

Higher Human Biology 2002

Section A

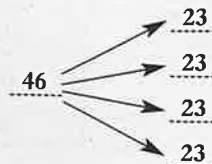
- | | | |
|-------|-------|-------|
| 1. C | 11. D | 21. C |
| 2. A | 12. B | 22. D |
| 3. C | 13. D | 23. A |
| 4. D | 14. A | 24. C |
| 5. C | 15. B | 25. A |
| 6. B | 16. C | 26. C |
| 7. B | 17. A | 27. B |
| 8. A | 18. C | 28. A |
| 9. B | 19. A | 29. C |
| 10. D | 20. D | 30. B |

Section B

1. (a) (i) ribosome
(ii) protein
(iii) *any example of protein eg enzyme, antibody, hormone*
- (b) (i) (rough) endoplasmic reticulum/ER
(ii) Example Golgi body/apparatus
Function packaging, processing of materials/proteins
- (c) To allow large/insoluble molecules/mRNA to pass through membrane
2. (a) Bond **X** peptide bond
Molecule **Y** mRNA
- (b) anti-codon
- (c) *iso* → **arg** → **tyr** → **ala** → **leu**
- (d) TGC
- (e) $\frac{2}{3}$ s or decimal equivalent (0.6 to 0.7 acceptable)
3. (a) (i) P **rr** T **Rr**
(ii) 6
(iii) *cross through white square*
(iv) No
There is not enough information to be certain whether Female S is homozygous or heterozygous.
- (b) (i) polygenic
(ii) **height** **skin colour**

4. (a) (i) **A → D → B → C**
(ii) A
(iii) They result in variation in individuals or gametes/shuffling of alleles/genes

(b) (i)

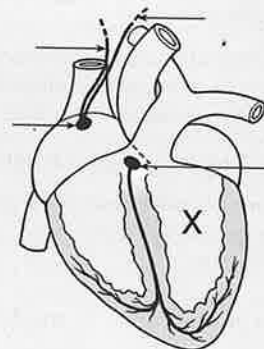


(ii) 2

(iii) seminiferous tubules/in sperm mother cells

5. (a) progesterone
(b) causes/stimulates ovulation
(c) **22–26 days**
(d) Difference It would not rise at the end of the cycle/It would stay low
Explanation because pituitary gland (which produces FSH) is inhibited (by progesterone)

6. (a)



- (b) They slow the heart (rate)
- (c) (i) AVN (atrio-ventricular node)
(ii) It co-ordinates/stimulates the contraction of the ventricles
or
Sends impulses down Bundle of His
(iii) 0.8 s
7. (a) (i) lacteal
(ii) It removes/absorbs/carries fats/fatty acids + glycerol/lipids away from villus/gut
- (b) (i) intrinsic factor
(ii) red blood corpuscle/cell
- (c) hepatic portal vein

Higher Human Biology 2002 (cont.)

8. (a)

Substance	Change
Oxygen	decrease
Carbon dioxide	increase
Insulin	increase

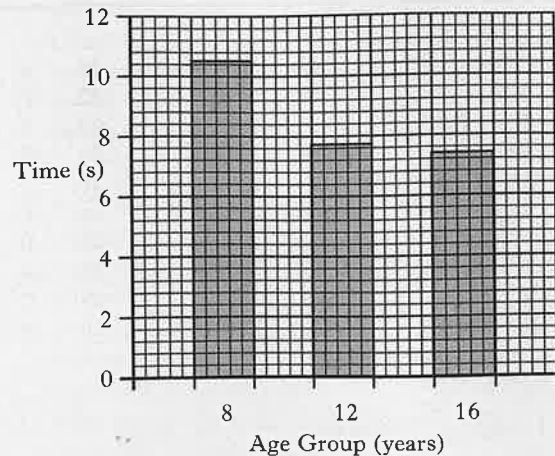
- (b) (i) It lowers glucose concentration of the blood
or
It stimulates conversion of glucose to glycogen
(ii) glucagon

9. (a) (i) People eat less in 1998 than in 1988
(ii) The figures for Scottish consumption in 1988
(iii) 1 The number/sex/class/type/age/
2 income group of people surveyed
Any two
- (b) 10.3%
- (c) 126 g/person/week
- (d) 1 Less milk, cream and cheese consumed/
less consumption of foods high in fat/less
consumption of sugar and preserves
2 More fruit and fruit products consumed
- (e) planning school meals subsidies/content/
farm quotas/subsidies/health advertising/
health care

