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Fraction / Decimal / Percent Conversions - With Understanding

1. Decimals to Fractions

$$0.31 = \frac{31}{100} \quad (\text{say "31 hundredths" for both decimal and fractions})$$

$$0.4 = \frac{4}{10} = \frac{4 \div 2}{10 \div 2} = \frac{2}{5} \quad (\text{say "4 tenths" for both decimal and fraction, then simplify})$$

2. Fractions to Decimals I - Benchmark Fractions

The benchmark fractions are $\frac{1}{2}$ $\frac{1}{4}$ $\frac{1}{8}$ $\frac{1}{3}$ $\frac{1}{10}$ $\frac{1}{5}$ $\frac{1}{100}$ $\frac{1}{20}$ $\frac{1}{25}$ $\frac{1}{50}$

A. Learn them as "fraction families", e.g. $\frac{1}{2} = 0.5$, so $\frac{1}{4} = 0.25$ and $\frac{1}{8} = 0.125$

B. Teach percent equivalents at the same time, and use these patterns to help learn them:

$$\frac{1}{2} = 50\% \text{ and } \frac{1}{50} = 2\% \quad \frac{1}{4} = 25\% \text{ and } \frac{1}{25} = 4\% \quad \frac{1}{5} = 20\% \text{ and } \frac{1}{20} = 5\%$$

Note: The denominator multiplied by the percent = 100.

3. Fractions to Decimals II - Denominators that are powers of 10

$$\frac{34}{100} = 0.34 \quad \frac{45}{1,000} = 0.045 \quad \frac{143.7}{100} = 1.437$$

Teaching Tip: As well as spelling the fraction (34 over 100) and spelling the decimal (point three four or point thirty-four), have the students say the fraction ("34 hundredths") and say the decimal ("34 hundredths"). Hey, they are the same!

4. Fractions to Decimals III - Denominators that are factors of powers of 10, e.g. 2, 4, 5, 20, 25

A. Build from the benchmark fractions:

$$\frac{3}{5} = 0.\underline{\quad}. \quad (\text{Think: } \frac{1}{5} = 0.2, \text{ so } \frac{3}{5} = 3 \times 0.2 = 0.6)$$

B. Write an equivalent fraction whose denominator is a power of 10.

$$\frac{3}{5} = \frac{3 \times 2}{5 \times 2} = \frac{6}{10} = 0.6 \quad \frac{4}{25} = \frac{4 \times 4}{25 \times 4} = \frac{16}{100} = 0.16$$

5. Fractions to Decimals IIII

To convert any fraction to a decimal, use long division.

If your students get confused about which number to divide into which number, here is a little trick you might want to teach your students.

Example: Write $\frac{3}{8}$ as a decimal.

Write the division symbol to the right of the denominator, and write the numerator as the dividend. Reason: Students will be less likely to make the mistake of dividing 3 into 8 rather than 8 into 3.

$$\begin{array}{r} 3 \\ \hline 8 \overline{) 3.000} \end{array}$$

6. Percent to Decimal

$$34\% = 34 \text{ per hundred} = \frac{34}{100} = 0.34$$

To change a percent to a decimal, divide by 100.

Shortcut: move the decimal place 2 places to the left and remove the percent sign.

7. Decimal to Percent

$$0.4 = 0.40 = \frac{40}{100} = 40\%$$

To change a decimal to a percent, multiply by 100.

Shortcut: move the decimal 2 places to the right and add a percent sign.

8. Fraction to Percent I - Denominators that are factors of 100.

Write the equivalent fraction with a denominator of 100.

$$\frac{4}{25} = \frac{4 \times 4}{25 \times 4} = \frac{16}{100} = 16\%$$

9. Fraction to Percent II - General

First change to the decimal equivalent, and then change from decimal to percent.

$$\frac{3}{8} = 0.375 = 37.5\%$$

10. Percent to Fraction

Write as a fraction with a denominator of 100, then simplify

$$40\% = \frac{40}{100} = \frac{40 \div 20}{100 \div 20} = \frac{2}{5}$$