

ANSWER SCHEME FOR STPM TRIAL EXAM , BIOLOGY 2012

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

MARKING SCHEME PERCUBAAN STPM 2012

BIOLOGY KERTAS 2

NEGERI PAHANG

No	Answer	Mark.
1(a)(i)	C to B to A	1
(a)(ii)	Water moves down a water potential gradient / high to low ; By osmosis	1 1
(b)(i)	$\Psi = 1000-1800$ $= -800\text{kPa}$	1
(b)(ii)	Plasmolysed; Cell in concentrated solution / low water potential ; Water diffuses out; Cytoplasm / vacuole shrinks.(not : cell membrane comes away from wall)	1 max=2
(c)	Water diffuses into cell by osmosis; Cytoplasm expands ; Cell become turgid; As cytoplasm / contents push against wall; Wall inelastic/ resists further expansion .(not : rigid)	 Max=3

No	Answer	Mark.
2	<p>The diagram illustrates the process of alcoholic fermentation. It starts with 'glucose' at the top left. A vertical arrow points down to 'pyruvate'. From 'pyruvate', an arrow points right to 'ethanal', with 'CO₂' written below it. From 'ethanal', an arrow points right to 'ethanol'. Above this, a cycle shows 'NAD+' being reduced to 'reduced NAD+' by '2H' (coming from the glucose-to-pyruvate step). 'reduced NAD+' then provides '2H' to the conversion of 'ethanal' to 'ethanol', and is oxidized back to 'NAD+' in the process.</p>	<p>2 corrects = 1</p> <p>3 corrects = 2</p> <p>4 corrects = 3</p> <p>all corrects = 4</p>
b	<p>In mammals:</p> <p>Lactate produced / no ethanol produced;</p> <p>No decarboxylation / carbon dioxide released;</p> <p>Single step;</p> <p>Lactate dehydrogenase;</p> <p>reversible</p>	Max=3
c	<p>In anaerobic respiration</p> <p>Only glycolysis occurs/ krebs cycle stops/link reaction stops;glucose , not fully broken down/ still contain energy;</p> <p>pyruvate does not enter mitochondrion;</p> <p>(no oxygen) so no final eletron acceptor (in ETC);</p> <p>ETC stops;</p> <p>No oxidative phosphorylation</p>	Max=3
3 (a)	<p>1= ectoderm</p> <p>2= endoterm</p> <p>3= mesoterm</p>	<p>1</p> <p>1</p> <p>1</p>
(b)	<p>B;</p> <p><u>Triploblastic</u> organism with <u>no coelom</u>(acoelomate).[both terms required]</p>	<p>1</p> <p>1</p>
(c)	A	1
(d)	C	1

No	Answer	Mark.
(e)	<p>Annelida have three body layers/triploblastic/possess mesoderm;</p> <p>Possess a coelom;</p> <p>Body is bilateral symmetrical;</p> <p>Metamerical segmented;</p> <p>Through gut/regional specialization;</p> <p>Other appropriate difference</p>	<p>Any 3 Max=3</p>
4(a)	<p>$1980+3600+62$ $=5642$ (state units)</p>	2
(b)	<p>Subtract respiration / 3600;</p> <p>Or</p> <p>2042 (state units)</p> <p>$NPP=(GPP-R)/GPP=NPP+R$</p>	1
(c)	<p>$44.4-(12.5+25.4)$;</p> <p>6.5 out of 44.4;</p> <p>14.6%</p>	3
(d)	<p>Faeces/indigestible material;</p> <p>Reject "inedible parts"</p> <p>Nitrogenous waste</p>	<p>1</p> <p>1</p>
(e)	<p>An explanation to include two form:</p> <p>Small proportion reaches next level/ converse;</p> <p>Correct use of figures;</p> <p>Insufficient energy to support another level</p>	<p>1</p> <p>1</p>
5(a)	<p><u>Labelled phosphate</u> linked to <u>labelled sugar</u> by a single bond;</p> <p><u>Labelled base</u> linked to a labelled sugar by a single bond;</p> <p>Correctly linked base, sugar and phosphate <u>labelled as nucleotide</u>;</p> <p>Covalent bond(s) labelled between sugar and phosphate/ between sugar and base;</p> <p>At least two nucleotides linked by a single sugar-phosphate bond;</p> <p>At least two nucleotides linked by base-base bonds;</p> <p><u>Hydrogen bonds labelled</u> between bases;</p> <p>A-T and /or C-G base pairing;</p>	Max =6

No	Answer	Mark.
	Phosphate and base shown linked to correct carbon atoms on sugar;	
5(b)	<p>Two genetically identical nuclei/daughter cells formed during mitosis (so hereditary information in DNA can be passed on);</p> <p>Two copies of each chromosome/DNA molecule/chromatid needed;</p> <p>Helicase unwinds the DNA /double helix;</p> <p>To allow the strands to be separated;</p> <p>Helicase separates the two (complementary) strands of DNA;</p> <p>By breaking hydrogen bonds between bases;</p>	Max=4
5(c)	<p>DNA replication is semi- conservative;</p> <p>DNA is split into two single/template strands;</p> <p>Nucleotides are assembled on / attached to each single / template strands;</p> <p>By complementary base pairing;</p> <p>Adenine with thymine and cytosine with guanine/A with T and C with G;</p> <p>Strand newly formed on each template strands is identical to other template strand;</p> <p>DNA polymerase used;</p>	Max=5
6(a)	<p>Award 1 mark for each of the following structures,shown in the correct relative position and labelled.</p> <p>Upper epidermis;</p> <p>Palisade layer/mesophyll;</p> <p>Spongy layer/mesophyll;</p> <p>lower epidermis;</p> <p>xylem (in a major or minor vein)</p> <p>phloem (in a major or minor vein)</p> <p>collenchyma (in the midrib);</p>	Max=6

