BIOLOGY PP2, SERIES 1, K.C.S.E EXAMINERS' FORECAST 10 QUESTION PAPERS



BIOLOGY PP2, SERIES 1, K.C.S.E EXAMINERS' FORECAST 10 QP

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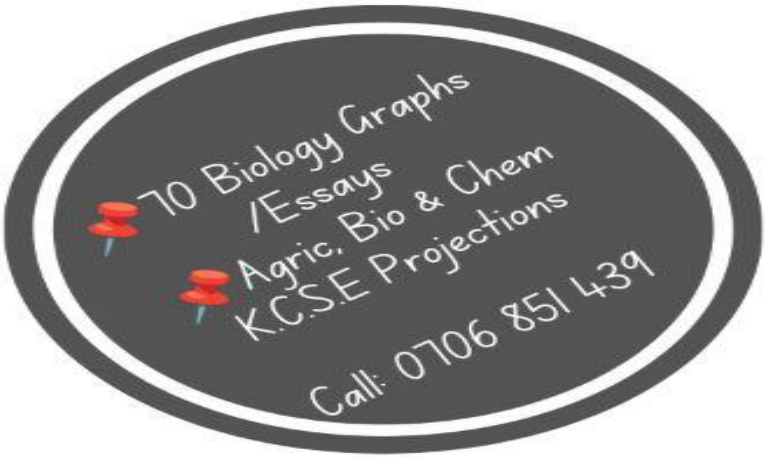
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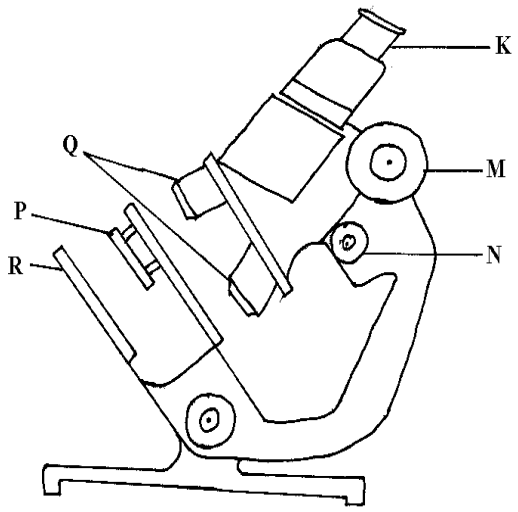
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K.C.S.E EXAMINERS' FORECAST SERIES 1
QUESTION PAPER NO: 1

231/2
BIOLOGY
PAPER 2

SECTION A

1. The diagram below shows some components of a light microscope.



a) Name the parts labeled **K** & **M** **(2mks)**

b) State the functions of **P** & **Q** **(2mks)**

c) A student was viewing a prepared slide of a plant cell under high power microscope. The features of the cell were blurred. Which one of the labelled parts of the microscope would the student use to obtain:-

(i) a sharper outline of the features. **(1mk)**

(ii) Give the formula used to calculate magnification in a light microscope. **(1mk)**

d) A student was preparing a section of a plant cell to be viewed on a light microscope. Give a reason for each of the following steps:-

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(i) Cutting a very thin section **(1mk)**

(ii) Staining the section **(1mk)**

(iii) Putting the section in water **(1mk)**

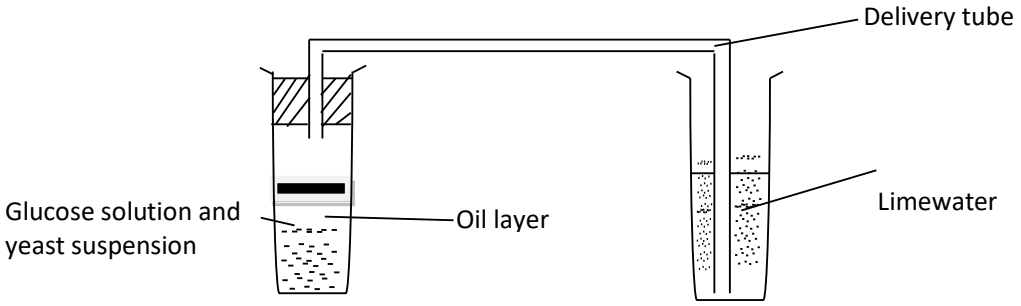
2.a) Explain what happens to excess amino acids in the liver of humans. **(4mks)**

b).i) What would happen if a person produced less anti-diurectic hormone? **(1mk)**

ii) What term is given to the condition described in (b) (i) above? **(1mk)**

c) State ***two*** portions of the human nephrone found only in the cortex of the kidney. **(2mk)**

3. The diagram below shows a set up that was used to demonstrate fermentation.



Glucose solution was boiled and oil added on top of it. The glucose solution was then allowed to cool before adding yeast suspension.

a) Why was the glucose solution boiled before adding the yeast suspension? **(1mk)**

b) What was the importance of cooling the glucose solution before adding the yeast suspension? **(1mk)**

c) What was the use of the oil in the experiment? **(1mk)**

d) Give ***two*** reasons why accumulation of lactic acid during vigorous exercise lead to an increase in heart beat. **(2mks)**

e). Other than carbon (iv) oxide, ***name*** the other products of anaerobic respiration in plants. **(2mks)**

4. In an experiment, a black mouse was mated with a brown mouse; all the off-springs were black. The off-springs grew and were allowed to mate with one another. The total number of (F2) generation off-springs was 96.

a) Using the letter symbols capital letter B for the gene of black colour and small b for brown colour, Work out the genotype of the F1 generation. **(3mks)**

b) From the information above, work out the following for the F2 generation.

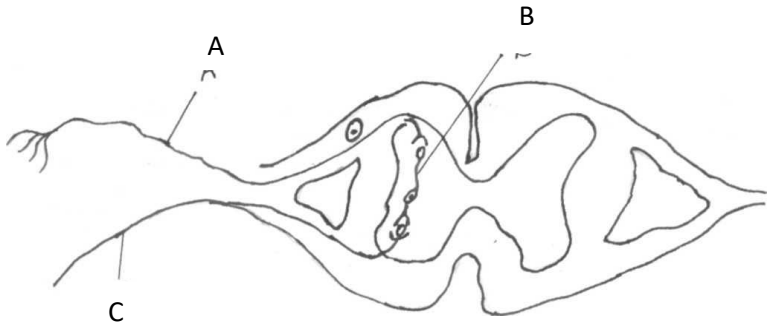
i) Genotypic ratio. **(2mks)**

ii) Phenotypic ratio. **(1mk)**

iii) The total number of brown mice **(2mks)**

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5. When a person's hand accidentally touches a hot object it is quickly withdrawn, below is the diagram showing how response occurs



a). Describe a reflex action that will lead to the withdrawal of hand from an object. **(7mks)**

b). Name the substance responsible for the transmission of an impulse across the synapse. **(1mk)**

SECTION B

6. (Compulsory)

An investigation was carried out between 1964 and 1973 to study the changes in fish population in a certain lake. Four species of fish A, B, C and D were found to live in the lake. In 1965, a factory was built near the lake and was found to discharge hot water in the lake raising the temperature from 25^{o} c to 30^{o} c. In 1967, sewage and industrial waste from a nearby town was diverted into the lake. In 1969, discharge of hot water, sewage and industrial waste into the lake was stopped. The fish populations during the period of investigation are shown in the table below.

Fish population during the period of investigation

Fish species	1964	1966	1968	1970	1971	1971	1973
A	6102	223	20	106	660	4071	7512
B	208	30	11	22	63	311	405
C	36	100	0	0	0	0	0
D	4521	272	23	27	79	400	617

a) (i) In which year was the fish population lowest? **(1mk)**

(ii) ***State*** the factors that might have caused the lowest fish populations during the year you have stated in (a) (i) above. **(3mks)**

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(iii) Explain how each factor you have stated in (a) (ii) above could have brought about the changes in the fish populations. **(11mks)**

(iv) Why did fish species C remain 0 after 1969? **(1mk)**

b). Other than the factors stated in (a) (i) above, state other four that may affect the population of fish in the lake. **(4mks)**

7 (a). What is meant by the term digestion? **(2mk)**

b) Describe how the mammalian small intestine is adapted to its function. **(18mks)**

8. Discuss the various evidences which show that evolution has taken place. **(20mks)**

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K.C.S.E EXAMINERS' FORECAST SERIES 1
QUESTION PAPER NO: 2

BIOLOGY
Paper2
Time 2Hours

1. In a garden with plants of the same species, 705 plants had red flowers while 224 had white flowers.

a) Work out the ratio of red to white flowered plants **(1mk)**

b)i) Using letter R to represent the dominant gene , work out a cross between F1 offspring and a white flowered plant. **(4mks)**

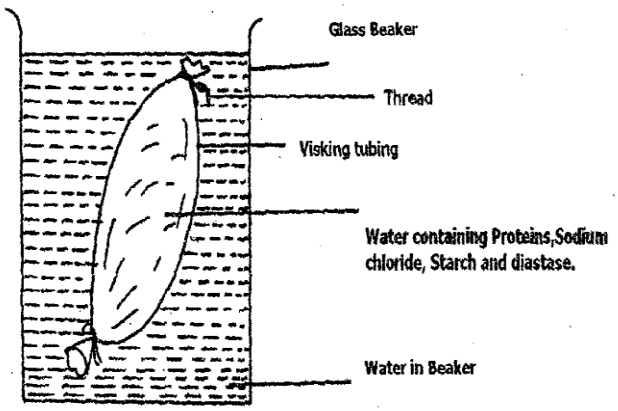
ii) What is the genotypic ratio from the cross in b)(i) above?

