

SULIT

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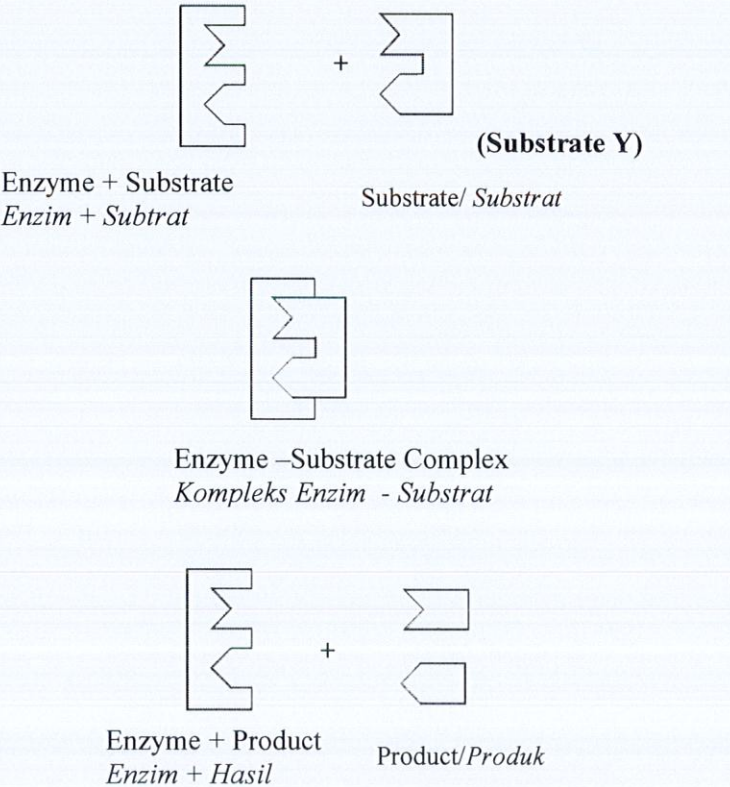
PERATURAN PEMARKAHAN KERTAS 1 SPMRSM BIOLOGI 2020

NO. SOALAN	JAWAPAN
1	C
2	C
3	B
4	A
5	D
6	B
7	D
8	A
9	D
10	A
11	A
12	A
13	B
14	D
15	B
16	C
17	D
18	C
19	A
20	D
21	C
22	B
23	D
24	C
25	D
26	C
27	A
28	A
29	D
30	C
31	B
32	A
33	A
34	C
35	B
36	B
37	A
38	A
39	B
40	A
41	D
42	C
43	C
44	D
45	C
46	D
47	D
48	A
49	D
50	C

CONTOH JAWAPAN KERTAS 2 SPMRSM BIOLOGI 2020**QUESTION 1**

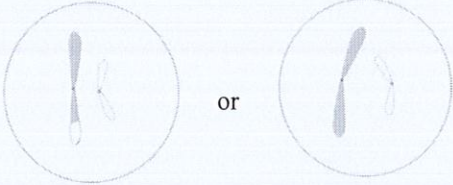
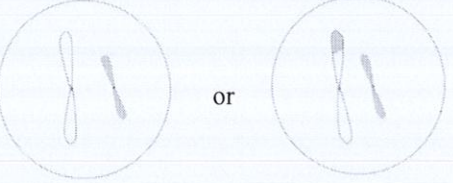
NO	SUGGESTED ANSWER	MARKS							
1(a)(i)	Protein X: Carrier Protein Protein Y: Pore Protein	1 1	2						
(a)(ii)	P1: Hydrophilic head – attracted to water P2: Hydrophobic tail – repelled to water	1 1	1						
(b)(i)	<table border="1"> <tr> <td>Through Structure Z</td> <td>Through protein X/ carrier proteins</td> <td>Through Protein Y/ Pore proteins</td> </tr> <tr> <td>Vitamin E</td> <td>Amino Acid</td> <td>Potassium Ion</td> </tr> </table>	Through Structure Z	Through protein X/ carrier proteins	Through Protein Y/ Pore proteins	Vitamin E	Amino Acid	Potassium Ion		3
Through Structure Z	Through protein X/ carrier proteins	Through Protein Y/ Pore proteins							
Vitamin E	Amino Acid	Potassium Ion							
(b)(ii)	P1: Substances move following concentration gradient//higher concentration region to lower concentration region P2: does not require energy	1 1	2						
(c)	P1: hydrophilic head of soap molecule will bond with water P2: hydrophobic tail of soap molecule will bond with oil and fat/ lipid membrane (on virus) P3: the hydrophobic tail of soap molecules wedge/ penetrate themselves into the lipid membrane of virus P4: soap destroy the membrane of virus P5: virus pry/ break apart P6: soap trap dirt and fragments (of the destroyed virus in tiny bubbles called micelles) P7: tiny bubbles/ micelles wash away in water	1 1 1 1 1 1 1	2						
(d)	P1: Diarrhoea patient loss a lot of body fluid/ water P2: Causing imbalance// increase in blood osmotic pressure P3: Rehydration salt contains mixture of salt, sugar and water P4: Absorb into blood to replace salt and glucose in body P5: Promotes reabsorption of water (from small intestines by osmosis to blood capillary)	1 1 1 1 1	2						
	TOTAL		12M						

