Cell Biology

(International Baccalaureate Diploma Programme HL Past Year Topical Questions)

Specimen Paper (Higher Level) Paper 1A

1. What structures are found in eukaryotes but not in prokaryotes?

A. Naked DNA and mitochondrion

B. Golgi apparatus and 70S ribosomes

C. 70S ribosomes and nuclear membrane

D. Mitochondrion and nuclear membrane

2. Membrane proteins of mice cells were marked with green and membrane proteins of human cells were marked with red. The cells were fused together. What would be seen after two hours?

A. Red and green markers fully mixed

B. All red markers and no green markers

C. Half of the new cell with green markers and the other half with red

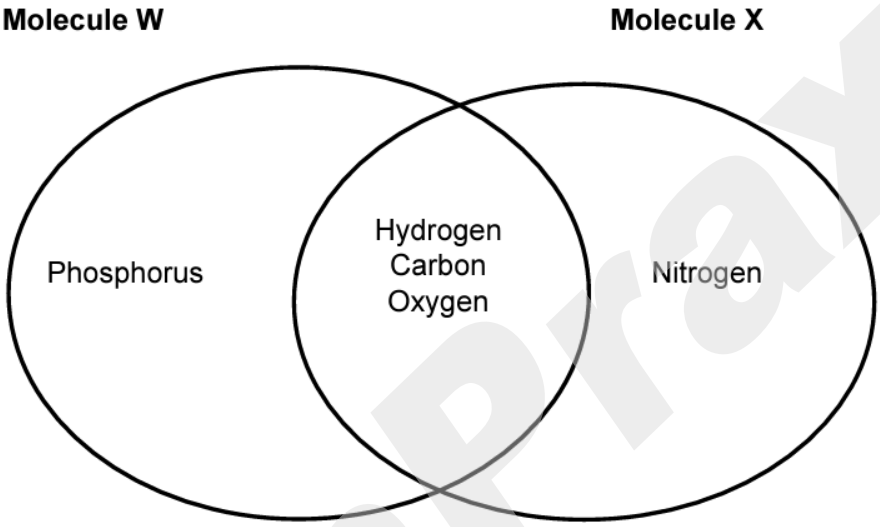
D. Red markers on the inside of the membrane and green markers on the outside

Molecular Biology

(International Baccalaureate Diploma Programme HL Past Year Topical Questions)

Specimen Paper (Higher Level) Paper 1A

2. The diagram shows the elements present in two organic molecules, W and X.
Which molecules could W and X be?



	Molecule W	Molecule X
A.	monosaccharide	amino acid
B.	nucleic acid	triglyceride
C.	phospholipid	protein
D.	triglyceride	fatty acid

3. Which property of DNA explains how genetic information can be replicated accurately?

A. Complementary base pairing

B. The double helical shape

C. 5' – 3' bonding in the sugar-phosphate backbone

D. The ability of DNA to bind to histones

4. Which molecules are produced during the hydrolysis of a triglyceride molecule?

A. Water and glycerol

B. Fatty acids and glycerol

C. Water and fatty acids

D. Water and lipids

5. The structure of monomers affects the structure and function of the polymers they form. Which row describes the structural features of polysaccharides made from alpha-glucose and beta-glucose?

	Monomer	Polymer	Shape of polymer
A.	alpha-glucose beta-glucose	starch cellulose	unbranched, straight branched, helical
B.	alpha-glucose beta-glucose	starch cellulose	branched, helical unbranched, straight
C.	alpha-glucose beta-glucose	cellulose starch	branched, helical unbranched, straight
D.	alpha-glucose beta-glucose	cellulose starch	unbranched, straight branched, helical

Specimen Paper (Higher Level) Paper 1A

5. In the experiments performed by Meselson and Stahl, *E. coli* were grown for many generations in ^{15}N then for one generation in ^{14}N. What results for the DNA of the last generation showed that replication was semi-conservative?

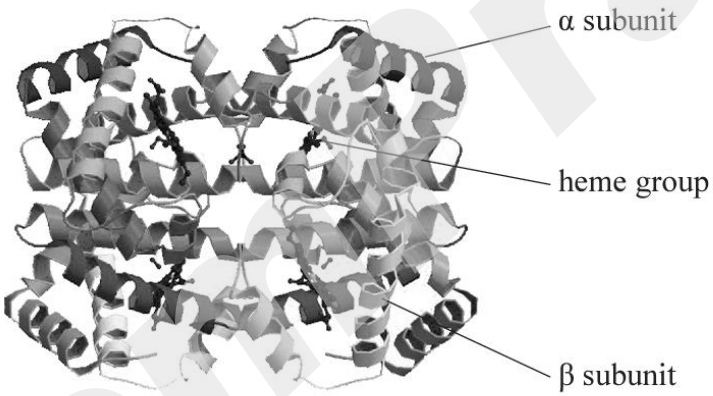
A. Both strands containing only ^{15}N

B. Both strands containing only ^{14}N

C. One strand containing only ^{15}N and one stand containing only ^{14}N

D. Both strands containing a mixture of ^{15}N and ^{14}N in equal amounts

7. The diagram shows the molecular structure of human hemoglobin as found in Protein Data Bank.



[Source: www.rcsb.org/pdb]

What characteristic of hemoglobin allows it to be considered a protein with quaternary structure?

