

K.C.S.E BIOLOGY PAPER 231/1
MARKING SCHEME 2004
SECTION A (20 marks)

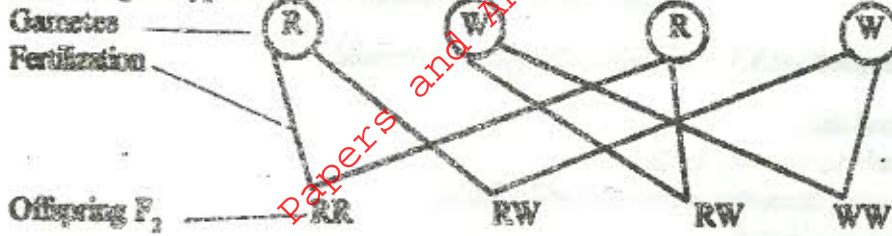
Answer ALL the question in this section in the spaces provided.

1. (a) Intervertebral disc;
(b) Act as a cushion/absorbs shock;
Reduce friction; flexibility of the vertebral column;
Reject: Prevent/Acid
2. Natural immunity is inherited/ transmitted from parent to offspring;
Acquired immunity is developed after suffering from a disease through vaccination
Accept: Innate/Inborn for natural
Reject: Born with it
3. Has large air spaces; which store gases/for gaseous exchange/buoyancy
Accept: Floating
4. Etheral/Alcohol;
Energy/ATP/210 KJ/mole;
Reject: stp/formula of Alcohol
5. Prophase I
6. (a) Myopia/short-sightedness/short sight;
(b) Concave lens/ divergent lens; to diverge the rays so that the image is focused on the retina;
Accept; Biconcave
7. (a) Stores hydrolytic enzymes for destruction of worn out organelles/cells/tissues/digestion of bacteria pathogens.
Accept digestion of food
Accept; Autolysis
(b) Processing/packaging synthesized and transporting of packaged cell materials
Production of lysosomes/secretion of packaged material
Accept: Glycoproteins for packaged material
8. Insects;
Reject: Insects/exopoda
9. Nitrogen;
Magnesium
Iron
Accept: Magnesium ion, Iron ion
Reject: Symbols of the elements
10. Thickened walls/Lignified;
Accept: Lignin
11. Parthenocarp

SECTION B(40 marks)

12. (a) RR WW

(b) Parental genotypes RW X RW



(c) (i) Phenotypic ratio Red : Pink : White

1 : 2 : 1

(ii) 1 RR : 2 RW : 1 WW

(d) (ABC) blood grouping

Reject: Rh Factor

Accept: Blood groups

13. (a) A Pulmonary vein

B Left atrium (auricle)

E Tricuspid valve

F Pulmonary artery

(c) The left ventricle 'C' pumps blood a longer distance to all parts of the body while the right ventricle 'D' pumps blood a shorter distance to the lung. Therefore the left ventricle has thicker walls to generate/exert more pressure.

14. (a) Lamarckian

- Inheritance of acquired characteristics/ environment induces production of inheritable character which is then inherited.

Darwinian

- Inheritance of genetically acquired characteristics/ character happen to appear spontaneously which then gives advantage to organisms therefore better adapted characters are then inherited by natural selection.

(b) (i) Have a common (embryonic) origin but are modified to perform different functions, vertebrates fore limb/ pentadactyl limb

e.g. Vertebrate forelimb/pentadactyl limb

Accept; Beaks of birds/feet of birds/mouth parts in insects

(ii) Have different (embryonic) origins, (but have evolved) to perform similar functions.

e.g. Wings of insects and birds/eye structure in humans and octopus

(iii) Are greatly reduced in size and therefore ceased to function.

