



CHEMISTRY ONLINE
— **TUITION** —

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BIOLOGY

CELLS

Level & Board	AQA (A-LEVEL)
TOPIC:	CELLS & MITOSIS
PAPER TYPE:	SOLUTION - 2
TOTAL QUESTIONS	6
TOTAL MARKS	38

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Cell Cycle and Mitosis - 2

1.

(a)

(i) The first 5 mm of an onion root are used because this is where the most cell division occurs. Firmly pressing the cover slip on a slide spreads the cells so they are not overlapping, thus making individual cells easier to view under the microscope.

(ii) When placing the coverslip firmly, but carefully, press down on the coverslip. This will further press the root tip, making it thinner. The thinner the root tip, the more easily light will be able to pass through it, which will make it easier to observe the cells using an optical microscope.

(b)

$$3 / 32 = 0.09375$$

$$0.09375 \times 1080 = 101.25$$

$$105 - 101.25 = 3.75$$

$$(3.75 / 105) \times 100 = 3.57\%$$

(c) Cytokinesis

(d) To ensure accuracy in counting cells for the mitotic index, the student should have measured the length of the root tip, counted the cells, calculated the average cell length, and compared it to the expected length at the end of the cell cycle

(e)

- Stops anaphase
- Stops spindle fibers forming
- Prevents separation of sister chromatids so new cells added to root tip

I am Sorry !!!!!

2.**(a)**

- The individual chromosomes are visible because they have condensed.
- Each chromosome is made up of two chromatids because DNA has replicated.
- The chromosomes are not arranged in homologous pairs, which they would be if it was meiosis.

(b) Prophase

(c) Water moves into the cytoplasm by osmosis cytoplasm gets bigger.

(d)

- Differences in base sequences
OR
- Differences in histones
OR
- Differences in condensation coiling

(e) The two chromosomes in a homologous pair are very similar to one another and have the same size and shape. Most importantly, they carry the same type of genetic information they have the same genes in the same locations.

3.**(a) Binary fission**

(b) Two essential aseptic techniques include sterilization of instruments and minimizing exposure of the agar plate to air. Sterilization ensures no external microbes contaminate the sample, and properly handling the agar plate minimizes exposure to airborne contaminants.

OR

- Open lid of Petri dish as little as possible.
- To prevent unwanted bacteria contaminating the dish.

- Wear gloves
- Prevent spread of bacteria outside the lab
- Use sterile pipette
- To maintain a pure culture of bacteria

4.

(a)

- During prophase chromosomes, condense, thicken, shorten and become more visible. Chromosomes appear as two sister chromatids joined at the centromere.
- During metaphase chromosomes line up on the equator. Chromosomes are attached to spindle fibres by the centromere. During anaphase the centromere splits and the sister chromatids are pulled to opposite poles of the cell.
- During telophase chromatids chromosomes recoil and become longer and thinner.

5.

(a) The student was instructed to push down hard on the cover slip without pushing it sideways to ensure the removal of any air bubbles trapped between the onion tissue and the glass slide.

OR

- Push hard to spread the tissue
- Not push sideways to avoid breaking chromosomes

(b)

- Chromosomes are in two groups at the poles of spindle
- V shaped shows that sister chromatids have been pulled apart at their centromeres

(c)

$$6/200 \times 16$$

$$= 0.03 \times 16$$

$$= 0.48$$

1 hour = 60 minutes

$0.48 \times 60 = 28.8$

= 29 minutes

6.

(a)

D

C

B

E

A

(b)

Step	Reason
(Taking cells from the root tip)	Region where mitosis / cell division occurs;
(Firmly squashing the root tip)	To allow light through / make tissue layer thin;

(c) At cell F after DNA replication the amount of DNA has doubled. there is then a decrease in DNA because the homologous pairs separate. there is then a further decrease due to the separation of sister chromatids.

(d) Upon fertilization, both the DNA content and the number of chromosomes doubles to $2c$ and $2n$



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- Founder & CEO of Chemistry Online Tuition Ltd.
- Completed Medicine (M.B.B.S) in 2007
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