10. (a) A **hypothalamus** B **medulla (oblongata)**
- (b) (i) motor/sensory/auditory/visual etc
(ii) It increases the surface area to allow for more nerve cells/neurones
(iii) It transfers information from/or links one hemisphere to the other
- (c) A disorder particularly associated with memory loss is **Alzheimer's** disease. This disorder is due to the disappearance of cells which produce the neurotransmitter **acetylcholine** in the **limbic** system of the brain.
- (d) Decrease in water concentration detected by hypothalamus/which stimulates increased secretion of ADH/which makes kidney tubules more permeable/so more water is removed from urine/returned to blood
Any three

11. (a) 7.7s

(b)



- (c) (i) Because the numbers of groups of pupils tested are not the same/Because the numbers of trials are not the same
(ii) The sex distribution of the pupils
The method of obtaining fastest times was applied equally
That each group of pupils was dealt with in the same way
That the same maze was used each time
- (d) social facilitation

12. (a)

Curve	Year
X	1800
Y	1960

Reason The death rate of young people was very high in 1800/or converse/more people survive to old age in 1960.

- (b) better hygiene, better medical care, better diet, better housing, vaccination programme, antibiotics, etc in 1960
Any two
- (c) X 40% Y 88%
- (d) X 0 to 10 years Y 80 to 90 years
13. (a) Both rise approx. same from 1930 to 1960 then N increases much more rapidly than P from 1960 to 1990
1970 to 1990 N increase, P no increase
They both increase between 1930 and 1990 but N more than P
Any two
- (b) 7.6 mg/dm³
- (c) As nitrate use on farmland increased, the nitrate content of the rivers also increased

13. (d) Causes algal blooms **or** reduction in oxygen content of water **or** death of many animals/fish **or** increase in organic matter **or** increase in numbers of bacteria
Any two
- (e) (domestic) sewage
- (f) eg mention of phospholipids in cell membranes **or** phosphate in ATP **or** DNA/RNA/nucleic acids

Section C

1. A. DNA

(i) **DNA structure**

- 1 full name
- 2 forms chromosomes
- 3 double helix/double strand/twisted (**both required**)
- 4 made of nucleotides (**plural important**)
- 5 three components named—base, deoxyribose sugar, phosphate
- 6 four bases named
- 7 complementary base pairing (**letters sufficient**)
- 8 sugar/phosphate backbone/ phosphates linked to sugars by (strong) bonds
- 9 hydrogen bonds linking bases/strands
- 10 strands run in opposite directions

(ii) **DNA replication**

- 11 (hydrogen bonds) unzip + strand unwinds
- 12 free nucleotides attach
- 13 need for ATP/enzymes/DNA template
- 14 complementary base pairing
- 15 semi-conservative replication described or named/copies are identical

B. Immunity

(i) **B-lymphocytes**

- 1 produced in bone marrow*/mature in bone marrow
- 2 manufacture antibodies
- 3 in response to antigens (**must indicate foreign or non-self**)
- 4 antibody is Y shaped/protein molecule
- 5 specific in their action **or** described*
- 6 this is humoral response/antibodies are free
- 7 memory cells left*
- 8 brief description of secondary response (eg stronger/quicker)*

**Starred points can be obtained under heading of T-lymphocytes*

2. B (i) continued

T-lymphocytes

- 9 mature in thymus
- 10 this is cell-mediated response/ antibodies attached
- 11 direct contact with infected cells (to bring about destruction)
- 12 T-killer and T-helper cells named.

(ii) **Macrophages**

- 13 non-specific in their action
- 14 phagocytosis named
- 15 description of process/engulf
- 16 lysosomes named
- 17 description of process/release enzymes

2. A. The life history of red blood cells

- 1 formed in bone marrow
- 2 iron and vitamin B₁₂ needed for formation
- 3 pick up oxygen in lungs/deliver oxygen to tissues
- 4 oxygen carried by (oxy)haemoglobin
- 5 biconcave to increase surface area
- 6 for ease of oxygen transfer/diffusion
- 7 flexible to get through capillaries
- 8 reference to very small size
- 9 no nucleus/lack of many organelles
- 10 to provide more capacity for haemoglobin
- 11 short life span/120 days
- 12 destroyed in liver/spleen
- 13 haemoglobin broken down to produce bilirubin

B. The influence of hormones on the growth and development of boys

- 1 growth hormone/somatotrophin
- 2 released by pituitary gland
- 3 stimulates protein synthesis/bone growth
- 4 effects of over-secretion/effects of under-secretion
- 5 growth spurt at puberty (or age given)
- 6 description or drawing of growth curve
- 7 thyroxine affects growth
- 8 produced by thyroid gland **or** influenced by TSH from pituitary
- 9 FSH **or** LH produced by pituitary
- 10 FSH stimulates sperm production/LH(ISCH) stimulates production of testosterone
- 11 testosterone produced by testes/interstitial cells
- 12 testosterone stimulates development of 2nd sexual characteristics/changes in body
- 13 eg growth of hair/drop of voice/ production of sperm/maturity/fertility/body proportions—muscle/bone changes