



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

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.

1. (a)	(i) Diplopoda; <i>acc diplopoda</i>	(1 mark)
	(ii)	(2 marks)
	<ul style="list-style-type: none"> Two pairs of walking legs per segment; 	
	<ul style="list-style-type: none"> Many segments; 	
	(iii)	(2 marks)
	<ul style="list-style-type: none"> Decomposes the organic matter/enriches soil fertility; 	
	<ul style="list-style-type: none"> Aerates the soil (through its movements/burrowing); 	(1 mark)
(b)	(i) Monera; <i>ACC monera - don't penalise spp.</i>	(2 marks)
	(ii) • Cholera; <i>- Syphilis</i>	(2 marks)
	• Typhoid; <i>- Anthrax</i>	
	• <i>Proteus</i>	
	• <i>plague</i>	(1 mark)
2. a)	<ul style="list-style-type: none"> Moist to dissolve respiratory gas (for faster gaseous exchange); 	
	<ul style="list-style-type: none"> Lined with a one-cell-thick epithelium (for faster diffusion of respiratory gases); 	
	<ul style="list-style-type: none"> Highly vascularized for faster/efficient transportation of respiratory gases; 	(2 marks)
	Any two	
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 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>	(2 marks)
	• makes the skin/hair water repellent/water proof	
b)	Sweat pore; <i>reject sweat duct</i>	(1 mark)



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1. (a)	(i) Diplopoda; <i>acc diplopoda</i> (ii) <ul style="list-style-type: none">Two pairs of (walking) legs per segment;Many segments; <i>cylindrical; A pair of short antennae;</i> (iii) <ul style="list-style-type: none">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) <ul style="list-style-type: none">Cholera; <i>- Syphilis</i>Typhoid; <i>- Malaria</i><i>- Prion</i><i>- Plague</i> <i>(max first 2)</i>	(1 mark) (2 marks) <i>(08)</i>
2. a)	<i>Thin/membranous</i> <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;Highly vascularized for faster/efficient transportation of respiratory gases; <i>max first 2</i> <i>Any two</i>	(2 marks) <i>2</i>
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> <i>Max-3 marks</i>	 <i>3</i> (3 marks)
c)	Has a large surface area to volume ratio; diffusion (across its cell membrane) is adequate;	 <i>2</i> (2 marks)
d)	Whooping cough; <i>acc wrong spelling</i>	 <i>1</i> (1 mark) <i>(08)</i>
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><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>

