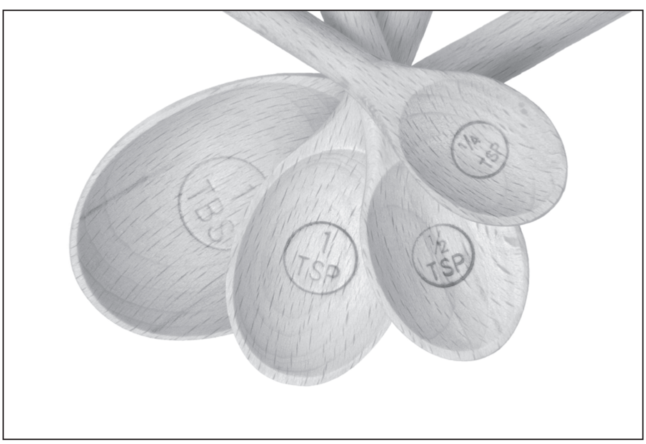
CHAPTER 1

Introduction and Background

Let me begin with a not very sincere apology: the only time I will use the word 'mathematics' in this book is in this sentence. From here on, I'm using the word maths only. OK? If this offends you, feel free to send me an email! Seriously, though, the word scares lots of people who suffered from difficult learning conditions of one sort or another when they were at school. I want you to enjoy this book and this subject.

So why write a book called *Using Business Maths*? Because maths is a valuable, daily life skill, that's why. It's useful and necessary for your personal life, your home life, your work life and for business generally. We use maths all the time, whether you realise it or not: cooking (recipes), shopping (pricing bargains), at the bookies (quite complicated: two to one, six to four, doubles, trebles, etc.) and when following the scoring in snooker (he needs three reds and all the colours to win) or darts (treble 19 and the bull to finish – and remember that finish in darts means to reduce your score to exactly zero, having started at 501). How do they do this? Maths, that's how!



Let me tell you a story about a student I once had; I'll call her Mary. We were learning about adding, subtracting, multiplying and dividing fractions (see Chapter 3) and I had given the class a question to work on. The solution, as far as Mary had it, finished with the fraction $\frac{42}{2}$. Now you can read this as '42 over 2 or '42 divided by 2'. I asked Mary, 'What's 42 divided by 2?' She answered with a nervous, rushed series of wild guesses: '13? 25? 19?' She was stressed and upset, so I said, 'Whoa, hold on there, you're guessing. What's half of 42?' And quick as a flash, without so much as a moment's hesitation, she said, '21.' Right answer.

You see, as a child she didn't 'get' maths, so she grew to adulthood with the impression that she would never be able to do maths. So when I presented her with a maths problem, her brain said, 'Uh oh, maths. We don't/won't/can't do maths. Panic stations. Guess, for God's sake. G-U-E-S-S. Anything to escape this!' But as you've seen, she knew the answer all along. She knew it immediately and instinctively, without having to think about it. 'Half of 42' is living, ordinary, everyday stuff, but '42 divided by 2' was the dreaded maths and in her mind, she couldn't do it. So I ask you to *stay open*. Don't think that just because you're an adult (or nearly an adult) and it may be years since you were in school that you don't know how to do lots of stuff. You *do*. Just remember Mary and be inspired!

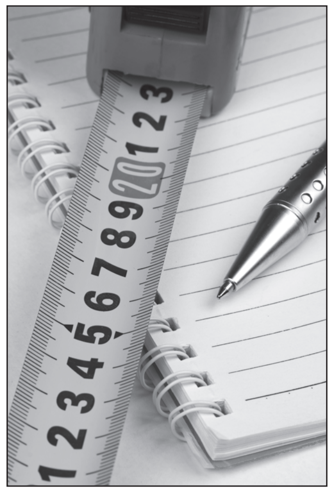
Every day, everywhere we go, we use maths. Every time we spend money and check our change: maths. Compare prices and pack sizes: more maths. Check our pay packet, do the household bills for next week and check the balance (if any!) in the bank: maths again. We play games, bet on horses and use some quite complicated maths.

