



**Exampro A-level Biology
(7401/7402)**

Name:

Class:

Mitosis QP

Author:

Date:

Time: 63

Marks: 44

Comments:

These questions mix the different styles of questions. Short answers, practical techniques, experimental data analysis, extended answer and comprehension Work through these, the more you do the better you will become with your exam technique.

Q1.A student investigated mitosis in the tissue from an onion root tip.

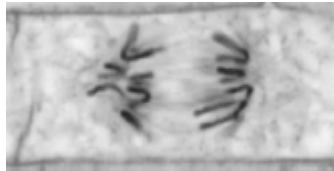
- (a) The student prepared a temporary mount of the onion tissue on a glass slide. She covered the tissue with a cover slip. She was then given the following instruction.

“Push down hard on the cover slip, but do not push the cover slip sideways.”

Explain why she was given this instruction.

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The image below shows one cell the student saw in the onion tissue.



© Ed Reschke/Oxford Scientific/Getty Images

(2)

- (b) The student concluded that the cell in the image above was in the anaphase stage of mitosis.

Was she correct? Give **two** reasons for your answer.

1

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2

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(2)

- (c) The student counted the number of cells she observed in each stage of mitosis. Of the 200 cells she counted, only six were in anaphase.

One cell cycle of onion root tissue takes 16 hours. Calculate how many minutes these cells spend in anaphase.

Show your working.

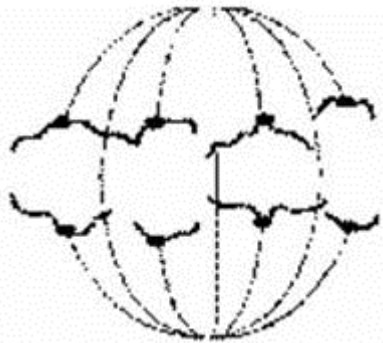
Answer = minutes

(2)
(Total 6 marks)

Q2. (a) The photographs show two stages in mitosis of a plant cell.



A



B

Name stages **A** and **B**. In each case describe what is happening to the chromosomes.

(i) Stage **A**

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.....

(2)

(ii) Stage **B**

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.....
.....

(2)

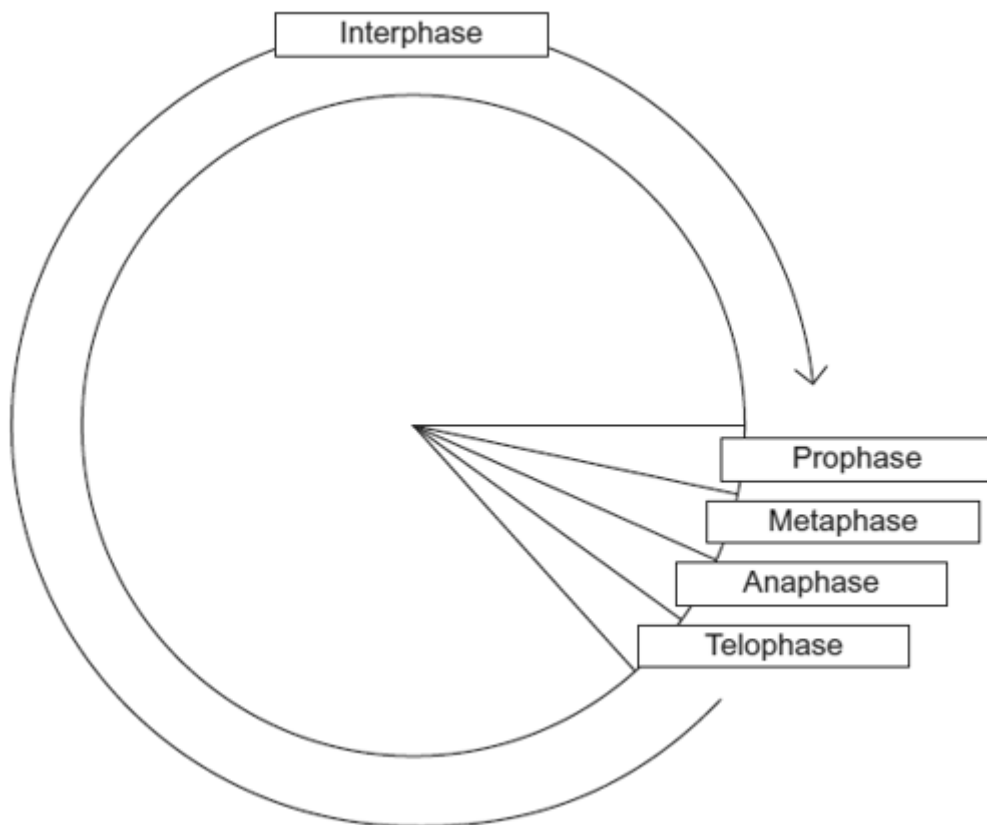
(b) Describe **two** events during interphase which prepare a cell for mitosis.

