Higher Human Biology 2001

Section A

1.	D	11.	C	21.	A
2.	B	12.	D	22.	B
3.	C	13.	A	23.	C
4.	C	14.	B	24.	A
5.	B	15.	D	25.	C
6.	A	16.	D	26.	D
7.	C	17.	A	27.	B
8.	B	18.	C	28.	B
9.	D	19.	B	29.	C
10.	A	20.	D	30.	B

Section B

solidus / indicates alternatives
(brackets) indicate desirable but not essential

1. (*a*) (i) active site
(ii) mitochondrion
(iii) water

(*b*) It changes the shape of the active site.
or It attaches to/blocks the active site.

(*c*) They are activators/co-factors/co-enzymes.

(*d*) (i) All active sites are occupied.
or Enzyme concentration is limiting factor.

(ii) Add more enzyme.
or Increase the concentration of the enzyme.

2. (*a*) (i) (1) sodium 1 6
(2) potassium 30 1

(ii) by active transport

(iii) decrease

Glucose is a source of energy (for making ATP/for respiration).

ATP/energy needed for active transport.

(*b*) A Cells burst because water enters (by osmosis).

B Cells stay same because solution is isotonic/same concentration.

C Cells shrink because water lost (by osmosis).

3. (*a*)

Blood group	*Antigens present on surface of red blood cells*	*Antibodies present in plasma*
A	A	**anti-B**
B	**B**	anti-A
AB	**A and B**	**none**
O	**none**	**anti-A and anti-B**

(*b*) A and O

(*c*) (i) female AB male AO

3. (*c*) (ii)

male gametes \ female gametes	**A**	**B**
A	**AA**	**AB**
O	**AO**	**BO**

(iii) 50

4. (*a*) (i) placenta
(ii) progesterone/oestrogen

(*b*) (i) cervix
(ii) thinner/less sticky/more watery

(*c*) (i) length/size of chromosomes/ position of centromere/shape of chromosomes

banding patterns

(ii) karyo/type/-graph

(iii) by checking sex chromosomes (XY male and XX female)

(iv) whether there is an abnormal number of chromosomes

or whether fetus has Down's syndrome/Kleinfelter's etc

5. (*a*) (i) glomerulus
(ii) The blood vessel entering is wider than that leaving.
(iii) proximal (convoluted) tubule

(*b*) (i) reabsorption
(ii) 40
(iii) The urine would contain glucose/more water.

6. (*a*) (i) autonomic (nervous system)
(ii) medulla (oblongata)

(*b*) (i) SAN/sino-atrial node/ pacemaker
(ii) slows/decreases heart rate

(*c*) slows breathing/stimulates peristalsis/ constricts pupil/decreases blood pressure/ etc

7. (*a*) (i) Pulse rate 86 bpm
Stroke volume 130 cm^3
(ii) 110
(iii) 16·5 litres
(iv) As one increases so does other.
Stroke volume unchanged at high level of exercise.

(*b*) (i) 6
(ii) number of breaths per minute/ breathing rate

7. (*c*) (i) 23 or 24

(ii)

Statement	*Tick (✓)*
The rate at which pulse rate changes is highest at low rates of oxygen uptake.	✓
When ventilation rate doubles, the rate of oxygen uptake doubles.	

(*d*) pulmonary artery

8. (*a*) Type of neurone – motor
Reason for answer
cell body at one end of neurone/
many dendrites present

(*b*) Name – **nucleolus** (*spelling must be correct*)
Function
manufacture of RNA/ribosomes/
ribosomal RNA

(*c*) (i) vesicle

(ii) neurotransmitter/
acetylcholine/noradrenalin

(*d*) (i) slows down/hinders/stops transmission of (nerve/electrical) impulse

(ii) autoimmune

(*e*) *arrow(s) must point towards nerve cell body*

(*f*) Impulse is transmitted to several points/destinations at same time.
This permits muscles/fingers to work in a coordinated way.

9. (*a*) Malnutrition: diet lacks vitamins/ minerals/sufficient protein/fibre/ sodium/calcium
Starvation: diet supplies sufficient energy (from fat)

(*b*) Natural ecosystems
Results in deforestation/erosion due to overgrazing
Local water supplies
results in reduced rainfall OR flooding OR silting of rivers OR nitrate/sewage pollution

(*c*) energy is lost at each link in food chain so the extra link/step in food chain results in energy loss

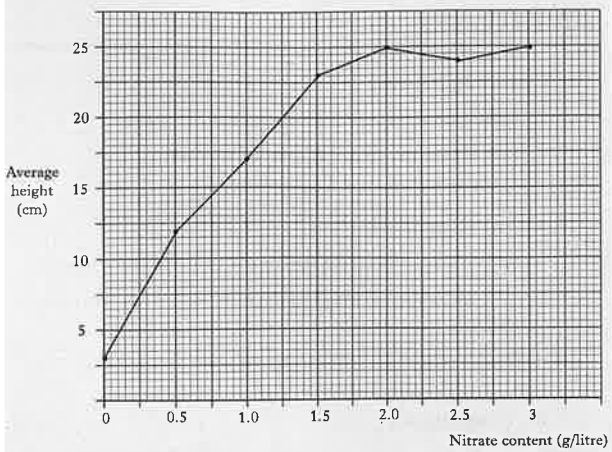
(*d*) increased yield
improved disease/frost/drought/resistance **or** improved storage/flavour etc

(*e*) (i) A chemical which kills pests/unwanted organisms.

