

NAME..... INDEX NO.....

231/2  
BIOLOGY  
PAPER 2  
TIME: 2 HOURS

## **2012 PROJECTIONS-001**

### **Kenya Certificate Of Secondary Education**

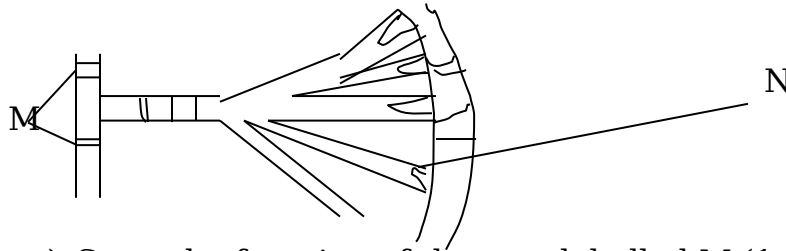
#### INSTRUCTIONS TO CANDIDATES

1. This paper consists of two sections A & AB
2. Answer ALL the questions in section A in the spaces provided.
3. In section B answer question 6 (Compulsory) and either question 7 or 8 in spaces provided.

#### **FOR EXAMINERS USE ONLY**

| NOS   | MARK<br>S | SCORE |
|-------|-----------|-------|
| 1     | 8         |       |
| 2     | 8         |       |
| 3     | 8         |       |
| 4     | 8         |       |
| 5     | 8         |       |
| 6     | 20        |       |
| 7     | 20        |       |
| 8     | 20        |       |
| TOTAL | 80        |       |

1. The diagram below represent part of a cockroach gaseous exchange system.



- a) State the function of the part labelled M (1 mark)

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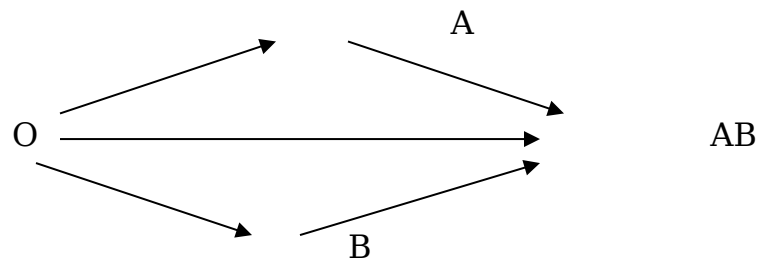
- b) Suggest how the part N is adapted for gaseous

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- c) How does the movement of oxygen in an insect and mammals from atmosphere to the tissue of the body differ. (4 marks)

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2. The flow chart below shows blood transfusion pathway



- a) What five conclusions can you draw from the flow chart? (5 marks)

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

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c) Apart from knowledge of blood groups state two precautions that must be observed during blood transfusion. (2 marks)

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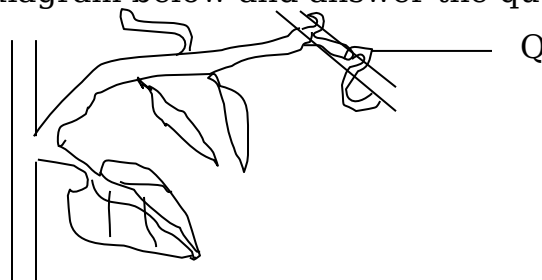
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3. Study the diagram below and answer the questions that follow.



a) Identify the part labelled Q. (1 mark)

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

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

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

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

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4. The genetic disorder haemophilia is due to a recessive sex linked gene. A man who is haemophilia married a woman who is a carrier for the condition.

a) Using the letter (H) to represent the normal condition and (h) for the haemophiliac condition.

(i) What is the genotype of the man and woman? (2 marks)

Man.....

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Woman.....

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(ii) Work out a cross between the man and woman. (3 marks)

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b) What is the chance that both the first and second sons will be haemophiliac? (2 marks)

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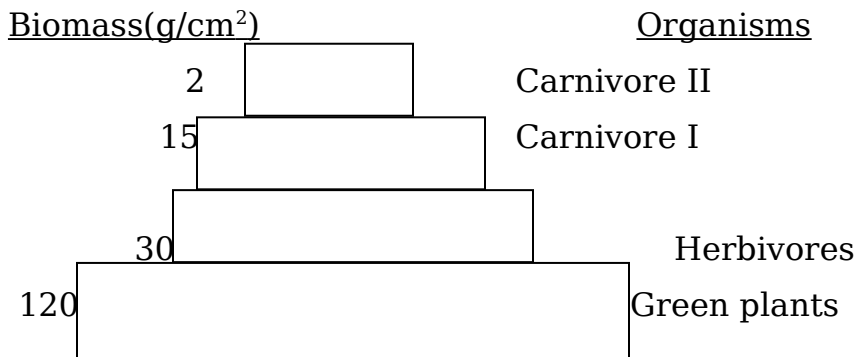
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c) Hemophilia is more common in males than in female humans. Explain. (1 mark)

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5. The diagram below shows different groups of organisms and their biomass.



a) Define the term biomass. (2 marks)

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b) Account for the decrease in biomass in the successive group of organisms. (3 marks)

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- .....
- c) Describe how energy from the sun is made available for  
Carnivore II (3 marks)
- .....
- .....
- .....

**SECTION B(40 MARKS)**

Answer question 6 (Compulsory) and either question 7 or 8 in the spaces provided.

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.

| Time in days | Oestrogen<br>mg/100cm of<br>blood | Progesterone<br>mg/100cm <sup>3</sup> of<br>blood | Temperature in<br>0°C |
|--------------|-----------------------------------|---------------------------------------------------|-----------------------|
| 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)

(8 marks)

b) State the possible event taking place in the uterus during the first week?

(1 mark)

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c) State the events taking place in the ovary between day 1 and day 13.

(2 marks)

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d) Account for the sudden increase in the progesterone concentration between day 14 and day 18.

(2 marks)

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e)Account for the change in temperature between day 14 and 17.

(1 mark)

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f)Account for the change of the curve of progesterone between day 19 and 27.

(2 marks)

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d) State the function of the following.

- (i) Ovary  
(1 mark)

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- (ii) Progesterone  
(1 mark)

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- (iii) Oestrogen  
(1 mark)

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7. Describe how xerophytic plants are structurally adapted to their habitat.

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8. (i) Blood has two broad functions namely protective and transport.

Describe how the blood protects the body.

(4 marks)

(ii) Describe the structural adaptation of the mammalian heart to its function. (16 marks)

NAME.....INDEX NO.....  
SCHOOL..... SIGNATURE.....

DATE.....

231/2

BIOLOGY

PAPER 2

2 HOURS

## **2012 PROJECTIONS-002**

### **Kenya Certificate Of Secondary Education**

#### **INSTRUCTION TO CANDIDATES:**

- Write your name and index number in the spaces provided at the top of this page. Sign and write the date of examination in the spaces provided
- Answer all questions in section A.
- Answer question 6 in section B and then answer either question 7 or 8
- Answers must be written in the spaces provided in the question paper. Additional paper **must not** be inserted.

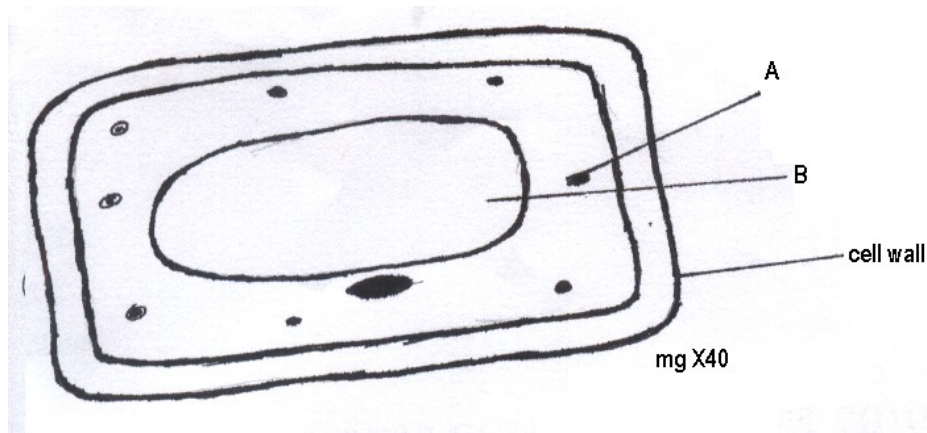
#### **FOR EXAMINERS USE ONLY**

| QUESTION | MAX SCORE | CANDIDATE'S<br>SCORE |
|----------|-----------|----------------------|
| 1-5      | 40        |                      |
| 6        | 20        |                      |
| 7        | 20        |                      |
| 8        | 20        |                      |

### **SECTION A**

**Answer all the questions in this section in the spaces provided**

1. The figure below is a diagram of a cell as seen under the light microscope.  
The microscope's eye piece lens had a magnification of x10



- (i) Name three structure that show that this is a plant cell and not an animal cell

(3mks)

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- (ii) Name one chemical compound that is only found in the structure labeled A and state its function.

(2mks)

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(iii) A plant growing in a waterlogged soil was found to have stunted growth and yellowing of leaves. Explain (3mks)

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2. The table below shows approximate percent concentration of various components in blood plasma entering the kidney glomerulus's filtrate and urine of a healthy human being.

| component       | plasma | Glomerular filtrate | urine |
|-----------------|--------|---------------------|-------|
| Water           | 90     | 90                  | 94    |
| Glucose         | 0.1    | 0.1                 | 0     |
| Amino acid      | 0.05   | 0.05                | 0     |
| Plasma proteins | 8.0    | 0                   | 0     |
| Urea            | 0.03   | 0.03                | 2.0   |
| Inorganic ions  | 0.72   | 0.72                | 1.5   |

(i) Name the process responsible for the formation of glomerular filtrate. (1mk)

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(ii) Explain why there are no plasma proteins in the glomerular filtrate.  
(2mks)

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(iii) Why is the concentration of urea in urine much higher than its  
concentration in the glomerular filtrate.

(2mks)

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(iv) Apart from plasma proteins, name other major component of blood  
that is absent in the glomerular filtrate.

(1mk)

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(v) Name the process that is responsible for the absence of glucose and  
amino acids in urine.

(1mk)

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(VI) Glucose was detected in the urine sample from a patient. Explain what would have been the cause of this condition.

(1mk)

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3. If the coleoptile of an oat seedling is exposed to light coming from one side, it bends towards the light.

(a) What term is used to describe this response.

(1mk)

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(b) Which hormone is involved in bringing about this response.

(1mk)

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(c) What is the effect of light on this hormone.

(1mk)

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(d) What would be the effect (if any) of cutting off the tip of the coleoptile and exposing the remaining portion to light from one direction.

(2mks)

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(e) How is a reflex action in man different from a tropism in a plant?

(1mk)

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(f) Give the significance of the two named responses in (e) above in organism.  
(2mks)

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4. Drosophila melanogaster (fruit fly) is an insect with complete metamorphosis. The time between mating and emergence of adults in this fly is nine days. The adult is capable of mating after eight hours from the time it emerges from the pupa. In this fly white eye is recessive to red eye. The gene for eye colour is sex – linked. If you are given a sample of each type for the purpose of carrying out breeding experiments, one of the things to do would be obtain unmated females. Sex determination in a fruit fly is similar to that in man.

(a) (i) How would you obtain unmated flies from the sample flies.  
(2mks)

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(ii) How would you verify experimentally that the flies you obtained in (a) (i) above were all unmated.

(2mks)

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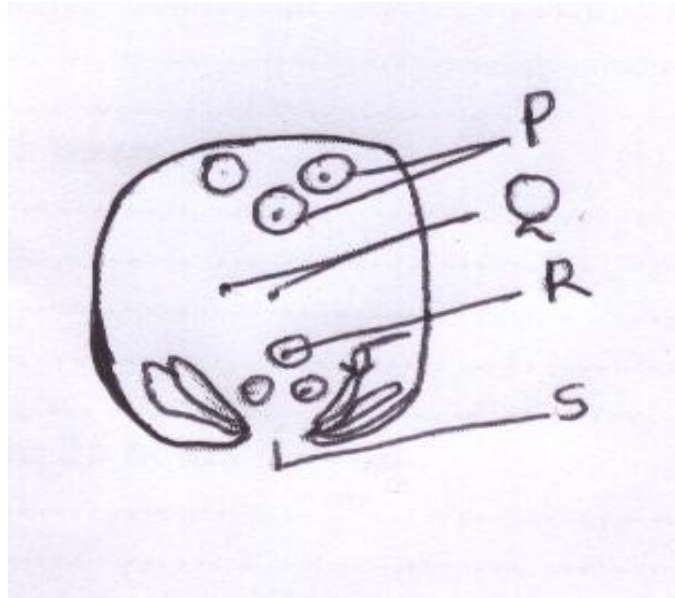
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(b) If heterozygous red eyed female were crossed with a white eyed male, what would be the eye colour of their off springs and in what proportions? (Show how you arrive at your answer)

Let **R** represent gene for red eye colour and **r** to represent gene for white eyes

(4mks)

5. The diagram below shows mature embryo sac



(a) Label the parts P, Q, R and S

(4mks)

P.....

Q.....

R.....

S.....

(b) Insects and wind are both agents of pollination. Giving a reason suggest which one of the two is more efficient.

(2mks)

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(c) Briefly explain how stigma in wind pollinated flower is adapted to pollination  
(2mks)

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**SECTION B (40 MARKS)**

**Answer question 6 (compulsory) in the spaces provided and either question 7 or 8 in the spaces provided after question 8.**

6. A culture of bacteria was incubated in nutrient agar at 35<sup>o</sup>c. Samples were taken at 5 hours intervals in order to estimate the number of bacteria in the population.

The data obtained is shown below.

|                                   |    |    |     |     |     |     |    |    |    |    |
|-----------------------------------|----|----|-----|-----|-----|-----|----|----|----|----|
| Time in hours                     | 0  | 5  | 10  | 15  | 20  | 25  | 30 | 35 | 40 | 45 |
| Number of living cells (millions) | 15 | 25 | 750 | 100 | 100 | 100 | 80 | 50 | 25 | 5  |
|                                   |    |    |     | 0   | 0   | 0   | 0  | 0  | 0  | 0  |

(a) On the grid provided, plot a graph of number of living cells (millions) against time in hours.  
(6mks)

(b) Account for the shape of the graph between

(i) 0 to 5 hours.

(3mks)

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(ii) 5 hours to 15 hours.

(4mks)

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(iii) 15 hours to 25 hours.

(2mks)

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(c) (i) Suggest what would happen to the population of the bacteria if the temperature was lowered to 0°C after incubating for 12 hours.

(1mk)

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(ii) Give a reason for your answer in c (i) above .

(1mk)

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(d) Give three reasons why it is important to control human population growth in Kenya

(3mks)

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7. Trace the path followed by a molecule of glucose from the time of absorption in the ileum until it enters a muscle cell in the leg.  
(20mks)

8. (a) Describe causes and effects of water pollution.  
(10mks)

(b) Describe the various control measures for water borne diseases.  
(10mks)

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Name \_\_\_\_\_

Index No: \_\_\_\_\_

**231/2**  
**BIOLOGY**  
**THEORY**  
**PAPER 2**  
**2 HOURS**

**2012 PROJECTIONS-003**

**Kenya Certificate Of Secondary**

**Education**

**INSTRUCTION TO CANDIDATES**

Write your name and index number in the spaces provided.

This paper consists of two sections A and B.

Answer all the questions in section A in the spaces provided

In section B answer question 6 (compulsory) and either question 7 or 8 in the spaces provided.

For Examiners use only.

| Section | Question    | Maximum score | Candidates score |
|---------|-------------|---------------|------------------|
| A       | 1           | 8             |                  |
|         | 2           | 8             |                  |
|         | 3           | 8             |                  |
|         | 4           | 8             |                  |
|         | 5           | 8             |                  |
| B       | 6           | 20            |                  |
|         | 7           | 20            |                  |
|         | 8           | 20            |                  |
|         | Total score | 80            |                  |

*This paper consist of 9 printed pages*

*Please Turn Over*

### **SECTION A**

**Answer all the questions in the spaces provided**

1. The diagram below represents the structure of the mammalian heart. Study it and answer the

questions that follow.

D C E M B A F

(a) Name part marked  
(3mks)

A

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B

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C

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(b) What is the role of the part marked B in mammalian circulation  
(1mk)

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F (c) State one structural difference between the blood vessels marked E and  
(1mk)

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<sup>2</sup>  
(d) Briefly describe systematic circulation  
(2mks)

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2. A red cow was mated with a white bull. All the F<sub>1</sub> were neither red nor white. Such individuals are said to be roan.

(a) Using letter R to represent the gene for red colour and W to represent the gene for the white colour, workout the genotypes of the F<sub>2</sub> offsprings when F<sub>1</sub> were mated. (4mks)

[illegible]

(c) Suggest a reason why the F1 were all roan

(1mk)

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(d) State the importance of a test cross?

(1mk)

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3. The diagram below represents the internal structure of a leaf. Study it and answer the questions that follow.

A B C D E

(a) Name the parts marked A and E  
(2mks)

A

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E

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(b) State the roles of parts marked B and C in plant nutrition  
(2mks)

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(c) Briefly describe the process of gaseous exchange between part marked  
D and the cells during the day  
(4mks)

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4. The diagram below represents a section of the mammalian ear.  
A B C Oval window Auditory canal Ear drum

(a) Name the parts marked  
A

(3mks)

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B

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C

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(b) State how the eardrum is adapted to its function

(1mk)

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(c) Briefly describe the transmission of sound waves from auditory canal to  
oval window

(4mks)

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

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(b) Name the hormone associated with apical dominance.

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(c) What is the importance of apical dominance?

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(d) Briefly describe the effects of the following plant growth hormones  
(i) Gibberellins (2mks)

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(ii) Absciscic Acid (3mks)

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### **SECTION B (40 MARKS)**

**Answer questions 6 (compulsory) and either question 7 or 8 in the spaces provided.**

6. Students investigated a certain physiological process using beans treated as described below

Set up 1 - Beans soaked in water and introduced into a vacuum flask

Set up 2 - Boiled beans were introduced into a vacuum flask.

Set up 3 - Boiled beans washed in antiseptic solution

Thermometers were used to measure temperature changes. It was observed that there was no

temperature change in set up 3. The results of set up 1 and 2 shown in the table below.

| Time (days) | Temperature (0c) |          |
|-------------|------------------|----------|
|             | Set up 1         | Set up 2 |
| 0           | 15               | 15       |
| 1           | 20               | 15       |
| 2           | 25               | 16       |
| 3           | 28               | 18       |
| 4           | 30               | 19       |
| 5           | 28               | 20       |
| 6           | 25               | 25       |
| 7           | 22               | 28       |
| 8           | 20               | 30       |
| 9           | 18               | 32       |

(a) Plot graphs on the same axis of temperature change against time (7mks)

(b) Account for the temperature change observed in set up 1 and 2

(i) From day zero to day two (4mks)

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(ii) After day five

(4mks)

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(c) Explain the observation for the physiological process taking place in set up 3 (2mk)

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(d) Write a word equation for the physiological process taking place in set up 1 (1mk)

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(e) The respiratory quotient of fat is 0.7 and that of carbohydrate is 1  
1. Explain the difference  
(2mks)

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

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NAME ..... DATE  
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INDEX NO. .... CANDIDATE'S SIGNATURE  
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231/2  
BIOLOGY  
PAPER 2  
(THEORY)

TIME : 1½ HOURS.

## **2012 PROJECTIONS-004**

### **Kenya Certificate Of Secondary Education**

#### **INSTRUCTIONS TO CANDIDATES**

- o Write your name and index number in spaces provided above.
- o Sign and write the date.
- o This paper consists of two sections; **A** and **B**. Answer **ALL** the questions in section A in the spaces provided.
- o In section **B** answer Question **7 (compulsory)** and either question **8 or 9** in the spaces provided.
- o Additional pages must not be inserted.

#### **FOR EXAMINER'S USE ONLY**

| QUESTION | MAXIMUM SCORE | CANDIDATE'S SCORE |
|----------|---------------|-------------------|
| 1        | 5             |                   |
| 2        | 8             |                   |
| 3        | 6             |                   |
| 4        | 8             |                   |
| 5        | 8             |                   |
| 6        | 5             |                   |
| 7        | 20            |                   |
| 8        | 20            |                   |
| 9        | 20            |                   |
| TOTAL    | 80            |                   |

|       |  |  |
|-------|--|--|
| SCORE |  |  |
|-------|--|--|

***This paper consists of 10 printed pages.  
Candidates should check to ensure that all pages are printed as indicated and  
no questions are missing***

### **SECTION A: (40 MARKS)**

**Answer all the questions in this section**

1. (a) Apart from avoiding overcrowding give two other benefits of seed dispersal. 1 mark

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- (b) State **two** ways through which overcrowding disadvantages plants process of photosynthesis.

2 marks

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- (c) List **two** mineral elements necessary for chlorophyll formation.

2 marks

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2. A woman whose blood group is O gives birth to a son whose blood group is A and a daughter whose blood group is B

a. (i) State the possible genotype of the father.

1 mark

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(ii) Using a punnet square work out the genotypes of the offsprings.

3 marks

b. (i) If the mother is rhesus positive and the father is rhesus negative what condition is the child likely to develop? 1 mark

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(ii) How can the condition be controlled?

1

mark

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- c. Explain why the second born child is at risk of death that the first born child if no precaution is taken

2 marks

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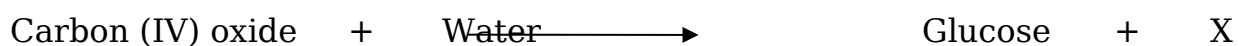
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3. The equation below shows a chemical reaction that takes place in green plants under certain conditions.



- (a) What is the name of substance X ?

1 mark

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- (b) Other than the reagents, state **two** conditions necessary for this reaction

2 marks

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- (c) Name **two** types of cells in which this process occurs

2 marks

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- (d) Name the process represented by the equation given above

1 mark

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- .....
4. The table below gives information about an aquarium community which is ecologically balanced;

| Type of organism | Weight in grammes |
|------------------|-------------------|
| Insect larva     | 500gms            |
| Fishes           | 1200gms           |
| Water plants     | 5000gms           |
| Bacteria         | 10gms             |

- a. What do you understand by the term ecological balance?

1 mark

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- b. Calculate the total biomass of the aquarium.

2 marks

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c. Which organism in the table is

(i) Primary producer?

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(ii) Secondary consumer?

2

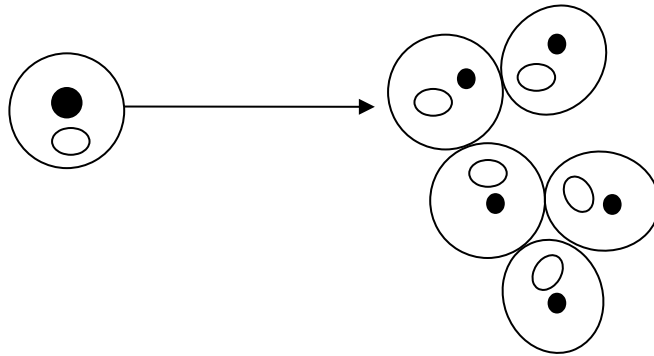
marks

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d. Construct a food web of the aquarium

3 marks

5. The diagram below represents a process in a given special of organisms;



(a)(i) Name the organism.

1

mark

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(ii) Identify the process that is shown to be taking place.

1 mark

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(iii) State the economic importance of organisms found in the kingdom  
which the organisms shown  
above belong.

2

marks

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(b)(i) Define the term species.

2

marks

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(ii) State **two** principals of binomial nomenclature.

2 marks

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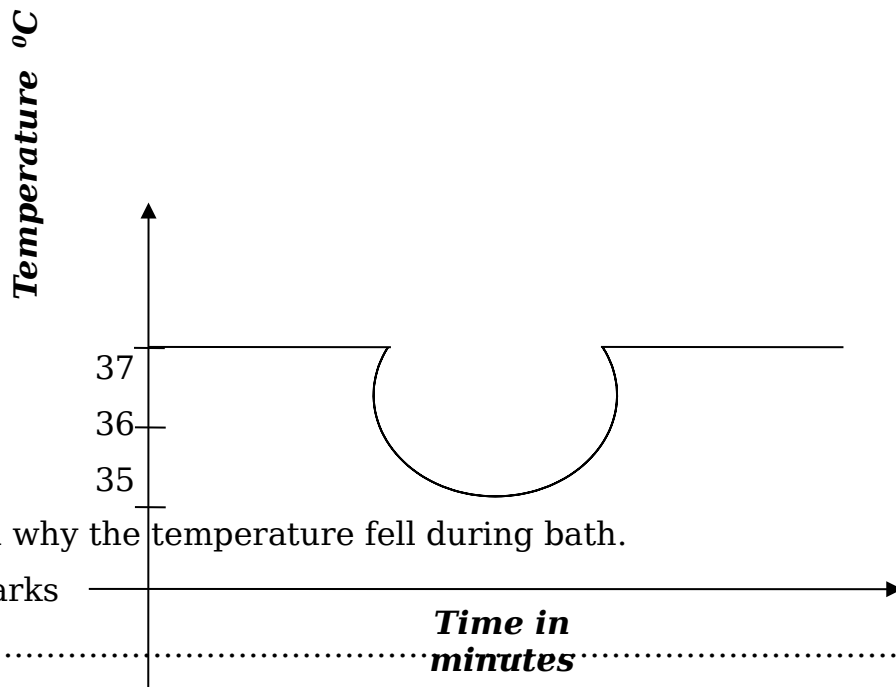
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6. The temperature of a person was taken before, during and after taking a cold bath. The results are as shown in the graph below.



