

CHAPTER 5

Working with numbers and symbols

1 Introduction: learning the language

You come across numbers and symbols every day. For instance, you find numbers on timetables, food packets and till receipts. Symbols appear on road signs, weather charts and dials for washing machines and cookers. Why aren't words used instead? I can think of at least three reasons.

Numbers and symbols summarize information in small, neat chunks.

'11:45' takes up much less space than 'eleven forty-five'.

Symbols have exact meanings, which are widely accepted as standard.

My washing machine has a spiral symbol for 'spin'. Operating a friend's machine is a little easier if it has the same symbol.

Once you know what a symbol means, you can read it very quickly

A road sign with a symbol indicating 'bend to left' can be read very quickly as you drive past. A sign that said 'You are approaching a sharp bend to the left' would give much the same information, but you'd probably have to stop the car to read it.

Numbers and symbols are therefore very convenient forms of communication. And they assume a particular importance in MST subjects. As was mentioned in Chapter 4, they form part of the language of mathematics. This chapter aims to make you feel more at home with this new technical language through advice about how to make sense of its new 'words' and 'letters'. Rather than expecting you to become fluent in a new language, I see this chapter as a phrase book, something to help you get started. It will be particularly helpful for students of science and technology, because it concentrates on examples of numbers and symbols that are sometimes the stumbling blocks in early study.

So, not only is the language of mathematics of enormous importance in its own right, but you'll need a basic understanding for studying science or technology. Indeed, some branches of science use mathematics as their language – to appreciate the *language* of physics, you'll need to understand the *language* of mathematics. Mathematics is a universal language, which crosses boundaries between subjects and countries. It is very powerful, and beautiful. Once you understand the ways it uses numbers and symbols, you can start to appreciate the elegance of the ideas that lie at the centre of MST subjects.

Chapter 4 ended by highlighting the importance of patience and practice; for this chapter, the same advice holds. The more you practise, the more confident you'll feel. If you feel daunted now by the prospect of numbers and symbols, keep an open mind and take things one step at a time. Take time to look at just a few symbols, try to master some of the basic aspects of working with numbers. By the

end of this chapter, you won't yet be fluent in this new language, but there should be less of a temptation to skip examples of numbers and symbols.

As you read this chapter, you may need to pause occasionally to work through some sections of Maths Help. These give you a chance to *use* numbers and symbols, not just learn to recognize them. So, it's a good idea to break up your study of this chapter into smaller chunks.

KEY POINTS

- Learning to use numbers and symbols is like learning a language – there are rules about when and how they are used, and how they are written.
- You need to practise using numbers and symbols, in order to understand what they mean and gain confidence in using them.

2 Getting used to numbers and symbols

Chapter 4 mentioned the importance of learning how to read mathematical writing carefully, checking that you understand something from each word and symbol. Here, I want to take this point further and tell you more about how some important numbers and symbols are read and written. As you will see, most of the symbols have standard meanings, whenever they are used. But sometimes the same symbol can have different meanings in different contexts – rather as the same word can have different meanings in different situations.

2.1 Reading numbers

In everyday life, you often come across numbers in the middle of ordinary writing, and you probably read them without giving them a second thought. For instance, 'there were 31 related outbreaks of food poisoning in 1988' would be said 'there were thirty-one related outbreaks of food poisoning in nineteen eighty-eight'. As you read the digits, you say them as words in your mind.