K.C.S.E 2023 BLUEPRINT PREDICTION

BIOLOGY PP2 10 QUESTION PAPERS



KCSE BLUEPRINT PREDICTION

BIOLOGY PP2

10 QUESTION PAPERS

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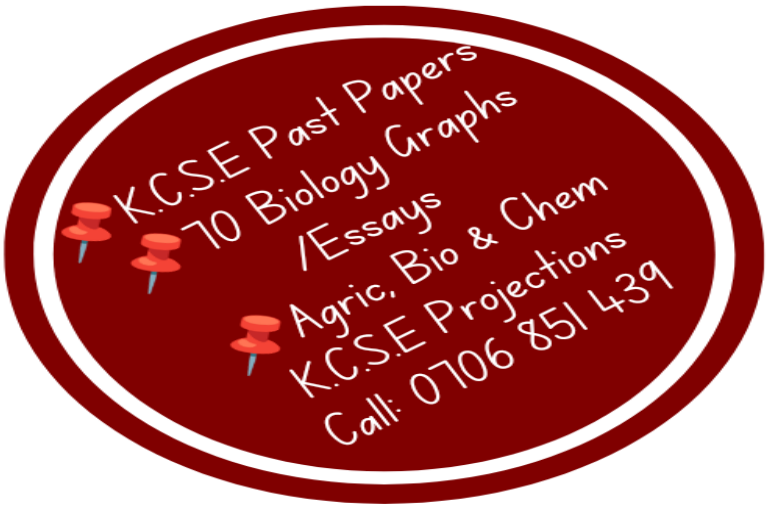
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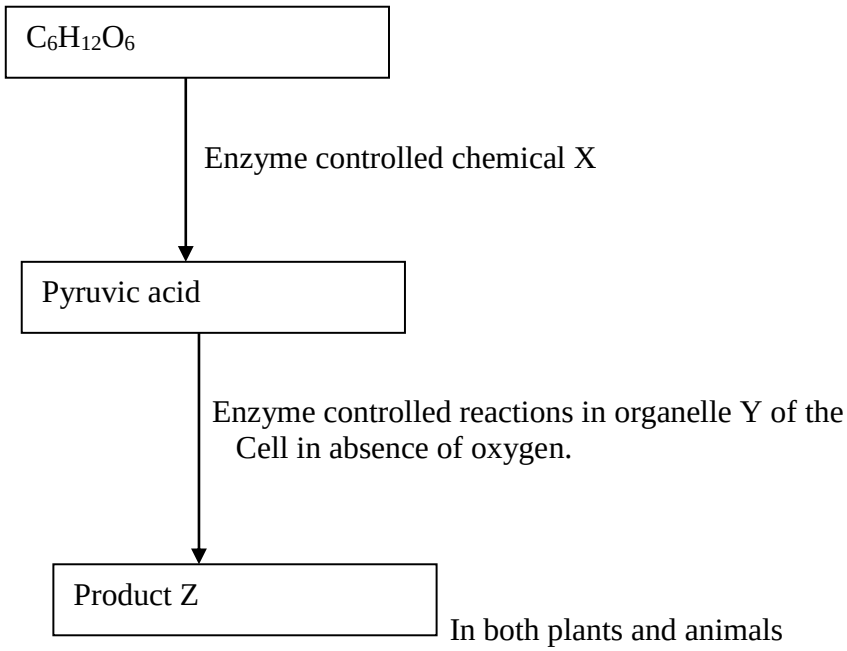
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QUESTION PAPER NO: 1

231/2
Biology
Paper 2 (Theory)
Time 2 hours

1. Study the flow chart below of a process that takes place in both plants and animals.



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

(b) (i) In the above process name the chemical reaction represented by X **(1mk)**

(ii) Name the part of the cell where the enzyme controlled reactions in b(i) above take place **(1mk)**

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(c) Name the products Z in

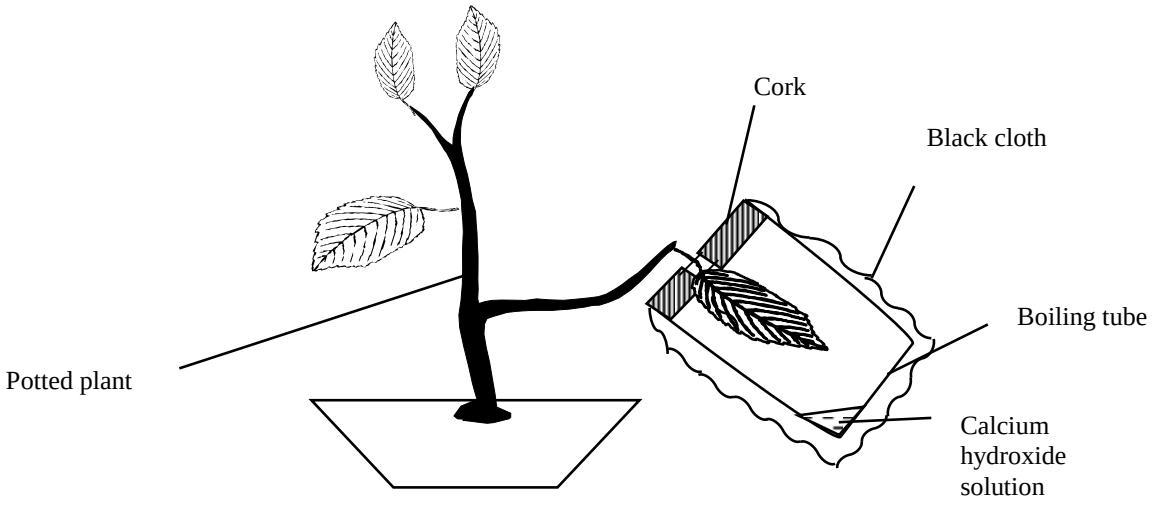
(i) Plants … **(1Mk)**

(ii) Animals … **(1Mk)**

(d) What would be the fate of pyruvic acid if oxygen supply is availed? **(2mks)**

(e) What is meant by the term oxygen debt? **(1mk)**

2. A group of students set up an experiment as shown below. The set up was left intact in sunlight for 48 hours



(a) What observation was made in calcium hydroxide solution ? **(1mk)**

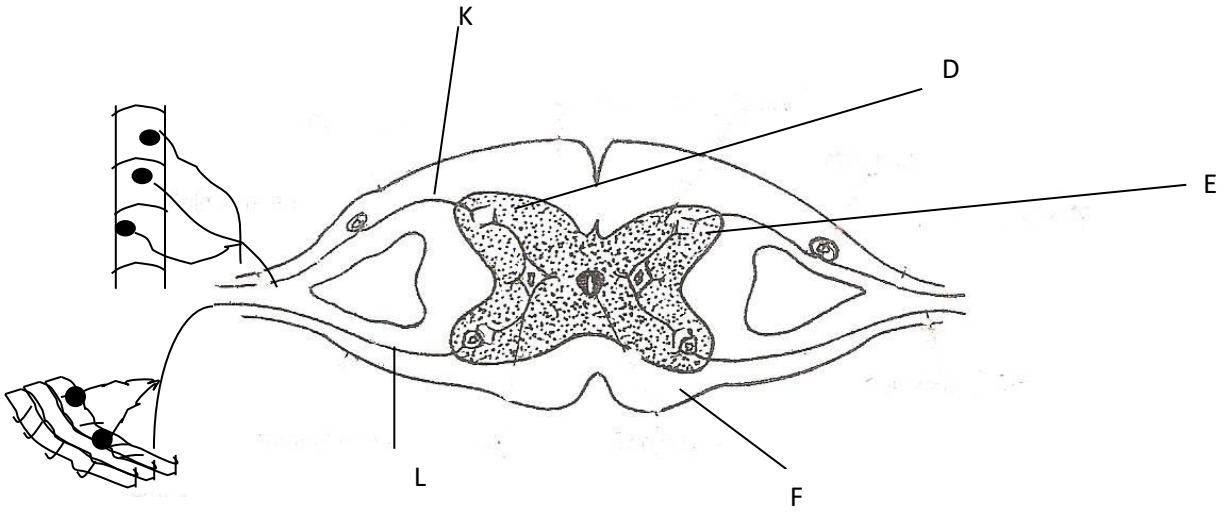
(b) Give a reason why the black cloth was used **(1mk)**

(c) Account for the observation in (a) above **(2mks)**

(d) Suggest a control experiment for the above experiment **(1mk)**

(f) State three factors that affect t he rate of photosynthesis **(3mks)**

3. The diagram below shows a simple reflex arc



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(a) Identify the structures labelled: **E** & **F** **(2mks)**

(b) What is the functional difference between K and L **(1mk)**

(c) Explain how a nerve impulse is transmitted across the gap labeled D**.** **(3mks)**

(d) State **<u>two</u>** differences between nervous communication and endocrine communication. **(2mks)**

4 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 F_1 generation had grey coats. Using letter B to represent the gene for black coat and W. for white coat;

