

Eukaryotic Cell Cycle & Division

Question Paper 4

Level	A Level
Subject	Biology
Exam Board	Edexcel
Topic	Cells & Viruses and Reproduction of Living Things
Sub Topic	Eukaryotic Cell Cycle & Division
Booklet	Question Paper 4

Time Allowed: 35 minutes

Score: /29

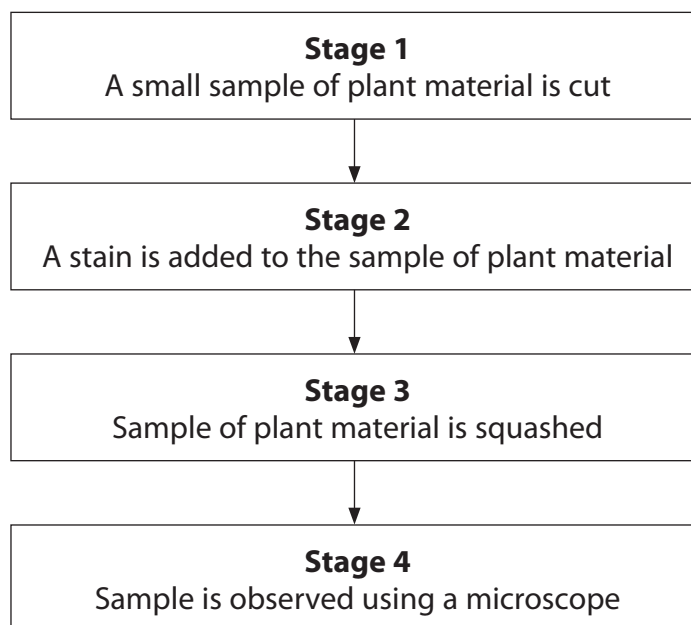
Percentage: /100

Grade Boundaries:

A*	A	B	C	D	E	U
>85%	77.5%	70%	62.5%	57.5%	45%	<45%

1 Mitosis can be studied using plant material.

- (a) The diagram below shows some stages in a process that allows mitosis to be studied in plant material.



Place a cross ☒ in the box next to the correct word or words to complete each of the following statements.

(5)

- (i) In stage 1, the small sample of plant material is cut from

- ☐ **A** a leaf edge
- ☐ **B** a root tip
- ☐ **C** sclerenchyma fibres
- ☐ **D** xylem vessels

(ii) In stage 1, the most sensible safety precaution is to

- ☐ **A** cut away from oneself
- ☐ **B** cut towards oneself
- ☐ **C** wear safety goggles
- ☐ **D** wear a lab coat

(iii) In stage 2, the most sensible precaution to protect clothes from the stain is to

- ☐ **A** keep the stain in a waterbath
- ☐ **B** wear a lab coat
- ☐ **C** wear gloves
- ☐ **D** wear safety goggles

(iv) The function of the stain in stage 2 is to

- ☐ **A** make the chromosomes visible
- ☐ **B** make the cytoplasm visible
- ☐ **C** separate the genes from the nucleus to make them more visible
- ☐ **D** separate the chromosomes from the nucleus to make them more visible

(v) In stage 3, the sample is squashed between

- ☐ **A** the objective lens of the microscope and the coverslip
- ☐ **B** the objective lens of the microscope and the slide
- ☐ **C** the slide and coverslip
- ☐ **D** two coverslips

The two diagrams below show prophase in an animal cell.

