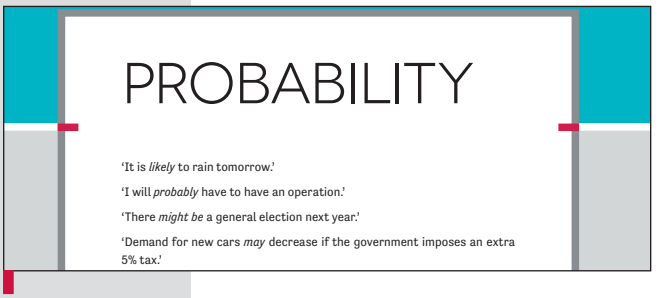
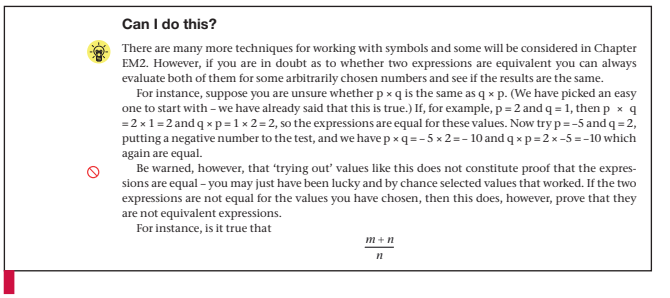
TOUR OF THE BOOK



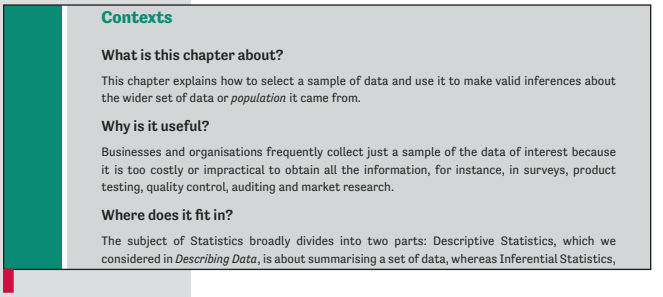
Section summary

An overview of each main section



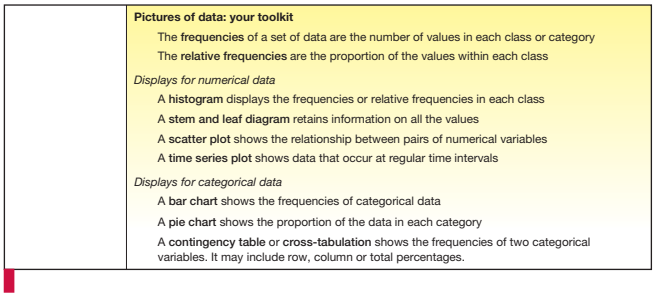
Icons

Pointing out tips, warnings and where computers can help



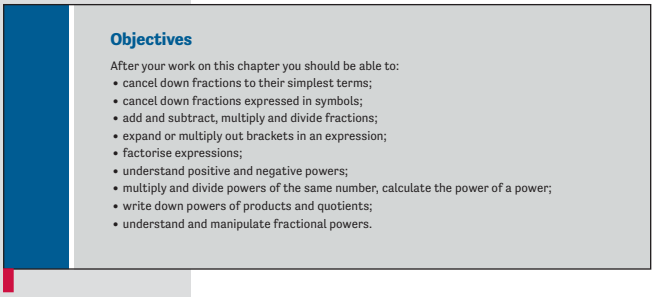
Contexts

Places each chapter in context and tells what you need to know to get the most from it