Genotypic ratio **(1mk)**

Phynotypic ratio **(1mk)**

c) What is meant by the term allele? **(1mk)**

2. In a physiological experiment, starch, protein, diastase and sodium chloride were added to water and put inside a visking tubing. The visking tubing was then placed in a water bath maintained at a temperature between *35* - 40°C. The set up was as shown in the diagram below.



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The following observations were made after the procedures indicated.

Contents in	At the start of experiment	After 1 hour
	i) Solution tastes salty	Solution tastes salty
	ii) Visking tubing is not firm	Visking tubing is firm
	iii) After boiling with Benedicts solution, solution remains blue	After boiling with Benedicts solution the solution turns brown
	iv) On addition of solution hydroxide followed by copper sulphate solution to the solution, the colour changes to purple	On addition of sodium hydroxide followed by coppers sulphate to the solution, the colour changes to purple
	i) Water is tasteless	Solution tastes sweet/salty
	ii) After boiling solution with Benedicts solution, Blue colour remains	After boiling solution with Benedicts solution, colour turns to brown
	iii) On addition to sodium hydroxide followed by copper sulphate solution, colour remains blue	On addition of sodium hydroxide followed by copper sulphate solution, colour remains blue

a) Name the process by which salt moved into the water in the beaker from the visking tubing. **(l mk)**

b)i) Name the food substance responsible for the brown colour observed after 1 hour both in the beaker and visking tubing when solutions are boiled with benedicts solution. **(lmk)**

ii) Account for the observation in (b i) above. **(3mks)**

c) i) Name the food substance tested with sodium hydroxide followed by copper sulphate solution(s) **(1mk)**

ii) Account for the absence of the food substance named in (c i) above in the beaker after 1 hour. **(lmk)**

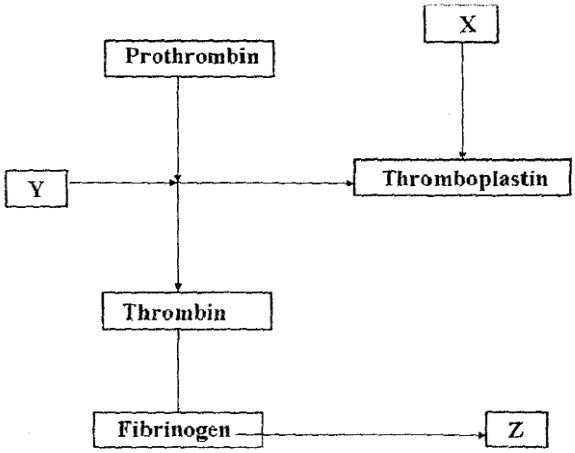
d) After one hour the visking tubing was firm. State the term used to describe this state. **(1mk)**

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3.a) Distinguish between natural and acquired immunity **(lmk)**

b) Define the term allergy **(lmk)**

c)The chart below shows the blood clotting mechanism



i)Name the blood cells represented by X **(1mk)**

ii) The end product of the mechanism represented by Z **(1mk)**

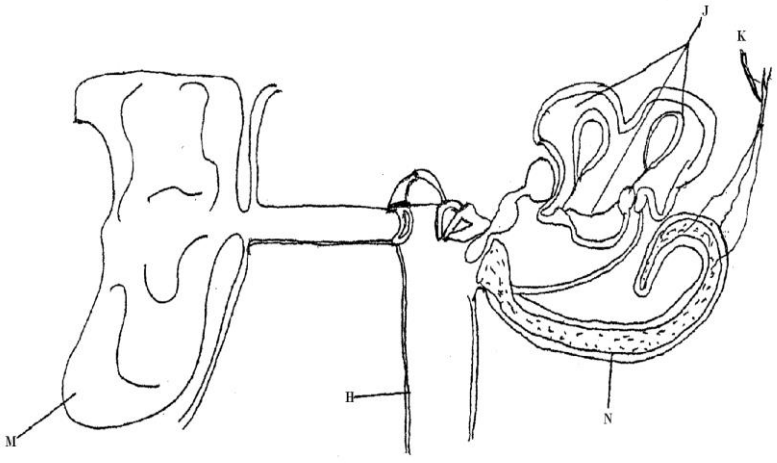
d) Explain how the following environmental factors increase the rate of transpiration.

i) Temperature **(2mks)**

ii) Humidity **(1mk)**

iii) Atmospheric pressure **(1mk)**

4. The diagram below represents a section through the mammalian ear. Study it and answer the questions that follow.



a) Name the structures labeled H and J **(2mks)**

b) State how the structures labeled H, M and N are adapted to their functions**.** **(3mks)**

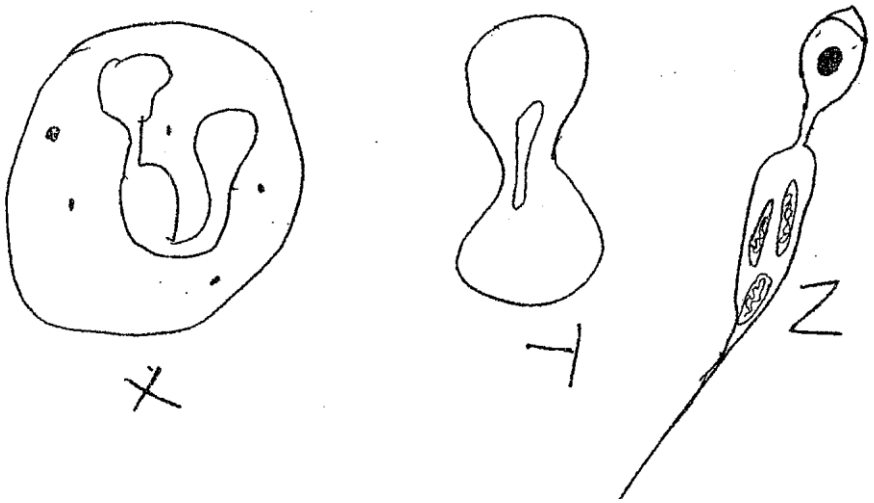
c) State *what* would happen if the structure labeled K was completely damaged. **(1mk)**

d) Name the fluid contained in structure N. **(1mk)**

e) Apart from hearing, state the other role performed by the human ear. **(1mk)**

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5. The structures below represent specialized cells in man.



a) Identify structure X, Y and *Z.* **(3mk)**

b) Give a reason for your answer for X in (a) above. **(1mk)**

c) Give two adaptation of *Z* to its function. **(2mks)**

d)What is tissue fluid? **(2mks)**

SECTION B(40 MARKS)

6.The table below shows the population of a housefly *musca domestica* which is parasitized by wasps of species Nasonia spp. The investigation of their population growth pattern was carried out for 70 weeks. In these experimental space and physical factors were assumed to be limiting.

Time in weeks	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70
Musca domestica	40	70	110	260	350	480	400	395	350	40	60	140	250	240	230
Nasonia Spp.	10	20	30	45	100.	200	300	380	410	250	60	20	40	200	280

a) Using the readings in the table, plot graphs on the same axis of population growth of organisms against time. **(8mks)**

(PROVIDE A GRAPH PAPER)

b) Account for the growth of

i) *Musca domestica* between 10th week — 25th week. **(1mk)**

ii) Nasonia species between 40th week –50th week. **(1mk)**

c) What is the population of?

i) Nasonia spp. on the 62nd week? **(1mk)**

ii) *Musca doniestica* on the **4th** week? **(1mk)**

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d) Bemex, another parasite of housefly was introduced into the ecosystem. Giving a reason; what will be the effect on the population of

i) Housefly *Musca domestica*. **(2mks)**

ii) Nasonia Spp. **(2mks)**

e) In estimating the population of *Musca domestica* in the experiment above. Capture-mark release recapture method was used. Describe the procedure which was followed. **(4mks)**

7.a) What is natural selection? **(2mks)**

b) Describe how natural selection brings about adaptations of a species of a living organism to its environment **(18mks)**

8.a) Describe how urea is formed **(5mks)**

b) Describe the path followed until it is eliminated from the body **(15mks)**

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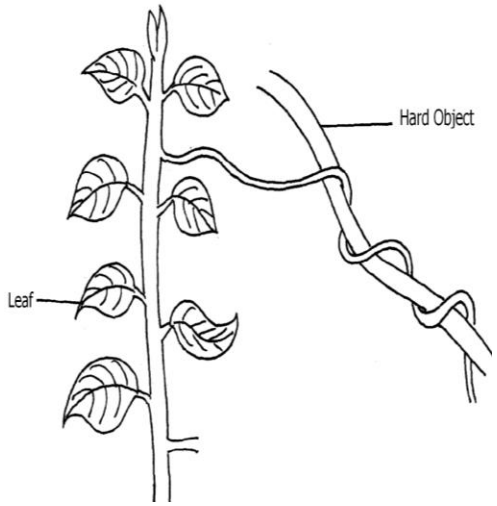
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K.C.S.E EXAMINERS' FORECAST SERIES 1
QUESTION PAPER NO: 3

BIOLOGY
PAPER 2
TIME: 2 HOURS

SECTION A (40 MARKS)

1. The figure below illustrate a response in plants.



(a) State the type of response illustrated **(1mk)**

(b) Explain how the response occurs. **(4mks)**

(c) State two importance of phototactic response in termites. **(2mks)**

(d) State hormone used in agriculture that breaks breaking seed dormancy. **(1mk)**

2.(a)(i) Define sex linkage. **(1mk)**

(ii) In a marriage of Jane and Otieno who are both normal for hemophiliac condition, gave birth to four children Susan, Grace, Tom and Peter. Tom the second born child was hemophilic. Later in life Tom married Alice who was normal. Their first born child was hemophiliac.
Let H represent gene for normal condition.