QUESTION 2

NO	SUGGESTED ANSWER	MARKS	
2(a)	Food Sample P: Monosaccharides Food Sample Q: Polysaccharides	1	2
		1	
(b)(i)	P1: process M is hydrolysis P2: Lactose is breakdown using water/ adding one water molecule P3: water used to break down a bond between lactose (molecule) P4: to produce X/ galactose and Y/ glucose	1	3
		1	
		1	
		1	
(b)(ii)	$\text{Lactose} + \text{water} \xrightarrow{\text{lactase}} \text{Glucose} + \text{Galactose}$	1	1
(iii)	 <p>Enzyme + Substrate <i>Enzim + Subtrat</i></p> <p>(Substrate Y) Substrate/ Substrat</p> <p>Enzyme -Substrate Complex <i>Kompleks Enzim - Substrat</i></p> <p>Enzyme + Product <i>Enzim + Hasil</i></p> <p>Product/Produk</p>		2

(c)	P1: (mango juice) contain fructose/ glucose/ simple sugar/ monosaccharides	1	2
	P2: fructose/ glucose/ simple sugar/ monosaccharides is a reducing sugar	1	
	P3: reduce the (blue) Copper (II) sulphate/ Cu(II) ions	1	
	P4: into (red) Copper (I) oxide/ Cu(I) ions	1	
(d)	P1: can reduce risk/ avoid diabetes mellitus	1	2
	P2: rice contain starch	1	
	P3: starch is a polysaccharide	1	
	P4: will produce large number of glucose (through hydrolysis)	1	
TOTAL		12M	

QUESTION 3

No	Answer Scheme	Marks	
3(a)(i)	Animal cell	1	1
(a)(ii)	P1: Has centriole	1	1
	P2: There is no cell wall	1	
(b)	Cell X: Metaphase	1	2
	Cell Y: Anaphase I	1	
(c)(i)	16	1	1
(ii)	6	1	1
(d)		1	2
		1	

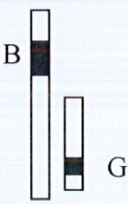
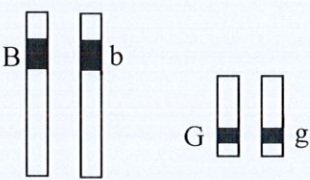
(e)		1	
	Daughter cell 1/ cell 2 Daughter cell 1/ cell 2	1	2
(f)	P1: (Benzene/ acetyldehyde) carcinogenic substances P2: stops/ fails the function of protein p53 P3: cell do not stop divide/ divide continuously/ divide uncontrollably P4: Form mass of abnormal number of cells	1 1 1 1	2
TOTAL		12M	

QUESTION 4

NO	SUGGESTED ANSWER	MARKS	
4(a)(i)	ovary	1	1
(a)(ii)	P: (Oestrogen) to repair/ stimulate the thickening uterine lining/ endometrium wall.	1	1
(a)(iii)	Any part of fallopian tube// abdominal cavity// cervix	1	1
(b)(i)	Phase S: Menstruation Phase/ Menses Phase T: (Secretory and) Vascularisation phase	1 1	2
(b)(ii)	<p style="text-align: center;">Corpus luteum size-same as before(day 24) Thickness of endometrium wall-maintain</p>		2
(b)(iii)	P1: Contraceptive pills contains oestrogen and progesterone// oestrogen// progesterone	1	

