SECTION A (40MARKS)

Answer **all** questions in the spaces provided

1. The results in the table below show the effect of some conditions on seed germination. In each experiment, all the other environmental conditions were kept constant except the one being investigated.

Experiment	Treatment	Percentage germination
I	Seeds placed in tightly closed container with pyrogallic acid	0
II	i)Seeds kept on saucer in light ii)Seeds kept on saucer in darkness	96 97
III	i)Seeds kept in a refrigerator at 40^0C ii)Seeds kept in an oven at 60^oC iii)Seeds kept at 35oC	0.5 0 92
IV	i)Dry Seeds in closed container ii)Moist seeds in closed container	0 87

a) i) What was the role of pyrogallic acid in experiment I (1mark)

ii) State the aim of experiment II (Imark)

b) i) Account for the results obtained in experiment set up III (3mks)

c) Name the conditions necessary for germination being investigated by experiment I, III and IV (3mks)

I

III

IV

2.In human beings, baldness is controlled by a dominant gene N located on the Y chromosome

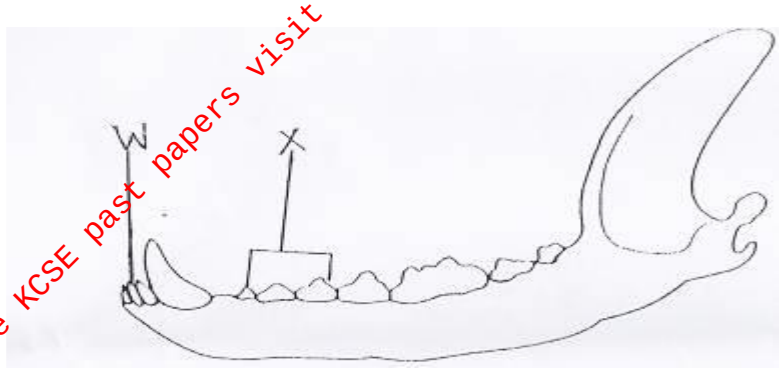
a) Work out a cross between a bald headed man and his wife (4mks)

b) i) What is the probability of the couple getting girls who would develop baldness (1mrk)

ii) Give a reason for your answer in b i) above. (1mk)

c) Apart from the above trait name **two** other sex linked traits in human beings associated with Y chromosome. (2mrks)

3.The diagram below represents the lower jaw of a mammal.



a) Suggest the mode of nutrition of the mammal whose jaw is shown above. (1mrk)

b) State **one** structural and **one** functional difference between the teeth labelled W and X (2mks)

Structural difference

Functional difference

C) The mammal whose jaw is shown above has 6 incisors, 2canines, 8 premolars and 4 molars in the upper jaw, while the lower jaw has 6 incisors, 2 canines, 8 premolars and 6 molars.

Write it's dental formula and indicate the total number of teeth in it's mouth. (2mks)

d) Name **two** mineral elements that are responsible for the hardening of the teeth. (2mks)

e) Give a reason why the activity of salivary amylase stops in the stomach. (1mk)

4. During an Ecological study of a lake a group of students recorded the following observations.

i) Planktonic crustaceans feed on planktonic algae
ii) Small fish feed on planktonic crustaceans, worms and Insect larvae
iii) Worms feed on insect larvae
iv) A bird species feed on small fish, planktonic crustaceans and worms
v) Insect larvae feed on planktonic algae
vi) Large fish feed on small fish

a) From this record of observations, construct a food web. (5mks)

b) From the food web you have constructed in a) above, isolate and write down a food chain that ends with:-

i) Bird species as secondary consumer (1mk)

ii) Large fish as a tertiary consumer (1mk)

c) How would humans interfere with this lake ecosystem (1mk)

5. In an investigation the approximate composition of plasma, glomerular filtrate and urine in a mammal was determined. The results were as shown in the table below.