And sometimes the maths isn't done using numbers: watch the way snooker players work out the angle, speed and weight of a shot or the way soccer players kick a long curved pass that goes right to the feet of a teammate running full speed down the wing. These are maths too, but of a different kind. Sure, we can always check a figure on a calculator, but honestly, who carries a calculator all the time, stuck to their shopping trolley, to the races, on the bus? No one, that's who. So my wish for the readers and students of this text is that you will learn to appreciate the importance of increasing your maths abilities and be better able to operate easily and confidently in your life, with friends and in work. This can only be good for you and your family, good for your community, good for your employer and good for your employment or promotion prospects. So this book is not about modules and exams. Yes, the modules are my guide, but you have reasons that are so much bigger and so much more important than any exam: a better life, a better job, a better and more confident *you*.

ACCURACY AND WHY IT'S IMPORTANT

Sometimes students ask, 'Why the need for such accuracy?' Well, when you collect your wages each week you expect to be paid properly for the right number of hours and at the right rate. You expect that the various taxes (see Chapter 9) will be correctly calculated and correctly deducted. You expect the correct money to show up in your bank account (and not somebody else's) when you go to the ATM. The only way these things happen is by people collecting data accurately, calculating your pay accurately, working out the taxes and other deductions accurately and then, if there's anything left, transferring the correct amount to the proper bank account in the right bank. The bank has to receive that information correctly and make sure it gets to your account as quickly and accurately as possible. You *expect* it to be right.

Think of all the maths and bookkeeping going on behind the scenes. There was a major bank computer failure in Ireland and the UK during the spring of 2012. People didn't get their wages, mortgages and other payments weren't made on time and some people even had no money to buy groceries. When these systems fail or are inaccurate, you will be the first to complain. Also, when businesses trade, buying and selling products and services, they need to be sure they are paying the prices agreed with their suppliers. When they sell, the invoices have to be correct to make sure that they in turn are paid in full by their customers. Not every business 'beeps' their products through a scanner, like at the supermarket. A builder or plumber can't scan the new pipes in your kitchen or 'beep' the 6 hours of their time they spent fixing the leak in your shower. They make up their bills for materials used and hours worked, charging appropriately for each. They can only do this if they know what they themselves paid and how much they must charge you to cover their costs and make a profit. They must also know how to calculate VAT and add this to your bill. And as if this weren't enough, at the end of the month they have to be able to show the taxman how they worked it all out. It's a lot of maths and it all has to be accurate.



We will learn about numbers and how to manipulate them by adding, subtracting, multiplying and dividing in Chapter 3. Most people using this book will probably have the basic skills of addition, subtraction, etc. However, some may not so I have included descriptions of the processes. If you want to, you can just skip over the sections you're happy with until you hit something you need to revise or learn for the first time.

We'll look at wages and the main payroll taxes in Chapter 9 and at keeping an eye on your budget in Chapter 12. We'll also look at measurement and all that goes with it, like distance, area, weight and volume, in Chapter 8, plus lots, lots more. So you see, it's a story about life, a journey, and as I said at the start, it's all maths. And remember, it's much more important than any exam.

> **'The hardest arithmetic to master is that which allows us to count our blessings.'**
>
> —*Eric Hoffer*

CHAPTER 3

Brilliant Basics: Getting Numbers to Work for You

We add, subtract, multiply and divide numbers all the time. It's natural to most people, but if you haven't done much of it you can easily forget or just get rusty. Like any skill, 'use it or lose it' applies. Some people just didn't 'get' maths in school, so this chapter starts at the very beginning, explaining the basic processes of arithmetic. Every skill has its basics: pianists practise their scales, athletes practise their techniques in running, jumping, kicking a football or hitting a golf shot. A sales trainer I once had used to say, 'Do the brilliant basics every day.'

DEFINITIONS

Numbers come in different types, although we rarely think of them in this way. Let's look at a few definitions so we all have the language right. This language won't change your life and you won't be required to memorise it (not by me, anyway), but it just means we understand each other more precisely. If I'm to explain things, I better make sure we speak the same language! (Try explaining to a French person how you like your tea when you don't speak French and they don't speak English.) I'll keep to simple, ordinary words as much as I can. You can always refer back to these definitions if you need to as you go along. Most of these terms are used in the FETAC module descriptors for our modules, Business Calculations and Functional Mathematics.