	P2: pituitary gland is less stimulated P3: less/ reduce/ low secretion of LH P4: Prevent ovulation (from occur)	1 1 1	3
(c)	P1: ovulation occur P2: menstrual cycle and ovulation back to normal P3: blood contain no progesterone (and oestrogen) P4: FSH is secreted (by pituitary gland) P5: stimulate developing of follicle in the ovary P6: LH is secreted	1 1 1 1 1 1	2
TOTAL			12M

QUESTION 5

NO	SUGGESTED ANSWER	MARKS																										
5(a)	<p>Gametes:</p>  <p>Genotype F1 Generation:</p> 	1	2																									
(b)(i)	(All/ 100%) yellow base color and speckled wing	1	1																									
(b)(ii)	P : Involved two characteristics// involved 4 traits// involved base color and type of wing// involved trait yellow base color and white base color, trait normal wing and clear wing.	1	1																									
(c)(i)	<table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td style="text-align: center;">Male</td> <td></td> <td style="text-align: center;">Bg</td> <td style="text-align: center;">bG</td> <td></td> </tr> <tr> <td style="text-align: center;">Female</td> <td></td> <td></td> <td></td> <td style="text-align: center;"><u>BbGg</u></td> </tr> <tr> <td></td> <td style="text-align: center;">Bg</td> <td style="text-align: center;">BBgg</td> <td></td> <td></td> </tr> <tr> <td></td> <td style="text-align: center;">bG</td> <td></td> <td style="text-align: center;">bbGG</td> <td></td> </tr> <tr> <td></td> <td></td> <td style="text-align: center;">BbGg</td> <td></td> <td></td> </tr> </table>	Male		Bg	bG		Female				<u>BbGg</u>		Bg	BBgg				bG		bbGG				BbGg				2
Male		Bg	bG																									
Female				<u>BbGg</u>																								
	Bg	BBgg																										
	bG		bbGG																									
		BbGg																										
(c)(ii)	3/16 // 18.8%	1	1																									

(c)(iii)	9 yellow base color speckled wing: 3 yellow base color non-speckled wing: 3 white base color speckled wing: 1 white base color non-speckled wing	1	1
(c)(iii)	4 BbGg : 1 bbgg	1	1
(d)	P1: (During metaphase 1) homologous chromosome arrange randomly on metaphase plate// independent assortment of chromosome	1	3
	P2: Result in a variety of gametes/ each with different combinations of maternal and paternal chromosome	1	
	P3: Random fertilisation between variety gametes	1	
	P4: Result in new combination/ recombinant trait in F2 generation/ variety zygote.	1	
TOTAL		12M	

QUESTION 6

NO	SUGGESTED ANSWER	MARK	
6(a)	F : It is lenticels	1	Max 4
	E1 : Raised pores	1	
	E2 : Cells are loosely arranged	1	
	E3 : Large intercellular space/ air space	1	
	E4 : Allow diffusion of respiratory gases/ oxygen into the plant cells	1	
	E5 : Allows carbon dioxide diffuse out from the cells	1	
	E6 : Provide a direct exchange of gases	1	
6(b)	P1 : <i>Oryza sativa</i> (root cells) are adapted to carry out anaerobic respiration	1	Max 6
	P2 : <i>Oryza sativa</i> still survive/ fresh where less amount of oxygen available	1	
	P3 : Root cells of <i>Oryza sativa</i> can respire anaerobically for a longer term.	1	
	P4 : Incomplete oxidation of glucose occurs	1	
	P5 : Produce ethanol, energy and carbon dioxide	1	
	P6 : Cell the root of paddy plant are (extremely) tolerant/ can adapt to (high content of) ethanol	1	
	P7 : Paddy plant has shallow/ short fibrous root	1	
	P8 : It enable to absorb oxygen from surface of water logged soil	1	

6(c)	SIMILARITIES			
	S1	: Both contain nicotine which can cause addiction	1	
	S2	: Both contain heat which can dry up the lining of respiratory tract	1	
	S3	: Both contain carcinogens which can cause cancer	1	
	DIFFERENCES			
	F1	: Nicotine in e-cigarette is higher than cigarette	1	
	E1	: It will cause more addiction/ stimulate production of dopamine/ excited/ stroke	1	
	F2	: Tar present in e-cigarette but does not present in cigarette	1	
	E2	: Tar may cover the lining of alveolus/ may accumulate in alveoli	1	
	E3	: Tobacco smoke contain tar		
	F3	: Heat produced in cigarette is higher than e-cigarette	1	
	E4	: Cigarette involves combustion while e-cigarette release vapour	1	
	E5	: Tobacco/cigarette smoke contain heat		
	E6	: Reduce moisture on the surface of alveolus// respiratory gases cannot dissolved easily.	1	
E7	: Cigarette smoker has higher tendency to cough.	1		
F4	: Carcinogens are higher in e-cigarette compare to cigarette	1		
E9	: Vaper has higher tendency to get cancer			
F5	: Carbon monoxide is present/ higher in cigarette compare to e-cigarette	1		
E10	: Smoker will face short breath worse than vaper/ person use e-cigarette	1		
F6	: Tobacco/ cigarette smoke contain carbon monoxide while e-cigarette do not release carbon monoxide	1		
E11	: (Tobacco/ cigarette smoke) increase acidity/ corrode the surface of alveolus	1		
				Max 10
		TOTAL		20M

