F_2 genotype

Gamete	RY	Ry	rY	ry
RY	RRYY	RRYy	RrYY	RrYy
Ry	RRYy	RRyy	RrYy	Rryy
rY	RrYY	RrYy	rrYY	rrYy
ry	RrYy	Rryy	rrYy	rryy

1

Criteria:
Gametes = 1 m
Genotype = 1 m

1

F_2 phenotype

Phenotypes	Round, Yellow seed	Round, green seed	Wrinkled, yellow seed	Wrinkled, green seed
Phenotypic ratio	9	3	3	1

1

1

(*Any three*)
Criteria:
Phenotypes = 1 m
Phenotypic ratio = 1 m

3

(b)(ii) Able to calculate the number of seeds with each characters

Sample answer

Phenotypes of the seeds in F_2	Round, Yellow seed	Round, green seed	Wrinkled, yellow seed	Wrinkled, green seed
Phenotypic ratio	9	3	3	1
Probability of combinations	$\frac{9}{16}$	$\frac{3}{16}$	$\frac{3}{16}$	$\frac{1}{16}$
Number of seeds in F_2	$3600 \times \frac{9}{16}$ = 2025	$3600 \times \frac{3}{16}$ = 675	$3600 \times \frac{3}{16}$ = 675	$3600 \times \frac{1}{16}$ = 225
Marks	**1**	**1**	**1**	**1**

Criteria
Round, yellow seeds = 2025
Round, green seeds = 675
Wrinkled, yellow seeds = 675
Wrinkled, green seeds = 225

1
1
1
1

4

TOTAL **20**

PERATURAN PEMARKAHAN TAMAT

JABATAN PELAJARAN NEGERI JOHOR

PEPERIKSAAN PERCUBAAN SPM 2009 **4551/2(PP)**
BIOLOGY
Kertas 2
Peraturan Pemarkahan
September

UNTUK KEGUNAAN PEMERIKSA SAHAJA

Peraturan pemarkahan ini mengandungi 14 halaman bercetak

Peperiksaan Percubaan SPM 2009 Negeri Johor
Biology 1 (4551/1)
Peraturan Pemarkahan

1	D	26	B
2	C	27	C
3	C	28	B
4	C	29	B
5	C	30	C
6	B	31	A
7	B	32	B
8	C	33	B
9	B	34	C
10	D	35	D
11	B	36	A
12	C	37	C
13	B	38	B
14	D	39	D
15	A	40	A
16	B	41	A
17	C	42	A
18	D	43	D
19	D	44	A
20	D	45	B
21	C	46	A
22	D	47	A
23	A	48	D
24	A	49	D
25	D	50	A

Marking scheme
Section A

QUESTION 1

No	Marking scheme	Mark	
1(a)	Able to mark and label producer second trophic level. Answer : *Producer label at shrubs* *Second trophic level label at giraffes*	 1 1	2
(b)(i)	Able to construct a food chain consisting all organism. Answer : Shrubs ⟶ giraffes ⟶ lion	 1	
(ii)	Able to explain the change in number of organisms from the base to the top of the pyramid. Sample answer : F: As we go up the pyramid, there are fewer giraffes than trees/shrubs // fewer lions than giraffes. P1 : many trees / shrubs providing ~~energy~~ to giraffes // many giraffes providing energy to lion. P2 : a large number of living organisms at the base of the pyramid is required to support a few organisms at the top of the pyramid	 1 1 1	4
(c)	Able to explain why a lot of energy is lost to the environment as it transferred from one trophic level to the next. Sample answer : P1 : Energy is lost as heat during respiration at every trophic level P2 : through undigested matter egested by consumer P3 : through excretory product / urea from consumer	 1 1 1	3
(d)(i)	Able to suggest a way to increase the numbers of this organism again. Sample answer : 1. Reduce the population of predators by killing / destroy the predators 2. Conserve the organism in the 2nd trophic level 3. Breed the organism in the 2nd trophic level 4. Increase the organisms in the 1st trophic level *Any one*	 1 1 1 1	

