SPRINGBOARD 6 LESSON 8
FRACTIONS, DECIMALS AND PERCENTAGES 2

30 MINUTES

Objective:

- Express percentages as simple fractions and simple fractions as percentages

Vocabulary:

- equivalent
- denominator

By the end of the lesson children should be able to:

- represent 43% as 0.43 and $\frac{43}{100}$;
- convert $\frac{1}{2}$, $\frac{1}{4}$, $\frac{1}{8}$, $\frac{1}{5}$, $\frac{1}{10}$ into percentages.

Resources:

- Resource Sheet 8.1
- Resource Sheet 8.2
- OHT 3.1

ORAL AND MENTAL STARTER

5 MINUTES

Remind the children that percentage means per 100.

Establish that 100% means 100 per 100 or 1 whole.

Explain that 50% means 50 per 100 and can be written as 50/100 $\frac{50}{100}$ as in m/s (metres per second), and $\frac{50}{100} = \frac{1}{2}$.

Q: What is 25% in hundredths?

Q: What is 75% in hundredths?

Remind the children that they should know that 25% = $\frac{25}{100} = \frac{1}{4} = 0.25$, and that 75% = $\frac{75}{100} = \frac{3}{4} = 0.75$.

Q: How many hundredths is 10%?

Establish that 10% = $\frac{10}{100}$ and this can be written as 0.10 or 0.1.

Q: How many hundredths is 20%?

Establish that 20% = $\frac{20}{100}$ and can be written as 0.20 or 0.2.

Q: How many hundredths is 75%?

Establish that 30% = $\frac{30}{100}$ and can be written as 0.30 or 0.3.

Give children a percentage from the set 40% to 90% and ask for the equivalent fraction in hundredths and the decimal equivalent.

MAIN TEACHING ACTIVITY

Display OHT 3.1 with the four number lines directly below each other. Explain that these represent:

- 0 to 1   fraction line
- 0 to 1   decimal line
- 0 to 1   empty line
- 0 to 100%   percentage line

Remind children that 100% represents 100 per 100 or the whole, so it is equivalent to 1.

Invite the children to locate $\frac{1}{2}$, $\frac{1}{10}$, $\frac{3}{10}$ and $\frac{7}{10}$.

Draw a straight line from each fraction on the fraction line to the equivalent percentage on the percentage line. The line will pass through the decimal number line.

Using the percentage line, invite children to locate the percentage equivalents of $\frac{1}{2}$, $\frac{1}{10}$, $\frac{3}{10}$ and $\frac{7}{10}$.

Ask children to identify the midpoint of the decimal number line.

Establish that the number is 0.5 and remind them it can be written as $\frac{50}{100}$ by referring to the same position on the percentage line.

Repeat for the points on the decimal number line connecting $\frac{1}{10}$ to 10%, $\frac{3}{10}$ to 30% and $\frac{7}{10}$ to 70%.

Ask the children where to mark $\frac{1}{4}$ on the fraction line.

Establish that this mark is half way between 0 and $\frac{1}{2}$.

Draw a straight, vertical line from $\frac{1}{4}$ to the percentage line.

Q: What is $\frac{1}{4}$ as a percentage?

Get the children to confirm that this is 25%.

Q: How can we use the same method to find $\frac{3}{5}$ as a percentage?

Ask the children to convert $\frac{3}{5}$ to tenths, and draw the vertical line to the percentage line from $\frac{6}{10}$, to establish that $\frac{3}{5} = \frac{6}{10} = 60\%$. Repeat for $\frac{2}{5}$ and $\frac{4}{5}$.

Explain that it is sometimes easier to convert fractions to percentages rather than to decimals and use what they know to work out other percentages,
e.g. $\frac{1}{2}$ = 50% so $\frac{1}{4}$ = 25%, $\frac{1}{8}$ = 12.5% and $\frac{1}{16}$ = 6.25%;
e.g. $\frac{1}{10}$ = 10% so $\frac{3}{10}$ = 30%, $\frac{7}{10}$ = 70%.

PLENARY

Hold up a card from the shuffled set of fraction and percentage cards from Resource Sheets 8.1 and 8.2. Invite children to give the fraction or percentage equivalent. Ask the children to explain how they know the two are equivalent. Shuffle and repeat.

Q; What is 43% as a fraction?

Establish that the answer is $\frac{43}{100}$ and remind them that any percentage can be written as a fraction with a denominator of 100.

Q: What is 33% as a fraction?

Invite children to write the answer $\frac{33}{100}$ on the board. Ask them to find 3×33.
Draw out that $3 \times 33\%$ = 99% which is nearly 100% so 33% is almost $\frac{1}{3}$.

Q: What is $\frac{2}{3}$ as a percentage?

Establish by doubling that the answer is about 66% or 67% and discuss why both answers are reasonable estimates.

Remember:

Percent means per hundred and percentages such as 45%, 63% can be written as $\frac{45}{100}$, $\frac{63}{100}$.

Knowing that $\frac{1}{2}$ = 50%, means that you can work out that $\frac{1}{4}$ = 25% and $\frac{1}{8}$ = 12.5%.

Knowing that $\frac{1}{10}$ = 10% means that you can work out that $\frac{3}{10}$ = 30%.

Knowing that $\frac{1}{3}$ is about 33% means that you can work out that $\frac{2}{3}$ is about 66%.

LESSON 8 RELATED TEST QUESTION
1999 MENTAL ARITHMETIC TEST

Put a ring around the fraction on your answer sheet which is equivalent to 40%.

| 13 | $\frac{1}{40}$ | $\frac{40}{60}$ | $\frac{1}{4}$ | $\frac{4}{10}$ | $\frac{1}{400}$ |

1 mark

MARK SCHEME

| 13 | $\frac{1}{40}$ | $\frac{40}{60}$ | $\frac{1}{4}$ | $\boxed{\frac{4}{10}}$ | $\frac{1}{400}$ |

ANALYSIS OF CHILDREN'S ANSWERS

- Many children do not answer questions with decimals, fractions or percentages.

- The relationship between percentages and fractions was poorly interpreted by children at all levels. The common response to this question was $\frac{1}{40}$.

IMPLICATIONS FOR PLANNING

- Percentages should be discussed by referring to the number of parts per hundred. Children should be taught that 100% represents 100 per 100 or a whole, and equivalent fractions developed through later discussions about hundredths, tenths and special cases.

- The relationship between fractions, decimals and percentages should be a regular feature of oral and mental starters, for example, by using a counting stick to establish equivalents.