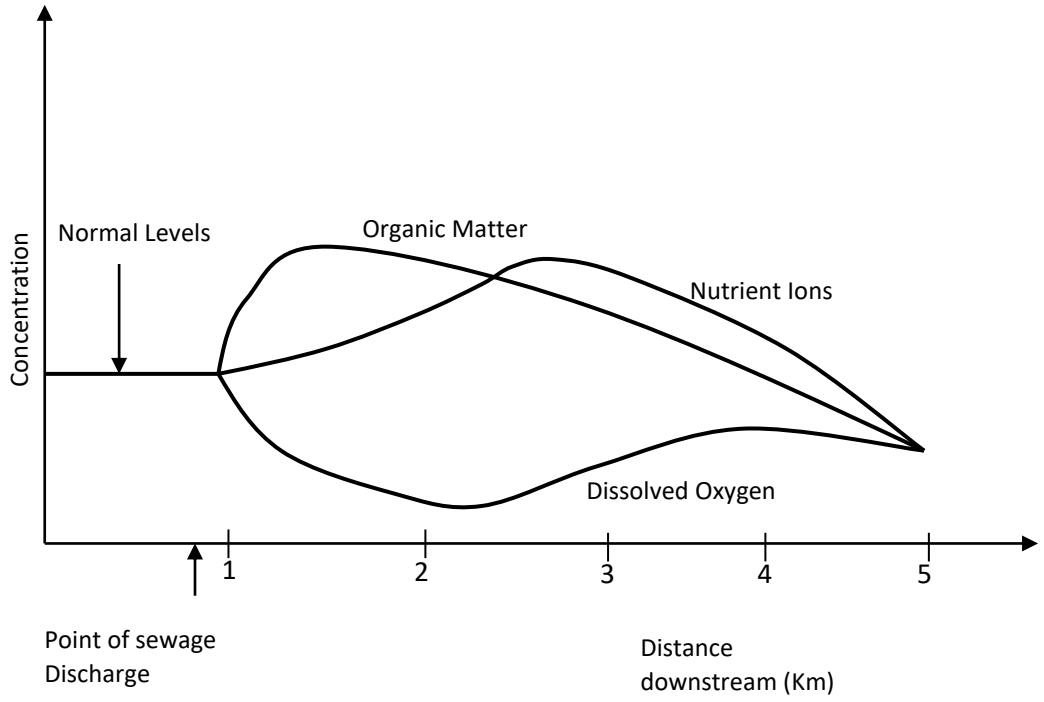
(a) Suggest a reason to explain why there were no white nor black rats in F_1 generation **(1mk)**

(b) The F_1 offspring were crossed to give F_2 generation. Work out the phenotypic ratio of F_2. Show your working **(5mks)**

(c) Name <u>ONE</u> trait in human beings that is determined by multiple allele **(1mk)**

(d)<u>Name</u> ONE genetic disorder affecting the human eye **(1mk)**

5. The figure below shows the changes in the concentration of various substances in a river Following the discharge of untreated sewage into it. Study it and answer the questions that follow.



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(a) Account for the changes in the concentration of

(i) Organic matter **(2mks)**

(ii) Nutrient ions **(1mk)**

(iii) Dissolved oxygen

(b) Describe the changes you would expect to observe with respect to fish population **(2mk)**

(c) What causes green house effect **(1mk)**

SECTION B (40 MARKS)

6. An investigation was carried out in boys and girls to show their average increase in mass from birth to 18 years.

Mass (kg)

Age(years)	Boys	Girls
0	3.4	3.4
1	10.1	9.8
2	12.6	12.3
3	14.6	14.4
4	16.5	16.4
5	18.9	18.6
6	21.9	21.1
7	24.5	23.7
8	27.3	26.4
9	29.9	28.9
10	32.6	31.9
11	35.2	35.7
12	38.3	39.7
13	42.2	45.0
14	48.8	49.2
15	54.5	51.5
16	58.3	53.1
17	61.8	54.2
18	63.1	54.4

(a) Using a suitable scale and on same axis plot graphs of mass against age **(8mks)**

(b) Between which two years does the greatest increase in mass occur in both girls and boys?**(1mk)**

(c) Between which two years does the second greatest increase in mass occur in

(i) boys …… **(1Mk)**

(ii) girls …… **(1Mk)**

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(d) What is the average yearly increase in mass in boys between ages

(i) 2 and 5 **(1mk)**

(ii) 13 and 16 **(1mk)**

(e) Besides sex, list other factors that determine the final mass attained by a person **(3mks)**

(f) Account for the differences in mass between the boys and the girls at ages 14-18 years **(3mks)**

7. Discuss how the mammalian heart is adapted to its functions **(20Mks)**

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

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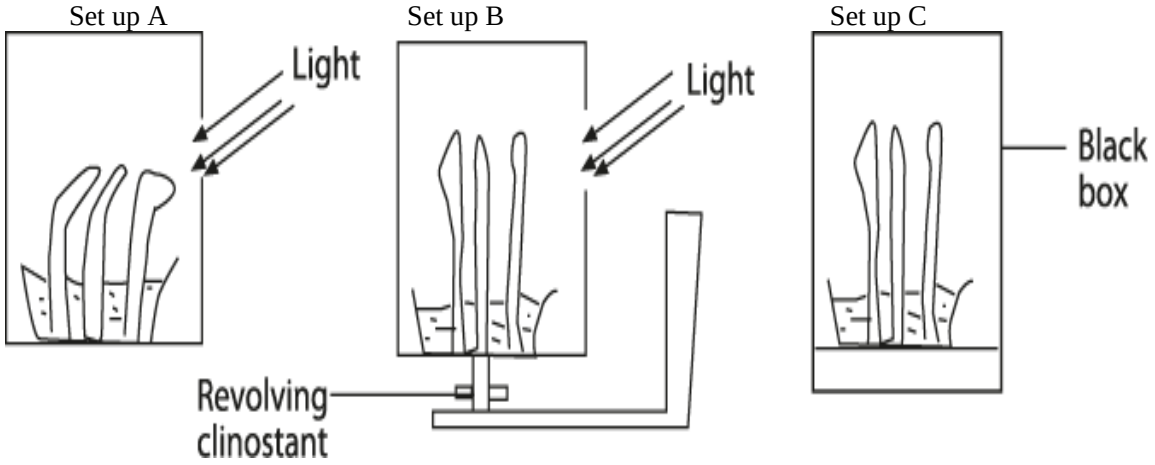
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QUESTION PAPER NO: 2

231/2
Biology
Paper 2 (Theory)
Time 2 hours

SECTION A (40 Marks)

1. A form 4 class set up an experiment as shown in the diagram below. All the three set ups had growing maize seedlings in a box. Study the set up and answer the question that follows;



(a) Suggest the aim of the experiment. **(1mk)**

b) i) Account for the result shown in the set up A. **(2mks)**

ii) What was the purpose of the revolving clinostat in set up B. **(1mk)**

c) i) Name the phenomenon exhibited by set up C results. **(1mk)**

ii) What is the significance of the phenomenon named in C (i) above. **(1mk)**

d) Differentiate between conditioned and simple reflex action. **(2mks)**

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2.a) What are the multiple alleles? **(1mk)**

b) A pure black male mouse was mated with a pure breeding brown female mouse. All the offspring had black coat colour.

i) Explain the appearance of black coat colour in the offsprings. **(1mk)**

ii) If the black parented mouse was mated with a mouse that is heterozygous for coat colour, work out the genotypic ratio of offspring. Show your working. **(4mks)**

iii) State two disorders in human being that are as a result of chromosomal mutation. **(2mks)**

3. In an attempt to estimate the number of weaver birds in a small woodland 435 were captured marked and released. Three days later 620 were captured 95 of which weremarked.

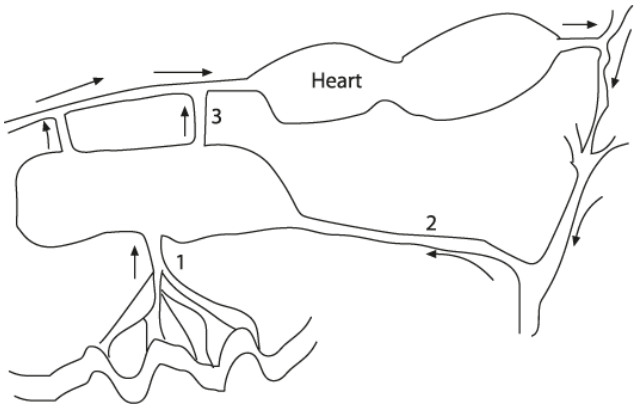
a) What is the name of the sampling method described above? **(1mk)**

b) Calculate the approximate size of the weaver bird population in the woodland. **(2mks)**

c) What two assumptions must be made during this investigation. **(2mks)**

d) List three other methods that can be used to estimate the number of organisms in a given habitat. **(3mks)**

4. The figure below is a simplified diagram of a mammalian circulatory system. Study it and answer the question that follows;



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)**

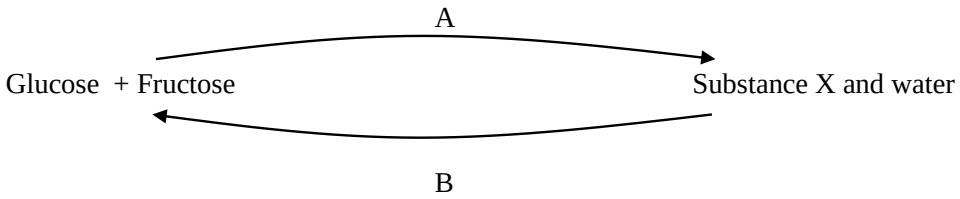
c) In what way does blood vessel 1 differ from most of the other blood vessel in the body? **(1mk)**

d) Name three nutrients that are only transported in vessels 1 following absorption. **(3mks)**

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

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5a) Study the diagram below and answer the questions that follows;



i) Name the identity of process B **(1mk)**

ii) Which part of the mammalian body does process B occur? **(1mk)**

iii) Give the identity of substance X **(1mk)**

iv) Name the enzyme involved in process B **(1mk)**

b) Briefly describe the light stage of photosynthesis. **(4mks)**

SECTION B (40marks)

6. A man carried out an experiment to find out the effect of water and 0.9% salt solution on urine production. On the first day, he drunkone litre of water (x). On the second day, he repeated the experiment, but instead of water, he drunk one litre of 0.9% salt solution (Y).

The experimental results are shown in the table below.

