



## We are bug fixers

Finding and correcting bugs in programs

**In this unit you will:**

- 1 Find and correct the bugs in the multiplication program.
- 2 Improve the circle drawing program.
- 3 Find and correct the bugs in the penguin program.
- 4 Find the bug in the 'Pong' game and try to correct it.
- 5 Find and correct the bugs in the division program.
- 6 Think of ways to improve a car driving program.

**Word bank**

algorithm

bugs

debug

instruction

program

script

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## Different types of bugs

**Off-by-one bug**  
Here, an instruction in a program repeats one too many, or one too few, times.

**Performance bug**  
This is where a program doesn't perform as well as it could. It could work more quickly or efficiently.

**Multi-thread bug**  
These bugs occur when several things need to happen at the same time. For example, there might be two processes where each is waiting for the other to complete, or one process that races ahead of the other.

**Conceptual bug**  
This happens when the programmer hasn't fully understood the idea of what is supposed to happen in the program. The bug lies in the idea for the program rather than the code. These sorts of bugs are tricky to find and fix!

**Arithmetical bug**  
These bugs occur when the computer cannot 'do' the maths required, such as divide by zero.

**Resource bug**  
These bugs happen when the programmer hasn't fully understood how the language or the operating system actually works, so the programming they want to do can't be done.

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Working at Age Expected		Working at Greater Depth	
Correct errors in sequencing		In addition, explain in more detail how they debugged programs using logical reasoning; and explain linked connections, for example, the number of steps, step size and turn, in the circle program	
Correct 'off-by-one' errors in repeat loops			
Experiment with changing values and other factors			
Describe how programs work			
Describe how changes they have made affect the program			