

3.2 Meiosis

Question Paper

Course	DPIB Biology
Section	3. Genetics
Topic	3.2 Meiosis
Difficulty	Hard

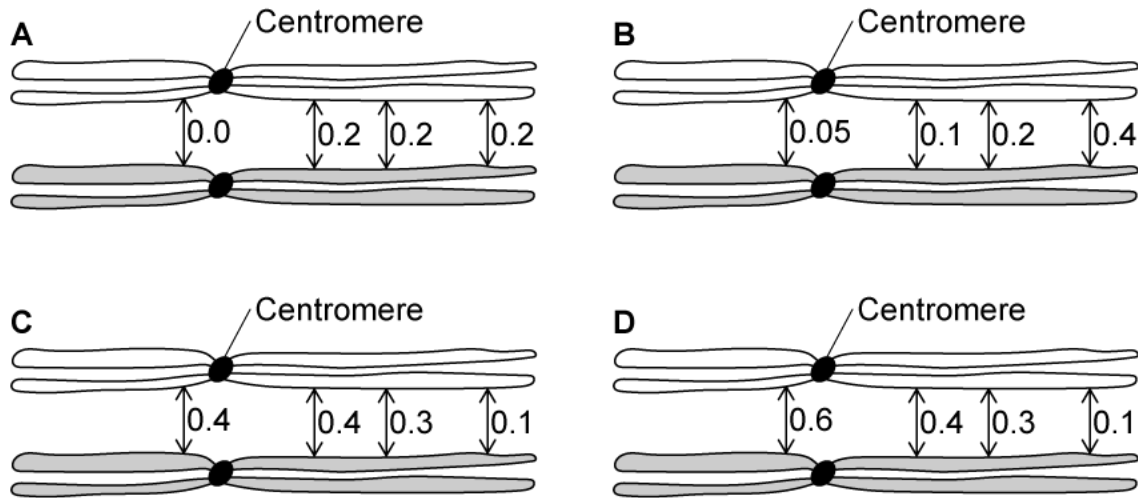
Time allowed: 10
Score: /5
Percentage: /100

Question 1

The following choices each show a bivalent.

Along the length of the bivalent are some values of probability.

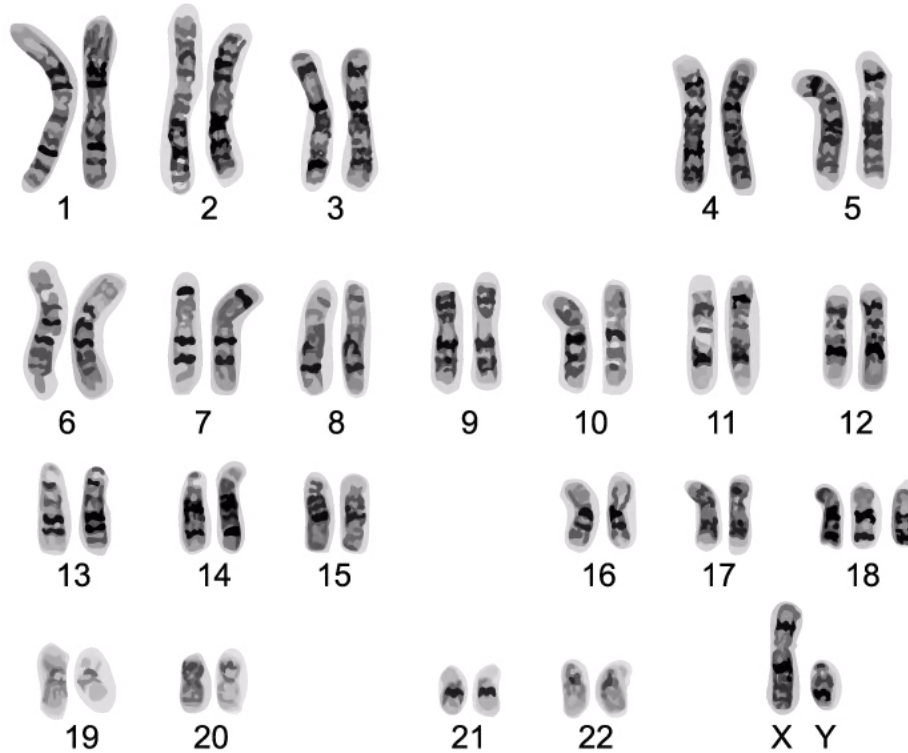
Which choice reflects the most likely probabilities of a chiasma forming at each of the positions shown?



