

Solutions

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

2.1

- RAM loses its contents when the power is off
- it is **volatile**

2.2

- three types of secondary storage
- **magnetic, optical, solid state**

2.3

- RAM is **volatile**; ROM is **non-volatile**
- RAM holds programs and data in use; ROM holds the **start-up instructions**

2.4

- a laser burns **pits** into a reflective layer along a spiral track, leaving **lands**
- a laser reads the disc; the change between a pit and a land is the **binary data**

2.5

- virtual memory is an area of **secondary storage used as though it were RAM**
- when RAM is full, unused pages are moved out to it
- more or larger programs can then run than RAM alone could hold

3.1 B

- ROM stores the **start-up (boot) instructions**
- A is RAM; C is secondary storage; D is on the hard disk

3.2

(a)

- part of secondary storage used as extra (pretend) RAM
- unused data is moved there to free RAM, so **more programs can run**

(b)

- it is **slower** (secondary storage is slower than RAM)

3.3

- an SSD has **no moving parts** / is **faster** (an HDD uses spinning magnetic disks)

3.4

(a)

- tracks and sectors on spinning platters

- a read-write head magnetises tiny areas; the direction is a **1** or a **0**

(b)

- NAND flash with **no moving parts**
- electrons trapped in or released from cells; the state is a **1** or a **0**

(c)

- any **three** of: faster start-up and loading / no moving parts so it survives knocks / silent / lighter / uses less power so the battery lasts longer

(d)

- **costs more per gigabyte** (or each cell has a limited number of write cycles)

(e)

- when RAM is full, unused pages are moved out to virtual memory on the drive
- that frees RAM for the program in use
- pages are moved back when needed
- the drive is much slower than RAM, so the laptop **slows down** if too many programs are open

(f)

- any **two** benefits: work from any device with internet / automatic backup / easy to share / school does not maintain the storage
- one drawback: needs internet / security depends on the provider / subscription cost