



**231/2 MS
BIOLOGY
Paper 2
MARKING SCHEME
MARCH 2022**

**THE KENYA NATIONAL EXAMINATIONS COUNCIL
KENYA CERTIFICATE OF SECONDARY EDUCATION**

BIOLOGY

Paper 2

**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.

231/2 MS

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Turn over

1. (a)	(i)	Diplopoda; <i>acc diplopoda</i>	1	(1 mark)
	(ii)	<ul style="list-style-type: none"> Two pairs (of walking) legs per segment; Many segments; <i>cylindrical; a pair of short antennae;</i> 	2	(2 marks)
	(iii)	<ul style="list-style-type: none"> Decomposes the organic matter/enriches soil fertility; Aerates the soil (through its movements/burrowing); 	5	(2 marks)
(b)	(i)	Monera; <i>ACC monera - don't penalise spp.</i>		(1 mark)
	(ii)	<ul style="list-style-type: none"> Cholera; <i>- Sydhilly</i> Typhoid; <i>- Shistosoma</i> <i>- prosova</i> <i>- plaque</i> 	3	(2 marks)
2. a)		<ul style="list-style-type: none"> Moist to dissolve respiratory gas (for faster gaseous exchange); Lined with a one-cell-thick epithelium (for faster diffusion of respiratory gases); 		(2 marks)
		<ul style="list-style-type: none"> Highly vascularized for faster/efficient transportation of respiratory gases; 	2	(2 marks)
b)		<ul style="list-style-type: none"> Lined with hair; to trap dust particles/foreign materials/purify (the incoming) air; has mucus; to moisten/warm (the incoming) air; trap dust particles from (incoming) air / inhaled air 	3	(3 marks)
c)		Has a large surface area to volume ratio; diffusion (across its cell membrane) is adequate;	2	(2 marks)
d)		Whooping cough; <i>ACC wrong spelling</i>	1	(1 mark)
3. a)	i.	Sebum; <i>reject descriptive terms eg oil substance</i>		(1 mark)
	ii.	<ul style="list-style-type: none"> keeps the skin moist/supple; <i>soft;</i> acts as an antiseptic; <i>- acc kills bacteria</i> makes the skin/hair water repellent/water proof 	3	(2 marks)
b)		Sweat pore; <i>reject sweat duct</i>	1	(1 mark)

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1. (a)	(i) Diplopoda; <i>acc diplopoda</i>	(1 mark)
	(ii)	(2 marks)
	(iii) <ul style="list-style-type: none"> • Two pairs of (walking) legs per segment; • Many segments; <i>cylindrical; A pair of short antennae;</i> • 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 sp.</i>	(1 mark)
	(ii) <ul style="list-style-type: none"> • Cholera; <i>- Symbiotes</i> • Typhoid; <i>- thamarchoa</i> <i>- Prionia</i> <i>- plague</i> 	(2 marks)
2. a)	<ul style="list-style-type: none"> • 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; <i>Thin membrane</i> • Highly vascularized for faster/efficient transportation of respiratory gases; <i>max 2</i> 	(2 marks)
b)	<ul style="list-style-type: none"> • 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. <ul style="list-style-type: none"> • keeps the skin moist/supple; <i>soft;</i> • acts as an antiseptic; <i>- ACC kills bacteria</i> • makes the skin/hair water repellent/water proof 	(2 marks)
b)	Sweat pore; <i>Reject sweat duct</i>	(1 mark)