Marking scheme
Section A

QUESTION 1

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(ii)	Able to explain the suggestion. Sample answer : P1 : Lion is the predator // Shrubs is the producer P2 : When the number of predator decreases , the giraffes will not be eaten // When the number of producer increases, the giraffes have more food supply. P3 : The breeding rate of the giraffes increase / the population of the giraffes increase	 1 1 1	4
	TOTAL		13

QUESTION 2

No	Marking Scheme	Mark	
2 (a) (i)	Able to name the parts labeled P and R. Answer : P : Trachea R: Spiracle	 1 1	
(ii)	Able to name the respiratory system shown. Answer : Tracheal system	 1	3
(b)	Able to state the **one** similarity and **one** difference of structure P Sample Answer : Similarity Both walls of P consist of rings to strengthen it Differences: The wall of P in insect consists of chitin ring while P in humans consists of cartilage ring.	 1 1	2
(c)	Able to explain how structures Q and S increase the efficiency of gaseous exchange in each organism. Sample Answer : F1 : Consist of (millions of) alveoli in lung and many tracheal tubes/ tracheole / thin layer / 1 cell thick P1 : to increase total surface area per volume ratio for gaseous exchange. F2 : The inner surface of alveolus and tracheoles end consists of tissue fluid / moisture P2 : to provide moist surface for gas diffusion / to dissolve oxygen/gases for diffusion. ***Any F with correspond P***	 1 1 1 1	2

(d)	Able to state how air is drawn from R to S. Sample Answer : P1 : by (rhythmic) movements of the abdominal muscles P2 : decreasing of air pressure inside trachea , (so that air is drawn in) P3 : gases diffuse into the cells (S) *Any two*	 1 1 1	2
(e)	Able to explain one difference between the respiratory system of a human and a cockroach. Sample Answer : F1 : Respiratory structures of cockroach consists of tracheae and spiracles while the respiratory structures of human consists of a trachea and a pair of lungs P1 :Tracheae of cockroach are branched into tracheoles which are directly in touch with body tissues and organs P2 :The trachea of human branched into 2 bronchi which enter the right and left lungs P3 :The bronchi of a human branched into smaller tubes called bronchioles which ends in a cluster of sacs called alveoli *F with any two P*	 1 1 1 1	3
	TOTAL		12

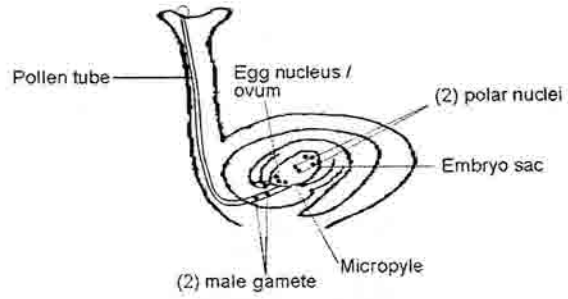
QUESTION 3

No	Marking Criteria	Marks	
3(a) (i)	Able to name structure X,Y and Z Sample answer: X : substrate Y : enzyme Z : enzyme-substrate complex	 1 1 1	3
(ii)	Able to identify correct structure Sample answer: Structure Y	 1	1
(b)(i)	Able to list down 3 characteristics of enzyme from the diagram given Sample answer: F1 - enzyme is highly specific//enzyme reaction follow the lock and key hypothesis F2 - enzyme is not destroyed after the reaction//can be reused again//remain unchanged after the reaction F3 - enzyme has specific site for its substrate F4 – enzyme hydrolyses / breaks down substrate to form products (Any 3)	 1 1 1 1 Max 3	3

