BIOLOGY

Paper 2

JUNE 2022

BUNAMFAN FORM 4 MARKING SCHEME

1 Study the diagram below and answer the questions that follow

(a) Identify the structure (1mks)

Villus; (rej. Wrong spp or villi)

(b) State the role of the part labelled R (1mk)

Secrete mucus with an alkaline pH which protects ileum from corrosion by enzymes/serves to neutralize chyme from the stomach;

c) A student took a meal of lean meat. Briefly describe the digestion of the food substance where this structure is found. (3mks)

Arrival of chyme in the ileum stimulates secretion of intestinal juice/succus entericus; which mixes with the food; It contains peptidase which breaks down peptides into amino acids;

(d)What is the role of the following; enterokinase and cholecystokinin in digestion? (2mk)

Enterokinase: Activates inactive trypsinogen to active form trypsin;

cholecystokinin:.causes gall bladder to release bile juice into duodenum; stimulates the pancreas to secrete pancreatic enzymes (reject without terms like stimulate/causes);

e) State the deficiency disease associated with lack of vitamin B2 (1mk)

pellagra; (rej wrong spp).

2 The diagram below shows how gaseous exchange occurs across the gills in fish

(a) (i) Name the type of flow shown above (1mk)

Counter current flow system

(ii) Explain the advantage of the above flow named in a(i) above. (1 Marks)

Maintains a steep concentration gradient ensuring efficient gaseous exchange;

(b) If the fish is removed from water it dies immediately. Explain why (2mks)

Fish uses dissolved oxygen for gaseous exchange; gill filament epithelium dries up; gill filaments clamp together; surface area for gaseous exchange is reduced; oxygen lacks moist surface for dissolution causing death (due to suffocation)

c) Explain mechanism of gaseous exchange in frog through the skin (4mks)

The frog has a thin and moist skin; Oxygen dissolves in the moisture and then diffuses through the skin;. There is a dense network of blood capillaries beneath the skin which transport the diffused gas/oxygen into the body tissues;. Carbon (IV) oxide in the blood diffuses out of the blood capillaries through the moist skin into the surrounding water and air;

3 a) L1 Hypotonic solution

L2 Hypertonic solution

b) L1 - Inner cells gained water by Osmosis; hence increased in length; epidermal cells did not gain water because they are covered by a water proof cuticle leading to curvature.

L2 - Inner cells lost water by osmosis; leading to (flaccidity) decrease in length; epidermal cells did not lose water due to waterproof leading to curvature

(c) Absorption of water by the roots;

Opening and closing of the stomata;

4. a (i) Structural similarity.

- Both show the pent dactyl limb structure; (1mk)

ii) Adaptational difference.

-Human arm has five digits separated into four fingers and an opposable thump for grasping

-The bat wing has five digits which are long and spread apart to support a large membranous wing for flight; (2mks)

b) Different shapes and sizes of beaks in birds;

Different feet structure in birds; (2mks)

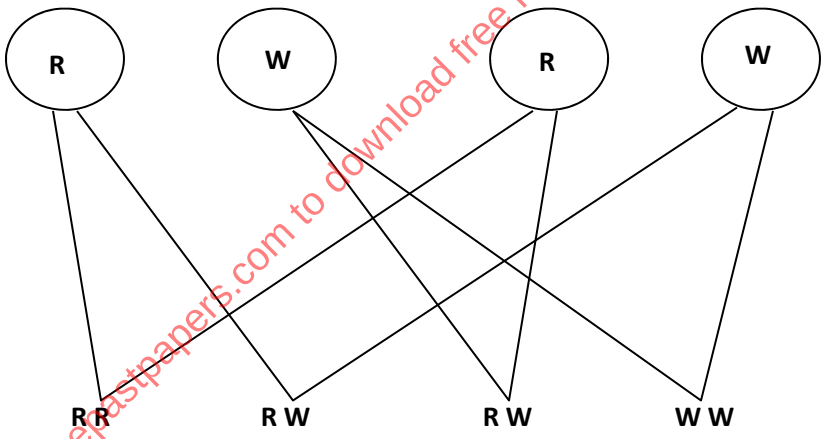
c) Chemical evolution explains the origin of life as having occurred when simple Chemical compounds reacted to form the simplest life forms; organic evolution is the progressive development of complex organisms from simple pre-existing life forms over a long period of time; (2mks)

(d)Paleontology; (1mk)

5.