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(b)(i) What was the genotype of Alice. **(1mk)**

(ii) Work out the phenotypic ratio of F2. **(5mks)**

(c) How does the police force use knowledge on genetics. **(1mk)**

(d) What is the name given to points of contact in a pair of homologous chromosomes. **(1mk)**

3. A student observed feeding relationship while on a tour in a coastal Island.

Eagles feed on small fish.

Small fish feed on sea grass

Insect larvae and molluscs feed on sea grass.

Insect larvae fed on by small fish, while crabs feed on insect larvae and molluscs.

(a) From the above information , construct a food web. **(3mks)**

(b) In which trophic level is small fish found. **(1mk)**

(c) Extract a food chain where the Eagle is a tertiary consumer. **(1mk)**

(d) Suppose all the crabs were poisoned, what would be the immediate effect in the ecosystem. Give a reason. **(1mk)**

(e) Give a reason why pyramid of biomass is a better representation of energy flow in an Eco-system than pyramid of numbers. **(1mk)**

4. A student wanted to observe human red blood cells under a light microscope. He put l0ml of solution X,Y and Z in three boiling test tubes. The solutions were of different concentration .In each of the test tubes he put three drops of blood sample. The experiment was left to stand for 30 minutes. He placed one drop of solution X on glass slide and observed under the microscope. The same procedure was repeated for solutions Y and Z.

He made the following observation.

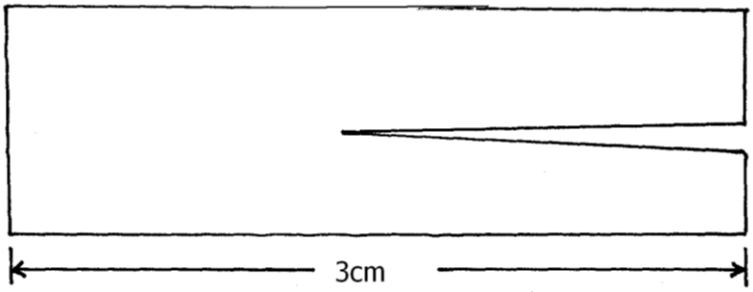
Solution	Observation
X	Normal Cells
Y	Wrinkled Cells
Z	No cells observed

(a) What was the physiological process observed. **(1mk)**

(b) Explain why red blood cells observed in solution Y were wrinkled. **(3mks)**

(c) A 3cm long piece of kale (sukuma wiki) stem was cut halfway along its length as shown below.

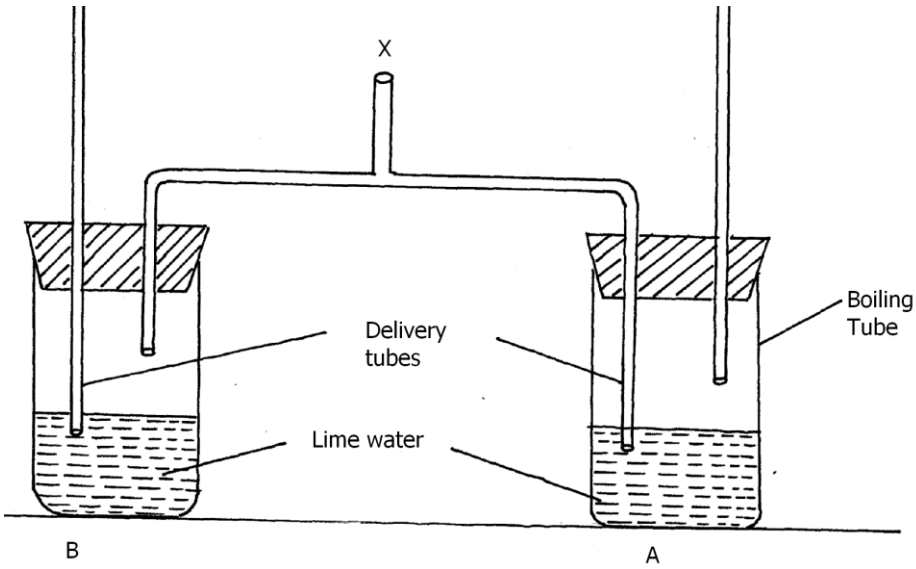
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(i) If the piece was placed in solution Z for 30 minutes, its shape changed . Using a pencil draw a diagram in the space provided to show the expected change. **(1mk)**

(ii) Explain the results obtained in C(i) above. **(3mks)**

5. An experiment was set up as shown below.



(a) A student blew air in and out through point X. Using arrows indicate on the diagram how air gets in and out of the set up. **(2mks)**

(b) (i) In which of the test tube would lime water turn milky first. **(1mk)**

(ii) Give a reason. **(1mk)**

(c) What is the effect of lactic acid in the thigh muscles of an athlete after a short fast race. **(2mks)**

(d) Identify the type of muscle in human being where formation and effect of lactic acid is not felt. **(1mk)**

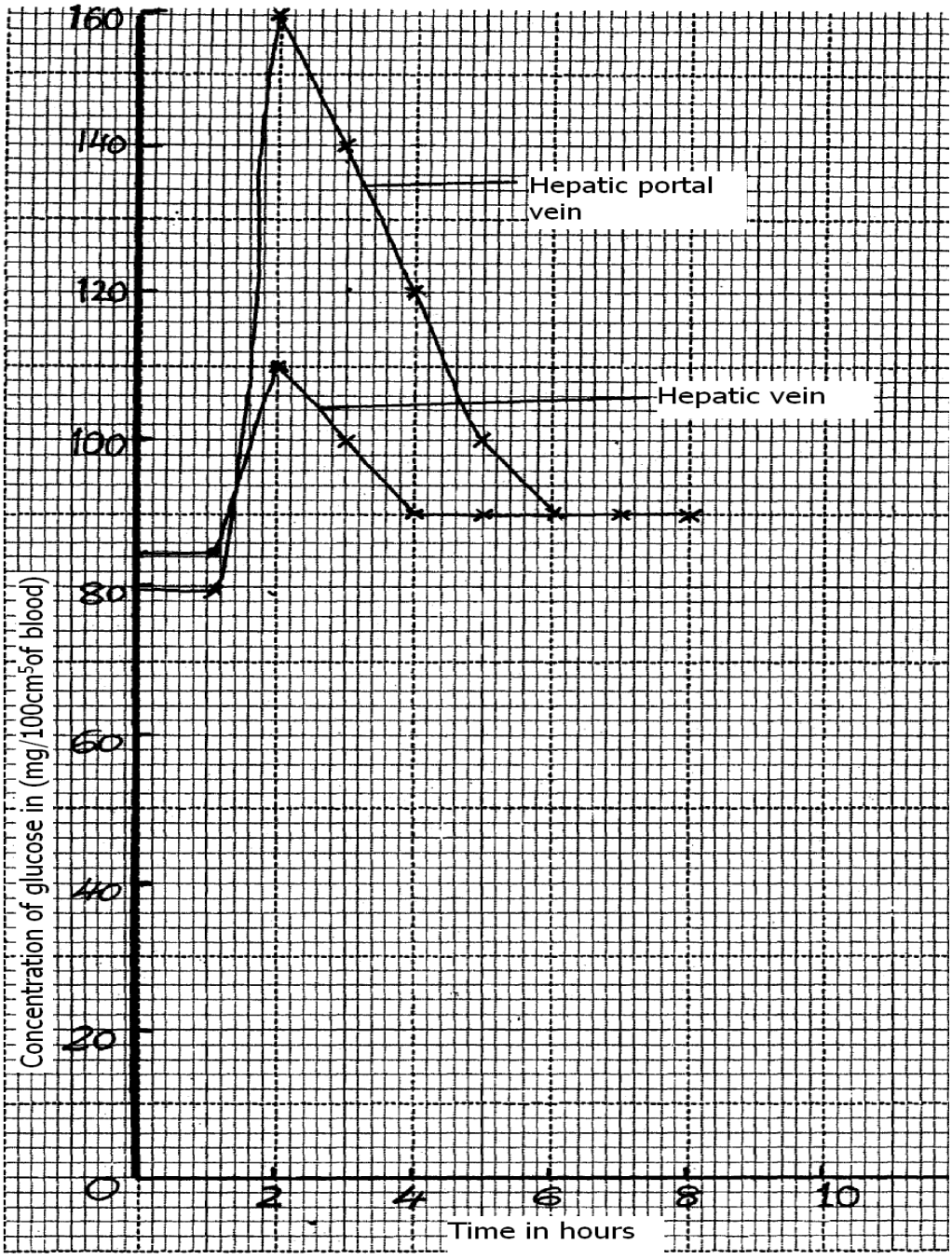
(e) What is the biological significance of boiling milk /ultra heat treated milk. **(1mk)**

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SECTION B
COMPULSORY QUESTIONS.