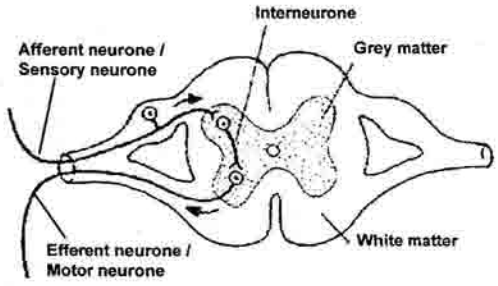
(b)(ii)	Able to explain the meaning of highly specific Sample answer: F1 - Enzyme has specific site called active site F2 - the active site has a distinctive F3 – the shape of the substrate must fit the enzyme precisely if a reaction is to be catalysed//complements its substrate	 1 1 1	3
(c)	Able to give one example and explain the reason Sample answer: F1 – Protease / lipase / amylase P1 - to breakdown/dissolve/hydrolyses protein stain/ fat stain / starch stain F and P must correspond	 1 1	2
	Total		12

QUESTION 4

No	Marking Criteria	Marks	
4(a) (i)	Able to name the process Sample answer Sexual reproduction	 1	1
(ii)	Able to identify the number of ovule Sample answer 16	 1	1
(b)	Able to state the importance of the reproduction Sample answer F 1 - There is variation/ diversity (in gene composition of the offspring) F2 - when conditions become unfavourable some individuals may survive F3 - And able to reproduce F4 - This will prevent the extinction of the species	 1 1 1 1 Max : 3	3
(c)(i)	Able to state structure S Sample answer Pollen grain	 1	1

(c)(ii)	Able to explain the process Sample answer F1 - Sucrose solution/sugar on structure T stimulate germination of S F2 - pollen tube grows out from S F3 - It grows down (the style) into the ovary F4 - enter the ovule through micropyle	1 1 1 1 Max : 3	3
(d)	Able to draw and label the diagram correctly Sample answer  Criteria of the diagram: Correct drawing with pollen tube enter through the micropyle end Correct drawing of embryo sac with 2 polar nuclei and egg nucleus inside Correct drawing of pollen tube with 2 male nuclei With correct labels	1 1 1	3
	Total		12

QUESTION 5

No.	Marking Scheme	Mark	
5 (a)	Able to name the parts label P, Q and R Answer P: Brain Q: Spinal cord R: Peripheral nervous system / Spinal nerve	 1 1 1	 3
(b)	Able to draw cross-section of a labelled diagram through XY of the central nervous system.  D: Able to draw transverse section through spinal cord L: Able to label grey matter and white matter correctly	 1 1+1	 3
(c)(i)	Able to label S, T and U correctly Answer: S: Interneurone T: Motor neurone // Efferent neurone U: Sensory neurone // Afferent neurone	 1 1 1	 3
(c)(ii)	Able to complete the reflex arc for the nerve impulse. *Answer:* Receptor / *Reseptor* → U → X : Synapses → Interneuron Interneuron → X : Synapses → T → Effector / *Efektor* *Note:* 2 synapses 1 Interneurone	 1 1	 2
	Total		12

Section B

Question 6

No	Marking scheme	Mark	
6(a)	Able to explain how molecule P move across the plasma membrane Sample answer F – Molecule P moves across the plasma membrane by facilitated diffusion P1 – Molecule P is water soluble / not soluble in lipid P2 – Molecule P moves from higher concentration region to lower concentration region // against the concentration gradient P3 – Molecule P bind to the binding site of carrier protein P4 – Carrier protein change its shape P5 – Molecule P move through carrier protein (F + any 3 P)	1 1 1 1 1 1	4
(b)	Able to describe what will happen if the blood osmotic pressure is not maintained at normal level Sample answer P1 – If the blood osmotic pressure is lower than normal, water diffuses into the RBC by osmosis P2 – Plasma membrane of RBC is too thin and delicate, so it cannot withstand the high osmotic pressure P3 – RBC swell up and finally burst P4 – Haemolysis occurs (Any 3)	1 1 1 1	3
	Q1 – If the blood osmotic pressure is higher than normal, water diffuses out of the RBC by osmosis Q2 – The internal pressure of RBC decreases Q3 – The RBC shrink Q4 – Crenation occurs (Any 3)	1 1 1 1	3
(c)(i)	Able to match cell P and cell Q to the correct plant Answer Cell P is obtained from plant in Diagram 6.2(b) Cell Q is obtained from plant in Diagram 6.2(a)	1 1	2
(c)(ii)	Able to explain what had happened to the plant Sample answer F1– Plant in Diagram 6.2(a) wilts P1 – During drought, soil water dries up P2 – Soil water becomes hypertonic to the cell sap of the root epidermal cells P3 – Water diffuses out of the cells by osmosis P4 – Root epidermal cells plasmolysed (F1 + any 3Ps)	1 1 1 1 1	4