1

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2
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(2)
(Total 6 marks)

Q3. The diagram shows a cell cycle.



(a) In prophase of mitosis, the chromosomes become visible. Describe what happens in

(i) metaphase

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(2)

(ii) anaphase.

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(2)

(b) (i) Cells lining the human intestine complete the cell cycle in a short time. Explain the advantage of these cells completing the cell cycle in a short time.

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.....

(1)

(ii) The time required for a cell to complete the cell cycle was 4 hours 18 minutes. Calculate the time required in minutes for this cell to multiply to produce eight cells. Show your working.

Answer

(2)

(c) Mikanolide is a drug that inhibits the enzyme DNA polymerase. Explain why this

drug may be effective against some types of cancer.

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(2)
(Total 9 marks)

Q4. A student investigated the stages of mitosis in a garlic root. The root tip was placed on a microscope slide with a stain. A cover slip was placed on top and the root tip was firmly squashed.

(a) Explain why

(i) a root tip was used;

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.....

(1)

(ii) a stain was used;

.....
.....

(1)

(iii) the root tip was firmly squashed.

.....
.....

(1)

(b) The student examined the cells in the garlic root tip under the microscope, and obtained the following data.

Stage	Number of cells
Interphase	872
Prophase	74
Metaphase	18
Anaphase	10
Telophase	8

- (i) Calculate the percentage of these cells in which the chromosomes are visible and would consist of a pair of chromatids joined together. Show your working.

Answer

(2)

- (ii) A different set of results was obtained when the count was repeated on another occasion with a different garlic root tip. Give **two** reasons for the difference in results.

1

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2

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(2)
(Total 7 marks)

Q5. In many parts of the world, crops have to be watered to grow enough food but fresh water is often in short supply.

Barley is a plant that grows a leafy shoot and then produces seed that is harvested for food.

Scientists investigated whether barley could be grown successfully using fresh water mixed with seawater. This would reduce the use of fresh water. However, seawater contains dissolved sodium chloride (salt).

The scientists grew barley in plots of equal size in the same large field. Each plot received one of four treatments.

- A** No watering.
- B** Watering with fresh water during growth and seed production.
- C** Watering with a 1:1 mix of fresh water and seawater during growth and seed production.
- D** Watering with fresh water during growth and with a 1:1 mix of fresh water and seawater during seed production.

At the end of the investigation, the scientists measured the concentration of salt in the soil in each plot and the yield of barley seed harvested from each plot.

The scientists' results are shown in the table below.

Watering treatment	Mean concentration of salt in soil / arbitrary units	Mean yield of barley seed / g
A	10.1	346
B	9.7	804
C	13.5	538
D	11.6	695

- (a) Watering treatment was the independent variable in this investigation. Explain what is meant by the **independent** variable.

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(1)

- (b) The same variety of barley was used in all the plots. Why was this important?

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(2)

- (c) When barley plants are growing, the number of cells increases. Name the process that increases the number of cells.