Accept; - Third digit of wing of bird

- Reduced pelvic girdle of whale

- Halkers in flies

- Presence of hind limb (buds) in python

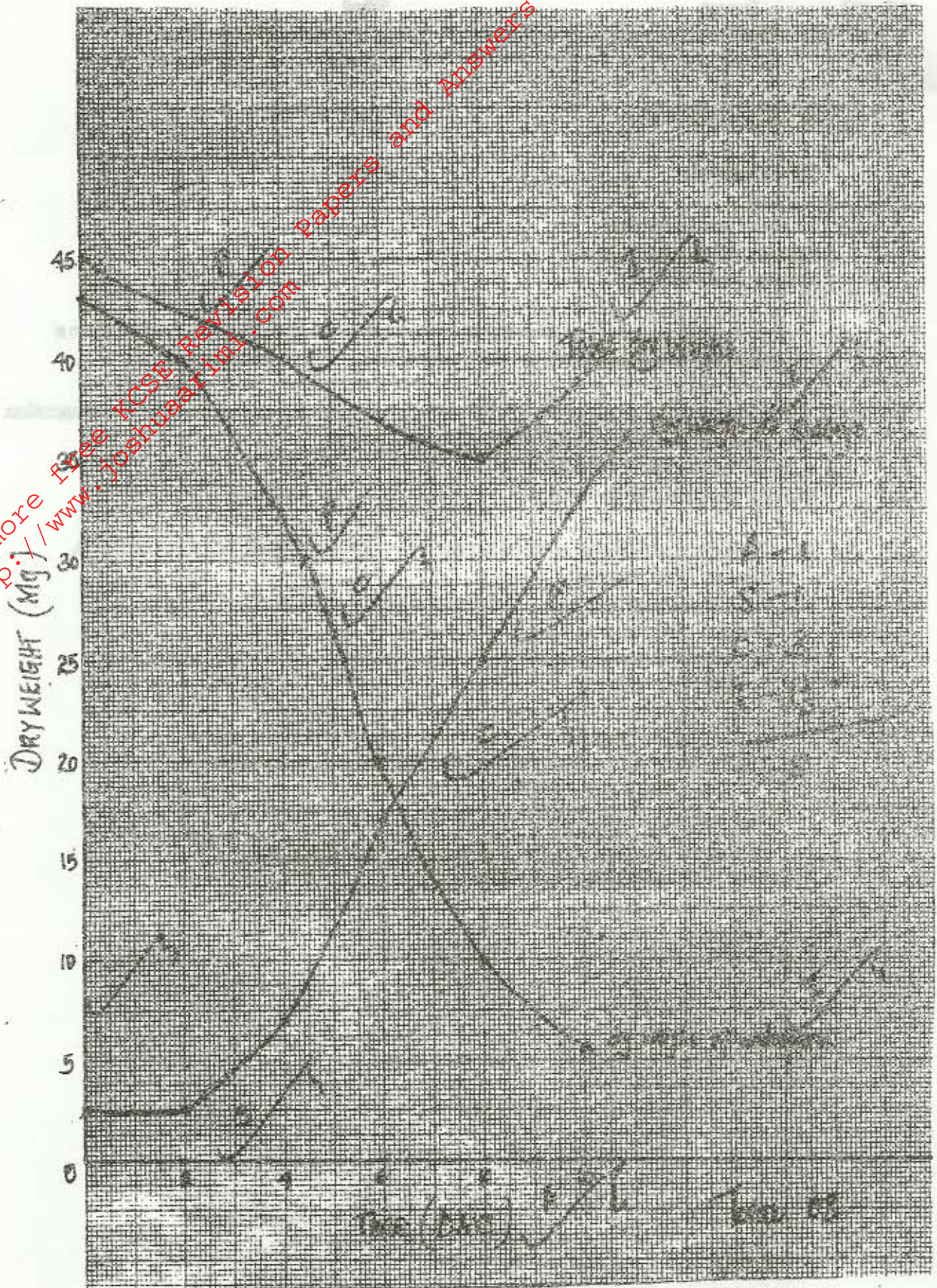
- Caecum in humans - human ear muscles

e.g. Human appendix/kiwi (flightless bird) with reduced wings/vestigial wings in flies, human hair presence of hindlimbs in python; nictitating membrane in human/ reduced pelvic girdle of whale.

15. (a) **Insect** **Wind**
- (i) Small/short anthers/ firmly attached to filaments Large/long anthers/loosely attached to filaments
- (ii) Large/heavy/spiky - Small/light/smooth
- (iii) Small/sticky - Long/feathery
- (b) Source of variation/hybrid
 Accept; Production of hybrid
 Reject; Heterosis/Vigour
- (c) (Zygote) undergoes mitosis to form embryo which has a rudimentary plumule and radicle a cotyledon, and/or an endosperm develop; testa develops from the integuments
16. (a) The movement of molecules from a region of high concentration to a region of low concentration. (until the molecules are uniformly distributed in the medium)
 Accept; Particles for molecules
 Reject; Substance for molecules
- (b) (i) The higher the diffusion gradient between two points the faster the rate of diffusion.
 Accept; The converse
- (ii) The higher the surface area : Volume ratio the faster is the rate of diffusion.
 Accept; The converse
- (iii) Increasing temperature increases the rate of diffusion.
 Accept; The converse
- (c) - Reabsorption of glucose/some salts in the kidney by kidney tubules.
 - Absorption of digested food/ mineral salts/ vitamins from the alimentary canal
 - Excretion of waste products from the body cells
 - Reabsorption of useful material in the blood stream
 - Accept sodium pump mechanism in the nervous system or nerve cell
 Reject; Sodium pump mechanism alone

