



ANSWER BOOK

The cell cycle: growth, copying, and one division that changes nothing

Cell cycles, reproduction and development · Unit B06

AQA 3.2.2 · OCR A 2.1.6 · Edexcel A Topic 3.7–3.9 · CAIE 5.1, 5.2

5 questions · 17 marks

NAVY EDITION

SECTION B · Standard, 3 to 5 marks

- B1** **B1** prophase: chromosomes condense and become visible, each already two sister chromatids. **B1** metaphase: chromosomes line up along the equator, attached to spindle fibres at their centromeres. **B1** anaphase: centromeres divide and the sister chromatids are pulled to opposite poles. **B1** telophase: chromosomes reach the poles, decondense, and a nuclear envelope re-forms around each group. [4]
- B2** **B1** tumour suppressor genes normally halt the cell cycle at a checkpoint. **B1** a mutation can switch the gene off, so the protein it codes for is not produced or does not function. **B1** the checkpoint no longer stops cells with damaged DNA or incomplete replication from dividing. **A1** division continues unchecked and a mass of cells accumulates, which is a tumour. [4]
- B3** **B1** DNA is replicated during S phase, so each chromosome is copied. **B1** the two copies stay joined at a single centromere as sister chromatids. **A1** chromosome number is counted by centromeres, so it is unchanged at 40 while the DNA quantity is doubled. [3]
- B4** **M1** mitotic index = number of cells in mitosis divided by the total number of cells counted. **M1** 36 divided by 240. **A1** 0.15, or equivalently 15 per cent, stated as a proportion of the 240 cells counted. [3]
- B5** **B1** without spindle fibres the chromosomes cannot be attached and aligned at the equator, so the cell cannot pass from metaphase into anaphase. **B1** division stops, so the tumour cannot grow by producing more cells. **B1** the drug cannot distinguish tumour cells from any other dividing cells, and hair follicle cells divide rapidly, so hair is not replaced as it is shed. [3]
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