	F2 – The plant regains its normal condition / turgidity P5 – After water is given to the plant, the soil water becomes hypotonic to the cell sap of the plant P6 – Water diffuses into the plant cells by osmosis P7 – The plasmolysed cells regain water// deplasmolysis occurs P8 – The plasmolysed cells become turgid (F2 + any 3Ps)	1 1 1 1 1	4
	Total		20

Question 7

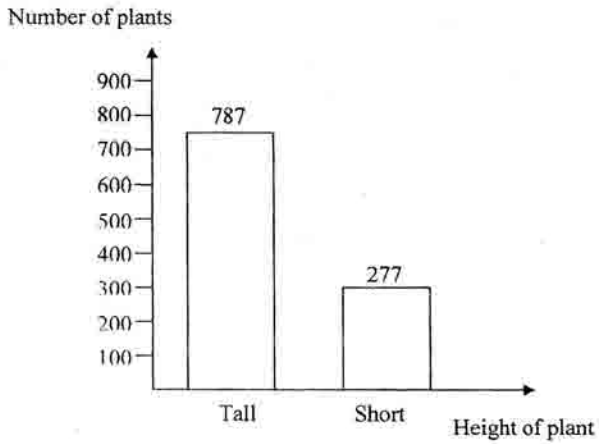
No	Marking scheme	Mark	
7(a)	Able to explain the two types of immunity Sample answer : F1 - Active immunity P1 - means the body produces its own antibodies in response to stimulation by an antigen. F2 - Passive immunity P2 - means the body receive an antibodies from an outside source	1 1 1 1	4
(b)(i)	Able to describe how a person obtain active immunity Sample answer Active immunity P1 - Active immunity can be obtained by vaccination/inoculation//artificially acquired P2 - Vaccine is a suspension of dead or weakened bacteria/virus/pathogen P3 - White blood cells are stimulated to produce antibodies againsts the pathogen P4 - Active immunity is also obtained when an individual has recovered from a certain disease//naturally acquired P5 - A ready made supply of antibody will give immunity towards that disease. (P1 + P4 + any other 1P)	1 1 1 1 1 Max 3	3
(b)(ii)	Able to describe how a person obtain passive immunity Sample answer Passive immunity P1 - Passive immunity can be obtained by an individual by injecting antibodies/antiserum into the body//artificially acquired P2 - No antigen is put into the body, so the body does not produce its own antibodies P3 - Passive immunity can also be obtained by a baby when the antibodies from the mother's blood plasma diffuse into the foetus through the placenta // naturally acquired	1 1 1	3
(c)	Able to explain the reason of cardiovascular disease because of smoking 20 cigarettes a day		

	Sample answer F1- In the cigarette/tobacco smoke, there is carbon monoxide, tar and nicotine that cause cardiovascular disease. P1 - Carbon monoxide reduces the oxygen supply to the heart and body cells because it combines with haemoglobin faster than oxygen//has higher affinity for oxygen than haemoglobin P2 - Carbon monoxide increase the sedimentation rate of fat and cholesterol on the wall of the blood vessels causing arteriosclerosis. P3 - Nicotine stimulates the production of adrenaline hormone, which increases the heart rate and blood pressure. P4 - Nicotine encourages blood clotting in the narrow artery causing cardiovascular diseases P5 – Tar in tobacco smoke is carcinogenic/cause cancer/cause mutation (F1 + any 3Ps)	1 1 1 1 1 1 Max 4	4
	Able to explain the reason of cardiovascular disease because constantly taking fast food meal Sample answer F2 - Fast food contain a lot of unsaturated fat and cholesterol P6 - Fat and cholesterol deposit on the arterial walls P7 - The lumen becomes small, and its wall hardens P8 - Less blood flow / blood flow is blocked P9 - Causes atherosclerosis P10 -Blood clots can be formed in the artery causing thrombosis. (F2 + any 2Ps)	1 1 1 1 1 1 Max 3	3
	Able to explain the reason of cardiovascular disease because of lacking of exercise Sample answer F3 - Exercise reduces the fat level in the blood P11 - Reduces the risk of arteriosclerosis because there is less fat deposits on the blood vessel walls P12 - Increase cardiovascular durability P13 - Blood circulatory system becomes more efficient and smooth P14 - Increase the heart's strength. (F3 + any 2Ps)	1 1 1 1 1 Max 3	3
	Total		20

