

10.1 Meiosis

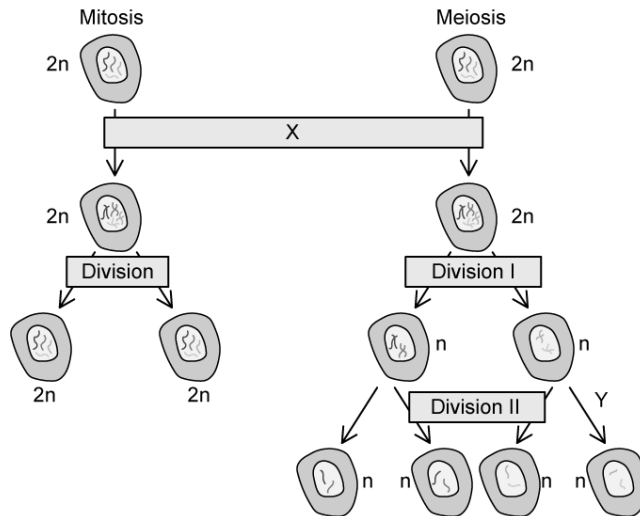
Question Paper

Course	DP IB Biology
Section	10. Genetics & Evolution (HL Only)
Topic	10.1 Meiosis
Difficulty	Easy

Time allowed: 50
Score: /35
Percentage: /100

Question 1a

a)
The diagram below summarises the processes of mitosis and meiosis.



Identify the process marked **X** in the diagram.

[1 mark]

[1 mark]

Question 1b

b)
Identify the stage of the cell cycle during which the process marked **X** in part a) takes place.

[1 mark]

[1 mark]

Question 1c

c)
Describe **one** way in which the process marked **X** in part a) can increase genetic variation.

[2 marks]

[2 marks]

Question 1d

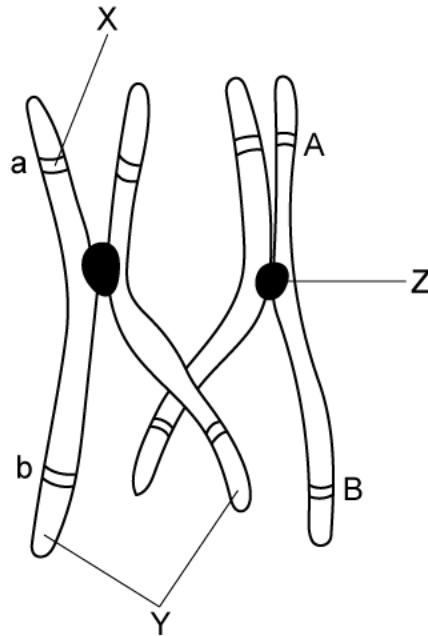
d)
Describe the chromosome activity taking place at the stage marked Y in the diagram in part a).

[2 marks]

[2 marks]

Question 2a

a)
The diagram below shows two chromosomes during meiosis.



Identify structures X-Z.

[3 marks]

[3 marks]

Question 2b

b)

Outline the events shown in the diagram in part a).

[3 marks]

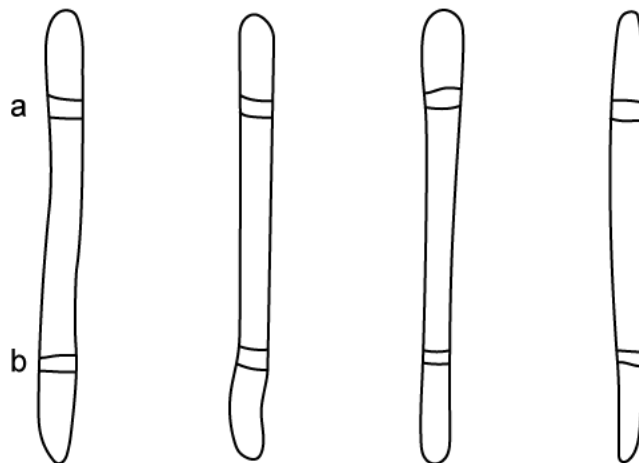
[3 marks]

Question 2c

c)

At the end of meiosis the chromosomes shown in part a) form four new chromosomes, as illustrated in the diagram below.

Annotate the four new chromosomes below to show the results of the events shown in part a). The first chromosome has been annotated for you.



[3 marks]

[3 marks]

Question 2d

d)

Outline the importance of the process shown in part a) to living organisms.

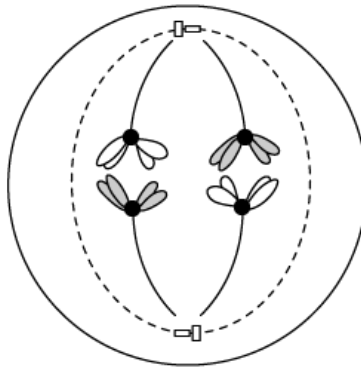
[2 marks]

[2 marks]

Question 3a

a)

The diagram below shows a cell in anaphase of meiosis I.



State how it is possible to know the following:

i)

That the cell is in anaphase.

[1 mark]

ii)

That the cell is in meiosis I.

[1 mark]

[2 marks]

Question 3b

b)

Meiosis I is described as **reduction** division.

State why this is the case.

[1 mark]

[1 mark]

Question 3c

c)

Meiosis I generates genetic variation due to the process of crossing over.

Outline **one other** process during meiosis I that generates genetic variation.

[2 marks]

[2 marks]

Question 3d

d)

Rice, *Oryza sativa*, has a chromosome number of 24.

Use the formula 2^n to calculate the number of different chromosome combinations that can be generated when rice cells undergo meiosis I. Note that the term n here denotes the number of pairs of chromosomes.

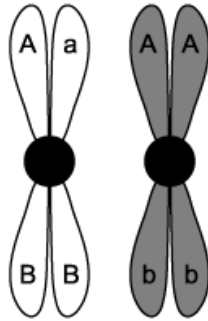
[2 marks]

[2 marks]

Question 4a

a)

The diagram below shows chromosomes from a garden pea plant, *Pisum sativum*, during meiosis.



Identify, with a reason, the meiotic division that is occurring in the diagram.

[2 marks]

[2 marks]

Question 4b

b)

Mendel's law of independent assortment states that:

'Characteristics are inherited completely independently of each other'

While the chromosomes in part a) will undergo independent assortment during meiosis, this law of Mendel's cannot be correctly applied to the characteristics for which genes A and B code.

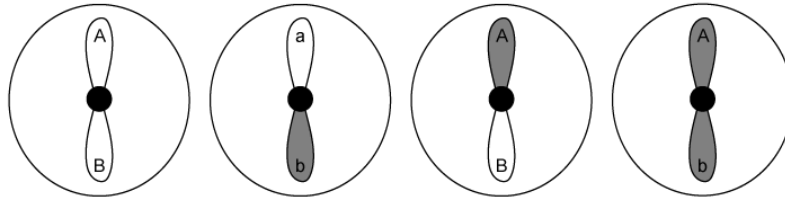
Explain why this is the case.

[1 mark]

[1 mark]

Question 4c

c)
At the end of meiosis the chromosomes were distributed to the pea plant pollen grains as shown below.



Explain how the chromosomes in part a) gave rise to the new allele combinations shown above.

[2 marks]

[2 marks]

Question 4d

d)
The process in part c) and independent assortment both contribute to genetic variation.

State **one other** process that contributes to genetic variation.

[1 mark]

[1 mark]

Question 5

b)
Outline the events that take place during the second division of meiosis.

[5 marks]

[5 marks]



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