SECTION C (40 marks)

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17. (b) 38.5 (mg)

Accept; ± 0.5 (i.e. 38 - 39)

- (c) (i) Hydrolysis of starch into simple sugars; which are translocated to the embryo
Respiration/ to give energy/heat/gases
Accept; Simple sugars oxidised
Reject; Oxidation of starch/endosperm
- (ii) New materials are synthesised (from protein); bringing about growth of embryo
Accept; New cells/ protoplasm synthesised
- (iii) The rate of respiration is faster than that of synthesis of materials for growth
- (iv) (first leaf) carried out photosynthesis leading to growth
- (d) (i) - Presence of abscisic acid/germination inhibitors;
Embryo not fully developed
- Absence of hormones/enzymes that stimulate germination
impermeable seed coat
Accept; Inactive enzymes/ hormones/ Absence of Gibberellins/Cytokinins
Reject; Hard seed coat
- (ii) - Unsuitable/unfavourable temperature
- Absence of light
- Lack of water
- Lack of oxygen
Accept; Correct example
Reject; Premature for maturity
- (e) - Dense cytoplasm
- Thin cell walls
Absence of vacuoles (cell sap)

18. The skin is made up of epidermis and dermis. The epidermis is made up of three layers. The Outer-most layer is known as cornified layer. Its made of dead cells that protect against mechanical damage/ desiccation microbes. The granular layer is made up of living cells that give rise to cornified layer. The malpighian layer contains actively dividing cells that give rise to new epidermal cells that contains melanin that protects the skin against ultraviolet rays.

The dermis has several components. Has sweat glands/sudorific glands that produce sweat. Sweat evaporates (carrying with it latent heat of vapourisation) thus reducing the body temperature. Under cold conditions little or no sweat is produced thus heat is conserved. The sweat contains water, sodium chloride, uric acid, urea etc. The skin is an excretory organ.

Has hair. The hair stands erect to trap air when temperature is low to reduce heat loss. Lies flat to allow heat loss when the temperature is high.

Has nerve endings which are sensitive to stimuli such as heat, cold, pain, pressure, touch.
Has subcutaneous fats/adipose tissue that insulate the body against heat loss.

Has arterioles that vasodilate when temperature are high to loose heat by radiation, convection (see converse)

Has sebaceous glands which secrete sebum an antiseptic, water repellent that prevent drying cracking of skin. Make skin supple.

Accept; Blood vessels/capillaries for arterioles to supply food, nutrients, oxygen, remove excretory products.

19. Wind

In windy conditions, the rate of transpiration increases, wind disperses fruit/seed. Its an agent of pollination.

Accept; Spores for seed

Temperature

Change in temperature affect the rate of photosynthesis and other biochemical reactions/ metabolic reactions/ enzymatic reactions. Temperature increase rate of transpiration.

Light

Plants need light for photosynthesis. Some plants need light for flowering/ photoperiodism. Seeds like lettuce require light for germination.

Humidity

When humidity is low, the rate of transpiration increases.

pH

Each plant requires specific pH to grow well/ acidic/alkalinity/neutral

Salinity

Plants with salt tolerant tissues grow in saline areas. Plants in estuaries adjust to salt fluctuations.

Topography

(SH) North facing slopes in temperate lands have more plants than South facing slopes.

Plants on windward side have stunted/distorted growth/plants on leeward side have stunted growth.

Accept comparisons of mountains and valleys.

Accept correct descriptions of other areas with other topographics e.g. River Valleys.

Rainfall/Water

Fewer plants in dry areas, semi arid, arid

Water is needed for germination. Its a raw material for photosynthesis. It dissolves mineral salts/ provides turgidity for support. Disperses fruits/seeds.

Pressure

Variation in atmospheric pressure affect availability of CO_2 , which affects photosynthesis and low pressure. Increase rate of transpiration and affect amount of oxygen for respiration.

Mineral salts/Traces elements

Affects distribution of plants in the soils.

Plants thrive well where there are mineral salts in the soil

Plant living in soil deficient in particular mineral element have special methods of obtaining it for example legumes obtaining of Nitrogen by fixation or carnivorous plants.