KCSE 2013 Paper 2

4.4.2 Biology Paper 2 (231/2)

1. (a) (i) **B** Seta/stalk; 1 mark
D Rhizoid; 1 mark

(ii) **A** Production of spores/sporulation; 1 mark
C Photosynthesis; 1 mark

(b) (i) Arthropoda; 1 mark

(ii) - Segmented body;
- Jointed appendages;
- Presence of exoskeleton 3 marks

2. (a) **E** Semi circular canals;
F Oval window/Fenestra ovalis/Fenestra vestibuli;
G Cochlea; 3 marks

(b) (i) Lined with hair/secretion of wax/(has glands that secrete wax) to trap foreign bodies;
Hollow/tubular/tube; to direct sound waves to the ear drum/tympanum/tympanic membrane;
(max) (2 marks

(ii) Small/form a lever system/solid; to amplify (sound) vibrations; (2 marks)

(c) Deafness/ absence of pinna/ vertigo/tinnitus; (max) (1 mark

3. (a) (i) Provides energy needed to split water molecules into oxygen and hydrogen/ photolysis;
Provides energy for formation of ATP molecules (which is used in dark stage)
(1 mark)

(ii) Combines with hydrogen ions to make glucose; (1 mark)

(iii) Used to trap light energy; (1 mark)

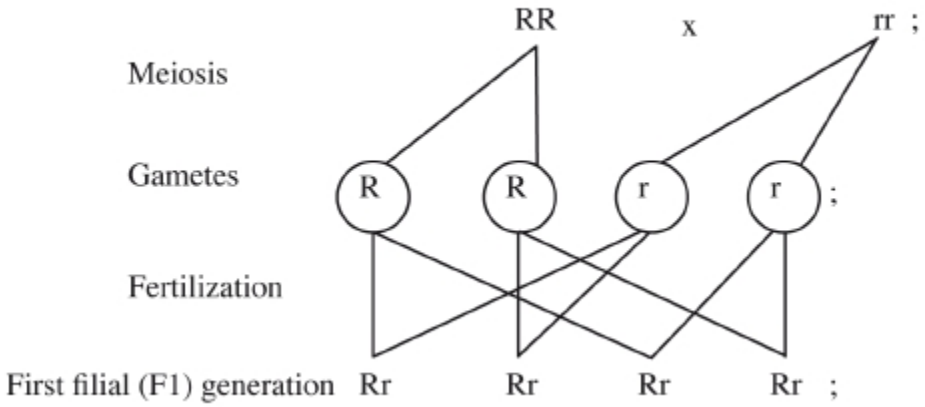
(b) (i) Starch;

(ii) Protein; (2 marks)

(c) (i) Lack of vitamin B1/thiamine; (1 mark)

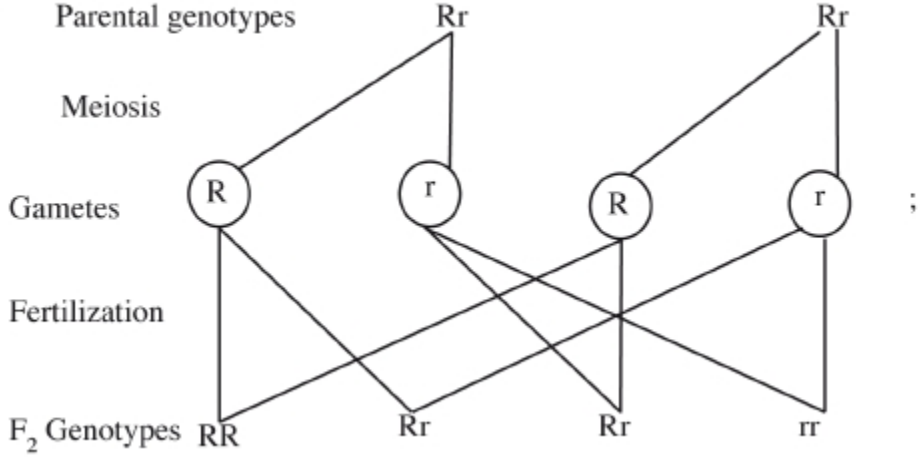
(ii) - Stunted growth;
- Paralysis of legs/arms/limbs/damage to peripheral nerves;
- Heart failure
- Swelling of feet/oedema
- Gastrointestinal disturbances/loss of appetite/sonstipation/diarrhoea/vomiting;
- Weight loss/muscle wasting
- Pale skin (2 marks)

