



231/2 MS
BIOLOGY
Paper 2
MARKING SCHEME
MARCH 2022

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THE KENYA NATIONAL EXAMINATIONS COUNCIL

KENYA CERTIFICATE OF SECONDARY EDUCATION

BIOLOGY

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MARKING SCHEME
(CONFIDENTIAL)

THIS MARKING SCHEME IS THE PROPERTY OF THE KENYA NATIONAL
EXAMINATIONS COUNCIL AND MUST BE RETURNED AT THE END OF
MARKING.

This marking scheme consists of 9 printed pages.

1. (a)	(i) Diplopoda; <i>acc diplopoda</i>	(1 mark)
	(ii) - Two pairs of walking legs per segment; - Many segments; <i>cylindrical; a pair of short antennae;</i>	(2 marks)
	(iii) - Decomposes the organic matter/enriches soil fertility; - Aerates the soil (through its movements/burrowing);	(2 marks)
(b)	(i) Monera; <i>ACC monera - don't penalise spp.</i>	(1 mark)
	(ii) - Cholera; <i>- Syphilis</i> - Typhoid; <i>- diphtheria</i> <i>- pneumonia</i> <i>- plague</i>	(2 marks)
2. a)	- Moist to dissolve respiratory gas (for faster gaseous exchange); <i>Thin/membrane</i> - Lined with a one-cell-thick epithelium (for faster diffusion of respiratory gases); <i>to reduce diffusion distance</i> - Highly vascularized for faster/efficient transportation of respiratory gases; <i>max 2</i>	(2 marks)
b)	Lined with hair; to trap dust particles/foreign materials/purify (the incoming) air; has mucus; to moisten/warm (the incoming) air; <i>trap dust particles from (incoming) air / inhaled air</i>	(3 marks)
c)	Has a large surface area to volume ratio; diffusion (across its cell membrane) is adequate;	(2 marks)
d)	Whooping cough; <i>ACC wrong spelling</i>	(1 mark)
3. a)	i. Sebum; <i>reject descriptive terms eg oil substance</i>	(1 mark)
	ii. - keeps the skin moist/supple; <i>soft</i>; - acts as an antiseptic; <i>acc kills bacteria</i> <i>makes the skin/hair water repellent/water proof</i>	(2 marks)
b)	Sweat pore; <i>reject sweat duct</i>	(1 mark)



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1. (a)	(i) Diplopoda; <i>acc diplopoda</i> (ii) - Two pairs of (walking) legs per segment; - Many segments; <i>cylindrical; A pair of short antennae;</i> (iii) - Decomposes the organic matter/enriches soil fertility; - Aerates the soil (through its movements/burrowing);	(1 mark) (2 marks) (2 marks)
(b)	(i) Monera; <i>acc monera - don't penalise spp.</i> (ii) - Cholera; <i>- Syphilis</i> - Typhoid; <i>- Malaria</i> <i>- Prion</i> <i>- Plague</i> <i>(max first 2)</i>	(1 mark) (2 marks) <i>3</i> <i>(08)</i>
2. a)	<i>Thin/membranous</i> - Moist to dissolve respiratory gas (for faster gaseous exchange); <i>to reduce diffusion distance</i> - Lined with a one-cell-thick epithelium for faster diffusion of respiratory gases; - Highly vascularized for faster/efficient transportation of respiratory gases; <i>max first 2</i> <i>Any two</i>	(2 marks) <i>2</i>
b)	Lined with hair; to trap dust particles/foreign materials/purify (the incoming) air; has mucus; to moisten/warm (the incoming) air; <i>trap dust particles from (incoming) air / inhaled air</i> <i>Max-3 marks</i>	(3 marks) <i>3</i>
c)	Has a large surface area to volume ratio; diffusion (across its cell membrane) is adequate;	(2 marks) <i>2</i>
d)	Whooping cough; <i>acc wrong spelling</i>	(1 mark) <i>(08)</i> <i>1</i>
3. a)	i. Sebum; <i>reject descriptive terms eg oil substance</i>	(1 mark)
ii.	- keeps the skin moist/supple; <i>soft</i>; - acts as an antiseptic; <i>- acc kills bacteria</i> <i>• makes the skin/hair water repellent/water proof</i>	(2 marks) <i>3</i>
b)	Sweat pore; <i>reject sweat duct</i>	(1 mark) <i>1</i>