6. A man was starved for 24hours.He was then served with a balanced diet after which the concentration of glucose in the hepatic and hepatic portal veins were determined at interval of 1 hour for the next 8 hours after the meal.

The results were as shown in the graph below.



(a) From the graph state the normal concentration of glucose in man. **(1mk)**

(b) Determine the concentration of glucose after 2 ½ hrs. **(2mks)**

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(c) Calculate the rate of glucose between 1 - 2 hours in hepatic portal vein. **(2mks)**

(d) Account for the blood sugar level in hepatic portal vein and hepatic vein between; **(4mks)**

(i) 0- 1hour

(ii) 2 - 4 hours. **(6mks)**

(e) A patient was found to produce urine that tasted sweet. Name the disease he was likely to be suffering from. **(1mk)**

(f) How would you test for the disease in your school laboratory. **(3mks)**

(g) What advice would you give to a patient whose blood contains abnormal high levels of urea. **(1mk)**

7. Describe how human skin is adapted to its function. **(20mks)**

8. (a) Describe the adaptation of floating water lily leaf to its photosynthetic function. **(10mks)**

(b) Describe the activities that take place in the chloroplast of growing plants. **(10mks)**

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K.C.S.E EXAMINERS' FORECAST SERIES 1
QUESTION PAPER NO: 4

BIOLOGY
Paper 2
Time: 2 Hours

SECTION A (40 MARKS)

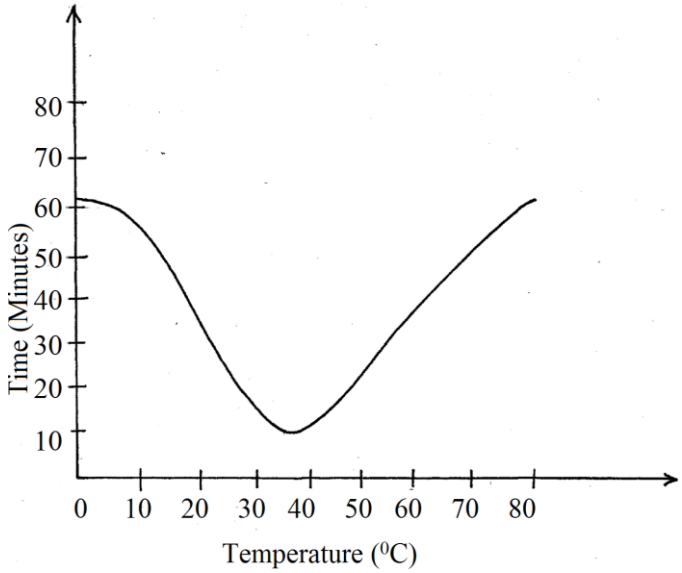
1. During an ecological study, students collected and marked 120 ants and released them. After 48 hours, the students captured another 90 ants, 20 of which had been marked previously.

(a) How many ants were there in the compound? Show your working. **(3mks)**

(b) What are the limitations of this method in sampling animal populations. **(4mks)**

(c) State two other methods which could be used to determine the population. **(1mk)**

2. In an experiment to investigate the action of pepsin on egg albumen, equal amount of paper were added to equal amount of egg albumen in different test –tubes. The test-tubes were placed in water bath at different temperature. The graph below shows the time taken for the enzymes to digest protein at each temperature.



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(a) What is the optimum temperature for enzymes? **(1mk)**

(b) Account for the time taken to digest egg albumen at 60^0C. **(2mks)**

(c) With reasons name the form in which the enzyme pepsin is secreted. **(2mks)**

(d) State three other factors that affect enzyme controlled reactions. **(3mks)**

3. The chart below represents the results of successive cross, starting with red-flowered Plants and write flowed plants and in which both plants are pure breeding.

Parental genotype: Red Flowers x White Flowers

First filial generation

↓ Selfed

Second filial generation

3 Red flowers : 1 White flower

(a) What are the parental genotypes? Use letter R to represent the gene for Red flower colour and r for white colour. **(2mks)**

(b)(i) What was the colour of the flowers in the first filial generation? **(1mk)**

(ii) Give a reason for your answer **(1mk)**

(c) If 480 red flowered plants were obtained in the second filial generation, how Many F_2 plants had white flowers? Show your working. **(4mks)**

4.(a) State the meaning of apical dominance in plants **(1mk)**

(b) Name the hormone associated with apical dominance. **(1mk)**

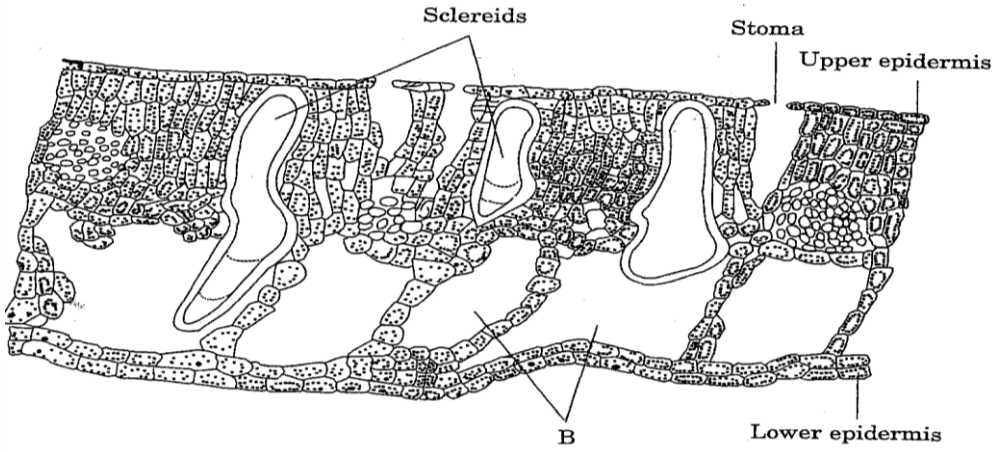
(c) What is the importance of apical dominance? **(1mk)**

(d) Briefly describe the effects of the following plant growth hormones

(i) Gibberellins **(2mks)**

(ii) Abscisic Acid **(3mks)**

5. The diagram below represents a transverse section of a leaf.



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(a)(i) State the habitat of the plant from which the leaf was obtained. **(1mk)**

(ii) Give two reasons for your answer in (a) (i) above. **(2mks)**

(b) How does the part labelled B adapt the plant to its habitat **(1mk)**

(c) Smokers are always at a high risk of suffering from respiratory infections. Explain **(3mks)**

(d) What structures are used for gaseous exchange in plants found in marine water? **(1mk)**

SECTION B (40 MARKS)

6. Carbohydrates used during respiration and those formed during photosynthesis by a certain plant was measured over a period of 24 hours at an interval of 3 hours

Time of day	12AM	3AM	6AM	9AM	12PM	3PM	6PM	9PM	11PM
Carbohydrates formed during photosynthesis (mg)	0	0	5	30	60	30	5	0	0
Carbohydrates used during respiration (mg)	10	10	10	10	10	10	10	10	10

Using the same axes,

(a) Plot a graph of carbohydrate formed during photosynthesis and carbohydrate used during respiration against time. **(7mks)**

(b) Calculate the net carbohydrate formed by the plant. **(2mks)**

(c) At what time of the day do the light compensation points occur? **(2mks)**

(d) Account for the shape of graph on carbohydrates.

(i) Between 12.00a.m and 3a.m. **(2mks)**

(ii) Between 3.00a.m to 12.00 noon. **(2mks)**

(e) How could foggy weather influence the net amount of carbohydrates formed over the 24 hour period? **(1mk)**

(f) Give other external factors apart from temperature and light intensity that influence the rate of photosynthesis. **(2mks)**

(g) In which form are carbohydrates stored in

(i) Plant bodies. **(1mks)**

(ii) Fungi **(1mk)**

7.(a) Define natural selection. **(2mks)**

(b) Natural selection brings about adaptation of a species to the environment. Discuss. **(18mks)**

8. Discuss the adaptations of seeds and fruits to dispersal. **(20mks)**

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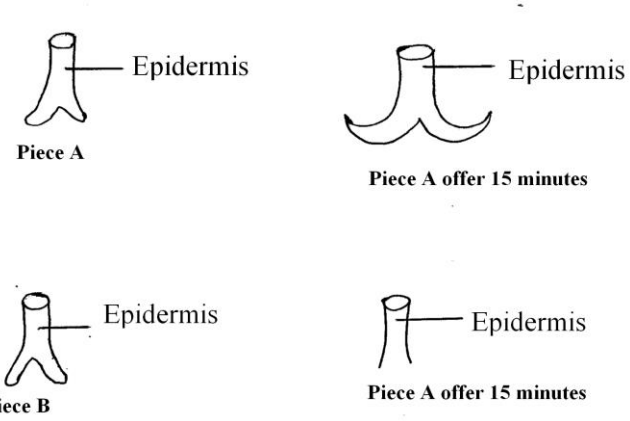
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K.C.S.E EXAMINERS' FORECAST SERIES 1
QUESTION PAPER NO: 5

BIOLOGY
PAPER 2
TIME: 2 HOURS

1.a) Define the term cell physiology **(1mk)**

b) Two pieces of leaf petioles were cut as shown in the diagram below, then each piece placed in solution of different concentration.



i) What physiological process was being investigated in this experiment? **(1mk)**

ii) Suggest the type of solution piece B was placed **(1mk)**

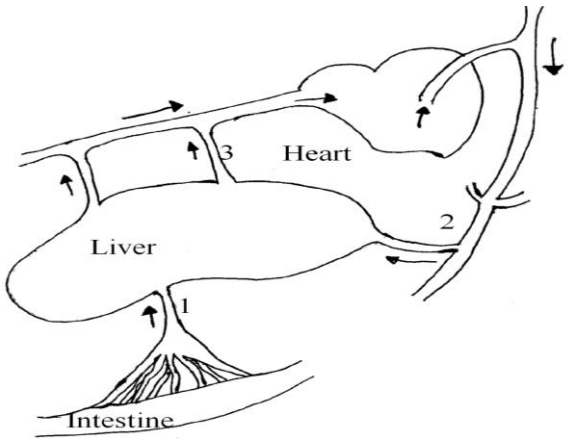
iii) Explain the appearance of piece A after 15 minutes **(3mks)**

c) In land plants, water logging slows down the uptake of certain minerals.

