Solutions

2.1

- Its intrinsic GTPase: GTP → GDP, seconds.

2.2

- $10^{-6}/10^{-8} = 100\times$.

2.3

- The message is relayed by the transmembrane receptor and second messengers; hydrophilic ligands cannot cross the bilayer (only lipophilic steroids enter, by a different mechanism).

3.1

- $10^{-6} \times 2 \times 10^{-12} \times N_A \approx 1.2 \times 10^6$ molecules – 100× the 12 000 resting ✓.
- Hormone → receptor → ~20 Gs → cyclases → cAMP: stage gains multiply (~10^4).
- OFF: Gα GTPase (seconds); PDE destroying cAMP (seconds).

3.2

- ADP-ribosylation of Gαs; GTPase disabled → Gs permanently on.
- Constitutive cyclase → maximal cAMP → PKA → Cl^- channel open → Cl^- and water follow into the lumen.
- No inhibitor can unweld an already-modified protein pool; support while proteins turn over.