

## 4.4.2 Biology Paper 2 (231/2)

## SECTION A (40 marks)

1. (a) • Fruit fleshy/juicy/succulent;  
• Fruit brightly coloured/large/inclusters;  
• Fruit scented has sweet smell/sweet aroma;  
• Seeds have tough/hard testa;  
• Some seeds have sticky/mucoid secretions;  
• Fruits have hooks; (max 4 marks)
- (b) (i) Luteinising hormone:-  
stimulates ovulation;  
stimulates the development of remains of the graafian follicle into corpus luteum;  
stimulate corpus luteum to produce progesterone; (max 2 marks)
- (ii) Oestrogen:-  
stimulates healing and repair of uterine lining /endometrium following menstruation;  
stimulates pituitary gland to secrete luteinising hormone; (2 marks)
2. (a) Carbonic acid/carbaminohaemoglobin/hydrogen carbonate; (1 mark)
- (b) (i) Water;  
(ii) Carbonic acid; (1 marks)
- Role: catalyses reaction between carbon IV oxide and water to form (weak) carbonic acid; (2 marks)
- (c) Prevents accumulation of acidity/maintains pH of blood since hydrogen ions combine with haemoglobin to form Haemoglobinc acids;  
Faster; due to the catalytic effect of carbonic anhydrase; (max 2 marks)
- (d) Activates thromboplastin; thrombokinase to neutralize heparin/convert prothrombin to thrombin; (2 marks)
3. (a) O<sub>2</sub> concentration is higher outside than inside the lenticels; O<sub>2</sub> diffuses into lenticels; then into the cells;  
CO<sub>2</sub> concentration is higher inside the lenticels than on the outside CO<sub>2</sub> diffuses out of the lenticels into the atmosphere; (4 marks)
- (b) (i) To provide a large surface area/ make them thin; for gaseous exchange/ to reduce diffusion distance for respiratory gases; (3 mark)

(ii) This increases the volume of the buccal cavity while decreasing the pressure; which forces water to rush into the mouth; (2 mark)

4. (a) Males have two dissimilar chromosomes X and Y/heterogametic; Females have two similar chromosomes X and X/homogametic; Male gamete/sperms have either X or Y chromosome, while all ova have X chromosome; If a sperm with X fuses with an ovum a female is formed and if a sperm with Y fuses with an ovum a male is formed; (4 mark)

(b) (i) Sickle-cell trait is heterozygous while sickle cell anaemia is a homozygous condition; (2 marks)

(ii) People with sickle cell trait are resistant to malaria; because the plasmodium cannot survive in sickle shaped red blood cells. (2 marks)

5. (a) H - cell body; (1 mark)

(b) – Has nutrients for nourishment of neurons, brain, spinal cord;  
– Acts as a shock absorber for protection of spinal cord from mechanical damage; (2 mark)

(c) Contains myelin sheaths (of neurons which are made up of fats that make it have a shiny white appearance); (1 mark)

(d) Cholinesterase; (1 mark)

Breaks down Acetylcholine; to acetic acid and choline; (2 marks)

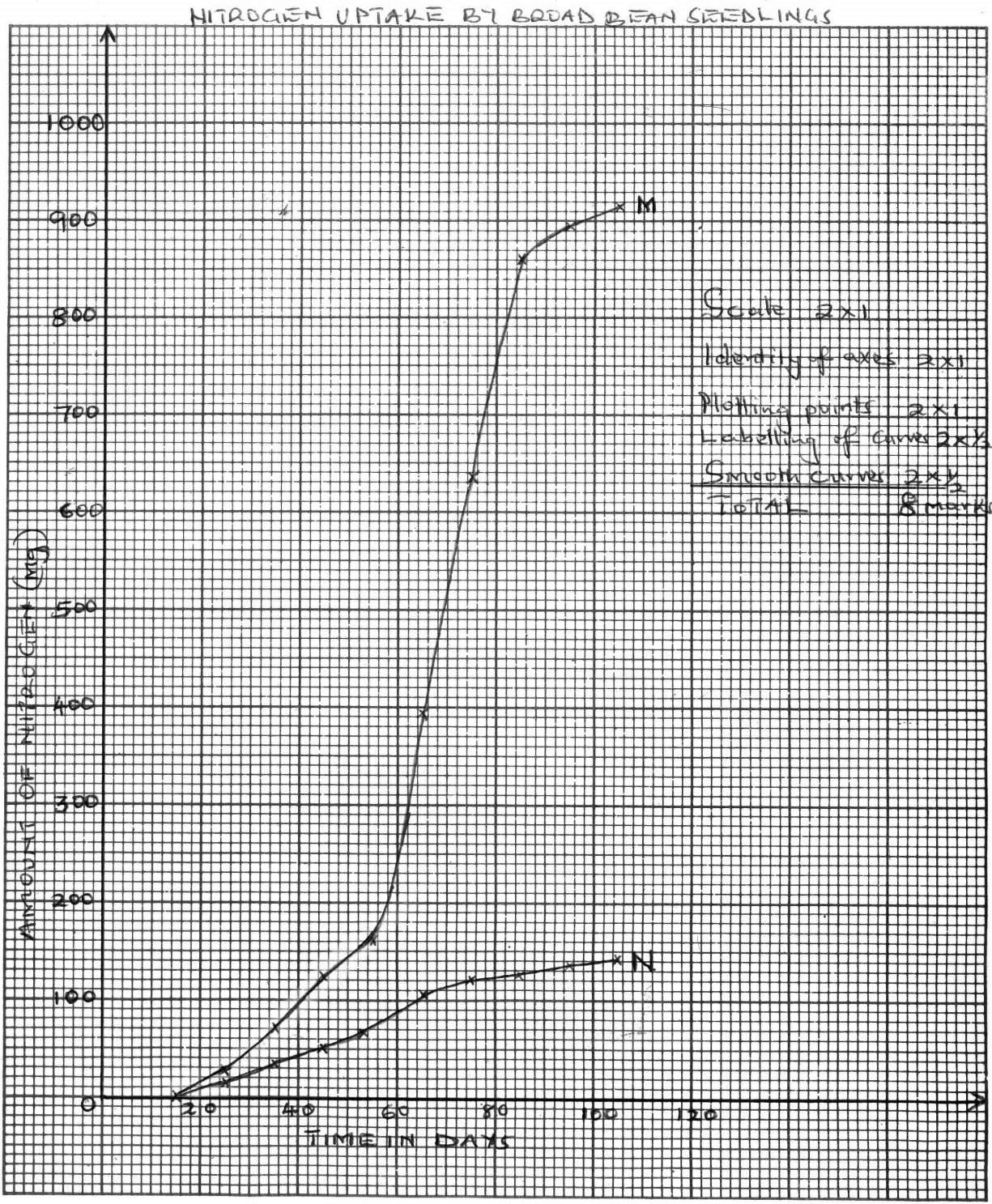
(e) Correct arrow on neurone 1 points towards the grey matter; (1 mark)

