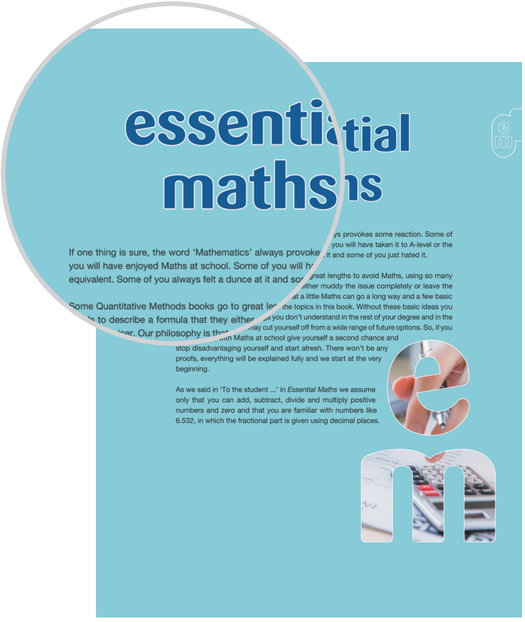
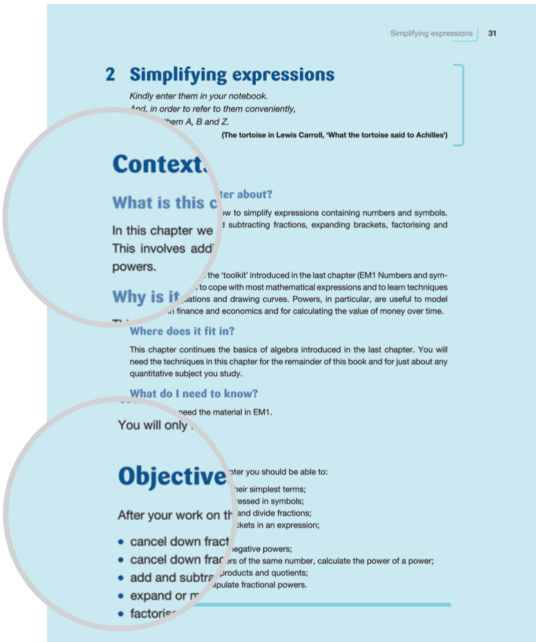
Guided tour of the book



Section summary An overview of each main section



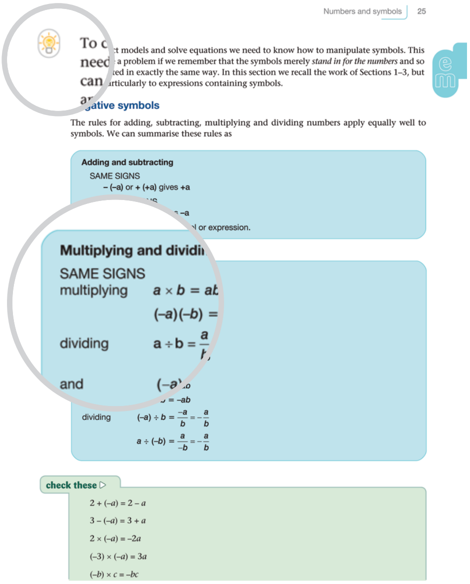
Contexts Places each chapter in context and tells what you need to know to get the most from it

Objectives What you should be able to do after completing the chapter

Icons Pointing out tips, warnings and where computers can help

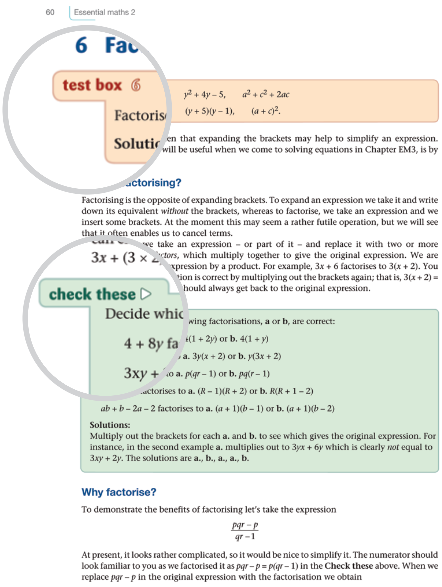
Tabs For easy access

Key facts Summaries of essential results and equations

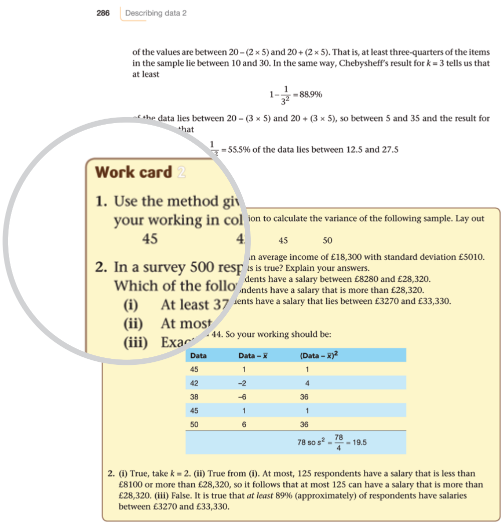


Test boxes A chance to see whether you already know the material in this section. If you do, you can skip it!

