

UNIT 10 *Arithmetic: Fractions*

Teaching Notes

Historical Background and Introduction

In this Arithmetic Unit we introduce the important topic of *fractions*. Unit 4 has already given an historical introduction to decimals and fractions; it is of interest to note that, from earliest times, two systems have been used. One was employed by the ancient Egyptians as early as 1700 BC. Indeed, in about 1850 BC, king Amememhat III came to the throne and he initiated an extensive system of irrigation, necessitating a knowledge of mathematics never before developed (except perhaps in Mesopotamia). There is good reason to believe that in this reign, about 1825 BC, there was written the original of the oldest elaborate manuscript on mathematics still in existence, the *Ahmes treatise*; if this conjecture is correct, the unit fraction (with 1 as the numerator) was already known in Egypt at this time. All their fractions had 1 as the numerator, and other fractions were expressed as the sum of fractions with 1 as the numerator, e.g.

$$\frac{4}{9} = \frac{1}{3} + \frac{1}{9}$$

Of course, for some fractions, an approximation is needed in order to express it as a series of fractions with 1 as the numerator, e.g.

$$\frac{1}{4} + \frac{1}{7} + \frac{1}{9} + \frac{1}{10} + \frac{1}{20}$$

is used as an approximation for $\frac{17}{26}$. You can use a calculator to check its suitability.

The second system, used by the Babylonians (c 200 BC) and brought to Europe by the Greeks, used fractions with $\frac{1}{60}$ as the base, e.g. $1 \cdot 22' 7'' 42'''$ represents

$$1 + \frac{22}{60} + \frac{7}{3600} + \frac{42}{216000} \text{ etc.}$$

The number 360 was probably an early guess at the number of days in a year; and even after it was clear that the number of days was *not* 360, this magical number was still used as the angular measure round a circle (just note how many factors 360 has to see its wondrous nature!). It is fascinating to note that the earliest dated event in human history is the introduction of the Egyptian calendar of 12 months of 30 days each, plus five feast days, in the year 4241 BC. Such an achievement is remarkable, given that it was a better calendar than that used in Europe from the time of the Romans until the reform of Gregory XIII (1582), and might be regarded as better than the one used to the present day – more than 6000 years later!

The key concepts in this unit are the identification of fractions, the equivalence of fractions, and the calculation of simple fractions of quantities.

Routes

	Standard	Academic	Express
10.1 Fractions	✓	✓	✓
10.2 Equivalent Fractions	✓	✓	✓
10.3 Fractions of Quantities	✓	✓	✓
10.4 Mixed Numbers and Vulgar (Improper) Fractions	(✓)	✓	✓

Language

• denominator, numerator	✓	✓	✓
• equivalent fractions	✓	✓	✓
• vulgar or improper fractions	(✓)	✓	✓

(✓) denotes extension work for these pupils

Misconceptions

- Confusion between denominator and numerator
- Note that equivalent fractions are always equal, e.g. $\frac{2}{4} = \frac{1}{2}$

Challenging Questions

The following questions are more challenging than others in the same section:

	<i>Section</i>	<i>Question No.</i>	<i>Page</i>
<i>Practice Book Y7A</i>	10.2	6	149
" "	10.2	8	149
" "	10.2	10	150
" "	10.4	7	155