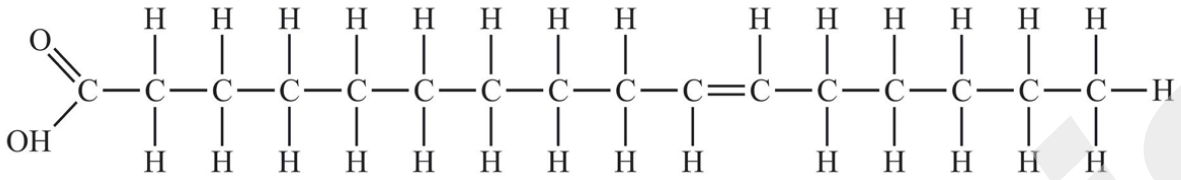
A. It contains many beta sheets.

B. It consists of polypeptide subunits and heme groups.

C. It allows bonding to oxygen atoms.

D. It contains histidine (His) residues.

8. What type of fatty acid is shown in this diagram?



A. Saturated cis

B. Saturated trans

C. Unsaturated cis

D. Unsaturated trans

+6018 – 375 2833

Genetics

(International Baccalaureate Diploma Programme HL Past Year Topical Questions)

Specimen Paper (Higher Level) Paper 1A

9. What is a reason that Taq polymerase is a suitable enzyme for use in the polymerase chain reaction (PCR)?

A. It can work at a wide range of pH.

B. It works at higher temperatures than most enzymes.

C. It can separate two strands of DNA.

D. It allows DNA to be replicated without the use of primers.

10. Which are examples of non-coding DNA?

A. Dominant and recessive alleles

B. Promoters and telomeres

C. Oncogenes and tumour suppressor genes

D. Introns and exons

11. The table shows the mRNA codons for three amino acids.

Valine	Threonine	Proline
GUU	ACU	CCU
GCC	ACC	CCC
GCA	ACA	CGA
GCG	ACG	CCG

Which substitution mutation of a base triplet on a DNA strand will lead to the same polypeptide being formed at translation?

A. TGA to TCA

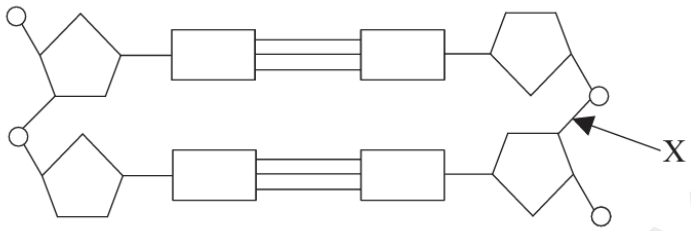
B. CGT to CTA

C. CAA to CGA

D. GCT to GGA

Specimen Paper (Higher Level) Paper 1A

9. The diagram shows part of a DNA molecule.



What type of bond is labelled X?

A. Covalent bond

B. Hydrogen bond

C. Peptide bond

D. Semi-conservative bond

10. The following alignment represents part of the sequence of a gene in two species, the mouse (*Mus musculus*) and woolly monkey (*Lagothrix lagotricha*).

Mouse MGDVEKGKKIFVMKCAQCHTVEKGGKHKTGPNLHGLFGRKTGQAAGFSYTDANKNK

Woolly monkey MGDVEKGKRIFIMKCSQCHTVEKGGKHKTGXNLHGLFGRKTGQASGYTYTEANKNK

What term is used for different forms of a gene such as these?

A. Loci

B. Alleles

C. Homologues

D. Heterologues

11. Rice has 24 chromosomes in diploid cells while humans have 46. What is a valid conclusion from these data?

A. Plants always have fewer chromosomes than animals.

B. More chromosomes means the species evolved more.

C. The number of chromosomes is a unique characteristic of species.

D. The number of chromosomes present in an organism is random.

Evolution and Biodiversity

(International Baccalaureate Diploma Programme HL Past Year Topical Questions)

Specimen Paper (Higher Level) Paper 1A

36. The preferred temperature ranges for three species of trout that are found together in freshwater lakes in North America are shown.

Lake trout
(*Salvelinus namaycush*)
6–13 °C

Rainbow trout
(*Oncorhynchus mykiss*)
12–18 °C

Brown trout
(*Salmo trutta*)
11–23 °C

What can be deduced from this information?

I. The niches for all three species overlap.
II. Brown trout have the most specialized niche.
III. Lake trout can avoid competition by living in colder water.

A. I only

B. II only

C. I and III only

D. I, II and III

39. What assumption is made when using the Hardy-Weinberg equation for calculating changes in allele frequencies in a population?

A. The population size is large.

B. Natural selection is taking place.

C. Mutations are occurring in the population.

D. There is variation among the phenotypes of the population.

40. Domestic dogs (*Canis familiaris*) have evolved from grey wolves (*Canis lupus*). Evidence suggests that the domestication of dogs first occurred around 30 000 years ago. Which best describes the evolution giving rise to the domestic dog?

A. The wolf produced offspring in large numbers which underwent natural selection.

B. Variations in the wolf population that resembled modern dogs favoured wolf survival.

C. Wolves showing favourable traits were selected for breeding.

D. Dogs were better suited to changes in the natural environment than wolves.