(a) Explain why the temperature fell during bath.

2 marks

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(b) What changes occurred in the skin that enabled the body temperature to return to normal.

3

marks

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**SECTION B. (40 MARKS)**

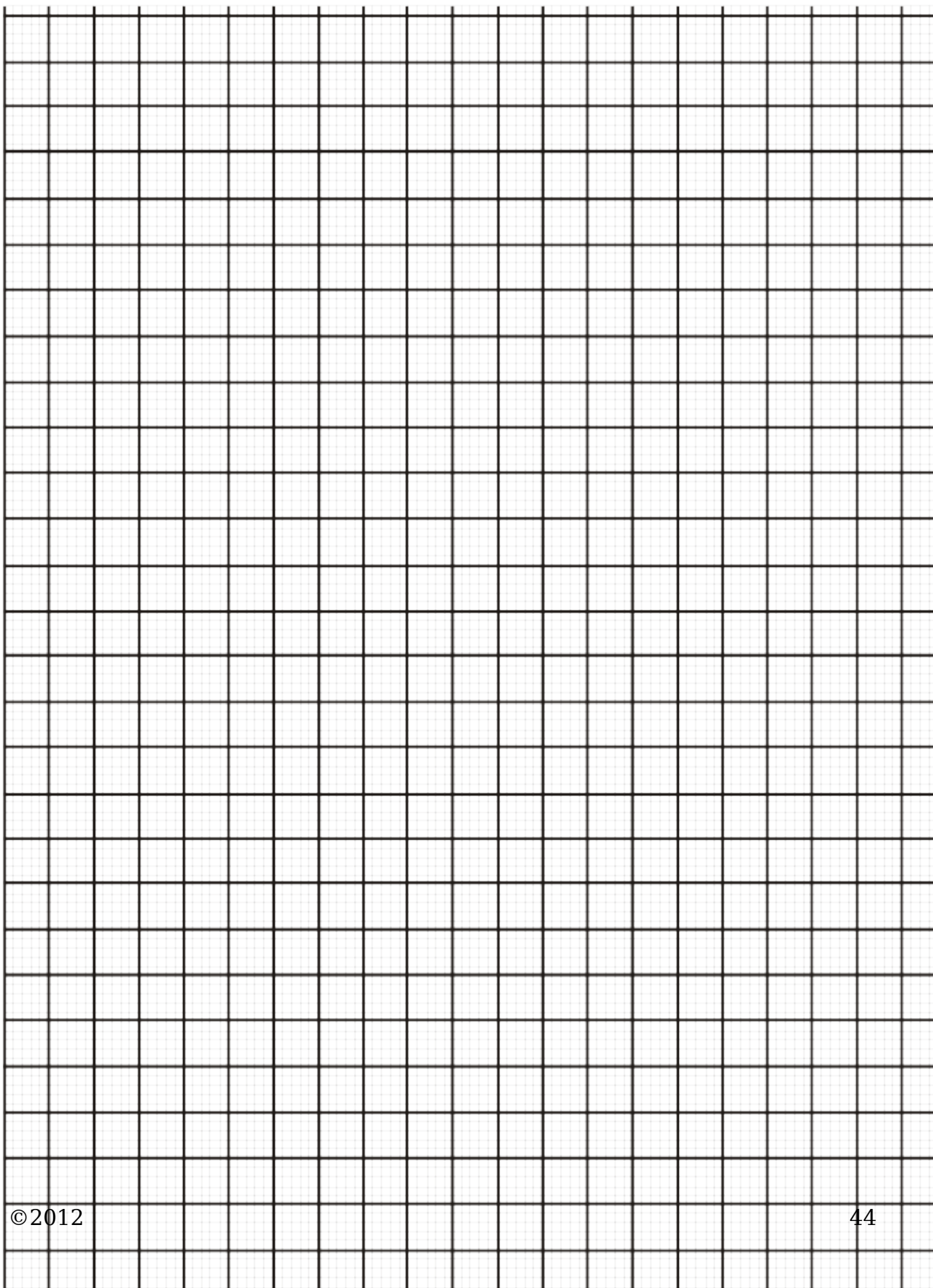
**Question 7 is compulsory.**

**Choose either question 8 or 9 and answer them in the spaces provided**

7. 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 released 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 <sub>2</sub> consumption<br>mm <sup>3</sup> /min | 0  | 43 | 69 | 91 | 91 | 50 | 18 | 0  | 0  | 0  |
| Co <sub>2</sub> release mm <sup>3</sup> /min        | 38 | 22 | 10 | 3  | 3  | 6  | 31 | 48 | 48 | 48 |

- (a) On the same axis on the grid provided plot graphs of volume of Co<sub>2</sub> consumed and released against time  
7 marks



|                                |   |
|--------------------------------|---|
| a. CO <sub>2</sub> consumption | 1 |
| mark                           |   |

b. CO<sub>2</sub> release 1 mark

(c) Account for the shape of the curve for

|                                |   |
|--------------------------------|---|
| a. CO <sub>2</sub> consumption | 3 |
| marks                          |   |

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b. CO<sub>2</sub> release 3 marks

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(d)(i) From the graph state the time of the day when the plant attains the compensation point.      1 mark

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(ii)    What is meant by compensation point?      2 marks

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(e) Explain how temperature affects the rate of CO<sub>2</sub> consumption in a plant.      2 marks

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[illegible]



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9. Describe the adaptations of the ileum to its function  
20 marks

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**BIOLOGY  
(THEORY)**

**PAPER2**

**Time: 2 Hours**

## **2012 PROJECTIONS-005**

### **Kenya Certificate Of Secondary Education**

#### ***INSTRUCTIONS TO CANDIDATES***

- This paper consists of two sections A and B.
- answer all questions in Section A in the spaces provided
- in section B answer question 6 (compulsory) and either question 7 or 8 in the spaces provided after question 8

#### **FOR EXAMINERS USE ONLY**

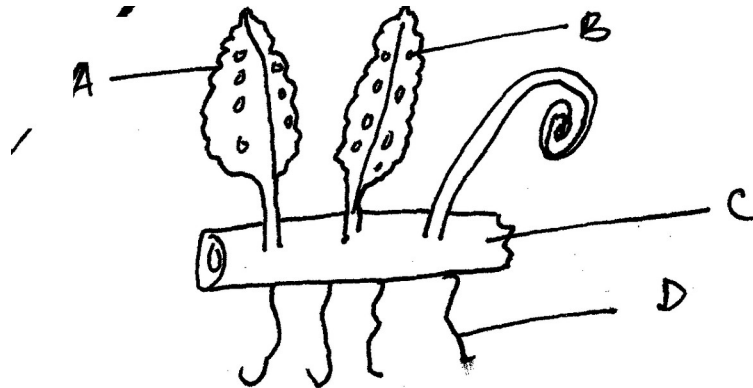
| <b>SECTION</b> | <b>QUESTION</b> | <b>Max Score</b> | <b>Candidate Score</b> |
|----------------|-----------------|------------------|------------------------|
| A              | 1               | 8                |                        |
|                | 2               | 8                |                        |
|                | 3               | 8                |                        |
|                | 4               | 8                |                        |
|                | 5               | 8                |                        |
| B              | 6               | 20               |                        |
|                | 7 or 8          | 20               |                        |
|                | TOTAL           | 80               |                        |

***This paper consists of 12 printed pages.  
Candidates should check the question paper to ensure that all pages are printed as indicated  
and no questions are missing***

**SECTION A**

***Answer ALL the questions in this section.***

1. The diagram below represents a fern plant.



- a) Name the parts labeled A, C and D

(3mks)

A .....

C .....

D .....

- b) What is the function of structure B?

(1mk)

.....

- i) Name the kingdom to which the fern belongs to

(1mk)

.....

- ii) List down THREE characteristics of members of the kingdom named in c (i) above

(3mks)

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2. Colour blindness is a sex-linked genetic disorder due to a recessive gene. A man who is colour blind marries a woman who is a carrier for the condition.

a) Using letter 'C' to represent the normal condition and 'c' for colour blind condition

i) What is the genotype of the man and the woman?

(2mks)

Man:

.....

Woman: .....

ii) Work out a cross between the man and the woman above

(3mks)

b) What is the probability of the couple getting

i) A colour blind son? ..... (1mk)

ii) A carrier daughter ..... (1mk)

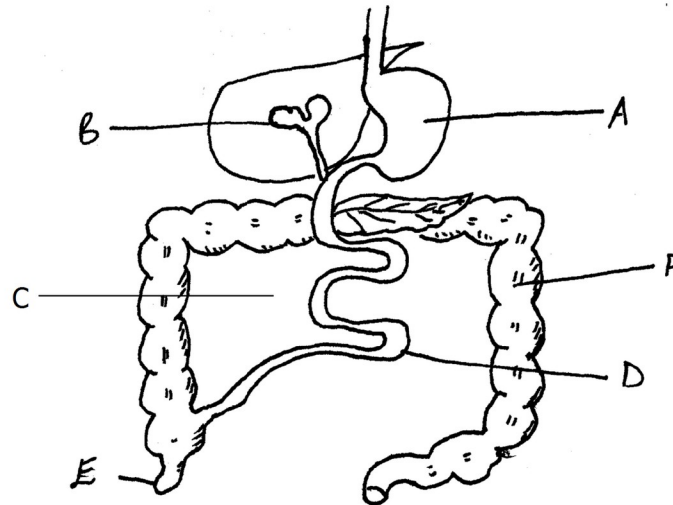
c) Why is colour blindness more common in males than in females

(1mk)

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3. The diagram below shows part of alimentary canal



a) What substances are absorbed at part labeled F  
(1mk)

b) State two functions of the substance stored in B  
(1mk)

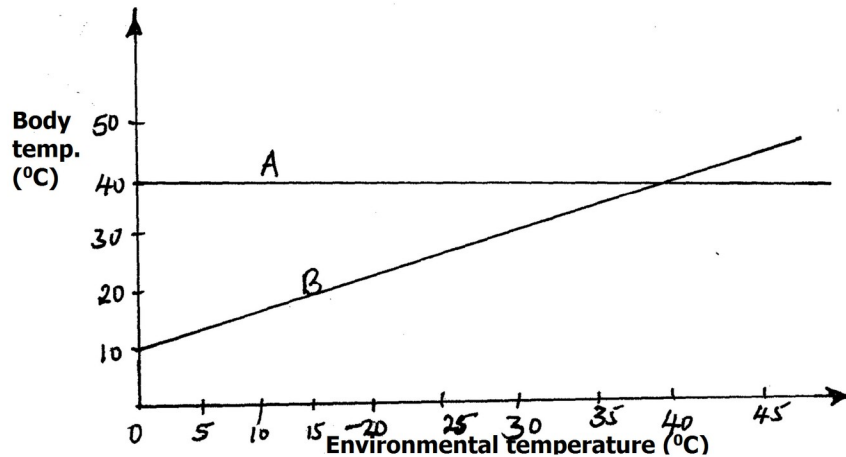
c) Name the enzyme that digest proteins in structure labeled C  
(1mk)

d) State two adaptations of the structure D that causes the increase of surface area (2mks)

e) Name structure E  
(1mk)

f) Name the enzyme that digests polysaccharide in the caecum of rabbit.  
(1mk)

4. The body temperature of man and a lizard were taken over the increase in environmental temperature. The results are shown in the diagram below



a) Name the graph that represents

i) Man .....

(1mk)

ii) Lizard .....

(1mk)

b) Explain why the temperature of graph B increase with increase in environmental temperature

(3mks)

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c) Name the sense organ in man that control body temperature.

(1mk)

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d) List two physiological processes in man that can lead to heat loss

(2mks)

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5. The table below gives information about an aquarium community which is ecologically balanced.

| Type of organism | Dry weight in grammes |
|------------------|-----------------------|
| Insect larvae    | 500                   |
| Fish             | 5000                  |
| Water plants     | 50000                 |
| Bacteria         | 10                    |

a) i) What do you understand by the term ecologically balanced

(1mk)

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ii) Calculate the total biomass of the aquarium  
(2mks)

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b) Draw a possible of biomas for the aquarium. (2mks)

c) i) Name the organism that would be least affected if water plants  
were removed from the aquarium  
(1mk)

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ii) Explain how excessive use of pesticides may affect soil fertility.  
(2mks)

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**SECTION B**

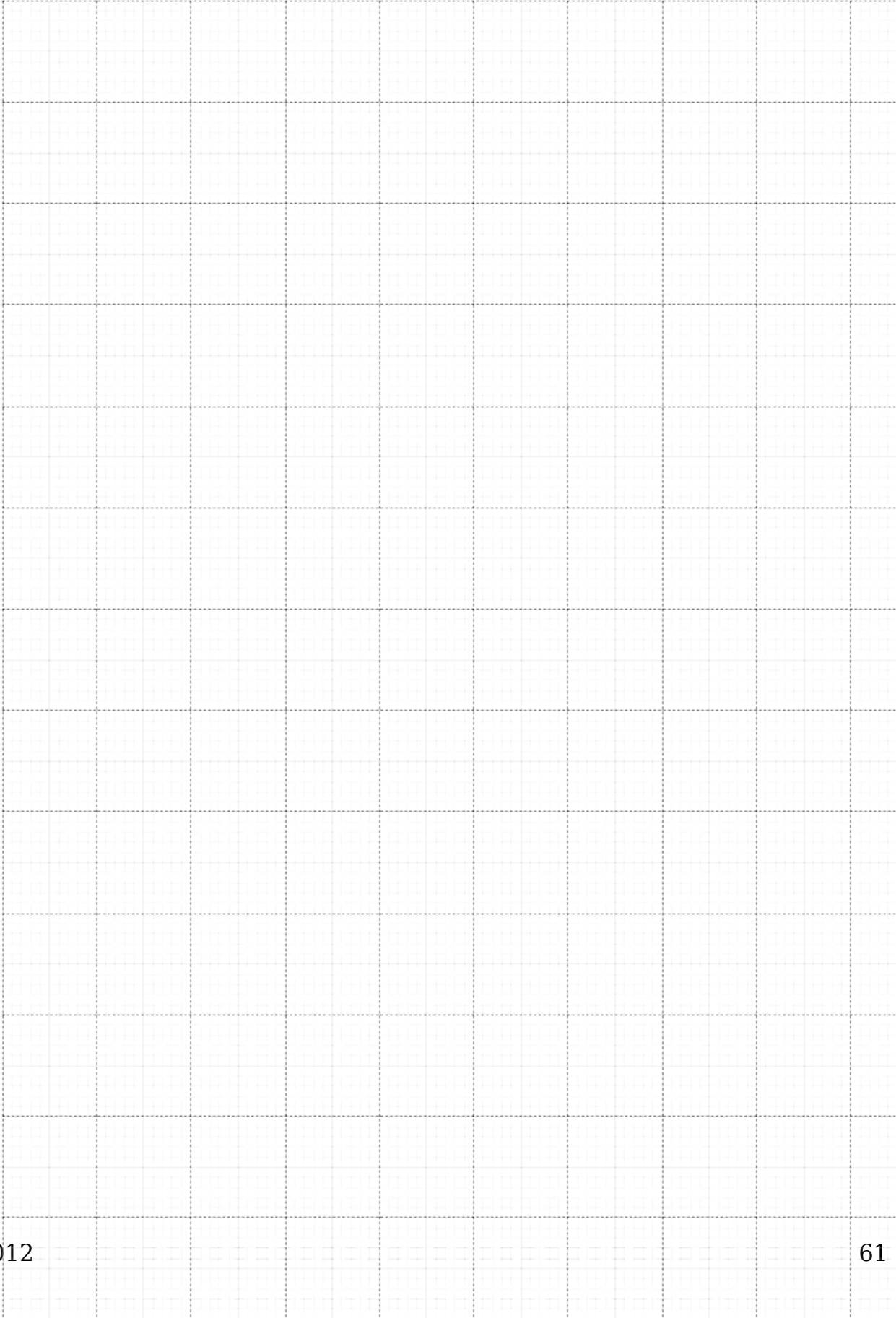
**Answer question 6 (Compulsory) and either question 7 or 8**

6. Two sets of a pea seeds were germinated set A was placed in normal daylight conditions in the laboratory while set B was placed in a dark cupboard. Starting a few days later the shoots lengths were measured twice daily and their mean lengths are shown in the table below.

|               |   |    |    |    |    |    |    |    |
|---------------|---|----|----|----|----|----|----|----|
| Time in hours | 0 | 12 | 24 | 36 | 48 | 60 | 72 | 84 |
|---------------|---|----|----|----|----|----|----|----|

|                      |    |    |    |    |    |    |    |    |
|----------------------|----|----|----|----|----|----|----|----|
| Set A length<br>(mm) | 12 | 14 | 20 | 23 | 28 | 31 | 47 | 54 |
| Set B length<br>(mm) | 17 | 23 | 28 | 35 | 48 | 62 | 80 | 94 |

- a) Using the above data, plot these figures on a graph paper showing growth curves of the tow sets of seedlings against time  
(8mks)



b) From the graph state the mean shoot length of each set of seedling at the 66<sup>th</sup> hour. (2mks)

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c) Account for the difference of curve B and A  
(3mks)

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d) Explain what would happen to set up B if it were allowed to continue to grow under conditions of darkness  
(4mks)

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e) State three external conditions which should be constant for both set  
ups (3mks)

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7. Describe the functions of various parts of the mammalian heart  
(20mks)

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

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BIOLOGY

PAPER 2

Time: 2 Hours

**2012 PROJECTIONS-006**  
**Kenya Certificate Of Secondary**  
**Education**

***INSTRUCTIONS TO CANDIDATES***

- Answer ALL the question.

**FOR EXAMINERS USE ONLY**

| SECTION | QUESTION     | Max Score | Candidate Score |
|---------|--------------|-----------|-----------------|
| A       | 1            | 8         |                 |
|         | 2            | 8         |                 |
|         | 3            | 8         |                 |
|         | 4            | 8         |                 |
|         | 5            | 8         |                 |
| B       | 6            | 20        |                 |
|         | 7            | 20        |                 |
|         | 8            | 20        |                 |
|         | <b>TOTAL</b> | <b>80</b> |                 |

*This paper consists of 12 printed pages.*

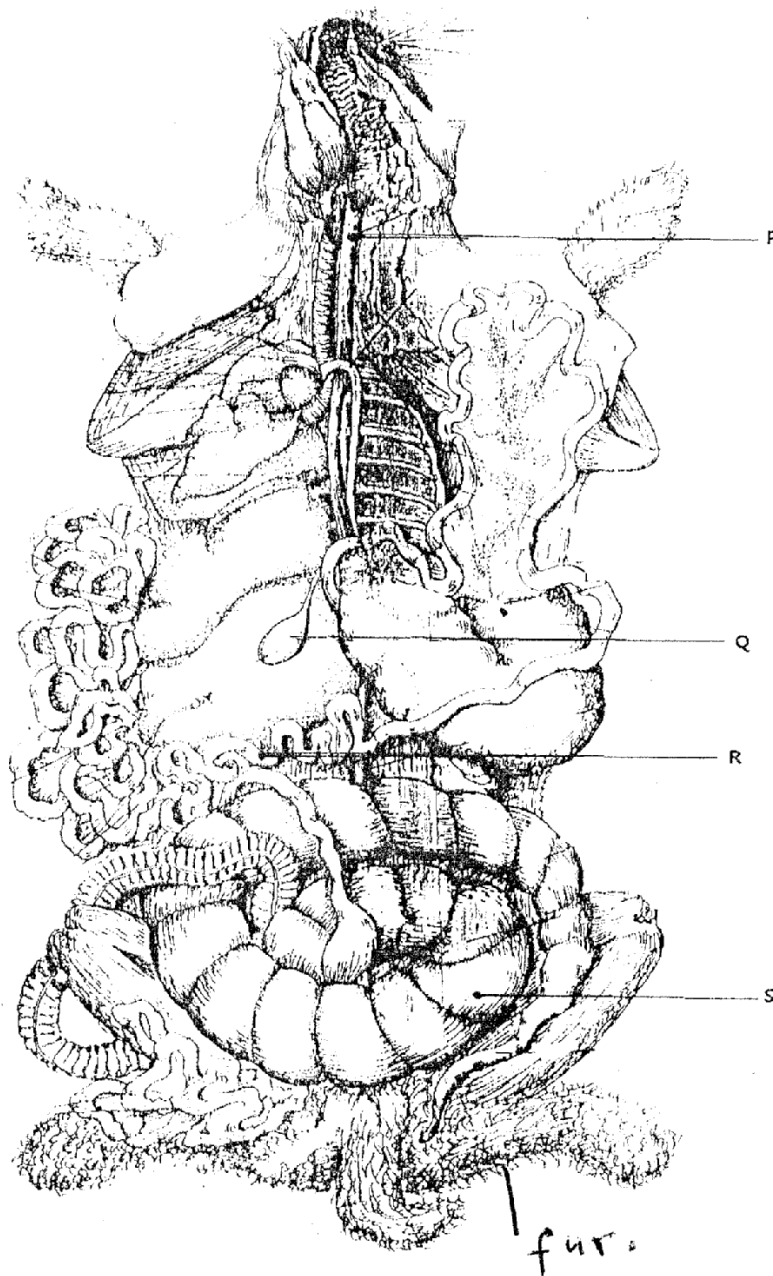
*Candidates should check the question paper to ensure that all pages are printed as indicated*

*and no questions are missing*

**SECTION A ( 40MARKS)**

**Answer ALL the questions in this section on the spaces provided.**

1. The drawing below, represent a dissection of an organism, Study it and answer the questions below.



**Magnification x5**

- (a) Name the parts labeled P and Q.  
(2mks)

P

.....

Q

.....

- (b) From the observable features only, explain the adaptations of the part labelled R to its functions. (2mks)

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- (c) Explain the Role of the part labeled.  
(2mks)

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- (d) With reasons, classify the organism into;  
(2mks)

(i)

**Class**.....

**Reason**.....

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2. One human gene which may be Y - linked, controls the length of hair on men's ears. One allele at this gene locus produces non - hairy ears. Another allele form produces rather long hairs ( hairy pinna).
- a) If a man with hairy pinna gets married work out the phenotypes of his children.

Use letter h to represent the gene for hairy pinna)  
(5mks)

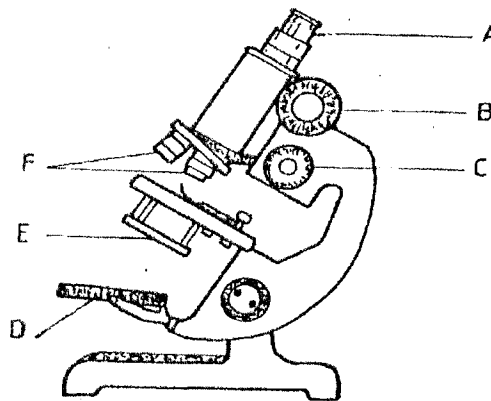
- b) Why would you not expect females to have hairy pinna.  
(2mks)

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c) Apart from hairy pinna name one other sex- linked trait linked to the Y chromosome.

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 .....



(a) **Name** the parts labelled A and B. (2 mks)

A .....  
 B .....

(b) **State** the functions of the parts labelled E and F. (2 mks)

E .....  
 F .....

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

(d) **Give** a reason for each of the following procedures when preparing sections to be observed under a **Light microscope**.

(i) **Cutting thin sections.** (1 mk)

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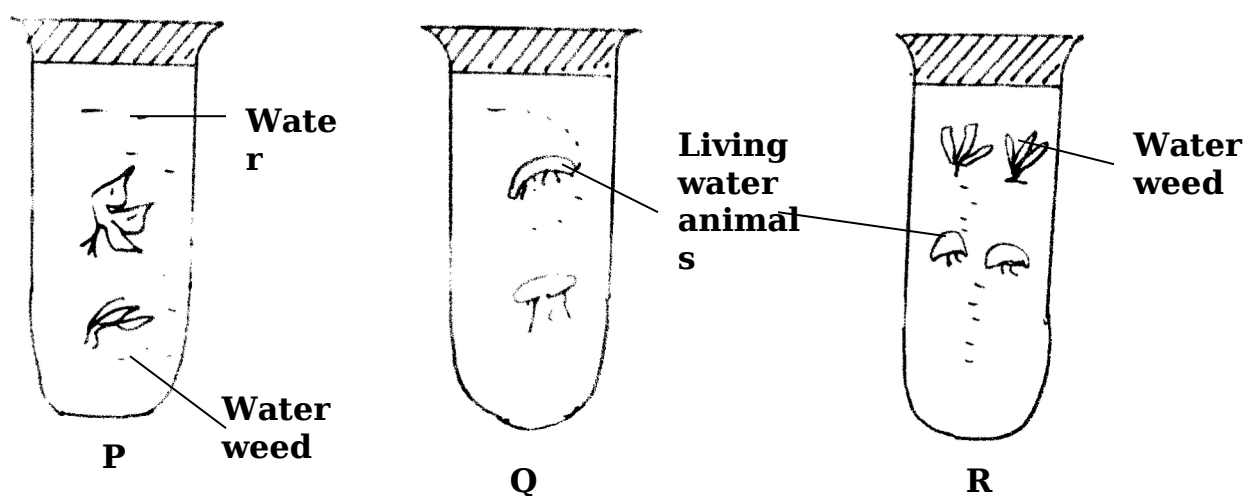
(ii) **Staining the sections.** (1 mk)

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 ....

