

Solutions

Each answer shows the steps, then the **result**.

2.1

- (i) does arithmetic and logic operations
- (ii) fetches and decodes instructions and sends control signals
- (iii) carries data between the CPU and memory, both ways

2.2

- RAM is volatile, ROM is not
- RAM can be written to while running and holds the programs in use; ROM is read-only and holds start-up firmware

2.3

- **6G3R4B**
- **lossless**: it can be expanded back exactly

2.4

- SaaS: e.g. online e-mail or office apps
- IaaS: e.g. renting a virtual server

3.1 C

- program counter

3.2 B

- addresses go from the CPU to memory only

3.3 B

- the same calculation on thousands of pixels in parallel

3.4

(a)

- **Y** is likely faster
- video export splits into parallel tasks, so 8 cores do more work at once than 4 slightly faster ones

(b)

- cache is much faster than RAM and holds the most-used data and instructions
- a larger cache means more reads are cache hits, so the CPU waits less

(c)

- videos are large; lossy compression makes them much smaller to store and stream
- the lost detail is hardly noticed by viewers

- a report must be rebuilt exactly: losing characters would change its meaning, so it is compressed losslessly

(d)

- advantage: e.g. no hardware to buy or maintain; scales up when needed
- disadvantage: e.g. ongoing fees; needs a reliable connection; data held by another company