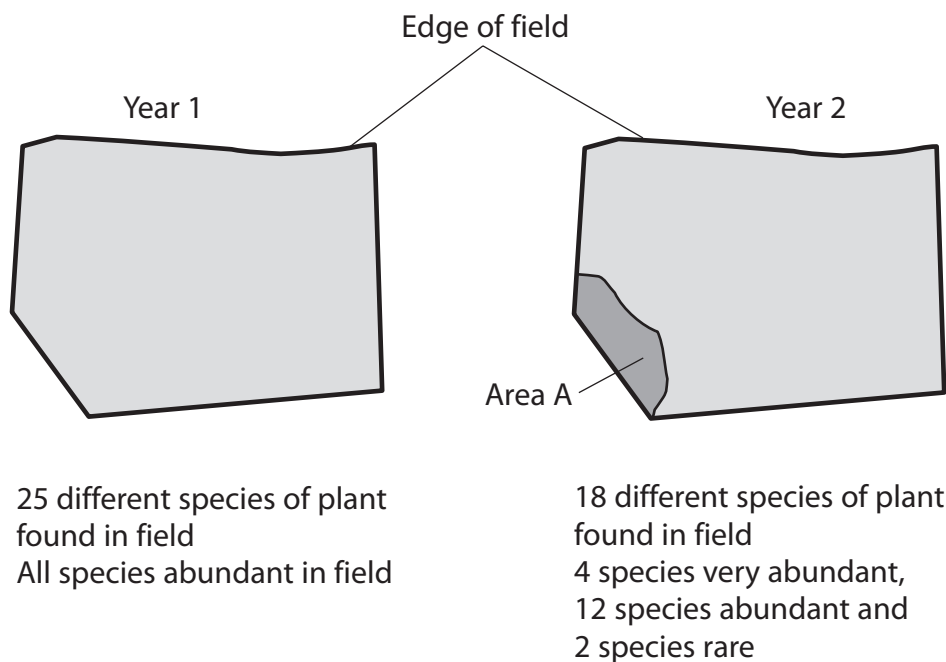
A diagram of a cell. The cell is represented by a large, irregular outer boundary. Inside the cell, there is a central, roughly circular nucleus. The nucleus is filled with a dense, stippled pattern. Within the nucleus, there is a smaller, darker, and more densely stippled region, which is the nucleolus. Surrounding the nucleus are several small, dark, circular dots, which represent ribosomes. The entire diagram is enclosed within a rectangular frame.

Using the two diagrams, describe the changes that occur from early prophase to late prophase.

[illegible]

(Total for Question 1 = 10 marks)

- 2 A student studied one field in two different years.
She recorded some information, shown in the diagram below.



- (a) Using the information in the diagram, suggest in which year the species richness was greater. Give a reason for your answer.

(2)

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- (b) Buttercup plants were found in this field in both years. Buttercup plants can produce new plants by asexual reproduction.

- (i) Name the type of cell division required for asexual reproduction.

(1)

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- (ii) The genetic diversity of buttercup plants in the field is low.
Describe and explain why asexual reproduction results in low genetic diversity.

(2)

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- *(c) Another student noted that several species of plant did not grow as well in area A as they did in the rest of the field. He suggested this was due to a shortage of nitrate ions in the soil in this area.

The effect of varying nitrate ion concentration on the growth of one plant species can be investigated in a laboratory.

Describe how this investigation can be carried out to produce **reliable** results.

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3 Mitosis and meiosis are both forms of nuclear division. Mitosis can be observed in root tip squashes from a plant such as garlic.

(a) Place a cross ☐ in the box next to the correct word or words to complete each of the following statements.

(i) The stain used in a root tip squash can be intensified by

(1)

- ☐ **A** adding acid
- ☐ **B** adding alkali
- ☐ **C** gently heating
- ☐ **D** squashing the tip

(ii) Mitosis occurs in

(1)

- ☐ **A** plant fibres
- ☐ **B** sclerenchyma fibres
- ☐ **C** stem cells
- ☐ **D** xylem vessels

(b) Describe the appearance of a cell in telophase of mitosis as seen in a root tip squash.

