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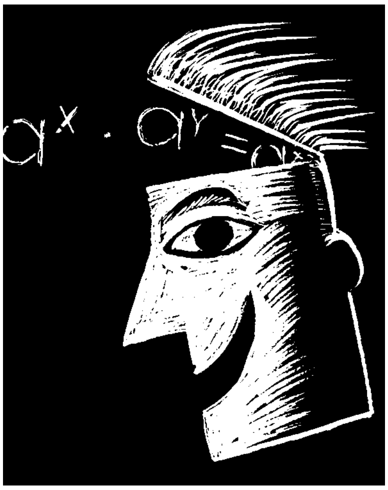
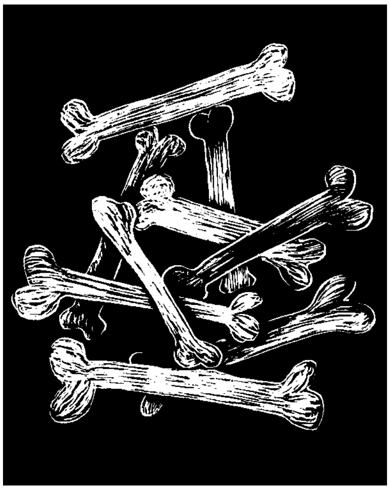
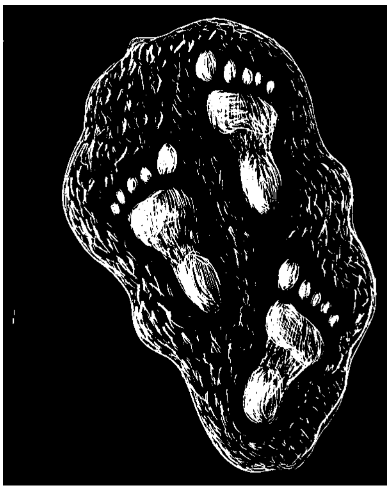
The Guide contains five kinds of pages, along with regular QuikChek problems:



Mind Munchies pages give you "food for thought", to help you make sense of algebraic ideas.



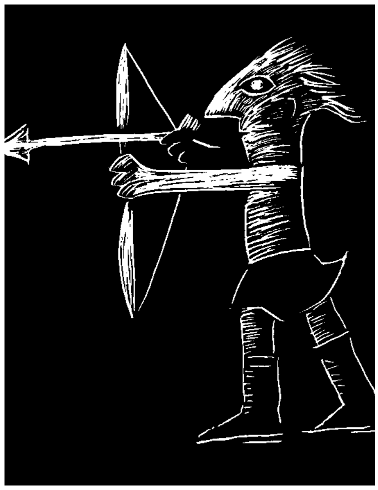
Bare Bones pages present basic information you'll want to memorise cold.



Step by Step pages show how to perform the steps for algebraic operations. These pages also illustrate those steps with an example.