Time in (hrs)		0.0	1.0	1.5	2.5	4.5	5.5	6.5	7.5
	x	80	60	360	520	60	100	40	60
	Y	40	40	40	45	100	60	80	100

a) Using a suitable scale draw graphs of urine produced in cm^3 per hour against time. **(8mks)**

b) From the graph determine the;

i) Amount of urine produced in the second hour when the man had drunk solution X. **(1mk)**

ii) The rate of urine production between the first and second hour after the man had drunk one litre of water. Show your working. **(2mks)**

c) What does the shape of the curve representing column X tell us about the rate of urine production? **(2mks)**

d) Explain the differences between the rate of production in graph X and Y. **(2mks)**

e) Why do you think drinking one litre (0.9%) of sodium chloride solution made little difference to the output? **(1mk)**

f) Name two hormones involved in regulation of osmotic pressure in kidney. **(2mks)**

g) Name two kidney diseases **(2mks)**

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7a) Describe adaptations of the reproductive system of a male mammal to its function. **(10mks)**

b) Describe the following evidences of evolution:

i) Comparative anatomy **(6mks)**

ii) Cell biology **(2mks)**

iii) Comparative embryology **(2mks)**

8 Describe the structure and functions of various organelles in a mature animal cell. **(20mks)**

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QUESTION PAPER NO: 3

231/2
Biology
Paper 2 (Theory)
Time 2 hours

SECTION A (40 MARKS)

1(a) The table below shows the concentration of sodium and iodine ions in pond water and in the cell sap.

	Sodium ion concentration	*Iodine concentration*
Pond water	180	0.4
Cell sap	90	500

Giving reasons name the process through which each of the ions is taken up by the plants

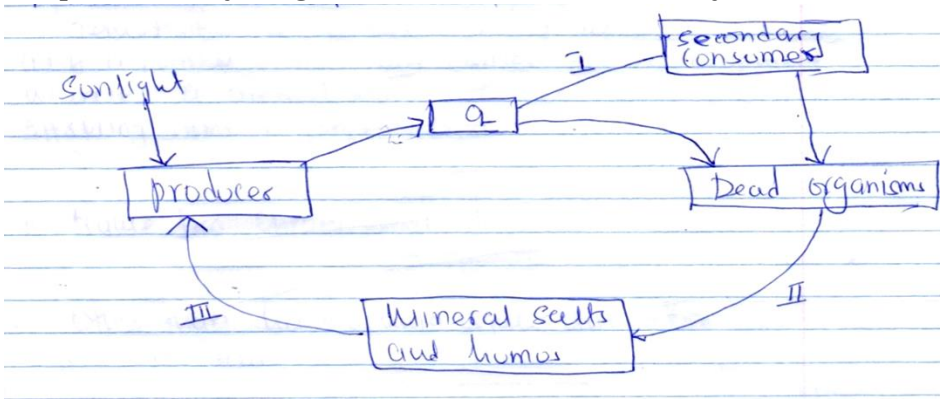
(i) Sodium ion **(2mks)**

(ii) Iodine ion **(2mks)**

(b) The lettuce plant was then treated with a chemical substance that inhibits the synthesis of ATP
Giving a reason, state which ion was affected by the treatment **(2mks)**

(c) Explain why fresh water fish cannot survive is marine habitat **(2mks)**

2. The diagram below represents recycling of nutrients in a certain ecosystem



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(a) Name the trophic level represented by Q **(1mk)**

(b) Name the process represented by: I, II & III **(3mks)**

(c) Name the organism involved in process II **(1mk)**

(d) What would happen within the ecosystem if all the secondary consumers were eliminated? **(3mks)**

3. (a) What is non disjunction **(1mk)**

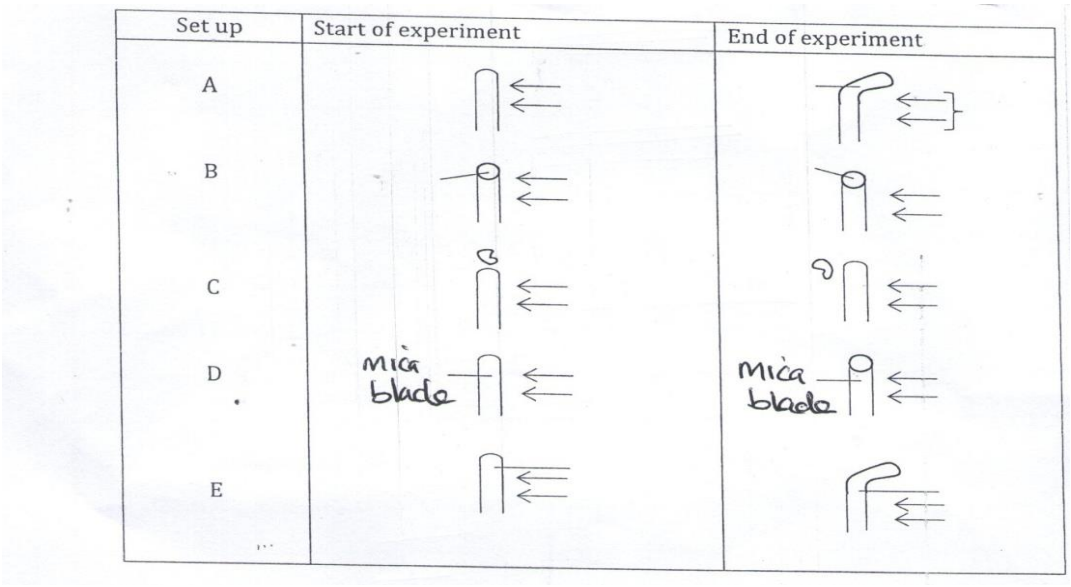
(b) Haemophilia is a sex linked trait

(i) If a normal woman but carrier for haemophilia marries a normal man, work out the phenotype of the offspring using a genetic cross **(3mks)**

(ii) Name two chromosomal disorders **(2mks)**

(c) Other then haemophilia, state any other two sex - linked defect in man **(2mks)**

4. An experiment was set to investigate the effect of unilateral light on the growth of oat coleoptiles. The diagram in the table represents the experimental set ups the start and the result at the end of experiment.



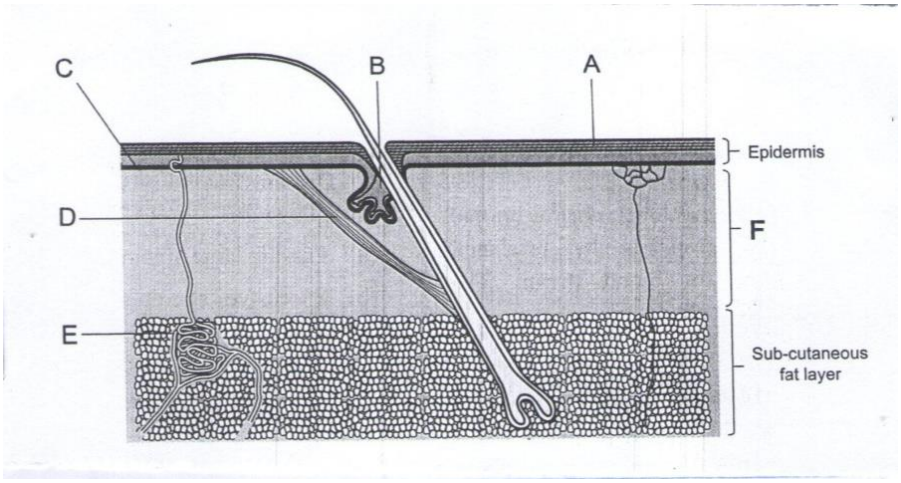
(a) Account for the reaction in experiment set up A **(3mks)**

(b) Explain the purpose of experiment set up B and C **(3mks)**

(c) Explain the results in the experiment set D and E **(2mks)**

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5. The diagram below represents a transverse section through mammalian skin



(a) Name the structures A and B **(2mks)**

(b)(i) Explain how the hair in human beings helps in keeping the body warm **(3mks)**

(ii) Explain other methods by which the skin helps to keep the body warm **(3mks)**

SECTION B: (40MARKS)

6. The table below shows how the width of the stomata and the wind speed can affect the rate of transpiration from a leaf of a plant. The width are measured in micrometers (nm)

Width of stomata in (nm)	*Rate of transpiration in gm/M^2/ hour*	
	In still air	*In wind*
0	0.0	0.0
5	0.9	4.0
10	16.0	7.0
15	2.0	8.4
20	2.2	9.0

(a) On the same axes plot a graph of rate of transpiration against width of the stomata **(8mks)**

(b) Use your graph to predict the rate of transpiration when the stomata have a width of 8nm **(2mks)**

(c) Describe the relationship between the width of stomata and the rate of transpiration in still air **(3mks)**

(d) Explain why the rate of transpiration in wind differs from rate in still air **(3mks)**

(e) Explain why transpiration is important in plants **(4mks)**

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7. Describe the various ways in which seeds and fruits are adapted for dispersal **(20mks)**

8.(a) State the possible application of the following plants hormones in agriculture **(8mks)**

(i) Auxins
(ii) Gibberellins

(b) Explain how each of the following serves as evidence of organic evolution

(i) Fossil records **(3mks)**

(ii) Comparative antinomy **(6mks)**

(iii) Geographical distribution **(3mks)**

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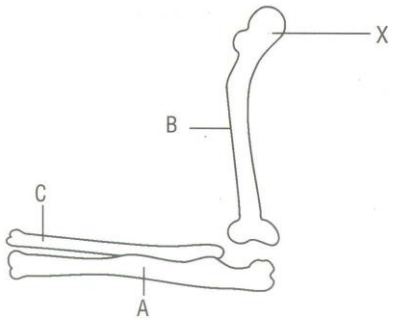
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QUESTION PAPER NO: 4

231/2
Biology
Paper 2 (Theory)
Time 2 hours

SECTION A (40 Marks)