Suggest a reason for this. **(2mks)**

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2. The figure below is a simplified diagram of mammalian circulatory system. Study it and answer the questions that follow.



a) Explain why the level of blood sugar in vessel 3 would be higher than that in vessel 1. during fasting. **(2mks)**

b) Name the vessel that has the highest concentration of urea among vessels labeled. 1,2 and 3 **(1mk)**

c) In what ways does blood vessel 1 differ from most of the other blood vessels in the body? **(1mk)**

d) Name the nutrients that is only transported in small quantities in vessels 1 following absorption. **(1mk)**

e) Why is it necessary that blood from digestive tract pass through the liver before entering the general circulation. **(1mk)**

3. A Pure – line pea plant with green pods was crossed with a pure – line plant with yellow pods. All F_1 plants had green pods out of 1160 F_2 plants, 856 had green pods and 304 had yellow pods.

a) i) Identify the dominant and the recessive genes. **(1mk)**

ii) Using letter G to represent dominant gene and g to represent recessive gene, work out the phenotype of the F_1 generation.

b) Showing your working, state the number of plants with; **(3mks)**

i) Recessive genes;

ii) Dominant genes;

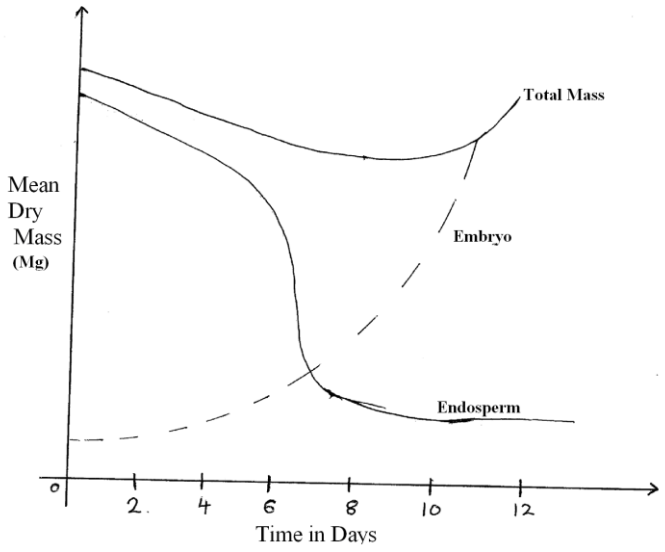
iii) Heterozygous genes;

c) i) What is sickle cell Anemia? **(1mk)**

ii) State one problem faced by people suffering from sickle cell anemia? **(1mk)**

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4. The graphs below show the changes in mean dry mass of endosperm, embryo and total mass of germinating maize.



Account for the ;

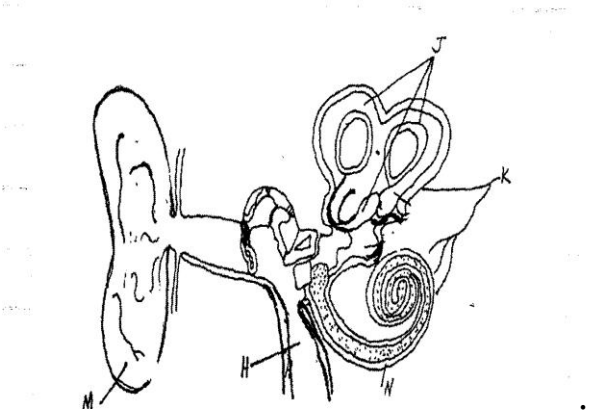
a) Decrease in the dry mass of endosperm from day 1 to day 9 **(4mks)**

b) Increase in dry mass of embryo from day 1 to day 9 **(1mk)**

c) Decrease in total mass upto day 6. **(1mk)**

d) Increase in total mass after day 6 **(2mks)**

5. The diagram below represents a section through the mammalian ear. Study it and answer the questions that follow



a) Name the structure labeled H and J. **(2mks)**

b) State how the structure labeled H,M and N are adapted to their functions. **(3mks)**

c) State what would happen if the structure labeled K was completely damaged. **(1mk)**

d) Name the fluid contain in structure N. **(1mk)**

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SECTION B (40 MKS)

6. In an experiment to investigate certain processes in a given plant species, the rate of carbon (iv) Oxide released and intake were measured over a long period of time. The results of the investigation were as shown below.

Time of the day (Hours)	6	8	10	12	14	16	18	20	22	24
Volume of carbon (iv) Oxide Consumed (mm^3/ min)	10	43	69	91	91	50	18	0	0	0
Volume of Carbon (iv) Oxide released (mm^3/ Min)	38	22	10	3	3	6	31	48	48	48

a) On the same axes draw graphs of volume of carbon (iv) oxide consumed and released against time. **(7mks)**

b) Name the chemical process changes represented by;

i) Carbon (iv) Oxide consumed **(1mk)**

ii) Carbon (iv) Oxide released **(1mk)**

c) Account for the shape of the curve for

i)Carbon (iv) oxide consumed **(3mk)**

ii) Carbon (iv) Oxide released **(3mk)**

d) i)What is meant by compensation point **(1mk)**

ii) From the graph, find the time of the day when the plant attained compensation point. **(2mks)**

e) Explain how temperature affects the rate of carbon (iv) oxide consumption in the plant**.(2mks)**

7.a) What is meant by natural selection **(3mks)**

b) Describe how natural selection brings about adaptation of species to its environment. **(17mks)**

8.a) Describe the characteristics and functions of the three types of muscle found in the mammalian body. **(11mks)**

b) Explain how the various components of blood are adapted to perform their functions. **(9mks)**

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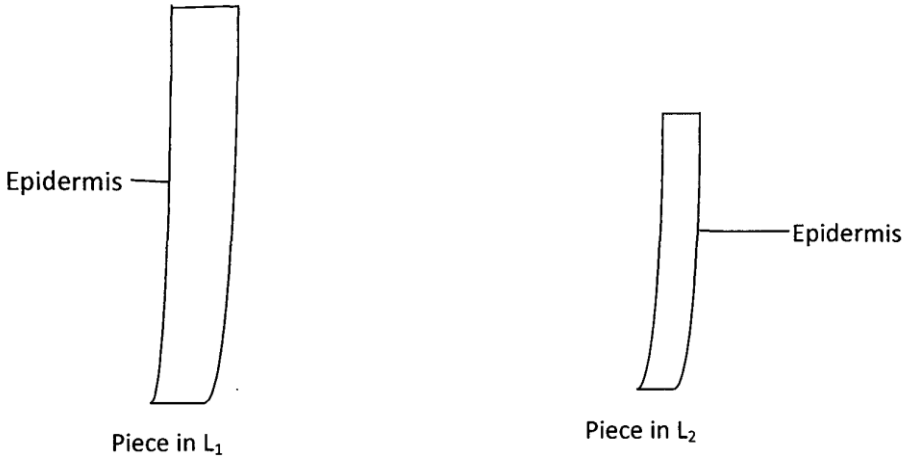
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K.C.S.E EXAMINERS' FORECAST SERIES 1
QUESTION PAPER NO: 6

BIOLOGY
PAPER 2
TIME: 2 HOURS

SECTION A (40MARKS)

1. A freshly obtained dandelion stem measuring 5cm long was split lengthwise to obtain two similar pieces. The pieces were placed in solutions of different concentrations in Petri dishes for 20 minutes. The appearance after 20 minutes is as shown.



(a) Account for the appearance of the pieces in solutions L1 and L2 **(6mks)**

(b) State the significance of biological process involved in the experiment. **(2mks)**

2.(a) Give three reasons in each case why support is necessary in

(i) Plants **(3mks)**

(ii) Animals **(3mks)**

(b) Why is movement necessary in animals? **(2mks)**

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3.In maize the gene for purple colour is dominant to the gene for white colour. A pure bleeding maize plant with purple grains was crossed with a heterozygous plant.