### SECTION B (40 marks)

6. (a) Scale 2x1 mark  
Identity of axes 2x1 mark  
Plotting of points 2x1 mark  
Labelling of curves 1 mark ( $\frac{1}{2} \times 2$ )  
Smooth curves 1 mark ( $\frac{1}{2} \times 2$ )

(b) At 65 = 395;  $\frac{860 - 395}{20} \times \frac{465}{20}$ ; = 23.25 ± 1 mg/day  
 At 85 = 860

(2 marks)



- (c) (i) The higher the carbon (IV) oxide content in air, the higher the nitrogen uptake and vice versa; (1 mark)
- (ii) More Carbon (IV) oxide in the air makes the seedlings to photosynthesize more; hence more amino acids/protein; are formed in the dark stage; formation of amino acids/protein requires nitrogen; (max 3 marks)
- (d) (i) The concentration of nitrogen would remain constant; (1 mark)
- (ii) Despite decline in CO<sub>2</sub>; the nitrogen already absorbed/taken up by the plant will still remain; (3 marks)
- (iii) Lightning;  
By free-living bacteria/micro organisms;  
By Rhizobium (in root nodules of legumes); (3 marks)
7. (a) (i) Reactions in photosynthesis are catalysed by enzymes; at optimum temperature photosynthesis proceeds faster;  
Below optimum temperature the rate of photosynthesis decreases because enzymes are inactivated by the low temperatures / above optimum the rate of photosynthesis decreases because enzymes are denatured; (2 marks)
- (ii) Chlorophyll traps energy from sunlight for photosynthesis;  
The higher the chlorophyll concentration the higher the rate of photosynthesis and vice versa; (2 marks)
- (b) **In the mouth;**  
Food is chewed; to increase surface area for enzyme activity/saliva contains salivary amylase;  
Saliva mixes with food and provides an alkaline medium; for amylase enzymes;  
Salivary amylase acts on starch and converts them to maltose;  
**In duodenum;**  
Food is mixed with bile; and pancreatic juice;  
Bile provides alkaline medium; for activity of duodenal enzymes; and neutralizes acidic chyme from the stomach;  
Pancreatic juice contains pancreatic amylase; which converts starch to maltose;  
**In the Ileum;**  
Epithelial cells in Ileum secrete *succus entericus*; which contains enzymes;  
sucrase; which acts on sucrose and converts it to fructose and glucose;  
Lactase; which acts on lactose and converts it to galactose and glucose;  
Maltase; acts on maltose and converts it to glucose;

max 16 marks

8. (a)
- Diffusion of Carbon (IV) Oxide; and oxygen; through stomata and lenticels;
  - Some wastes are stored in tissues in non-toxic form e.g. calcium oxalate;
  - Some of these tissues or organs drop off from plants e.g. leaves, flowers, fruits and bark of caffeine, nicotine, quinine;
  - Some wastes are released by transpiration through stomata and lenticels such as water vapour;
  - Others are released by guttation through hydathodes as water;
  - Others are released by exudation.
- (max 4 marks)

- (b)
- When body temperature is lowered below normal;  
arterioles in the skin constrict;  
blood is diverted to a shunt system;  
less blood flows to the skin/less heat is lost;  
when body temperature is raised above normal;  
arterioles in the skin dilate;  
more blood flows to the skin;  
more heat is lost by convection and radiation;

when body temperature is lowered below normal:  
erector-pilli muscles contract, hair stands erect;  
more air is trapped, air is a bad conductor;  
and insulates the body against heat loss;  
when body temperature is raised above normal:  
erector-pilli muscles relax, hair lies on skin;  
less air is trapped, more heat is lost;

when body temperature is lowered below normal:  
less fluids are absorbed by sweat glands;  
less sweating, less vaporisation of water;  
when body temperature is raised above normal:  
sweat glands are more stimulated and more sweat is produced;  
water in sweat evaporates and takes up heat from the body;  
body is cooled/body temperature is lowered;

(max 20)