- **Natural numbers** are the ordinary counting numbers we are used to, starting with 1 and continuing to infinity.
- **Digits** are the individual characters we use to write all numbers. There are only 10 of them: 1 2 3 4 5 6 7 8 9 0.

- **Integers**, or **whole numbers**, are all the natural numbers, both positive and negative, and including zero (e.g. 12, 5, 0, −7, −124), excluding decimals and fractions.
- **Rational numbers** are all numbers, including decimals and fractions, that can be accurately expressed as fractions, where the **numerator** (number on top) and **denominator** (number on the bottom) are whole numbers (e.g. 12 ⅘).
- **Irrational numbers** are any numbers that are not rational and therefore cannot be accurately expressed as decimals or fractions. The most widely known irrational number is pi (pronounced 'pie'), which is the circumference of a circle divided by its diameter (see Chapter 8). Pi is commonly written as 3.14, but it can never be accurately written.

Most people using this book will probably already be comfortable with the basic skills of addition, subtraction, etc. However, some may not so I have included descriptions of the processes. If you want to, you can just skip over the sections you're happy with until you hit something you need to revise or learn for the first time.

Your teacher may want to take you directly to the calculator chapter (Chapter 2), as these are so cheap and easy to carry – everybody has one, as they're on mobile phones. That's fine by me, but if you want to use your brain a bit more by doing some of life's simple calculations on the fly, then you might just try some of the following.

ADDITION

Adding is calculating the sum, or total, of two or more numbers. If you're no good at this, I suggest you practise. Like music, maths is simply a skill you can learn. When I was at school, admittedly a long time ago, we all learned our tables, starting with the addition of numbers from 1 to 12 and progressing to multiplication (so I never did master 13 times!). That approach isn't favoured today, but for your own sake and to keep the brain working, use every opportunity to practise even simple maths tasks. Every little helps and you will get better and better.

Here's a simple matrix to help you. Photocopy it or type it, print it small, stick it to one side of a piece of card and keep it in your pocket, bag or wallet. Refer to it often until you know all the combinations comfortably.

	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
1	2	3	4	5	6	7	8	9	10	11	12	13
2	3	4	5	6	7	8	9	10	11	12	13	14
3	4	5	6	7	8	9	10	11	12	13	14	15
4	5	6	7	8	9	10	11	12	13	14	15	16
5	6	7	8	9	10	11	12	13	14	15	16	17
6	7	8	9	10	11	12	13	14	15	16	17	18
7	8	9	10	11	12	13	14	15	16	17	18	19
8	9	10	11	12	13	14	15	16	17	18	19	20
9	10	11	12	13	14	15	16	17	18	19	20	21
10	11	12	13	14	15	16	17	18	19	20	21	22
11	12	13	14	15	16	17	18	19	20	21	22	23
12	13	14	15	16	17	18	19	20	21	22	23	24

Why do we need to know how to add and subtract anyway, you might ask? Haven't we got calculators? Well, in all home, work and business situations we need to add numbers, e.g. the number of people coming to a party, the ingredients for a cake, the price of a few groceries or the hours we've worked this week. We need to be able to add up the bills we have to pay each week out of our wages or out of the bank account. In everyday life adding isn't just a useful skill, it's a necessary skill, so *learn how to add numbers*. Take your time and don't be embarrassed. You can learn how to add your numbers with practice, over an extended period. Don't expect results in a day, or even a week. Slowly does it. At first you can use your matrix, but try and get away from that as soon as you can. After a while you may find that you start to know the answer in your head even before you find it on the matrix. That's learning with practice.

EXERCISE 3.1

(a) 2 + 4
(b) 2 + 7
(c) 5 + 3
(d) 4 + 3
(e) 6 + 2
(f) 4 + 6
(g) 5 + 6
(h) 6 + 6
(i) 7 + 5
(j) 8 + 3
(k) 6 + 8
(l) 7 + 6
(m) 9 + 4
(n) 7 + 8
(o) 8 + 6

At this point you should be getting the idea. You can check your answers in the answers section at the back of the book or on your calculator.

