

KCSE 2011 BIOLOGY

PAPER 1

MARKING SCHEME

1. Nephritis
Kidney stones
2. a) $I^{2/2} C^{1/1} PM^{2/2} M^{3/3}$ or $2(I^{2/2} C^{1/1} PM^{2/2} M^{3/3}) = 32$
b) Dental carries; periodontitis/periodontal disease/pyorihoea
3. (i) Identify similarities and differences between organisms
(ii) Organize scientific knowledge in an orderly system
(iii) Monitor emergency presence and disappearance of organisms in and from earth
(iv) Grouping organisms for easy study
4. (a) Sacking small insects/small animals
(b) A trap into which (small) animals fall and get trapped; acc. Examples of small animals e.g. insect/reptiles. Arachnids
5. (a) Grass → Grasshopper → Lizards
(b) (i) Chicken
(ii) Grass
6. (a) This is the study of the interrelationship between organisms and their environment
(b) The maximum population of a species/Total number of organisms that a population habitat/area/region/ecosystem can support
or
Total number of population of a species a given habitat/area/region/ecosystem can support without depleting available resources. **Rej.** If different species
7. Water was hypotonic to cell sap of adjacent and these cells absorb water through osmosis; and their cell sap became less conc. than those of next cell; the process was repeated until water reached the sugar solution.
Or
Sugar solution was hypotonic to cell sap of adjacent cells; they lost water by osmosis; cell sap became more conc. than those of next cell sap; the process was repeated until water was drawn from the beaker
8. - Fused head and thorax/cephalothorax (often) protected by carapace
- Gaseous exchange through gills
- Two pair of antennae
- Five more pairs of limbs/five to twenty pairs of limbs; **rej.** five
- A pair of compound eyes
- Three pairs of mouth parts (consisting of labial pulps/maxillae)
9. A – Dicotyledonae
B – Monocotyledonae
10. (a) (i) Lactic acid in animals while plastic is ethanol/alcohol
(ii) No CO₂ produced in anaerobic respiration in animals while anaerobic respiration in plants produces CO₂
(b) Cytoplasm



11. **Fine adjustment knob**
Moves the body tube through smaller distances to bring image/specimen/object into sharper/sharp focus
Stage
Platform where specimen (on slide) is placed
12. Phylum - Chordate
Class – Aves
13. Source of energy
Storage of materials
14. (a) Dry/arid/semi-arid/desert
(b) Succulent/freshly stem; reduced leaves/leaves reduced into thorns/spines.
Acc. Thick stem for storage of water
15. (a) (To reduce layers of cells) to allow light to pass through
(b) To make the cell turgid/prevent drying up
(c) To protect lens on objective; exclude air/dust/foreign particles; hold specimen in position/place.
16. (a) Weakened/defective valves in veins; causing blood/body fluid/tissues fluid to accumulate (leading to swelling)
(b) When exposed to air they disintegrate/burst; releasing thromboplastin/thromborinase
17. (a) L – Duodenum
M – Pancrease
(b) (i) Bile
(ii) Emulsification/emulsification of fat; neutralize acidic chime from stomach; provides alkaline media for enzyme to work
18. (a) Sublingual; submaxillary/submandibular; parotid
(b) Lubricating food; digestion of starch; moistens food; provides alkaline medium; softens food; dissolves food. **Acc.** for correct component of saliva to correct function.
19. (a) Skin
Buccal cavity/mouth cavity; **rej** mouth
(b) $\text{Glucose} + \text{Oxygen} \rightarrow \text{Carbon (IV) Oxide} + \text{Water} + \text{Energy}$
 $\text{C}_6\text{H}_{12}\text{O}_6 + 6\text{O}_2 \rightarrow 6\text{CO}_2 + 6\text{H}_2\text{O} + \text{ATP/Energy}$
20. (a) X
(b) X has fewer stomata; most stomata in leaf X are concentrated on the lower side
21. (a) Where different structures evolve to perform different functions e.g. wings of insect/birds, eye of human and octopus. **Rej**; wrong example given.
Acc. if no example given
(b) Missing links; distortion of parts during sedimentation
Destruction of fossils by geographical activities. **Acc.** correct examples
22. - Air that enters the lungs has high content of oxygen than air that leaves
- Air that enters the lungs has lower content of CO₂ than air that leaves
Acc. air that enters the lungs has 20% - 21% oxygen, air that leaves has 15% - 17% oxygen, air that enters lungs has 0.03 – 0.04% CO₂, air that leaves has 4.0% CO₂