(a)

(i) Using letter G to represent the gene for purple colour, work out the genotypic ratio of the offspring. **(5mks)**

(ii) State the phenotype of the offspring. **(lmk)**

(b) What is genetic engineering? **(lmk)**

(c) What is meant by hybrid vigour? **(lmk)**

4.(a) Distinguish between pyramid of numbers and pyramid of biomass. **(2mks)**

(b) Give <u>three</u> reasons for loss of energy from one trophic level to another in a food chain. **(3mks)**

(c) Describe how the belt transect can be used in estimating the population of a shrub in a grassland. **(3mks)**

5.(a) What is meant by the terms?

(i) Epigynous flower? **(lmk)**

(ii) Staminate flower? **(lmk)**

(b) Name the essential parts of a flower. **(2mks)**

(c) How are the male parts of a wind pollinated flower adapted to their functions? **(4mks)**

SECTION B (4OMARKS)

6. In an experiment to determine the effect of ringing on the concentration of sugar in phloem, a ring of bark from the stem of a tree was cut and removed. The amount of sugar in **grams per** $16cm^3$ piece of bark above the ring was measured over a 24hour period. Sugar was also measured in the bark of a similar stem of a tree which was not ringed. The results are shown in the table below.

Time of the day	Amount of sugar in grams per	$16cm^3$ piece of bank
	Normal stem	Ringed stem
0645	0.78	0.87
0945	0.80	0.91
1245	0.81	1.01
1545	0.80	1.04
1845	0.77	1.00
2145	0.73	0.95
0045	0.65	0.88

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(a) Using the same axes, plot a graph of the amount of sugar against time. **(6mks)**

(PROVIDE A GRAPH PAPER)

(b) At what time was the amount of sugar highest in the-:

(i) Ringed stem. **(lmk)**

(ii) Normal stem. **(lmk)**

(c) How much sugar would be in the ringed stem if it was measured at 0345 hours? **(lmk)**

(d) Give reasons why there was sugar in the stems of both trees at 0645 hours. **(2mks)**

(e) Account for the shape of the graph for the tree ringed stem between

(i). 0645 hours and 1545 hours **(3mks)**

(ii) 1545 hours and 0045 hours **(2mks)**

(f) Name the structures in the phloem that are involved in the translocation of sugars. **(2mks)**

(g) Other than sugars name two compounds that are translocated in phloem. **(2mks)**

7.(a) State four characteristics of gaseous exchange surfaces. **(4mks)**

(b) Describe the mechanism of gaseous exchange in a mammal. **(l6mks)**

8.(a) What is meant by the term digestion? **(2mks)**

(b) Explain the role of bile in the digestion of food. **(4mks)**

(c) Describe the digestion of protein in the human body. **(l4mks)**

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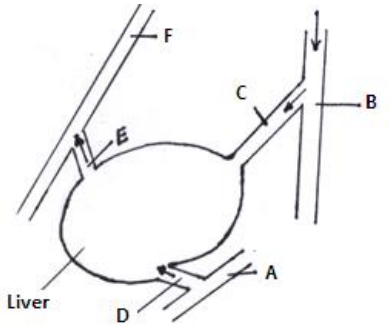
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K.C.S.E EXAMINERS' FORECAST SERIES 1
QUESTION PAPER NO: 7

BIOLOGY
PAPER 2
2HRS

SECTION A (40MARKS)

1. The diagram below illustrates blood circulation in certain organs in humans.



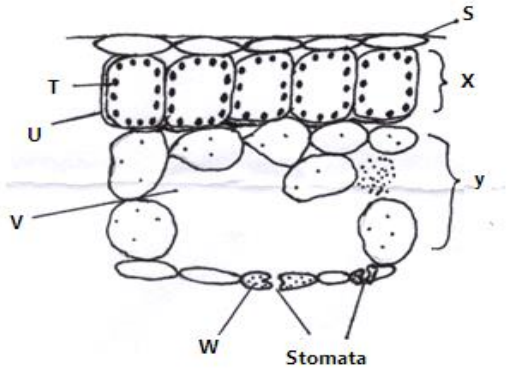
a) Name the part labeled A. **(1mk)**

b) Name the blood vessels labeled B and F. **(2mks)**

c) State how the composition of blood in vessel E differs from that in vessel D. **(3mks)**

d) Explain the role of bile in the process of digestion. **(2mks)**

2. The diagram below represents a section through a leaf of a terrestrial plant.



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a) Name the structures labeled S, X, Y and V **(2mks)**

b) State the roles of each of the parts labeled V and W. **(2mks)**

c) ***State two*** ways in which structures labeled X and Y are adapted to their functions. **(4mks)**

3. A common species of rats has individuals with white, black or grey coats. During a study a rat with white coat was crossed with a rat with black coat. Both parents were pure lines. All the offspring in F1 generation had grey coats. Using letter B to represent the gene type for black coat and W for white coat, answer the questions that follow.

a) Suggest a reason to explain why there were no white or black rats in the F1 generation. **(1mk)**

b) The F1 offspring were selfed to get F2 generation. Work out the phenotypic ratio of F2. Show your working**.** **(5mks)**

c) ***Name one*** trait in human beings that is determined by multiple allele. **(1mk)**

d) ***Name one*** genetic disorder affecting the human eye. **(1mk)**

e)

4. During an ecological field work, a group of students caught 240 grasshoppers, marked them and then released them back to the study area. After one day they caught 160 grasshoppers and found that 40 were marked. Using the formula;

$$P = \frac{F.C.M \times S.C}{S.C.M}$$

Where P =Total population

F.C.M = First capture marked

S.C = Second capture

S.C.M = Second capture marked

a) Work out the total population of the grasshoppers in the study area. **(2mk)**

b) Identify the method used to capture the grasshoppers. **(1mk)**

c) Name the instrument and chemical the students used to collect and mark the grasshoppers. **(2mks)**

i) Instrument for collection .

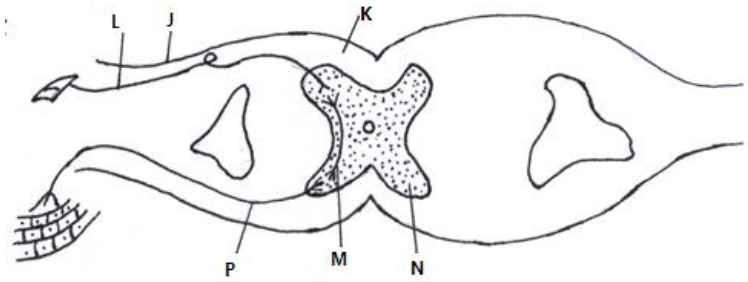
ii) Chemical for marking .

d) State any ***one*** assumption the students made during the field work**.** **(1mk)**

f) The students observed the organisms and placed them into their correct phylum and class. Name the phylum and class.

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5. The diagram below shows a transverse section of the spinal cord.



a) Name the parts labeled K and N. **(2mks)**

b) Describe briefly how the impulse transmission occurs through the structures in the diagram **(3mks)**

c) ***State three*** differences between simple and conditioned reflex actions. **(3mks)**

SECTION B (40MARKS)

6. Rice seeds were soaked overnight. Fresh mass and dry mass of a sample of 20 seeds was obtained and recorded in the table. The rest of the seeds were planted in a tray that had soil and well watered daily. Twenty of the seeds/seedlings were removed from the soil every two days for two weeks. Their fresh and dry mass were taken and recorded in the table as shown below.

Time in days	Fresh mass in (g)	Dry mass in (g)
0	14.0	4.0
2	18.0	3.5
4	24.5	2.5
6	32.0	1.5
8	38.5	2.0
10	41.0	3.0
12	43.0	4.5
14	45.0	6.0

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a) Using the same axes, plot two graphs to represent changes in fresh and dry mass over the two –week period **(7mks)**

(PROVIDE A GRAPH PAPER)

b) What would be the fresh and dry mass of the seedlings at day 9. **(2mks)**

i) Fresh mass .

ii) Dry mass .

c) Account for the change in fresh mass and dry mass between day 0 and day 6. **(4mks)**

i) Fresh mass ..

ii) Dry mass .

d) Explain the change in dry mass from day 8 **(2mks)**

e) Explain why a sample of 20 seeds was used instead of one seed**.** **(2mks)**

f) ***State one*** factor within and one factor outside the seed that cause dormancy. **(2mks)**

i) Within the seed ...

ii) Outside the seed.

g) ***Give one*** characteristic of a meristematic cell **(1mk)**

7. Explain the evidences of organic evolution in life forms. **(20mks)**

8. Describe how gaseous exchange takes place in terrestrial plants. **(20mks)**

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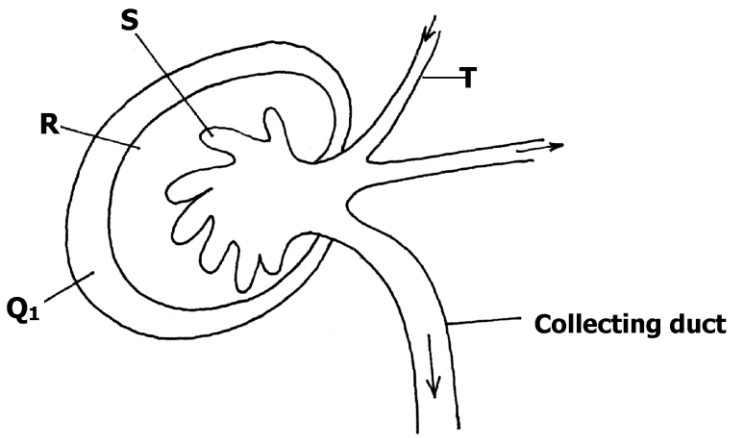
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K.C.S.E EXAMINERS' FORECAST SERIES 1
QUESTION PAPER NO: 8