	<p><i>Fl (hair shaft) - lies flat when hot to release / emit / allow heat loss; - stand upright / erect / perpendicular when cold to conserve heat;</i></p>	
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)	<p>i) Sole of the feet/palm of hands; <i>Acc SBI and heel feet alone</i></p> <p>ii) (Thickest because they) encounter high friction/hard-walking (soles of feet) and manual work (palms of hands); OWTTE</p>	(1 mark) <u>2</u>
d)	It is thicker; to insulate the skin/animal against heat loss	(1 mark) <u>08</u>
4. a)	<p>Parental phenotype: ♂ Black fur male ♀ Black fur female</p> <p>Parental genotype: Nn Nn</p> <p>Gametes: N n N n</p> <p>F₁ offspring: NN (Black fur homozygous), Nn (Black fur heterozygous), nn (Brown fur)</p> <p>Phenotypic ratio: 1 Black fur homozygous : 2 Black fur heterozygous : 1 nn Brown fur</p> <p><i>3 Black fur : 1 brown fur</i></p>	(5 marks)
b)	<p>(i) The trait is sex-linked; the gene responsible for the hairy pinna is found/attached to the Y-chromosome;</p> <p><i>Hairy nose</i></p> <p><i>Duchean muscular dystrophy</i></p> <p>(ii) Premature baldness; <i>Acc baldness alone</i></p>	2 (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 (1 mark) <u>1</u>
b)	(i) Sacrum/sacral vertebra; <i>Acc Sacral Vertebrae</i>	(1 mark) <u>1</u>

*Acc hanging or extend just like
- Acc X (cross) between gametes
- Acc incomplete circle gametes*

*- If a student use different letter, mark junior alone (inc) -
- A paired sq genotype must be outside box*

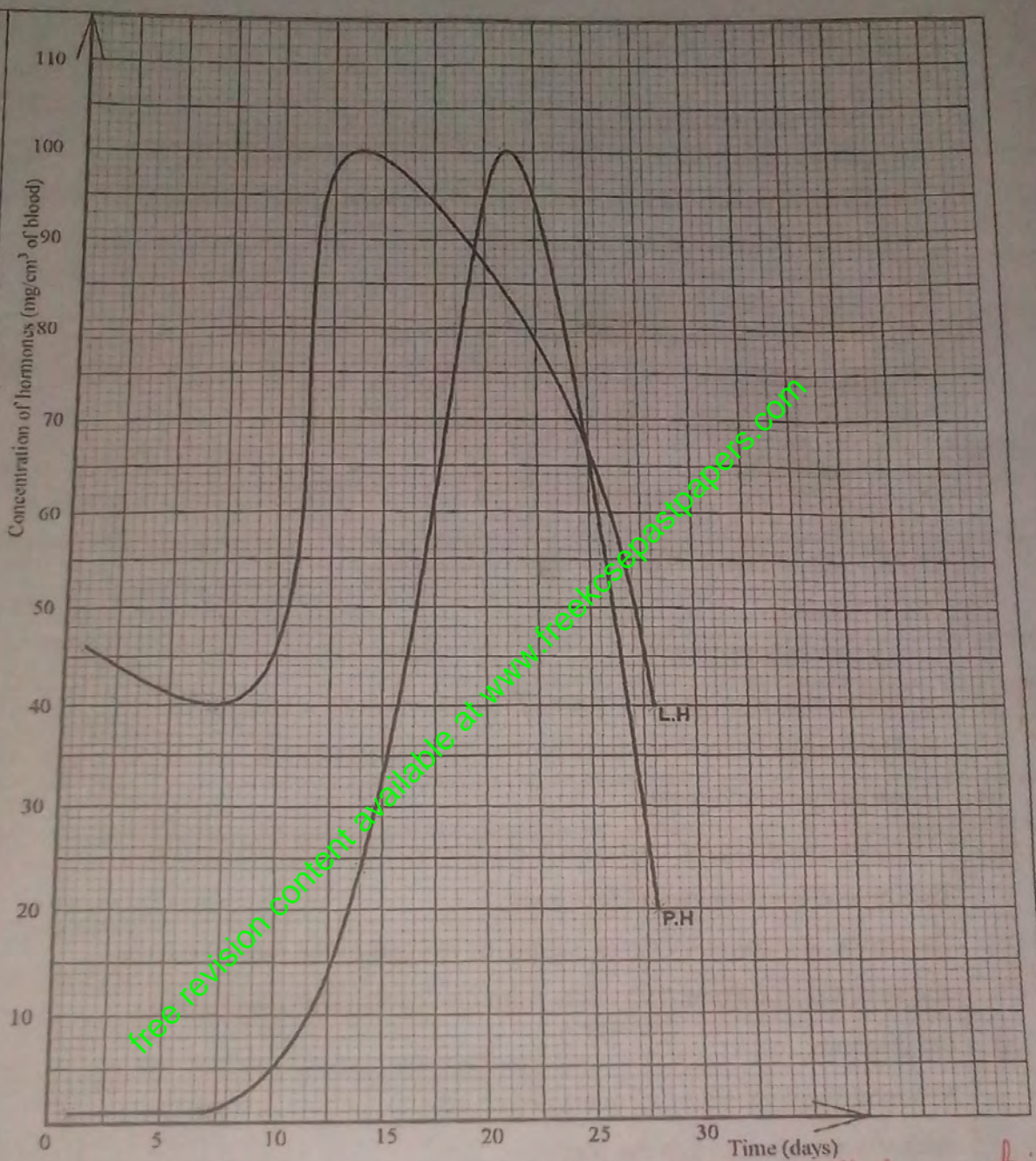
- Sacral foramen for passage of nerve / nerve roots;
- neural spines / processes for muscle attachment;