1. Below is a diagram illustrating formation of a certain joint;



a) ***Identify*** the bones labeled ***B*** and ***C*** **(2mks)**

b) ***Name*** the cavity found on bone ***A*** **(1mk)**

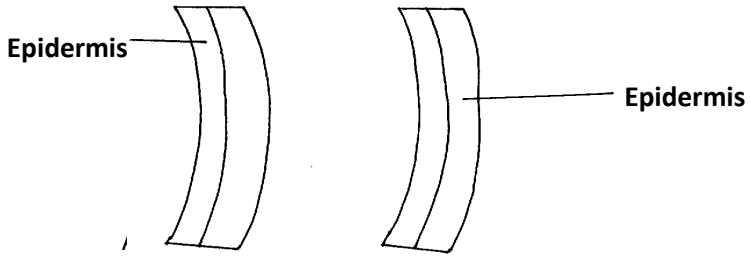
c) ***Identify*** the type of movable joint formed at the proximal end of bone ***B***. **(1mk)**

d) ***State two functions*** of an exoskeleton in arthropods **(2mks)**

e) ***Give two reasons*** why support is necessary in Plants **(2mks)**

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2. A 4cm straight piece of stem from a herbaceous plant was split lengthwise into two similar pieces. The pieces were placed in sugar solutions of different concentrations for 30 minutes. Their appearance after 30 minutes is as shown below:



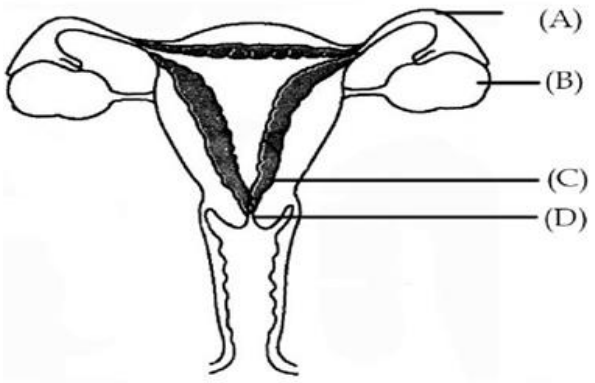
a) ***Which*** physiological process is being investigated? **(1mk)**

Account for the appearance of the piece in solution A: **(4mks)**

b) ***How is*** active transport affected by metabolic poison? **(2mks)**

c) ***Name*** the part of the cell that is useful in maintaining support in the herbaceous plants. **(1mk)**

3. Study the diagram below and answer the questions the follow



a) ***Name*** the parts labeled ***C*** and ***D***. **(2mks)**

b) ***State two*** hormones produced in the organ labeled ***B***. **(2mks)**

c) ***Give two*** adaptations of the structure labeled ***A*** that adapts it to its function. **(2mks)**

d) ***Identify*** the labeled site where fertilization takes place **(1mk)**

e) ***What is*** the function of oxytocin hormone in the female body? **(1mk)**

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4. A woman who is normal for haemophilia is married to a man who suffers from Haemophilia.

One of their daughters Jenifer turns to be haemophiliac. Taking ***H*** for normal trait and ***h*** for haemophilia;

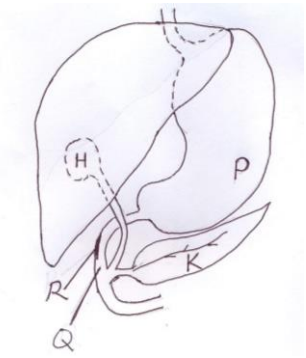
a) ***State*** the genotypes of the parents **(2mks)**

b)(i) ***Work out*** the genotypes of the offspring.(*show your working*) **(4mks)**

ii) ***State*** the genotype of Jenifer **(1mk)**

c) ***What is*** polyploidy? **(1mk)**

5. The illustration below show part of the alimentary canal. Study it then answer the questions that follow.



a) (i) Name structure labeled H. **(1mk)**

ii) ***Explain*** the importance of structure ***H*** in digestion. **(2mks)**

b) Organ labeled ***K*** has both endocrine and exocrine characteristics. ***Explain.*** **(2mks)**

c) (i) Region labeled ***P*** has acidic chyme but in region ***Q*** chyme is neutral. ***Explain***. **(2mks)**

ii) ***Name*** the hormone produced by inner lining of part ***R***. **(1mk)**

SECTION B (40 MARKS)

6. In an experiment to investigate certain processes in a given plant species, the rates 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/ mm	10	43	69	91	91	50	18	0	0	0
Volume of Carbon (IV) oxide released (mm^3/ mm	38	22	10	3	3	6	31	48	48	48

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

b) ***Name*** the physiological process that lead to:

(i) Carbon (IV) oxide consumption. **(1mk)**

(ii) Carbon (IV) oxide production. **(1mk)**

c) ***Account for*** the shape of the curve for:

(i) Carbon (IV) oxide consumed. **(3mks)**

(ii) Carbon (IV) oxide released. **(3mks)**

d)(i) ***What*** is meant by compensation point. **(lmk)**

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

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

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

(b) ***Describe*** the mechanism of gaseous exchange in a mammal. **(l6Mks)**

8.(a) ***Describe how*** fruits and seeds are adapted to water and wind dispersal. **(10mks)**

(b) ***How*** are flowers adapted to insect pollination? **(10mks)**

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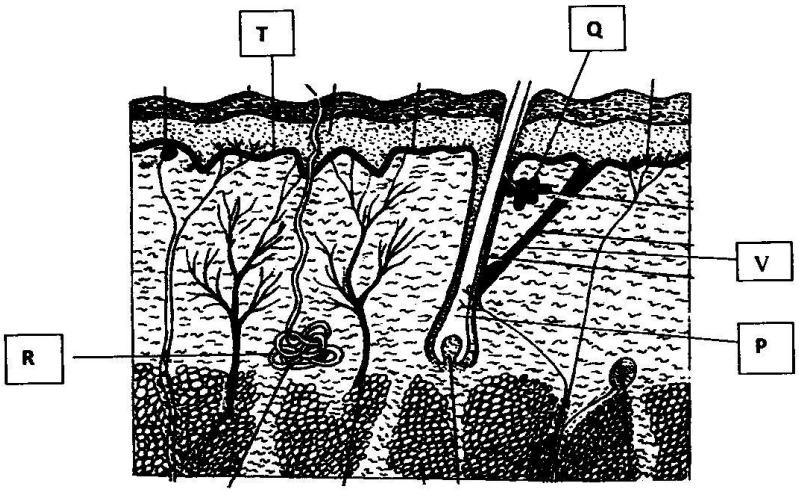
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QUESTION PAPER NO: 5

231/2
Biology
Paper 2 (Theory)
Time 2 hours

SECTION A (40 Marks)

1. Below is a diagram of a mammalian skin, use it to answer the questions that follow.



a) Name the parts labelled P, Q, R **(3mks)**

b) Give the function of the parts labelled Q and T **(2mks)**

c) Briefly explain how the part labelled R contribute to lowering of body temperature on a hot day. **(2mks)**

d) Give **one** function of the mammalian skin other than thermoregulation. **(1mk)**

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2. Form two students subjected an orange plant growing outside the laboratory to the Following;

i) Selected two sized leaves and gently brushed them clean on both sides.

ii) Placed two strips of dry cobalt chloride paper on both sides of each leaf and opposite each other and covered the cobalt chloride papers with cello tape. They observed the time taken for any colour change to occur and recorded the following.

Side of leaf	Upper epidermis	Lower epidermis
Time taken	5 minutes	2 minutes

Use the above information to answer the following questions.

a.i) What was the aim of the above experiment. **(1mk)**

ii) What was the purpose of brush cleaning the leaf **(1mk)**

iii) What was the role of cello-tape in this experiment? **(1mk)**

b.i) What was the original colour of dry cobalt chloride paper. **(1mk)**

ii) What colour change did the students observe? **(1mk)**

c. Explain the difference in time taken for the colour change observed. **(3mks)**

3. Red-green colour blindness is controlled by a sex-linked gene. The allele for normal sight is represented by letter C and of colour blindness is represented by letter c. A carrier female is married to a colour blind male.

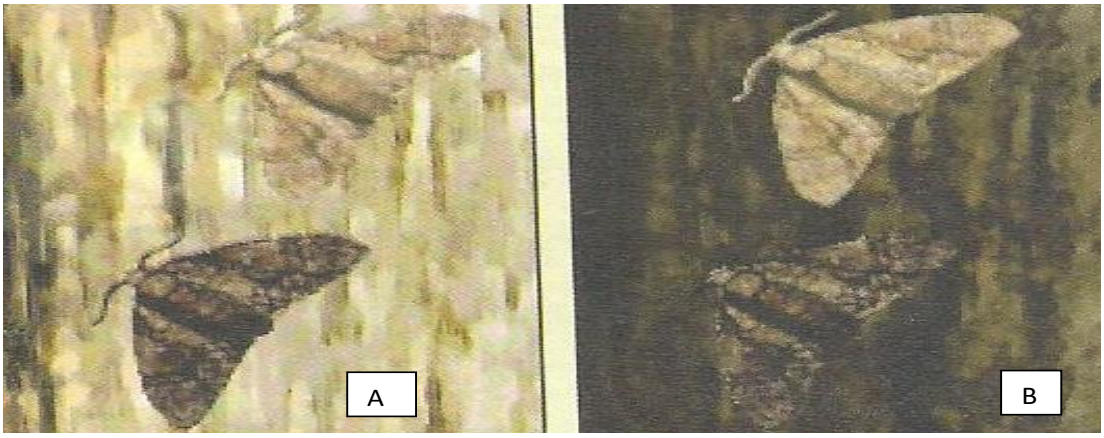
a) What is sex linked gene? **(1mk)**

b) Write down the genotype of the parents. **(2mks)**

c) Work out the F1 genotypes. **(4mks)**

d) What is the percentage of colour blind sons in all the male offspring's **(1mk)**

4. The photographs below are of organisms resting on different environmental backgrounds. Observe them and answer the questions that follow;