BIOLOGY
PAPER 2
Time: 2 Hours

SECTION A 40 MARKS

1.The diagram below is a longitudinal section of an organ in mammals



a) Name the organ **(1mk)**

b) Identify the parts R and S **(2mks)**

c) i) State two differences in the structure above found in the deserted- rat and fish **(3mks)**

ii) Account for the difference stated above. **(2mks)**

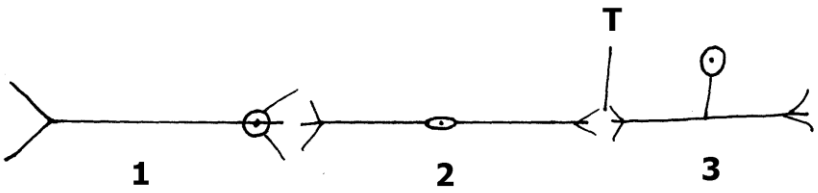
d) Name the gland associated with the secretion of aldorsterone hormone. **(1mk)**

2.a) What is the economic importance of anaerobic respiration in industry. **(3mks)**

b) Explain what happens in the two phases of aerobic respiration. **(5mks)**

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3. The diagram below shows three different types of neurons along a reflex arc.



a) Identify the Neuron labeled 1,2 and 3. **(3mks)**

b) Using arrows show the direction of impulse transmission on the diagram. **(1mk)**

c) Name the part where the cell body of neurons 1 and 2 are located. **(2mks)**

d)Describe the transmission of impulses across the part labeled T.

4. In an experiment, a variety of garden peas have a smooth seed coat was crossed with a variety with a wrinkled seed coat. All the seeds obtained in the F_1, had a smooth seed coat

The F_1 generation was selfed. The total number of F_2 generation was 7324.

a) Using appropriate letter symbols in a punnet square, work out the genotypes of the F1 generation. **(4mks)**

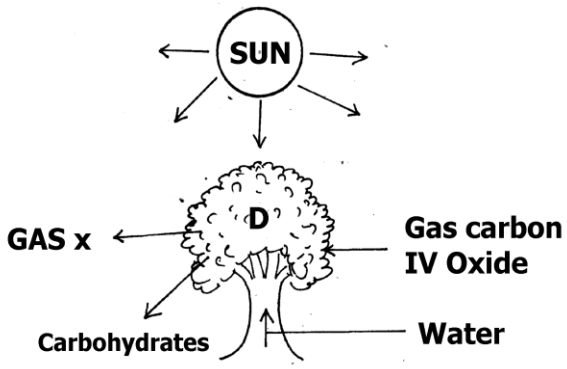
b) From the information above, work out the following for the F_2 generation

(i) Genotypic ratio **(2mks)**

(ii) Phenotypic ratio **(1mk)**

(iii) Wrinkled number **(1mk)**

5. The diagram below illustrate the first stage in the energy flow in the ecosystem



a) Identify (i) organelles responsible for activity in D.

(i)in D **(1mk)**

(ii) Gas X **(1mk)**

b)Suggest the roles played by each of the following in the process illustrated above.

i) Light energy **(1mk)**

ii) Water **(1mk)**

iii) Carbon (II) oxide **(1mk)**

c) Give three ways in which the carbohydrates produced in the organelles at D is utilized in the plants. **(3mks)**

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SECTION B: 40 MARKS

6. The following data are results from an observation and measurement of daily growth in an organism over a period of 24 days of its development

a) Using a suitable scale draw graphs of width of head and length of femur against time on the same axis. **(8mks)**

DAY	WIDTH OF HEAD	LENGHT
	Mm	Femur (mm)
1	3.0	7.0
2	3.5	7.5
3	4.0	8.0
4	4.0	8.0
5	4.0	8.0
6	4.0	9.2
7	4.0	10.5
8	4.0	12.0
9	4.7	12.0
10	5.0	12.0
11	5.0	12.0
12	5.0	12.0
13	5.0	12.0
14	5.0	12.0
15	5.0	13.3
16	5.0	14.8
17	5.7	16.4
18	6.4	18.0
19	7.0	18.0
20	7.6	18.0
21	7.6	18.0
22	7.6	18.0
23	7.6	18.0
24.	7.6	18.0

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b)i) Name the growth pattern represented by the graph. **(1mk)**

ii) With reference to your graph, identify the phylum to which the organism belongs. Give reasons for your answer. **(2mks)**

c) Account for the length of hind femur between

(i) day 3 and day 7 **(2mks)**

(ii) day 7 and day 10 **(2mks)**

d) State two hormones involved in the growth pattern represented by the graphs. **(2mks)**

e) State two advantages of metamorphosis in organisms. **(2mks)**

7. Explain how the various activities of man have caused air pollution. **(20mks)**

8.a) What are enzymes? **(2mks)**

b) State the properties of enzymes **(6mks)**

c) Discuss the factors that affect the rate of enzyme – catalysed reactions **(12mks)**

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K.C.S.E EXAMINERS' FORECAST SERIES 1
QUESTION PAPER NO: 9

BILOGY
PAPER 2
Time: 2 Hours

SECTION A

1. In an experiment to investigate the rate of reaction indicated by the equation.

$$C_{12}H_{22}O_{11} \longrightarrow C_6H_{12}O_6 + C_6H_{12}O_6$$

Sucrose — Fructose Glucose

It was found out that for products fructose and glucose to form, substance "K" was needed. Temperature was maintained at 37°C.When substance "L" was added, reaction slowed and then stopped.

(a) Suggest identity of the substances **K** & **L** **(2mks)**

(b) Other than temperature, state <u>three</u> factures that increase the rate of reaction. **(3mks)**

(c) Explain how substance "L" slowed the rate of reaction. **(2mks)**

(d) What type of reaction is represented by the equation above? **(1mk)**

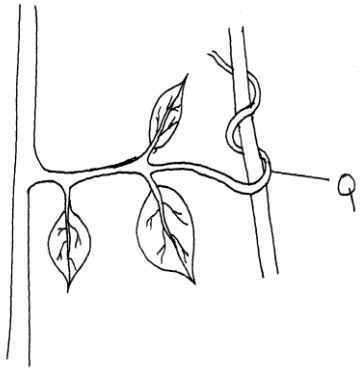
2.(a) Give the differences between the following structures in wind and insect pollinated flowers. **(6mks)**

Structure	Insect pollinated flower	Wind pollinated flower
(i)Anther (ii)Stigma (iii)Pollen grain		

(b) State two mechanisms that hinder self pollination in flowering plants

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3. Study the diagram below and answer the questions that follows.



(a) Identify part labeled Q. **(1mk)**

(b)(i) What type of response is shown above? **(1mk)**

(ii) What is the importance of the above response? **(1mk)**

(c) Explain how the response exhibited by the part Q occurs. **(4mks)**

(d) Name the plant hormone that is responsible for this response. **(1mk)**

4.In a certain species of flies, the genotypes of pure breeds RR and rr, a cross was made between the two genotypes. When sprayed with an insecticides ,it was found that it would only kills flies of genotype rr.

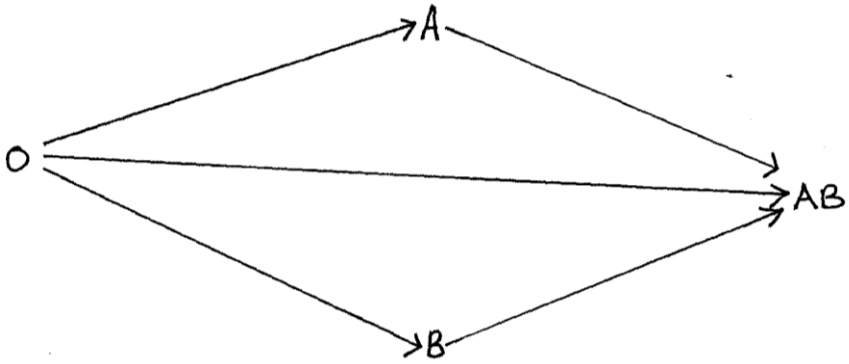
(a) Perform a cross to show the results of a cross between two heterozygote flies. **(3mks)**

(b) What percentage of flies would be killed by the insecticides show your working. **(2mks)**

(c) Explain why the insecticides kills only flies of genotype rr. **(2mks)**

(d) What is an allele? **(1mk)**

5.The flow chart below shows blood transfusion pathway.



(a) What five conclusions can you draw from the above flow chart? **(5mks)**

(b) Why is the knowledge of blood groups necessary before blood transfusion? **(1mk)**

(c)A part from knowledge of blood groups state two precautions that must be observed during blood transfusion. **(2mks)**

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SECTION B(40 MARKS)

6.A person had gone for 24 hours without food. Then he was served with a well balanced meal after which the concentration of glucose and amino acids in the blood were determined every one hour for the next 8 hours after the meal, the concentration were measured as blood passed through the hepatic portal vein and hepatic vein.

The results were as shown in the data below.