(ii) It increases crop yield (because crop is less likely to be eaten/ damaged by pests).

(*f*) quicker/more precise/allows transfer of genes between different species

10. (*a*)



Correct y-axis with numbers and units (1)
Correct x-axis with numbers and units (1)
Correct plot by straight lines or line of best fit (1)
One mark reductions for:
Use of less than half of graph paper. ie half-size scale
Transposition of axes

(*b*) temperature/pH/volume of solution/type of seed/light intensity/air supply

(*c*) to provide oxygen (for roots)

(*d*) the experiment was repeated (ten times)

(*e*) number/surface area/colour of leaves **or** length of roots/(dry) weight

(*f*) Prediction
The plants would grow better/as well as others (at low nitrate concentrations).
Reason
They can fix/obtain their own nitrogen.

(*g*) It indicates the minimum amount of fertiliser required for optimum growth.

Section C
1 mark for each line unless specified otherwise
(brackets) = no marks
solidus / = alternative

1. A.

(i) **Encoding**

The means by which information is entered into memory eg sound, smell, taste, visual, semantic/meaning.

(Encoding is enhanced by) rehearsal, organisation, elaboration + description or examples.

Mnemonic devices + description or example.

(ii) **Storage**

LTM can store almost unlimited number of items.

STM has limited capacity of around 7 items/ called memory span.

More information can be held if it is chunked + example of chunking.

Excess information in STM will be displaced/

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1. A (ii) **continued**

lost/transferred to LTM.

Localisation of memory in limbic system/cerebrum/hippocampus.

(iii) **Retrieval**

Retrieval is getting information out of memory.

it is aided by contextual cues eg sights, smells, sounds

Serial position effect described eg items at beginning and end of a list are easier remembered.

B.

(i) **Artificial active immunity**

Immunisation is the introduction of weakened/harmless form of virus/bacterium to the body.

Nucleic acid/cell contents damaged/attenuated, so will not cause the disease.

However, surface antigens are same, so will be recognised by body defences.

B-lymphocytes manufacture antibodies.

T-lymphocytes attack cells directly.

Memory cells are produced.

So, if same pathogen invades body again, there will be faster/stronger response.

Body now has (long-term) immunity to the disease.

One example of disease for which we are routinely vaccinated. eg polio, tetanus, diphtheria, whooping cough, meningitis, measles, mumps, rubella, TB.

(ii) **Artificial passive immunity**

Injection/inoculation of (ready-made) antibodies into the body.

A short lived effect.

because it does not induce an immune response from the body.

Allows body time to develop its own antibodies.

One example of disease for which this type of inoculation is used eg tetanus, rabies, hepatitis, measles.

(iii) **The impact of vaccination on childhood diseases**

Public inoculation/vaccination programmes have reduced death rates smallpox eradicated worldwide.

Developing countries still have high mortality due to common childhood diseases.

Examples of disease eg diphtheria, whooping cough, measles, tetanus, polio and TB.

Examples of diseases in each of three sections above must be different and separate to gain marks.

2. A.

Describe the biological basis of contraception.

Contraception is prevention of fertilisation after intercourse/pregnancy.

Fertile period lasts for a few days around day 14/mid point of cycle.

Rhythm methods of contraception rely on detection of this fertile period.

Can be detected by change in body temperature or changes in cervical mucus/mucus becomes thinner.

Hormonal contraceptives can be pills/injections/implants/morning after which contain synthetic oestrogen/progesterone.

Pills usually taken for 3 weeks/one pill taken each day.

Concentration of hormones in blood is artificially increased.

Causes negative feedback effect on pituitary gland.

Reduced production of FSH prevents maturation of ova/eggs.

Reduced production of LH prevents ovulation.

Prolonged/regular suckling acts as a contraceptive.

Explanation/labelled diagram of menstrual cycle. (1)

B.

Outline involuntary mechanisms of temperature control.

Hypothalamus detects/controls changes in blood temperature.

Also receives information from (thermo) receptors in the skin.

(responses to overheating)

Increased blood flow to skin causes increased heat loss (by radiation/convection)/vasodilation.

(Increased) sweat production which results in heat loss by evaporation.

Reduced metabolic rate resulting in less heat production.

(responses to cooling)

Reduced blood flow to skin reduces heat loss (by radiation/convection)/vasoconstriction.

Contraction of hair (erector pili) muscles make hair stand on end and trap a layer of air which insulates skin/prevents heat loss.

Increased metabolic rate causes increased heat production.

Increased release of adrenaline/thyroxine.

Shivering increases heat production.

Shivering is spasmodic contraction of muscles.