Solutions

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

2.1

- A series of molecules that each activate the next, relaying the signal

2.2

- Each step activates many of the next molecule, amplifying the signal

2.3

- Cyclic AMP (or calcium ions)

2.4

- any two of: change in gene expression (transcription switched on or off); programmed cell death (apoptosis); cell division

3.1 C

- many activated molecules

3.2

(a)

- Each cell type has a different set of internal proteins and genes, so the same signal is acted on differently

(b)

- A small amount of signal can produce a large, fast response

3.3

- The receptor activates the first molecule, which activates the next, and so on (a cascade); at each step one active molecule activates many of the next, so the signal grows and reaches the response amplified

3.4

(a)

- glucose release falls or stops
- no cAMP is made, so protein kinase A and the cascade are not activated, and glycogen is not broken down

(b)

- glucose is released continuously, even without the hormone
- the pathway is switched on at all times, so every later step stays active

(c)

- the pathway that tells the cell to divide stays on without the signal, so cells divide uncontrollably

3.5 A

- quorum sensing lets bacteria regulate genes according to population density