Solutions

Marking: **M1** a correct method, **A1** the correct answer, **B1** an independent mark.

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

2.1

- A glycoprotein
- B phospholipid (bilayer)
- C cholesterol
- D channel protein

2.2

- fluid: the phospholipids and many proteins move about within the layer
- mosaic: proteins are scattered through the bilayer like tiles in a mosaic

3.1

- it regulates fluidity: it stops the membrane becoming too fluid at high temperature / too rigid at low temperature
- it gives mechanical stability and reduces the permeability to ions and polar molecules

3.2

Any three:

- cell recognition / antigens
- receptors for hormones or other signalling molecules
- cell adhesion, holding cells together
- forming hydrogen bonds with water to stabilise the membrane

3.3

- the core of the bilayer is made of hydrophobic fatty acid tails
- charged ions are repelled by / insoluble in this region
- they cross through channel or carrier proteins

3.4

- the hormone binds to a specific receptor (glycoprotein) with a complementary shape on the cell surface
- the receptor changes shape, activating a G protein / an enzyme inside the cell
- this produces a second messenger (e.g. cyclic AMP) that triggers a cascade and the response

3.5

(a) to remove pigment from cells cut open when the discs were made

(b) absorbance rises slowly from 10 to 40 °C; then rises steeply above about 50 °C

(c) membrane proteins are denatured, leaving gaps; the phospholipids become very fluid, so pigment leaks out of the vacuoles

(d) phospholipids gain kinetic energy and the bilayer becomes slightly more fluid / permeable

(e) any two: size and number of discs; volume of water; time in the water; washing; source of beetroot