Time in hours	Concentration of	Glucose & amino	Acids in blood	(Mg/100 cm^3 of blood)
	HEPATIC	PORTAL VEIN	HEPAT IC	VEIN
	GLUCOSE	AMINO ACIDS	GLUCOSE	AMINO ACIDS
0	79	1.0	85	1.0
1	79	1.0	85	1.0
2	160	1.0	110	1.0
3	140	4.0	100	3.0
4	120	6.0	90	3.0
5	100	5.0	90	2.0
6	90	2.0	90	1.0
7	90	1.0	90	1.0
8	90	1.0	90	1.0

(a) On the same axis plot graphs of glucose concentration in hepatic portal vein and hepatic vein against time. **(7mks)**

(PROVIDE A GRAPH PAPER)

(b) Account for the difference in blood sugar level in hepatic portal vein and hepatic vein.

(i) Between 0-1 hours. **(4mks)**

(ii) Between 2-4 hours **(5mks)**

(c)(i) Give one reason that delayed increase in amino acids concentration in hepatic portal vein. **(1mk)**

(**ii)**Account for the difference in concentrations of amino acids in hepatic portal vein and hepatic vein between 3^{rd} -6^{th} hours **(2mks)**

(d) Name the enzyme that completes fat digestion in man **(1mk)**

7. A student ate lean meat for break fast, Explain fully how the meal eventually becomes part of the body tissue. **(20mks)**

8.(a) With aid of a large labeled diagram describe the process of fertilization in a flowering plant. **(14mks)**

(b) How does the process above differ from that in Bryophytes. **(6mks)**

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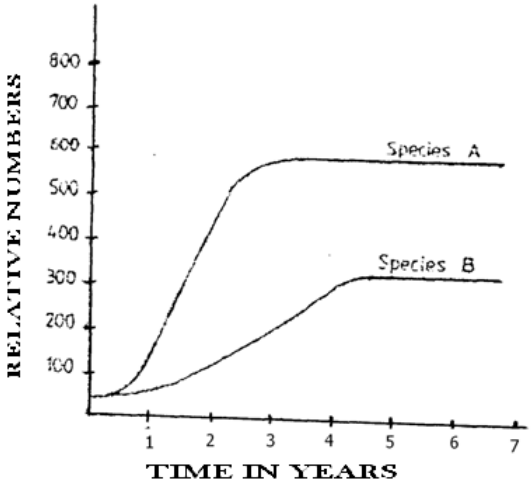
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K.C.S.E EXAMINERS' FORECAST SERIES 1
QUESTION PAPER NO: 10

BIOLOGY
Paper2
Time 2 Hours

SECTION A (40 MARKS)

1. Two herbivorous mammalian species were introduced into an ecosystem at the same time and iin equal numbers. The graph below represents their populations during the first seven years. Study the graph and answer the questions that follow.



a) i) Which species has a better competitive ability? **(1mk)**

ii) Give reason for your answer **(lmk)**

b) Account for the shape of the curve of species A between

i) One year and three years **(2mks)**

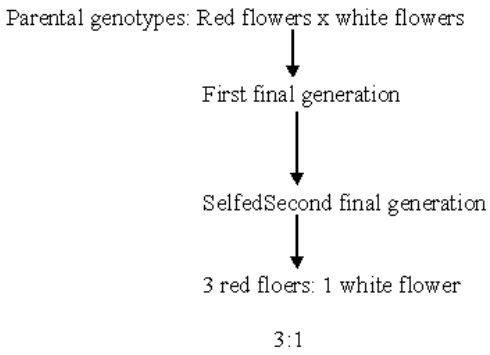
ii) Three years and seven year **(2mks)**

c) A natural predator for species A was introduced into the ecosystem.

With a reason state how the population of each species will be affected **(2mks)**

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2 The chart below represents the result of successive crosses, staring with red flowered plants and white flowered plants in which both plants are pure breeding



a) What were parental genotype ? Use letter R to represent the gene for red colour and r for white colour **(lmk)**

b)i) What was the colour of the flowers in the first filial generation? **(lmk)**

ii) Give a reason for your answer in b (i) above **(lmk)**

c)If 480 red flowered plants were obtained in the second filial generation, how many F2 plants had white flowers? Show your working **(5mks)**

3.A form 1 student placed a red blood cell in a solution and made an observation as follows.

Start of experiment/ end of experiment

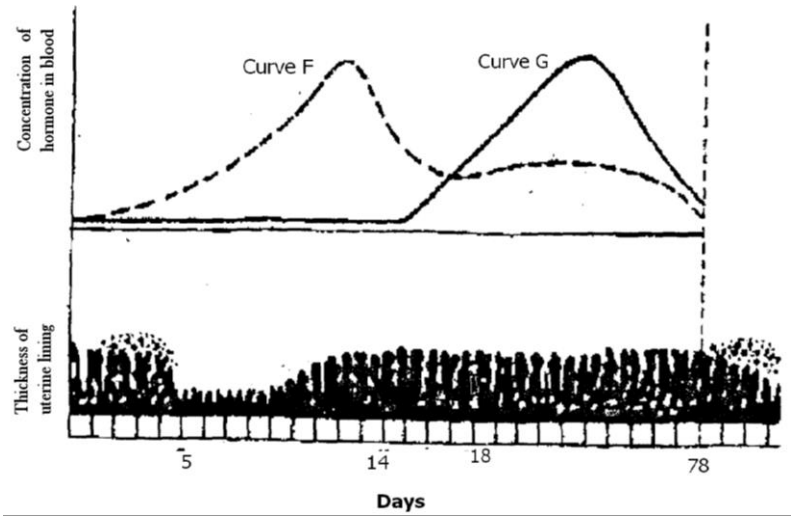
a) i) In what solution was the red blood cell paced? **(lmk)**

ii) Explain the observation above **(2mks).**

b)If the red blood cell was replaced by a plant cell what would be the observation **(2mks)**

c) Why don't the red blood cell undergo the same changes as above while in the body. **(3mks)**

4. The figure shows changes that take place during menstrual cycle in human



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a) Name the hormone whose concentrations are represented by curves F and G **(2mks)**

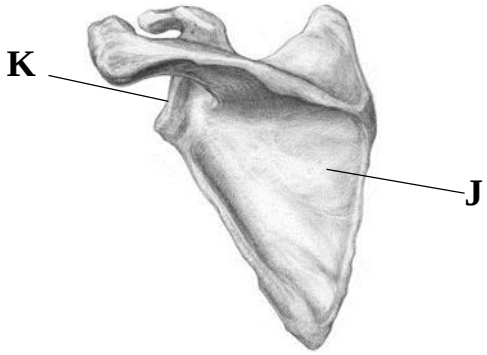
b) State the effects of the hormones named in (a) above on the lining of the uterus **(2mks)**

c) i) Name the hormone which is released by the pituitary gland in high concentration on the 14th day of the menstrual cycle **(lmk)**

ii) State two functions of the hormone named in (c) (i) above **(2mks)**

d) State the fertile period during the menstrual cycle **(1mk)**

5. The diagram below represents a bone obtained from a mammal



a) Name the bone **(1mk)**

b) Name the:

i) Bone which articulate with the bone named in (a) above at the cavity labeled K; **(1mk)**

ii) Joint formed by the two bones **(1mk)**

c) State the function of the part labeled J

d) Explain how the pelvic girdle is adopted to its function **(4mks)**

Section B

6. An experiment was carried out to investigate the nutritional value of two dry powder animals feeds X and Y over a period of six months. Twenty 5 month's old castrated goats were use. The goats were divided into two equal groups A and B.

The animal's in group A were fed on feed X throughout the experiment while those of group B were fed on feed Y.

The feeds were supplemented with dry hay and water. The average body weight of each group of goats and the weight of the dry powder feeds were determined and recorded each month. The faeces produced by each group was dried and weighed and the average dry faecal output per month was also recorded. The results are as shown below.

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	GROUP	A		GROUP	B	
Months since commencement of the experiment	Average total weight of goats(Kg)	Average weight of total feed(Kg)	Average monthly dry faecal output(Kg)	Average total weight of goats(Kg)	Average weight of total feed(Kg)	Average monthly dry faecal output(Kg)
0	20.4	26.7	10.5	20.5	35.4	16.5
1	22.5	27.5	10.7	19.5	34.3	17.7
2	24.5	25.8	10.3	19.0	35.2	17.2
3	26.3	18.5	8.8	18.5	36.1	17.5
4	28.0	16.6	7.2	17.1	36.0	16.9
5	29.4	16.3	6.0	16.3	35.8	16.8
6	29.5	16.1	5.6	15.6	35.5	16.6

a)i) What is the relationship between the amount of feed and the faecal output **(2mks)**

ii) Work out the average increase in weight for the animal's in group A during:

The first four months

The last two months **(4mks)**

iii) Account for the average increase weight in goats in group A during:

The first four months

The last two months **(4mks)**

iv) Which of the two feeds is more nutritious? Give reason for your answer **(2mks)**

b) Explain the digestion of lipids in humans **(8mks)**

7a) Describe how semicircular canals perform their functions **(8mks)**

b) Describe how the cervical, lumbar and sacral vertebrae are suited to their functions **(l2mks)**

8a) State four characteristics of gaseous exchange surfaces. **(4mks)**

b) Explain the theories for opening and closing of the stomata **(16mks)**

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