	(ii) coccyx; Acc caudal vertebrae	1 (1 mark)
	(iii) - Broad transverse processes for articulate with ilium; <ul style="list-style-type: none"> • Presence of prezygapophysis to articulate with the lumbar vertebrae; • Large, broad centrum to offer support; • Wide neural canal for passage of blood vessels/nerves; • Fused vertebrae to form a rigid/firm structure; 	of spinal cord 3 5
c)	Plants move to reach/access light/water/moisture/carbon (IV) oxide/nutrient (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 marks) 2 (08)
6. a)		

If marks exceeds but write 4

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- If no origin penalise ones



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 axes 1mk each 1/2 mark

5

		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>		(1 mark)
	(ii) Endometrium is thickest when the concentration of progesterone is highest (in preparation for implantation);		(1 mark)
d)	<ul style="list-style-type: none"> Inhibits production of luteinizing and follicle stimulating hormones; <i>hormone inhibits products of</i> Stimulates the thickening of the endometrial lining (for implantation); <i>Def abbreviation of Hormones LH & FSH</i> Maintains pregnancy; <i>- Mark the first two</i> 	2	(2 marks)
e)	<ul style="list-style-type: none"> Corpus luteum/ovary; Placenta; 	2	(2 marks)
f)	Prolactin (hormone);	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)	<p>The placenta plays the respiratory, excretory; nutritive; endocrine barrier; and immunological functions;</p> <p>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;</p> <p>Nutrients/food substances are also released into the foetus from the mother's system through the placenta;</p> <p>The placenta also serves as a barrier, preventing the mixing of maternal and foetus' blood/poisonous/harmful substances from the mother; <i>pathogens</i></p> <p>Some hormones/enzymes; needed for the foetus' development are also passed from the mother to the foetus through the placenta;</p>		(10 marks)

20

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 :- *U*

Protandry and protogyny; are mechanisms where either the male or female parts of the plant reproductive organs ripen at different times in *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 fertilise the ovules of the same flower. *ACC* *is higher / above the anther / stamen* *converse / opposite*

Dioecious; plants have reproductive parts located separately on different plants of the same species (discouraging self-pollination);

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 dichogamy

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	<p>- xylem / tracheids are narrow; for capillarity.</p>	<p>(10 marks)</p>
<p>8. (a)</p>	<p>Xylem tissue consists of xylem vessels; and tracheids; Xylem vessels are ^{tubular} 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 chisel-shaped ends and perforated cross-walls; the pits on the side walls allow lateral movement of water to cells surrounding the xylem;</p>	<p>(5 marks)</p> <p>for continuous column of water provides support of plant</p> <p>5</p>
<p>(b)</p>	<p>Human blood is made up of erythrocytes; leucocytes; and platelets; suspended in the 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/ creatinine} 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;</p>	<p>(15 marks)</p>

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;*

Thrombocyte

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

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Qsn 7a Roles of Placenta (10 marks)

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

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