(c)	P1 : When blood pressure increases than normal (blood pressure)	1	
	P2 : Baroreceptors are stimulated	1	
	P3 : Increased rate of nerve impulses send to the cardiovascular centre	1	
	P4 : Nerve impulses send to the cardiac/ heart muscles/ effectors (from cardiovascular centre)	1	
	P5 : Contraction of cardiac/ heart muscles become weaker/ slower	1	
	P6 : Smooth muscles of arteries will relax	1	
	P7 : Blood vessels widening// vasodilation	1	
	P8 : Decreases the resistance of blood flow in the blood vessels	1	
	P9 : Blood pressure decreases and back to normal	1	
	D1 : When blood pressure decreases than normal (blood pressure)	1	
	D2 : Baroreceptors are less stimulated	1	
	D3 : Decreased rate of nerve impulses send to the cardiovascular centre	1	
	D4 : Nerve impulses send to the cardiac/ heart muscles/ effectors (from cardiovascular centre)	1	
	D5 : Contraction of cardiac/ heart muscles become stronger	1	
	D6 : Smooth muscle of arteries contract	1	
	D7 : Blood vessels narrowing// vasoconstriction	1	
	D8 : Increases the resistance of blood flow in the blood vessel	1	
	D9 : Blood pressure increase and back to normal	1	Max 10
		TOTAL	20M

QUESTION 8

BIL	SUGGESTED ANSWER	MARK	
(a)	<u>Vaccine</u>		
	V1 : (Prepared from) a weakened or dead/ microorganisms/ pathogen	1	
	V2 : Vaccine contains an antigen that resembles a disease-causing microorganism/ pathogen	1	
	V3 : Stimulates the body immune system/ lymphocytes (in the body)	1	
	V4 : To recognize the agent as foreign proteins	1	
	V5 : Record/ memory of it kept	1	
	V6 : Immune system can (more) easily recognize	1	
	V7 : Produce antibody to destroy these pathogen/ microorganisms	1	
	<u>Antibiotics</u>		
	B1 : Chemicals produce by microorganisms/ fungus/ bacteria	1	
	B2 : Can stop bacteria from reproducing/ kill bacteria	1	
	B3 : Bind permanently at the cell wall of the bacteria	1	
	B4 : Penicillin-related antibiotics are from fungus	1	
	B5 : Streptomycin are from bacteria	1	
	<u>Antiserum</u>		
	R1 : (Prepared) by injecting certain animal with (specific) pathogens/ microorganisms	1	
	R2 : The animal white blood cell/lymphocytes is stimulated to produce antibody (towards the disease)	1	
	R3 : Blood serum/ plasma containing antibody is extracted	1	
	R4 : The most common use in humans is antitoxin/ anti venom	1	
	R5 : Antiserum is used to acquire (artificial) passive immunity	1	
	<u>Insulin</u>		
	N1 : Technique use is DNA recombinant/ biotechnology/ genetic engineering	1	
	N2 : Plasmid DNA of a bacterium is used/ Escherichia coli is cut using (restriction) enzyme	1	
	N3 : Introduce/ insert recombinant DNA into a bacterium/ E.coli	1	
	N4 : (Recombinant DNA in) bacterium multiply	1	
N5 : The bacteria produce human insulin	1	Max10	
(b)	P1 : Source for food	1	
	P2 : Provide timber to build shelter/ houses/ building	1	
	P3 : As a fuel	1	

