10.1 Meiosis

Question Paper

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

Time allowed: 10

Score: /5

Percentage: /100

Question 1

Consider the following pair of chromosomes at the start of meiosis.
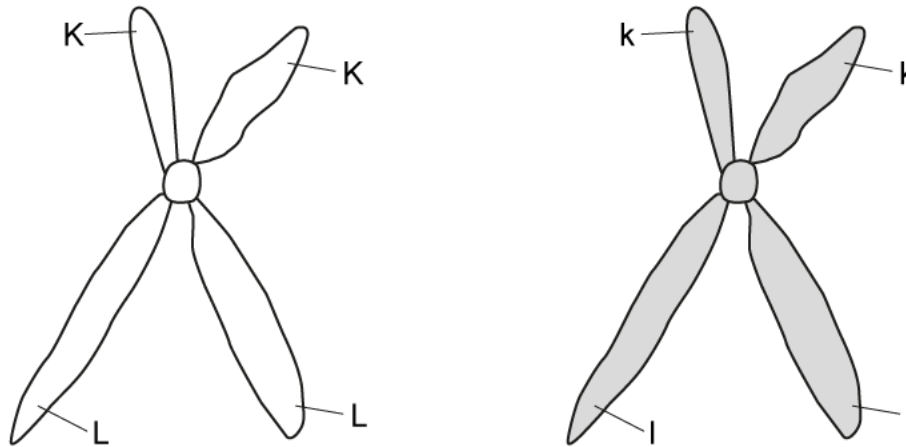
Which table gives the distribution of alleles in the gametes that would be most realistic, in percentage terms?

A.

Genotype	KL	Kl	kL	kl
% distribution	25	25	25	25

B.

Genotype	KL	Kl	kL	kl
% distribution	50	0	0	50

C.

Genotype	KL	Kl	kL	kl
% distribution	45	5	5	45

D.

Genotype	KL	Kl	kL	kl
% distribution	10	40	40	10

[1 mark]

Question 2

Which of the following statements about meiosis are true?

1. Gene locus can affect the chances of new allele combinations being formed
2. Gene locus can affect the rate of mutation giving rise to new allele combinations
3. Crossing over can occur between a chromatid and either of its non-sister chromatids lying alongside it
4. Independent assortment gives rise to far less variation than crossing over

A. 1, 3 and 4

B. 2 and 3

C. 2 and 4

D. 3 and 4

[1 mark]

Question 3

Which event causes genetic variety in the gametes formed during meiosis?

    A. Linkage of genes in prophase 1 and crossing over in metaphase 1

    B. Crossing over during prophase 1 and independent assortment of chromosomes during metaphase 1

    C. Linkage of genes in metaphase 1 and independent assortment of chromosomes in prophase 1

    D. Crossing over during metaphase 1 and independent assortment of chromosomes during prophase 1

[1 mark]

Question 4

Use your knowledge of the number of events that occur in the various stages of meiosis I and meiosis II to suggest which stage occupies around 90% of the time required for a full cycle of human meiosis.

    A. Prophase I

    B. Metaphase I

    C. Telophase I

    D. Metaphase II

[1 mark]

Question 5

Which of the following is the best explanation of why the lengths of DNA exchanged during crossing-over tend to be of the same length as each other?

    A. Because breakages occur where distinct alleles fail to line up accurately with each other in the formation of a tetrad.

    B. Because if uneven lengths of DNA are crossed over, restriction enzymes will trim off the unnecessary DNA from the longer chromatid.

    C. Because there is a lack of space in the tightly-packed ball of condensed chromosomes in prophase I, so only short lengths of DNA can cross over.

    D. Because breaks occur in the same base sequences on each non-sister chromatid.

[1 mark]