Parental Genotype *R W* *X* *R W;*

Gametes



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Fertilization

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F_2 genotypes R R R W R W W W

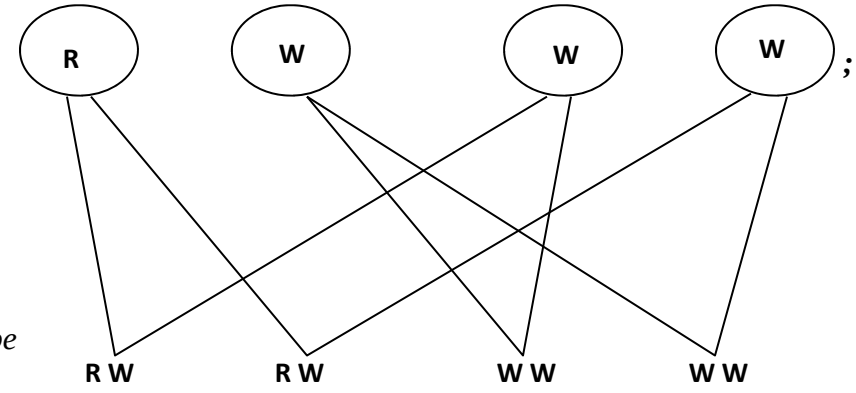
Phenotypic ratio 1 Red : 2 Roan : 1 White;

Rej. 1 : 2 : 1 only

(b) Work out the genotypic ratio of a cross between F_1 offspring and white bull. (3mks)