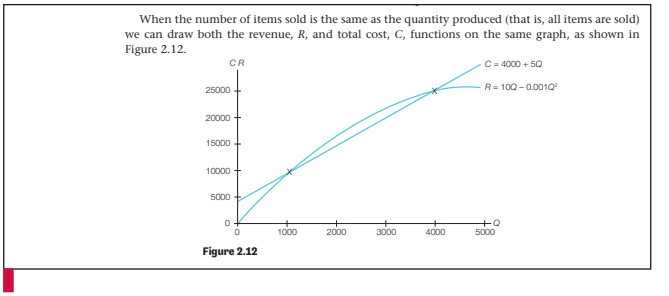
Key facts

Summaries of essential results and equations



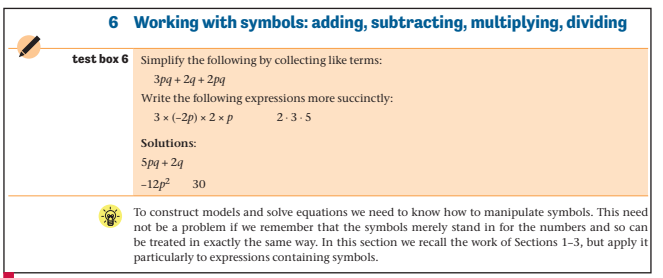
Objectives

What you should be able to do after completing the chapter



Figures and tables

Clear graphical and tabular presentation of data



6 Working with symbols: adding, subtracting, multiplying, dividing

test box 6 Simplify the following by collecting like terms:

$3pq + 2q + 2pq$

Write the following expressions more succinctly:

$3 \times (-2p) \times 2 \times p$ $2 \cdot 3 \cdot 5$

Solutions:

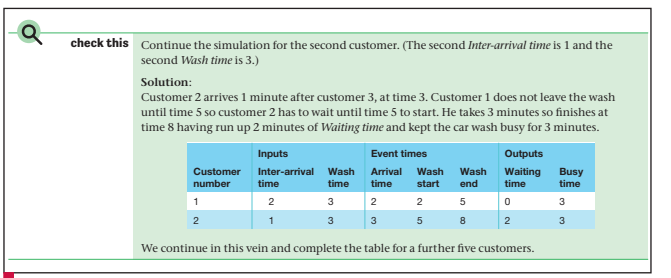
$5pq + 2q$

$-12p^2$ 30

To construct models and solve equations we need to know how to manipulate symbols. This need not be a problem if we remember that the symbols merely stand in for the numbers and so can be treated in exactly the same way. In this section we recall the work of Sections 1–3, but apply it particularly to expressions containing symbols.

Test boxes

In *Essential Maths* and *More Maths*, a chance to see whether you already know the material in a section. If you do, you can skip it!



check this Continue the simulation for the second customer. (The second *Inter-arrival time* is 1 and the second *Wash time* is 3.)

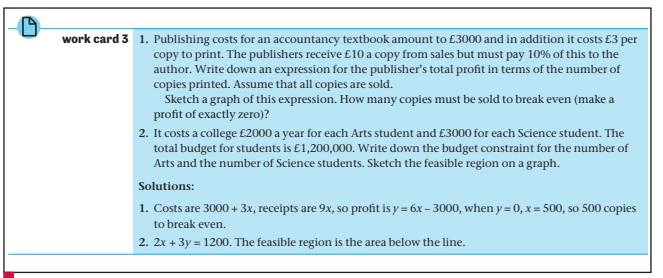
Solution:
Customer 2 arrives 1 minute after customer 3, at time 3. Customer 1 does not leave the wash until time 5 so customer 2 has to wait until time 5 to start. He takes 3 minutes so finishes at time 8 having run up 2 minutes of *Waiting time* and kept the car wash busy for 3 minutes.

	Inputs		Event times			Outputs	
Customer number	Inter-arrival time	Wash time	Arrival time	Wash start	Wash end	Waiting time	Busy time
1	2	3	2	2	5	0	3
2	1	3	3	5	8	2	3

We continue in this vein and complete the table for a further five customers.

Check this

Worked examples so that you can learn by doing



work card 3

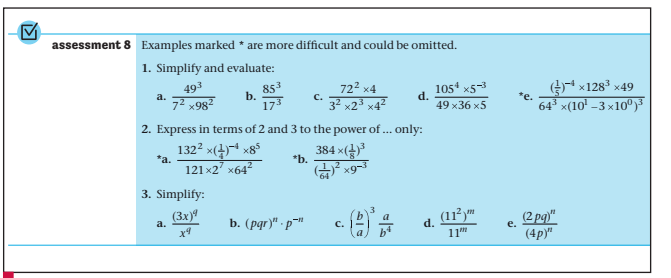
1. Publishing costs for an accountancy textbook amount to £3000 and in addition it costs £3 per copy to print. The publishers receive £10 a copy from sales but must pay 10% of this to the author. Write down an expression for the publisher's total profit in terms of the number of copies printed. Assume that all copies are sold.
   Sketch a graph of this expression. How many copies must be sold to break even (make a profit of exactly zero)?
2. It costs a college £2000 a year for each Arts student and £3000 for each Science student. The total budget for students is £1,200,000. Write down the budget constraint for the number of Arts and the number of Science students. Sketch the feasible region on a graph.