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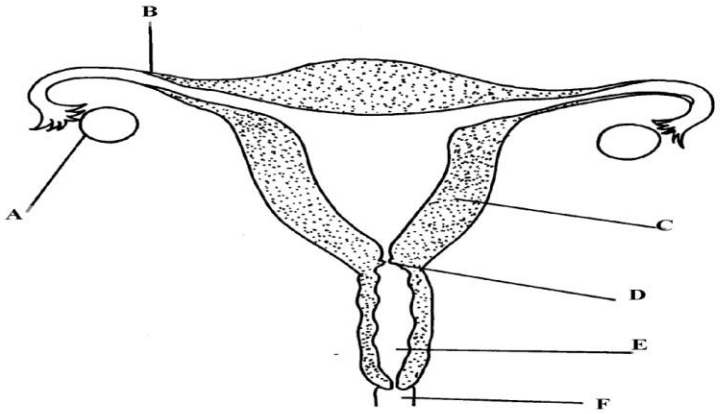
a) Name the aspect of evolution depicted in the photograph **(1mk)**

b) Explain the phenomenon. **(4mks)**

c) How do we refer to this concept mentioned in (b) above. **(1mk)**

d) State any four other evidences of the phenomenon in (a) above in the modern World. **(2mks)**

5. The diagram below represents female reproductive system;



a) Name the part labelled A, B, C and D **(4mks)**

b) State two functions of structure A **(2mks)**

c) How is part C adapted to its function? **(1mk)**

d) Of what significance is part E to reproduction? **(1mk)**

SECTION B (40 Marks)

6. A research was carried out to determine the trend of growth for some boys and girls. Their average mass in kilograms was taken separately for a period of 20 years and tabulated as shown in the table below.

Age	Average Mass of boys (kg)	Average mass of girls (kg)
0	2.5	2.5
2	11.1	11.5
4	15.0	16.0
6	18.5	19.3
8	22.1	27.1
10	25.1	27.1
12	27.5	30.5
14	37.0	35.5
16	44.0	44.0
18	46.9	52.5
20	48.5	55.0

a) On the same axis draw a graph of average mass of girls and of boys against the age. **(7mks)**

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b) From the graph , determine the;

i) Mass for boys at age of 11 years. **(1mk)**

ii) Growth rate in girls between ages 13 and 15 **(3mks)**

c) Account for the change in the mass of girls during the age stated in (ii) above. **(2mks)**

d) Explain the trend observed in the curves for both boys and girls. **(2mks)**

e) Why do girls above 10 years require intake of food that is richer in iron than boys of the same age. **(1mk)**

f) Mention two other factors apart from the diet that affect the rate of growth in boys and girls. **(2mks)**

g) Apart from using average mass to estimate growth in human beings, name two other parameters that can be used. **(2mks)**

7. Explain how the following plants are adapted to their habitats.

a) Xerophytes **(14mks)**

b) Halophytes. **(6mks)**

8. a) Describe the mechanism of inhalation in man. **(8mks)**

b) State **three** factors affecting breathing rate in human beings. **(6mks)**

c) Describe how the brain regulates breathing. **(6mks)**

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K.C.S.E BLUEPRINT PREDICTION
QUESTION PAPER NO: 6

231/2
Biology
Paper 2 (Theory)
Time 2 hours

SECTION A (40 MARKS)

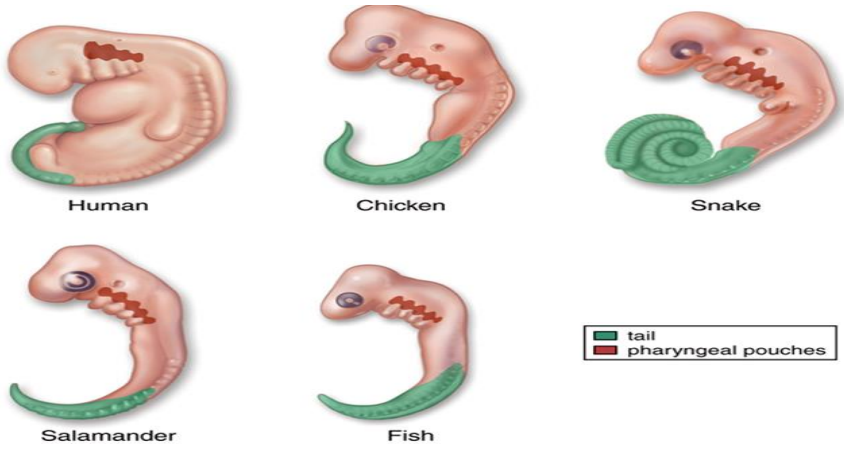
1.(a) Explain how dichogamy prevents self-fertilization in flowering plants. **(2mks)**

(b) State the changes that take place in a flower after fertilization. **(3mks)**

(c) Describe the adaptations of the male parts of a wind pollinated flower to their function? **(3Mks)**

2.(a) Explain how convergent evolution may occur. **(3mks)**

(b) The diagrams below show some organism structures that have been used as evidence of the process of evolution.



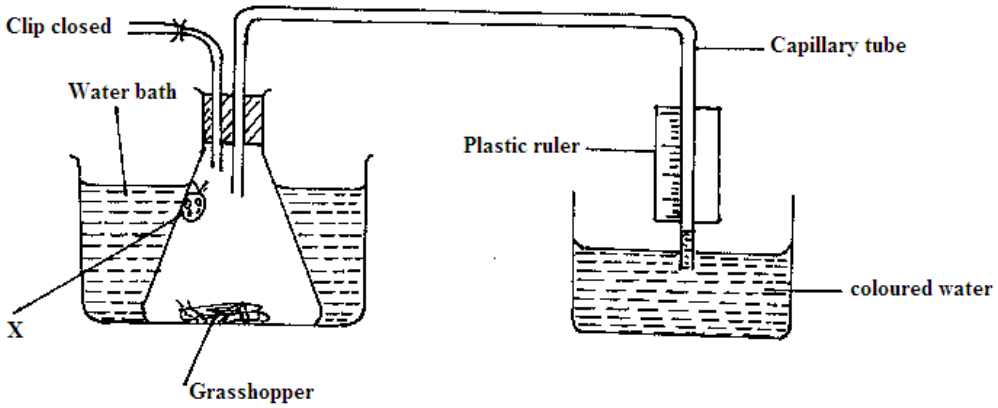
Name the type of evidence and explain it provides evidence to proof that the process of evolution may be taking place. **(3mks)**

(c) Outline two evolutionary characteristics that adapt man to his environment. **(2mks)**

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3. (a) Name the end products of glycolysis. **(1mk)**

(b) The diagram below illustrates an experiment to determine the rate of respiration in a small insect.



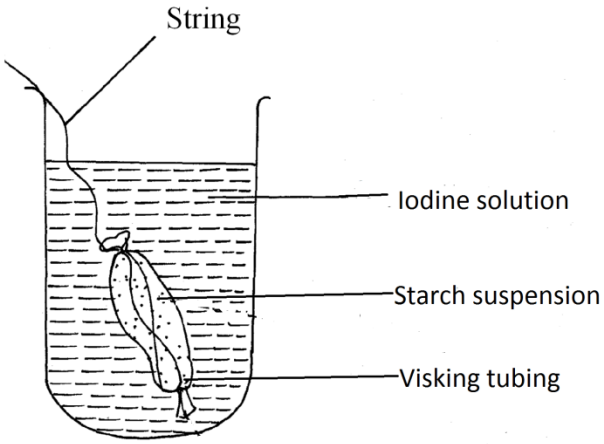
(i) Name the chemical compound labelled X and state its function. **(2mks)**

(ii) What changes would you expect to observe in the level of the coloured water in the capillary tube after the experiment has run for 10 minutes? **(1mk)**

(iii) Explain the changes you have stated in (b) (ii) above. **(3mks)**

(c) Why was it necessary to place the flask in a water bath? **(1mk)**

4. An investigation was performed by a group of students as shown in the set up below.



After 30 minutes, the starch suspension had turned blue-black while iodine solution retained its colour.

(a) Name the physiological process that was being investigated in the experiment. **(1mk)**

(b) Account for the results observed after 30 minutes. **(3mks)**

(c) Explain what would happen to a red blood cell when placed in distilled water and left to stand for the same duration as for the experiment above. **(3mks)**

(d) Define cell physiology. **(1mk)**

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5. In a plant breeding research, a certain plant species was developed and found to be normally green in colour. A recessive gene for colour (g) causes these plants to be white in the homozygous state. In this state, the gene is lethal causing white plants to die at an early age soon after germination. In the heterozygous state, these plants are pale green in colour and grow to maturity.

(a) Suggest a reason for the early death of the plants with homozygous recessive genes. **(1mks)**

(b) A normal green plant was crossed with a pale green plant; work out the genotypes of the F1 generation. Show your working. **(4mks)**

(c) Seeds from the heterozygous plants were planted. The plant breeders allowed the resulting plants to self-pollinate. Work out the phenotypic ratio of the plants that would grow to become mature**.** **(2mks)**

(d) Give an explanation for the occurrence of the pale green colour in heterozygous plants. **(1mk)**

SECTION B (40 Marks)

6. A group of students carried out a study to estimate the population of grasshoppers in their school compound. The table below shows the number of grasshoppers that were collected from eight sites within the school compound.

