## Solutions

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

**2.1**

- particles spread because they move randomly
- **spreading from high concentration to low concentration**

**2.2**

- particles in a solid **cannot move from place to place** (they only vibrate)

**3.1 B**

- the gas with the **smaller** $M_r$ diffuses faster
- A, C and D all go with slower diffusion

**3.2**

(a)

- ammonia is lighter ($M_r = 17$ vs 36.5), so it **diffuses faster and travels further**
- the ring forms **nearer the hydrogen chloride end**

(b)

- the white solid is **ammonium chloride**, $NH_4Cl$

**3.3**

- perfume particles move **randomly in all directions**
- they **diffuse** and mix with the air until they reach your nose