in the form:

\[
\frac{a}{b}
\]

• The top number \(a\) is called the **numerator** and tells you how many pieces you have of the whole.
• The bottom number \(b\) is called the **denominator** and tells you into how many equal pieces the whole was divided. It represents the **size** of the parts.
The total number of parts in the diagram = denominator = 8

The number of parts shaded = numerator = 3

\[ \text{Fraction} = \frac{3}{8} \]

The total number of parts in the diagram = denominator = 10

The number of parts shaded = numerator = 7

\[ \text{Fraction} = \frac{7}{10} \]
Introducing **Rectangle Fractions** or **Arrays** or **Grids**

- A window provides a whole which is divided into parts

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  ____________
 |            |
 |            |
 |            |
 |___________|
```

- Like all arrays, made of equal length rows:
  - The rectangle is the whole
  - One fraction of the whole is made by the rows
  - One fraction of the whole is made by the columns
  - One fraction of the whole is made by the individual ‘cells’

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**Part 1**

**Breaking it into parts**
Exercise 1

• What parts can you see in the whole?
• Each row represents one half. The rows divide it into two equal parts
• Each column represents one third. The columns divide it into three equal parts
• Each cell represents one sixth. The cells divide the whole into six equal parts.
• From this, can you write any other fraction sentences you can see in the windows?

Examples

• One half equals three sixths
• One third equals two sixths
• Two thirds plus one sixth equals five sixths
Exercise 2

- The board originally had 3 rows of 5 gaps.
- The plugs have been placed to fill the whole with different colours.
- What colour makes up \( \frac{1}{3} \) of the whole?
- What colour makes up \( \frac{2}{3} \) of the whole?
- What colour makes up \( \frac{10}{15} \) of the whole?
- What colour makes up \( \frac{5}{15} \) of the whole?

Exercise 3

The window and board have helped us model operations with fractions.

It is time to extend the idea to a new problem.

\[
\frac{2}{5} + \frac{1}{4}
\]

- Can you create a grid that will help us work out this problem? Hint: Row and column numbers depend on the denominators
- Show me a rectangle/grid that will help us solve it.
With labelling

Exercise 4

• How many rows and columns need to be coloured to solve:

\[
\frac{2}{5} + \frac{1}{4}
\]

• Hint: Cells cannot be shaded twice.
• Show me \(\frac{3}{4}\)?
• Show me \(\frac{1}{4}\)?
• Now use the grids to process the sum.
• What fraction of the whole grid is coloured?
• Hint: The total number of cells shaded is?
How many cells are coloured?

Result?

- Count the coloured cells and name them with their fraction name.
- In this case,
  - Thirteen out of twenty are coloured
  - Answer is $\frac{13}{20}$
- Similar reasoning can be applied to allow calculation of subtraction, multiplication and division questions
Leading into algorithms

• After sufficient experience, compare with a more formal version of the same operation:
\[
\frac{2}{5} + \frac{1}{4} = \frac{8}{20} + \frac{5}{20} = \frac{13}{20}
\]

• “Imagining the rectangle” becomes finding the lowest common denominator.

Addition of Fractions – The Method

At Mill Park SC all students are taught the same method. This method is consistent with how students add and subtract whole numbers. This is very important when it comes to subtraction. The whole process is readily understood and extended from whole numbers to fractions.

The Method

1. Fractions with different denominators are renamed (Equivalent fractions). This process is completed SIDEWAYS.
2. The fractions are then added or subtracted vertically – as with whole numbers. This process is completed VERTICALLY.
3. The answer is renamed (Simplified) if possible. This process is completed SIDEWAYS.
Addition of Fractions

SAME DENOMINATORS

Addition Example
\[ \frac{4}{5} + \frac{3}{5} = \frac{7}{5} \]

Subtraction Example
\[ \frac{3}{2} - \frac{1}{8} = \frac{5}{8} \]

DIFFERENT DENOMINATORS

Addition Example
\[ \frac{2}{3} + \frac{9}{15} = \frac{2}{3} + \frac{3}{5} = \frac{12}{15} + \frac{9}{15} = \frac{21}{15} \]

Subtraction Example
\[ \frac{7}{12} - \frac{1}{4} = \frac{7}{12} - \frac{3}{12} = \frac{4}{12} \]

Multiples
\[ \begin{align*}
\text{SAME DEOMINATORS} &: 3, 6, 9, 12, \ldots \\
\text{DIFFERENT DENOMINATORS} &: 2, 4, 6, 8, 9, 10, 12, \ldots
\end{align*} \]

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