4. (a) Parental phenotypes Smooth Wrinkled



(3 marks)

(b) Parental genotypes Rr Rr



(1 mark)

(i) Genotypic ratio 1 : 2 : 1 ; (1 mark)

(ii) Phenotypic ratio 3 smooth coats : 1 wrinkled coat; (1 mark)

(c) The total number of wrinkled seeds.

1/4 x 14,640 = 3660 ; (2 marks)

5. (a) (i) **H** - It is long/wide/broad/flat; to provide a large surface area for attachment of muscles;
- Has facets; for articulation with sacrum; (2 marks)

(ii) **J** Has flexible cartilage; which allows for widening of the (female) pelvic girdle when giving birth/to absorb shock. (2 marks)

(b) Allows passage of blood vessels/nerves/ and muscles; (1 mark)

(c) (i) Femur; 1 mark
(ii) Ball and socket; 1 mark

(d) Coccyx; 1 mark

6. (a) See graph on page 5.

(b) (i) No change in population/population is constant; mice still maturing/have not given birth; (2 marks)

(ii) Slow/gradual population growth; few mice have reached sexual maturity; (2 marks)

(iii) Faster/rapid rate of population growth/exponential;
Many mice sexually matured/reproducing/enough food/space/no competition/ birth rate higher than death/no diseases: (2 marks)

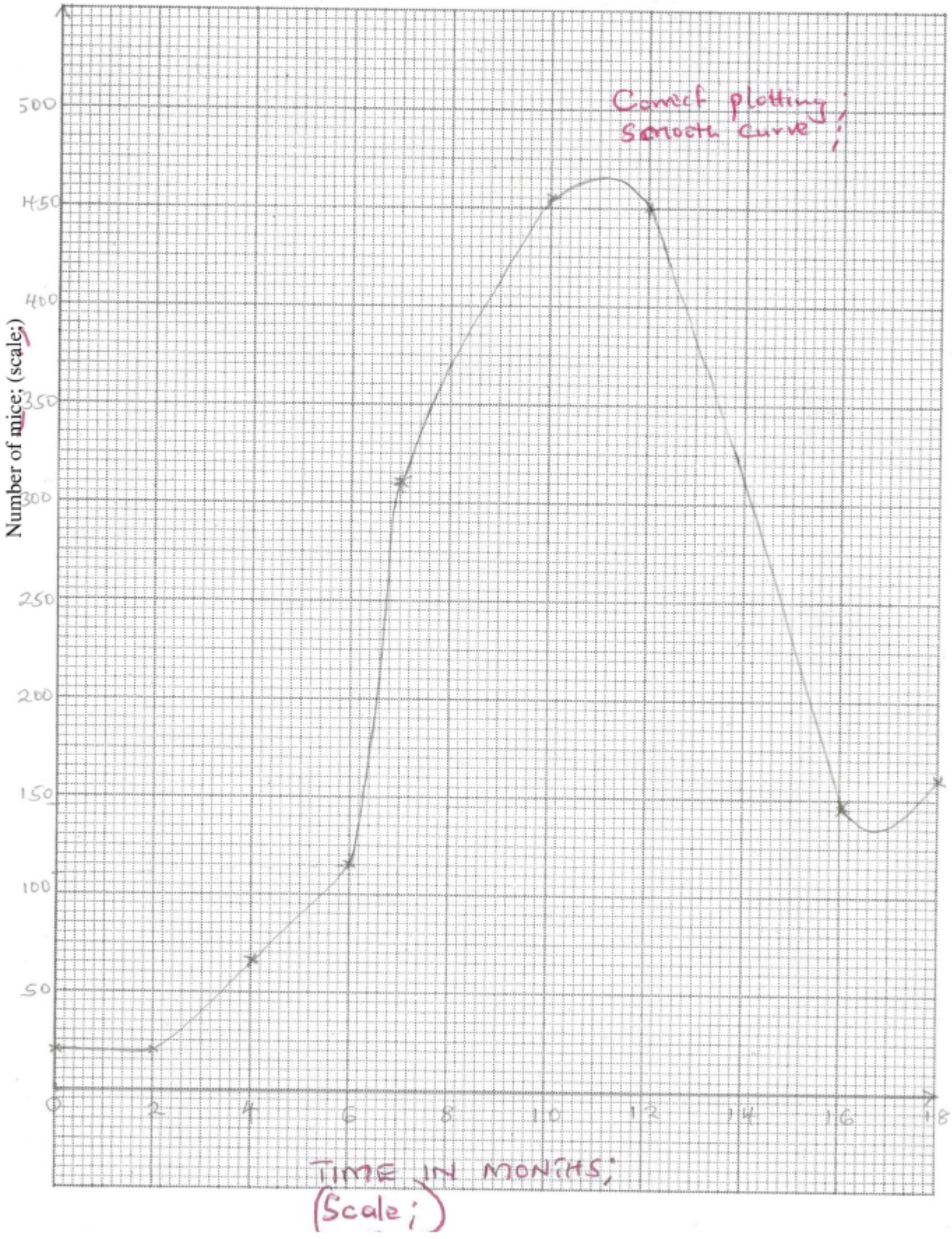
(iv) Population decline;
Competition is high / food is limiting / space is limiting/accumulation of toxic waste/disease (outbreak) deathrate higher than birth rate. (2 marks)

