

10.1 Meiosis

Question Paper

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

Time allowed: 20
Score: /10
Percentage: /100

Question 1

Which of the following statements about meiosis are **incorrect**?

- I. The overall amount of DNA doubles just before meiosis
- II. Crossing over occurs between chromatids of non-homologous chromosomes
- III. Meiosis II is referred to as reduction division
- IV. Sister chromatids separate in anaphase I

- A. I, II and III
- B. I and IV
- C. All of them
- D. II, III and IV

[1 mark]

Question 2

The diploid number of a koala (*Phascolarctos cinereus*) is 16.

How many autosomes are there in a koala's egg cell?

- A. 7
- B. 8
- C. 14
- D. 32

[1 mark]

Question 3

Which of the following gives an accurate definition of genetic recombination?

- A. The orientation of homologous chromosomes as they align during metaphase I of meiosis
- B. The development of new alleles within a population through mutation
- C. The breaking and rejoining of DNA to create new combinations
- D. The loss of DNA telomeres through multiple cycles of replication

[1 mark]

Question 4

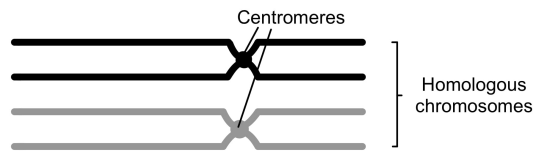
Which of the following most accurately describes the events that occur in meiosis I?

- | | | |
|----|---------------------------------|-------------------------------|
| A. | Chromatids separate | Chiasmata form in prophase I |
| B. | Chromatids separate | Chiasmata form in metaphase I |
| C. | Homologous chromosomes separate | Chiasmata form in prophase I |
| D. | Homologous chromosomes separate | Chiasmata form in metaphase I |

[1 mark]

Question 5

The diagram shows a pair of homologous chromosomes at the beginning of prophase I of meiosis and four possible examples of crossing over, **A - D**



Which of the four representations of crossing over **cannot occur** in meiosis I?

- | | |
|----|--|
| A. | |
| B. | |
| C. | |
| D. | |

[1 mark]

Question 6

Mitosis has many similarities to **meiosis II**. Which of the following statements describe(s) a **difference** between the cellular processes of mitosis and meiosis II?

- I. During prophase, the nuclear envelope disintegrates and the chromosomes condense
- II. The ploidy of the cells entering the process
- III. Replication occurs immediately before each process, to double the amount of genetic material
- IV. During cytokinesis, the cytoplasm divides as new cell membranes are formed

- A. II only
- B. I, II and III
- C. III and IV
- D. II and III

[1 mark]

Question 7

Exchange of alleles is an important feature of meiosis. During which precise event of meiosis does the exchange of alleles take place?

- A. When a chiasma forms between two non-sister chromatids
- B. At the assortment of homologous chromosomes at the cell equator
- C. When gametes form in meiosis II
- D. During gene linkage

[1 mark]

Question 8

For a eukaryotic organism with a diploid number of 14, which calculation would be required to establish how many combinations of chromosomes can occur through independent assortment in meiosis? All the equations below are mathematically correct.

- A. $2 \times 7 = 14$
- B. $2^7 = 128$
- C. $2^{14} = 16\,384$
- D. $2^{14} \times 2^7 = 2\,097\,152$

[1 mark]

Question 9

Which row of the table puts these DNA-containing structures into the correct order of size?

	Largest ←	Mid-sized	→ Smallest	
A	bivalent & tetrad the same size		chromosome	chromatid
B	bivalent	tetrad	chromatid	chromosome
C	tetrad	chromosome	bivalent	chromatid
D	chromosome	bivalent & tetrad the same size		chromatid

[1 mark]

Question 10

Which of the following cell types are haploid?

- I. Primary spermatocyte
 - II. Oocyte
 - III. Spermatid
 - IV. Spermatozoon
- A. II, III and IV
 - B. I and II
 - C. I, III and IV
 - D. All of them

[1 mark]