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(1)

- (d) What do the data in the table above show about the effect of watering barley with a mixture of fresh water and seawater?

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(2)

- (e) The scientists suggested that watering barley with diluted seawater might not be sustainable if repeated every year. Do these data support this suggestion?

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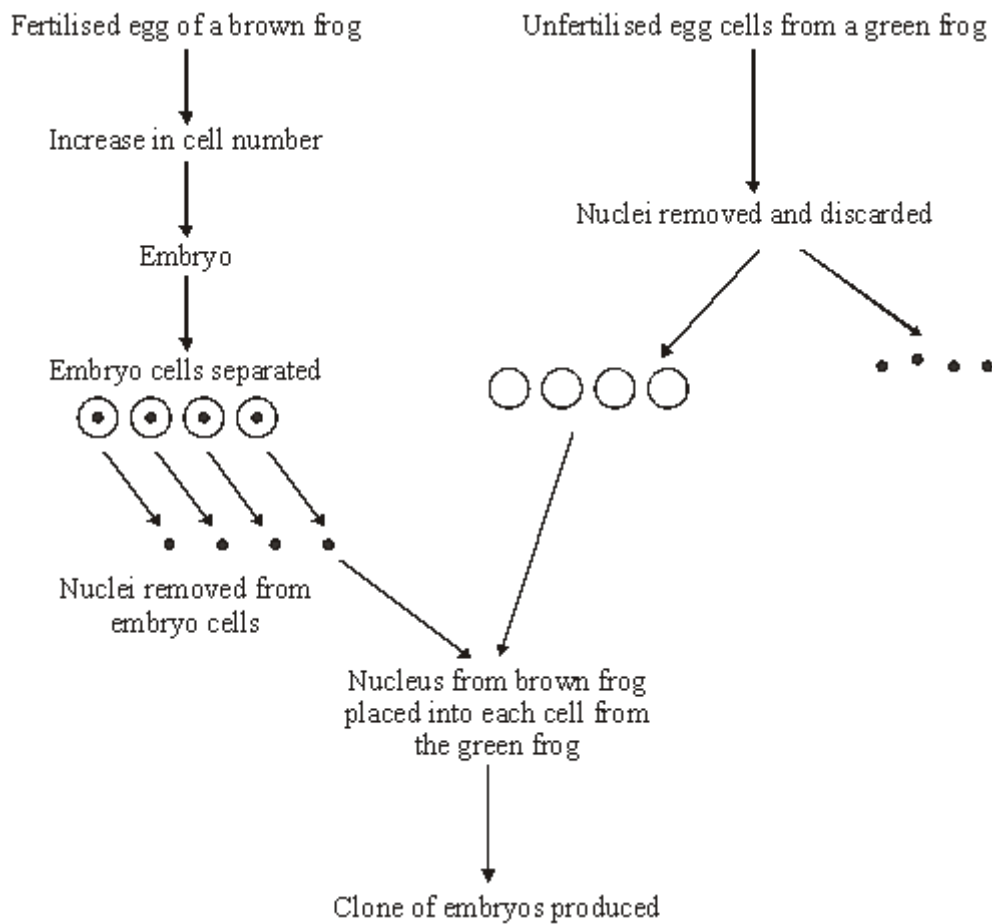
(Extra space)

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(3)

(Total 9 marks)

Q6. A clone of frogs was produced by nuclear transfer. This procedure is summarised in the diagram.



(a) What is a clone?

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(1)

(b) Name the type of cell division occurring in a developing embryo.

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(1)

(c) The embryo cells used are from an early stage of development. Explain why.

.....

(1)

(d) What would be the colour of the cloned offspring? Explain your answer.

.....
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(1)

(e) Give **two** differences between the nuclei removed from the embryo cells and the nuclei discarded from the unfertilised egg cells.

1

2

(2)

(f) Only 30% of the cloned cells successfully developed into embryos. Suggest a reason for this low success rate.

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(1)

(Total 7 marks)