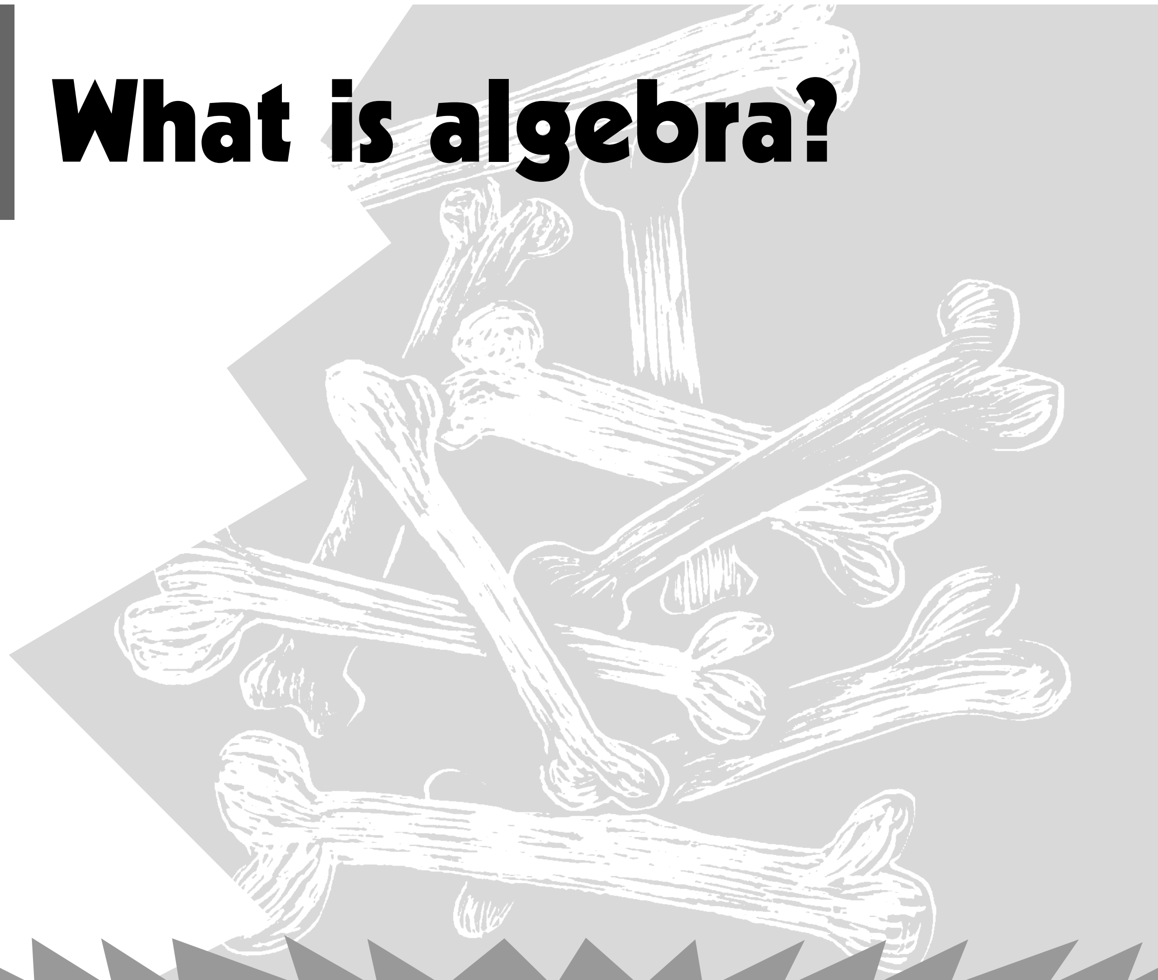
Pitfall pages teach you misunderstandings and mistakes to avoid.

Target Practice pages let you test your understanding by working out practice problems.



QuikChek problems give you a chance to check your grasp of the concept just taught.

Q: What is algebra?



A: Algebra is a branch of maths that performs a magic trick — it takes something that's **unknown** and - poof! - turns it into something **known**. Algebra does this by:

a) using letters (**variables**) to stand for **mystery numbers**, and

b) giving you a **process** to let you discover the value of the variables.

Simple example of an algebra problem

Joan has an unknown amount of money in her purse. If Joan had $5 more, she would have $100. How much money does Joan have?

Using algebra, you'd work out the solution like this:
Let the variable, **j**, stand for the amount of money **Joan** has.
Since Joan would have $100 if she had five dollars more,