(iii) **Fixation** (1mk)

.....  
 ....

4. a) Three jars were set- up as shown below.



- Each tube was containing four drops phenol indicator, which was orange red at the beginning of the experiment.
- Phenol red changes from orange red to yellow at pH 6.8.
- After three hours in sunlight the following results were obtained.

| Jar | Colour of indicator |
|-----|---------------------|
| P   | Red                 |
| Q   | Yellow              |
| R   | Orange - red        |

a) Give two ways of altering the living contents of Jar R to bring a colour change from Orange red to yellow. (2mks)

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b) Account for the colour changes in jar :-

(i) P  
(2mks)

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.....  
.....

(ii) Q (2mks)

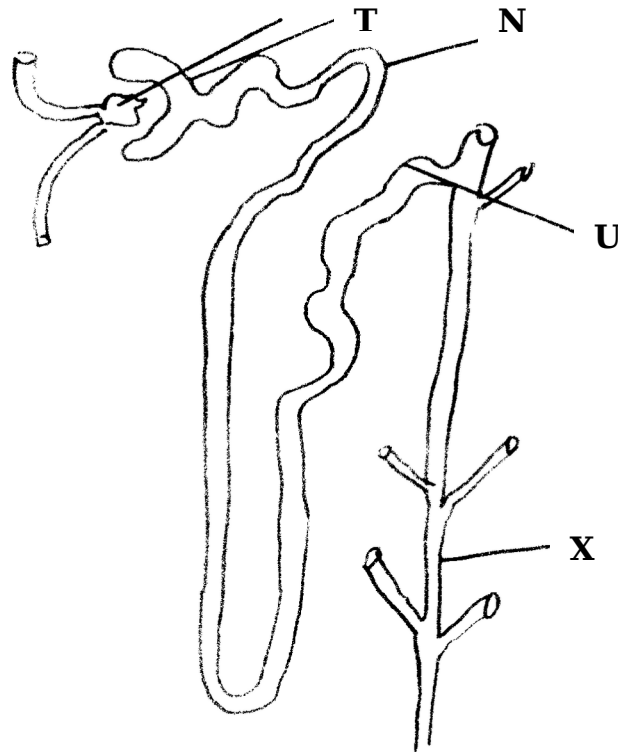
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(iii) R (2mks)

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5. Shown below is a section through the mammalian nephron.

**S**



(i) Name parts :-  
(2mks)

**T** .....

**U** .....

ii) a) Name one hormone that has an effect on part labeled X and where is it produced.

(2mks)

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b) How will the concentration of urine be affected at region U in the absence of hormone referred to in (ii) (a) .

(1mk)

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c) Name the fluid formed in part labeled T.  
(1mk)

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d) Which conditions are responsible for formation of fluid at part labeled T. (2mks)

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### SECTION B ( 40 MARKS)

**Answer question 6 (compulsory ) and either question 7 or 8 in the spaces provided after question 8.**

6. The table below shows the effect of predation in a laboratory experiment using paramecium aurelia and yeast cells, cultured in a solution containing sugar.

| Time (hour)                 | 2  | 4   | 6   | 8  | 10 | 12 | 14 | 16  |
|-----------------------------|----|-----|-----|----|----|----|----|-----|
| Paramecium                  | 20 | 90  | 120 | 95 | 50 | 20 | 40 | 60  |
| Yeast per 15cm <sup>3</sup> | 60 | 140 | 100 | 65 | 25 | 50 | 80 | 100 |

- a) Using the same axes plot, graphs to show growth curves of paramecium Aurelia and yeast.

(7 mks)

b) At what time was the population of Paramecium aurelia and yeast the same. (2mks)

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c) Explain the relationship between Paramecium aurelia and yeast. (2mks)

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d) What is the approximate time lag between the maximum population of yeast and maximum population of paramecium? (2mks)

Suggest a reason for this lag?

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.....  
e) Account for the shape of the graph of Paramecium aurelia  
between:-

(i) 2 and 6 hours.  
(3mks)

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(ii) 6 and 12 hours. (3mks)

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f)(i) Suggest what would happen to the population of paramecium if the  
temperature was lowered to 0°C.  
Give reasons.  
(2mks)

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7. Describe the structure and functions of the various part of the  
mammalian brain. (20mks)

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[illegible]

8. a) Describe the process of fertilizers in flowering plant.  
(15mks)

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This image shows a full page of white paper with horizontal dotted lines, typical of primary school writing paper. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

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b) State the changes that take place in a flower after fertilization.  
(5mks)

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**BIOLOGY**  
**PAPER 2**  
**(THEORY)**  
**TIME: 2 HOURS**

## **2012 PROJECTIONS-007**

### **Kenya Certificate Of Secondary Education**

#### **INSTRUCTION TO CANDIDATES**

1. This paper has **two** sections; **A** and **B**.
2. Answer **all** the questions in section **A** in the spaces provided on the question paper.
3. From section **B**, answer questions **6 (Compulsory)** and any other question in the spaces provided after question 8.

#### **FOR EXAMINER'S USE ONLY**

| <b>SECTION</b> | <b>QUESTION</b> | <b>MAXIMUM<br/>SCORE</b> | <b>CANDIDATE'S<br/>SCORE</b> |
|----------------|-----------------|--------------------------|------------------------------|
| <b>A</b>       | 1               | 8                        |                              |
|                | 2               | 8                        |                              |
|                | 3               | 8                        |                              |
|                | 4               | 8                        |                              |
|                | 5               | 8                        |                              |
| <b>B</b>       | 6               | 20                       |                              |
|                | 7               | 20                       |                              |
|                | 8               | 20                       |                              |
| <b>TOTAL</b>   |                 | <b>80</b>                |                              |

-

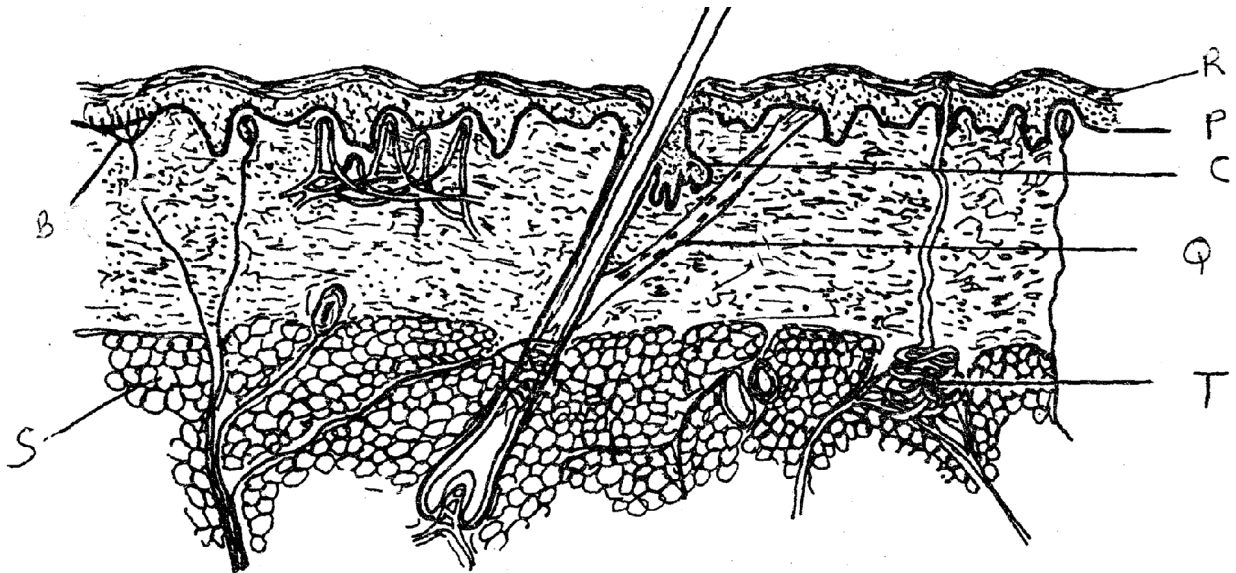
*This paper consists of 12 printed pages. Candidates should check the question paper to*

*Ensure that all the pages are printed as indicated and no questions are missing*

**SECTION A (40 MARKS)**

**Answer ALL the questions in this section in the spaces provided.**

1. The diagram below represents a transverse section through a human skin. Use it to answer the questions that follow.



- a) Name the parts labeled B and R

(2mks)

B .....

R .....

- b) Give the functions of each of the parts C and P

C .....

P .....

- c) Mention two ways in which the skin helps to keep the body warm

(2mks)

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d) Skin lightening cosmetics are used by some people. State two adverse effects such

cosmetics may have on the skin.

(2mks)

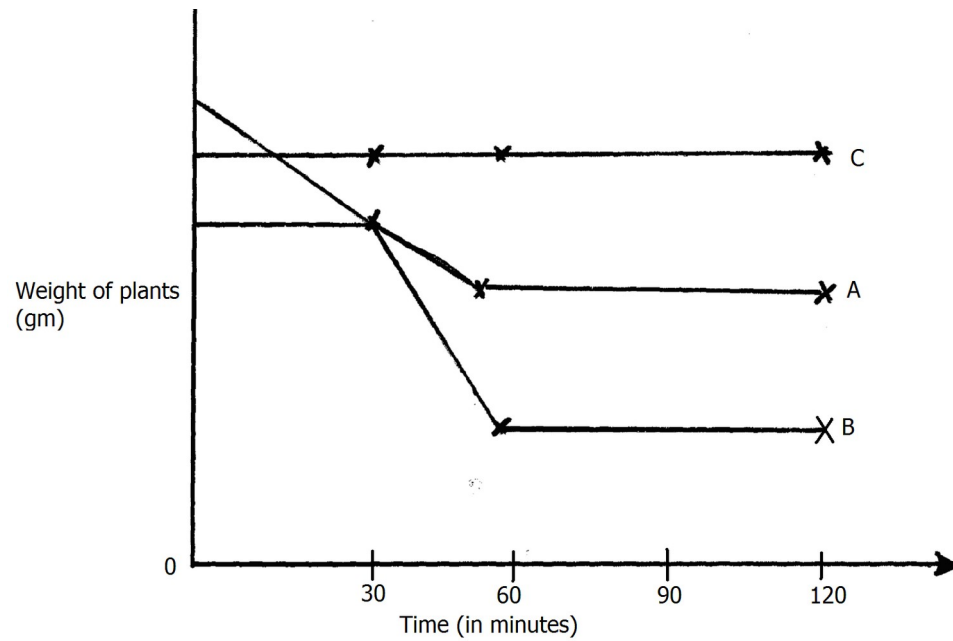
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2. An experiment was carried out to determine the rate of transpiration in three plants A, B and C. Plants A and B belonged to different species while plants B and C belonged to the same species. Plant C had all its leaves removed. The three plants were of similar size and were exposed to the same environmental conditions. The results are as shown in the graphs below.



- a) Suggest possible environmental conditions under which the experiment was carried out between 30 and 60 minutes (2mks)

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- b) Account for the results obtained for plant C (2mks)

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- c) Suggest the habitat for plant A and B. Give reasons for your answer. (4mks)

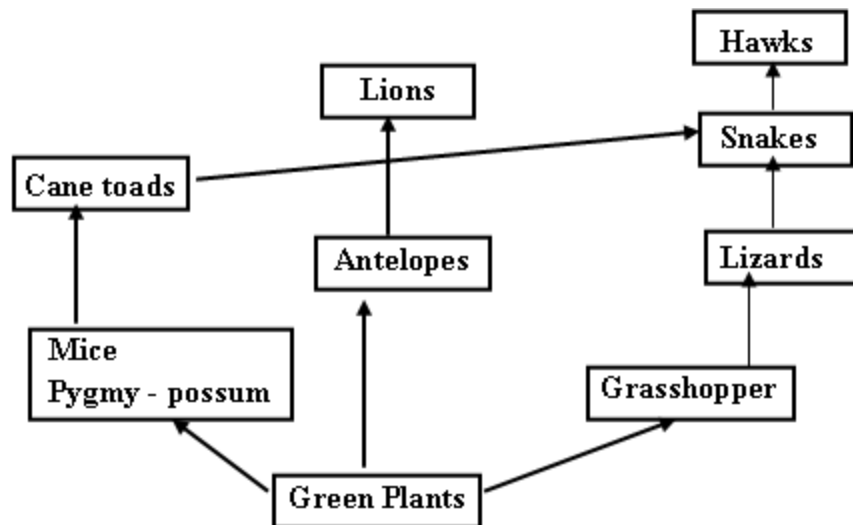
Habitat for plant A.....

Reason .....

Habitat for plant B .....

Reason .....

3. The diagram below represents a food web in a terrestrial ecosystem.



- a) Which organism has the highest number of preys (1mk)

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.....

b) Construct a food chains with snakes as tertiary consumers  
(2mks)

c) State the trophic level occupied by hawks in the food chains  
constructed in b)  
above (1mk)

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d) Describe how capture – recapture method can be used in  
estimating the population of  
fishes in a lake. (4mks)

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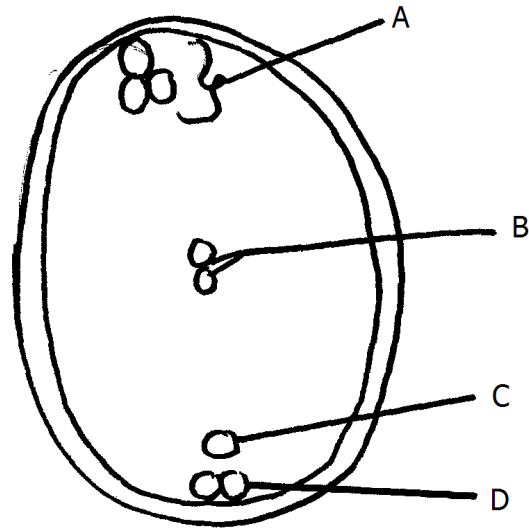
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4. Study the diagram below and answer the questions that follow.



a) Identify the diagram  
(1mk)

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b) Name the parts labeled A, B and D  
(3mks)

A .....

B .....

D .....

c) State the role of B and C  
(2mks)

B

.....

C

.....

d) What do you understand by the following terms as used in

reproduction.

i) Protandry (1mk)

.....

.....

ii) Protogyny (1mk)

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5. In a family with four children, three were found to have normal skin pigmentation while

one was an albino. Using letter A to represent gene for normal skin pigmentation and a to represent the gene for albinism.

a) What are the genotypes of the parents?  
(2mks)

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b) Work out the genotypes of the normal pigmented children and the albino child(5mks)

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c) What is the probability that the fifth child will be an albino?  
(1mk)

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### SECTION B (40 MARKS)

**Answer question 6 (compulsory) in the spaces provided and either question 7 or 8 in the spaces provided after question 8.**

6. In an investigation, two persons; A and B drank the same amount of a glucose solution. Their blood sugar levels were determined immediately and thereafter at intervals of one hour for the next six hours. The results were as shown in the following table.

**Blood glucose Level (mg/100ml)**

| <b>Time<br/>(hours)</b> | <b>Person A</b> | <b>Person B</b> |
|-------------------------|-----------------|-----------------|
| 0                       | 90              | 120             |
| 1                       | 220             | 360             |
| 2                       | 160             | 370             |
| 3                       | 100             | 380             |
| 4                       | 90              | 240             |
| 5                       | 90              | 200             |
| 6                       | 90              | 160             |

a) Draw a graph of blood sugar levels of persons A and B against time on the same axes.

(7mks)

b) Explain each of the following observations;

i) Blood sugar level increase in person A between 0 and 1 hour  
(2mks)

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ii) The blood sugar level dropped in person A between 1 and 4  
hours (2mks)

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- c) From the graph; what is the normal blood sugar level in person B  
(2mks)

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- d) Suggest a reason for the high sugar level in person B  
(2mks)

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- e) How can the high blood sugar level in person B be controlled?  
(1mk)

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- f) What is the biological significance of maintaining a relatively  
constant sugar  
level in a human body?  
(2mks)

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g) Account for the decrease in the blood sugar level of person B after 4 hours. (2mks)

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7. Describe the digestion of a buttered piece of bread from the time it is ingested until it is absorbed in the body.

(20mks)

8. a) Describe secondary growth in flowering plants (14mks)

b) Describe one method that can be used to measure the average growth rate of a

single leaf.

(6mks)

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BIOLOGY

PAPER 2

(Theory)

TIME: 2 HOURS

## **2012 PROJECTIONS-008**

### **Kenya Certificate Of Secondary Education**

#### **INSTRUCTIONS TO CANDIDATES.**

- ❖ Write your name and Index Number in the spaces provided.
- ❖ Sign and write the date of examination in the spaces provided above
- ❖ This paper consist of TWO sections; A and B.
- ❖ Answer ALL the questions in section A in the spaces provided.
- ❖ In section B answer question **6** (compulsory) and either question 7 or 8 in the spaces provided after question 8.
- ❖ This paper consists of **8** printed pages.
- ❖ Check the question paper to ascertain the pages are printed as indicated and no questions are missing.

**FOR EXAMINERS' USE ONLY**

| SECTION | QUESTION    | MAX SCORE | CANDIDATES SCORE |
|---------|-------------|-----------|------------------|
| A       | 1           | 8         |                  |
|         | 2           | 8         |                  |
|         | 3           | 7         |                  |
|         | 4           | 9         |                  |
|         | 5           | 8         |                  |
| B       | 6           | 20        |                  |
|         | 7           | 20        |                  |
|         | 8           | 20        |                  |
|         | TOTAL SCORE | 80        |                  |

### **SECTION A (40MKS)**

***Answer ALL the questions in this section in the spaces provided.***

1. (a) What is meant by the term sex linkage?

(1mk)

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- (b) **Name two** sex-linked traits in humans associated to Y-chromosomes. (2mks)

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- (c) In Drosophila melanogaster, the inheritance of eye colour is sex linked. The gene for red eye is dominant. A cross was made between a homozygous red-eyed female and white eyed male. Work out the phenotypic ratio of F1 generation (use R to represent the gene for red eye)

(5mks)

2. (a) Complete the table below showing Blood transfusion, tick (✓) means no agglutination, cross (x) means agglutination.

(4mks)

| Recipient | DONOR |    |     |     |
|-----------|-------|----|-----|-----|
|           | Ab    | Ba | ABo | Oab |
|           | Ab    | ✓  |     | X   |
|           | Ba    | x  |     | x   |
|           | ABo   | ✓  | ✓   |     |
|           | Oab   | x  | x   |     |

- (b) The type of circulatory system found in member of the class insecta is (1mk)

.....  
 .....  
 .....

- (c) **Name** the blood vessel that transports blood;

- (i) From the small intestines to the liver

(1mk)

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 .....  
 .....  
 .....  
 .....

- (ii) With the highest concentration of carbon (IV) oxide

(1mk)

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 .....  
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.....

(d) **Explain** why the wall of the left ventricle is thicker than that of the right ventricle

(2mks)

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3. (a) Distinguish between a **community** and a **population**.

(2mks)

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.....

(b) Describe how a population of grasshoppers in a given area can be estimated (5mks)

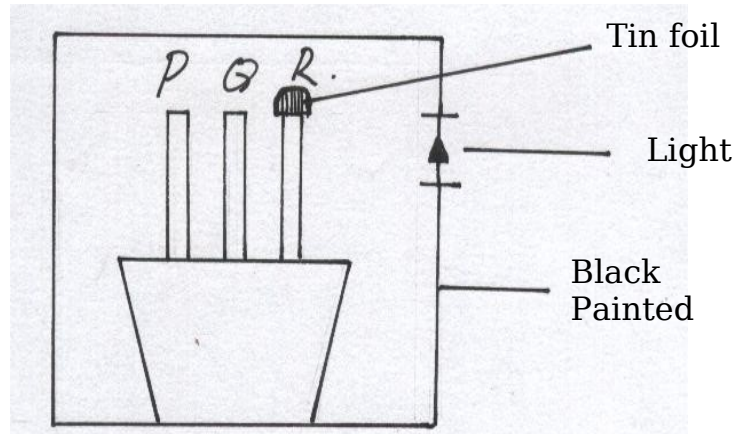
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.....

.....

4. The diagram below represents growing seedlings which were subjected to unilateral light at the beginning of an experiment.



- (a) (i) **State** the results of P, Q and R after 5 days

(3mks)

P .....

.....

.....

Q.....

.....

R.....

.....

.....

- (ii) Account for your answer in a (i) above

(4mks)

P .....

.....

.....

.....

Q

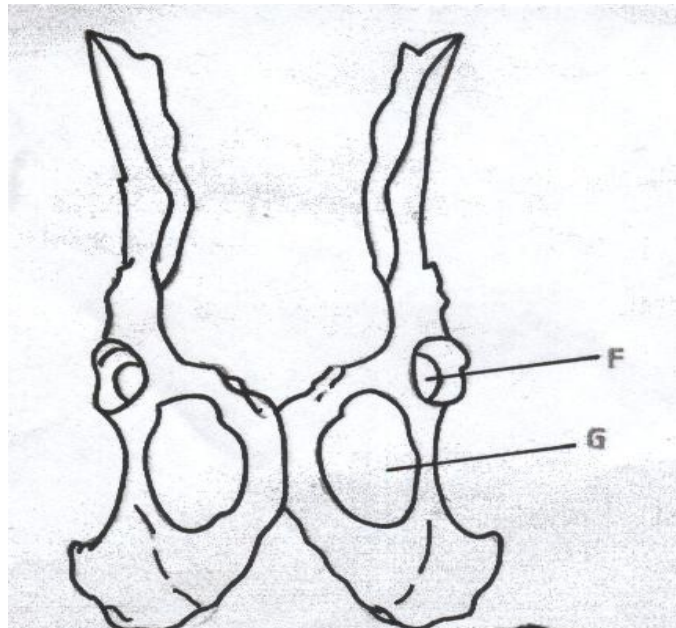
.....

.....  
.....  
R .....

.....  
.....  
(b) If the tin foil were removed from the tip of seedling R what  
results would be observed after 2 days  
(1mk)

.....  
.....  
.....  
(c) **State** the expected results after 3 days if the box were removed  
(1mk)

.....  
.....  
.....  
5. The diagram below shows two fused bones of a mammal.



(a) Identify the fused bones

(1mk)

.....  
.....

(b) Name the;

(i) Bone that articulates at the point labeled F

(1mk)

.....  
.....

(ii) The hole labeled G

(1mk)

.....  
.....

(c) Name the **three** types of muscles found in the body of a human

(3mks)

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.....

(d) (i) State **one** difference between a ball and socket joint and a hinge joint. (1mk)

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.....  
.....  
.....

(ii) Name the structure at the knee that performs the same function as the olecranon process

(1mk)

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.....

.....

.....

## **SECTION B (40MKS)**

**Answer question 6 (compulsory) and either question 7 or 8 in the spaces provided after question 8**

6. The table below represent the increase in number of yeast cells over a period of 45 minutes

|                       |   |   |    |    |    |    |     |     |     |     |
|-----------------------|---|---|----|----|----|----|-----|-----|-----|-----|
| Time in minutes       | 0 | 5 | 10 | 15 | 20 | 25 | 30  | 35  | 40  | 45  |
| Number of yeast cells | 2 | 2 | 4  | 24 | 46 | 84 | 124 | 136 | 140 | 146 |

(a) Using the grid provided, draw the graph of the number of yeast cells against time. (6mks)

(b) (i) **Name** the type of curve shown  
(1mk)

.....

.....

(ii) Determine the number of yeast cells after 26 minutes  
(2mks)

(iii) After how long was the population of yeast cells 128?

(1mk)

.....

.....

.....

.....

(c) Work out the rate of cell division between the 24 and 28 minutes

(2mks)

(d) Account for the curve shown

(i) between 0 and 10 minutes

(2mks)

.....

.....

.....

.....

(ii) between 10 and 30 minutes

(2mks)

.....

.....

.....

.....

.....

(iii) between 40 and 45 minutes

(2mks)

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.....  
.....  
.....

- (e) State **four** factors which would cause human population growth to assume the shape of the curve between 10 and 30 minutes (2mks)

.....  
.....  
.....  
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.....

7. (a) Define digestion.  
(2mks)

- (b) Describe the digestion of a piece of ugali in a human digestive system from the mouth until its assimilation  
(18mks)

8. **Explain** how the various environmental factors affect the rate of transpiration in plants  
(20mks)

Name.....

Index No.....

School.....

Signature.....

Date.....

231/2  
BIOLOGY  
PAPER 2  
THEORY  
2 hrs

## **2012 PROJECTIONS-009**

### **Kenya Certificate Of Secondary Education**

#### **INSTRUCTIONS**

1. This paper consists of two sections A and B. Answer **All** the questions in section A in the spaces provided.
2. In section B answer questions 6 (**Compulsory**) and either Questions 7 or 8 in the spaces provided after question 8.

#### **FOR EXAMINER'S USE ONLY**

| SECTION | QUESTION | MAXIMUM SCORE | CANDIDATE'S |
|---------|----------|---------------|-------------|
|         | 1        | 8             |             |
|         | 2        | 8             |             |
|         | 3        | 8             |             |
|         | 4        | 8             |             |
|         | 5        | 20            |             |
|         | 6        | 20            |             |
|         | 7        | 20            |             |
|         | 8        | 20            |             |
| B       | 6        | 20            |             |
|         | 7        | 20            |             |

|                    |   |  |  |
|--------------------|---|--|--|
|                    | 8 |  |  |
| <b>TOTAL SCORE</b> |   |  |  |

***This paper consists of 12 printed pages. Candidates should check carefully to ascertain that all the pages are printed as indicated and no questions are missing.***

1. In a breeding experiment a red - flowered plant was crossed with a white - flowered plant. All the offspring had pink flowers. These pink - flowered plants were selfed. The resultant offspring had red, Pink and white flowers in the ratios of 1: 2: 1 respectively.  
Use letter R to represent gene for red flower colour and W to represent the gene for white colour and answer the following questions.

