2017-18 biology mock exam paper II suggested answers

Section A Human Physiology: Regulation and Control

1.

(a) A rise in skin / blood temperature stimulates the thermoreceptors in the skin / hypothalamus (1)
Heat loss centre of the thermoregulatory centre generate and send impulses (1)
to sweat glands in skin (1)
Increase sweating (1)
Evaporation of water in sweat increases, increase heat loss (1)
(maximum the first 2 marks will be given if students mention vasodilation / hairs lie flat/reduced secretion of thyroxine/any other inappropriate mechanisms)

(b) The drop in skin temperature at the first 10 to 15 minutes during the race. (1)
Under the low relative humidity, evaporation rate of water is high and heat is loss quickly from the skin surface (1), production of heat is not that great at the beginning of race because of muscles activity is not that high yet.

(c) Low blood glucose level (1) glucose is loss in urine, blood glucose level may be too low cause causes dizziness /glucose is the substrate for aerobic respiration to release energy (1)
heat stroke / dehydration (1) urine volume is larger than normal person /extra amount of water is lost with the presence of glucose in the glomerular filtrate (1)

2. (a) (i) Follicle stimulating hormone (1)
FSH stimulates more follicles to develop into mature ones in the ovaries.(1)

(ii)

(1) As the follicles fail to response to FSH and do not develop, they do not secrete oestrogen.(1)
The low level of oestrogen cannot stimulate the thickening of the uterine lining (1) and so no shedding can occur.

(2) The inhibition is removed on the secretion of FSH by the pituitary gland is removed (1)
due to the low level of oestrogen (1)
As a consequence, the pituitary gland increases(1)its FSH secretion and the level of FSH remains high.

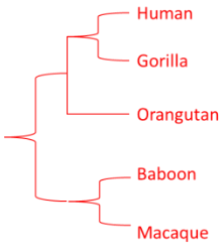
(iii) No (1) Her ovarian follicles cannot response to FSH and do not develop/ her ovaries have no functional follicles, mature ova cannot be produced. (1)

Section B Biotechnology

1(a)

(i) *Mucin DNA are digested by RE into fragments*
Gel electrophoresis to separate DNA fragments
Transfer to nylon membrane and
incubate with radioactive probe
Signal visualization under X-ray film

(ii)
(1)



(2) *The smaller the differences between the copy number of the tandem repeats, the closer the evolutionary relationship,*

1(b)

(i) *Genetically modified mosquitos can be identified if they glow under UV light.*
Without any DNA extracted from the mosquito for PCR analysis/genotyping/checking the presence of transgene, which is a time consuming/invasive process.

(ii) *The GM mosquitos will mate with the wild one and pass the lethal gene to the offspring*
In the wild without the chemical, the lethal gene is expressed in the offspring
The survival rate and reproduction rate of the mosquitos in the wild thus decreased

(iii)
(1) *More specific: only the GM mosquito is being targeted; other organisms in the pond might be potentially harmed by the chemicals/bioaccumulation.*
More controlled: GM mosquito will soon die after being released, impact on mosquito population more short termed; chemicals once added to the ponds cannot be retrieved.
(any one)

(2) *Potential gene mutation of that lethal gene make the protein encoded toxic to other animals*
Unknown ecological impact to ecosystem once GM mosquitos are released to the wild
(any acceptable answer)

(iv)

(1) *The genes essential to viral multiplication and infection are removed from the virus*
Extract DNA containing the antibody encoding gene from rat
Digest DNA and viral vector with same restriction enzymes
Incorporate the DNA into viral genome using DNA ligase
(Any three)

(2) *Body cells have limited potential to undergo further cell divisions.*
The modified cell population and thus the parasite specific antibody concentration in blood will drop progressively