Component	Plasma g/100cm^3	Glomerular Filtrate g/100cm^3	urine g/100cm^3
Urea	0.04	0.04	2.00
Uric acid	0.005	0.005	0.07
Glucose	0.20	0.20	0.00
Amino acids	0.07	0.07	0.00
Plasma Proteins	9.00	0.00	0.00
Mineral salts	0.84	0.84	1.96

a) Account for the absence of:-

i) Plasma proteins in glomerular fitrate in urine (1mk)

ii) Glucose and aminoacids in urine (1mk)

b) i) State the Principal requirement of filtration that forms glomerular filtrate. (1mk)

ii)How is the requirement identified in b) i) achieved in the kidney. (1mk)

c) Other than **excretion**, give another function of the mammalian kidney. (1mk)

d) From the above results, identify the types of metabolic wastes eliminated from mammalian blood. (2mks)

e) How many times is uric acid concentrated in urine than in Plasma. (1mk)

SECTION B (40MARKS)

Question **6** is **compulsory**

Choose either question **7** or **8**. Answer **all** the questions in the spaces provided.

6. In an investigation two persons Y and Z drunk same quantity of a glucose solution. Their blood sugar levels were determined immediately and thereafter at intervals of one hour for the next 6 hours. The results were as shown in the table below.

Time (Hours)	Blood glucose level (mg/100ml) Person Y	 Person Z
0	80	110
1	210	350
2	170	380
3	110	390
4	90	230
5	90	180
6	90	160

a) Plot a graph of the blood sugar levels of persons Y and Z against time on the same axes. (7mks)

b) Account for each of the following observations:-

i)The change in Blood sugar level in person Y between 0 and 1 hour. (2mks)

ii)The change in blood sugar level in person Y between 1 and 4 hours.(2mks)

c)From the graph, state the blood sugar level of person Y and Z at 4 ½ minutes.(2mks)

Y

Z

d) Suggest a reason for the high blood sugar level in person Z. (2mks)

e) How can the high blood sugar level in person Z be controlled. (1mrk)

f) Name the process which ensures that blood sugar level in human blood remains relatively constant. (1mk)

g) Explain the effect of large intake of salt in the diet. (3mks)

7 Explain how abiotic factors affect plants. (20mks)

8 Explain the adaptations of ileum to it's functions. (20mks)

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MARKING SCHEME

a)i) Eliminate/absorb oxygen;

ii)Investigate whether light is necessary for germination;

b)i) At 4°C temperature, enzymes are in active due to low temperature hence low percentage germination;

At 60°C, temperature, is very high/higher than optimum, enzyme are denatured hence no germination;

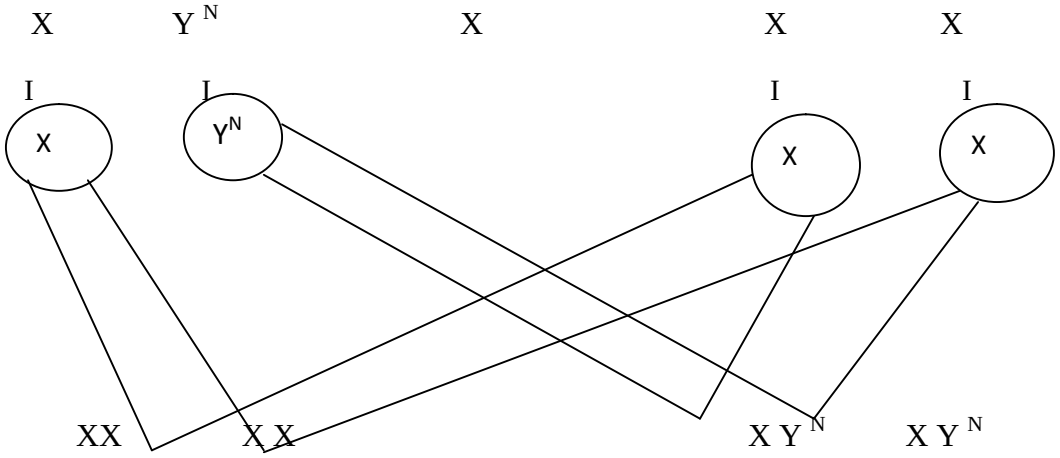
A 35^0C temperature is optimum for enzymes controlling germination hence high percentage germination;

c) I - Oxygen;

III - Optimum/favourable/ suitable temperature;

IV - Water;

2. Male Female



b) girls

0% (Zero)