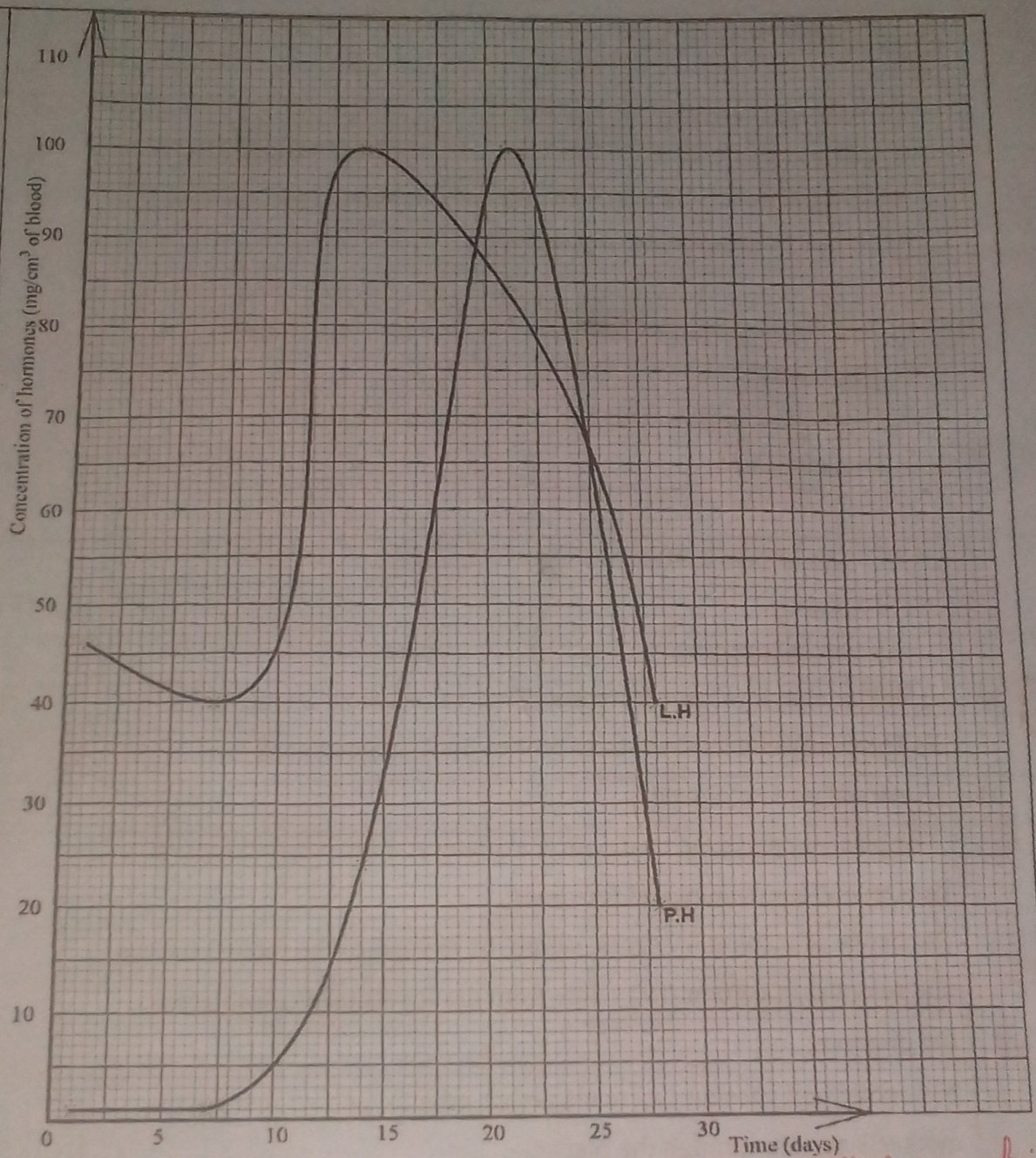
	<i>F (hair shaft)</i> - lies flat when hot to release / emit / allow heat loss; - stand upright / erect / perpendicular when cold to <i>conserve heat</i> ;	
c)	Thermoregulation; lies flat or erects (on the skin surface) when hot/cold to conserve heat or emit excess heat;	(2 marks) <u>2</u>
d)	i) Sole of the feet/palm of hands; <i>Acc SBI and repeat feet alone</i> ii) (Thickest because they) encounter high friction/hard-walking (soles of feet) and manual work (palms of hands); OWTTE	(1 mark) <u>2</u> (1 mark) <u>08</u>
d)	It is thicker; to insulate the skin/animal against heat loss	(2 marks)
4. a)	<p>Parental phenotype: ♂ Black fur male ♀ Black fur female</p> <p>Parental genotype: Nn Nn</p> <p>Gametes: N n x N n</p> <p>Offspring: NN (Black fur homozygous), Nn (Black fur heterozygous), 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) <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 (2 marks) (08)
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)	<ul style="list-style-type: none"> 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)	<ul style="list-style-type: none"> 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)	<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)

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~~ ^{is higher / above the anther / stamen} a shorter stamen or pistil, making it impossible for the pollen to land, accumulate and fertilize the ovules of the same flower; ^{ACC 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 answering

	<p>xylem / tracheids are narrow; for capillarity.</p> <p>(10 marks)</p>	
8. (a)	<p>Xylem tissue consists of xylem vessels; and tracheids;</p> <p>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;</p> <p>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}</p> <p>(Max-5 marks)</p>	<p>(5 marks)</p> <p>for continuous column of water</p> <p>provides support of plant</p> <p>5</p>
(b)	<p>Human blood is made up of erythrocytes; leucocytes; and platelets; suspended in the plasma; ^{plasma};</p> <p>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;</p> <p>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);</p> <p>^{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;

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

Qsn 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