Site	1	2	3	4	5	6	7	8
Number of grasshoppers	280	50	190	220	85	300	175	30

(a)(i) Construct a bar graph to represent the number of grasshoppers collected from each site. **(6mks)**

(ii) In a related exercise, students caught 240 grasshoppers, marked them with ink and then released them. After five days, they caught 160 grasshoppers and found that 40 were marked. Work out the estimated population of grasshoppers in the school compound. **(3mks)**

(b)(i) Identify the method described in (a)(ii) above. **(1mk)**

(ii) Identify the instrument the students might have used to get the grasshoppers. **(1mk)**

(iii) State three factors that would influence the results in the method above. **(3mks)**

(c) Outline the adaptable observations the students would make on the grasshopper regarding;

(i) Locomotion. **(2mks)**

(ii) Protection. **(2mks)**

(iii) Feeding. **(2mks)**

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7.(a) Name the tissues in flowering plants responsible for secondary thickening **(2Mks)**

(b) Describe an experiment you would carry out to demonstrate the region of growth in the root of a bean seedling. **(8Mks)**

(c) Explain the role of growth hormones in metamorphosis of a housefly **(10Mks)**

8. Describe the role of the liver in;

(a) Blood sugar regulation. **(10Mks)**

(b) Thermoregulation. **(5Mks)**

(c) Name and explain the process that occurs when blood reaching the liver carries excess amino acids. **(5Mks)**

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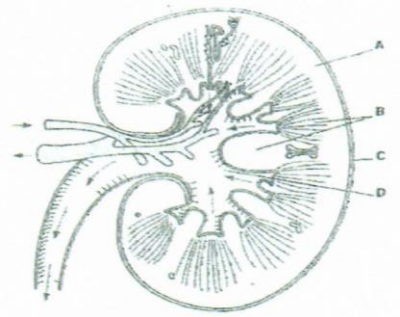
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K.C.S.E BLUEPRINT PREDICTION
QUESTION PAPER NO: 7

231/2
Biology
Paper 2 (Theory)
Time 2 hours

SECTION A: 40 MARKS

1. Study the diagram below and answer the questions that follow.



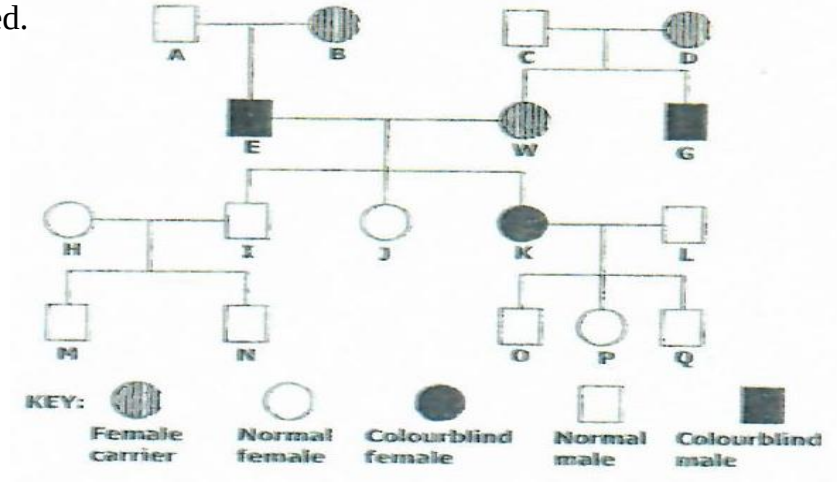
(a) Label the parts A and D on the diagram. **(2mks)**

(b) State two functions of the mammalian kidney. **(2mks)**

(c) Explain how the kidney keeps the concentration of water in the blood constant. **(2mks)**

(d) State two reasons why plants do not have an elaborate excretory system. **(2mks)**

2. The following is a human pedigree showing the transmission of red-green colour blindness. The gene trait is recessive and sex-linked.



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(a)

i. Using R to represent the gene for the normal vision and r to represent the gene for colour-blindness, work out the genotype of W. **(4mks)**

ii. What is the percentage of male sufferer in the cross above? **(1mk)**

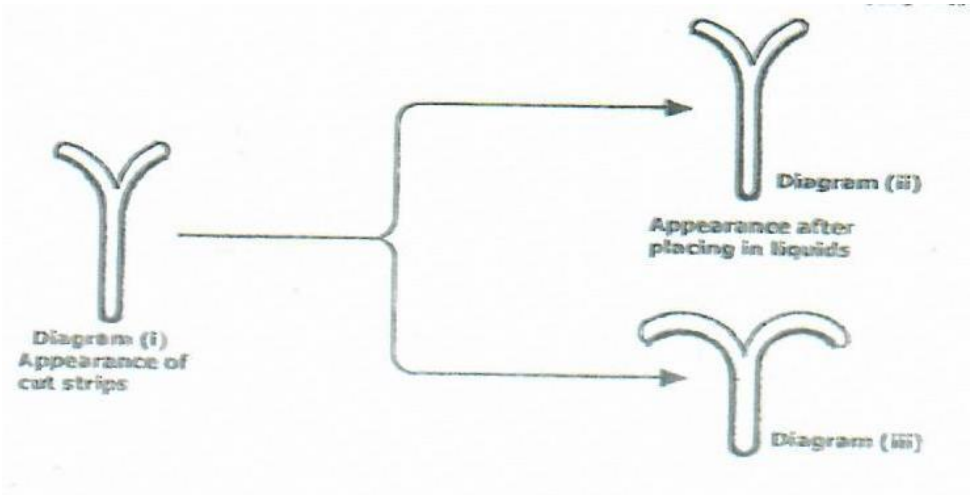
(b) Explain the meaning of the term sex-linked with respect to the gene that controls the red-green colour blindness. **(1mk)**

(c)

i. In which sex is the occurrence of colour blindness more common. **(1mk)**

ii. Give the reason for your answer in question c (i) above. **(1mk)**

3. Two strips of a herbaceous plant stems were cut as shown below.



Each was placed into a liquid resulting in appearance shown in diagram (ii) and (iii).

(a) Account for the observations made in diagram (iii). **(4mks)**

(b) Explain the similarity in appearance between diagram (i) and (ii). **(2mks)**

(c) Draw a diagram to show the appearance of the stem strip in diagram (ii) after staying in hypertonic solution for 30 minutes. **(1mk)**

(d) State one factor that affects the rate of active transport. **(1mk)**

4.

a. Define the term immunity. **(1mk)**

b. Differentiate between 'Natural passive immunity' and 'artificial passive immunity. **(2mks)**

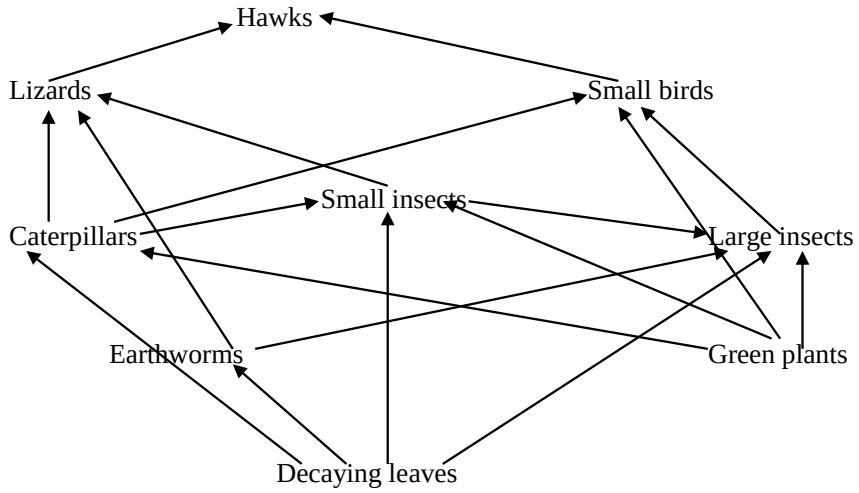
c. State two functional differences between pulmonary artery and pulmonary vein. **(2mks)**

d. State two importance of blood clotting. **(2mks)**

e. What do you understand by the term counter-current flow system as applied in gaseous exchange in fish? **(1mk)**

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5. The diagram below represents a food web in a certain ecosystem.



(a) Name the trophic level occupied by each of the following.

(i). Caterpillars **(1mk)**

(ii). Small insects **(1mk)**

(b) From the food web, construct two food chains which end with lizards as a tertiary consumer. **(2mks)**

(c) (i) Which organisms have the least biomass in the ecosystem? **(1mk)**

(ii) Explain the answer in c (i) above **(3mks)**

SECTION B: (40MKS)

6. In an experiment to investigate a certain process in a given plant species, the rate of carbon (IV) oxide consumption and the rate of carbon (IV) oxide release were measured over a period of time of the day. The results of the investigation are shown in the table below.

Time of day (Hrs)	6	8	10	12	14	16	18	20	22	24
CO_2consumption ($mm^3\ min^{-1}$	10	43	69	91	91	50	18	0	0	0
CO_2 Release ($mm^3\ min^{-1}$)	38	22	10	3	3	6	31	48	48	48

(a) On the same axes, plot graphs of volumes of carbon (IV) oxide against time. **(7mks)**

(b) Name the biochemical process represented by.

(i) Carbon (IV) oxide consumption. **(1mk)**

(ii) Carbon (IV) oxide release. **(1mk)**

(c) Account for the shape of the curve for;

(i) Carbon (IV) oxide consumption between 6 to 12 hrs. **(3mks)**

(ii) Carbon (IV) oxide release between 14 to 20hrs. **(3mks)**

(d)

(i) From the graph, state the time of the day when the plant attains compensation point. **(1mk)**

(ii) State two factors that affect the rate of carbon (IV) oxide release by a plant. **(2mks)**

(e) Explain how temperature affects the rate of Carbon (IV) oxide consumption in a plant. **(2mks)**

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7.