P4	: Fibres for clothing	1	
P5	: Sources of pharmaceutical drugs/ medicines// Any plant species are original	1	
P6	: New commodities, for example, new crop plants or medicinal materials could be developed (using the gene pool from wild species in the forests).	1	
P7	: As gene pool from wild species in the forests.	1	
P8	: Allow for biological control to maintain stable population	1	
P9	: Regulate climatic conditions	1	
P10	: Maintaining biogeochemical cycles/ water cycle /nitrogen cycle/ carbon cycle)	1	
P11	: Prevent flash flood// soil erosion// landslide	1	
P12	Prevent soil erosion// landslide		
P13	: Natural ecosystems and species in the wild are beautiful// ecotourism	1	
P14	: For education/ research	1	
P15	: Pleasure to be derived from unspoilt natural environment.	1	Max10
P16	: Could provide income for some countries	1	
TOTAL			20M

QUESTION 9

BIL	SUGGESTED ANSWER	MARK	
(a)(i)	F : (The phenomenon is) haze	1	
	P1 : Caused by smog/ soot/ solid particles	1	
	P2 : Gases such as carbon dioxide/ oxide of nitrogen/ sulphur dioxide/ carbon monoxide is trapped by the particles present in the air	1	
	P3 : Cause by open burning	1	
	P4 : Source is dust / smoke from traffic/ industry/ quarry/ any suitable answer	1	
	P5 : Due to human ignorance/ lack of knowledge	1	
	P6 : (Worsen by) still/ dry air	1	
	P7 : Cause by hot weather/ no wind	1	
	P8 : No rain to wash off the suspended particles	1	Max 5

(ii)	F	: Impairs human health	1	
	P1	: Cause asthma/ cough/ difficulty in breathing/ lung diseases/ conjunctivitis/ eye inflammation/ bronchitis	1	
	P2	: Leads to anxiety/ stress/ heart failure/ dizzy	1	
	P3	: Impairs visibility	1	
	P4	: Can cause (land and air traffic) accidents	1	
	P5	: Covers leaves/ clogs stomata in plants	1	
	P6	: Prevent gaseous exchange// reduce light intensity	1	
	P7	: Reduce rate of transpiration/ respiration// rate of photosynthesis decreases	1	
	P8	: Reduce crop yield	1	
	P9	: Cause death of small animal	1	
	P10	: Disrupt the food chain/ food web	1	Max 5
P11	: Decrease livestock/ the income of farmers	1		
(b)	F	: Brings (more) bad (effect) impacts to the environment	1	
	P1	: Deforestation occur	1	
	P2	: Lead to flash flood/ landslide	1	
	P3	: Open burning lead to air pollution	1	
	P4	: Formation of haze	1	
	P5	: Increase carbon dioxide concentration in atmosphere (that trap heat)	1	
	P6	: Can cause greenhouse effects	1	
	P7	: Lead to global warming	1	
	P8	: Changes in world climate	1	
	P9	: Increase the temperature of earth	1	
	P10	: Destroying flora and fauna// loss of habitat flora and fauna	1	
	P11	: Migration of fauna/ birds	1	
	P12	: Lead to loss of herbs for medical purposes// loss of timber	1	
P13	: No/ disruption of water catchment area	1	Max10	
TOTAL			20M	

CADANGAN PEMARKAHAN KERTAS 3 SPMRSM BIOLOGI 2020**1 (a) KB0603 – Measuring Using Numbers**

Mark Scheme			Score
Sample Answer:			
Clone type of durian/ <i>Durio zibethinus</i> Jenis klon durian/ <i>Durio zibethinus</i>	Number of cells undergoing anaphase		3
	Sample 1	Sample 2	
D24	12	10	
D99	4	6	
D159	9	7	

1 (b) [KB0602 – Classifying]

Mark scheme		Score
Sample answer:		
Materials	Apparatus	3
Distilled water Aceto-orcein stain Filter paper 1.0M hydrochloric acid	Knife Glass slides Cover slip Microscope Mounting needle	

(c) (i) [KB0601 - Observation]

Explanation	Score
Sample answer:	3
1. When clone type of durian/ <i>Durio zibethinus</i> is D24, the number of cells undergoing anaphase in Sample 1 is 12 and Sample 2 is 10.	
2. When clone type of durian/ <i>Durio zibethinus</i> is D99, the number of cells undergoing anaphase in Sample 1 is 4 and Sample 2 is 6.	
3. When clone type of durian/ <i>Durio zibethinus</i> is D159, the number of cells undergoing anaphase in Sample 1 is 9 and Sample 2 is 7.	

