UNIT 6 *Arithmetic: Multiplication of Decimals*   Teaching Notes

Historical Background and Introduction

This is another of the basic Arithmetic Units, extending the previous work on addition and subtraction to multiplication, both of whole numbers and of decimals.

There are many interesting ways of multiplying, invented back in history when there were no aids to calculation. In section 6.2 of the Practice Book, pupils are introduced to both Napier's method and Russian multiplication; these, together with Egyptian multiplication, are further analysed in the Activities (Activities 6.2, 6.3 and 6.5). Napier's method (or Napier's bones) is the starting point for the invention of logarithms.

John Napier was born in Edinburgh in 1550, and his father was an important gentleman landowner. John Napier was educated at St Andrew's University, but left for Europe before graduating. Whilst in Europe he gained his knowledge of higher mathematics. In 1571 he returned to Scotland where he began to run his father's estates. He married in 1574, by which time he had built a castle. He approached agricultural problems in a scientific way, experimenting with soil fertilization.

Napier's study of mathematics, though, was just a hobby, and he found it difficult to make time for his calculations. Despite this, he invented logarithms; used Napier's bones* for mechanically multiplying, dividing and taking square and cube roots; found exponential expressions for trigonometric functions, and introduced the decimal notation for fractions!

He died in Edinburgh in April 1617.

Routes	**Standard**	**Academic**	**Express**
6.1 Multiplication of Whole Numbers	✓	✓	✓
6.2 Long Multiplication	✓	✓	✓
6.3 Multiplication with Decimals	(✓)	✓	✓
6.4 Problems Involving Multiplication	(✓)	✓	✓

(✓) *denotes extension work for these pupils*

Language			
• multiplication	✓	✓	✓
• Napier's method	✓	✓	✓
• Russian multiplication	✓	✓	✓
• Box method	✓	✓	✓

* The rods Napier produced were made of ivory, so they looked like bones – hence the name.

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Misconceptions

- 0.1×0.1 is often thought to be 0.1; this can readily be seen to be false, as $0.1 \times 10 \times 0.1 = 0.1$

- 2.3×10 is *not* 2.30 or 20.3

Challenging Questions

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

	Section	*Question No.*	*Page*
Practice Book Y7A	6.2	3 (f)	94
	6.3	2 (e), (f), (j)	95
	6.3	3	96
	6.4	11, 14	97