Check this Worked examples so that you can learn by doing



Work cards Exercises with fully worked solutions at the end of each section



286 Describing data 2

of the values are between 20 – (2 × 5) and 20 + (2 × 5). That is, at least three-quarters of the items in the sample lie between 10 and 30. In the same way, Chebysheff's result for $k = 3$ tells us that at least

$$1-\frac{1}{3^2}=88.9\%$$

of the data lies between 20 – (3 × 5) and 20 + (3 × 5), so between 5 and 35 and the result for ... that

... = 55.5% of the data lies between 12.5 and 27.5

Work card 2

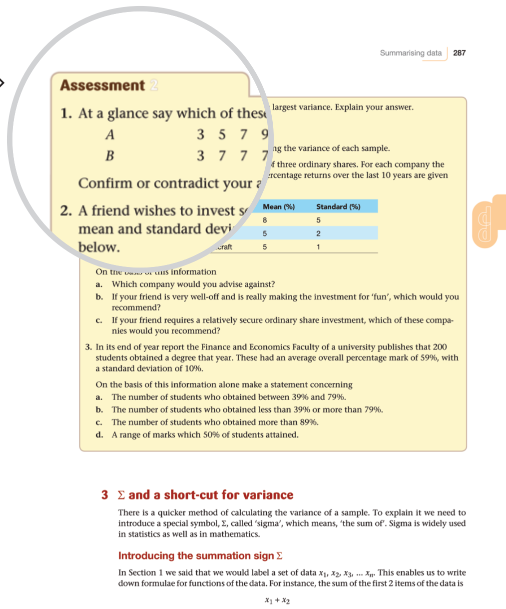
1. Use the method giv...ion to calculate the variance of the following sample. Lay out your working in col...
45 4... 45 50
2. In a survey 500 resp...n average income of £18,300 with standard deviation £5010. Which of the follo...ts is true? Explain your answers.
(i) At least 37...dents have a salary between £8280 and £28,320.
(ii) At most ...ndents have a salary that is more than £28,320.
(iii) Exac...ents have a salary that lies between £3270 and £33,330.

... 44. So your working should be:

Data	Data – $\bar{x}$	(Data – $\bar{x}$)^2
45	1	1
42	–2	4
38	–6	36
45	1	1
50	6	36
		78 so $s^2 = \frac{78}{4} = 19.5$

2. (i) True, take $k = 2$. (ii) True from (i). At most, 125 respondents have a salary that is less than £8100 or more than £28,320, so it follows that at most 125 can have a salary that is more than £28,320. (iii) False. It is true that *at least* 89% (approximately) of respondents have salaries between £3270 and £33,330.

Assessments Additional exercises – without solutions



Summarising data 287

Assessment 2

1. At a glance say which of these ... largest variance. Explain your answer.
A 3 5 7 9
B 3 7 7 7 ...
Confirm or contradict your a...ng the variance of each sample.
2. A friend wishes to invest s...f three ordinary shares. For each company the mean and standard devi...rcentage returns over the last 10 years are given below.

	Mean (%)	Standard (%)
	8	5
	5	2
...craft	5	1

On the basis of this information
a. Which company would you advise against?
b. If your friend is very well-off and is really making the investment for 'fun', which would you recommend?
c. If your friend requires a relatively secure ordinary share investment, which of these companies would you recommend?
3. In its end of year report the Finance and Economics Faculty of a university publishes that 200 students obtained a degree that year. These had an average overall percentage mark of 59%, with a standard deviation of 10%.
On the basis of this information alone make a statement concerning
a. The number of students who obtained between 39% and 79%.
b. The number of students who obtained less than 39% or more than 79%.
c. The number of students who obtained more than 89%.
d. A range of marks which 50% of students attained.

3 Σ and a short-cut for variance

There is a quicker method of calculating the variance of a sample. To explain it we need to introduce a special symbol, Σ, called 'sigma', which means, 'the sum of'. Sigma is widely used in statistics as well as in mathematics.

Introducing the summation sign Σ

In Section 1 we said that we would label a set of data $x_1, x_2, x_3, \dots x_n$. This enables us to write down formulae for functions of the data. For instance, the sum of the first 2 items of the data is

$$x_1 + x_2$$

Further reading Pointers to more sources of information about specific topics