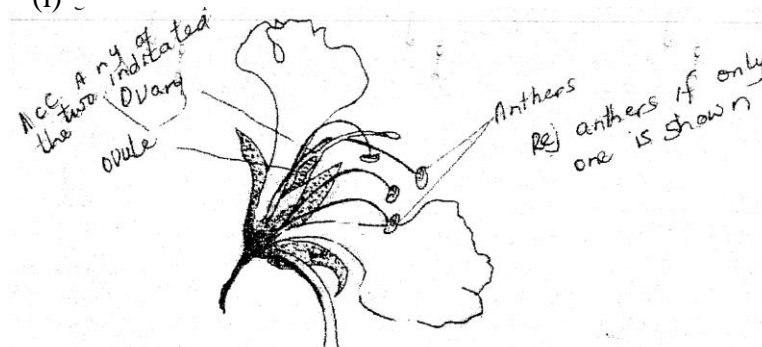


23. (a) (i) Ovule; **rej**; ovules
(ii) Axile
(b) Orange or any other citrus fruit; lemon, tangerine, grape, lime, tomato, Sodom apple, Irish potato, egg plant, thorn apple, banana
24. (a)
(i) A dominant gene expresses itself in both its homozygous and heterozygous state while recessive gene can only express itself in the homozygous state
(b) (Either) all offsprings show dominant characteristics; or half offsprings show the recessive while the other halve show dominant characteristics
25. (a) **Tannin** – softening of leather/conversion or treatment of hides or skins to leather/tanning leather/treatment of leather; manufacture of ink/printing of fabrics/dyeing of cloths/printing patterns in pots
(b) **Quinine** – treatment of malaria
(c) **Caffeine** – stimulant in beverages/increase mental activities/reduce fatigue
26. Egg/ovum/ova; **rej**; ovula
27. (a) Ligament
(b) Secretes synovial fluid; contains/holds the synovial fluid in place
28. (a) It is a growth movement in plastic/part of a plant in response to a unidirectional stimulus; **rej**; unilateral
(b) Accelerates growth in shoots
(c) Can inhibit growth in roots **Acc**; High conc
Promote growth in roots
Inhibit growth in shoots **acc**; low conc
29. Activate enzyme; provide a medium for enzymatic activities (to break down stored foods to soluble form); hydrolysis; dissolves food materials; a medium of transportation of dissolved food substances/oxygen/nutrients of growing region (of radicle and plumule); soften seed coat to facilitate emergence of radicle