State the

a) State the genotype of :-

i) Parents

(2mks)

.....

.....

.....

.....

.....

.....

ii) F<sub>1</sub> generation

(1mk)

.....

.....

.....

b) Work out the cross between plants in the F<sub>1</sub> generation.  
(4mks)

.....

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.....

c) Explain the occurrence of the colour in the F<sub>2</sub> generation  
(1mk)

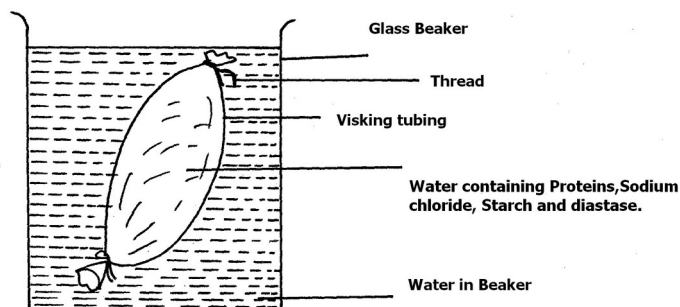
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2. In a physiological experiment, starch, protein, diastase and sodium chloride were added to water and put inside a visking tubing. The visking tubing was then placed in a water bath maintained at a temperature

between 35 - 40°C. The set up was as shown in the diagram below.



The following observations were made after the procedures indicated.

| Contents in    | At the Start of Experiment                                                                       | After 1 hour                                                                             |
|----------------|--------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------|
| Visking tubing | (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.                          |
| Beaker         | (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 |
|                | (iv) On addition of solution hydroxide                                                           | On addition of sodium hydroxide followed by                                              |

|  |                                                                                     |                                                                |
|--|-------------------------------------------------------------------------------------|----------------------------------------------------------------|
|  | followed by copper sulphate solution to the solution, the colour changes to purple. | copper sulphate to the solution, the colour changes to purple. |
|--|-------------------------------------------------------------------------------------|----------------------------------------------------------------|

a) Name the process by which salt 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 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 (ci) above in the beaker after 1 hour.

(1mk)

.....  
.....  
.....

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

(1mk)

.....  
.....  
.....

3. a) Distinguish between natural and acquired immunity

(1mk)

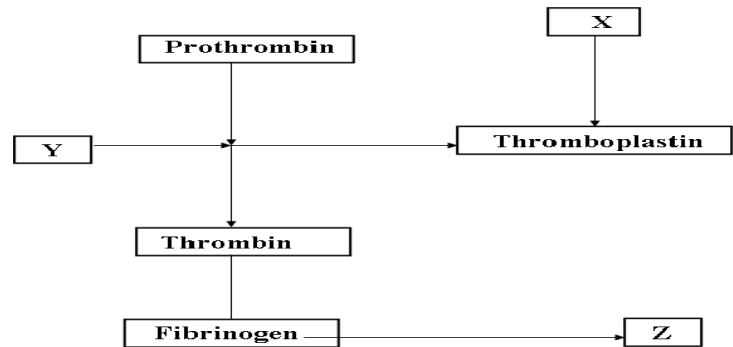
.....  
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b) Define the term allergy

(1mk)

.....  
.....  
.....

c) The chart below shows the blood clotting mechanism



i) Name the blood cells represented by x  
(1mk)

.....  
.....  
.....

iii) 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)

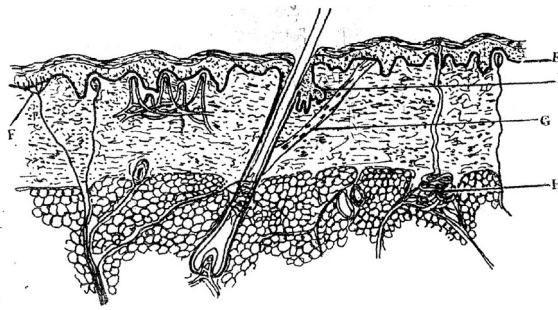
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iii) Atmospheric Pressure

(1mk)

.....  
.....  
.....

4. The diagram below shows a section through the mammalian skin.



- a) Name the parts labeled E and F

(2mks)

E

.....

F.....

- b) State the functions of the secretions produced by

i) structure H

(1mk)

.....  
.....  
.....

ii) structure I

(1mk)

.....  
.....  
.....

c) Explain how the structures listed below help in regulation of body temperature

on a hot day.

i) Structure H

(1mk)

.....

.....

.....

ii) Structure G

(1mk)

.....

.....

.....

d) Apart from excretion and temperature regulation in man, state two other functions of the mammalian skin.

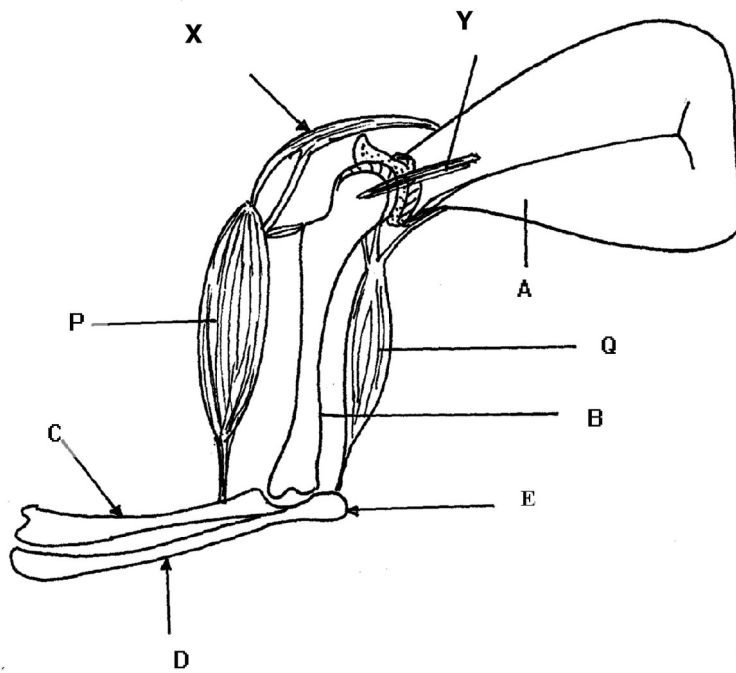
(2mk)

.....

.....

.....

5. The diagram below shows some bones and muscles in the human arm.



a) Name the bones that articulate with B at the anterior end and posterior end.

i) Anterior end

(1mk)

.....

.....

.....

ii) Posterior end

(1mk)

.....

.....

.....

b) Name the types of joints formed by C at the distal and proximal ends.

Distal end

(1mk)

.....

.....

.....

Proximal end  
(1mk)

.....  
.....  
.....

c) State one function of the structure labeled E  
(1mk)

.....  
.....  
.....

d) Name the structure labeled Y and state its function.  
(1mk)

Name: .....

Function:

.....  
.....  
.....

e) State the events that take place in P and Q in order to raise the  
arm. (1mk)

.....  
.....  
.....

f) Name the substance that hardens the structure labeled B.  
(1mk)

.....  
.....  
.....

## SECTION B (40 MKS)

**Answer question 6(compulsory) and either question 7 or 8 in the spaces provided after question 8**

6. In an experiment the energy requirement by persons of different sizes was determined. Their body weight and amount of energy used at rest were measured. The results are as shown below:

| <b>Weight of Individual ( Kg)</b> | <b>Energy used per kg of body weight per day in KJ</b> |
|-----------------------------------|--------------------------------------------------------|
| 05                                | 300                                                    |
| 15                                | 200                                                    |
| 25                                | 150                                                    |
| 35                                | 130                                                    |
| 45                                | 115                                                    |
| 55                                | 105                                                    |
| 65                                | 100                                                    |
| 75                                | 95                                                     |

- a) Using suitable scale draw a graph of amount of energy used per kg of body weight per day against weight of individual.

(6mks)

- b) From the graph determine the difference in energy requirements between persons weighing.

i) 10 kg and 20 kg

(1mk)

ii) 60 kg and 70 kg

(1mk)

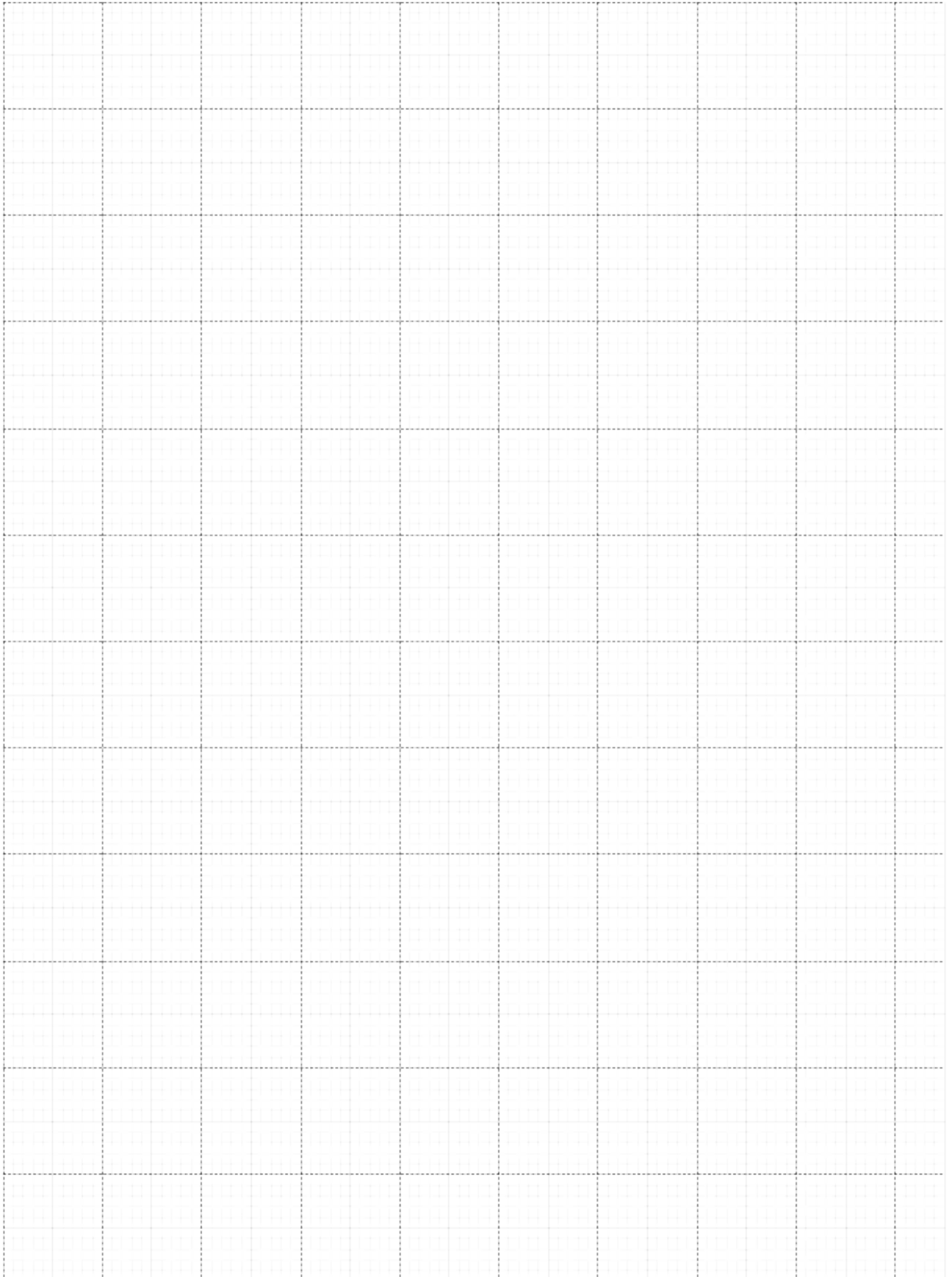
- c) Why did individuals with smaller sizes require more energy per kg of body weight than those with larger sizes?

(1mk)

.....

.....

.....



d) i) Use the graph to determine the energy requirements of an infant whose body weight is 2.5kg.  
(1mk)

ii) Explain how the following factors determine the daily energy requirement in humans. Age  
(1mk)

.....  
.....  
.....

Occupation  
(1mk)

.....  
.....  
.....

Sex  
(1mk)

.....  
.....  
.....

e) i) How would the results differ if the experiment is repeated using reptiles instead of humans.  
(1mk)

.....  
.....  
.....

ii) Give reason for your answer in (e) i) above  
(1mk)

.....  
.....  
.....

f) Name two classes of food that provide energy in the body under normal conditions.(1mk)

.....  
.....  
.....

g) Name the class of food that provide energy in a mammal during starvation. (1mk)

.....  
.....  
.....

h) An organic chemical is completely oxidized as shown by the equation below.



(i) Calculate the respiratory quotient (RQ) of the food substance.  
(1mk)

(ii) Suggest the identity of the food being oxidized.  
(1mk)

(iii) What is the disadvantage of oxidizing such food substrate  
(1mk)

.....  
.....  
.....

7. Describe causes and methods of controlling water pollution.  
(20mks)

8. How is the human eye adapted to its functions.  
(20mks)

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NAME:.....INDEX .....  
.....DATE.....

SCHOOL:.....  
SIGNATURE.....

231/2  
BIOLOGY  
PAPER2  
2 HOURS

## **2012 PROJECTIONS-010**

### **Kenya Certificate Of Secondary Education**

#### **INSTRUCTIONS TO CANDIDATES**

- ❖ This paper consists of **TWO** sections A and B
- ❖ Answer **ALL** the questions in section A in the spaces provided
- ❖ In section B answer question **6 (compulsory)** and either question 7 or 8 in the spaces provided after question 8

#### **For Examiner's Use Only**

| Section   | Question | Maximum Score | Candidates' Score |
|-----------|----------|---------------|-------------------|
| A         | 1        | 8             |                   |
|           | 2        | 8             |                   |
|           | 3        | 8             |                   |
|           | 4        | 8             |                   |
|           | 5        | 8             |                   |
| B         | 6        | 20            |                   |
|           | 7        | 20            |                   |
|           | 8        | 20            |                   |
| <b>80</b> |          |               |                   |

**SECTION A** Answer **ALL** questions in the spaces provided

1. (a) (i) Name the structure of the plant where translocation takes place (1 mk)

.....

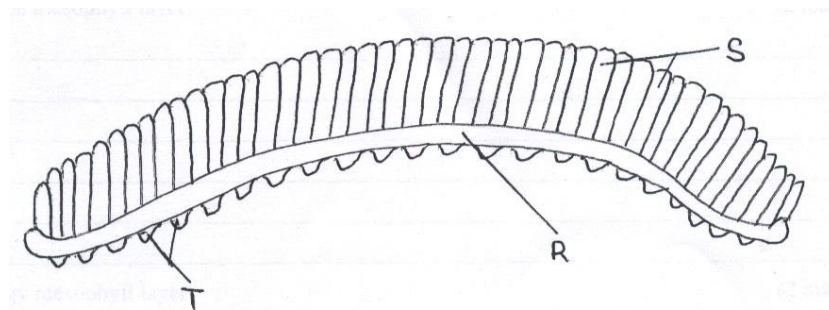
(ii) State three structural adaptations of the part named above (3 mks)

.....  
.....  
.....  
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(b) Explain the movement of water from the soil until it reaches the root xylem (4 mks)

.....  
.....  
.....  
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.....

2. The structure below is found in the members of a class in the kingdom Animalia



(a) Name the class from which the animal with the structure above is found. (1 mk)

.....

.....  
.....  
(b) State the functions of the parts labelled T and R (2 mks)

T.....

R.....

(c) Name the structure on the animal that protects S from mechanical injury. (1 mk)

.....  
(d) State the adaptations of the part labelled S (4 mks)

.....  
.....  
.....  
.....  
.....  
3. (a) Define the term autotrophism (2 mks)

.....  
.....  
.....  
(b) Explain what happens during the light stage of photosynthesis (2 mks)

.....  
.....  
(c) Explain three adaptations of the mesophyte leaf to photosynthesis using the following heading

(i) Palisade mesophyll layer (2 mks)

.....  
.....  
.....

(ii) Spongy mesophyll layer (2 mks)

.....  
.....  
.....  
.....  
.....

(d) State the role of Carbon (IV) oxide during photosynthesis (1 mk)

.....  
.....  
.....

4. (a) Differentiate between the mode of fertilization in higher plants and in mammals

(2 mks)

.....  
.....  
.....

(b) Explain the role of the following hormones in the female menstrual cycle

(i) Oestrogen (2 mks)

.....  
.....  
.....

(ii) Luteinizing hormone (2 mks)

.....  
.....  
.....

(c) Give two functions of the placenta during pregnancy (2 mks)

.....  
.....  
.....  
5. (a) What is mutation (2 mks)

.....  
.....  
.....  
(b) Explain why certain bacteria and other pathogens become resistant to drugs after some time (2 mks)

.....  
.....  
.....  
(c) Work out a cross between a Haemophiliac man married to a carrier woman for Haemophilia (3 mks)

.....  
.....  
.....  
(d) State the phenotypic ratio of the children (1 mk)

**SECTION B** Answer question 6 (compulsory) and either question 7 or 8 in the spaces provided after question 8

6. Two individuals X and Y drunk equal volumes of concentrated solution of glucose. The amount of glucose in their blood was determined at intervals. The results are shown in the table below.

| Time<br>(minutes) | Glucose level in blood<br>(mg/100cm <sup>3</sup> ) |     |
|-------------------|----------------------------------------------------|-----|
|                   | X                                                  | Y   |
| 0                 | 87                                                 | 84  |
| 15                | 112                                                | 123 |
| 30                | 139                                                | 170 |
| 45                | 116                                                | 188 |
| 60                | 100                                                | 208 |
| 90                | 95                                                 | 202 |
| 120               | 92                                                 | 144 |
| 150               | 88                                                 | 123 |

- (a) On the grid provided plot a graph of glucose level in blood against time on the same axes (7 mks)

(b) What was the connection of glucose in the blood of X and Y at the 25<sup>th</sup> minute  
(2 mks)

(c) Explain the causes in the level of glucose for the two individuals X and Y after  
30 minutes (4 mks)

.....  
.....  
.....  
.....  
.....

(d) Give your opinion on the Homeostatic condition of X and Y in respect to  
control of blood sugar level  
(2 mks)

.....

.....  
.....

(e) (i) Name a hormone in the human body that regulates low blood sugar level (1

mk)

.....  
.....  
.....

(ii) How does the hormone named in e (i) above act in the body (2  
mks)

.....  
.....  
.....

(f) (i) State the role of blood sugar in the human body (1  
mk)

.....  
...

(ii) Name a disease in the human body that results when the body is not able to  
control its sugar level (1  
mk)

.....  
.....

7. Describe how the following plants are adapted to their habitat

(a) Xerophytes (12 mks)

.....  
.....  
.....  
.....  
.....  
.....

(8 mks)

8. Describe the structure and function of the mammalian ear in relation to hearing and balance (20 mks)

NAME:.....INDEX .....DATE.....

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SCHOOL:.....SIGNATURE.....

231/2  
BIOLOGY  
PAPER 2  
2 HOURS

## **2012 PROJECTIONS-011**

### **Kenya Certificate Of Secondary Education**

#### **INSTRUCTIONS TO CANDIDATES:**

- ❖ *Write your name, index numbers and the name of your school in the spaces provided above.*
- ❖ *This paper consists of two parts A and B.*
- ❖ *Answer all the questions in section A in the spaces provided.*
- ❖ *In section B, answer 6 (compulsory) and either question 7 or 8 in the spaces provided after question 8.*

#### **For Examiner's Use Only.**

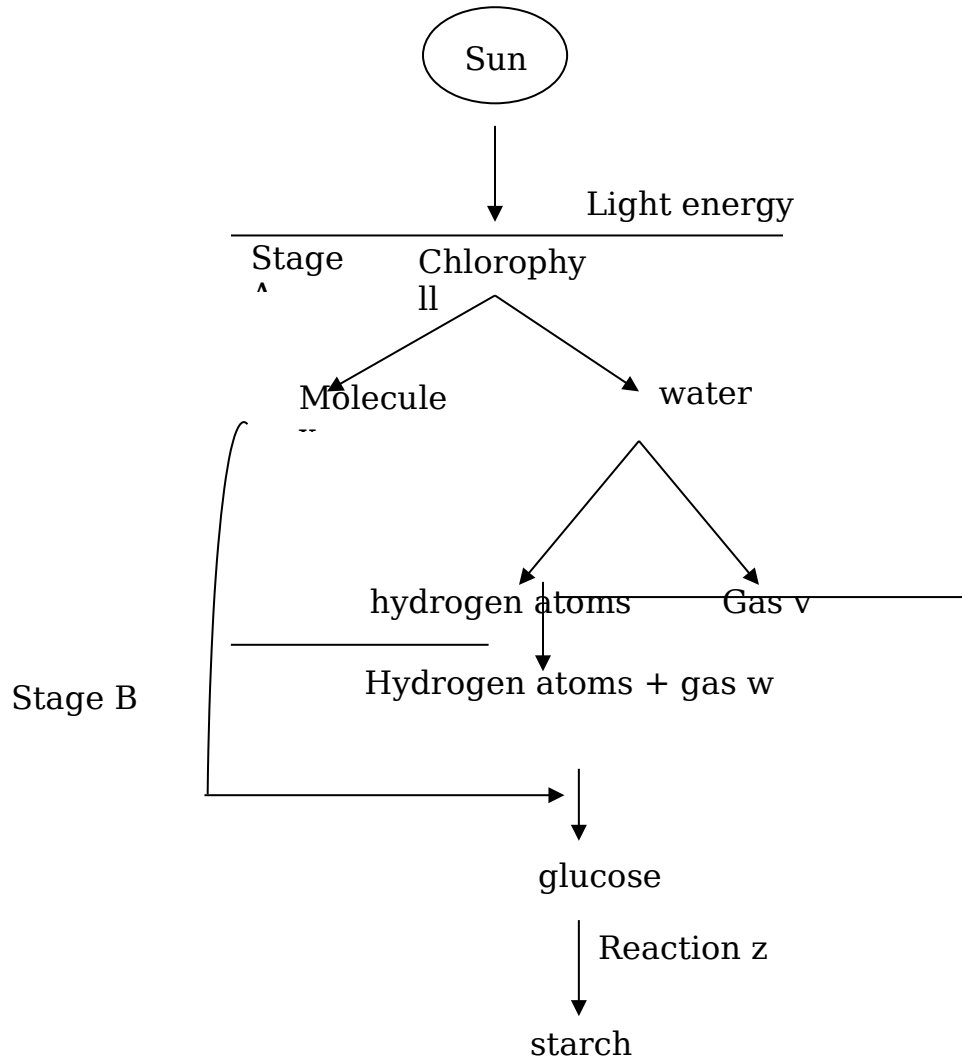
| Section  | Question     | Maximum score | Candidate's score |
|----------|--------------|---------------|-------------------|
| <b>A</b> | 1            | 9             |                   |
|          | 2            | 7             |                   |
|          | 3            | 7             |                   |
|          | 4            | 10            |                   |
|          | 5            | 7             |                   |
| <b>B</b> | 6            | 20            |                   |
|          | 7            | 20            |                   |
|          | 8            | 20            |                   |
|          | <b>SCORE</b> | <b>80</b>     |                   |

## SECTION A (40marks)

**Answer all the question in this section in the spaces provided.**

1. Below is a diagrammatic summary of the main biochemical events in photosynthesis.

Study it carefully.



- a) Suggest the identity of molecule X  
(1 mk)

.....

- b) Name the gases represented by the letters (2 mks)

V.....

W.....

c) Identify reaction Z. (1 mk)

.....

d) Name the specific site for the reactions in stage B. (1 mk)

.....

e) Apart from starch, which other compounds are formed from glucose? (2 mks)

.....

f) State two observable features of a leaf which adapt it to the biochemical reactions shown above. (2 mks)

.....

.....

.....

.....

.....

.....

2. When offspring of purple and white flower pea plants were crossed, they produced purple and white flowered plants in the ratio of 3:1.

Using letter H to represent purple colour,

a) State the genotype of:

(i) Parents

(2mks)

.....

(ii) F1 generation

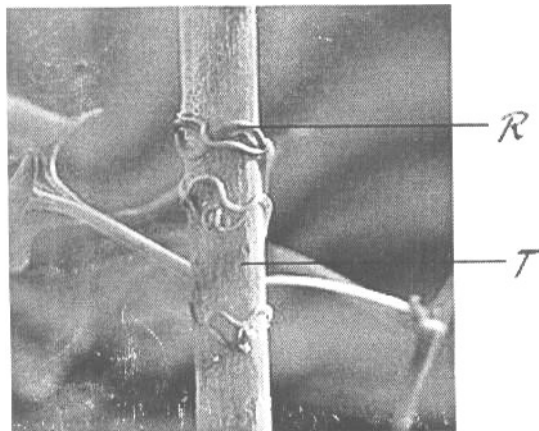
(1mk)

.....

b) Work out the cross between plants in the F1 generation. (4mks)

- c) Account for the colour of the flowers in plants of the F1 generation.  
(1mk)

3.