$$j + 5 = 100$$

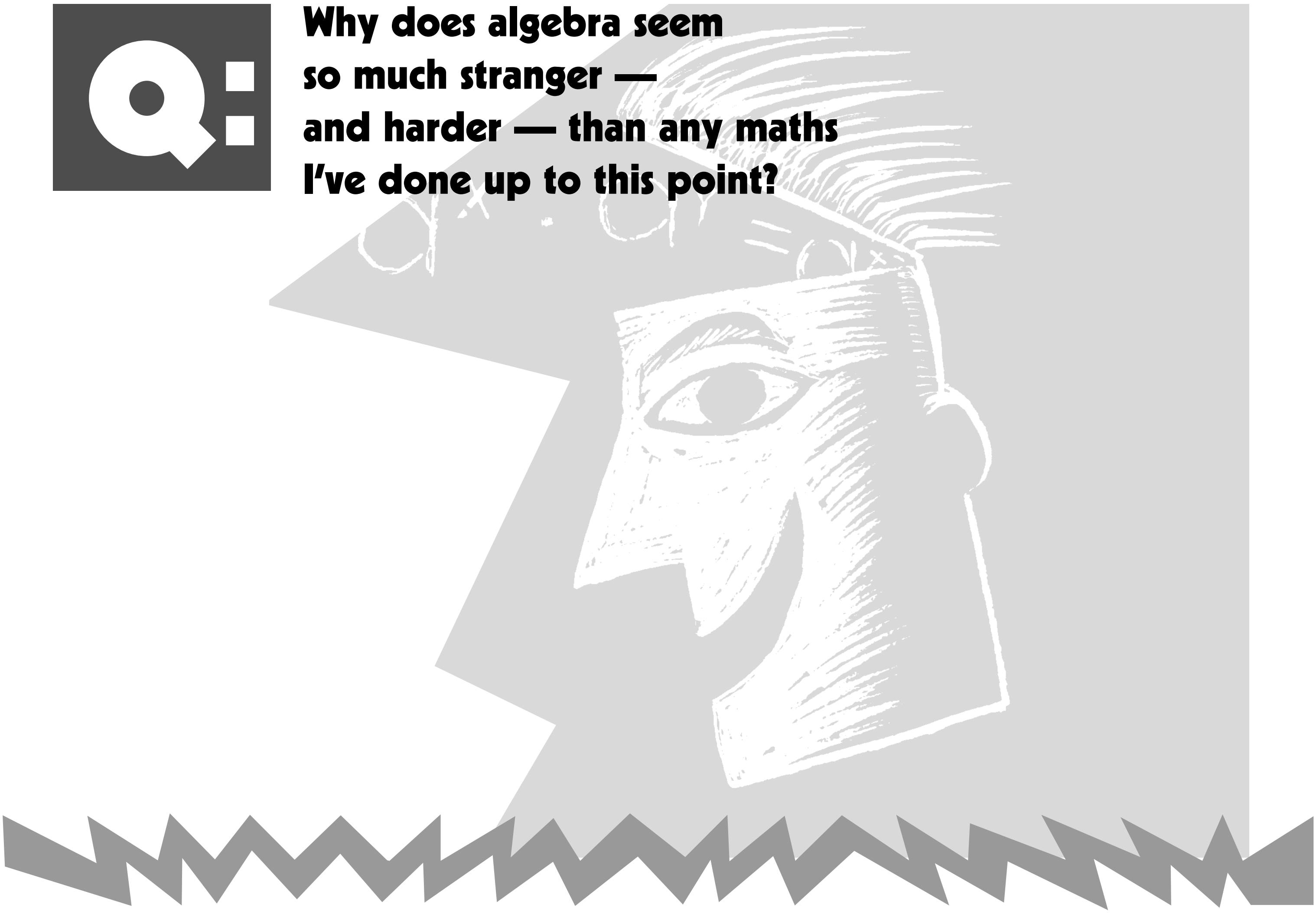
Then, using rules for solving equations (**pp. 188-198**),

$$\begin{aligned} j + 5 &= 100 \\ -5 &\quad -5 \\ j &= 95 \end{aligned}$$

meaning: Joan has **$95** in her purse

Seems simple? Don't worry ... in a little while, you'll be challenged by problems like this: **Two trains start heading toward Algebraville at the same time. One's coming down from the north at 100 km/h; the other is steaming up from the south at 150 km/h. If it takes the trains three hours to reach Algebraville, how far apart were they when they started?**

Q: Why does algebra seem so much stranger — and harder — than any maths I've done up to this point?



A: Algebra is weirder because it uses **abstract ideas**.

To grasp what is meant by **abstract ideas**, it helps to learn the difference between concrete and abstract thinking. Thinking about concrete things (not to be confused with thinking about cement) means thinking about stuff you can take in through your five senses, things you can touch, taste, smell, see or hear. Thinking about abstract things means thinking about pure ideas. Here's a little chart showing how you can take something concrete and make it more and more abstract.

