The mitotic cell cycle – AS 9700 June 2022

1. June/2023/Paper_9700/11/No.17

The cell cycle includes mitosis.

What are features of this type of nuclear division?

1 forms cells of equal size to the parent cell

2 forms genetically identical nuclei

3 semi-conservative replication of DNA

A 1, 2 and 3 **B** 1 and 2 only **C** 1 and 3 only **D** 2 only

2. June/2023/Paper_9700/11/No.18

A student observed the cells in the growing region (meristem) of an onion root and obtained the data shown.

stage	number of cells
interphase	886
prophase	73
metaphase	16
anaphase	14
telophase	11

Which percentage of cells contains chromosomes that appear as two chromatids?

A 7.3% **B** 8.9% **C** 95.9% **D** 97.5%

3. June/2023/Paper_9700/12/No.21

How many copies of each DNA molecule will be found in a cell at the **start** of the stages of the mitotic cell cycle shown?

	G_1 of interphase	cytokinesis
A	1	1
B	1	2
C	2	1
D	2	2

4. June/2023/Paper_9700/12/No.22

One characteristic of DNA is that it is a universal genetic code.

What is meant by a universal genetic code?

A All living organisms use the same triplet code for amino acids.

B All DNA triplets code for a different amino acid.

C Not all DNA triplets code for an amino acid.

D All living organisms contain the same four nucleic acids.

5. June/2023/Paper_9700/13/No.21

Which row describes some properties of stem cells?

	able to divide by mitosis to produce more stem cells	able to differentiate into specialised cells	able to repair damaged cells
A	✓	✓	✓
B	✓	✓	✗
C	✓	✗	✗
D	✗	✗	✓

key

✓ = is a property

✗ = is not a property

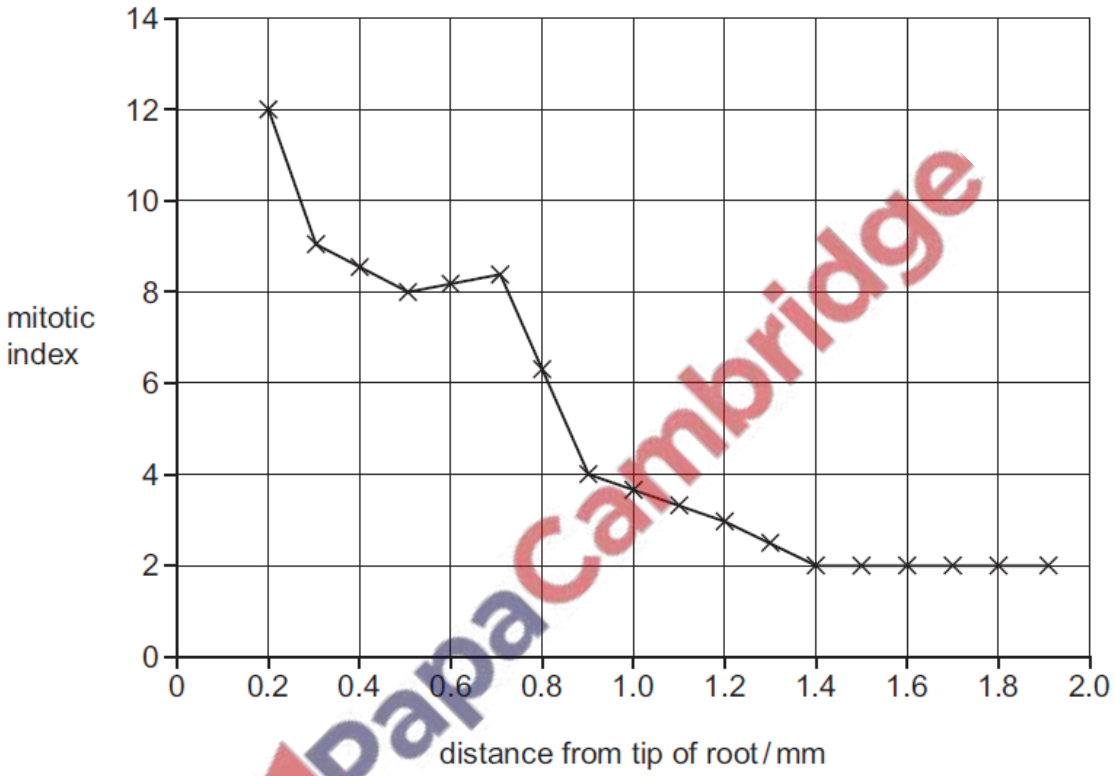
6. June/2023/Paper_9700/13/No.22

The mitotic index is a measure of the proportion of cells that are undergoing mitosis in an area of tissue. It is calculated using the formula shown.

$$\text{mitotic index} = (\text{number of cells undergoing mitosis} \div \text{total number of cells}) \times 100$$

A scientist calculated the mitotic index of areas of onion root at different distances from the tip of the root.

The results are shown.



Which statement is correct?

A No cell division occurs further than 1.4 mm from the tip of the root.

B The rate of cell division decreases as the distance from the root tip decreases.

C Most of the cells undergoing cell division are closer to the tip of the root.

D For a sample of 200 cells 0.2 mm from the tip of the root, 6 would be undergoing mitosis.

7. March/2023/Paper_9700/12/No.19

Which events are part of the mitotic cell cycle?

1 interphase

2 telophase

3 cytokinesis

A 1, 2 and 3 **B** 1 and 2 only **C** 1 and 3 only **D** 2 and 3 only

8. March/2023/Paper_9700/22/No.1(c)

(c) Mitogens are short chains of amino acids that function as cell-signalling molecules. Mitogens are released from secretory cells and travel in the blood to target cells, where the mitogens bind to cell surface receptors. The target cells respond by progressing from the G_1 phase to the S phase of the mitotic cell cycle.

(i) Outline what happens in the G_1 phase and S phase of the mitotic cell cycle.

G_1 phase .....

.....

.....

S phase .....

.....

.....

[2]

(ii) As a result of mutation, the production and release of mitogens into the blood can be greatly increased.

Suggest a possible consequence for target cells of increased concentrations of mitogens in the blood.

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..... [1]