- a) Name the structure labeled R  
(1mk)

.....

- b) (i) What response is exhibited by the structure labeled R?  
(1mk)

.....

- (ii) State two importance of the response named in (b)(i) above to the survival of the plant.

(2mks)

.....

.....

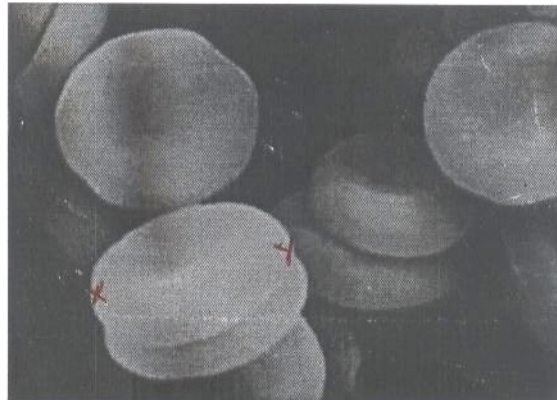
.....

.....

- c) Explain how structure R intertwines round structure T.  
(3mks)

.....  
.....  
.....  
.....  
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.....

4. Study carefully the picture shown below.



a) (i) Identify the cells above.

(1mk)

.....

(ii) State two functions of the cells shown above.

(2mks)

.....

.....

.....

b) Explain how the above cells are adapted to their function.

(2mks)

.....

.....

.....

.....

c) Name a parasite that may invade and destroy the cells above.

(1mk)

.....  
.....

- d) Suggest two bones in an adult man which produce the cells shown above.  
(2mks)

.....  
.....  
.....

- e) The picture shown above was observed using an electron microscope with  
total magnification of X 1000

(i) Measure the length of the cell on the electromicrograph in millimeters  
between

X and Y

(1mk)

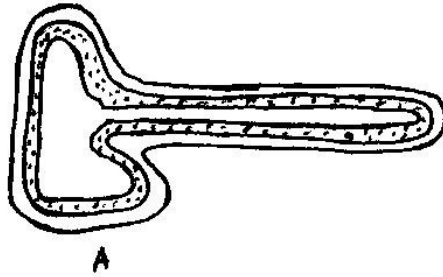
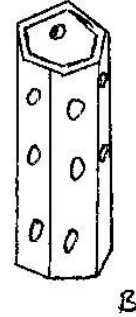
.....  
.....

(ii) Calculate the actual size of the cell and give your answer in  
micrometer

**(show your working)**

(2mks)

5. The figure below shows two types of cells, not drawn to scale.



a) What is the name of cell A?

(1mk)

.....  
 .....

b) (i) B is a xylem vessels state two functions in plants.

(2mks)

.....  
 .....

(ii) The cells forming the xylem vessel have no chloroplasts or vacuoles.

In what other way is this type of cell different from a typical plant cell.

(2mks)

.....  
 .....

(iii) Explain how this difference helps this type of cell to perform its

function. (2mks)

.....  
 .....

**SECTION B (40marks)**

**Answer question 6 (compulsory) and either question 7 or 8 in the spaces provided after question 8.**

6. In an experiment three healthy rabbits were fed on equal amount of carbohydrates. After one hour the glucose concentration in mg per ml of blood was measured at 30 minutes interval for three hours. The results are as shown in the table below.

| Rabbit \ | Initial | 30min<br>s | 60min<br>s | 90min<br>s | 120min<br>s | 150min<br>s | 180min<br>s |
|----------|---------|------------|------------|------------|-------------|-------------|-------------|
| P        | 1.60    | 1.55       | 1.43       | 1.36       | 1.30        | 1.19        | 1.11        |
| Q        | 1.49    | 1.39       | 1.39       | 1.32       | 1.27        | 1.20        | 1.09        |
| R        | 1.57    | 1.39       | 1.33       | 1.27       | 1.18        | 1.10        | 0.99        |
| Mean     | 1.55    | 1.44       |            | 1.32       | 1.25        | 1.16        |             |

- a) (i) Calculate the mean concentration of glucose in mg per ml of blood at 60 and 180 minutes. Record your answer in the table.  
(2mks)
- (ii) On the graph paper, plot graphs of the mean glucose concentration against time.  
(6mks)

# Grid

(iii) What is the mean glucose concentration in the blood after 75 minutes? (1mk)

.....

(iv) Why is it necessary to use three rabbits in the experiment? (1mk)

.....

.....

.....

b) Suggest three reasons why the initial concentration of glucose in the three rabbits was not the same.

(3mks)

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.....

c) Explain the general trend of the glucose concentration during this period. (5mks)

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.....  
.....  
.....

d) Name two end products of digestion other than those of carbohydrates.  
(2mks)

.....  
.....

7. Describe the structure and functions of the mammalian ear for hearing.  
(20mks)

8 (a) Name three parameters that can be used to measuring growth.  
(3mks)

(b) State the limitation in the use of the above parameters in the measurement of growth in organisms.

(6mks)

(c) Describe the structural adaptations of the insect's tracheal system to its functions.

(14mks)

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Name.....

Index No.....

School.....

Candidate's sign.....

Date.....

231/2

BIOLOGY

PAPER 2

Time: 2 Hours

## **2012 PROJECTIONS-012**

### **Kenya Certificate Of Secondary Education**

#### ***INSTRUCTIONS TO CANDIDATES***

Answer ALL the questions in section A and B. In section C answer only one question

#### **FOR EXAMINERS USE ONLY**

| <b>QUESTION</b> | <b>Max Score</b> | <b>Candidate Score</b> |
|-----------------|------------------|------------------------|
| 1 - 27          | 80               |                        |

*This paper consists of 12 printed pages.  
Candidates should check the question paper to ensure that all pages are printed as  
indicated  
and no questions are missing*

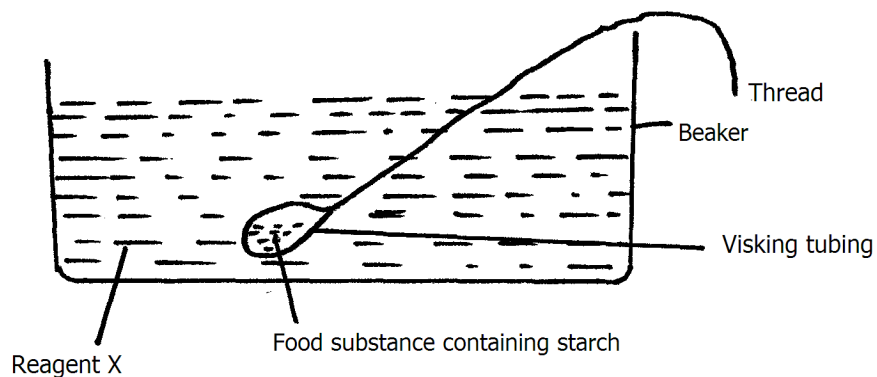
#### **SECTION A (40MKS)**

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

.....

.....

b) A group of students carried out an experiment to investigate a certain physiological process as shown in the diagram below.



After leaving the set up for 20 minutes, they observed that the food substance had changed to blue black colour

i) Identify the reagent X  
(1mk)

.....

.....

ii) What physiological process was being investigated  
(1mk)

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iii) Account for the observation made after twenty minutes  
(3mks)

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iv) What is the role of the above process in plants  
(2mks)

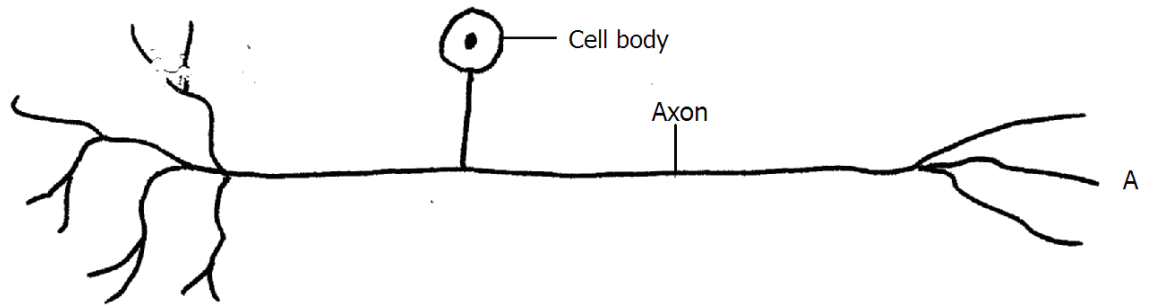
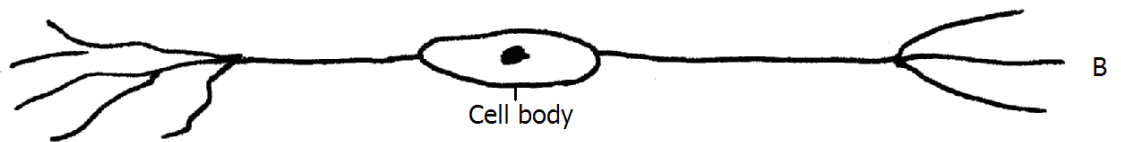
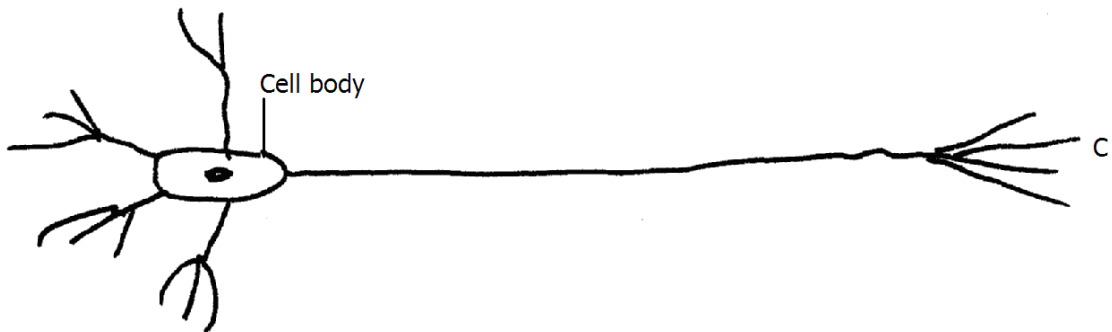
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2. The diagrams below shows three types of neurons. Study them carefully and answer the  
Questions that follow



a) With a reason identify each neurone

A.....

(2mks)

.....

B.....

(2mks)

.....

C.....

(2mks)

.....

- b) Briefly explain how a nerve impulse is transmitted across a synapse (2mks)

.....

.....

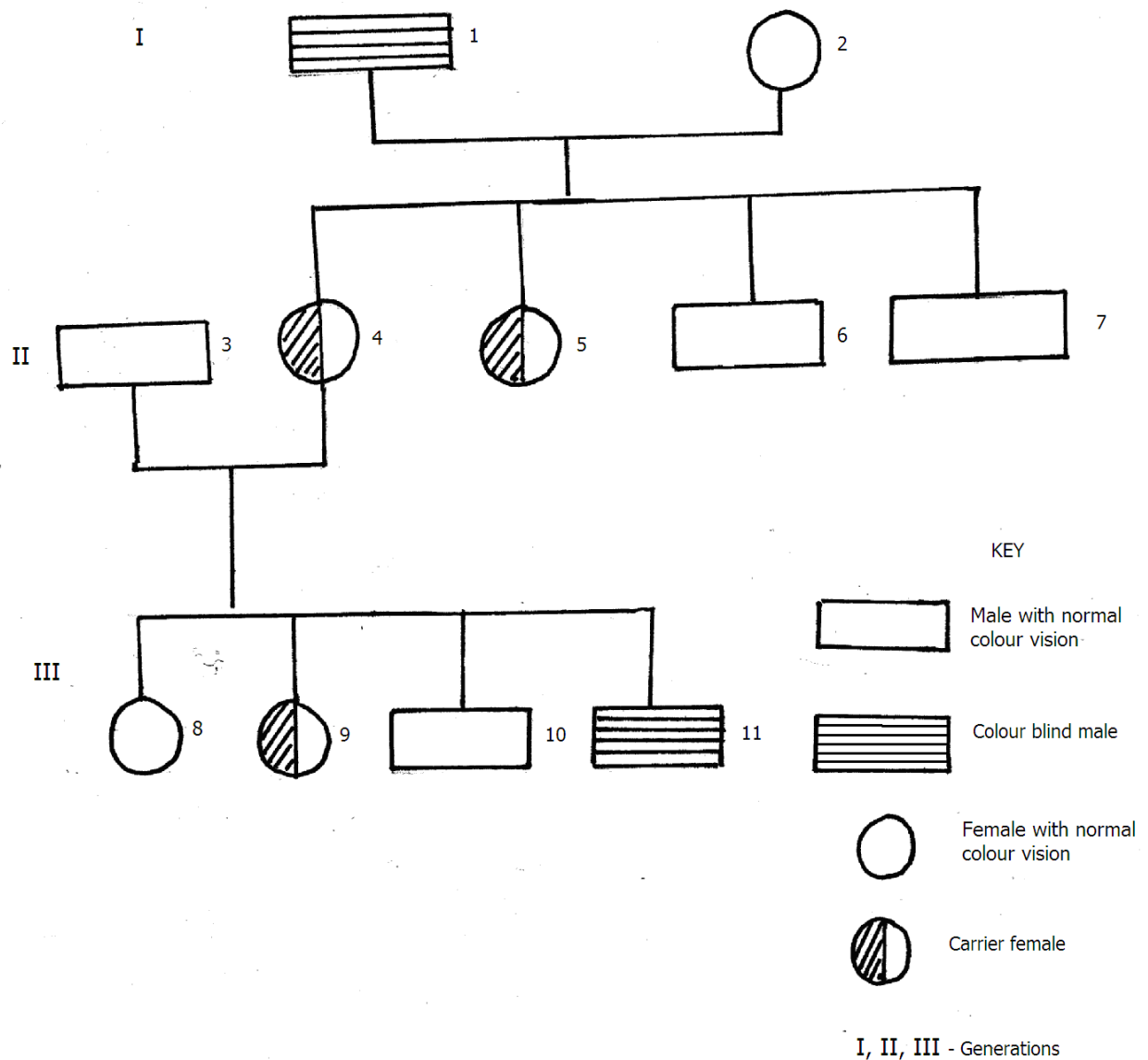
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3. Below is a pedigree chart showing the incidences of colour blindness a condition that is transmitted through a recessive gene. Study the diagram and answer the following questions
- (Note: in all your answers use letter A for normal gene and letter a for the colourblind gene)



a) Give the genotypes of persons  
(4mks)

- 1.....
- 2.....
- 7.....
- 9.....

b) Explain why there are no male carriers for this condition  
(2mks)

.....

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.....

.....

c) Explain why there are more colour blind male than female in a population (2mks)

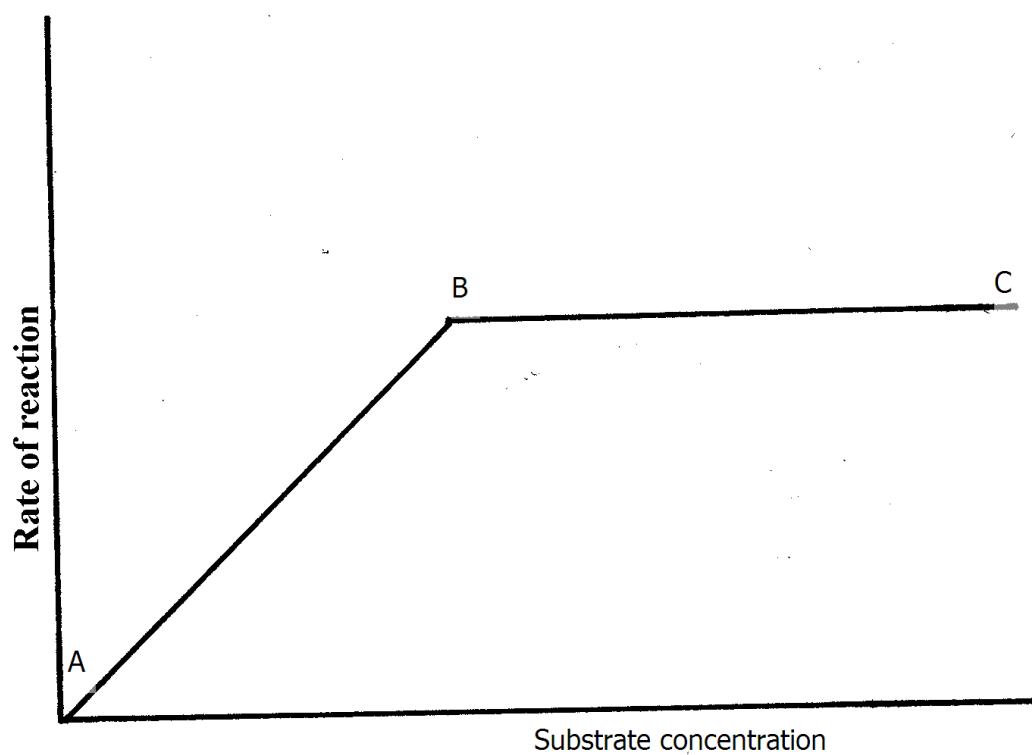
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4. The graph below shows the effect of substrate concentration on the rate of enzyme reaction



a) Account for the shape of the graph between

i) A and B

(2mks)

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ii) B and C

(2mks)

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.....

- b) How can the rate of reaction be increased after point B  
(1mk)

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- c) State three other factors that affect the rate of enzyme reaction  
(3mks)

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5. During an ecological study of a lake, a group of students recorded the following observations.

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

- vi) Large fish feed on small fish
- a) From this record of observations, construct a food web  
(5mks)

b) From the food web you have constructed in (a) above, isolate and write down a food chain

that ends with;

- i) Bird species as secondary consumer  
(1mk)

.....

.....

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

.....

.....

c) The biomass of the producers in the lake was found to be greater than that of

primary consumers. Give an explanation for this observation  
(1mk)

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### SECTION B (40 MARKS)

**Number 6 is compulsory. Choose either question 7 or 8.**

6. The menstrual cycle is a sequence of events repeated monthly in the female reproductive system.

The table below shows the concentration of oestrogen and progesterone hormones and body temperature of the female against time

| Time in days | Oestrogen mg/100cm <sup>3</sup> of blood | Progesterone mg/100cm <sup>3</sup> of blood | Temperature in °C |
|--------------|------------------------------------------|---------------------------------------------|-------------------|
| 1            | 20                                       | 0                                           | 36.4              |
| 2            | 20.5                                     | 0                                           | 36.7              |
| 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   | 36.4  |
| 11 | 64  | 0   | 36.3  |
| 12 | 72  | 0   | 36.6  |
| 13 | 80  | 0   | 37.0  |
| 14 | 170 | 20  | 37.2  |
| 15 | 140 | 50  | 37.0  |
| 16 | 80  | 80  | 37.1  |
| 17 | 70  | 130 | 37.15 |
| 18 | 65  | 170 | 37.2  |
| 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 the graphs of Oestrogen and progesterone against time(8mks)

- b) State the possible event taking place in the uterus during the first week (1mk)

.....

.....

- c) State the event taking place in the ovary between day 1 and day 3  
(2mks)

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- d) Account for the sudden increase in the progesterone concentration  
between day 14  
and day 18  
(2mks)

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- e) Account for the change in temperature between day 14 and 17  
(2mks)

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

.....

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.....

.....

g) State the functions of the following

i) Ovary

(1mk)

.....

.....

ii) Progesterone

(1mk)

.....

.....

iii) Oestrogen

(1mk)

.....

.....

### SECTION C

**Answer either question 7 or 8 in the spaces provided**

7. a) Define a reflex action  
(2mks)

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- b) Using a diagram describe what happens in the nervous system of a person who withdraws  
a finger from a very hot object  
(18mks)

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8. a) Define digestion  
(2mks)

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b) Describe how starch and proteins are digested along the human digestive system (18mks)

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**NAME:**.....

**INDEX** .....

**.DATE**.....

**SCHOOL:**.....

**SIGNATURE**.....

231/2  
BIOLOGY  
PAPER 2  
2 HOURS

## **2012 PROJECTIONS-013**

### **Kenya Certificate Of Secondary Education**

#### **INSTRUCTIONS TO CANDIDATES:**

- ❖ *Write your name, index numbers and the name of your school in the spaces provided above.*
- ❖ *This paper consists of two parts A and B.*
- ❖ *Answer all the questions in section A in the spaces provided.*
- ❖ *In section B, answer 6 (compulsory) and either question 7 or 8 in the spaces provided after question 8.*

#### **For Examiner's Use Only.**

| Section | Question | Maximum score | Candidate score |
|---------|----------|---------------|-----------------|
|         |          |               |                 |

|                    |   |           |  |
|--------------------|---|-----------|--|
| A                  | 1 | 8         |  |
|                    | 2 | 8         |  |
|                    | 3 | 8         |  |
|                    | 4 | 8         |  |
|                    | 5 | 8         |  |
| B                  | 6 | 20        |  |
|                    | 7 | 20        |  |
|                    | 8 | 20        |  |
| <b>TOTAL SCORE</b> |   | <b>80</b> |  |

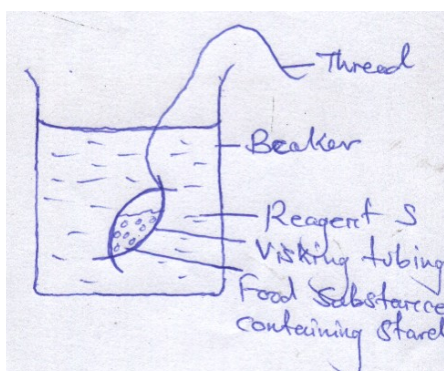
### **SECTION A (40marks)**

**Answer all the question in this section in the spaces provided.**

1. a) Define the term cell physiology. (1mark)

.....  
 .....  
 .....

- b) A group of students carried out an experiment to investigate a certain physiological process as shown in the diagram below.



After leaving the set up for 20 minutes, they observed that the food substance had changed to blue-black colour.

- (i) Identify the reagent

S..... (1mark)

- (ii) Which physiological process was being investigated?

(1mark)

.....

- c) Account for the observation made after 20 minutes.

(3marks)

.....  
.....  
.....  
.....

d) State the parts in the human alimentary canal where starch is digested.

(2marks)

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2. Haemophilia is a sex linked disorder caused by a recessive gene. A man who is haemophilic marries a woman who is heterozygous for the disorder. Using letter H to represent the dominant gene.

a) Work out the genotypes of the children from the above marriage.

(4marks)

b) What is the probability that a baby boy born to the family is haemophilic?

(1mark)

c) (i) What is meant by the term sex-linked genes.

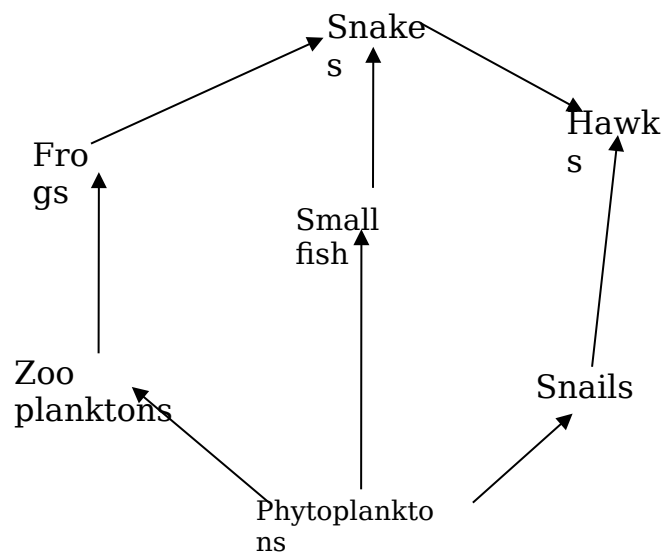
(2marks)

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.....

(ii) Name two other sex-linked disorders apart from haemophilia.  
(2marks)

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.....  
.....

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 organisms in the food web that:

(i) Are producers. ....  
(1mark)

.....

.....

(ii) Occupies the highest trophic level .....

(1mark)

.....

.....

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

.....

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

(2marks)

.....

.....

d) How does oil spills lead to death of fish.

(1mark)

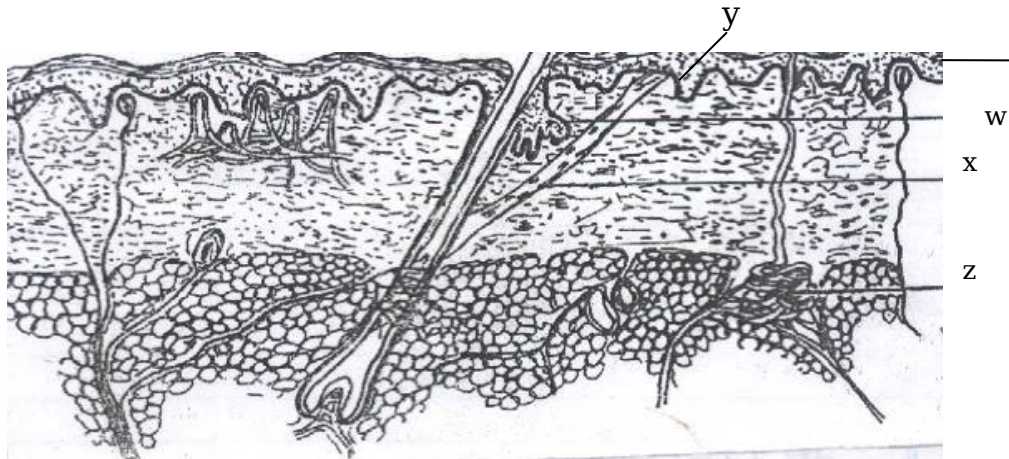
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.....

e) Name one other cause of water pollution apart from oil spills.  
(1mark)

.....  
.....