Now to add bigger numbers. One important element of adding is how we write numbers to do the exercise, since where we place a digit affects its value in the overall number. They would normally look like this:

Thousands	Hundreds	Tens	Units	Decimal point	Tenths	Hundredths
1	2	3	4	.	5	6

This gives an overall picture of how the value of a digit is changed depending on where it appears in a number. More on this later, but for now let's look at a simple addition example.

$$\begin{array}{r} 23 \\ +123 \\ \hline 146 \end{array}$$

You'll notice that, starting from the right, the units (the 3s) are under one another. The tens (the 2s) are also directly under one another. Setting them out this way makes adding much easier. Make this a habit, especially if you do any bookkeeping by hand. Computers do this automatically, but when using paper (remember paper?), you must be tidy. Start from the right and you can't go wrong.

Going back to the example above, 3 + 3 = 6 (being six units), 2 + 2 = 4 (or four tens) and the final 1 is one hundred. So 146 is the answer.

But what about bigger numbers or numbers with higher-value digits that add up to more than 10?

$$\begin{array}{r} 58 \\ +\ 63 \\ \hline 121 \end{array}$$

As before, starting at the right, 8 + 3 = 11 (one unit and one ten). Write down the unit answer. We add the 'ten' to the next column of numbers (the tens).

1 (from the units column) + 5 = 6, and 6 + 6 = 12 (i.e. two tens and one hundred). The 2 is written under the 6, in the column with the other tens, and the hundred is written, on its own, in the hundred column, which is a new column to the left of the tens.

So now you see that the rows increase in value from right to left: ones, tens, hundreds and thousands. You probably already know that ten is really ten ones and one hundred is ten tens. In the same way, a thousand is ten hundreds.

Remember to practise. You might not get it straightaway, but you will. If you ever played a musical instrument, you know that learning a new chord or a new technique sometimes takes a lot of work before you can perform it with ease. It's the same here. It may be simple, but it's not easy – not if you've never done it before – so practise, practise, practise. Try these, then make up your own. You can always check your answers on a calculator.

EXERCISE 3.2

(a) 15 + 28

(b) 38 + 79

(c) 126 + 72

(d) 1,126 + 273

(e) 857 + 1,265

(f) 258 + 65 + 5,687

(g) 654 + 1,268 + 27

SUBTRACTION: THE OTHER SIDE OF THE COIN

If we can add one number to another, we must also be able to take numbers away. This is called **subtraction** – it's where you calculate the difference between two numbers by taking one number away from the other, or if you prefer, reducing one number by another.

So how do we do it? Let's try one. If I have €9 and I give you a fiver (€5), how many euros do I have left? In maths we write it like this:

$$9 - 5 = 4$$

We say this as 'nine minus five equals four'.

If there are ten of us in the house and I leave with my three kids, how many remain behind? Three kids and me is four, so ten minus four equals six. Or in maths form:

$$10 - 4 = 6$$

EXERCISE 3.3

(a) $8 - 3$
(b) $9 - 5$
(c) $12 - 2$
(d) $17 - 4$
(e) $18 - 12$
(f) $17 - 12$
(g) $16 - 11$
(h) $19 - 15$

These are easy enough to 'see' in your head, as they are small numbers. But how do we handle subtracting larger numbers? It hinges on writing them down properly, as before. So if we want to take 56 from 279, that's not so easy, is it? Write it down, making sure to line up the units, tens and hundreds under one another.

$$\begin{array}{r} 279 \\ -\ \ 56 \\ \hline 223 \end{array}$$

If you write them down like this, it's fairly easy to subtract:

Units: 6 from 9 leaves 3
Tens: 5 from 7 leaves 2
Hundreds: Nothing from 2 leaves 2

That was easy, wasn't it? But what if the digits on the bottom – the ones we're subtracting – are bigger than the ones in the top row? There are some different views on how this should be done. This is how I've always done it and it works reliably, every time.

