Solutions

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

2.1

- gas → liquid
- **condensation**

2.2

- arrangement: close together, **random**
- motion: they **move and slide past each other**

2.3

- a gas: particles far apart with large spaces, so they can be pushed closer
- a liquid: particles already touching, so **almost no space to remove**

2.4

- solid → gas (skipping liquid): **sublimation**
- energy is **taken in**

2.5

- particles have more kinetic energy on a hot day, so they **move faster**
- they **diffuse** through the room more quickly

3.1 C

- a gas is **easily compressed**; a liquid is not
- A is true for both; B is a liquid; D is a solid

3.2

(a)

- energy goes into **breaking the forces** between particles, not into making them move faster
- so the **temperature stays constant** while melting

(b)

- a gas has particles far apart with space, so it can be squeezed
- a liquid's particles are already close, with **almost no space**

3.3

- heating gives the particles more kinetic energy, so they **move faster**
- they hit the walls **harder and more often**
- in a **fixed volume** the **pressure rises**

3.4

(a)

- **diffusion**
- spreading from higher to lower concentration because of **random movement**

(b)

- $M_r(\mathrm{NH_3}) = 17$ and $M_r(\mathrm{HCl}) = 36.5$, so ammonia is **lighter**
- at the same temperature, lighter molecules **move faster**
- ammonia travels further, so the ring forms **nearer the acid end**

(c)

- the ring would form **sooner**
- particles gain kinetic energy and **diffuse faster**

(d)

- ammonia gas: particles **far apart** and randomly arranged, moving quickly in all directions
- solid ring: particles **close together** in a regular arrangement, only **vibrating** about fixed positions

(e)

- gas $\rightarrow$ solid: **deposition** (sublimation in reverse)
- energy was **given out**