**KCSE 2011 BIOLOGY
PAPER 2
MARKING SCHEME**

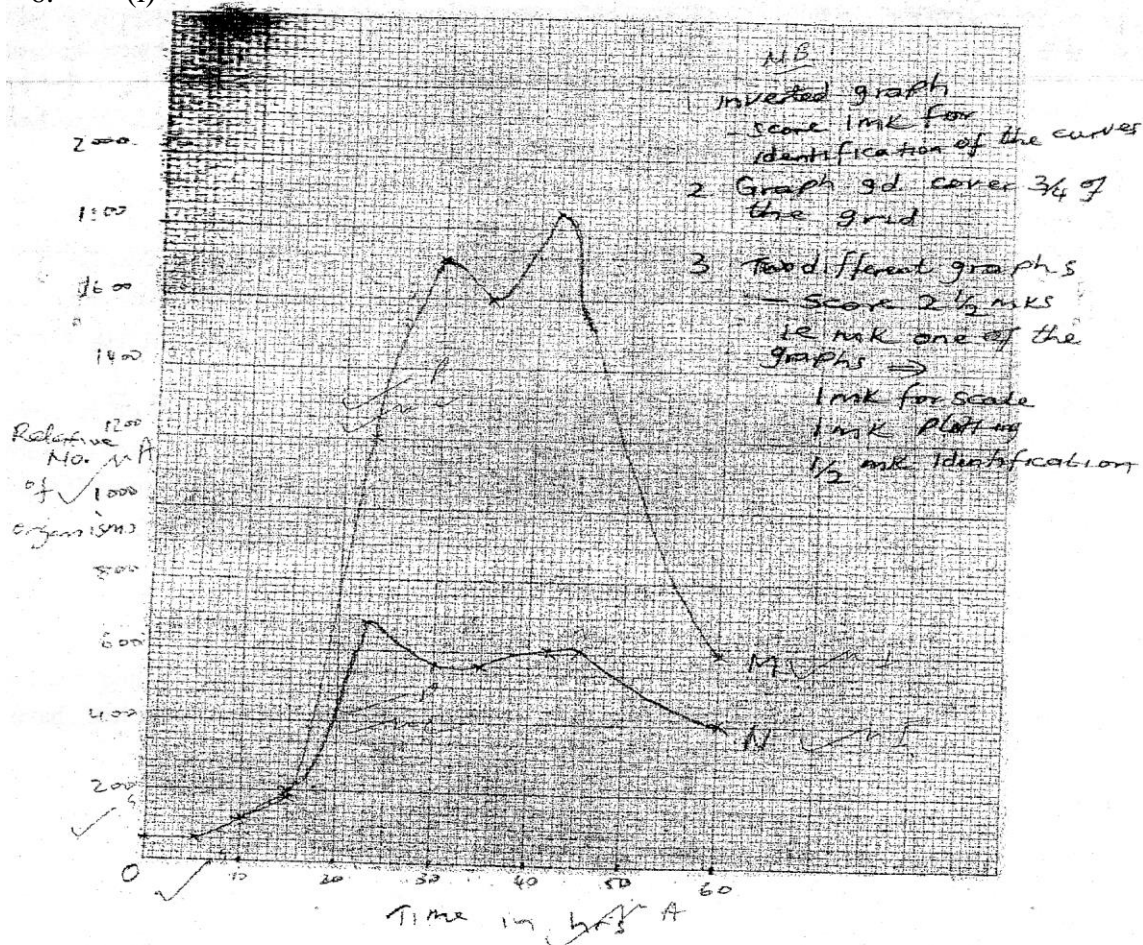
1. (i) Testing for the presence of starch
(ii) A. Kill the leaf/cells/photoplasm/breakdown starch/granules/stop enzymatic activities; acc. denature enzyme
B. Removal of chlorophyll/decolorize the leaf/dissolve chlorophyll
C. Soften the leaf/make the leaf less brittle
(iii) Iodine solution, rej; iodine alone, rej; reagent
(iv) Stain dark blue/blue-dark
2. (a)
(b) (i) Zero/0/nil acc $0/2$; rej. $0/4=0$
(ii) The gene for heavy ear is on Y chromosome which girls do not inherit from fathers OWTTE Muscular dystrophy
(c) Haemophilia, colour blindness, premature baldness, muscular dystrophy
(d) Vertebrates embryos have similar morphological features which suggest a common ancestry; invertebrates, annelids and molluscs have similar blastula/ trochophore larva suggesting common ancestry
3. (a) (i) Whooping cough
Bordetella pertussis
(ii) Pneumonia
Streptococcus pneumonia/acc. para influenza virus/influenza virus
young chlamydia mycoplasma pneumoniae
(b) Inhaled O_2 dissolves in alveolar fluid in the alveolus; since the O_2 concentration in blood is lower than alveolus; O_2 diffuses through epithelium the capillary wall into the plasma/blood/blood cells and finally into red blood cells
(c) Grow into the air above mud/water
Have lenticels for gaseous exchange
4. (a) (i) P. Cerebral hemisphere/cerebrum
R. medulla oblongata
(ii) Muscular coordination, maintain body posture/balance/manual motor dexterity
(b) (i) Follicle stimulating hormone, luteinizing hormone, oxytocin, Prolactin
(ii) FSH-Stimulates secretion of Oestrogen, stimulate development of graafian follicle
LH-Ovulation, development of corpus luteum, stimulates production of progesterone by corpus luteum
5. (a) (i) -



- (ii) Anthers are below the stigma (to minimize self pollination)
 Petals are large/conspicuous for insects to land on/to attract insects (encouraging cross pollination)
- (b) (i) L is hanging outside the body to ensure optimal temperature for sperm production. It has many long coiled seminiferous tubules to increase surface area for production of sperms
- (ii) Produces an alkaline fluid that neutralizes acid in the vagina/urethra. This fluid contains nutrients for the sperm and also activates the sperms.

SECTION B

6. (i)



