K.C.S.E BIOLOGY PAPER 231/1
MARKING SCHEME 2003

1. (a) Anaerobic respiration/ fermentation; Acc. Alcohol production/ raising dough. (1 mark)

   (b) Brewing/Baking; (1 mark)

2. Chordae; (1 mark)

3. By pollen tube that grows through style; (1 mark)

4. (a) Rhizobium; (1 mark)

   (b) Convert nitrogen into nitrates/ convert nitrogen into proteins/ convert N_2 into nitrogenous .../fixed N_2 into nitrates; (1 mark)

5. (a) Ulna

   (b) Radius; (1 mark)
   Humerus;

6. Analogous structure–structures which (appear similar and) perform similar functions but have different origins; (2 marks)

   Homdogous structures – structures which have a common origin but (have evolved to) perform different functions; (2 marks)

7. (a) Zone of cell division Acc. Cell multiplication.

   Zone of cell elongation/enlargement; Acc expansion for elongation.

   (2 marks)

Florigens
- Promote flowering (20 marks)

20. (a) Name the three types of skeletons found in multicellular animals
Hydrostatic
Exoskeleton
Endoskeleton (3 marks)

(b) Describe how the cervical, lumbar and sacral vertebrae are suited to their Functions. (17 marks)

Cervical vertebrae

- Vertebrarterial canals' for passage of (vertebral) artery; Atlas has (broad) Surfaces, for articulation with condyles of skulls' to permit nodding (Movement)

Axis has adenoid process/projection Centrum to permit rotary /turning /act as a pivot for Atlas/skull/movement of Atlas/
Branched / forked/short/broad transverse processes, for attachment of (neck) Muscles; ace zygopophysis, poster prezypophysis, for articulation between Vertebrae (acc vertibraterical canals and zygopophogen if shown on A diagram of the vertebrae)

- Has a short reduce neural spine, for attachment of (neck) muscles, Has Wide /larger neural canal; for passage of spinal cord/alternatively has wide Neural arch for protection of spinal cord;

Lumbar

- Broad/long/neural spine for attachment of (powerful back) muscles, Long/ large/ well developed / transverse processes' for attachment of muscles (that maintain posture and flex the spine)

- Has metamorphosis and hypothesis for muscle attachment, large thick Centrums for support.
- prezygapophysis/post/zygapophysis for articulation between vertebrae' (acc. Napophysis for hypophses)

Sacral vertebrae

- Anterior vertebrae has a well developed transverse processes, which are Fused to the pelvis girdle/articulate with pelvic girdle;
- Vertebrae fused, for strength transmit weight of the stationary animal to the Rest of the body.
- Sacrum has a broad base/ short neural spine; for attachment of (back) Muscles.

(b) To protect root tip; 1 mark

8. Absorption of water; Accept: absorption of salts/ calcium / iron; secretion of mucus; 1 mark

9. (a) Lignin; 1 mark

(b) Phloem 1 mark

10. - Numerous chloroplasts to absorb light / epidermis have chloroplasts to absorb light;
- Deeply divided / dissected/ trancted leaves/ branched leaves to increase surface area;
- Large air spaces for storage of air/ buoyancy; Acc; Aerenchyma tissue for storage of air.
- Have no cuticle to facilitate exchange of gases ;

2 marks

11. Salmonella typhi; Acc. Bacteria/ Salmonella alone. 1 mark

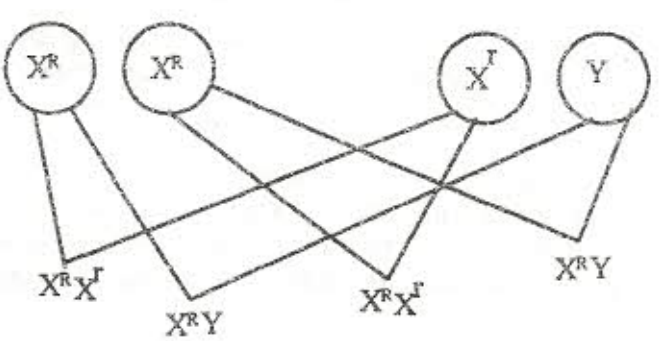
SECTION B – (40 MARKS)

12. (a) Genes are located on the sex-chromosomes; they are transmitted along with those determining sex; 2 marks

(b) Colour blindness - Acc. Hairy ears/pinna;
Haemophila Boldness, Accept two. 2 marks

Parents X^RX^R X X^rY ;

Gametes



5 marks

2 Red eyed males: 2 Red eyed female

1 Red eyed male: 1 Red eyed female

Accept Punnett Square

	$X^R X^R$	X
$X^r Y$	X^R	Y
X^R	$X^R X^r$;	$X^R Y$
X^R	$X^R X^r$	$X^R Y$;

13. (a) (i) Oxygen 1 mark
(ii) Carbon dioxide; 1 mark

(b) Oxyhaemoglobin; 1 mark

(c) (i) The blood plasma except blood cells and proteins; that has filtered out the capillaries; 2 marks
(ii) It is a medium of exchange of substances between capillaries and body cells; 1 mark

Accept supply nutrients to cells/ supply oxygen to cells/ remove waste products from cells.