Suppose I want to subtract 48 from 67. Write it down as before, lining up the units and tens.

$$\begin{array}{r} 67 \\ -48 \\ \hline 19 \end{array}$$

Beginning from the right, we try to take 8 from 7 but immediately realise there isn't enough in 7 to take away 8. So we 'borrow' 10 from the next column (tens), giving us 17 units. Now take 8 from 17, which leaves 9. Put this in your units column as the first part of the answer.

We then carry forward the 10 we borrowed and add it to the 4 in the tens column, giving us 5 to subtract. Take the 5 on the bottom from 6 on the top line and you get 1. Write that in the tens column and you're done! Check that on the calculator just to satisfy yourself, or for more practice, add the answer, 19, to 48. Try a few on your own.

EXERCISE 3.4

(a) 63 − 34
(b) 92 − 27
(c) 83 − 45
(d) 47 − 29
(e) 31 − 14
(f) 66 − 39

Let's work with a longer number and take 5,548 from 8,632. Begin by writing it out.

$$\begin{array}{r} 8{,}632 \\ -5{,}548 \\ \hline 3{,}084 \end{array}$$

8 (units) from 2 … not enough. Borrow 1 from the tens, making 12 units. 8 from 12 equals 4. Write down the 4.

Carry the 1 we borrowed. 1 and 4 (tens) is 5. 5 from 3 … again, not enough. Don't panic, just repeat the process. Borrow 1.

Now 5 (tens) from 13 leaves 8. Write down the 8.

Carry the 1 (the second 1) and add to the 5 in the hundreds column, giving 6. 6 from 6 leaves zero. Simple. Write that down.

Finally, take 5 (thousands) from 8 to give you 3. Write it down. You're done!

EXERCISE 3.5

(a) 158 − 129
(b) 292 − 195
(c) 1,283 − 856
(d) 1,247 − 255
(e) 26,326 − 16,459
(f) 6,652 − 3,978
(g) 22,444 − 15,657
(h) 239,239 − 89,789

So you see, you borrow from the next highest column when you're short and you repay by carrying forward each time. And it's always just 1 you borrow and repay, borrow and carry forward. So as I keep saying, practise by doing the exercise, but go on practising at home, noticing when you're subtracting numbers in life situations. For example, you need five players for a basketball team, so you need ten players for a match. Oops, there are only eight of us. We're short – 10 minus 8 is 2. That's subtraction. There's twelve of us but only eight sandwiches. We need 12 − 8 = 4 sandwiches from the shop please. Subtraction again! I have 68 cents but that bar of chocolate is 80 cents. Can you give us a lend of … (80 less 68 equals, let's see, 8 from 0, borrow 1, 8 from 10 is 2, carry 1, 7 from 8 is 1, that's 2 units and 1 ten) 12 cents please! Get it? It's subtraction. Notice it, practise it. 'Yes you can!' as US President Obama says.

MULTIPLICATION

For the simpler multiplication of single-digit numbers, use the matrix. Like the addition matrix on page 18, you can photocopy this and keep it in your pocket to use as you gradually become familiar with how it works. Remember, you help yourself learn by saying the figures you read off the matrix: two 3s are 6; three 4s are 12; seven 5s are 35. (By the way, learn to count in fives, it helps with your multiplication: 5, 10, 15, 20, 25, 30, etc.) Keep saying it. Keep learning. 'Yes you can!'

1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
2	4	6	8	10	12	14	16	18	20	22	24
3	6	9	12	15	18	21	24	27	30	33	36
4	8	12	16	20	24	28	32	36	40	44	48
5	10	15	20	25	30	35	40	45	50	55	60
6	12	18	24	30	36	42	48	54	60	66	72
7	14	21	28	35	42	49	56	63	70	77	84
8	16	24	32	40	48	56	64	72	80	88	96
9	18	27	36	45	54	63	72	81	90	99	108
10	20	30	40	50	60	70	80	90	100	110	120
11	22	33	44	55	66	77	88	99	110	121	132
12	24	36	48	60	72	84	96	108	120	132	144