Parental genotypes *R W* *X* *W W;*

Gametes



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F1 Genotype

R W R W W W W W

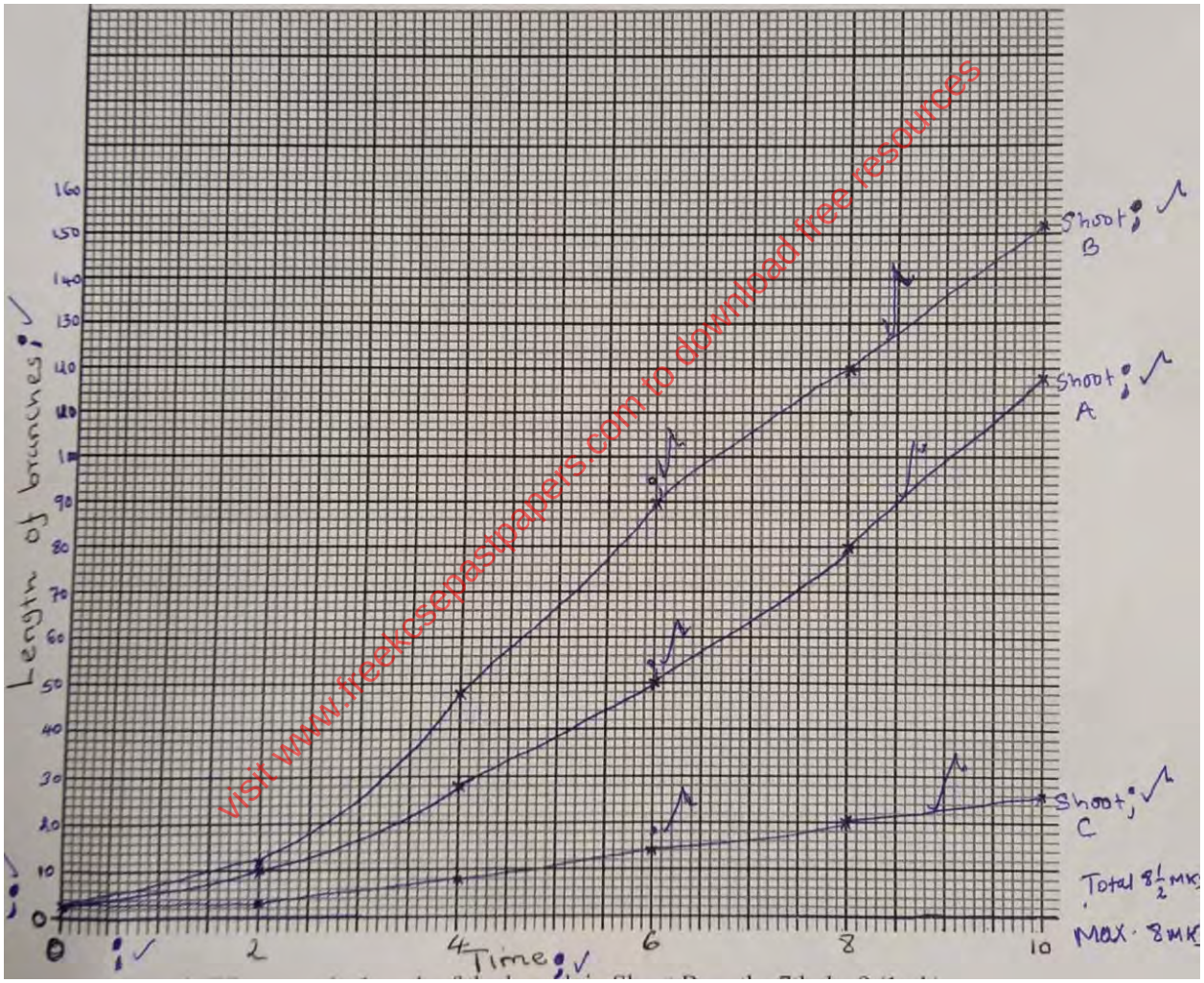
Genotype *2R W* : *2W W*

Ratio *1RW* : *1WW;* *Rej. Ratio only.*

(c) Comment on the gene(s) controlling the colour of coats in cattle mentioned above. (1mk)

Gene for red colour coat and white colour coat are codominant/ have equal dominance;

a)



b) i) 106

ii) 109

c) Shoot A: The tip of the shoot which was removed contained Indole acetic acid (IAA) which causes apical dominance/inhibit growth/development of lateral buds; hence lateral buds sprouted/formed/grew;

Shoot B: The gibberellic acid which was added on the cut promoted the formation of lateral branches on the stem; hence the fast growth of branches on shoot B.

Shoot C: The shoot tip which remained intact contains IAA which inhibits growth/development of lateral buds; hence little change of length of lateral buds;

d) Control experiment;

e) Increase in productivity since more lateral branches are formed;

f) Promote cell division;

Induce germination in plants;

7. Pollen grains land on to the stigma; and adhere to it as a result of the stigma cells secreting a sticky substance; it absorbs nutrients; and germinates forming a pollen tube; the pollen tube grows down the style to the ovary; deriving nourishment from the surrounding tissues; the pollen tube has tube nucleus at the tip; and generative nucleus immediately behind it; As the tube grows downwards into the ovary the generative nucleus divides mitotically; to give rise to two nuclei; which represent the male gamete; the pollen tube penetrates the ovule/embryo sac through the microphyle/chalaza; after the pollen tube enters the embryo sac, the tube nucleus disintegrates; leaving a clear passage for the entry of the male nucleic (The two male nucleic) then enters the embryo sac; where one fuses with the egg (cell) nucleus to form diploid zygotes; which develops into an embryo; the other male nucleus fuses with the two polar nucleic; to form a triploid nucleus/primary endosperm; nucleus ; which becomes the endosperm; this is called double fertilization. Acc egg cell/ovum Vegetative nucleus/tube nucleus

20mks max 15

b) Integument changes into seed coat/test;
Zygote into embryo;
Ovary wall into pericarp;

Ovary into fruit;

Ovule into seed;

Triploid nucleus into endosperm;

Style dries up/fall of leaving a scar; corolla dries up (falls off); stamen dry up; (rej degeration/disinergrates) **9mks max 5**

8. - It is muscular/has cardiac muscles; which are myogenic (does not need nervous Stimulation) to pump blood;

- It is supplies by vagus and a sympathetic nerve; which controls the rate of heart beat;
  (Depending on body's physiological requirements)
- It has tricuspid valves and bicuspid valves; (between atrium and ventricles) which
  Prevent back flow of the blood into the right and left ventricles respectively.
- Present of valve tendons attached to the walls of ventricles and to the atrium
  Ventricular walls; to prevent atria-ventricular valves from due to changes in the
  Pressure in the ventricles;
- Heart is supplied by coronary artery; which supplies food and oxygen to the cardiac
  Muscle for their pumping action; the coronary vein; in heart removes metabolic wastes;
- The heart is enclosed by the pericardium membrane; that secretes a fluid which lubricates it (reducing friction on the walls as it bumps);
- The heart is divided into two by the atria-ventricular septum; that prevent mixing of Oxygenated blood and deoxygenated blood;
- The left ventricles has a thick muscular wall; to pump blood at higher pressure to the Distant body issues;
- The outer part of the pericardium has a fatty layer; which act as a shock absorber; keeps the heart in position.
- The Sino Atrial Node (S.A.N) the pacemaker region); which initiate the wave of contraction leading into contraction and relaxation of muscles; the arterial-ventricular Node; in the heart spreads out waves of contraction throughout the heart creating the heart beat;