[1 mark]

Question 2

The image shows a human karyotype of cells taken from amniocentesis in the later stages of the first half of a pregnancy.



What conclusion can be drawn from this karyotype?

- A. The foetus's karyotype is entirely normal.
- B. The foetus has Down syndrome.
- C. The foetus has trisomy 18 (Edward's syndrome) and is unlikely to survive beyond the age of 12 months.
- D. The foetus is female.

[1 mark]

Question 3

Which row best describes an organism whose diploid number is 16 and whose body cells have an amount of DNA, x ?

	Number of chromosomes per body cell	Number of centromeres	Amount of DNA per cell at the beginning of meiosis I
A.	16	16	$2x$
B.	8	16	$2x$
C.	16	8	$4x$
D.	8	8	x

[1 mark]

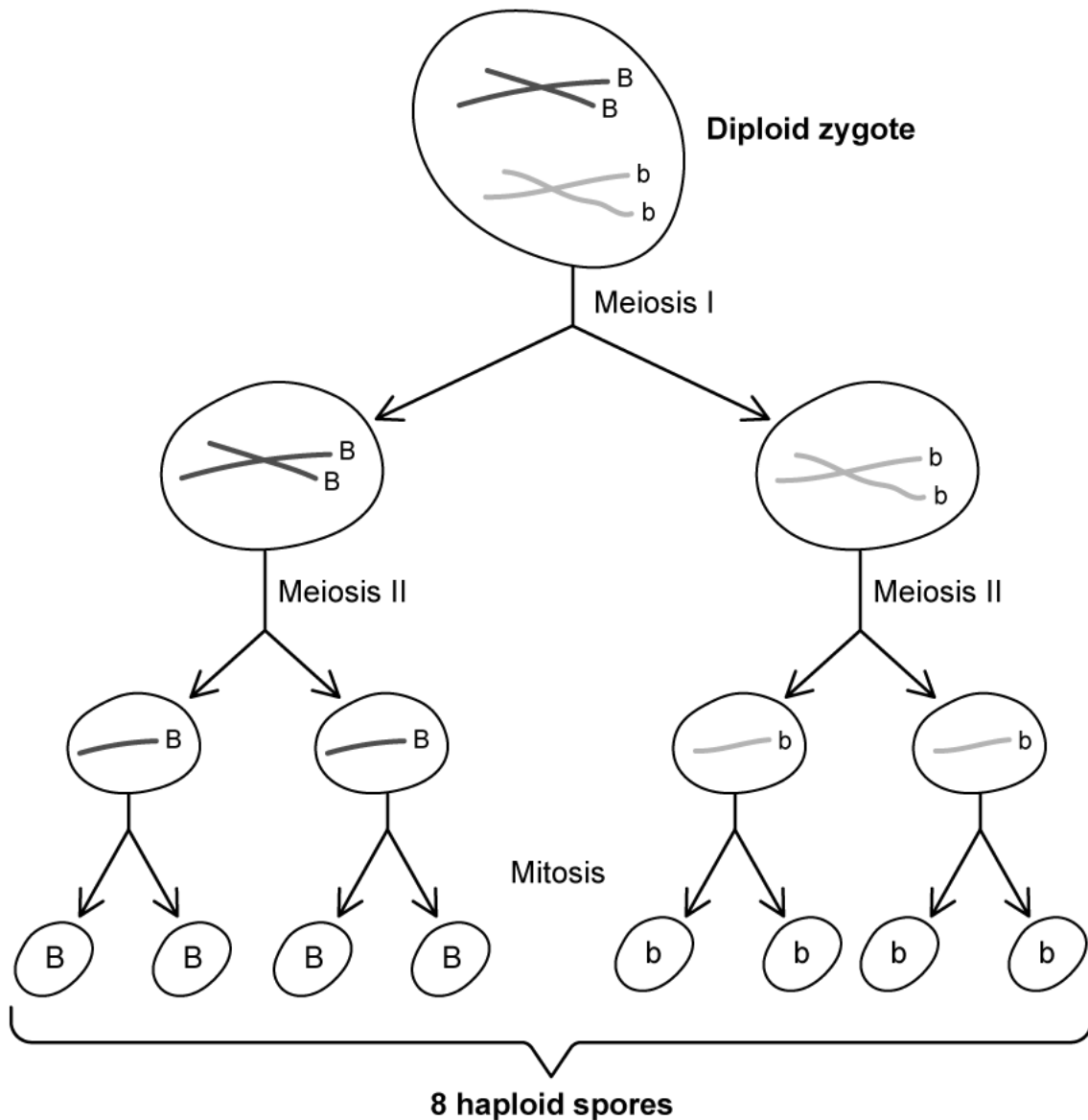
Question 4