(a) Explain the mechanism of opening and closing of the stomata using photosynthetic theory. **(6mks)**

(b) Explain the breathing process in man. **(14mks)**

8. Describe the role of hormones in the human menstrual cycle. **(20mks)**

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K.C.S.E BLUEPRINT PREDICTION
QUESTION PAPER NO: 8

231/2
Biology
Paper 2 (Theory)
Time 2 hours

SECTION A (40 MARKS)

1. A couple has three children, the mother had **blood group A** and the father had **blood group B** while one of the children had **blood group 0.**

(a) (i) What were the genotypes of the parents? **(1mk)**

Father

Mother

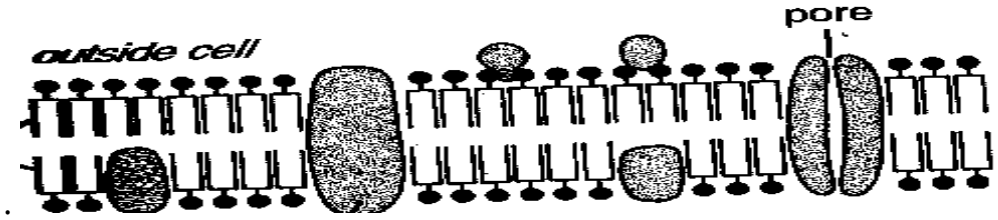
(ii) What was the genotype of the child with blood **group 0?** **(1mk)**

(b) Work out using a **punnet** square the genotypes of the other children. **(4mks)**

(c) Which child can receive blood from any member of the family? **(1Mk)**

(d) State the percentage of children who can donate blood to all blood groups. **(1mk)**

2. Below is a diagram of a structure found in Eukaryotic cells? Study it and answer the questions that follow



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a) Identify the structure **(1Mk)**

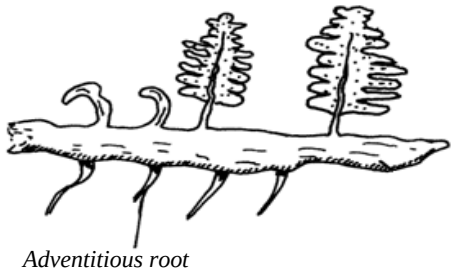
b) State **two** functions of the structure **(2Mks)**

c) (i) Name **one** organelle found in animal cells but absent in plant cells **(1Mk)**

ii) State **one** function of the organelle you have named in(c) above **(1Mk)**

d) Briefly **explain** cell biology as an evidence of evolution **(3Mks)**

3. Below is a diagram of a plant a form three student collected while carrying out an ecological study?



Adventitious root

(a) With reasons identify the division into which the students classified the plant.

Division **(1mk)**

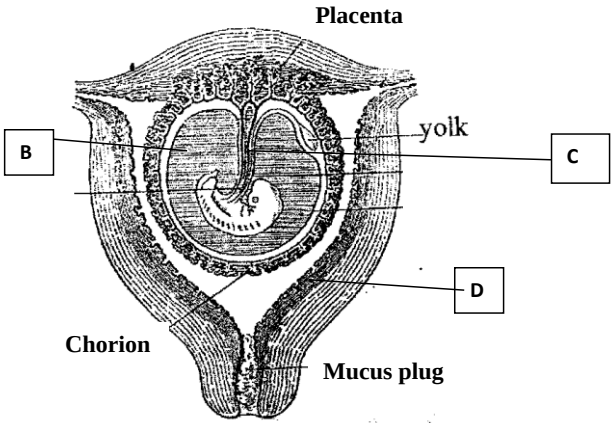
Reasons **(2Mks)**

b)(i) Name the structure that produces spores in this plant. **(1Mk)**

(ii) State **two** differences between the plant division above and that of the division *spermatophyta & Spermatophyte* **(2Mks)**

c) Give **two** distinguishing features of class *Amphibia* **(2Mks)**

4. The diagram below represents human foetus in a uterus.



a) Name the part labeled D. **(1Mk)**

b) i) Name the types of blood vessels found in the structure labeled C. **(2Mks)**

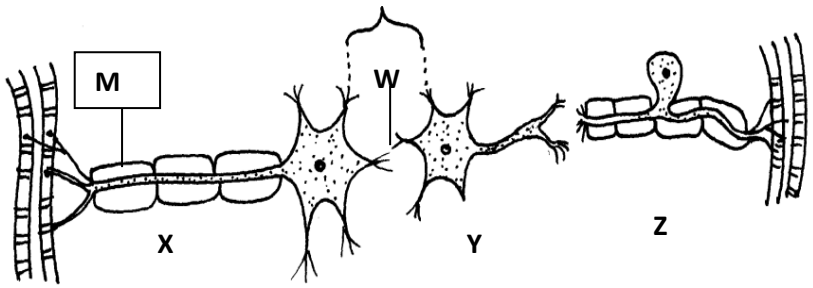
ii) State the differences in composition of blood found in the vessels named in (b) (i) above. **(2Mks)**

iii) State **two** importance of the fluid found in part B **(2Mks)**

iv) State the role of progesterone during pregnancy **(1Mk)**

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5. The diagram below represents three types of neurons found in a mammalian body.



(a) Name the neurons **X, Y** and **Z** **(3Mks)**

(b) Name the chemical substance responsible for the transmission of an impulse across the gap labelled **W**. **(1Mk)**

(c) State **two** functions of the part labelled **M**. **(2Mks)**

(d) In which part of the spinal cord is neurone **Y** located? **(1Mk)**

(e) Using arrows indicate on the diagrams the direction followed by nerve impulse leading to a response. **(1Mk)**

SECTION B (40MARKS)

6. During germination and growth of a cereal, the dry weight of endosperm, the embryo and total dry weight were determined at two – day intervals. The results are shown in the table below.

Time after planting(days)	Dry weight of endosperm	Dry weight of embryo (mg)	Total dry weight (mg)
0	43	2	45
2	40	2	42
4	33	7	40
6	20	17	37
8	10	25	35
10	6	33	39

a) Using the same axes, draw graphs of dry weigh of endosperm, embryo and the total dry weight against time **(8Mks)**

b) What was the dry weight of the endosperm and embryo on the **5th day?** **(2Mks)**

c) Account for:

i) Decrease in dry weight of endosperm from day 0 to 10 **(2Mks)**

ii) Increase in dry weight of embryo from day 0 day 10 **(2Mks)**

iii) Decrease in total dry weight from day 0 to day 8 **(2Mks)**

d) State the role of the following in germination **(2Mks)**

i) Glucose **ii)** Enzymes

e) How are the foliage leaves adapted to their function **(2Mks)**

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7 (a) Describe the role of hormones in blood sugar regulation **(10Mks)**

(b) Explain how halophytes are adapted to their habitat **(10Mks)**

8 (a) Explain the adaptations of thoracic, cervical and lumbar vertebrae to their functions **(12Mks)**

(b) Describe the structural factors affecting transpiration **(8Mks)**

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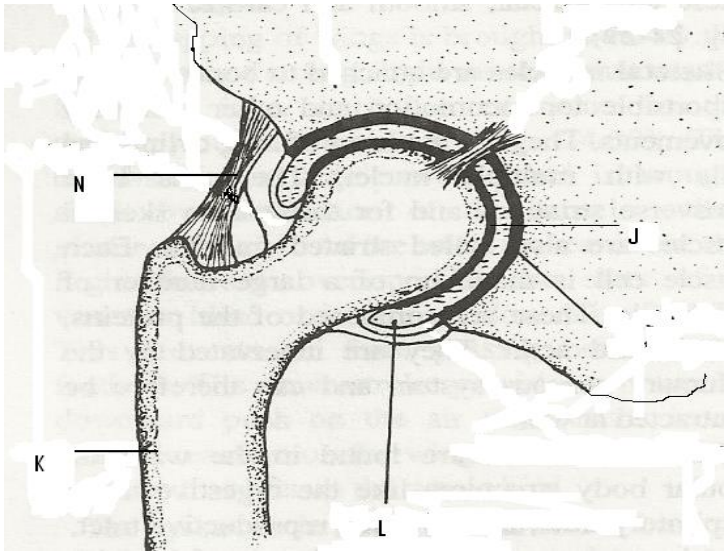
(a) State the kingdom in which the organism belongs. **(1Mk)**

(b) Name the parts labeled B & Y **(2Mks)**

(c) State the functions of the following parts A, X & Z **(3Mks)**

(d) Explain briefly why the organism is described as eukaryotic **(2Mks)**

3a) The diagram below shows some of the features of a synovial joint. Study the diagram carefully and answer the questions that follow.



i) Name the type of synovial joint. **(1Mk)**

ii) Name the parts labeled J, and L **(2Mks)**

iii) State **two** roles of the part labeled L**.** **(2Mks)**

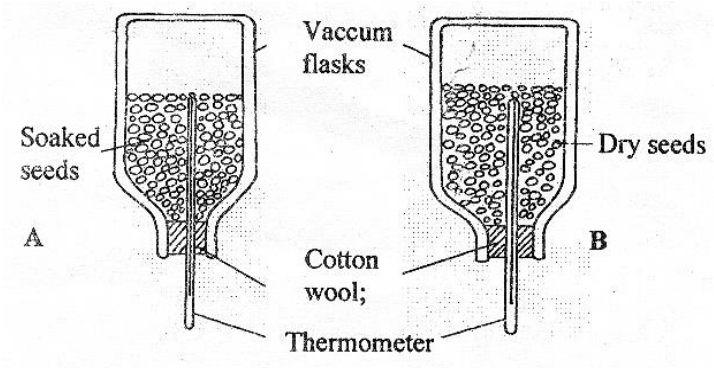
iv) Suggest **one** advantage of this type of joint. **(1Mk)**

b) State how the following tissues are adapted to provide mechanical support in plants **(2Mks)**

i) Parenchyma

ii) Collenchyma

4. A student set up an experiment using soaked and dry seeds as shown below



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a) State the objective of this experiment **(1mk)**

b) State the observations made in each of the flask after 24 hours **(2mks)**

c) Account for the observation made in (b) above **(2mks)**

d) Suggest why vacuum flasks were used in this experiment **(1mk)**

e) What alteration would you make in the set-up to make the results more reliable **(1mk)**

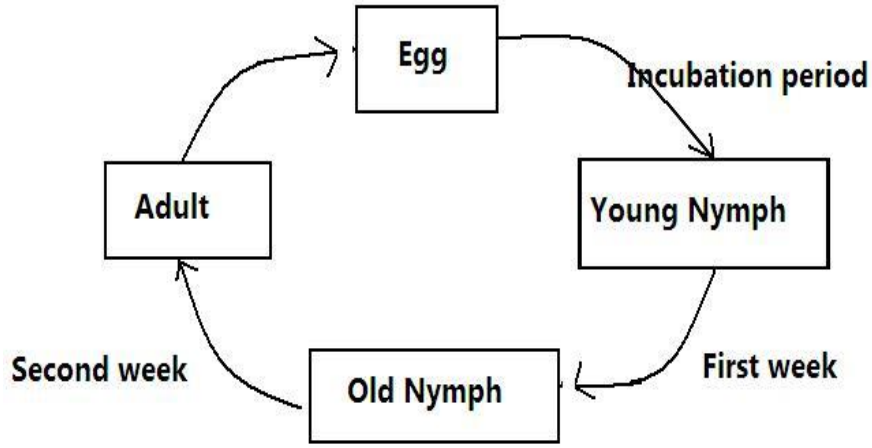
f) Why should the seeds be washed with antiseptic/10% formalin? **(1mk)**

5a) Explain how the following meristematic tissues contribute to growth of higher plants

i) Vascular cambium **(2mks)**

ii) Cork Cambium **(2mks)**

b) The diagram below shows a life cycle of a cockroach



a) Name the hormone that would be at high concentration during.

