ASSESSMENT and QUALIFICATIONS ALLIANCE

# Mark scheme January 2002

# GCE

## Biology A / Human Biology

## Unit BYA3

**Question 1**

(a) (i) Use of stopper / cotton wool / sealed / lid / airtight; 1
*NOT aseptic technique or sterile conditions*

(ii) Competition for space / nutrients / <u>reduced</u> growth rate of yeast / kills yeast; 1
*Ignore feeding on yeast*

(b) (i) 32; 1

(ii) 1. Achieve a (uniform) distribution of yeast cells / spread out yeast / ora;
2. Avoid anomalies / produce an average; 2
*Reject accuracy, reliability*

(c) Faster rate of increase (to left of curve) and lag phase shown;
But same plateau; 2
*Ignore earlier decline phase*

Total 7

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**Question 2**

(a)

| | | |
|---|---|---|
| ✓ | × | ; |
| ✓ | ✓ | ; |
| × | ✓ | ; |
| ✓ | × | ; |

4

(b) (i) (Females vaccinated) before <u>pregnancy</u> / so baby not damaged / does not get *Rubella*;
*Reject immune / antibodies idea above*

(ii) Males vaccinated **so not a source of infection** for unprotected **females** 2

Total 6

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**Question 3**

(a) B; snail;
C; mosquito; 4

(b) Burrows into / penetrates <u>skin</u>; 1
*Reject gut, ignore mouth*

Total 5

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**Question 4**

(a) (Cancer = ) mass of cells that divide continuously / uncontrolled / faster;
(Malignant = ) can spread (to other body parts); 2

(b) (i) Higher incidence in females than males / females have higher risk;
Correlation between changes in males and females / changes in both occur at same times;
Change in rate between c1981-1986 / larger increase then; 3 max

(ii) Male = 3 (per 100,000) and female = 5 (per 100,000);
(5 x 3) + (5 x 5) = 40; 2
*Reject correct answer based on wrong readings*

(iii) Fair-skinned people contain less pigment / melanin / melanocytes;
More UV light in sunny parts; 2
*Reject lifestyle argument*

Total 8

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**Question 5**

(a) (i) 100-250 (arbitrary units); 1
*Accept 255*

(ii) 1000-100;
900 (%); 2

(b) (i) Pancreas tissue is damaged / inflamed;
Amylase escapes into blood / little released into gut; 2

(ii) Blood amylase concentration may not change much / may be difficult to detect change in blood / higher level in urine (since filtered from blood) so indicates change in blood level / easier to collect or test urine than blood / risks associated with taking blood samples; 1
*Reject discomfort of patients*

Total 6

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**Question 6**

(a) A thromboplastin / thrombokinase / plasma enzymes / (factor VIII);
B thrombin;
C & D fibrinogen and fibrin; 3

(b) Calcium ions are (a cofactor) needed for (activity of) thromboplastin / thrombokinase / plasma enzymes / (factor VIII) / substance A;
(Therefore) little thrombin formation / fibrin formation / calcium needed for fibrin or thrombin formation;
(So) blood does not **readily** clot / blood more runny / eq; 3
*Reject does not clot*

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**Question 7**

| | | | |
|---|---|---|---|
| (a) | | A and B = 23;<br>C = 46; | 2 |
| (b) | | Zygote / fertilised egg; | 1 |
| (b) | | Chromatids move apart / to (opposite) poles;<br>S / interphase;<br>Chromosome as chromatid pair / spindle forms / nuclear membrane degenerates / chromosomes condense;<br>Cytokinesis / telophase; | 4 |
| | | Total | 7 |

**Question 8**

| | | | |
|---|---|---|---|
| (a) | (i) | Region of non-coding DNA / degenerate DNA; | 1 |
| | (ii) | A-T / C-G | 1 |
| (b) | (i) | Cut vector / plasmid DNA with restriction enzymes / endonucleases;<br>Use (DNA) ligase;<br>To join sticky ends / description; | 2 max |
| | (ii) | (Plasmid) DNA **base sequence** / gene (function) altered / different proteins made; | 1 |
| (c) | (i) | Arrow pointing downwards<br>AND<br>lightest molecules move the furthest / fastest / ora; | 1 |
| | (ii) | 5; | 1 |
| | (iii) | Probe binds to **complementary** base sequence in gene;<br>Position determined by radioactivity / fluorescence; | 2 |
| (d) | | DNA unzips / unwinds / splits / separates / hydrogen bonds break;<br>To allow assembly of mRNA;<br>Using RNA nucleotides;<br>Via RNA polymerase;<br>Complementary sequence / eq;<br>mRNA joins to ribosome *(accept travels to ribosome)*;<br>tRNA carries a specific amino acid;<br>Codon-anticodon relationship / explained;<br>Peptide bonds form between adjacent amino acids; | 6 max |
| | | Total | 15 |

**Question 9**

(a) (i) (Risk of):
High blood pressure increases with age;
Heart attack increases with age / no heart attacks before 35 years; 2

(ii) *Females* (or reverse argument for males):
More likely to develop high blood pressure;
Have lower risk of heart attack (as they get older / post-55); 2

(b) (Beta blocker) binds to receptor;
Receptor on heart (muscle cells);
(Therefore) adrenaline cannot bind;
Blood pressure falls because heart rate reduced / force of contraction reduced; 3

(c) Male is (700 – 378 = 322, 322 / 700 = ) 46%;
Female because (480 – 252 = 228 / 480 = ) 47.5%; 2

(d) *Principle:*

CHD = heart muscle receives inadequate amount of blood or oxygen / (coronary) blood supply reduced;

*Smoking:*

Raises concentration of fibrinogen (in blood) / increased risk of clotting;
Increases viscosity of blood;
(Nicotine) causes platelets to stick together / causes vasoconstriction;
Carbon monoxide associated with plaque formation;
Reduces ability of arteries to dilate / reduces elasticity;

*Cholesterol:*

Fatty streaks / deposits adhere to wall of arteries;
Atheroma / atherosclerosis / plaque;
Narrows lumen of artery;
Damages endothelium;
Can lead to formation of thrombus / blood clot; 6 max
*Clots need to be in context*

Total 15