4. The diagram below shows a section through the mammalian skin.



a) Name the parts labeled W and X.

(2mrks)

W.....

X.....

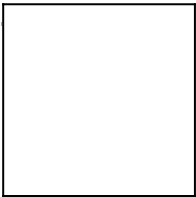
b) State the function of the parts labeled Y and Z.

(2mrks)

Y.....

.....

Z.....



.....c)

Explain the changes that occur in the skin when it is cold.

(4mrks)

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The results in the table below shows the effects of some conditions necessary for seed germination. In each experiment, all other environmental conditions were kept constant, except for the one being investigated.

| Experiment | Treatment                                                                                                 | % of germination |
|------------|-----------------------------------------------------------------------------------------------------------|------------------|
| A          | Seeds placed in a tightly closed container with pyrogallic acid.                                          | 0                |
| B          | (i) Seeds kept in light<br>(ii) seeds kept in a dark cupboard                                             | 96<br>97         |
| C          | (i) Seeds kept in a refrigerator at 4°C<br>(ii) Seeds kept in an oven at 60°C<br>(iii) Seeds kept at 33°C | 0.5<br>0<br>92   |
| D          | (i) Dry seeds in closed containers.<br>(ii) Moist seeds in closed container.                              | 0<br>87          |

a) (i) What was the purpose of pyrogalllic acid in experiment A?  
(1mark)

.....

(ii) State the aim of experiment. B  
(1mark)

.....

...b) (i) Account for the results obtained in experiment set up C  
(3mrks).

.....

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.....

(ii) State why 100% germination was not achieved in experiment D (ii)  
(1mark)

.....

.....

.....c) Of what biological significance is the condition necessary for  
germination been investigated by experiment A/D?

(2marks).

.....

.....

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.....

## SECTION B (40marks)

**Answer question 6 (compulsory) and either question 7 or 8 in the spaces provided after question 8.**

5. 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.

a)

|                                                             |    |    |    |    |    |    |    |    |    |    |                       |
|-------------------------------------------------------------|----|----|----|----|----|----|----|----|----|----|-----------------------|
| Time of the day (hours)                                     | 6  | 8  | 10 | 12 | 14 | 16 | 18 | 20 | 22 | 24 | On the same axes draw |
| Volume of Carbon (iv) oxide consumed (mm <sup>3</sup> /min) | 10 | 43 | 69 | 91 | 91 | 50 | 18 | 0  | 0  | 0  |                       |
| Volume of Carbon (iv) oxide released (mm <sup>3</sup> /min) | 38 | 22 | 10 | 3  | 3  | 6  | 31 | 48 | 48 | 48 |                       |

graphs of volume of Carbon (iv) oxide consumed and released against time. (7marks)

- b) Name the chemical process changes represented by:

(i) Carbon (iv) oxide consumed.

(1mark)

.....  
 .....

(ii) Carbon (iv) oxide released.

(1mark)

.....

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

(i) Carbon (iv) oxide consumed.

(3marks)

.....  
.....  
.....  
.....

(ii) Carbon (iv) oxide released.

(3marks)

.....  
.....  
.....  
.....

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

(1mark)

.....  
.....

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

(2marks)

.....  
.....  
.....

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

(2marks)



Name: ..... Index. No: .....

Candidate's Signature: .....

Date: .....

## **2012 PROJECTIONS-014**

### **Kenya Certificate Of Secondary Education**

**BIOLOGY  
PAPER 2  
THEORY  
2 HOURS**

#### **Instructions to Candidates**

- Write your name and index number in the spaces provided.
- Sign and write the date of examination in the spaces provided.
- The paper has two sections: A and B.
- Answer all the questions in Section A in the spaces provided , 40 marks.
- In Section B answer six (6) compulsory questions and either question 7 or 8 in the spaces provided after question 8.
- This paper consists of 8 printed pages.
- Kindly check the question paper to ascertain that all the pages are printed as indicated.

#### **For Examiners Use Only**

| Section | Question | Maximum | Candidate's |
|---------|----------|---------|-------------|
|---------|----------|---------|-------------|

|          |              | <b>Score</b> | <b>Score</b> |
|----------|--------------|--------------|--------------|
| <b>A</b> | 1            | 9            |              |
|          | 2            | 8            |              |
|          | 3            | 8            |              |
|          | 4            | 8            |              |
|          | 5            | 7            |              |
| <b>B</b> | 6            | 20           |              |
|          | 7            | 20           |              |
|          | 8            | 20           |              |
|          | <b>Total</b> |              |              |

1. In a certain habitat

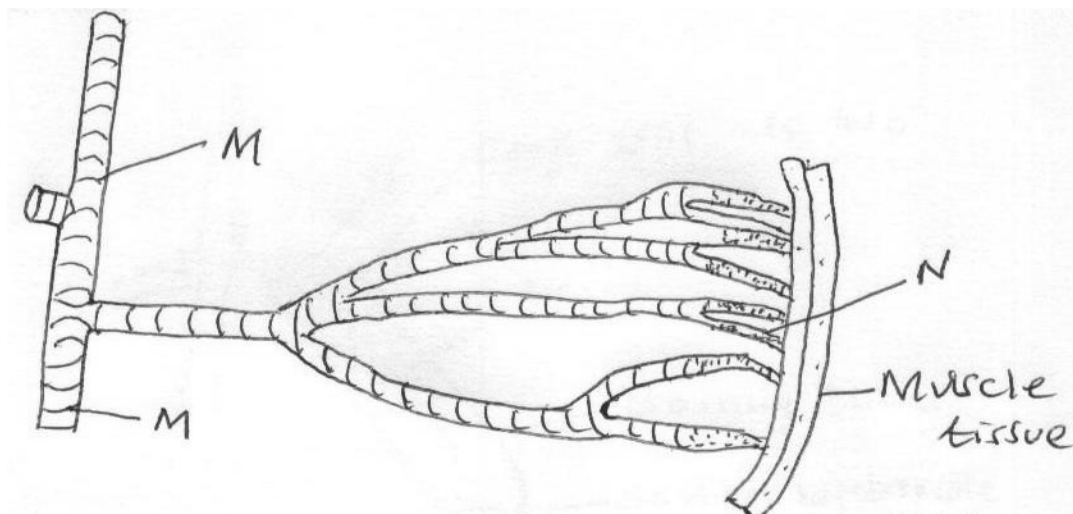
- Gazelles, termites, guinea fowls and grasshoppers feed on grass.
- Guinea fowls feed on grasshoppers and termites.
- Vultures feed on guinea fowls and leopards.
- Leopards feed on gazelles.

a) Construct a food web to show the above feeding relationship.  
(5mks)

b) Extract **two** food chains where vultures are tertiary consumers.  
(2mks)

- c) What would be the short term effects on the ecosystem if lions invaded the area?  
(2mks)

2. The diagram below represents part of a cockroach gaseous exchange system.



a) Name the parts labelled M and N on the diagram.  
(2mks)

M -

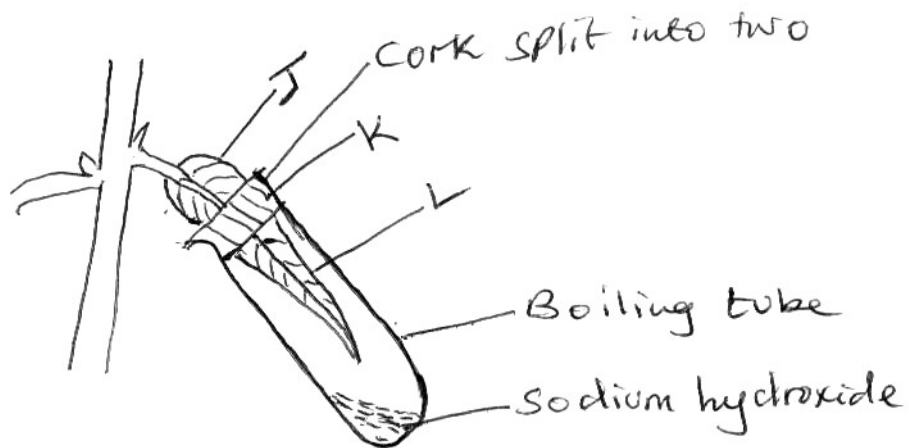
N -

b) State the functions of the structure labelled M. (1mk)

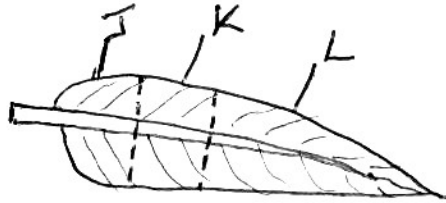
c) Describe the path taken by CO<sub>2</sub> as it diffuses out of the muscle tissues of the cockroach.  
(3mks)

d) Name the structures in mammalian breathing systems that have similar functions to M and N.  
(2mks)

3. A potted plant with healthy leaves was kept in the dark for 48 hours. One of the leaf was then partly enclosed in a wide boiling test tube containing sodium hydroxide solution. The whole set up was then kept in sunlight for six hours. The diagram is shown below.



- a) Suggest the aim of the experiment. (1mk)
- b) Why was the set up kept in the dark for 48 hours? (1mk)
- c) Why was the set up kept in the sunlight for six hours? (1mk)
- d) What is the importance of sodium hydroxide solution in the set up? (1mk)
- e) The leaf was then tested for starch. (1mk)



- i) State the expected results for the parts labelled J and L.

J -

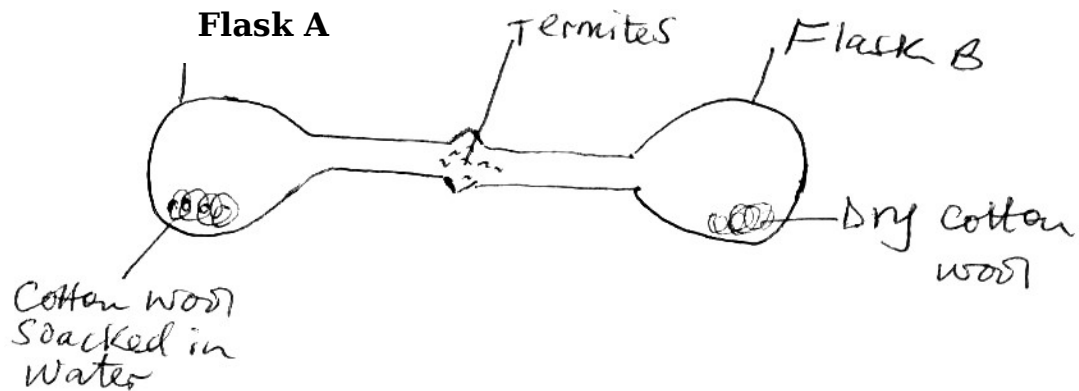
L -

- ii) In part K the colour of iodine did not change. Suggest two possible reasons. (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 offsprings in F1 generation had grey coats. Using letter B to represent the gene 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 F1 generation. (1mk)
- b) The F1 offsprings were believed 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)
5. An experiment was set up to investigate the behaviour of termites when subjected to different conditions as shown below.



After 20 minutes all the termites moved into flask A.

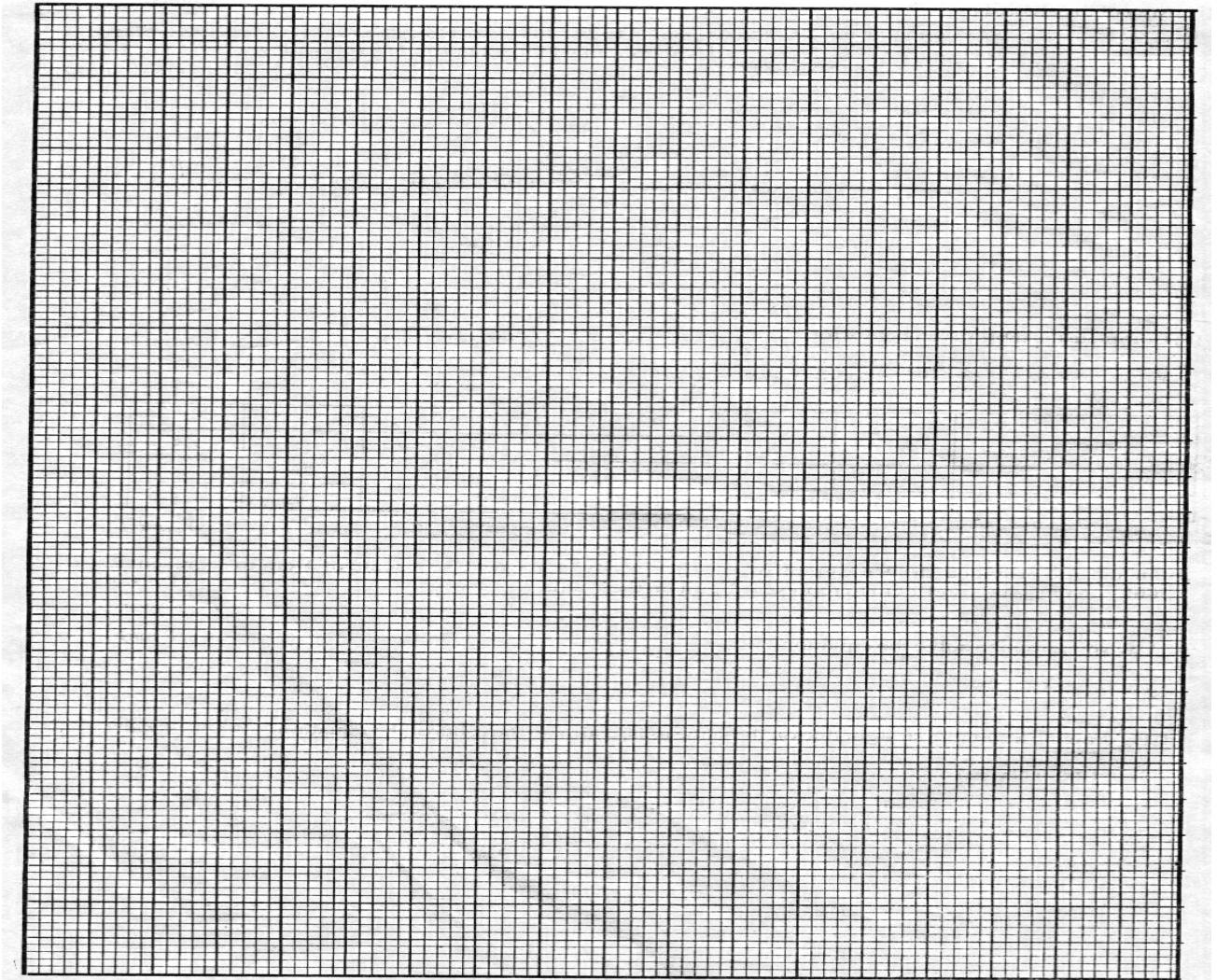
- a) What is the name of this response? (1mk)
- b) Of what importance is the response in (a) above.  
(1mk)
- c) Name the type of circulation found in termites. (1mk)
- d) Explain how tendrils in passion fruits coil around a hard object.  
(4mks)

**SECTION B (40 MARKS)****Question 6 is compulsory****Answer either question 7 or 8 in the spaces provided at the end of the question 8.**

6. In an investigation, two people A and B drank equal amounts of a strong glucose solution. Their blood sugar level was immediately determined and thereafter at one hour intervals for the next six hours. The results were shown in the table below.

| Time in Hours | Glucose level in of blood<br>mg/100ml |          |
|---------------|---------------------------------------|----------|
|               | Person A                              | Person B |
| 0             | 88                                    | 110      |
| 1             | 224                                   | 334      |
| 2             | 160                                   | 320      |
| 3             | 92                                    | 300      |
| 4             | 90                                    | 260      |
| 5             | 90                                    | 244      |
| 6             | 88                                    | 214      |

- a) In the grid provided, plot a graph for the blood glucose level against time for the person A and B. (8mks)



b) In man, the normal blood sugar level is about 90mg/100ml of blood.  
Explain the change in the sugar level in person A during:

i) The first hour (2mks)

ii) Between 2<sup>nd</sup> - 4<sup>th</sup> hour. (3mks)

- c) i) What is the possible reason for the high blood sugar level in person B beyond the normal level. (1mk)
- ii) Name the disease associated with high blood sugar level. (1mk)
- iii) Name the test that can be carried out to test for the presence of glucose in urine. (1mk)
- d) Explain the absence of glucose in the urine of person A. (2mks)
- e) How is blood sugar level raised back to normal level. (2mks)
7. Describe the functions of the various parts of a mammalian skin. (20mks)

NAME: \_\_\_\_\_  
INDEX NUMBER \_\_\_\_\_  
CANDIDATE'S SIGN \_\_\_\_\_  
DATE: \_\_\_\_\_

**231/2  
BIOLOGY  
PAPER 2  
(THEORY)  
2 HRS**

**2012 PROJECTIONS-015**

**Kenya Certificate Of Secondary  
Education**

**INSTRUCTIONS TO CANDIDATES**

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

**FOR EXAMINERS USE ONLY.**

| Section | Maximum score | Candidates score |
|---------|---------------|------------------|
|---------|---------------|------------------|

|   |             |  |
|---|-------------|--|
| A | 40          |  |
| B | 40          |  |
|   | Total score |  |

**SECTION A (40 MARKS)**

Answer ALL questions in this section in the space provided below the question.

1. (a) What is meant by the term sex linkage? (1 mk)

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- (b) Name two sex-linked traits in humans. (2 mks)

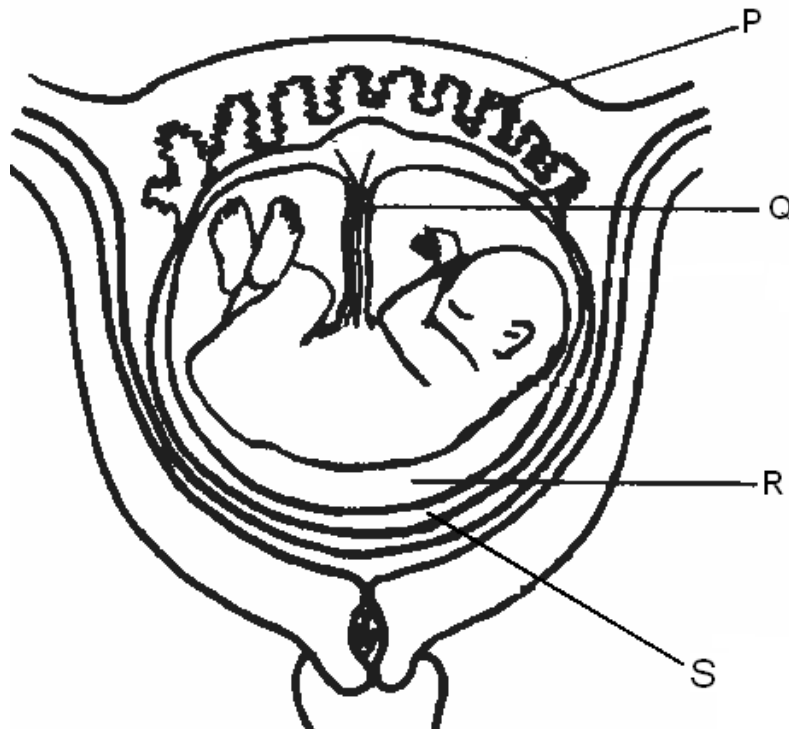
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- (c) In Drosophila Melanogaster, the inheritance of eye colour is sex-linked. The gene for the red eye is dominant. A cross was made between a homozygous red-eyed female and a white eyed male. Work out the phenotypic ratio of F1 generation. (5 mks)  
(Use R to represent the gene for red eyes)

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



(a) Name the part labeled S. (1 mk)

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(b) (i) Name the types of blood vessels found in the structure labeled Q. (2mks)

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

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(c) Name two features that enable the structure labeled P carry out its function. (2 mks).

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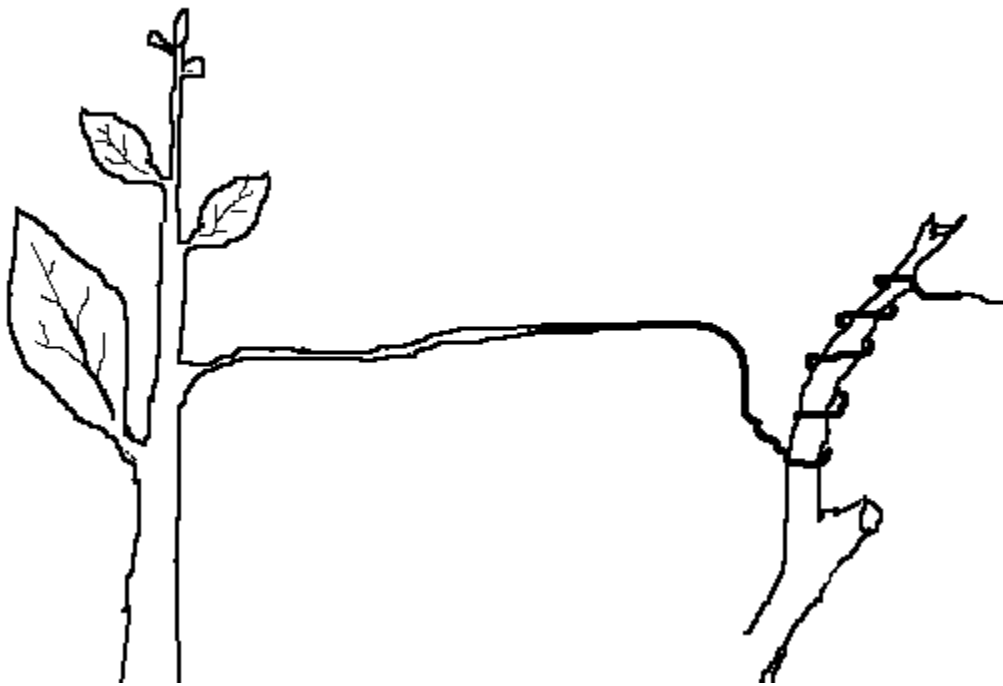
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(d) State the role of the part labeled R. (1 mk)

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3. A response exhibited by a certain plant tendril is illustrated below.



(a)(i) Name the type of response. (1 mark)

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ii. Explain how the response named in a (i) above occurs. (3 mks)

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(b) What is the importance of tactic response to microscopic pants? (1 mark)

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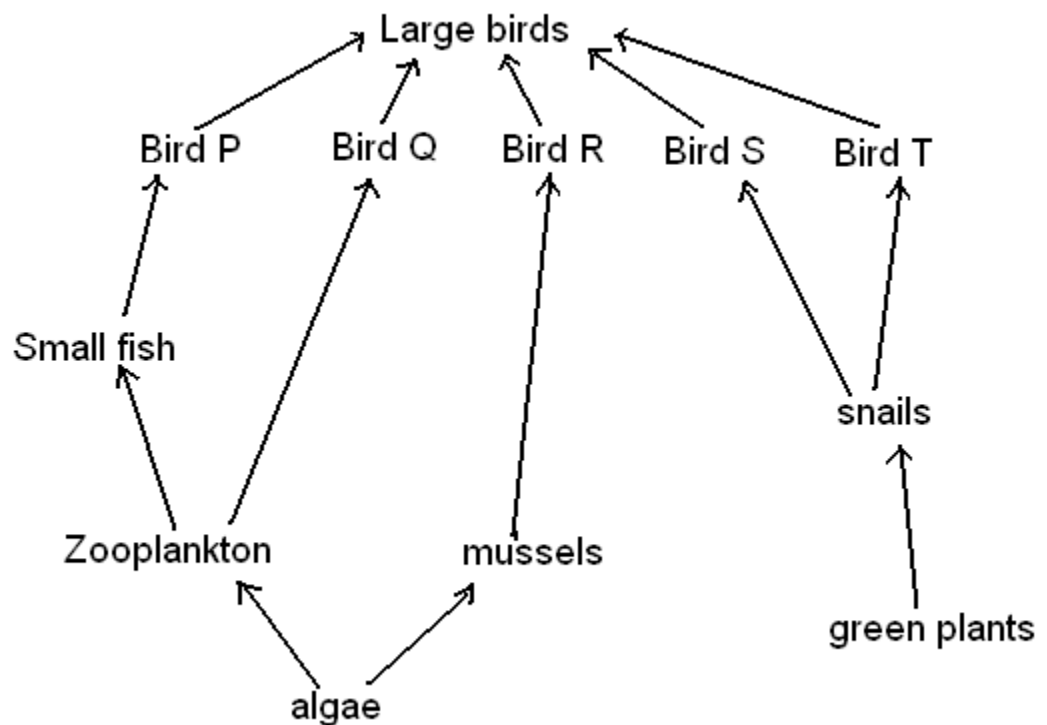
(c) State three applications of plant hormones in agriculture. (3 marks)

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4. After an ecological study of feeding relationships, students constructed the food web below.



a. Name the process through which energy from the sun is incorporated into the food web. (1mk)

---

b. State the mode of feeding of the birds in the food web. (1 mark)

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c. Name two ecosystems in which the organisms in the food web live. (2 mks)

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d. From the information in the food web, construct a food chain with the large bird as a quaternary consumer. (1 mark)

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e. (i) Two organisms which play a role in the ecosystems are not included in the food web. Name them. (2 mks)

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(ii) State the role played by the organism named in e (i) (1 mark)

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5. The table below shows the concentration of sodium and iodine ions in pond water and in the cell sap of water lettuce plant.