(d) Hepatic portal vein; 1 mark

Pulmonary artery;

14. (a) - Swallow plenty of sea water to increase amount of water in the body;
- Have chloride secretary cells in their grills to remove excess salts;
- Eliminate nitrogenous wastes in form of trimothylamine oxide which requires little water for elimination;
- Few/ small glomeruli thus slow filtration rate in the kidneys; 3 mks

(b) Less ADH secreted (by pituitary gland); causing less reabsorption of water in the kidney tubules; thus resulting in dilute urine; 3 mks

15. (a) (i) Thigmotropism / Haptotropism ; 1 mark
(ii) Contact with support; causes migration of auxine to outer side; causing faster growth on the side away from control surface; (causing tendrils curl around support). 3 marks

(b) Escape injurious stimuli / seek favourable habitats; — 1 mark

(c)
- Induce foot growth in stem cutting
- Selective weed killers;
- Encourage apical dominance
- Encourage sprouting of side branches
- Breaking seeds dormancy
- Induce pathenocarpy
- Promotes flowering
- Induce fruit fall;
- Accelerates ripening of fruits.

— 4 marks

16. (a) (i) Study of a single species within a community / ecosystem/ habitat/ environment; — 1 mark

(ii) Study of natural communities within an ecosystem;

(b)
A Aquatic / fresh water;
B Forest ; REJ. Terrestrial
C Arid/ Semi-arid; Acc. Desert