$\frac{0}{2}$ = 0%

Rej $\frac{0}{4}$ = 0% ,but mark (ii)

ii)Girls do not inherit the Y chromosome from their fathers which carry the gene /girls inherit only X chromosome from their fathers which does not contain the gene.OWTTE

c) Hairy Pinna/Nose ;

Any two Marks first two

3 a) Carnivorous ;

b) **Structural differences**

W	X
Chisel shaped	Has cusps/Ridges

Functional

W	X
- Bite and hold/sieze/grip Prey Stripping/cutting fresh	- Crushing/grinding/slicing food OWTTE

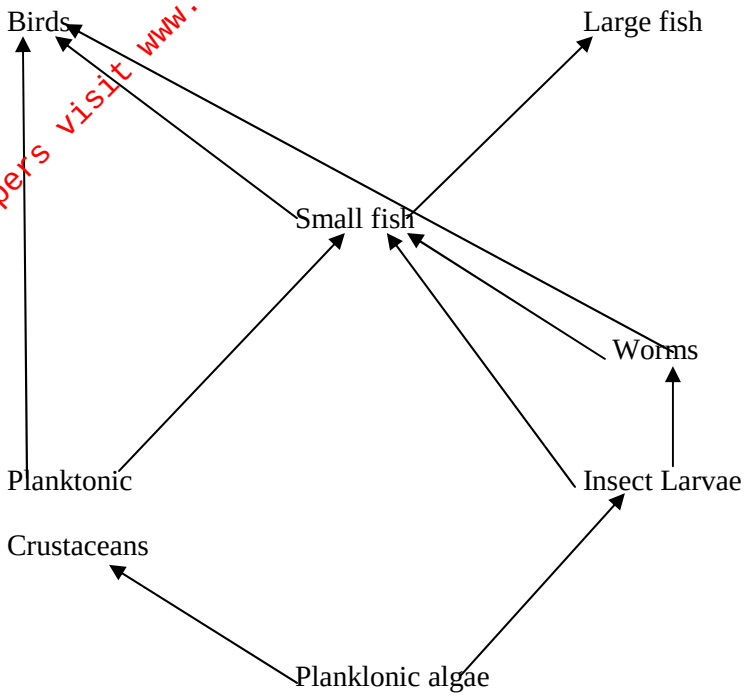
c) $\frac{i\ 3}{3}\ \frac{c\ 1}{1}\ pm\ \frac{4}{4}\ \frac{m\ 2}{3}$; = 42 ;

d) Calcium ;

Phosphorous ;

e) Acidic pH/medium/Presence of HCl ;

4a)



bi) Planktonic algae → Planktonic Crustaceans → Birds ;

ii) Planktonic algae → Planktonic Crustaceans → Small Fish → Large Fish ;

Planktonic algae → Planktonic Crustaceans → Small Fish → Large Fish ;

Mark any one

C Pollution / use of lake water for irrigation / fishing / Introduction of new species / shooting / Poaching of birds

Mark any one

5 a i) Plasma Proteins molecules too large to pass the capillary walls hence left in blood;

ii)They are selectively reabsorbed back into blood stream ;

b i) High Pressure;

ii)Blood reaching renal artery being is at high pressure due to the fact that it branches directly from dorsal aorta where blood flow is at high pressure / afferent arteriole is wider than efferent arteriole creating resistance to blood flow leading to development of high pressure/ Narrow capillaries of glomerulus cause pressure build up due to resistance of blood flow

c)Osmoregulation / Ionic balance / pH regulation;

d) Urea; Any two

Uric acid ;

Salt ;

Water ;