1 (c) (ii) [KB0604 – Making inference]

Explanation	Score
<p>Sample answer :</p> <p>1. (When clone type of durian/ <i>Durio zibethinus</i> is D24), the number of cells undergoing anaphase is the highest because cell (actively) divide by mitosis is highest so growth rate is the highest.</p>	3

1 (d) [KB0610 – Controlling Variables]

Explanation	Score								
<p>Able to state all 3 variables and the methods to handle the variable correctly. Sample answer:</p> <table border="1"> <thead> <tr> <th>Variables</th> <th>Method to handle the variable correctly</th> </tr> </thead> <tbody> <tr> <td> <p>Manipulated variable: Clone type of durian/ <i>Durio zibethinus</i></p> </td> <td> <p>Use different clone type of durian/ <i>Durio zibethinus</i> which are D24, D99 and D129</p> </td> </tr> <tr> <td> <p>Responding variable: Number of cells undergoing anaphase or Growth rate</p> </td> <td> <p>Count and record the number of cells undergo anaphase in Sample 1 and Sample 2 or Calculate the growth rate of clone type of durian/ <i>Durio zibethinus</i> by using formula: Growth rate of clone type of <i>Durio zibethinus</i> = <u>Average number of cell undergoing anaphase</u> time taken</p> </td> </tr> <tr> <td> <p>Constant variable: Type of plant</p> </td> <td> <p>Fix// use the same type of plant which is durian/ <i>Durio zibethinus</i></p> </td> </tr> </tbody> </table>	Variables	Method to handle the variable correctly	<p>Manipulated variable: Clone type of durian/ <i>Durio zibethinus</i></p>	<p>Use different clone type of durian/ <i>Durio zibethinus</i> which are D24, D99 and D129</p>	<p>Responding variable: Number of cells undergoing anaphase or Growth rate</p>	<p>Count and record the number of cells undergo anaphase in Sample 1 and Sample 2 or Calculate the growth rate of clone type of durian/ <i>Durio zibethinus</i> by using formula: Growth rate of clone type of <i>Durio zibethinus</i> = <u>Average number of cell undergoing anaphase</u> time taken</p>	<p>Constant variable: Type of plant</p>	<p>Fix// use the same type of plant which is durian/ <i>Durio zibethinus</i></p>	3
Variables	Method to handle the variable correctly								
<p>Manipulated variable: Clone type of durian/ <i>Durio zibethinus</i></p>	<p>Use different clone type of durian/ <i>Durio zibethinus</i> which are D24, D99 and D129</p>								
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<p>Constant variable: Type of plant</p>	<p>Fix// use the same type of plant which is durian/ <i>Durio zibethinus</i></p>								

1 (e) [KB0611 – Making Hypothesis]

Mark scheme	Score
<p>Sample answer:</p> <p>1. When Clone type of durian/ <i>Durio zibethinus</i> is D24, the number of cells undergoing anaphase (in Sample 1 and 2)// average number of cells undergoing anaphase is higher compared to D159 and D99.</p> <p>2. When Clone type of durian/ <i>Durio zibethinus</i> is D24, the growth rate is the higher compared to D159 and D99.</p>	3

1 (f) (i) [KB0606 – Communication]

Mark scheme				Score
Sample answers :				
Clone type of durian / <i>Durio zibethinus</i>	Number of cells undergoing anaphase		Average number of cells undergoing anaphase	Growth Rate (1/month)/ month ⁻¹
	Sample 1	Sample 2		
D 24	12	10	11	5.5
99	4	6	5	2.5
D 159	9	7	8	4.0

1 (f)(ii) [KB0608 – Space and time relationship]

Criteria	Score
<p>Able to draw a bar chart base on three criteria:</p> <p>P : Uniform scale for both axes T : Correct height plotted B : 3 bars correct with the same width</p>	3

1 (g) [KB0607 – Interpreting Data]

Criteria	Score
<p>Sample answer:</p> <p>1. Clone D24 because cell (actively) divide by mitosis is highest so number of cells undergoing anaphase is the highest.</p>	3