The fungus *Sordaria fimicola* is an excellent organism for observing the effects of meiosis because its gametes (spores) are coloured and can be observed under a microscope.

Wild-type fungus has black spores. Another variety has tan spores.

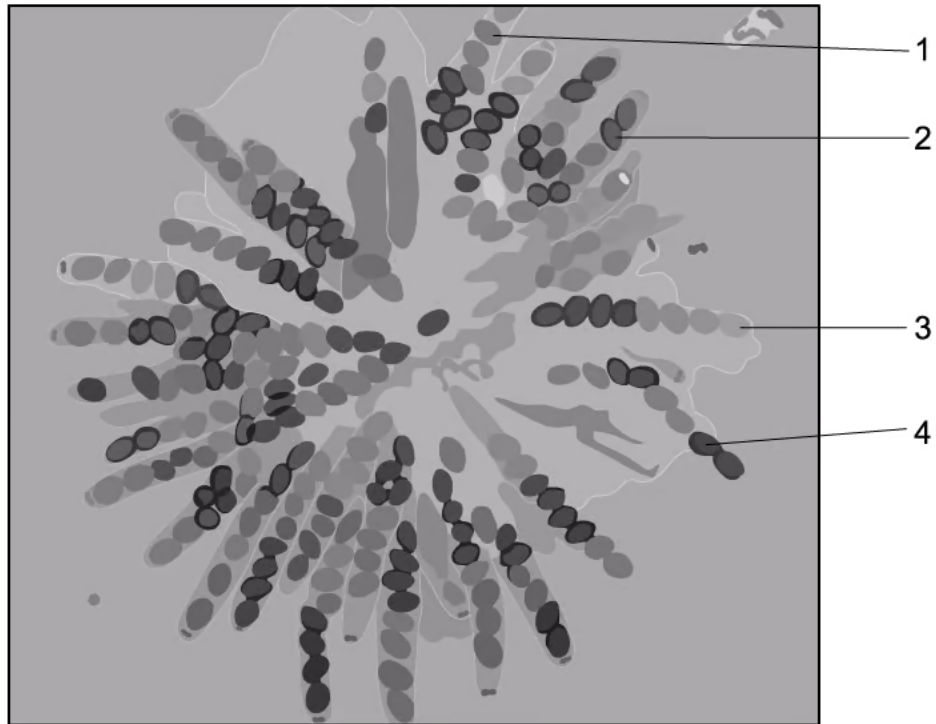
The allele for black spores is **B** and the allele for tan spores is **b**.

These can be crossed to produce a diploid zygote, which can then undergo meiosis to produce spores. In this species, a final mitotic division results in 8 spores produced as shown below.



Each zygote produces its eight spores in a structure called an **ascus**, in which the eight spores line up to reveal the alignment of homologous chromosomes during the meiotic division that led to their formation.

A microscope image of some asci is shown below.



Which asci, labelled **1 - 4** in the microscope view above, show evidence that crossing over has taken place?