e) 0.07 : 0.005

$= \frac{0.07}{0.005}$

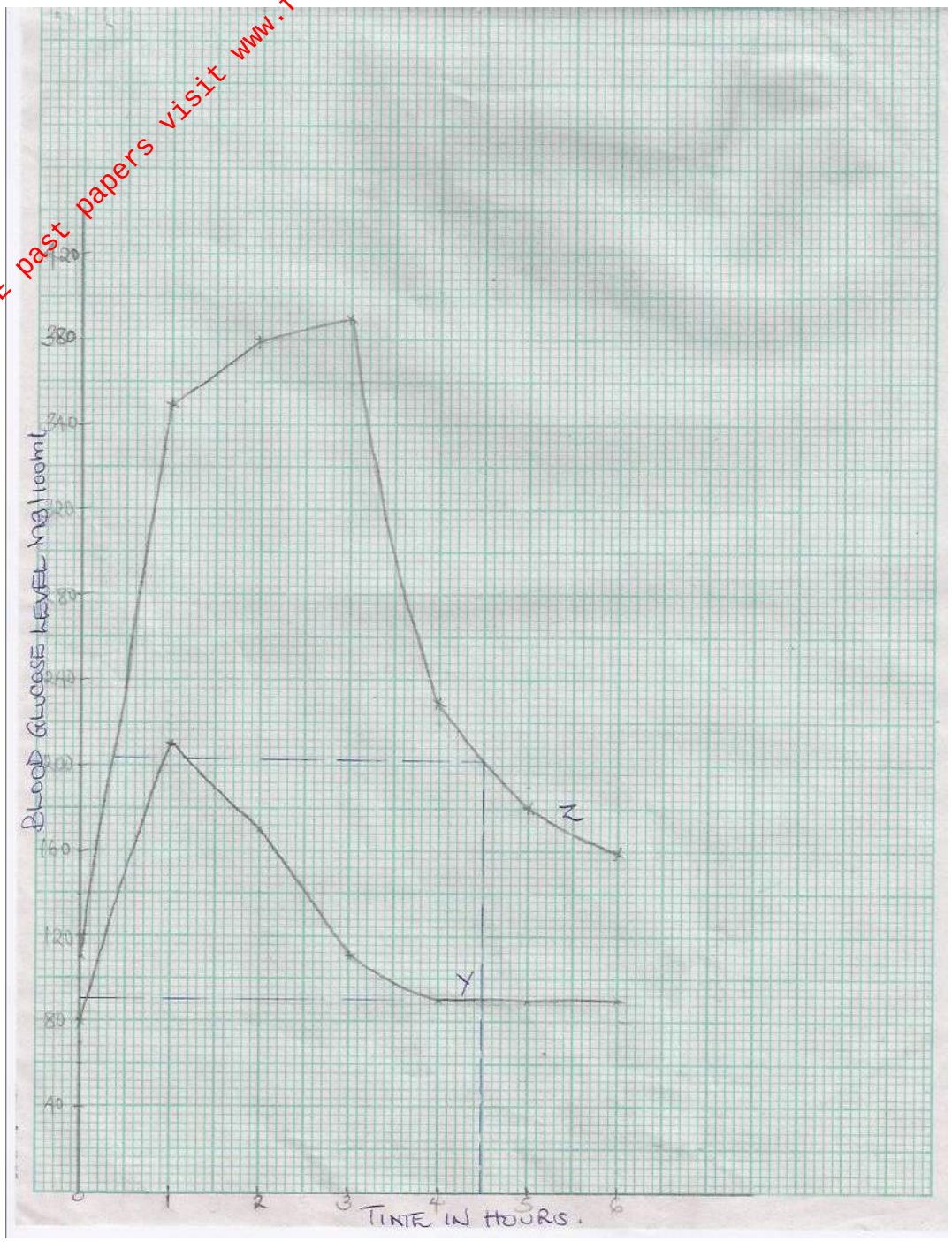
$= \frac{70}{5}$

= 14 ;

6 a)GRAPH

Labeling of axes @1mrk=2,scale on both axes @ 1=2,plotting of curves for P and Q@1mrk=2,labeling ofcurves@1/2= 1 Mark

Grand total for the graph 7Marks



B)i)glucose was absorbed in the ileum by diffusion / Active transport ;

ii)Conversion of excess glucose to glycogen / fats by the liver under influence of insulin /increased oxidation of glucose ;

Any two.

c)Y - 81mg/100ml + or -1

Z - 203mg/100ml + or -1

d)Has defective pancreas which doesn't release enough insulin ; which stimulate liver cells to convert excess glucose to glycogen/Fats/increase oxidation of glucose ;

e)Administration of insulin :

f)Homeostasis :

h) Osmotic pressure of blood rises / increases ; Antidiuretic hormone is secreted; (by pituitary gland) (more) water is reabsorbed ; from kidney tubules ;

7). How abiotic factors affect plants

- **Wind**
  - During windy conditions the rate of transpiration increases.
  - Wind modifies the temperature, which affects transpiration and photosynthesis.
  - Wind disperses fruits, seeds and spores.
  - Wind is an agent of pollination.
  - Strong wind break branches of trees and may uproot some trees.