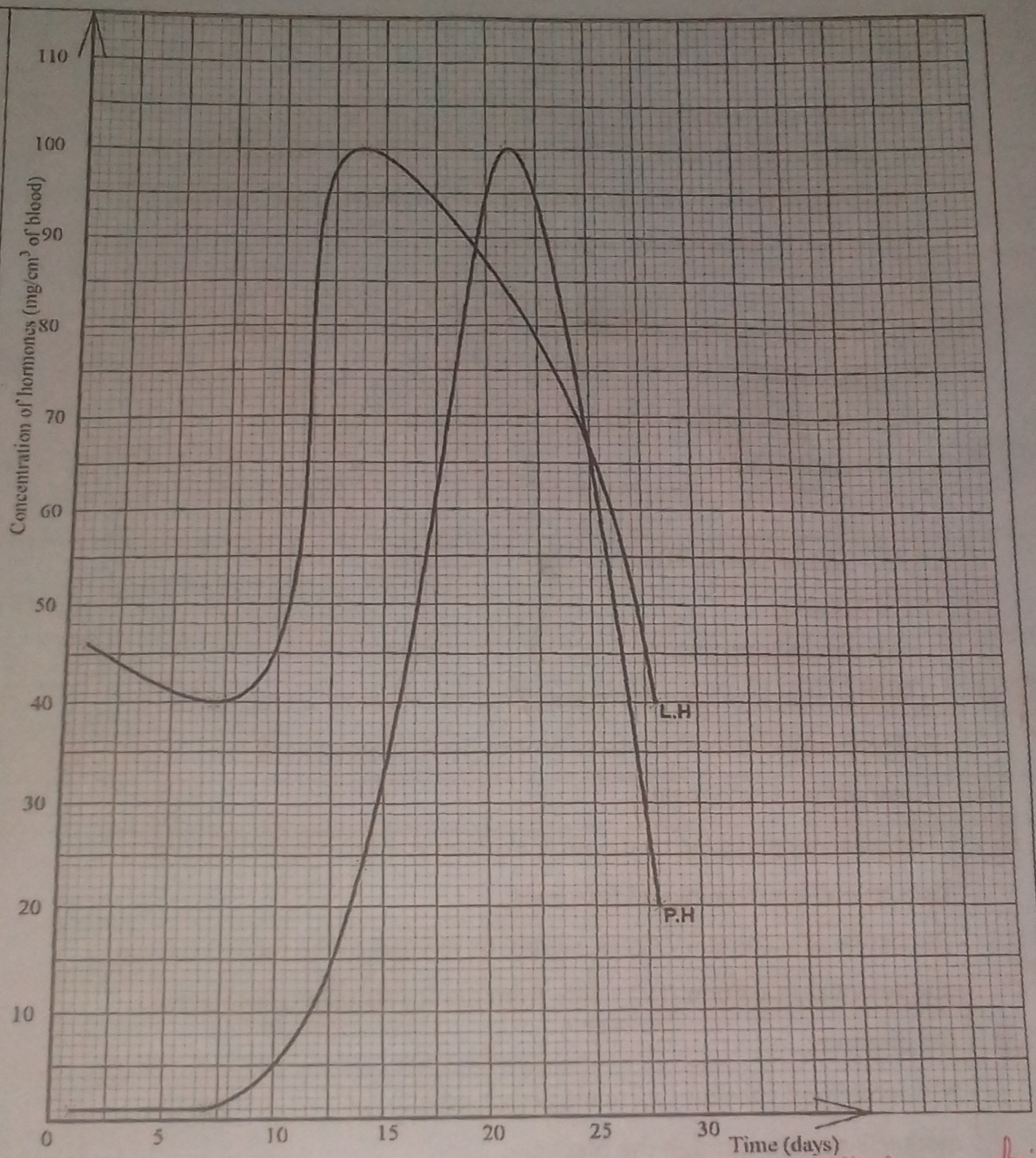
	<i>F (hair shaft)</i> - lies flat when hot to release / emit / allow heat loss; - stand upright / erect / perpendicular when cold to <i>conserve heat</i> ;	
c)	Thermoregulation; lies flat or erects (on the skin surface) when hot/cold to conserve heat or emit excess heat;	(2 marks) <u>2</u>
d)	i) Sole of the feet/palm of hands; <i>Acc SBI and repeat feet alone</i> ii) <i>(Thickest because they) encounter high friction/hard-walking (soles of feet) and manual work (palms of hands);</i> OWTTE	(1 mark) <u>2</u>
d)	<i>It is thicker; to insulate the skin/animal against heat loss</i>	(1 mark) <u>08</u>
4. a)	Parental phenotype: ♂ Black fur male ♀ Black fur female Parental genotype: Nn x Nn Gametes: N n x N n Offspring: NN (Black fur homozygous), Nn (Black fur heterozygous), nn (Brown fur) Phenotypic ratio: 1 Black fur homozygous : 2 Black fur heterozygous : 1 nn Brown fur <i>3 Black fur : 1 brown fur</i>	(5 marks) <u>2</u>
b)	(i) The trait is sex-linked; the gene responsible for the hairy pinna is found/attached to the Y-chromosome; <i>Hairy nose</i> <i>Duchenne muscular dystrophy</i> (ii) Premature baldness; <i>Acc baldness alone</i>	(2 marks) <u>3</u>
5. a)	Sunlight enables the skin to <u>synthesize</u> vitamins <u>D</u> which is necessary for the formation of strong bones	(1 mark) <u>1</u>
b)	(i) Sacrum/sacral vertebra; <i>Acc Sacral Vertebrae</i>	(1 mark) <u>1</u>