(c) (i) 6 and 8 ; (1 mark)

(ii) 310 - 115 = 195 mice per month; (2 marks)

(d) Population would increase; (1 marks)

(e) Food; space ; cage size; water;



7. (a) When a blood vessel is cut/injured platelets/thrombocytes/damaged tissue/wound is exposed to the air; they release thrombokinase/thromboplastin ; an enzyme that activates the conversion of prothrombin; to thrombin; in the presence of calcium ions; vitamin K/ phylloquinone ; is needed for the formation of prothrombin;
Thrombin converts (soluble blood protein) fibrinogen ; into (the fibrous form) fibrin; which forms a mesh / network across the wound; The clot so formed prevents excessive bleeding; and entry of disease agents/pathogens/micro-organisms/microbes;

Max 10 marks

(b) Many to provide a large surface area; across which large amounts of gases diffuse; moist surfaces; to dissolve respiratory gases; so as to diffuse. Made of a thin membrane/epithelium/one cell thick wall ; to reduce diffusion distance;
Highly vascularized; to carry away oxygen; and bring in carbon (IV) oxide; creating a steep diffusion gradients. (10 marks)

8. (a) Regulation of blood sugar ; when blood sugar is below normal/90 mg/100 cm^3 glucagon ; triggers the conversion of glycogen to glucose in the liver ; the glucose is released into the blood stream. When blood sugar is in excess above normal/10 mg/100 cm^3, insulin; causes the liver to convert glucose excess to glycogen ; which is stored.

Production of heat energy ; by increasing the rate of metabolic activities;

Excretion of bile pigments ; produced due to breakdown of worn out red blood cells;
Deamination/removal of amino group of excess amino acids to form urea; and detoxication/poisonous/toxic substances;

(Max 10 marks)

(b) Sweat glands excrete urea; excess water; and salts; hence maintaining salt & water balance in the blood. Evaporation of sweat; cools the body due to loss of latent heat of vaporization; when the body temperature rises ; blood vessels in the skin vasolidate; allowing more blood to flow near the skin surface; thus heat is lost to the environment by radiation/convection. The erctor pili mucle relaxes hair flattens ; in a hot environment reducing insulation; hence heat is lost from the body by radiation/ convection; to the environment.

(max 10 marks)