

Teacher's guide to PCR

The PCR program can be given to students without modification. The program is designed to be self-explanatory, and hints are available at all stages.

As emphasised in several places in the program, students should understand something about DNA structure and synthesis before they tackle the simulation. The Genetic molecules program can be used to provide the background for this.

Simulating PCR on the screen calls for some way to cope with the large number of molecules which accumulate. This program copes by artificially combining molecules which are the same, and showing numbers of each class of molecule. The advantage of this approach is that it shows the types of DNA products, and allows their buildup in numbers to be followed precisely. The disadvantage is that it does not give a physical picture of the complexity of the mixture of large numbers of the different types of molecule involved in the reactions. The initial screens attempt to give a picture of the mixture.

The simulation goes for a fixed number of 30 cycles, and students should be encouraged to follow through to the finish. Initially the simulation must all be done by hand, but different degrees of automation are introduced at particular times, so that the final cycles pass very quickly.

The program presents the student with the primers at the start, so that the question of primer design, the most important practical consideration when undertaking a new PCR, does not arise. This, and other aspects of the reaction, are considered in the 15 questions following the simulation, which students should be encouraged to try.