- Sacral foramen for passage of nerve / nerve vessels;
- neural spines / processes for muscle attachment;

	(ii) coccyx; Acc caudal vertebrae	1 (1 mark)
	(iii) • Broad transverse processes for articulate with ilium; • Presence of prezygapophysis to articulate with the lumbar vertebrae; • Large, broad centrum to offer support; • Wide neural canal for passage of blood vessels/nerves; <i>of spinal cord</i> • Fused vertebrae to form a rigid/firm structure;	3 <u>5</u>
c)	Plants move to reach/access light/water/moisture/carbon (IV) oxide/nutrients (for photosynthesis); they also move to escape harmful environmental conditions/for safety/withstand harsh external forces; as well as for (mechanical) support; (Max-2 marks) • (To enable) fertilisation;	2 <u>(08)</u>
6. a)		

If marks exceeds but insert 44

- If no origin penalise once



Plotting- 02 marks each line with correctly plotted points
 Scale - 02 marks each line on (Y and X)
 Smooth curves - 02 marks 1mk each 1/2 mark
 Appropriate labelling of axes - 02 marks - Each axis 1mk (8 marks)
 Identification of curves 1mk each 1/2 mark

8

		1	(1 mark)
b)	(i) Ovulation;	1	(1 mark)
	(ii) Releases the ovum;	2	(1 mark)
c)	(i) 100(mg/cm ³) of blood; <i>Acc without units</i> (ii) Endometrium is thickest when the concentration of progesterone is highest (in preparation for implantation);		(1 mark)
d)	- Inhibits production of luteinizing and follicle stimulating hormones; <i>hormone inhibits products of</i> <i>stimulates</i> <i>Def abbreviation of Hormones LH & FSH</i> Stimulating the thickening of the endometrial lining (for implantation); <i>maintains pregnancy; -Mark the first two</i>	2	(2 marks)
e)	- Corpus luteum/ovary; - Placenta;	2	(2 marks)
f)	Prolactin (hormone); <i>from 2 and</i>	1	
g)	i) Will remain low/keep decreasing (any value below 20 mg/cm ³);		(1 mark)
	ii) The Corpus luteum will have broken down/degenerated; <i>disintegrated</i>	2	(1 mark)
h)	(Anterior) pituitary gland;	1	
7. a)	The placenta plays the respiratory; excretory; nutritive; endocrine; barrier; and immunological functions; Exchange of respiratory gases, supply of oxygen-to the foetus' tissues and removal of carbon (IV) oxide from the foetus takes place across the placenta; Nutrients/food substances are also released into the foetus from the mother's system through the placenta; The placenta also serves as a barrier, preventing the mixing of maternal and foetus' blood/poisonous/harmful substances from the mother; <i>pathogens</i> Some hormones/enzymes; needed for the foetus' development are also passed from the mother to the foetus through the placenta;		(10 marks)