Solutions:

1. Costs are $3000 + 3x$, receipts are $9x$, so profit is $y = 6x - 3000$, when $y = 0$, $x = 500$, so 500 copies to break even.
2. $2x + 3y = 1200$. The feasible region is the area below the line.

Work cards

Exercises with fully worked solutions at the end of each section

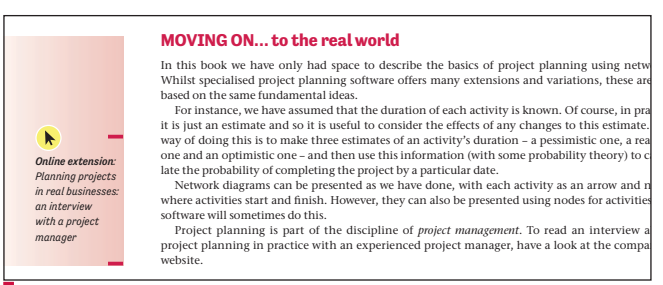


assessment 8 Examples marked * are more difficult and could be omitted.

1. Simplify and evaluate:
   a. $\frac{49^3}{7^2 \times 98^2}$ b. $\frac{85^3}{17^3}$ c. $\frac{72^2 \times 4}{3^2 \times 2^3 \times 4^2}$ d. $\frac{105^4 \times 5^{-3}}{49 \times 36 \times 5}$ *e. $\frac{(\frac{1}{3})^{-4} \times 128^3 \times 49}{64^3 \times (10^1 - 3 \times 10^0)^3}$
2. Express in terms of 2 and 3 to the power of ... only:
   *a. $\frac{132^2 \times (\frac{1}{4})^{-4} \times 8^5}{121 \times 2^7 \times 64^2}$ *b. $\frac{384 \times (\frac{1}{8})^3}{(\frac{1}{64})^2 \times 9^{-3}}$
3. Simplify:
   a. $\frac{(3x)^q}{x^q}$ b. $(pqr)^n \cdot p^{-n}$ c. $\left(\frac{b}{a}\right)^3 \frac{a}{b^4}$ d. $\frac{(11^2)^m}{11^m}$ e. $\frac{(2pq)^n}{(4p)^n}$

Assessments

Additional exercises – with solutions only available to lecturers through the companion website



Online extension: Planning projects in real businesses: an interview with a project manager

MOVING ON... to the real world

In this book we have only had space to describe the basics of project planning using netw
Whilst specialised project planning software offers many extensions and variations, these are based on the same fundamental ideas.

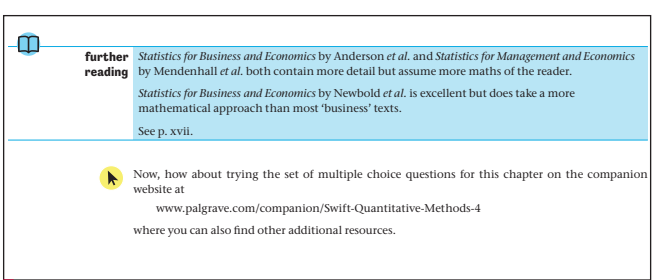
For instance, we have assumed that the duration of each activity is known. Of course, in pra it is just an estimate and so it is useful to consider the effects of any changes to this estimate. way of doing this is to make three estimates of an activity's duration – a pessimistic one, a rea one and an optimistic one – and then use this information (with some probability theory) to c late the probability of completing the project by a particular date.

Network diagrams can be presented as we have done, with each activity as an arrow and n where activities start and finish. However, they can also be presented using nodes for activities software will sometimes do this.

Project planning is part of the discipline of *project management*. To read an interview a project planning in practice with an experienced project manager, have a look at the compa website.

Moving on... to the real world

Discusses the application of quantitative techniques in real-life businesses and organisations, with links to further material on the companion website



further reading *Statistics for Business and Economics* by Anderson *et al.* and *Statistics for Management and Economics* by Mendenhall *et al.* both contain more detail but assume more maths of the reader.

Statistics for Business and Economics by Newbold *et al.* is excellent but does take a more mathematical approach than most 'business' texts.

See p. xvii.

Now, how about trying the set of multiple choice questions for this chapter on the companion website at

www.palgrave.com/companion/Swift-Quantitative-Methods-4

where you can also find other additional resources.

Further reading

Pointers to more sources of information about specific topics in other books, and further resources on the companion website