- A. All of them
- B. 2 and 3
- C. 1 and 3
- D. 2 and 4

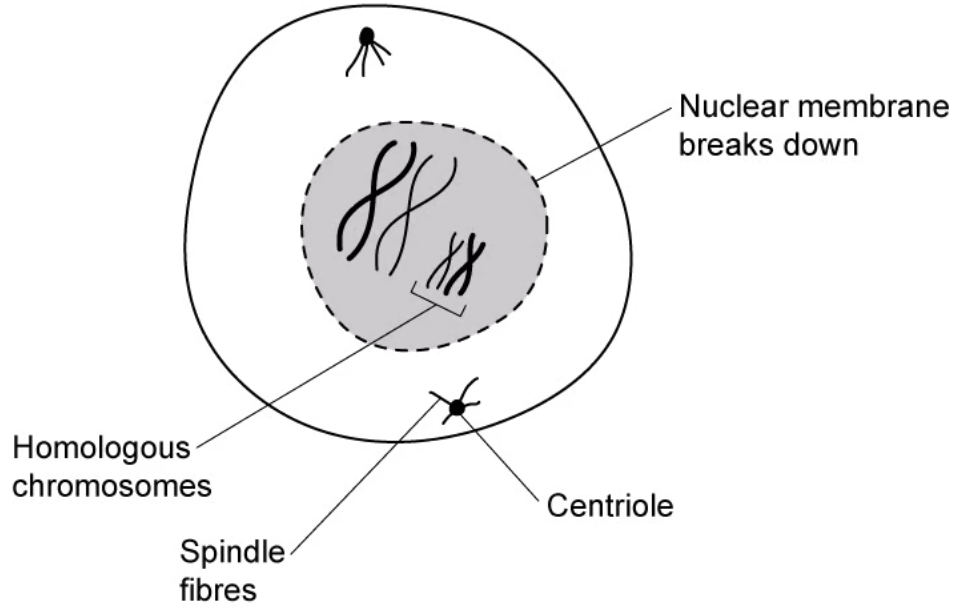
[1 mark]

Question 5

Four students were asked to draw an image of a cell undergoing meiosis I in one of its phases (prophase I).

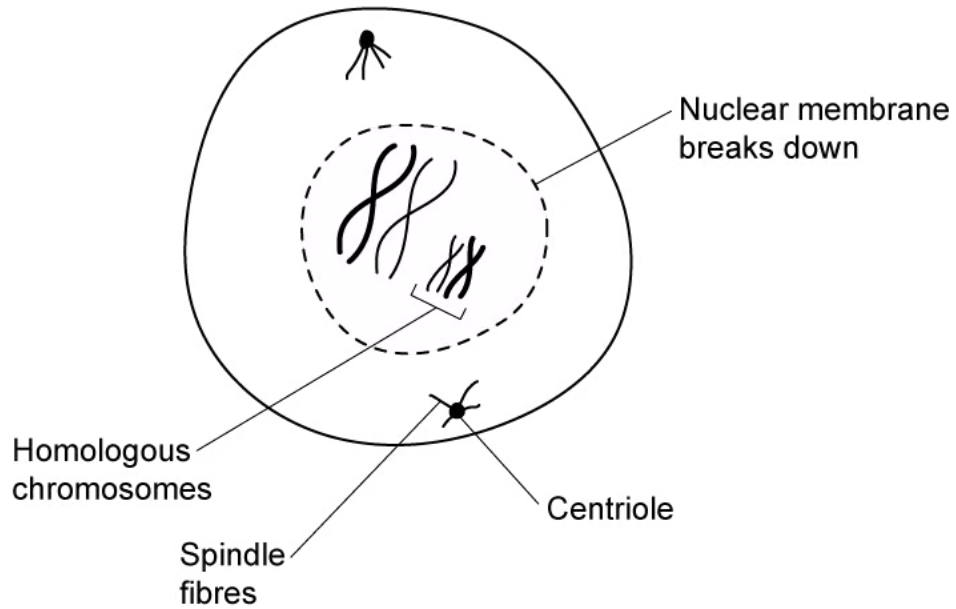
Which is the best-drawn example produced by these four students?