Question 8

No.	Marking Scheme	Mark	
8(a)	Able to explain the phenomenon and its effects to the environment . Criteria: Fact (F): Name of phenomenon Explanation (E): Formation of phenomenon Effects(Ef) Sample answers: F: (The phenomenon) is acid rain. E1: Factories / motor vehicles released large amount of oxides of nitrogen to the atmosphere E2 : and sulphur dioxide E3: oxides of nitrogen combines with water vapour (in the atmosphere) to form nitric acid E4 :sulphur dioxide combines with water vapour (in the atmosphere) to form sulphuric acid E5 : The rain falls as acid rain. Effects: Ef1. May corrode buildings Ef2. Aquatic lives may die due to acidic water/low pH Ef3. Minerals in soil will be dissolved / washed into rivers Ef4. Soil becomes infertile / not suitable for agriculture Ef5. Plants may die due to infertile soil / acidic soil Ef6. The ecological balance of ecosystem disrupted	1 1 1 1 1 1 F + Any 4Es 1 1 1 1 1 1 Any 5 Efs	5 5
8(b)	Able to evaluate the statement with impacts in environmental aspect. Criteria: E - Evaluation Im - Impacts on environment Sample answers: Evaluation(E): – E1. Brings more bad impacts to the environment. Impacts on environment (I) : - Im1 - Deforestation will lead to flash flood / land slide Im2 - Open burning will lead to air pollution / formation of haze Im3 - More carbon dioxide (from open burning) trap heat Im4 - Lead to greenhouse effects / global warming Im5 - Lead to changes in world climate Im6 - Greenhouse effect / global warming increases the earth temperature Im7 - Destroying flora and fauna Im8 - Migration of fauna / birds Im9 - Lead to loss of herbs for medical purposes / timber Im10 - No more / Disrupted water catchment area (E + any 9Ims)	1 1 1 1 1 1 1 1 1 1 1	10
	Total		**20**

Question 9

No.	Marking Scheme	Mark	
9(a)(i)	Able to draw the bar chart correctly Sample answer  Criteria: P: Correct title on both horizontal and vertical axis T: Bars of equal thickness, correct height and separated L: Label tall and short with correct numbers	1 1 1	3
(a)(ii)	Able to state and explain the type of variation Sample answer F : Discontinuous variation P1: the differences in the character is distinctive / with no intermediate characters P2: The character is qualitative / cannot be measured from one extreme to the other P3: the graph shows a discrete distribution P4: A single gene/ a pair of alleles determines the differences in the character/ traits P5: the phenotype is controlled by a pair of alleles *(F + any 2Ps)*	1 1 1 1 1 1	Max 3

(a)(iii)	Able to draw a schematic diagram of the cross breeding Sample answer: Parental genotype Tt X Tt Meiosis Gamete T t T t Fertilisation F_2/offspring/ Genptype TT Tt Tt tt F_2/offspring/ Phenotype Tall Tall Tall Short *(Any four)*	1 1 1 1 1 1	4
(b)(i)	Able to draw schematic diagram and Punnett square show the genotypic characters correctly Sample answer Parental phenotype Round, Yellow seed (Heterozygote) Round, Yellow seed (Heterozygote) Parental genotype RrYy RrYy Meiosis Gamete RY rY Ry ry RY rY Ry ry *(Any three)*	1 1 1 1	3