M99/410/S(2)M

INTERNATIONAL BACCALAUREATE
BACCALAURÉAT INTERNATIONAL
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MARKSCHEME

MAY 1999

BIOLOGY

Standard Level

Paper 2

12 pages

SECTION A

1. (a) (i) *(Award 1 mark)*
sigmoid / S shaped;

(b) (i) *(Award 1 mark)*
continue curve to year 8 reaching 2000 then plateau to year 10;
(accept a small oscillation around the plateau or a small 'overshoot' at the start of the plateau);

(ii) *(Award 1 mark for any of the below; up to a maximum of 2 marks; the answer must be somewhat qualified, not just stating 'food' or 'natural resources')*
shortage of food;
shortage of water;
disease / accumulation of wastes;
increase in numbers of predators;
all territories occupied / no space for nesting;

(c) (i) *(Award 1 mark)*
faster growth / curve displaced to left / growth ending sooner;

(ii) *(Award 1 mark)*
carrying capacity the same / no effect / reached earlier;

(d) *(Award 1 mark)*
1968

(e) *(Award 1 mark for any of the below; up to a maximum of 2 marks)*
catch by fishermen fell before cormorants feeding was significant;
fishermens' catch was low in 1960s before cormorant numbers rose;
fishermens' catch fluctuated greatly without cormorant feeding;
cormorants caught less than the fishermen in every year;

(Award 1 mark for either of the below)
lowest catches by fishermen when cormorant numbers have risen;
fishermens' catches remain low when cormorant numbers have risen;

2. (a) (i) *(Award 1 mark)*
phospholipid;

(ii) *(Award 1 mark)*
circle labelled as hydrophilic **and** tails as hydrophobic;

(b) (i) *(Award 1 mark)*
extrinsic;

(ii) *(Award 1 mark for any of the below; up to a maximum of 2 marks)*
carries a substance across the membrane;
through a pore / by binding the substance and changing shape;
uses energy from ATP / works against the concentration gradient;

3. (a) *(Award 1 mark for either of the below)*
group of organisms of identical genotype / single organism identical to parent;
group of cells descended from a single parent cell / product of asexual reproduction;

(b) *(Award 1 mark for any of the below; up to a maximum of 2 marks)*
obtain fertilised embryos at early (8 cell) stage;
break up embryo's cells to form several embryos;
transfer to surrogate mothers;
denucleated egg cell;
insert nucleus from a diploid cell of body;
implanted in surrogate mother;

(c) *(Award 1 mark for any of the below; up to a maximum of 2 marks)*
not a natural process therefore not acceptable / playing God leads to eugenics / only wealthy people or countries can use it / genetic discrimination;
lead to eugenics;
psychological problems for cloned individuals;
decreases biodiversity, changing evolutionary paths;
or any other suitable ethical issue.

SECTION B

(Remember, up to TWO 'quality of construction' marks for the essay)

4. (a) *(Award 1 mark for any of the below; up to a maximum of 5 marks)*
consists of base sugar and phosphate;
base can be adenine, cytosine, guanine or thymine;
deoxyribose sugar;
base to sugar joined correctly (C_1 to base)
sugar to phosphate joined correctly (C_5 to phosphate)

(b) *(Award marks to only the first 3 suggested differences; 3 marks)*

RNA	**DNA**
ribose	deoxyribose;
uracil	thymine;
single strand	double strand;

(c) *(Award 1 mark for each of the below; up to a maximum of 10 marks)*
Replication
complementary base pairing allows production of identical DNA molecules / semi-conservative model;
DNA molecule separates into two single strands / role of specific enzymes described as helicase;
(free) DNA nucleotides join up to bases on the single strands;
C to G and A to T;

Transcription
complementary base pairing allows an mRNA copy of a gene to be made;
part of DNA molecule unwinds / strands separate;
RNA nucleotides join to complementary bases of DNA;
U to A **not** T to A;

Translation
complementary base pairing allows base sequence to be converted to amino acid sequence;
triplet of bases on mRNA known as codon;
anticodon of tRNA binds to complementary codon;
tRNA carries corresponding amino acid;
complementary base pairing in tRNA creates specific protein;

(plus 2 quality marks)

5. (a) *(Award 1 mark for any of the below; up to 4 marks maximum)*
results / effects / products of a process control the rate of the process;
increase in the level / results / effects leads to a decrease;
decrease in the level / results / effects leads to an increase;
level of a variable can be kept constant / within limits / maintain homeostasis;
e.g. regulation of body temperature / blood glucose level / other example;

(b) *(Award 1 mark for any of the below; up to 5 marks maximum)*
vasodilatation occurs in response to heat;
arterioles leading to skin widen;
more blood flows near the skin surface;
skin becomes warmer / rises to core temperature / blood temperature;
more heat loss / radiated;
converse occurs in response to cold;

(Accept the converse of each of the points above if the candidate describes responses to cold in detail and responses to heat more briefly)
(Do not accept answers suggesting that blood vessels move)

(c) *(Award 1 mark for any of the below; up to 9 marks maximum)*
glucose level in blood monitored / measured;
if it rises too high insulin is secreted;
insulin causes processes that reduce blood sugar;
e.g. conversion of glucose to glycogen by the liver / muscles
e.g. increased respiration in body cells;
e.g. conversion of glucose to fat in adipose cells;
if blood sugar level falls too low glucagon is secreted;
glucagon causes processes that increase blood sugar;
e.g. conversion of glycogen to glucose;
e.g. conversion of (some) amino acids to glucose;
pancreas secretes insulin and glucagon;
low blood sugar causes hunger and therefore feeding / vice versa;
low blood sugar (may) cause reduced activity so less glucose use;

(plus 2 quality marks)

6. (a) *(Award 1 mark for any of the below; up to 4 marks maximum)*
large surface area / many small rather than few large air sacs;
moist surface;
thin / short distance between blood and air / one cell thick walls;
rich blood supply / constant blood flow / air flow / large concentration gradients;
permeable to oxygen and carbon dioxide;

(b) *(Award 1 mark for any of the below; up to 9 marks maximum)*
to provide more oxygen to muscles;
to provide more glucose to muscles;
to remove carbon dioxide from muscles;
because the respiration rate is higher;
because muscles use energy for contractions;
carbon dioxide increases acidity of blood / lowers blood pH;
detected by chemoreceptors (chemosensors);
in carotid artery / aorta;
sends impulses to breathing centre in hind brain / medulla oblongata;
sends impulses to diaphragm / intercostal muscles;
causing increased rate of contraction;

(c) *(Award 1 mark for a named disease and 1 mark each for any four relevant points as shown in the example below; up to 5 marks maximum)*
e.g. emphysema
lungs lose elasticity;
become permanently stretched;
cannot force air from alveoli;
walls of alveoli broken down to form larger sacs;
less surface area for gas exchange;
gas exchange cannot take place across the damaged alveoli;
can be brought on by smoking.
(Accept any reasonable disease and its corresponding effects on the efficiency of gas exchange, such as cystic fibrosis, cancer, bronchitis, asthma, *etc.*)

(plus 2 quality marks)