A.



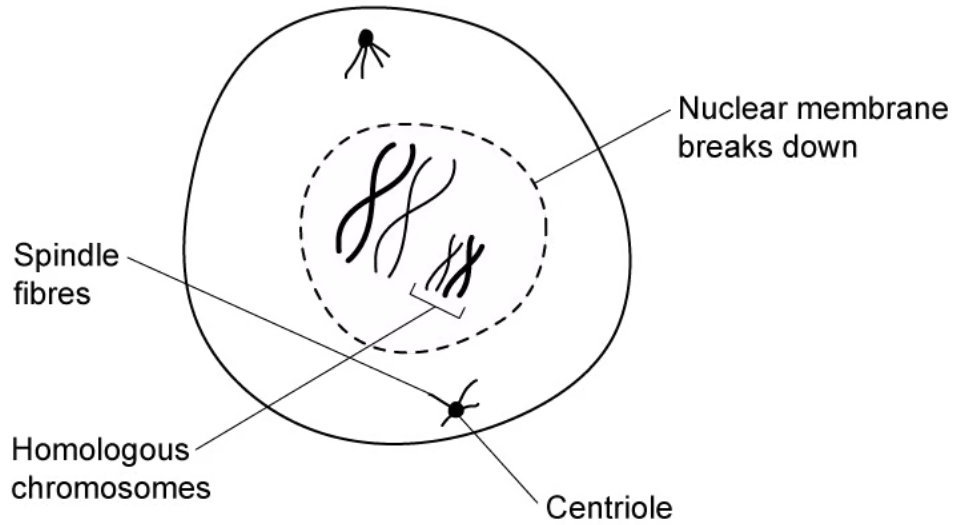
A cell undergoing prophase I of meiosis

B.



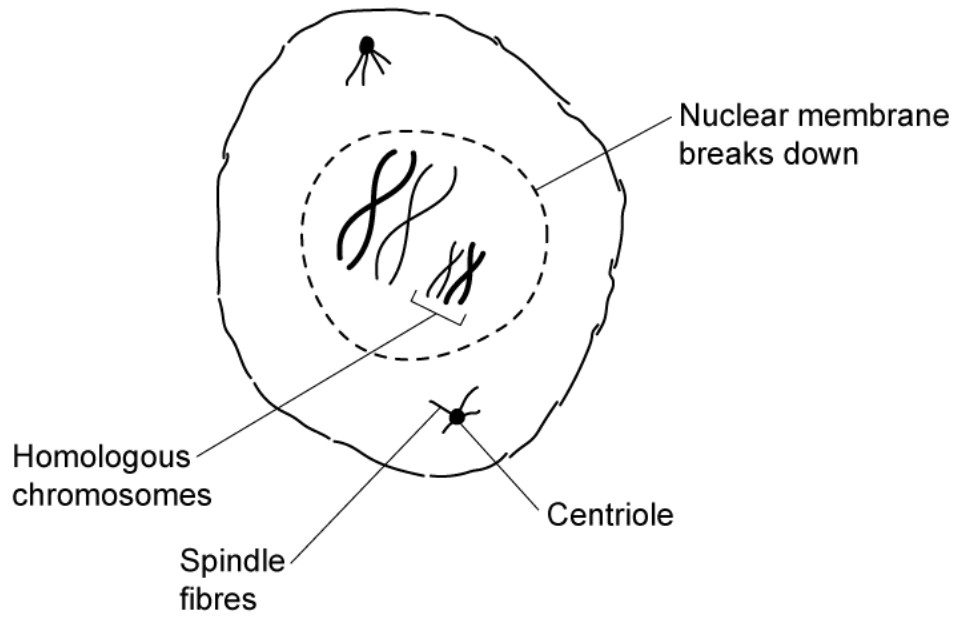
A cell undergoing prophase I of meiosis

C.



A cell undergoing prophase I of meiosis

D.



A cell undergoing prophase I of meiosis

[1 mark]