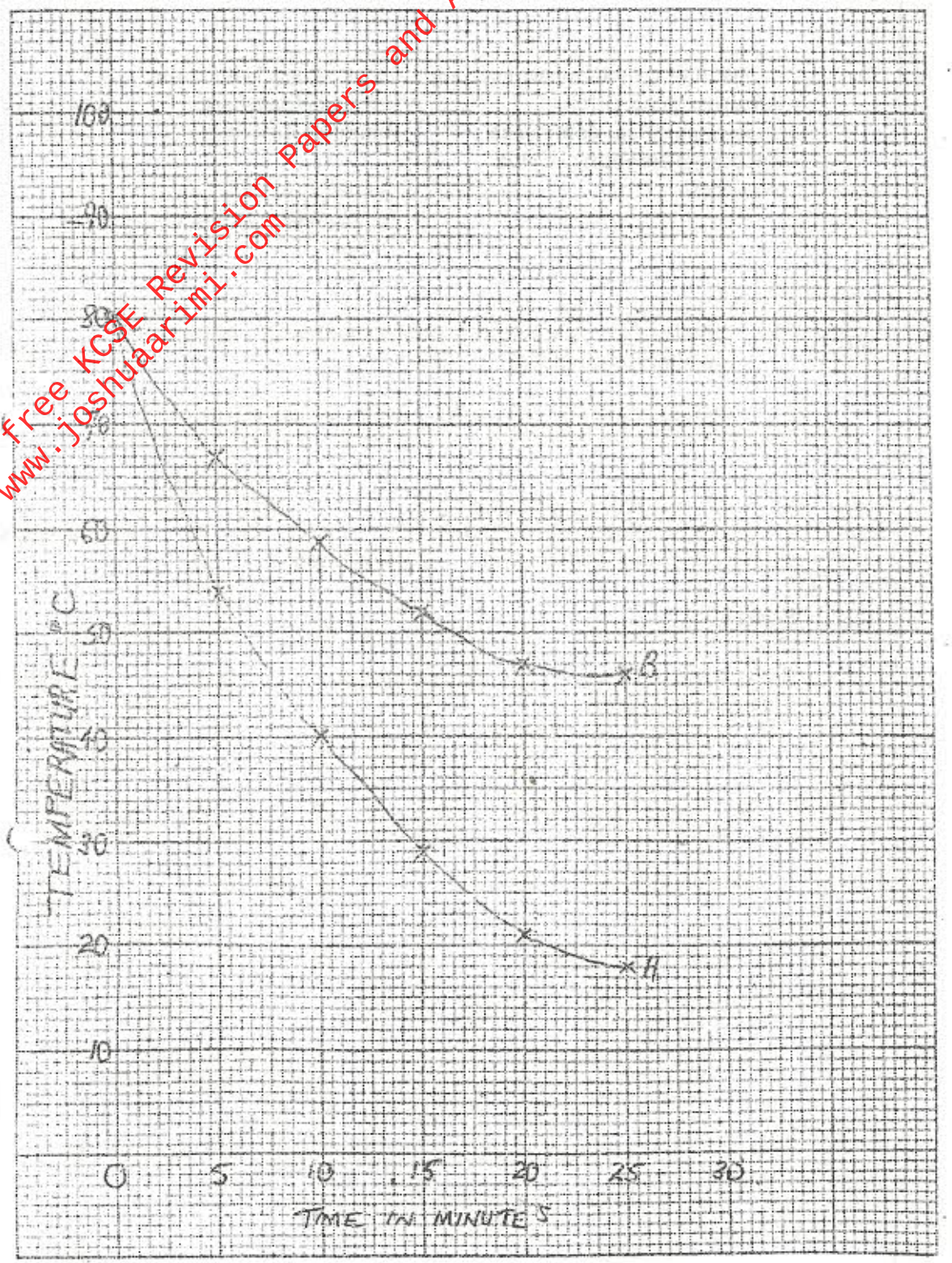
— 3 marks

(c)
Sunken
Hairy
Reversed rhythm;
Small stomatal pore;

— 3 marks

SECTION C (40 Marks)

GRAPH OF TEMPERATURE OF WATER IN TUBES AGAINST TIME



(7 marks)

(b) $\frac{80-18}{25} = \frac{62}{25}$; $= 2.48^{\circ}$ C/Min; 2 marks
1 mark

(c) Control;

(d) Rate was faster in tube A; because the film of methylated spirit evaporated; removing heat from the tube; 3 marks

(e) Convection; radiation; 2 marks

(f) Lower rate of heat loss; 1 mark

(g) Feathers; 1 mark

(h) Fur; 1 mark

(i) (i) Temperature receptor/End bulb carpuscles /Bulb of Krause, Organs of Ruffini. 1 mark

(ii) Hypothalamus 1 mark

18. Sclerotic layer: (made up of collagen fibres thus) protects the eye;
Cornea: - Allows light to enter the eye;
- Refracts light towards retina;
Conjuctiva: - Protect cornea;
Eyelids: - Protects cornea from mechanical and chemical damage/protects eye from entry of foreign particles;
- Protects retina from bright light (by reflex action);
Chloroid: - (Contains black pigment which prevents reflection of light within the eye/ absorbs light; nourishes the eye/retina/supply oxygen/remove CO_2
Ciliary Muscles: - After shape of lens during accommodation;
- Ciliary body produces aqueous humour;
Suspensory Ligaments: Adjusts shape of the lens during accommodation;

Lens: - Refracts light rays/ focuses light on retina;

Vitreous humour - Maintains shape of the eyeball / Refracts light.

Aqueous humour - Nourishes Cornea/Lens; Refracts light;

Iris (Pigmented thus) - Gives the eye its colour / Absorbs light;
- Controls amount of light entering the eye / Adjusts size of pupil;
Pupil: - Light enters the eyes through pupil;
Retina: - Has photoreceptors cells/ Rods / Cones / image formation; generates impulses.
Fovea/Yellow spot - Visual activity / most sensitive part of retina in the only cones;

Max: 20 marks

Blind spot Point where nerve fibre emerge from the optic nerve/ where the optic nerve leaves the eye/ point where blood vessels and nerve fibres enter the eye;

Optic nerve Transmit impulses to brain;

Total = 24 mks.

- Water dispersed fruits / seeds;
- Mescarp/seed has air space thus light/ buoyant to float;
- Therefore carried away by water;
- The fruit/seeds are protected from soaking by water proof pericarp;

Animal dispersed fruits/ seeds:

- Presence of hooks for attachment to animals; thus carried to other places;
- Fruits are brightly coloured; succulent; aromatic/ scented to attract animals; which feed on them. The seed coats are resistant to digestive enzymes; thus remain unaffected.

The seeds are dropped away from parent plant in fieces dropping.

Self dispersed fruits / seeds / explosive mechanisms;

- The dry pods / fruits split (along lines of weakness/ satures);
- Scattering seeds away from parent plant;

Wind dispersed fruits / seeds:

- Censer mechanism;
- Perforated capsule is usually loosely attached to stalk/ the long stalk is swayed by wind scattering seeds;
- Presence of hairs / wing – like structure, floss/ extension which increase surface area/ for buoyancy's making it easy for
- Fruits/seeds to be blown away; fruits / seeds are light due to small size; therefore easily carried away by wind;

20 marks