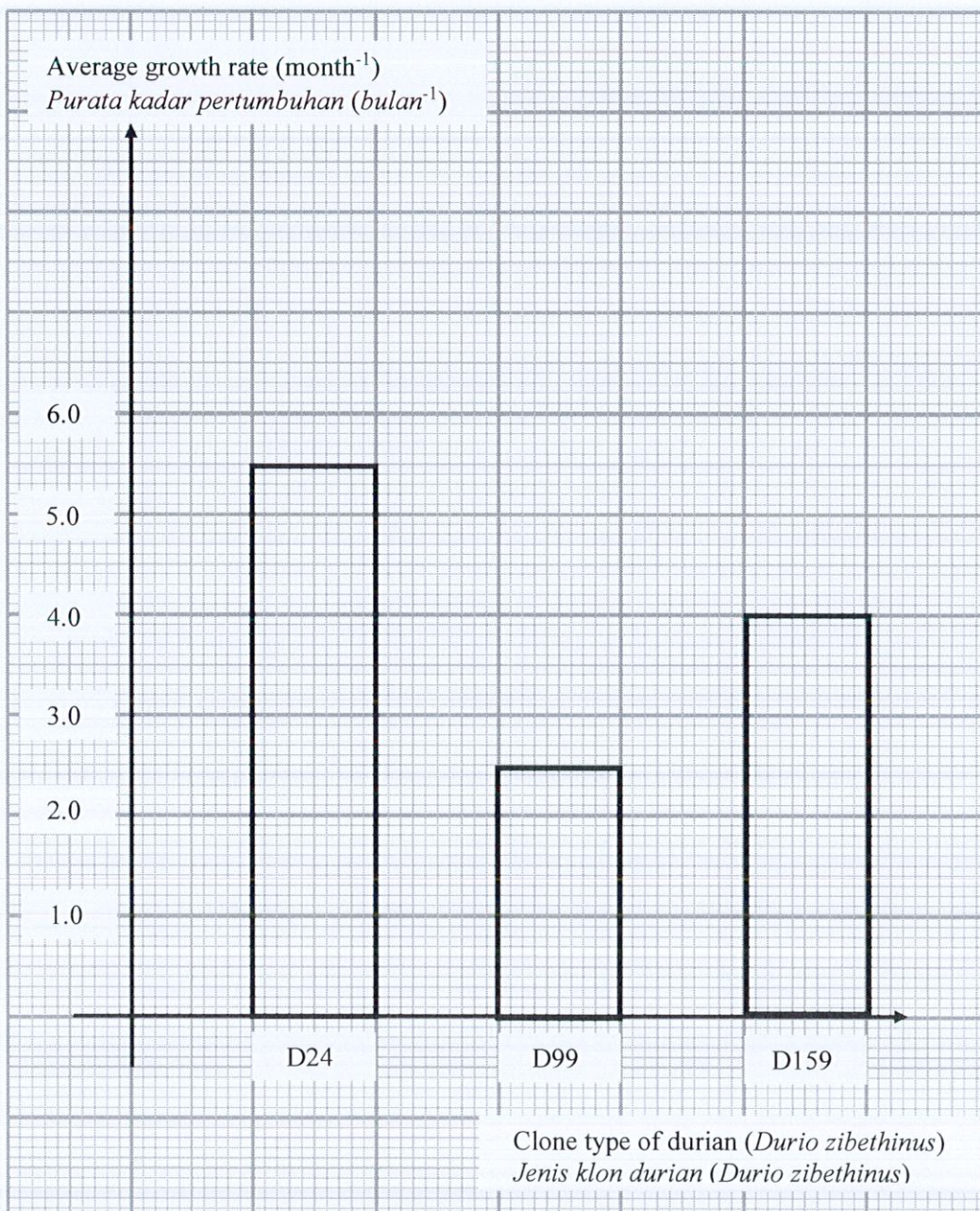
1 (h) [KB0605 –Predicting]

Mark scheme	Score
<p>Sample answer:</p> <p>Average weight of fruits is 4.0 – 6.0 kg and colour of durian flesh is intense yellow. This is because the cross-breed produce hybrid which inherited dominant alleles from both parents through sexual reproduction. So (with random fertilisation), variation occurs in the offspring.</p>	3

1 (i) [KB0609 – Define operationally]

Explanation	Score
<p>Sample answers:</p> <p>Growth rate is the process of increasing number of cell by mitosis in durian (<i>Durio zibethinus</i>) per time// per month that is shown by number of cells undergo anaphase and affected by (different) clone type of durian/ <i>Durio zibethinus</i>.</p>	<p>3</p>

Bar chart of average growth rate against clone type of durian (*Durio zibethinus*)
 Carta bar purata kadar pertumbuhan melawan jenis klon durian (*Durio zibethinus*)