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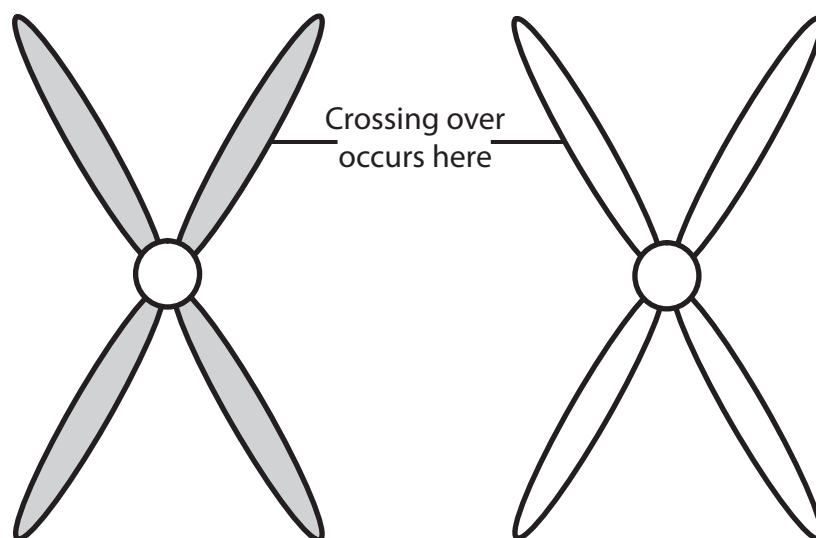
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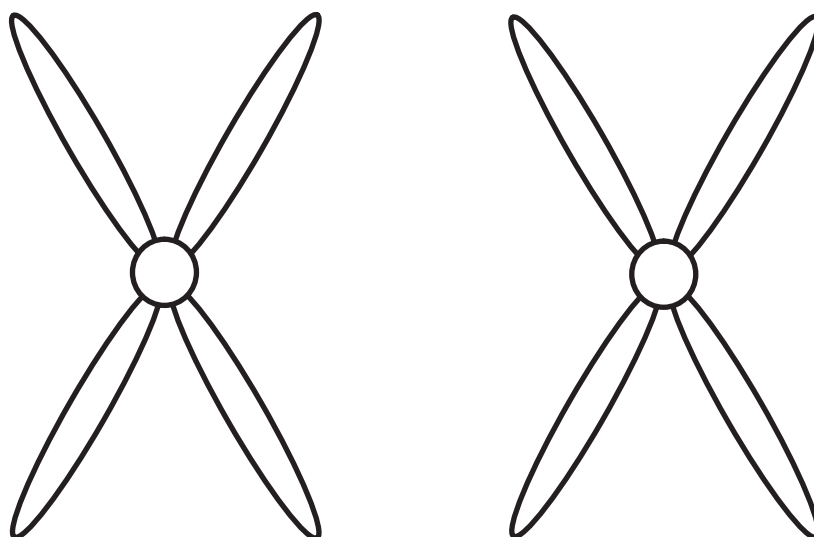
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- (c) One way in which meiosis increases genetic variation is through crossing over.
- (i) The diagram below shows a pair of homologous chromosomes during meiosis. They are positioned next to each other but crossing over has not yet occurred.



Complete the diagram below to show these chromosomes after crossing over has occurred.

(1)

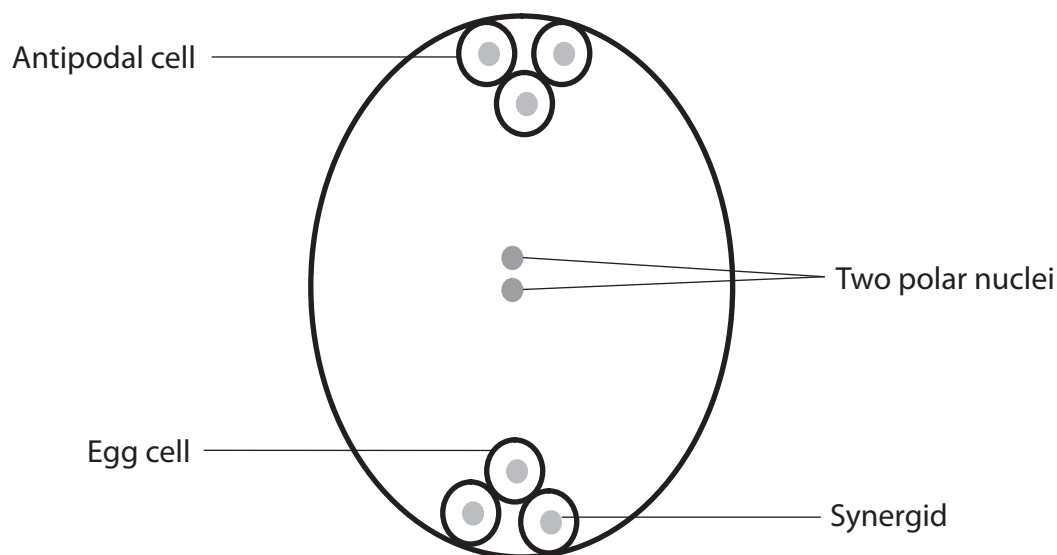


- (ii) Meiosis produces haploid structures in the plant.

The diagram below shows an embryo sac.

Draw a circle round each of the labels of **two** haploid structures that are fertilised in the embryo sac.

(2)



- (iii) Explain what is meant by the term **haploid number** of chromosomes.

(1)

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(Total for Question 3 = 9 marks)