(i) First week **(1mk)**

(ii) Second week **(1mk)**

b) Name the structure that produces hormone in a (ii) above **(1mk)**

c) Name the series of stages through which the nymph undergoes to reach adult stage **(1mks)**

SECTION B (40 Marks)

6. The menstrual cycle is a sequence of events repeated monthly in the female production system. The table below shows the concentration of oestrogen and progesterone hormones and body temperatures of female against time.

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Time in days	Oestrogen mg/100cm of blood	Progesterone mg/100cm^3 of blood	Temperature in 0^oc
1	20	0	36.4
2	20.5	0	36.6
3	25	0	36.7
4	27.5	0	36.8
5	30	0	36.7
6	32.5	0	36.6
7	35	0	36.8
8	40	0	36.7
9	48	0	36.6
10	56	0	36.8
11	64	0	36.7
12	72	0	36.6
13	80	0	36.4
14	170	20	36.3
15	140	50	36.6
16	80	80	37.0
17	70	130	37.2
18	65	170	37.0
19	60	160	37.1
20	65	150	37.15
21	130	130	37.2
22	140	110	37.1
23	130	90	37.0
24	100	70	37.1
25	80	50	37.2
26	60	20	37.0
27	20	0	36.4

a). Using the same axis draw graphs of oestrogen and progesterone against time/days **(8mks)**

b) State the possible event taking place in the uterus during the first week? **(1Mk)**

c) State the events taking place in the ovary between day 1 and day 13. **(2Mks)**

d) Account for the sudden increase in the progesterone concentration between day 14 and day18. **(2Mks)**

e) Account for the change in temperature between day 14 and 17**.** **(1Mk)**

f) Account for the change of the curve of progesterone between day 19 and 27. **(2Mks)**

g) State the function of the following.

(i) Ovary **(1Mk)**

(ii) Progesterone **(1Mk)**

(iii) Oestrogen **(1Mk)**

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7 a) Describe how the following evidences support the theory of organic evolution: geographical distribution, fossil records and comparative anatomy **(10mks)**

b) Explain tropic responses in plants and their survival values **(10mks)**

8a) Describe the structural adaptations of mammalian heart to its Functions **(10mks)**

b) Explain the role of osmosis in organisms **(10mks)**

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K.C.S.E BLUEPRINT PREDICTION
QUESTION PAPER NO: 10

231/2
Biology
Paper 2 (Theory)
Time 2 hours

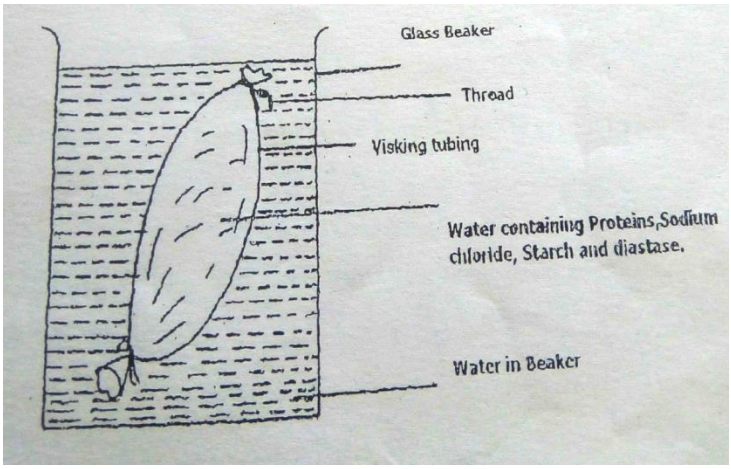
1. In a garden with plants of same species, 705 plants had red flowers while 224 had white flowers.

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 the heterozygous F1 offspring and a white flowered plant. **4mks**

ii) What is the genotype ratio from the cross in b(i) above? **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 – 40oc. The set uop was shown in the diagram below



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The following observations were made after the procedure 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 sodium hydroxide followed by copper sulphate solution to the solution, the colour changes to purple	On addition of sodium hydroxide followed by copper 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 turn 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 is moved into the water in the beaker from the visking tubing. **1mk**

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. **1mk**

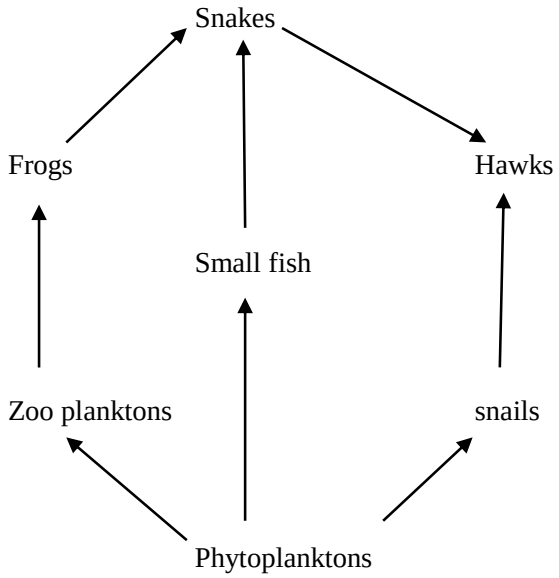
ii) Account f or the observation in b(i) above. **3mks**

c) i) Name the food substances 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 **1mk**

d) After one hour, the visking tubing was firm. State the term used to d escribe this state if it occurred in a plant cell. **1mk**

3. The diagram below represents a feeding relationship in an ecosystem.



a) Name the type of ecosystem represented by the above food web. **1mk**

b) Name the organism in the food web that:

i) Are producers **1mk**

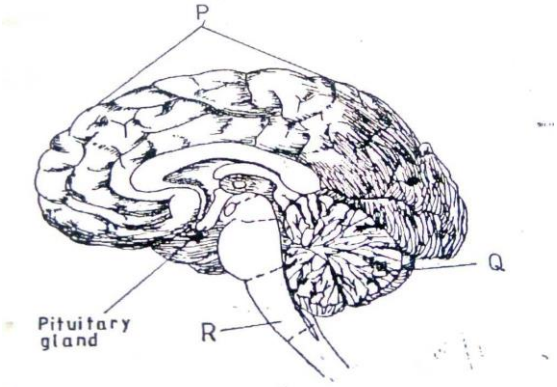
ii) Occupies the highest trophic level **1mk**

c) i) Write a food chain that ends with the hawk as quaternary consumer. **1mk**

ii) State two short term effects on the above ecosystem if all the small fish were killed. **2mks**

d) State two ways in which oil spills lead to death of fish. **2mks**

4. The diagram below represents a section of the human brain.



i) Name the structures labelled P And Q. **2mks**

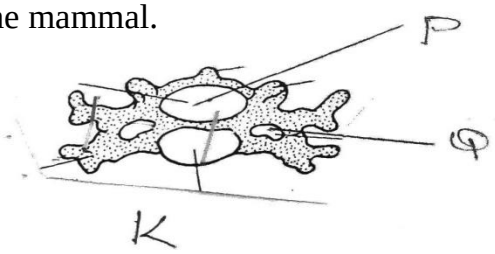
ii) State two functions of the part labelled R **2mks**

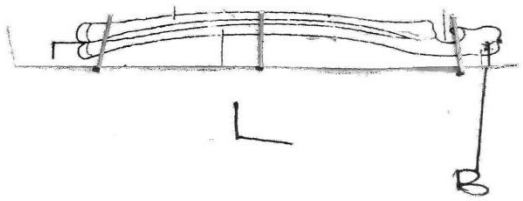
b) i) Name two productive hormones secreted by t he pituitary gland in women. **2mks**

ii) State one function of each of the hormone named in (b) (i) above. **2mks**

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5. The diagrams below represent the photographs of two bones labelled K and L obtained from the same mammal.





a) Identify the bone labelled K. **1mk**

b) i) Name the parts labelled P and Q. **2mks**

ii) State the function of the part labelled Q. **1mk**

c) i) Identify the bone that articulates with bone at the proximal end. **1mk**

ii) Name the type of joint formed at the proximal end by bone L. **1mk**

SECTION B: (40 Marks)

6. In an experiment to investigate certain processes in a given plant species, the rates 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 (mm3/min)	10	43	69	91	91	50	18	0	0	0
Volume of carbon (iv) oxide released (mm3/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 consumsed. **1mk**

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

c) Account for the shape of the curve for:

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

ii) Carbon (iv) oxide released. **3mks**

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

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

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

7.a) Describe the mechanism of urine formation in the kidney. **10mks**

b) Explain how the human skin brings about cooling of the body on a hot day. **10mks**

8.a) How are flowers adapted to pollination by insects. **10mks**

b) Describe the process of fertilization in flowering plants. **10mks**

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