scale

- * check origin
- * intervals
- * Highest Pt

Plotting

- All Pts should be there

Curve

- Free hand

(ii) 42 Hrs

(iii) Graph at 50Hrs = 1240 Graph N = 547

$$1240 = 547, = 693 + 4$$

$$M: 1220 - 20 = 1200 - 1240$$

$$N: 540 - 20 = 520 - 56$$

$$\text{Ans} = 680 - 40 = 640 - 720$$



- (iv) Pop growth decreases/reduces, high temperature kills the main organism/denature enzymes
 - (v) Pop (growth rate) decreases, death rate is higher than rate of multiplication due to exhaustion of nutrients (in the culture medium), accumulation of toxic wastes, shortage of O₂, overcrowding/shortage of space.
 - (b) When OP of the blood increases (beyond normal) the osmoreceptors in the hypothalamus detects this and stimulates pituitary glands to secrete more ADH/Vasopresin which makes kidney tubules more permeable to water and more water is reabsorbed into the blood reducing up to normal level. Osmoreceptors in the hypothalamus detect this pituitary gland less stimulated, less ADH released, kidney tubules less permeable to water, less water reabsorbed into the blood raising up to normal level
7. (a) Plants in arid/semi-arid/desert habitats have leaves covered with thick/waxy cuticle that are water proof/impermeable to water allowing for reduced rate of transpiration. Sunken stomata in some desert/semi-arid areas plants have water vapour accumulating in the pits reducing rate of transpiration as moisture in the pits is not carried away by wind. Most plants have few or no stomata on the upper surface of the leaf/more stomata on the lower surface or sheltered from direct sunlight, small stomata/small stomata size thus reducing rate of transpiration. Plants with small/needle like leaves/spines expose less surface area hence reduced rate of transpiration. Leaves with shiny surfaces reflect light resulting in reduced leaf temperature thus reducing rate of transpiration. Some plants have leaves covered/scales to trap a large moisture on the leaf surface reducing transpiration. Plants growing in wet habitat/mesophylls have thin layer of cuticle which allow high rate of transpiration. Broad leaves expose large surface area. Many stomata on both surfaces of the leaf, have large stomatal aperture
- (b) Erector pilli muscle relax and hats lies flat, trapping less air thus reducing insulation/more heat lost, blood capillaries/vessels/arterioles in the skin vasodilate and more blood is brought near skin surface increasing heat loss by radiation/convection. Sweat glands release (move) sweat to the skin surface the sweat takes away heat from the body when it evaporates.
8. (a) The exoskeleton is made of chitin, chitin is not evenly distributed/is thin and flexible at joints for movement. Exoskeleton is secreted by epidermal cells, when still soft it allows for growth of the insect. When (in contact with the air) it hardens limiting growth, it is shed regularly thus regulating growth. It also supports internal structures, because if is hard, it protects internal organs from mechanical damage. It is waterproof preventing/reducing water loss/desiccation of the insect. It also provides a surface for attachment of muscles, it is light/has low density/modified into wings for flight, can be modified to form jaws/mouth for



biting/piercing/sucking/grinding, pigmented for camouflage, can be transparent in some places allowing entry of light into the eyes for camouflage in water.

- (b) Light rays from near object are more divergent and need to bend more. Ciliary muscles contract, suspensory ligaments slaken, the lens become thicker/more convex/increases in curvature/reduces focal length. Light from the object is refracted more in order to be focused sharply/form an image on the retina.



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PAPER 3

MARKING SCHEME

1. (a) K – Pectoral fin
L – Dorsal fin
M – Ventral fin/arial fin
N – Pelvic fin
- (b) Length of scissors = 4.6cm
Length of fish = 12.6cm
Actual fish length = $\frac{\text{actual length of scissors} \times \text{actual length of fish}}{\text{Actual length of fish}}$
 $= \frac{13.5}{0.36} = 37.5\text{cm}$
- (c) (i) Yawing – Dorsal fin and ventral fin
(ii) Pitching – Pelvic fin and pectoral fin
- (d) (i) R – Gill rakers
S – Gill bar/gill arch
T – Gill filament
(ii)
2. (a) Photograph D – dicotyledonae
Reason – network of vein/presence of petals/broad
Photograph E – monocotyledonae
Reason – parallel venation/presence of leaf sheath/narrow
- (b) Broad (flattened)/wide to offer large surface area for absorption of light/absorption of CO₂/transpiration
Rich supply of veins to transport water to Ps cells/transport mineral salts/manufacture food.
Presence of chlorophyll to absorb light (4ps) green colouring matter to absorb light
- (c) (i) U – Xylem/phloem
V – Phloem/xylem
W – Cambium
(ii)

Cross section F	Cross section G
No pith	Pith present
V.B scattered	V.B in a ring/at the periphery
V.B numerous/root	V.B few
Cambium ring absent	Cambium ring present
Cortex absent	Cortex present
Small V.B	Large V.B



3.

Food being tested for	Procedure	Observation	Conclusion
Starch Iodine test	Add iodine solution/soln J	Black/blue black/ blue colour formed	Starch present
Reducing sugar Rej; Benedict test	Add benedict solution/sol K. put in a hot water bath/ heat/warm	Colour changes to green/yellow/orange/ brown/Redding brown	Reducing sugar present. Rej. traces/ little red sugar
Proteins Rej. Biuret test	Add biuret's reagent/ soil	No colour change/ colour change to brown colour of biuret reagent/black	Protein absent

