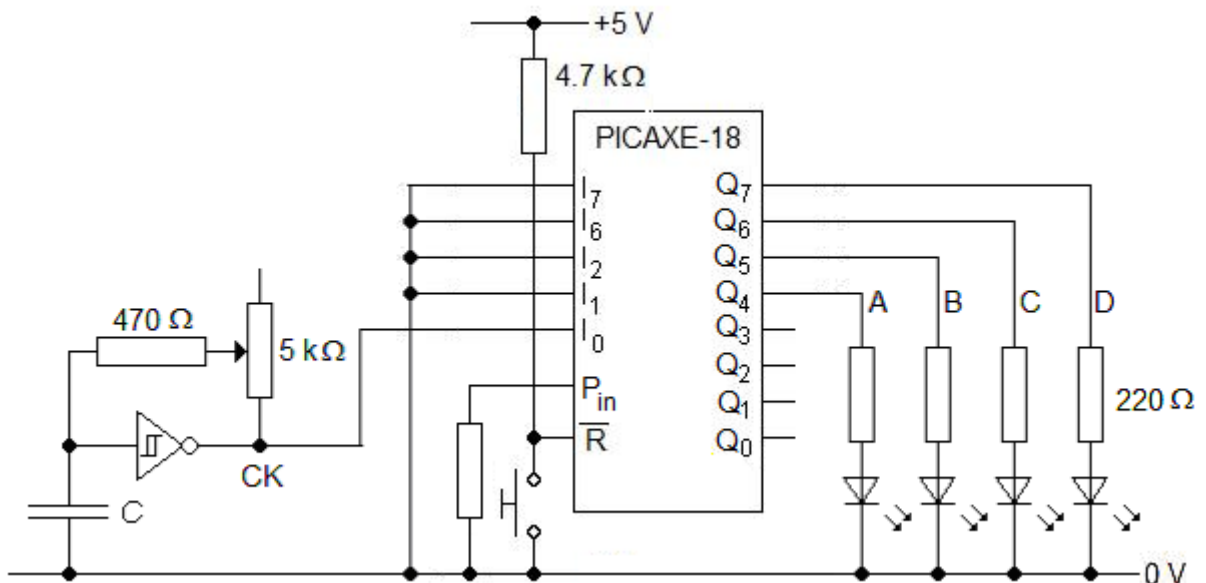
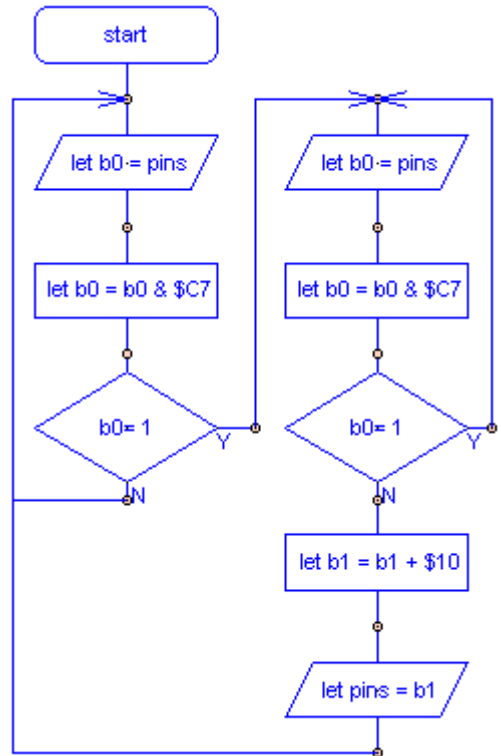


**Processing time**

You are going to investigate how fast a PICAXE microcontroller can process information.

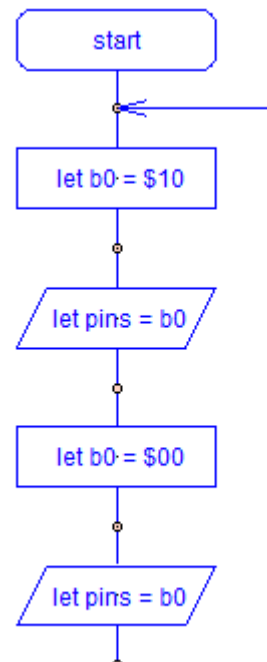
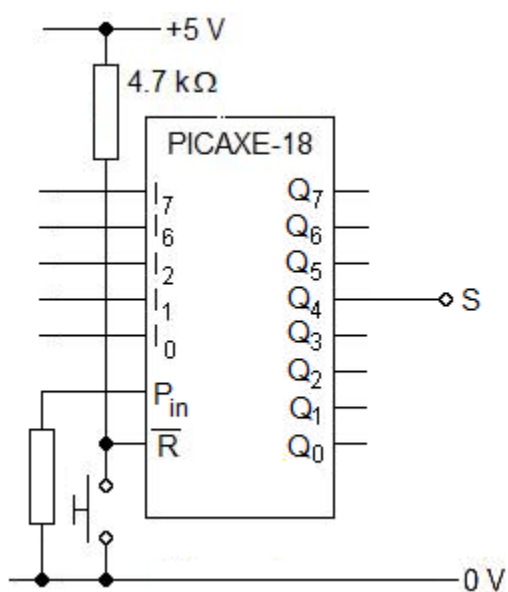
- 1 Write this flowchart into the PICAXE Programming Editor. It makes the microcontroller behave like a four-bit binary counter.
- 2 Download the program into a PICAXE-18 i.c.
- 3 Assemble the circuit shown below. Start with  $C = 100 \mu\text{F}$ . The potentiometer allows the frequency of the oscillator to be altered.
- 4 Press and release the reset switch. If all is well, the LEDs should come on and off as the system counts up in binary.
- 5 Use a double-beam oscilloscope to display the signals at CK and A. Trigger on CK. Verify that A has half the frequency of the signal at CK.
- 6 Increase the frequency of the signal at CK until the signal at A no longer has half its frequency. You will need to try  $C = 10 \mu\text{F}$  and  $C = 1 \mu\text{F}$ .
- 7 Find, by trial-and-error, the maximum frequency at CK which allows the PICAXE-18 to count falling edges of CK accurately.



## Maximum speed

You are going to measure the time taken for a PICAXE-18 to execute an instruction.

- 1 Write this flowchart into the PICAXE Programming Editor. It makes the microcontroller behave like an oscillator.
- 2 Download the program into a PICAXE-18 i.c. and power it up as shown below.



- 3 Use an oscilloscope to display the signal at S. If all is well, it should be a square wave.
- 4 Measure the period of the signal at S. Use it to estimate the time it takes for a PICAXE-18 to execute a single instruction.