1. You are provided with the following materials and reagents.

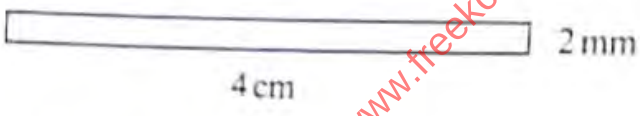
A straight portion of raw banana, labelled D
Two petri dishes
A scalpel sharp razor blade
Two beakers containing liquids, E and F
A measuring cylinder
A stopwatch access to a wall clock
Means of labelling.

(i) Label the two petri dishes, E and F

(ii) Place 30 cm^3 of liquid E into petri dish E and 30 cm^3 of liquid F into petri dish F

(iii) Using the scalpel, prepare four thin, straight, flat strips from the raw banana peel

(iv) Each strip should measure about 4 cm by 2 mm as illustrated below.



Note: To get a straight, flat, thin strip, remove all the banana flesh, leaving only the peel.

(v) Immerse two strips in petri dish E and the other two in petri dish F and leave the set ups undisturbed for 10 minutes.

(a) (i) State your observations in petri dishes E and F after 10 minutes.

Petri dish E

(1 mark)

.....

.....

Petri dish F

(1 mark)

.....

.....

(ii) Account for the observations made in (a) (i) on page 2.

Petri dish E (3 marks)

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.....

Petri dish F (2 marks)

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.....

.....

(b) Describe the nature of liquids E and F in relation to the sap in the banana peel used in the experiment.

E (1 mark)

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F (1 mark)

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(c) With reference to the observations made, compare the nature of the outer and inner surfaces of the banana peel. (1 mark)

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(d) (i) Name the cell structure responsible for the observations made in this experiment. (1 mark)

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(ii) Explain how the cell structure named in (d) (i) above works to bring about the observations made. (2 marks)

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2. You are provided with the following materials and reagents.

Three test tubes on a rack
Dilute egg albumen
(Access to) dilute hydrochloric acid with a dropper
(Access to) Sodium hydroxide solution with a dropper
Solution P
Two droppers
Three 10 ml measuring cylinders
A stop watch/access to a wall clock
Access to a water bath maintained at 50 °C to 60 °C

(i) Label the test tubes A, B, and C
(ii) Put 2 cm^3 of egg albumen into each of the test tubes A, B and C
(iii) Add 1cm^3 of soluton P in each of the test tubes
(iv) Into test tube A, add two drops of sodium hydroxide
(v) Into test tube B, add two drops of hydrochloric acid
(vi) Into test tube C, add 2 drops of water
(vii) Place all the three test tubes in the water bath for 10 minutes.

(a) (i) State the observations made in test tubes A and B.

Test tube A

(1 mark)

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.....

Test tube B

(1 mark)

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(ii) Account for the observations made in a (i) above.

Test tube A (3 marks)

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.....

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Test tube B (3 marks)

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(b) Explain why the investigation was carried out at the specified temperature range. (1 mark)

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(d) State the purpose of test tube C. (1 mark)

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(e) (i) With a reason, identify solution P. (2 marks)

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.....

(ii) Name the likely part of the human alimentary canal where the process in this experiment occurs. (1 mark)

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(iii) Give a reason for your answer in e (ii) above. (1 mark)

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3. You are provided with specimens labelled H and K.
Specimen H is a complete plant while J is a portion of a different plant. Observe the specimens and answer the questions that follow.

(a) State **three** observable differences between the leaves of specimens H and K. (3 marks)

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(b) (i) Explain **three** ways in which the stem of specimen H adapts the plant for maximum photosynthesis. (3 marks)

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(ii) Explain **three** ways in which the plant from which specimen K was obtained is adapted for survival in its habitat. (3 marks)

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(c) Explain the consequence of adding liquid F used in question 1 to the soil in which specimen H is growing. (2 marks)

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(d) State **two** ecological importance of specimen K in an ecosystem. (2 marks)

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THE KENYA NATIONAL EXAMINATIONS COUNCIL
Kenya Certificate of Secondary Education

231/3(b) Inst. Sch. – BIOLOGY (PRACTICAL) – Paper 3

Nov. 2017

INSTRUCTIONS TO SCHOOLS

The information contained in this paper is to enable the head of the school and the teacher in charge of Biology to make adequate preparations for this year's Biology practical Examination.

NO ONE ELSE should have access to this paper or acquire knowledge of its contents. Great care **MUST** be taken to ensure that the information herein does not reach the candidate either directly or indirectly. The teacher or laboratory technician in charge of Biology should NOT perform any of the experiments or give any information related to these instructions to the candidates.

This paper consists of 4 printed pages.

1. Besides other laboratory fittings and equipment, each candidate will require the following:

   (a) Two petri dishes

   (b) Three test tubes and two boiling tubes on a rack

   (c) A scalpel/sharp razor blade

   (d) Stop watch or access to a wall clock

   (e) Six labels

   (f) Access to a water bath, maintained at 50°C to 60°C temperature (One for not more than four candidates)

   (g) Three 10-ml measuring cylinders/syringes

   (h) Three droppers

   (i) A full, healthy bean plant (*Phaseolus vulgaris*) grown for at least two weeks.

