**Revision Division**
Software packages designed to help the student with revision for specific examinations are, quite properly, limited in scope. Each one attempts to cover a single aspect of the subject (mathematics, for example, or English literature) in considerable detail. Our first example deals only with mathematical equations of various sorts (linear, quadratic and simultaneous), and runs on the Spectrum, while the geometry package designed for the same hardware is wider reaching. The two remaining examples pose problems relating to Ohm's Law, and the design of amplifiers

'Equations And Inequalities', Rose Software

'Geometry', Rose Software
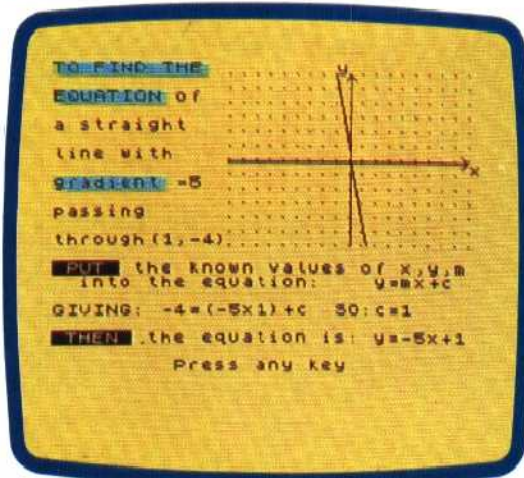
start on a computer literacy scheme, let alone explore the possible advantages of interactive educational software packages.

Given this inadequacy in the school system, it is perhaps less than surprising that a significant number of home computer owners cite the possibility of improving on their childrens' educational opportunities as one of the chief reasons for buying a machine.
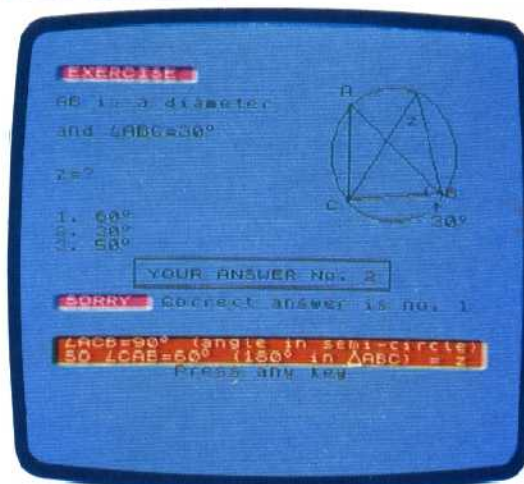
But leaving aside the problem of hardware, there is no doubt that educational programs play an increasingly important role as teacher aids in the classroom. Writing revision software, as it has come to be called, is a straightforward matter, requiring few of the tricks and devices employed in screen–based games programs, for instance. We have considered them as interactive textbooks because they have a great deal in common with their printed and bound counterparts. The identity of the author, for example, is an important selling point, just as it is with a conventional textbook, and the narrative pattern established in the book trade is also continued into the new medium.

The key difference, however, is the introduction of the concept of interaction. Traditionally, students are expected to rely on two sources of knowledge: the teacher and the textbook. The relationship with a teacher is interactive to some degree — albeit only to a small extent, given that classes are often 30-strong or more, and two hours of instruction per week allows each child four minutes of the teacher's undivided attention at the very best. It is not surprising that educationalists have explored the possibilities of more effective ways for children to interact with the material they are learning.

The first attempts at mechanised learning were the 'language laboratories' of the 1960s, which were applied to the teaching of imitative subjects such as foreign languages. Each student had access to a tape recorder and a pre-recorded text, and worked through that text at his or her own pace. The instructor had access to each student's individual audio channel, and could monitor or intervene as necessary. But the objective was to structure the course of instruction in such a way

as to make that intervention as infrequent as possible.

Computer-based instruction takes this to its logical conclusion, and removes the necessity for an instructor to intervene at any time. In many ways the revision package must be an expert system: that is, it must be totally self-contained, include no inaccuracies and, furthermore, be designed in such a way as to lead the user through the material easily and naturally. In this instance the computer system should be as easy to use as possible. It must assume very little in the way of computer literacy on the user's part, and certainly must not require any of the skills of a computer programmer or operator in order to make it usable.

When we come to consider the content of the software itself, then we must first differentiate between the sciences (where we are dealing with known and quantifiable facts) and the arts (where much of the analysis is judgemental and subjective). In the case of computer-based revision packages, there is a further distinction between the arts and the sciences. The latter will tend to be highly illustrated — even where we must rely on microcomputers that possess relatively low resolution graphics capabilities — whereas the arts subjects will be forced to rely very heavily on text-handling routines.

In addition to the very curriculum-specific tutorial and revision packages, a considerable body of material has been produced in the field of primary education — especially in simple arithmetic, reading and spelling.

So far we have concerned ourselves with computer software that is either didactic or inquisitorial in nature; either seeking to present facts in such a way as to make them easy to memorise, or asking multiple choice questions based on that information. However, there is a third type of software, more generally used in the classroom than by the student at home: experimental simulation software. In this case the programming techniques involved are much more complex, as the program is required to replicate mathematically the interaction of physical forces.