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

a. Giving reasons, name the process through which each of the ions is taken up by the plant.

(i) Sodium ion. (2 mks)

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(ii) Iodine ion. (2 mks)

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b. The lettuce plant was then treated with a chemical substance that inhibits the synthesis of ATP.

Giving a reasons, state which ion uptake was affected by the treatment. (2 mks)

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c. Explain why fresh water fish cannot survive in marine habitat. (2 mks)

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### **SECTION B 40 MARKS**

Answer question 6 (compulsory) and either question 7 or 8 in the spaces provided after question 8

6. A hungry person had a meal, after which the concentrations of glucose and amino acids in the blood were determined. This was measured hourly as the blood passed through the hepatic portal vein

and the iliac vein in the leg. The results were as shown in the table below.

| Time (hrs) | Concentrations of contents in the hepatic portal vein (mg/100ml) |             | Concentration of contents in the iliac vein of the leg (mg/100ml) |             |
|------------|------------------------------------------------------------------|-------------|-------------------------------------------------------------------|-------------|
|            | Glucose                                                          | Amino acids | Glucose                                                           | Amino acids |
| 0          | 85                                                               | 1.0         | 85                                                                | 1.0         |
| 1          | 85                                                               | 1.0         | 85                                                                | 1.0         |
| 2          | 140                                                              | 1.0         | 125                                                               | 1.0         |
| 3          | 130                                                              | 1.5         | 110                                                               | 1.5         |
| 4          | 110                                                              | 1.5         | 90                                                                | 3.0         |
| 5          | 90                                                               | 3.0         | 90                                                                | 2.0         |
| 6          | 90                                                               | 2.0         | 90                                                                | 1.0         |
| 7          | 90                                                               | 1.0         | 90                                                                | 1.0         |

a. Using the same axis, draw graphs of concentration of glucose in the hepatic portal vein and the iliac vein of the leg against time. (7 mks)

b. Account for the concentration of glucose in the hepatic portal vein from

i. 0 – 1 hr. (2 mks)

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ii. 1 – 2 hrs (3 mks)

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iii. 2 – 4 hrs. (2 mks)

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iv. 5 – 7 hrs. (2 mks)

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- c. Account for the difference in concentration of glucose in hepatic portal vein and the iliac vein between 2 and 4 hrs. (3 mks)

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- d. Using the data provided in the table, explain why the concentration of amino acids in the hepatic portal vein took longer to increase. (1 mark)

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7. (a) Explain the roles of the mammalian placenta. (7 mks)

- (b) Describe how hormones regulate the menstrual cycle in human females. (13 mks)

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8Describe causes and methods of controlling water pollution. (20 mks)

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**Name**.....  
 .....

**Index No.**

**School** .....

**Date.....**

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**Sign.....**

**231/2**  
**BIOLOGY**  
**PAPER 2**  
**Time: 2 Hours**

## 2012 PROJECTIONS-016

# Kenya Certificate Of Secondary Education

## **INSTRUCTIONS TO CANDIDATES**

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

## **FOR EXAMINERS USE ONLY**

| SECTION | QUESTION | Max Score | Candidate Score |
|---------|----------|-----------|-----------------|
| A       | 1        | 8         |                 |
|         | 2        | 8         |                 |
|         | 3        | 8         |                 |
|         | 4        | 8         |                 |
|         | 5        | 8         |                 |
| B       | 6        | 20        |                 |
|         | 7        | 20        |                 |
|         | 8        | 20        |                 |
|         | TOTAL    | 80        |                 |

*This paper consists of 12 printed pages. Candidates should check the question paper to ensure that all pages are printed as indicated and no questions are missing*

## **SECTION A (40 MARKS)**

1. Sickle cell anaemia is caused by a recessive gene "S" A woman who has a sickle cell trait marries a normal man.
  - a) Using a punnet square work out the genotypic ratio of the offsprings. (5mks)

b) The sickle cell trait is more prevalent in tropical countries than in temperate countries. Explain this observation  
(3mks)

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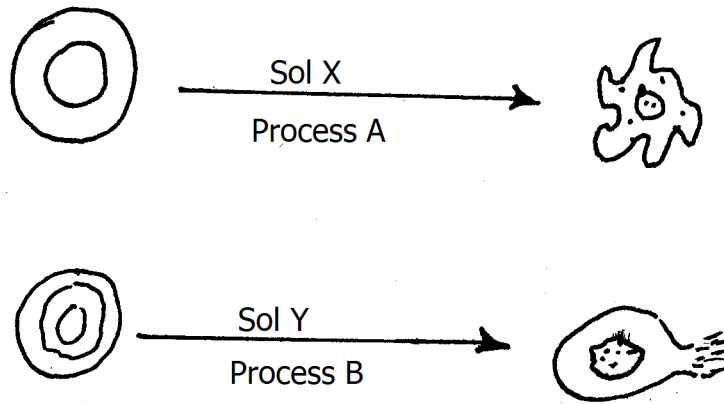
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2. The diagram below illustrates the behaviour of red blood cells when placed into two different solutions X and Y.



a) i) Suggest the nature of solution X and Y  
(2mks)

Solution

X .....

Solution Y.....

ii) Name the process represented by each of the letters A and B  
(2mks)

Process

A .....

Process

B.....

b) Name the process in the human body, which prevents processes A and B from taking place  
(1mks)

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c) Account for the observation made at the end of process B above.  
(3mks)

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3. The table below shows the contents of urine compared to blood plasma and glomerular filtrate in a mammal. Study it and answer the questions that follow.

| Component          | Plasma g/cm <sup>3</sup> | Glomerular<br>g/100cm <sup>3</sup> | Urine g/100cm <sup>3</sup> |
|--------------------|--------------------------|------------------------------------|----------------------------|
| Urea               | 0.04                     | 0.04                               | 2.10                       |
| Uric acid          | 0.005                    | 0.005                              | 0.07                       |
| Glucose            | 0.20                     | 0.20                               | 0.00                       |
| Amino acids        | 0.07                     | 0.07                               | 0.00                       |
| Plasma<br>proteins | 9.00                     | 0.00                               | 0.00                       |
| Salts              | 0.84                     | 0.84                               | 1.96                       |

- a) Account for the absence of;  
i) Plasma protein in glomerular filtrate  
(1mk)

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- ii) Glucose and amino acids in urine  
(1mk)

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- b) From the results above, identify two types of wastes eliminated from the mammalian blood through the kidney.

(2mks)

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- c) Give a reason why kidney tubules are highly coiled  
(1mk)

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d) Name the hormone responsible for;

i) Osmoregulation

(1mk)

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.....

ii) Reabsorption of mineral salts

(1mk)

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e) Name one kidney disease

(1mk)

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.....

4. The table below shows the approximate distribution of human blood group in a sample

Of 100 people in a population.

| Blood group | Pregnecy | Rh <sup>+ve</sup> | Rh <sup>-ve</sup> |
|-------------|----------|-------------------|-------------------|
| A           | 26       | 22                | 4                 |
| B           | 20       | 18                | 2                 |
| AB          | 4        | 3                 | 1                 |
| O           | 50       | 42                | 8                 |

a) Calculate the percentage of Rh<sup>-ve</sup> in the whole group of donors.  
(2mks)

b) Evolutionary changes take place in a population to maintain a balanced community.

Basing your answer on blood transfusion, explain the role played by the nature on

distribution of

i) Blood group O (2mks)

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ii) Blood group AB in the population  
(2mks)

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c) i) What is the difference between Rhesus positive and Rhesus negative blood samples (1mk)

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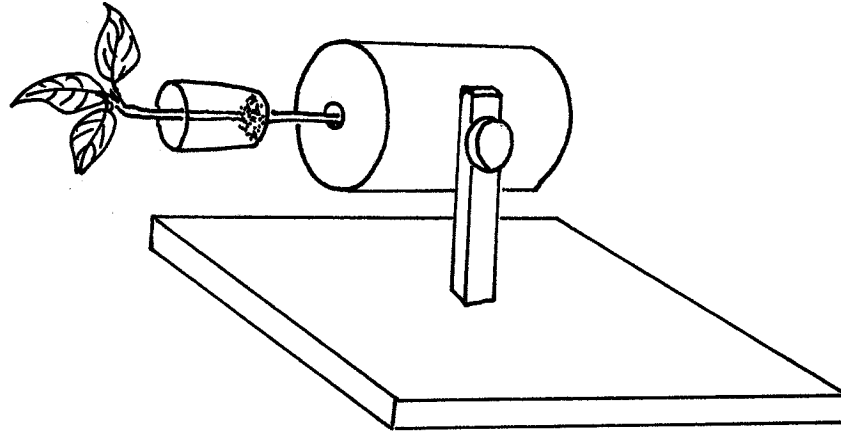
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ii) A potential mother of blood group BRh<sup>-ve</sup> requires a blood transfusion before her first pregnancy. What blood group(s) can she receive safely if the husband is of Rh<sup>+ve</sup> blood. Explain your answer (1mk)

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.....

5. Study the diagram below which makes 4 revolutions per hour. A tomato seedling with a straight radicle and plumule was attached to the apparatus as shown below.



- a) Give the name of the above apparatus  
(1mk)

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- b) i) Make a drawing of how the seedling above might have appeared after a fortnight.

(Draw the seedling alone with radicle and shoot)

(2mks)

ii) Account for the observation in b) (i) above  
(2mks)

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c) What type of responses are being expected in this experiment?  
(2mks)

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d) Give one survival value of the response above  
(1mk)

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## SECTION B (40 MARKS)

**Answer question six (compulsory) and either question 7 or 8 in the spaces provided after question 8.**

6. An experiment was performed to find out the effect of carbon (iv) oxide concentration on

The rate of photosynthesis. The results were as given below.

|                                           |   |     |     |     |     |     |     |     |     |     |     |
|-------------------------------------------|---|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| % CO <sub>2</sub>                         | 0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.2 |
| Concentration in (Vol of air)             |   | 2   | 3   | 5   | 7   | 0   | 3   | 5   | 7   | 9   |     |
| Rate of photosynthesis<br>arbitrary units | 0 | 21  | 25  | 29  | 38  | 40  | 44  | 46  | 46  | 46  | 46  |

- a) On the grid provided draw a graph showing the rate of photosynthesis against carbon (iv) oxide concentration  
(6mks)

b) i) From the graph, what is the optimum concentration of carbon (iv) oxide for photosynthesis

(1mk)

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ii) Define the term optimum concentration with reference to the graph (1mk)

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c) Account for the shape of the curve between carbon (iv) oxide concentration of 0.02% and

0.15% carbon (iv) oxide concentration.

(1mk)

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d) Explain why the curve levels off at 0.15% carbon (iv) oxide concentration (1mk)

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e) Other than carbon (iv) oxide concentration state four other factor that affect the

rate of photosynthesis

(4mks)

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f) Name two products formed in

i) Light stage (2mks)

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ii) Dark stage (2mks)

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g) What is the importance of photosynthesis in nature  
(2mks)

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7. a) Distinguish between Homologous and analogous structures.  
(2mks)

b) Discuss the various evidences that support organic evolution  
(18mks)

8. Describe how the structures of the mammalian heart is adapted to  
performing its function (2mks)

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**Name..... Index**

**No.....**

**School..... Candidate's**

**sign.....**

**Date.....**

## 2012 PROJECTIONS-017

# Kenya Certificate Of Secondary Education

## **INSTRUCTIONS TO CANDIDATES**

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

## **FOR EXAMINERS USE ONLY**

| SECTION | QUESTION     | Max Score | Candidate Score |
|---------|--------------|-----------|-----------------|
| A       | 1            | 3         |                 |
|         | 2            | 9         |                 |
|         | 3            | 8         |                 |
|         | 4            | 7         |                 |
|         | 5            | 6         |                 |
| B       | 6            | 7         |                 |
|         | 7            | 20        |                 |
|         | 8            | 20        |                 |
|         | <b>TOTAL</b> | <b>80</b> |                 |

***This paper consists of 12 printed pages. Candidates should check the question paper to ensure that all pages are printed as indicated and no questions are missing***

1. There is an outbreak of cholera in your village and being the only reliable scientist, you are contacted for advice.
  - a) State the causes of cholera .  
(1mk)

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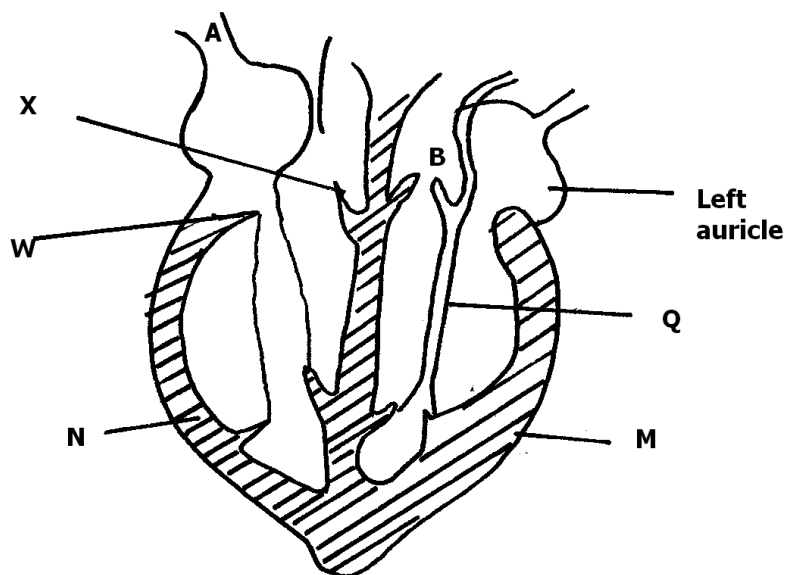
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b) State one piece of advice in each case that you would give the community regarding

(i) Way of the spread of the disease.  
(1mk)

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.....  
(ii) Prevention of the disease.  
(1mk)

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.....  
2. Below is a diagram of a mammalian heart. The diagram does not represent the central size of the organ.



- a) Name the valves X,W and Q and the function of each.  
(3mks)

|   | Name | Function |
|---|------|----------|
| X |      |          |
| W |      |          |
| Q |      |          |

- b) i) Name the muscle type M.  
(1mk)

- .....
- ii) What is the significance in the difference between thickness of muscle M and N.  
(2mks)
- .....
- .....

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- c) How does blood in vessel A differ from that in vessel B.  
(2mks)

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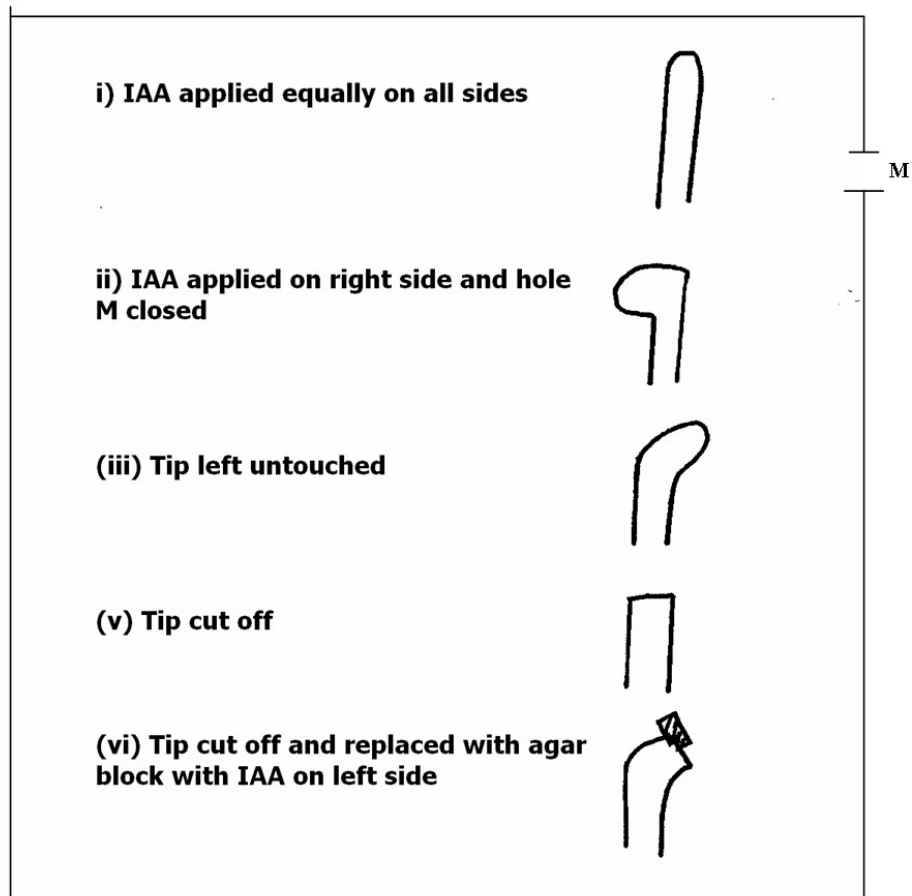
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- d) Why is the muscle named in b(i) above considered special than the other body muscles.

(1mk)

.....

3. Indoleacetic acid (IAA) is a plant hormones. The following experiments were carried out using oat coleoptiles. Growing coleoptiles were treated in each then placed in a large dark box with a small Hole M for 18 hours. The box was placed near a source of light.



- a) i) What is the effect of IAA on plant as shown by experiment (i) and (ii) .

Give a reason.

(2mks)

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- ii) From experiment (iii) and (vi), deduce the part of the coleoptile affected by light.

Give a reason.

(2mks)

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b) Explain how growth of coleoptile in experiment III is brought about. (3mks)

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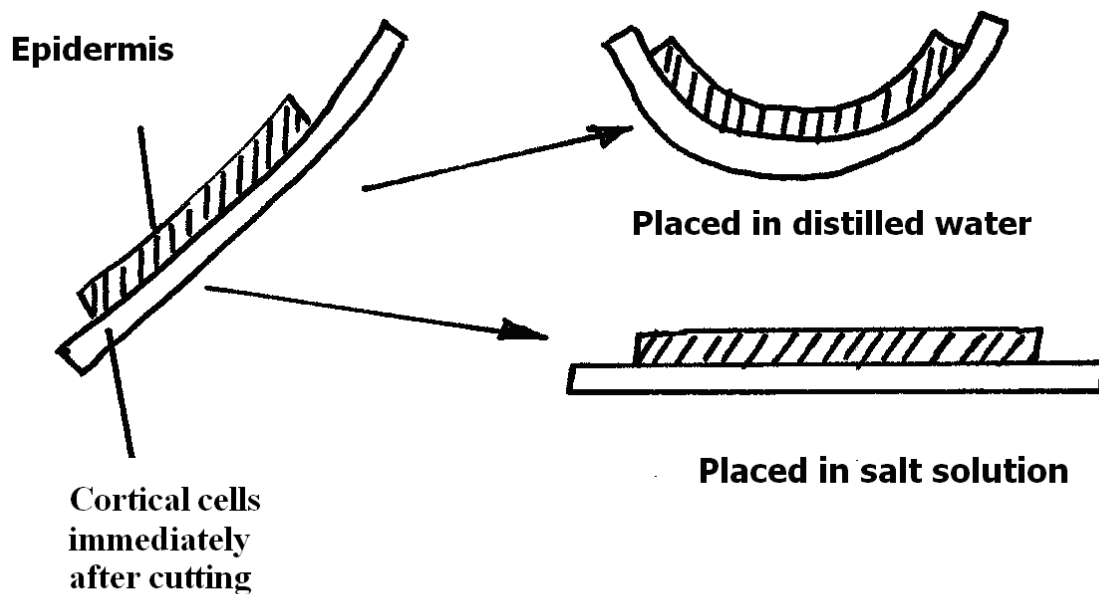
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c) Name the growth response exhibited by the coleoptile in experiment (iii) (1mk)

.....

4. The diagrams below show the treatment given to stripes of Barbadoes stem which were cut lengthwise from the main stem.



- a) Account for the results obtained when the stripes were put in;
- (i) Distilled water.
- (2mks)

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- (ii) Strong salt solution.
- (2mks)

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b) Name the physiological process being investigated.  
(1mk)

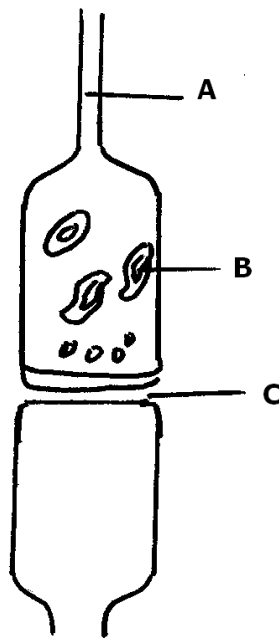
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c) Why did the strips curl slightly towards the epidermis after being  
cut . (2mks)

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5. a) Define a nerve impulse.  
(1mk)

.....

.....  
b) The diagram below represents a part of nervous system of a  
mammal.



Identify the structure represented by diagram.

(1mk)

c) Name the parts labelled A B and C.

(3mks)

A .....

B .....

C .....

d) Name the chemical contained in the synaptic vesicles.

(1mk)

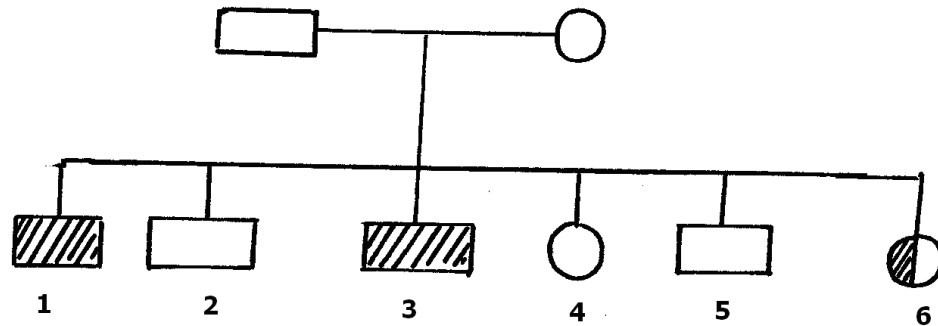
e) On the diagram indicate the direction of the impulse using arrow.

(1mk)

6. a) Name one human disorders caused by gene mutation and are not sex-linked. (1mk)

.....

b) Study the genetic chart below showing inheritance of a gene responsible for haemophilia in a family.



**KEY**



Normal female



Haemospiliac female



Haemospiliac male



Normal male



Carrier female

i) Write the genotypes of individual numbered 1 and 6.

(2mks)

1 .....

6 .....

i) Supposed a family member 6 marries haemophilia male, what will be the phenotype ratio of the offspring. Show your working.

(4mks)

## SECTION B (40 MARKS)

### Compulsory

7. In an investigation, the approximate composition of plasma, glomerula filtrate and urine in a mammals was determined.

| <b>Component</b>      | <b>Plasma g/<br/>100cm<sup>3</sup></b> | <b>Glomerular<br/>filtrate<br/>g/100cm<sup>3</sup></b> | <b>Urine g/<br/>100cm<sup>3</sup></b> |
|-----------------------|----------------------------------------|--------------------------------------------------------|---------------------------------------|
| <b>Urea</b>           | 0.04                                   | 0.04                                                   | 2.0                                   |
| <b>Uric acid</b>      | 0.005                                  | 0.005                                                  | 0.07                                  |
| <b>Glucose</b>        | 0.20                                   | 0.20                                                   | 0.00                                  |
| <b>Amino acid</b>     | 0.07                                   | 0.07                                                   | 0.00                                  |
| <b>Plasma protein</b> | 9.00                                   | 0.00                                                   | 0.00                                  |
| <b>Salts</b>          | 0.84                                   | 0.84                                                   | 1.96                                  |

- a) Account for the absence of:

i) Plasma protein in glomerular filtrate.  
(2mks)

.....

.....

ii) Glucose and amino acid in urine.  
(2mks)

.....

.....

b) i) From the above results, identify two types of wastes  
eliminated from mammalian  
blood.  
(2mks)

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ii) Other than excretion, give one other function of the  
Mammalian Kidney. (1mk)

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c) i) State the principal requirement of filtration that forms glomerular filtrate. (1mk)

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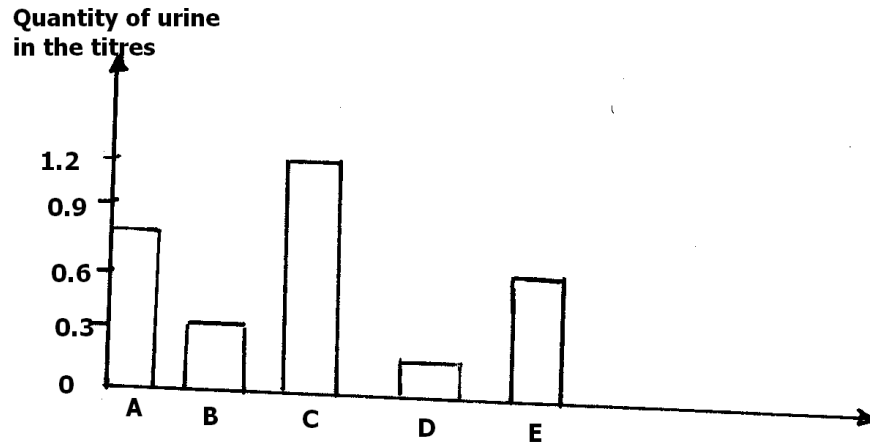
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ii) How is the requirement identified in c(i) above achieved in the Kidney? (2mks)

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d) Describe the process of urea formation. (3mks)

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e) The quality of urine passed per day was established in five mammals A,B,C,D and E of the same species in their natural Habitats .The results are shown below.