No.	Mark Scheme	Score				
2(iv)	<p>Materials and Apparatus: [KB061205 – Material and Apparatus] <u>Sample answers :</u></p> <table border="1"> <thead> <tr> <th>Material (M)</th> <th>Apparatus (A)</th> </tr> </thead> <tbody> <tr> <td> <ul style="list-style-type: none"> Student/ boy * Reject : girl/ woman Mineral water/ drinking water * </td> <td> <ul style="list-style-type: none"> Treadmill * (Painting) brush * Comic * Glass/ cup/ mug/ beaker/ paper cup/ bottle/ container Measuring cylinder * Stopwatch/ clock/ timer </td> </tr> </tbody> </table>	Material (M)	Apparatus (A)	<ul style="list-style-type: none"> Student/ boy * Reject : girl/ woman Mineral water/ drinking water * 	<ul style="list-style-type: none"> Treadmill * (Painting) brush * Comic * Glass/ cup/ mug/ beaker/ paper cup/ bottle/ container Measuring cylinder * Stopwatch/ clock/ timer 	3
Material (M)	Apparatus (A)					
<ul style="list-style-type: none"> Student/ boy * Reject : girl/ woman Mineral water/ drinking water * 	<ul style="list-style-type: none"> Treadmill * (Painting) brush * Comic * Glass/ cup/ mug/ beaker/ paper cup/ bottle/ container Measuring cylinder * Stopwatch/ clock/ timer 					

Question 2

No.	Mark Scheme	Score
2(i)	<p><u>Sample answers:</u></p> <ol style="list-style-type: none"> What is the effect of types of activity on the volume of urine produced by the student? Does different types of activity affect the volume of urine produced/ output of the student? Does running on a treadmill has the higher volume of urine produced compared to painting a portrait and reading a comic? 	3

No.	Mark Scheme	Score
2(ii)	<p><u>Sample answers :</u></p> <ol style="list-style-type: none"> When running on a treadmill, the volume of urine produced by the student is lower compared to painting a portrait and reading a comic. Reading a comic has higher volume of urine produced compared to painting a portrait and running on a treadmill. 	3

No.	Mark Scheme	Score
2(iii)	<p><u>Sample answers:</u></p> <p>Manipulated variables: types of activity Responding variables : volume of urine produced/ output by the student Constant variables : age/ body size (weight/height), health condition/ duration/ volume water intake/ type of water intake/ concentration of water intake (*Reject : activity and gender)</p>	3

No.	Mark Scheme	Score
2(v)	<p>Sample answer:</p> <ol style="list-style-type: none"> 1. Student is requested to stop eating and drinking 4 hours/ (any suitable period) before starting the experiment. 2. Students of the same size/ weight age are instructed to empty their bladder before the start of the experiment. *Reject : Gender 3. Measure 500 ml (any suitable volume) of mineral/ drinking water using measuring cylinder 4. Put the mineral/distilled water into a glass/ mug/ cup. 5. Ask the student to drinks 500 ml of mineral/distilled water 6. Ask the student to run on a treadmill for a distance of 5 km. 7. Start the stopwatch immediately. 8. Student is required to stay in air-conditioned room with 16°C (accept any suitable temperture). 9. Student is not allowed to eat/ drink (other drinks) during the experiment. 10. After one hour (accept any suitable period), student empties his urinary bladder. 11. The urine is collected in a bottle/ paper cup/ container. 12. The volume of urine produced is measure and record by using measuring cylinder. 13. Steps 1-12 are repeated by painting a potret and reading a comic. *Reject any activity other than stated in Diagram 2 14. The experiment is repeated twice to get average reading. 15. All data is recorded in table/ tabulate the data 16. Dispose the urine properly 17. Wear gloves for hygienic purpose. 	3

No.	Mark Scheme	Score																							
2(vi)	<p>Sample answer:</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th rowspan="2" style="width: 30%;">Types of activity</th> <th colspan="3" style="width: 40%;">Volume of urine produced (ml)</th> <th rowspan="2" style="width: 30%;">Average volume of urine produced (ml)</th> </tr> <tr> <th style="width: 10%;">First reading</th> <th style="width: 10%;">Second reading</th> <th style="width: 10%;">Third reading</th> </tr> </thead> <tbody> <tr> <td>Running on a treadmill</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Painting a portrait</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Reading a comic</td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table>	Types of activity	Volume of urine produced (ml)			Average volume of urine produced (ml)	First reading	Second reading	Third reading	Running on a treadmill					Painting a portrait					Reading a comic					2
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