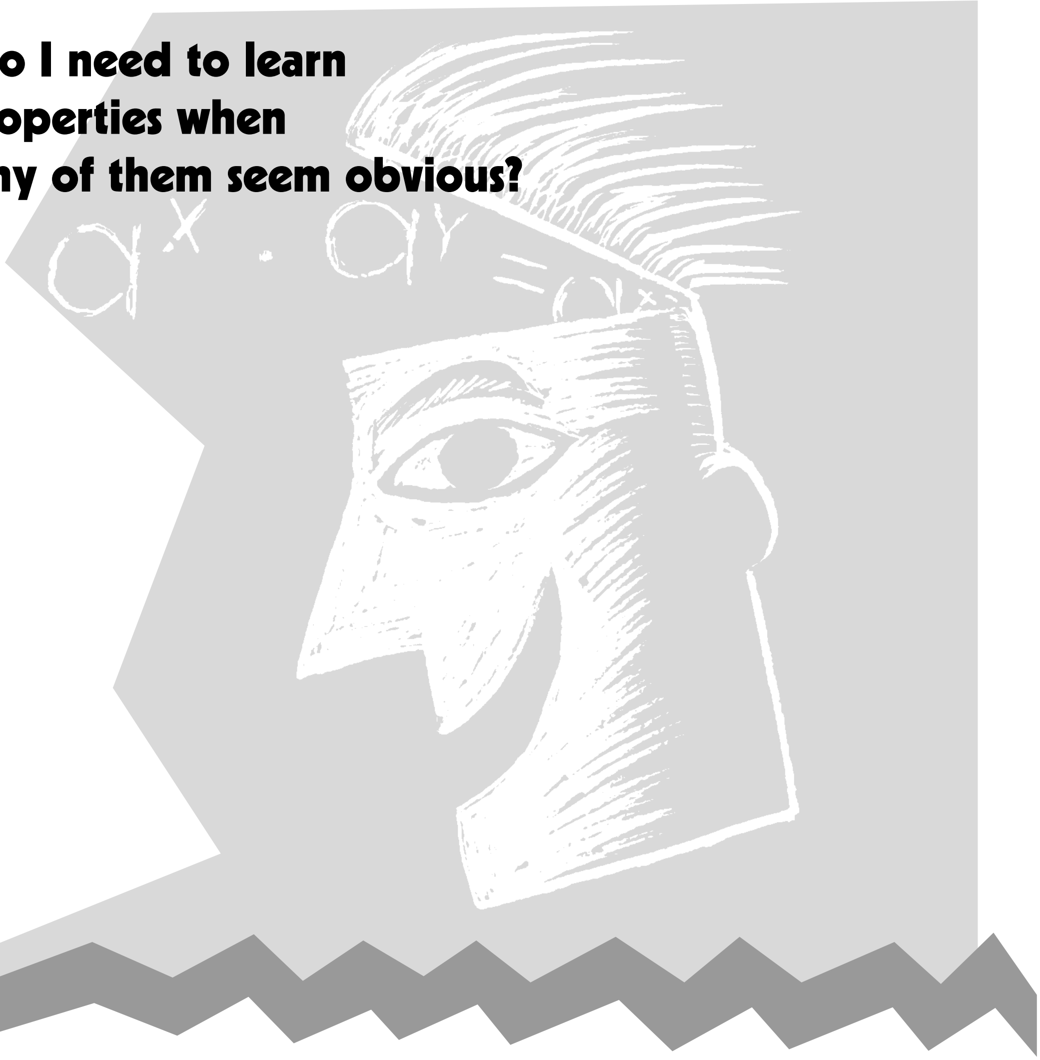
Concrete		**Somewhat abstract**		**More abstract**		**Abstract**
my dog Rover	→	dogs in general	→	living things	→	life
how Mr. X treats students	→	is Mr. X fair?	→	what is fairness?	→	justice

As you can see, concrete things are **specific**, while abstract ideas are **general**. Now, you might be wondering how this relates to maths. It relates because algebra takes the idea of a number (already fairly abstract) and lifts it to an even more abstract level. You can see this in the development of your sense of what a number is. For example, the idea of ....

- **three puppies** is a **concrete** idea (learned around age 3)
- **the number three**, standing for three of anything, is a **more abstract** idea (learned around age 7)
- **a variable like x**, which can stand for any number, is a **completely abstract** idea (learned during adolescence through algebra)

Since a variable like **x** can stand for any number, it's hard to think about at first. But just as you made the earlier leaps toward abstract thinking, you'll make this leap too. Hang on for the ride.

Q: Why do I need to learn the properties when so many of them seem obvious?



A: Even though many of the properties — for example, the reflexive and symmetric properties — seem so obvious that even most two-year-olds would understand them (reflexive property: Susie is Susie), still you need to memorise these properties so you can:

a) perform algebraic operations with confidence, and
b) prove algebraic principles.

Think of it this way. If algebra is viewed as a huge mansion that you're wandering around in for a year or so, this house had better have a strong foundation. For if it doesn't, a strong gust of logic could blow it down like a house of cards. The **properties of algebra**, which you'll learn in this section, **create the secure foundation for the House of Algebra**. They're what you'll rely on as you go tiptoeing about — performing algebraic operations and trying to prove basic principles — to make sure that your footing is always one hundred percent secure.