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3.1 Genes & Chromosomes

Medium

BIOLOGY

IB HL

EXAM PAPERS PRACTICE

3.1 Genes & Chromosomes

Question Paper

Course	DP IB Biology
Section	3. Genetics
Topic	3.1 Genes & Chromosomes
Difficulty	Medium

Time allowed: 20

Score: /10

Percentage: /100

Question 1

Which of the following statements about genes is **not** correct?

A A gene may be found at a different locus in different individuals.

B A gene is a section of DNA that codes for one polypeptide.

C Genes are heritable factors.

D The number of genes that a species has is not directly proportional to the size or complexity of the organism.

[1 mark]

Question 2

Which of the following statements about alleles are correct?

I. New alleles can arise through mutation.
II. There are two different versions, or alleles, of every gene.
III. Every eukaryotic cell contains two alleles of every gene.

A I only

B I and II only

C I and III only

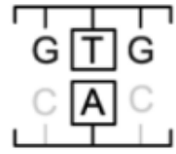
D II and III only

Question 3

Sickle cell anaemia is caused by the following mutation in the gene that codes for haemoglobin:

Normal haemoglobin gene

Mutated haemoglobin gene



Which of the following correctly explains how this mutation causes sickle cell anaemia?

A It causes valine to be replaced by glutamic acid, altering the structure of the haemoglobin protein.

B It produces an allele known as Hb^A.

C It causes glutamic acid to be replaced by valine, altering the structure of the final haemoglobin protein.

D It causes an amino acid substitution at the 8th position in the polypeptide.

[1 mark]

Question 4

Which of the following statements about genome sequencing are correct?

A	Scientists now know the location and role of every human gene	The genomes of humans are the only genomes to be sequenced in their entirety	Advancing computer technology means that the rate at which a genome can be sequenced continues to increase
B	Scientists can now look for correlations between changes in a gene and particular human traits	The genomes of humans are the only genomes to be sequenced in their entirety	Genome sequencing technology is now so advanced that further developments are not expected
C	Scientists can now look for correlations between changes in a gene and particular human traits	The genomes of many species have now been sequenced	Advancing computer technology means that the rate at which a genome can be sequenced continues to increase
D	Scientists can now look for correlations between changes in a gene and particular human traits	The genomes of many species have now been sequenced	Genome sequencing technology is now so advanced that further developments are not expected

Question 5

John Cairns carried out a study in which he kept *E. coli* bacteria in a solution containing radioactive thymine.

What was he able to conclude from the results of his study?

A Prokaryotes have a circular chromosome.

B *E. coli* have a circular chromosome.

C Autoradiography does not produce clear enough results to determine whether bacteria have one chromosome or many.

D Bacteria replicate their DNA using a structure called a replication fork.

[1 mark]

Question 6

Which of the following statements about eukaryotic chromosomes are correct?

I. Chromosomes are long, linear molecules that can be condensed for compact storage.
II. After DNA replication, the two strands of DNA are held together at the centromere.
III. DNA wraps around histone proteins to form chromatids.

A I and II only

B II only

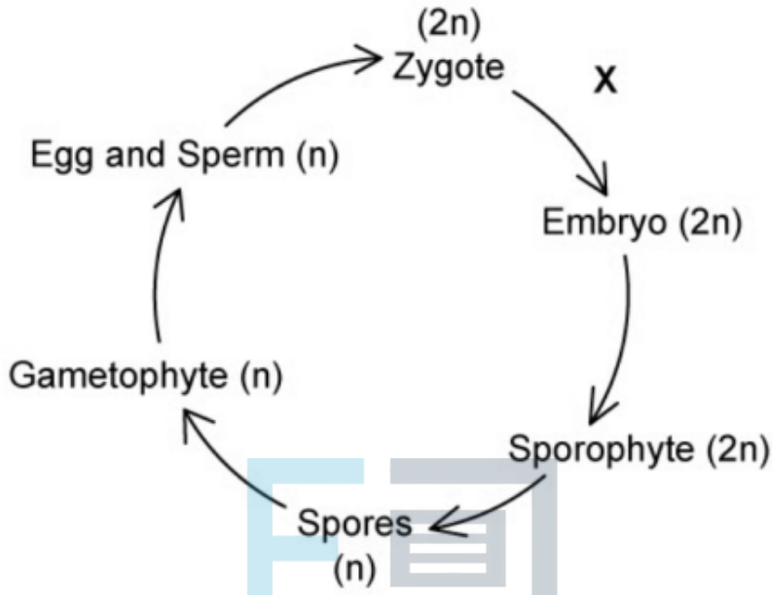
C II and III only

D I, II, and III

[1 mark]

Question 7

The diagram below shows a plant life cycle. It includes unfamiliar stages such as 'sporophyte' and 'gametophyte' that are not found in human life cycles.



What process is taking place at the stage marked **X** on the diagram?

A Fertilisation

B Meiosis

C Fusion

D Mitosis

[1 mark]

Question 8

Which of the following explains why the father determines the sex of offspring and not the mother?

A Only sperm cells contain the sex chromosomes.

B Fathers can only pass on the Y chromosome to their offspring.

C Females can only pass on the X chromosome to their offspring.

D Female gametes only contain autosomes.

[1 mark]

Question 9

Which of the individuals described below does the following karyogram represent?

A A male with Down syndrome.

B A male with a chromosome abnormality.

C A healthy male.

D A female with Down syndrome.

Question 10

Which of the following is **not** correct regarding online gene databases?

A Online databases can be used to find the locus of a human gene.

B Online databases can be used to find out the chromosome on which a gene is located.

C Online databases can be used to determine the evolutionary relationships of organisms.

D Online databases can only be used by scientists with special access.

[1 mark]