The matrix is limited to small numbers (1 to 12). So how do you multiply *any* number? Just like the subtraction process above, there is a procedure for multiplying that breaks it down into steps. Let's keep it simple to start and try 23 × 4.

$$\begin{array}{r} 23 \\ \times\ \ 4 \\ \hline 92 \end{array}$$

As always, line the digits up and start on the right. 4 times 3 is 12: write down the 2. You can't write down both the 2 and the 1 because you have to go on to the tens and that 1 will get in the way. A bit like carrying in subtraction, here we have an extra 10 to be carried forward. So remember this one 10 and continue multiplying: four 2s are 8, so add on that 1 from above. Four 2s are 8, plus 1 is 9. Write this down. Done. (You can check this on your calculator.)

EXERCISE 3.6

(a) 23×3
(b) 24×7
(c) 43×5
(d) 127×6
(e) 237×8
(f) 862×9

Moving along, let's be a little braver and try something a little harder. Let's multiply by a bigger number: 456×32.

$$\begin{array}{rl} 456 & \\ \times\quad 32 & \\ \hline 912 & = 456 \times 2 \\ 13{,}680 & = 456 \times 30 \\ \hline 14{,}592 & \end{array}$$

Basically what we do is multiply the 456 by 2 and then separately by 30 and add the two answers together. Check the calculation above: 456 by 2 is 912. What you do then is write down a 0 on the units column on the next line, then proceed as normal, but starting in the tens column. 456×3 is 1,368. Tack on that 0 and you get 13,680. Add 912 and 13,680 and the answer is 14,592. Try it yourself before you try the exercises below. Take your time with these. You're in new territory here and making good progress.

EXERCISE 3.7

(a) 23×38
(b) 324×723
(c) 643×562
(d) $1{,}127 \times 65$
(e) $3{,}237 \times 875$
(f) $3{,}862 \times 629$

DIVISION

Division can be done in two ways: short division and long division.

Short division

Short division deals with small, usually single-figure divisors. It's quick and easy as long as you know your simple multiplication and division (the matrix or tables).

Say you want to divide 1,071 by 7. It's not the sort of thing you can do just like that, so we write it down and work it out. Write it like this:

$$7\overline{)1071}$$

Start with the first number, 1. 7 doesn't divide into it, so proceed to take the next digit along with the first. That makes 10. Divide the 7 into 10. It goes once, with 3 left over. As you learn, it's handy to write in a tiny 3 over and between the 0 and the 7, as shown:

$$\begin{array}{r} 7\overline{)10{}^{3}71} \\ 15 \end{array}$$

That 3 is really 300, but as we're working in small values, we say 30. Now divide the 7 into 37. That's 3 (or 30) left from the first division and the 7, the next digit in our number. 7 into 37 goes 5 times ($7 \times 5 = 35$) with 2 remaining. Repeat the process, writing a tiny 2 as shown below, giving us 21. 7 into 21 goes 3 times exactly. And we're done.

$$\begin{array}{r} 7\overline{)1\ \ 0\ \ {}^{3}7\ \ {}^{2}1} \\ 1\ \ \ 5\ \ \ 3 \end{array}$$

This is worth practising.

EXERCISE 3.8

(a) $685 \div 5$

(b) $741 \div 3$

(c) $1{,}518 \div 6$

(d) $2{,}574 \div 3$

(e) $2{,}792 \div 8$

(f) $2{,}744 \div 7$

(g) $12{,}683 \div 11$

(h) $30{,}876 \div 12$

Long division

Long division is the name given to the process of dividing by larger numbers and it has its own layout. To divide 15,129 by 123, we write it out like this:

$$123\overline{)1\ 5\ 1\ 2\ 9}$$

So far it looks like short division. However, as we divide we write the answer *above* the dividend (the number being divided) and work below. We place the first answer digit above the latest digit in the dividend that we're using (in this case, the right-hand 1 of 151). Placing it in this way becomes more important later.

```
          1
     _________
123)1 5 1 2 9
    1 2 3
    -----
      2 8
```

123 won't go into 1 or 15 but 151 will work, as it's bigger than 123. 123 goes once into 151, so write the 1 on the line above, being the first digit of the answer, then write 123, or (1 × 123), below the 151 and subtract, leaving 28.

