

## UNIT 2 *Arithmetic: Place Value*

## Teaching Notes

### *Historical Background and Introduction*

This is the first of the six Arithmetic Units in Book 7A. These units aim to consolidate and develop pupils' understanding of place value and arithmetic, as well as providing practice in the basic number operations.

The familiar place value concept used in our number system, and usually referred to as the Hindu - Arabic system, had its origins in India but brought to the West by means of the Arabs. The Babylonians had a place value system, but it was based on 60, whilst the Chinese, from the earliest times, had a system based on 10.

Around the 7th Century, the Indians dropped symbols for numbers higher than 9 and began to use symbols for 1 to 9 in our familiar place value arrangement (with a dot used for the zero). The first reference to this is in fact attributed to a Syberian priest in 662. Others began to use systems in which words stand for numbers, for example

<i>Number</i>	<i>Word</i>
0	sky
1	moon
2	eye
3	fire

Thus fire - sky - moon - eye is in fact 2103, the place value beginning on the left with the units.

Whilst the exact sequence of development is not at all clear, certainly by 870, a decimal place value system for integers existed both in India and China.

In this unit, we concentrate on *place value and rounding*. The first section (2.1) deals with the *natural numbers* and the second section (2.2) deals with *decimals*. After this Unit on *place value* the later arithmetic units will deal with *number operations*.

You must be careful not to labour these Arithmetic Units; if your pupils are already confident, just use them for quick and fast-paced revision. As the National Numeracy Strategy in Primary Schools begins to have an effect, it is hoped that these Arithmetic Units will no longer be necessary for any but the mathematically less able pupils.

You will find mental tests in this unit – it is crucial that your pupils can respond instantly to questions of this sort, and you ought to reinforce this aspect throughout the course.

### *Routes*

2.1 Place Value and Rounding

2.2 Decimals and Place Value

### **Standard Academic Express**

✓ ✓ ✓

(✓) ✓ ✓

### *Language*

• units, tens, hundreds, thousands, millions

• rounding to nearest 10, 100, 1000

• tenths, hundredths, thousandths

✓ ✓ ✓

✓ ✓ ✓

(✓) ✓ ✓

(✓) denotes extension work for these pupils

*Misconceptions*

- To round, say 14 459 to the nearest 1000, you first round to the nearest 10, then 100, then 1000 giving

$14\ 489 \longrightarrow 14\ 490 \longrightarrow 14\ 500 \longrightarrow 15\ 000$  (as '5' rounds up)

giving clearly the incorrect answer that 14 459 to the nearest thousand is 15 000.

- The number 1.329 is greater than 1.4 as it has more decimal places - reference to a number line will clearly show this to be false. Similarly, 1.09 is greater than 1.22, as the final digit 9 is greater than 2 - again reference to a number line shows this to be false.