- i) Which of the five mammals was likely to be excreting urine very rich in ammonia?

Give a reason.

(2mks)

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- ii) Of the five mammals which is likely to be a desert Mammal. Give a reason . (2mks)

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iii) State two structural differences expected in the nephrons of mammals A and D. (2mks)

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iv) Explain how ADH affect the amount of urine produced by a mammal per day. (1mk)

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.....  
8. a) Outline the characteristics of the meristematic tissues . (5mks)

b) Explain how meristematic tissues contribute to growth of higher plants.  
(15mks)

9. Giving examples give an account of the evidences of organic evolution.  
(20mks)

Name.....

Index

No...../.....

School.....

Date

.....

Candidate's Signature.....

231/2

**BIOLOGY**

**(THEORY)**

**PAPER 2**

**Time: 2 Hours**

## **2012 PROJECTIONS-018**

### **Kenya Certificate Of Secondary**

### **Education**

#### ***INSTRUCTIONS TO CANDIDATES***

- Write your Name, School and Index number in the spaces provided above.
- This paper consists of two section A and B
- Answer **ALL** the questions in section A in the spaces provided. In section B answer question 6( compulsory) and either questions 7 or 8.

#### **For Examiners Use Only**

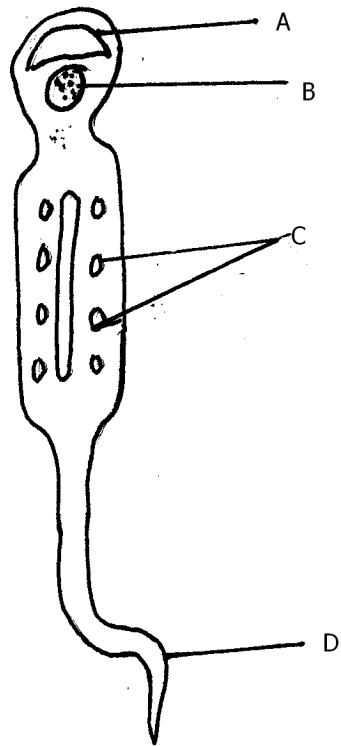
| <b>SECTION</b> | <b>Question</b> | <b>Maximum</b> | <b>Score</b> |
|----------------|-----------------|----------------|--------------|
| <b>A</b>       | <b>1</b>        | <b>8</b>       |              |
|                | <b>2</b>        | <b>8</b>       |              |
|                | <b>3</b>        | <b>8</b>       |              |
|                | <b>4</b>        | <b>8</b>       |              |

|                    |          |           |  |
|--------------------|----------|-----------|--|
|                    | <b>5</b> | <b>8</b>  |  |
| <b>B</b>           | <b>6</b> | <b>20</b> |  |
|                    | <b>7</b> | <b>20</b> |  |
|                    | <b>8</b> | <b>20</b> |  |
| <b>TOTAL SCORE</b> |          | <b>80</b> |  |

*This paper consists of 12 printed pages.  
Candidates should check the question paper to ensure that all pages are printed as  
indicated  
and no questions are missing.*

**SECTION A**

1. The diagram below shows a specialized cell from a human being.



(a) Identify the cell.  
(1mk)

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(b) Name the parts labeled A,B and C.  
(3mks)

A

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B.

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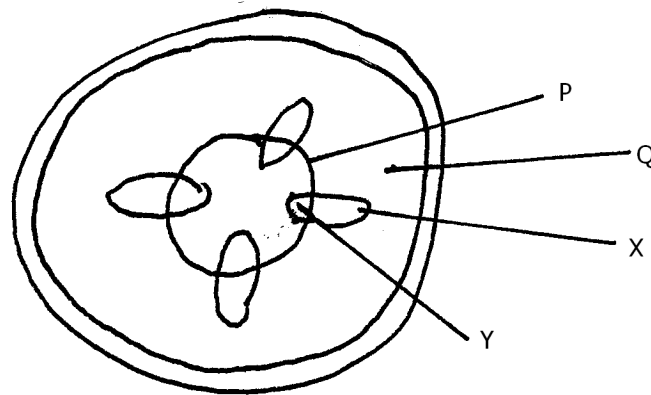
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.....  
C.....

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( c) State the function of the part labeled D.  
(1mk)

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(d) A student observed cells under a microscope and counted six ( 6) cells across the diameter of field of view. The diameter of field of view was found to be 1.25 mm. Calculate the length of one of the cells observed.  
(Answer in micrometer)  
(3mks)

2. The diagram below shows a cross section of a dicotyledonous plant stem. Study it and answer the questions that follow.



(a) Identify parts labeled Q,X,Y.  
(3mks)

Q.....  
.....  
.....  
.....

X.....  
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Y.....  
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(b) State the function of part labeled P.  
(1mk)

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( c) State how structure labeled Y is adapted to perform its functions.  
(2mks)

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- (d) State two structural differences between arteries and veins.  
(2mks)

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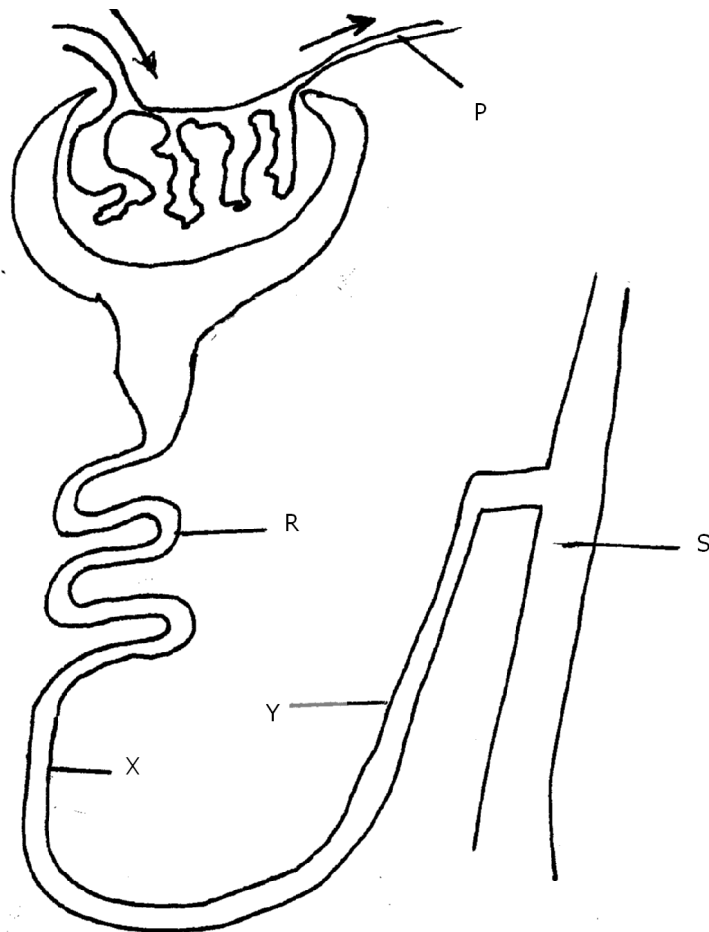
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3. The diagram below represents a mammalian nephron.



(a) i) Name the part labeled R.

(1mk)

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(ii) Explain what occurs in the portion between X and Y.

(2mks)

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(b) Name two substances present at point R but absent at point S in a healthy person. (2mks)

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( c) Explain how urea is formed in the liver.

(2mks)

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(d) State one structural modification of nephrons found in desert mammals. (1mk)

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4. (a) What is meant by the term sex – linkage.

(2mks)

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(b) Name an example of sex linked trait in humans.

(1mk)

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- (c) In *Drosophila* species, the inheritance of eye colour is sex-linked. The gene for red eye colour is dominant. A cross was made between a white eyed female and a red eyed male. Work out the phenotypic ratio of F1 generation. Use R to represent the gene for red eyes.

(5mks)

5. (a) Explain the meaning of the following terms as used in evolution.  
(i) Adaptive radiation.

(1mk)

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- (ii) Convergent evolution .

(1mk)

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(iii) Mutation.

(1mk)

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(b) Give three reasons that made mankind to be the dominant specie  
on earth. (3mks)

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( c) State two limitations of fossils as evidence for evolution.

(2mks)

## **SECTION B**

6. A group of students carried out a study of the population growth of flour weevils. They put 16grams and 64 grams of maize flour into two equal boxes K and L respectively. They then introduced equal numbers of weevils into the boxes. The boxes were kept under similar environmental conditions. The weevils were counted at intervals and the results recorded in the table below.

| No. of days after<br>introduction of weevils | Approximate No. of weevils present |      |
|----------------------------------------------|------------------------------------|------|
|                                              | K                                  | L    |
| 0                                            | 20                                 | 20   |
| 5                                            | 20                                 | 20   |
| 40                                           | 200                                | 300  |
| 60                                           | 550                                | 800  |
| 80                                           | 560                                | 1300 |
| 100                                          | 650                                | 1750 |
| 120                                          | 640                                | 1750 |
| 135                                          | 650                                | 1740 |
| 150                                          | 645                                | 1748 |

- (a) Using a suitable scale, draw two graphs on the same axes from the results in the table.

Plot approximate number of weevils present on the Y - axis.

(8mks)

(b) What were the approximate numbers of weevils present in the two boxes on the 70<sup>th</sup> day.

(2mks)

Number in

K.....

.....

.....

Number in

L.....

.....

.....

( c) (i) On the what day was the population of weevils in K 580.

(1mk

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(ii) Between which days was the population difference greatest.

(1mk)

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(d) Account for the shape of graph L between day 5 and day 100.

(4mks)

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- (e) State factors that would make the human species assume the graph curve between day 100 and day 150.  
(4mks)

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7. Describe how human male reproductive system is adapted to perform its functions. (20mks)

8. How are leaves of mesophytes suited to their function.  
(20mks)



PAPER 2

Time 2 Hours.

## **2012 PROJECTIONS-019**

### **Kenya Certificate Of Secondary Education**

#### ***Instructions to Candidates.***

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

For examiner's use only.

| Question    | Maximum score | Candidates score. |
|-------------|---------------|-------------------|
| 1           | 8             |                   |
| 2           | 7             |                   |
| 3           | 9             |                   |
| 4           | 8             |                   |
| 5           | 8             |                   |
| 6           | 20            |                   |
| 7           | 20            |                   |
| 8           | 20            |                   |
| Total score | 80            |                   |

This paper consists of 9 pages

Turnover

SECTION A (40 MARKS)

Answer all the questions in this section in the spaces provided after each question.

1. Red- green colour blindness is inability to distinguish red and green colours caused by a sex- linked recessive gene.

(a)(i) In which chromosome is this gene found. (1 mark)

(ii) Which part of the eye fails to develop? (1 mark)

(b) A colour blind man marries a homozygous normal woman. Show the genotypes of the resulting offspring's. (Use R to stand for a dominant gene.) (4 marks)

(c) Why it is that this person cannot transmit this trait to his sons? (2 marks)

2. (a) What is osmoregulation? (1 mark)

(b) Name the habitats of organisms that excrete each of the following nitrogenous waste products. (3 marks)

| Nitrogenous waste product | Habitat |
|---------------------------|---------|
| Ammonia                   |         |
| Urea                      |         |
| Uric acid                 |         |

(c) Give three ways in which desert mammals conserve water. (3 marks)

3. Students in a certain school carried out an ecological study of a woodland and recorded the following observations.

- (i) Rabbits feed on plants.
- (ii) Hawks feed on rabbits and small birds.
- (iii) Snail feed on plants.
- (iv) Small birds feed on snails.
- (v) Fox feeds on rabbits and small birds.

(a) Using the above observations, construct a food web. 3 marks)

(b) From your food web;

- (i) Draw a food chain that ends with hawks as tertiary consumer. (1 mark)
  - (ii) Name two carnivores that compete for in the woodland and state the food they compete for? (2 marks)
  - (c) Suggest the most likely method of sampling used to estimate the rabbit population in the woodland. (1 mark)
  - (d) State two precautions the students should have taken when using the sampling method named in (c) above. (2 marks)
4. An experiment was set as shown below to compare the amount of carbon (iv) oxide in expired and inspired air.

- (a) State the purpose of clip
- (i) P (1 mark)

(ii) Q ( 1mark)

(b) Compare observations in tube A and B after experiment. Give reasons for your answer. (4 marks)

(c) State two advantages of breathing through the nostrils other than mouth. (2 marks)

5. The diagram below represents a germinating seedling whose radicle has been marked at equal intervals using water proof ink.

(a) Name the region labeled A, B and C (3 marks)

(b) If the seedling in diagram 1 was allowed to grow, indicate on diagram 2 the appearance of the marks after 3 days. (1 mark)

(c) State two roles of gibberellic acid in plants. (2 marks)

(d) State the importance of turgor responses in organisms. (2 marks)

SECTION B. (40 MARKS).

Answer question 6 (compulsory) in the spaces provided and either question 7 or 8 in the spaces provided after question 8.

6. Cells of tradescantia plant were found to have an average diameter of  $2.5\mu\text{m}$ . the cells were placed in varying concentrations of sugar solution. The diameter of the cells in each solution was determined and results obtained were as shown below.

| Percentage sugar concentration | Diameter of cells ( $\mu\text{m}$ ) |
|--------------------------------|-------------------------------------|
| 1                              | 5.0                                 |
| 5                              | 4.0                                 |
| 10                             | 3.0                                 |
| 15                             | 2.0                                 |
| 20                             | 1.5                                 |
| 25                             | 1.0                                 |

(a) Draw a graph of diameter of cells against percentage sugar concentration. (6 marks)

(b) From the graph determine the concentration of cell sap. (1 mark)

(c) Give an explanation for the average diameter of cells placed in 2.5% sugar solution. (4 marks)

(d) Describe the difference in appearance between cytoplasm before and after cells being placed in 25% sugar solution. (2 marks)

(e) Account for the appearance of red blood cells when viewed under light microscope after they were placed in 25% sugar solution and left for 10 minutes. (3 marks)

(f) State the importance of the process under investigation to plants.  
(4 marks)

7. (a) Describe the structure and functions of plasma and leucocytes as some of the components of blood(14 marks)

(b) Describe the process of blood clotting. (6 marks)

8. A nursery boy encountered an angry dog when traveling home from school and got frightened. Describe the nervous and endocrine responses that took place in the body of the boy. (20 marks)

Name.....

Index No...../.....

School.....

Candidates Signature.....

Date.....

231/2

BIOLOGY

Paper 2

TIME 2 HOURS

## **2012 PROJECTIONS-020**

### **Kenya Certificate Of Secondary Education**

#### **INSTRUCTIONS TO CANDIDATES**

- Write your name and Index Number in the spaces provided above.
- Sign and write date of examination in the spaces provided above.
- Answer **ALL** questions in the spaces provided.
- Mathematical tables and electronic calculators may be used.
- All workings **MUST** be clearly shown where necessary.

#### **FOR EXAMINERS USE ONLY**

| Questions   | Maximum Score | Candidates Score |
|-------------|---------------|------------------|
| 1           | 8             |                  |
| 2           | 8             |                  |
| 3           | 8             |                  |
| 4           | 8             |                  |
| 5           | 8             |                  |
| 6           | 20            |                  |
| 7           | 20            |                  |
| 8           | 20            |                  |
| Total Score | 80            |                  |

*This paper consists of 7 printed pages  
Candidates should check the question paper to ensure that all the*

**ANSWER ALL QUESTIONS IN THE SPACES PROVIDED**

1. In a family with four children, three were found to have normal skin pigmentation while one was an albino

Using letter **A** to represent gene for normal skin pigmentation and **a** to represent the gene for albino.

- (a) What are the genotypes of the parents  
(2mks)

.....

- (b) Work out the genotypes of  
(2mks)  
i) normal pigmented children  
(ii) the albino child

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Genotypes of normal/pigmented children.....  
(2mks)

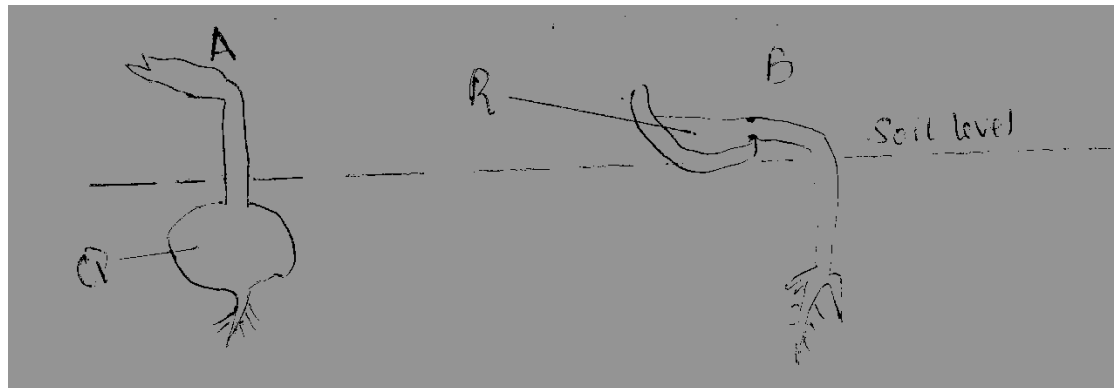
Genotypes for the albino child.....(1mk)

- (c) What is the probability that the fifth child will be an albino?  
(1mk)

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.....

.....  
.....

2 Study the diagrams below and answer the questions that follow.



(a)(i) What type of germination is represented by;

A ..... B .....

(2mks)

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

A.....

.....

B.....

.....

(b)(i) State the functions of the part labeled Q in the above diagram

(1mk)

.....

.....

(ii) What role does R play immediately after germination (1mk)

.....

.....

(c) State the difference in the type of growth shown by man and insect

(2mks)

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.....

.....

3 (a) What is diffusion? (2mks)

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...

(b) Explain the effects of the following factors on the rate of diffusion

(i) Diffusion gradient (1mk)

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.....

(ii) Surface area to volume ration (1mk)

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.....

(iii) Temperature

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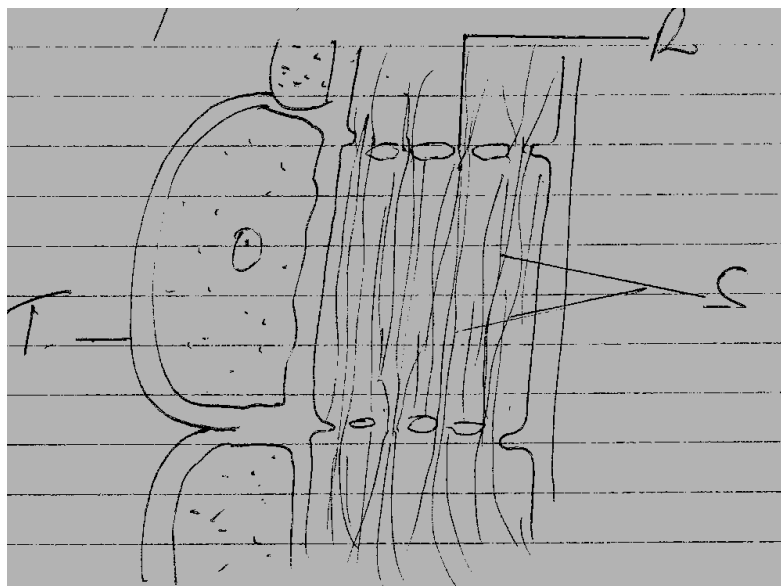
(c) State the characteristics of active transport (3mks)

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.....

4 The diagram below represents part of the phloem tissue



(a) Name the structures labeled R and s and the cell labeled T. (3mks)

R. .... S.....

Cell labeled T.....

(b) State the function of the structure labeled S (1mk)

.....  
.....

(c) Explain the role of structure labeled T (3mks)

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.....

(d) Explain why xylem is a mechanical tissue (2mks)

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5 (a) What is organic evolution? (2mks)

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(b) Distinguish between divergent and convergent evolution giving an example in

each(4 mks)

(b) State TWO evidence of evolution (2mks)

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### **SECTION B.**

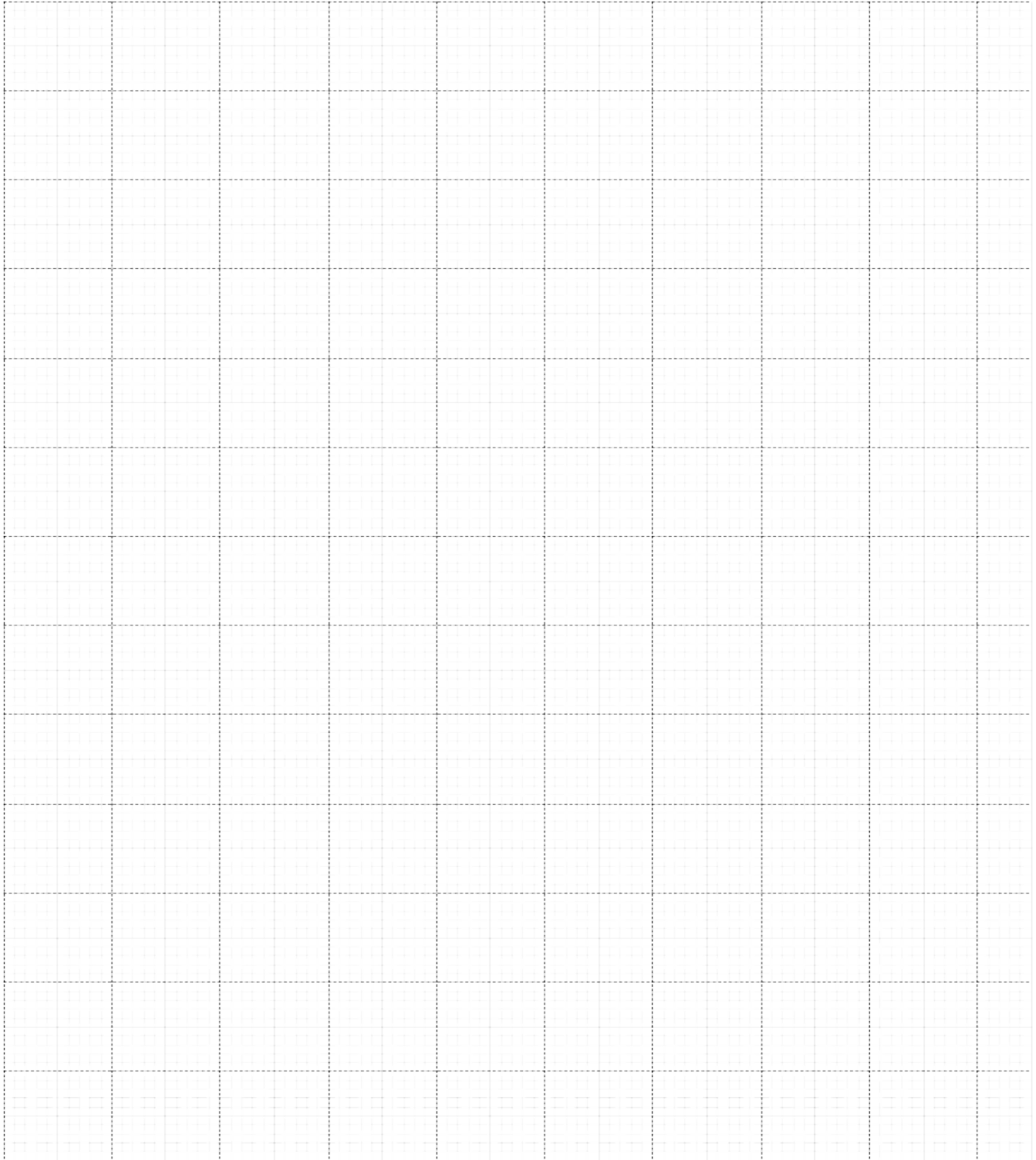
**Answer question 6 (compulsory) and either 7 or 8 in the spaces provided**

6 Two people A and B drunk volumes of concentrated solution of glucose.  
The

amount of glucose in their blood was determined at intervals. The results are shown in table below.

| Time (Minutes) | Glucose level in blood<br>(mg/1000cm <sup>3</sup> ) |     |
|----------------|-----------------------------------------------------|-----|
|                | A                                                   | B   |
| 0              | 87                                                  | 84  |
| 15             | 112                                                 | 123 |
| 30             | 139                                                 | 170 |
| 45             | 116                                                 | 188 |
| 60             | 100                                                 | 208 |
| 90             | 95                                                  | 202 |
| 120            | 92                                                  | 144 |
| 150            | 88                                                  | 123 |

- (a) On the graph paper provided plot graphs of glucose level in blood against time on the same axes (7mks).



(b) What was the concentration of glucose of A and B at the 20<sup>th</sup> minute?  
(2mks)

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.....

(c) Suggest why the glucose level in person A stopped rising after 30 minutes while it continued rising in person B. (2mks)

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(d) Account for the decrease in glucose level in person A after 30 minutes and person B after 60 minutes (3mks)

A.....  
.....  
.....

B.....  
.....  
.....

(e) Name the compound that stores energy released during oxidation of glucose (1mk)

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(f) Explain what happens to excess amino acids in the body (5mks)

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

8 (a) Describe the process of fertilization in a flowering plant  
(15 mks)

(b) List the changes that take place in a flower after fertilization  
(5m)

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