

Solutions

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

2.1

- Q falls below K

2.2

- Forward (toward products)

2.3

- No

3.1 B

- removing a product lowers the numerator, so Q falls below K

3.2

(a)

- Q rises above K (more product in the numerator)

(b)

- Shifts **reverse** (toward A), because $Q > K$ so the reaction consumes B to bring Q back down to K

3.3

- Concentration changes only move the current Q ; the reaction shifts to restore the same K . Temperature changes the equilibrium position by changing K itself (since K depends on temperature)