Now divide 123 into 28. Of course it won't go, so 'bring down' the next available digit, i.e. 2, making 282, which is big enough to work. Divide by 121. At this stage you may have to guess a little, but with practice you'll start to see what's appropriate. 282 divided by 123 is about 2 times with a bit left over. Write the 2 on the answer line. Now multiply the 123 by that 2, giving 246. Subtract 246 from 282, leaving 36.

```
          1 2 3
     _________
123)1 5 1 2 9
    1 2 3
    -----
      2 8 2
      2 4 6
      -----
        3 6 9
        3 6 9
        -----
          --
```

Again, 'bring down' the next digit (as it happens, the last digit, 9). Divide 369 by 123. You can probably see this is 3 times. Write 3 on the answer line, giving 123, and write 369 below the 369 you already have and draw a line underneath. Obviously there is no remainder, so we're done – the answer is 123. However, just to show there is no remainder, I usually put a dash under the line. I'll demonstrate another one of those for you without any comment and you can practise it yourself and then check your answer against mine:

```
          2 4 8 3
     ___________
256)6 3 5 6 4 8
    5 1 2
    -----
    1 2 3 6
    1 0 2 4
    -------
      2 1 2 4
      2 0 4 8
      -------
          7 6 8
          7 6 8
          -----
           --
```

EXERCISE 3.9

(a) 1,632 ÷ 24

(b) 2,759 ÷ 31

(c) 4,384 ÷ 16

(d) 20,736 ÷ 27

(e) 68,556 ÷ 174

(f) 179,705 ÷ 283

The final piece of this jigsaw is what to do if we don't get a nice clean ending, as we have in these exercises. What if there's a bit left over? Try this one: divide 345 by 60.

```
        5. 7 5
60 )3 4 5. 0 0
    3 0 0
    -----
      4 5 0
      4 2 0
      -----
        3 0 0
        3 0 0
        -----
          —
```

The first answer digit is 5 (5 × 60 = 300). Deduct this and you have a remainder of 45. Now, we have no more digits in the original number. So just like you would if the 345 was in euro (€345 or €345.00), you can insert zeros after a decimal point without changing the value of the number. Insert a decimal point and one 0 to start with. When you insert a decimal point in your dividend, you insert one in your answer as well and place them directly over each other.

Now you can divide 60 into 450. 7 times will give you 420. Write that down and subtract as normal and continue, inserting zeros, until you complete the division with no remainder or you have enough decimal places to satisfy your requirements. In this example, the answer is 5.75.

If the dividend has decimals in it from the start, just continue as if it wasn't there, except insert the decimal point in your answer, as shown, directly over the decimal point in the original number when you get to it.

But what if there's a decimal in the divisor as well? Now there's a great question. Again, it's easy to deal with. Write down the problem as before, including the decimal points. Now move the decimal point in the divisor to the right, until it's at the end of the digits. Then move the decimal point in the dividend *the same number of places* to the right and proceed as normal.

Let's take figures from the last example: divide 60 by 5.75.

Write them down as usual, then move the decimal point twice so that 5.75 becomes 575.

Do the same to the 60: 60 becomes 600, then 6,000. So we end up dividing 6,000 by 575. This doesn't divide evenly, so stop after three decimal places. (I got 10.434.) I've inserted all the decimal points so you can easily see what it looks like.

Before:

$$5.75\overline{)60.}$$

After:

$$575.\overline{)6000.}$$

EXERCISE 3.10

(a) 2,190 ÷ 17

(b) 7,870 ÷ 21

(c) 7,623 ÷ 18

(d) 10,500 ÷ 65

> 'The different branches of Arithmetic: Ambition, Distraction, Uglification and Derision.'
>
> —*Lewis Carroll*

> 'In the arithmetic of love, one plus one equals everything and two minus one equals nothing.'
>
> —*Mignon McLoughlin*