

UNIT 4 *Arithmetic: Addition and Subtraction of Decimals*

Teaching Notes

Historical Background and Introduction

In this, the second of the six Arithmetic Units in Book 7A, addition and subtraction are revised, using firstly whole numbers and then decimals.

Our current way of writing (and manipulating) decimals is, largely, attributable to the Belgian mathematician, *Simon Stevin* (1548-1620), who moved to Holland and worked for the Dutch government as quartermaster-general of the army. In this role, he organised a school of engineering at the University of Leiden, to meet the growing need of the Dutch nation for trained engineers, surveyors and navigators.

Prior to his work, a notation for decimal fractions had been used, particularly in the Islamic world, but not manipulated in the way with which we are now familiar. Stevin made the significant jump of designing a system in which arithmetic operations (i.e. +, -, ×, ÷) used with whole numbers, worked in the same way with decimals.

For example, he first wrote 364.3759, as

$$364 \textcircled{0} 3 \textcircled{1} 7 \textcircled{2} 5 \textcircled{3} 9 \textcircled{4}$$

meaning $364 + \frac{3}{10} + \frac{7}{100} + \frac{5}{1000} + \frac{9}{10\,000}$ or $364 \frac{3759}{10\,000}$. He made the point that no fractions

were used in his notation, and his article went on to show how all the basic operations can be performed.

It should also be noted that, in a second major article, Stevin made the point that firstly 'unity' is a number (previously it was not regarded as a number, rather a generator of numbers), as are decimal squares, square roots, etc.

In principle, he defined what we now refer to as the set of 'real numbers'.

As was the case with Unit 2, much of this work should be revision; do not labour the work if your class is competent – just have one or two revision lessons, using the mental tests and the appropriate revision test.

Routes

- 4.1 Addition and Subtraction
- 4.2 Dealing with Money

	Standard	Academic	Express
4.1 Addition and Subtraction	✓	✓	✓
4.2 Dealing with Money	✓	✓	✓
<i>Language</i>			
• sum	✓	✓	✓
• difference	✓	✓	✓
• brackets	✓	✓	✓

Language

- sum
- difference
- brackets

Misconceptions

- Brackets often cause problems – they *do* matter and, in some cases, their use will produce a different answer,

e.g. $7 - (4 + 1) = 7 - 5 = 2$

whilst $7 - 4 + 1 = 3 + 1 = 4$

Challenging Questions

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

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