Temperature

- Temperature affects enzymatic reaction. This influences the rate of photosynthesis and other biological reactions.
- Increase in temperature increases the rate of transpiration.

Light

- Green plants need light for photosynthesis
- Some plants need light for flowering or photoperiodism.
- Some seeds such as lettuce require light to germinate
- Light affects the opening and closing of stomata, which affects transpiration, gaseous exchange and photosynthesis.

Humidity

- When humidity is low, the rate of transpiration increases due to the little amount of water vapour in the atmosphere.
- When humidity is high , the atmosphere becomes saturated with water vapour, reducing the rate of transpiration.

- **pH**
  - Each plant requires a specific PH to grow well: acidic, alkaline or neutral.
- **Salinity**
  - Plants with salt-tolerant tissues, such as mangroves, grow in saline areas.
  - Plants in estuaries adjust to salt fluctuations
- **Rainfall/Water**
  - Water is necessary for germination.
  - Water is a raw material for photosynthesis.
  - It is a solvent and dissolves mineral salts for absorption and transport.
  - It is the transport medium for manufactured food.
  - Water is needed for turgidity of cells to give the plant support, especially in herbaceous plants.
  - Water is an agent of fruit and seed dispersal.
  - Some aquatic plants require water for pollination.
  - Pteridophytes and bryophytes need water during fertilization.
- **Topography**
  - The windward side of a hill receives enough rainfall and plants grow well.
  - The leeward side receives less rainfall and there's stunted plant growth
  - North facing slopes in the southern hemisphere have more plants.
  - Water drains readily from steep slopes so they dry more quickly than flat areas.

8).Adaptations of ileum to it's functions

- Has secretory glands/crypts of Lieberkuhn; which secrete enzymes maltase/sucrase/peptidase/Lipase to complete digestion of sugars /proteins/Lipids; respectively.
- Goblet cells secrete mucus; allows for smooth movement of food/protects wall of ileum from action of the digestive enzymes;

- Very long; to provide large surface area for absorption;
- Highly folded/coiled; to slow down movement of food to allow more time for digestion/absorption/increase surface area for absoption:
- Has numerous villi; which increase surface area for absorption: microvilli; which further increase surface area for absorption;
- Ileum wall/villi has a thin epithelium which is only one cell thick; reduces distance over which digested food has to diffuse;
- Villi are highly vascularised/have a rich network of blood capillaries;rapidly transport from the small intestine food materials that diffuse through epithelium (maintains a steep concentration, gradient)for efficient absorption of digested food materials into the blood;
- Villi have lacteals; for absorption of fatty acids and glycerol/lipids;
- Cells of the ileum wall have large numbers of mitochondria; release energy that aids in active transport across epithelium;
- The ileum has a narrow lumen; allowing close contact of food to the intestinal wall;

-Total 22 points.max 20marks.

- To increase surface area for absorption mark once

NAME..... **INDEX NUMBER**.....

231/2
BIOLOGY
PAPER 2
JULY/AUG.2O13
2 HOURS

CANDIDATE'S SIGNATURE.....

DATE......

LARI DISTRICT PRE-KCSE EXAMINATIONS 2013

KENYA CERTIFICATE OF SECONDARY EDUCATION
BIOLOGY
PAPER 2
(Theory)
2 hours

Write your name and index number in the spaces provided above.
Sign and write the date of examination in the spaces provided above .
This paper consists of **TWO** sections: **A** and **B.**
Answer **ALL** the questions in section **A** in the spaces provided .
In section **B** answer question **6** (**compulsory**) and either question 7 or 8 in the spaces provided after question 8.

For examiner's use only

Section	Question	Maximum score	Candidate's score
A	1	8	
	2	8	
	3	8	
	4	8	
	5	8	
B	6	20	
	7	20	
	8	20	
	Total score	**80**	

This paper consist of 9 printed pages
Candidates should check the question paper to ascertain that all the Pages are printed as indicated and no questions are missing.