

GCE 2004

June Series



Mark Scheme

Biology B

BYB8/A

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BYB8/A**Question 1**

- (a) (i) acrosome;
(releases) enzymes/protease/hyaluronidase;
which digest zona pellucida/granulosa cells/ cells
surrounding egg/oocyte; 2 max
- (ii) cortical reaction/ release of calcium ions/ movement of cortical
granules;
formation of fertilisation membrane;
thickening/hardening of zona pellucida/cells surrounding oocyte;
(sperm) receptors destroyed/lost (accept ZP3); 2 max
- (b) produced by meiosis;
independent/random assortment (of chromosomes);
homologous/pair of chromosomes separate independently of each other;

OR

- produced by meiosis;
crossing over / description of crossing over / formation of chiasmata;
new combinations of alleles; 2 max

Total 6

Question 2

- (a) mass of undifferentiated/unspecialised/totipotent cells;
uncontrolled cell division; (*not 'repeated'*)
metastasis /(cells break off and) form new tumours/spread to other
parts of body; 3
- (b) cancer takes time to develop/exposure when young but cancer triggered
later;
other organs destroyed before death occurs/metastasis affects other
organs;
immune system less effective in old people;
longer time of exposure to UV/ accumulation of mutagenic effect; 1 max
- (c) dark skin/melanin/pigment stops UV light/prevents burning;
so less cancer risk in dark skinned people/less likely to develop tumours; 2
(*allow converse*)

Total 6

Question 3

- (a) (i) sperm have difficulty in entering/unable to enter uterus/
pass through mucus; 1
- (ii) (LH) stimulates ovulation;
no egg to fertilise; 2
- (b) (i) if pill taken late/missed progesterone falls below level required
to prevent conception;
level falls to just above level needed to prevent conception
each day;
level of progesterone with injection less likely to fall below level
to prevent conception; 1 max
- (ii) advantages –
one ‘dose’ lasts five years/ a long time; (*not longer*)
can be removed so contraceptive effect removed;
dose of progesterone lower;
so likely to be fewer side effects;
- disadvantages –
long term effects not known/idea of side effects;
problems associated with insertion or removal of implant;
difficulty of desired pregnancy after treatment;
possible problems associated with a level of progesterone just
above level to prevent conception;
(*max 2 for advantages/disadvantages*) 3 max

Total 7

Question 4

- (a) time between hatching and the investigation/age of duckling - ability to imprint decreases with age;
speed of movement of model - speed would affect time taken to complete set distance;
no other moving objects - so that it can only imprint on model;
distance between model and duckling – to maintain same view of object;
same model used – will imprint on specific object;
named environmental factor - valid explanation of why it should be kept constant; 1 max
- (b) model has to move for imprinting to occur;
(up to 20m) the greater the distance/time following model the greater the extent of imprinting;
so imprinting occurs in short period of time/not instantaneous;
above 20m imprinting is complete/no further change in amount of imprinting;
all ducklings do not imprint; 2 max
- (c) ducklings learn from (parents);
ducklings would be led to food;
protection by parents; 2 max
- Total 5
-

Question 5

- (a) receptor - stretch receptors (in wall of bladder);
effector - sphincter (muscles); 2
- (b) awareness of fullness of bladder/impulse from stretch receptors to brain;
activation of association centres;
conscious control of sphincter (muscles)/impulses from brain to sphincter (muscles); 2 max
- (c) slower response to changing light intensity;
if kept open would let bright light in;
(high light intensity would) damage retina/temporary loss of vision (due to bleaching); 2 max
- Total 6
-

Question 6

- (a) (i) 1931;
smallest difference between birth and death rate; 2
- (ii) rate of increase = $34.3 - 22.0 = 12.3$ per thousand,
so increase = $18\,000 \times 12.3/221\,400$;
size of population = $18\,000\,000 + 221\,400$ (increase)
= 18 221 400; 2
- (b) herd immunity/effect;
any individual has lower chance of meeting infected individual;
lower chance of disease being passed on/prevents spread of disease; 2 max
- (c) males have XY, females XX/ males have Y chromosome females do not;
so males have only one allele for some genes;
these alleles are expressed;
(harmful alleles) increase chance of early death/valid example;

OR

males have XY, females XX/ males have Y chromosome, females do not;
males develop testes;
which are responsible for testosterone production;
which causes males to take more risks/valid example;

OR

males have XY, females XX/ males have Y chromosomes, females do not;
females develop ovaries;
which are responsible for oestrogen production;
which protects individuals against diseases/valid example, e.g CHD; 3 max

Total 9

Question 7

- (a) change in base/nucleotide (in DNA);
change in base sequence of mRNA/change in codons/idea of frameshift following deletion or addition;
incorrect tRNA/anticodon;
incorrect amino acids/ different primary structure/fomation of new stop codon;
different tertiary structure/different 3D structure/different polypeptide/shortened polypeptide;
different shape of active site/no active site present; 5 max

- (b) ATP produced by electron transfer chain;
electrons not passed between carriers in chain/series of redox reactions; 2

- (c) named role of ATP;
explanation of how specific physiological function would be affected;

two examples from:

ATP needed for active transport;
reduced uptake of named ion or molecule from gut/reduced uptake of sodium or glucose from kidney;
malnourished/dehydrated/valid effect;

ATP required for movement of actin and myosin;
reduced muscle contraction;
movement restricted or slower/not possible to maintain level of activity;

ATP needed for sodium pump/manufacture of transmitter substance;
reduced conduction of nerve impulses/transfer of synapses;
slower reaction time/valid effect;

ATP needed for synthesis of named molecule;
reduced cell division/ valid effect;
slower wound healing/valid effect;
(physiological link required in each case; last marking point not awarded independently)

4 max

Total 11
