Solutions

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

2.1

- S phase

2.2

- The cell grows and carries out its normal functions

2.3

- It divides the cytoplasm, splitting the cell into two

2.4

- any two of: growth; tissue repair (replacing damaged cells); asexual reproduction

2.5

- animal cells: a cleavage furrow pinches the cell in two
- plant cells: a cell plate forms across the middle and becomes the new cell wall

3.1 B

- S phase

3.2

(a)

- It has doubled

(b)

- Mitosis separates the copied chromosomes into two identical nuclei, and cytokinesis splits the cytoplasm, producing two identical daughter cells

3.3

- Each daughter cell needs a full copy of the DNA; copying it first (in S) ensures there are two complete sets for mitosis to separate

3.4

(a)

- S phase
- the DNA in chromatin is replicated, so each chromosome becomes two sister chromatids joined at a centromere

(b)

- the sister chromatids were separated in mitosis
- cytokinesis then divides the cell, so each daughter cell gets one copy: half of 20 units

(c)

- G1: the cell grows, makes proteins and duplicates its organelles

(d)

- G0, where it no longer divides (it can re-enter the cycle only in response to the right signals)

3.5

- **R** prophase → **Q** metaphase → **P** anaphase → **S** telophase