Some antibodies needed for the protection of the foetus from infections are also passed from the mother to the foetus through the placenta;

Some waste products, like urea, are also passed from the foetus through the placenta;

Max 10 marks

10

Dichogamy ~~is~~ Protandry and protogyny; are mechanisms where either the male or female parts of the plant reproductive organs ripen at different times in ~~some~~ ^{same} plants;

Protandry is when stamens ripen earlier and anthers release their pollen before the stigma is mature, while protogyny refers to where the stigma matures earlier ^{pistil / carpel} hence becomes ready to receive pollen grains (common in plants of the grass family);

Self-sterility/incompatibility; is where pollen grains cannot germinate on the stigma of the same plant but only germinate on a different plant of the same species, hindering self-pollination;

Heterostyly; is a condition ~~of the style and stigma~~, for instance, having a ~~shorter stamen or pistil~~, making it impossible for the pollen to land, accumulate and fertilize the ovules of the same flower; ^{is higher / above the anther / stamen}

Dioecious; plants have reproductive parts located separately on different plants of the same species (discouraging self-pollination); ^{ACC converse / opposite}

Monoecious; plants have the reproductive parts located at different parts on the same plant ~~body~~, discouraging self-pollination; ;

Max 10 marks

10

20

Different ways of answering

	xylem / tracheids are narrow; for capillarity; (10 marks)	
8. (a)	Xylem tissue consists of xylem vessels; and tracheids; Xylem vessels are ^{tubular} ~~tabular~~, long hollow structures, running continuously from the roots through the stem to the leaves; its walls are strengthened with lignin; preventing them from collapsing; the vessels have bordered pits; to allow passage of water; Tracheids have ^{tracheids} ~~chisel-shaped~~ ends and perforated cross-walls; the pits on the side walls allow lateral movement of water to cells surrounding the xylem; ^{to allow movement of water} (Max-5 marks)	(5 marks) for continuous column of water provides support of plant 5
(b)	Human blood is made up of erythrocytes; leucocytes; and platelets; ~~suspended in the plasma~~; ^{plasma}; Transport is the main function of blood; it transports vitamins; mineral salts and digested food materials to tissues of the body where they are needed; hormones are also transported by blood from the secretory sites to the target tissues/organs; (to bring about the needed hormonal responses); blood also transports enzymes to tissues where they are required to catalyze certain reactions; waste products (ammonia / ^{urea} / ^{ketone} / ~~dead worn out tissues/cells~~ / carbon (IV) oxide) are also transported in the ~~blood~~; ^{plasma} to the excretory organs; Erythrocytes are important in the transportation of oxygen from the lungs to different body tissues; and carbon (IV) oxide from (respiring) tissues to the lungs (for purification); by haemoglobin (a protein in the erythrocytes); ^{plasma} Blood also plays a thermoregulatory role; by distribution of heat throughout the body / emitting excess heat to the surroundings; based on the external temperatures;	(15 marks)

WBC

Leucocytes protect the body against infections (from bacteria/viruses);

Some leucocytes, like phagocytes use amoeboid movements to engulf the invading pathogens; Acc specific way of protection

The plasma also transports antibodies; throughout the body for defense purposes; against pathogens;

Thrombocytes

Platelets play a role in clotting of blood/protect damaged blood body tissues; by releasing thromboplastin; which initiates the clotting

process; preventing excessive loss of blood; preventing entry of pathogens;

Max 15 marks

15

20

Ques 7a Roles of Placenta (10 marks)

Function	Explanation
1. G. E. / Respiratory;	→ Oxygen moves into the fetus and carbon (ii) oxide moves out of fetus;
2. Excretory / Excretion / Removal of metabolic wastes;	- from the fetus; (eg Acc 1 correct example)
3. nutritive / Nutrition / Feeding / Nourishment;	- Nutrients / food substances from the mother to fetus; Acc 1 correct example
4. Endocrine / Exocrine / glandular / production of progesterone / Oestrogen / HCG / Hormones;	- Hormones / enzymes move into the fetus / maintenance of pregnancy
5. Barrier / protective / protection;	- preventing mixing of maternal and fetal blood / passage of poisonous / pathogens / harmful
6. Immunological, protective, protection / passage of antibodies;	- Antibodies from the mother to the fetus