   (j) A portion of a healthy creeping grass (with visible roots, leaves, nodes)

   (k) A portion of a fresh, raw banana

   (l) One 50-ml measuring cylinder

   (m) Solutions E, F, G, H, J and P.

2. Each examination centre will be required to provide the following in addition to all the listed requirements above for the examination.

   2. Hydrochloric acid, specific gravity, 1.18 g/cm^3 density

   3. Glucose monohydrate, standard grade (About 7 g per candidate)

3. Preparation of the solutions E, F, G, H, J and P will require distilled water, at least 80 ml per candidate.

4. Some of the substances and procedures required for the preparation of solutions E, F, G and P be provided by the Kenya National Examinations Council.

1. Besides other laboratory fittings and equipment, each candidate will require the following:

(a) Two petri dishes

(b) Three test tubes on a rack

(c) A scalpel/sharp razor blade

(d) Stopwatch or access to a wall clock

(e) Six labels

(f) Access to a water bath maintained at 50 °C to 60 °C temperature (One for not more than four candidates)

(g) Three 10-ml measuring cylinders/syringes

(h) Three droppers

(i) Specimen H, an uprooted whole, bean plant (*Phaseolus vulgaris*) grown for at least two weeks.

(j) Specimen K, a portion of a healthy creeping grass (with visible roots, leaves, nodes)

(k) A straight portion of a raw banana, at least 6 cm long, labelled D

(l) About 40 cm^3 of distilled water in a beaker, labelled liquid E

(m) About 100 cm^3 of distilled water in a wash bottle

(n) About 30 cm^3 of solution F, labelled Liquid F

(o) About 4 cm^3 of solution G, labelled sodium hydroxide in a test tube with a dropper

(p) About 4 cm^3 of solution H, labelled hydrochloric acid in a test tube with a dropper

(q) 10 cm^3 of solution J in a boiling tube

(r) 10 cm^3 of solution P in a boiling tube

(s) One 50-ml measuring cylinder.

2. Preparation of solutions

Read the procedures, carefully before you start preparing the solutions.

2.1 *Solution F*

To be prepared using the glucose monohydrate procured by the school/examination centre.

(a) To prepare solution F, dissolve the glucose in distilled water to form a 20.0% solution

(b) To determine the quantity of distilled water to be used, multiply 20 g of glucose by 5 = 100 ml

Example

1. For 20 g of glucose, put the 20 g of glucose in a beaker and add distilled water to $20 \times 5 = 100\,cm^3$ and stir to dissolve.

2. For 80 g of glucose, put the 80 g of glucose in a beaker, add distilled water to $80 \times 5 = 400$ and stir to dissolve.

Supply each candidate with $30\,cm^3$ of the solution and label this as **Liquid F**

2.2 *Sodium Hydroxide, Solution G*

To be prepared using substance G provided.
Dissolve 4 g of substance G provided in $900\,cm^3$ of distilled water, stir gently and top up the solution to 1 litre.
The quantity of distilled water to be used will depend on the quantity of substance G supplied.

Example
For 0.3 g of substance G supplied;

(a) Put the 0.3 g of the substance G in a beaker

(b) Add distilled water to $0.3 \times 250 = 75\,cm^3$ and stir to dissolve

Label this solution, **sodium hydroxide** and provide with a dropper, about $4\,cm^3$ to every candidate in a test tube.

2.3 *Hydrochloric acid, solution H*

To be prepared using the hydrochloric acid procured by the school.
To prepare dilute hydrochloric acid, carefully add $8.6\,cm^3$ concentrated hydrochloric acid in distilled water and make up to 1 litre (in a fume chamber)
Label this solution, **hydrochloric acid** and provide with a dropper, about $4\,cm^3$ to every candidate in a test tube.

2.4 ***Solution J (Egg albumen)***

To be prepared using substance J provided.

(a) To prepare solution J, dissolve the substance J supplied in distilled water to form a 1.0% solution.

(b) The quantity of distilled water to be used will depend on the quantity of substance J supplied.

(c) To determine the quantity of distilled water to be used, multiply the quantity of substance J supplied by 100.

Example

1. For 0.3 g of substance J supplied;

   (a) Put the 0.3 g of the substance J in a beaker

   (b) Add distilled water to $0.3 \times 100 = 30\,cm^3$ and stir to dissolve

2. For 2 g of substance J supplied;

   (a) put the 2 g of the substance J in a beaker

   (b) Add distilled water to $2 \times 100 = 200\,cm^3$ and stir to dissolve

   (c) Provide $10\,cm^3$ of the solution J to each of the candidates and label it as ***Egg albumen***.

2.5 ***Solution P***

To be prepared in the morning of the examination using substance P provided.
Prepare using similar procedure used in the preparation of solution J
Provide each of the candidates with $10\,cm^3$ and label it as **Solution P**.

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