No	Answer	Mark.
	guard cell;(do not accept stoma/stomata only)	
6(b)	<p>Chlorophyll/photosystem absorbs light;</p> <p>Electron raised to higher energy level/photoactivated;</p> <p>Splitting of water / photolysis replaces electron;</p> <p>Passing of excited electrons between chlorophyll molecules in photosystem;</p> <p>Electron passed from photosystem II (in thylakoid membrane);</p> <p>Production of ATP in this way is called photophosphorylation;</p> <p>Pumping of protons into the thylakoid;</p> <p>Proton gradient used by ATPase to drive ATP production;</p> <p>Electron passes to photosystem I at end of carrier chain;</p> <p>Electron re-excited and emitted by photosystem I;</p> <p>Electron passed to / used to reduce NADP+;</p> <p>Cyclic photophosphorylation using photosystem I electron carriers and ATPase only;</p>	Max=9
7(a)	<p>Multiple alleles means a gene has three or more alleles/ more than two alleles;</p> <p>ABO blood groups/other named example of multiple alleles;</p> <p>ABO gene has three alleles / equivalent for other example;</p> <p>I^A I^B and i shown (at some point in the answer) / equivalent for other example;</p> <p><i>Accept other notation for alleles if clear.</i></p> <p>any two of these alleles are present in an individual;</p> <p>homozygous and heterozygous genotype with phenotypes (shown somewhere);</p>	Max=6

No	Answer	Mark.
	<p>all six genotypes with phenotypes given (shown somewhere);</p> <p>example / diagram of a cross involving all three alleles</p>	
7(b)	<p>linked genes occur on the same chromosome / chromatid;</p> <p>genes (tend to be) inherited together / not separated/do not segregate independently;</p> <p>non-Mendelian ratio / not 9:3:3:1 / 1:1:1:1;</p> <p>real example of two linked genes;</p> <p><i>Award [1] for each of the following examples of a cross between two linked genes.</i></p> <p>key for alleles involved in the example of a cross;</p> <p>homozygous parental genotypes and phenotypes shown;</p> <p>genotype and phenotype shown / double heterozygote genotype and phenotype; 1 F</p> <p>possible genotypes and phenotypes shown; 2 F</p> <p>recombinants identified;</p> <p>recombinants due to crossing over;</p> <p>in prophase I of meiosis;</p> <p>diagram / explanation of mutual exchange of parts of chromatids during crossing over;</p>	Max=9
8(a)	<p><i>Award [1] for each of the following clearly drawn and correctly labelled.</i></p> <p>loop of Henle;</p> <p>ascending and descending;</p> <p>proximal convoluted tubule; <i>(shown with convolutions)</i></p> <p>Bowman's capsule; <i>(shown as a continuation of proximal convoluted tubule)</i></p> <p>afferent arteriole;</p> <p>efferent arteriole; <i>(with smaller diameter than afferent)</i></p> <p>distal convoluted tubule; <i>(shown with convolutions)</i></p>	Max=5

No	Answer	Mark.
	collecting duct; <i>(shown with branches)</i> fenestrated capillaries; <i>(shown as an enlarged diagram)</i>	
8(b)	ADH released (by the pituitary) when blood solute high; ADH makes cells of the collecting duct more permeable; more water is reabsorbed / concentrated urine produced; solute gradient within the medulla draws water from filtrate; leads to water reabsorption in the descending loop of Henle; ascending limb is impermeable to water (at upper reaches); (lower) ascending limb permeable to sodium ions/ Na ⁺ pumped out of (upper) ascending limb; which contributes to the establishment of a solute gradient; more Na ⁺ at base of loop / deeper in medulla; some water re-absorbed in proximal convoluted tubule; capillaries associated with nephron absorb reclaimed water; once water level returns to normal/low blood solute, release of ADH stops; less water is reabsorbed / dilute urine produced;	Max=9
9(a)	Compare each aspect : endocrine hormones ; chemical messengers ; A chemical that transfer information ductless glands / (released) into blood ; target, organs / cells ; ref. receptors on cell membranes ; example of named hormone and effect ; nervous impulses / action potentials ; electrical, signals / current along, neurones / nerve fibres ; nerves synapse (with target) / neuromuscular junction ;	Max =8

No	Answer	Mark.
	<p>ref. receptor / effector / sensory / motor, neurones ;</p> <p>differences – endocrine / nervous</p> <p>slow manifestation/ fast</p> <p>long lasting effect / short;</p> <p>widespread effect/ localised;</p>	
9(b)	<p>IAA / plant growth regulator ;</p> <p>synthesised in, growing tips / apical buds / meristems ;</p> <p>moves by diffusion ;</p> <p>from cell to cell ;</p> <p>also, mass flow / in phloem ;</p> <p>stimulates cell elongation ; R cell enlargement</p> <p>inhibits, side / lateral, buds / growth ; A inhibits branching</p> <p>plant grows, upwards / taller ; A stem elongates</p> <p>IAA / auxin, not solely responsible ;</p> <p>interaction between IAA and other plant growth regulators ;</p> <p>e.g. role of ABA and lateral bud inhibition</p> <p>e.g. cytokinins antagonistic to IAA / gibberellins enhance IAA</p>	Max=7
10 (a)	<p>allopatric speciation ;</p> <p>geographical isolation / spatial separation ;</p> <p>e.g. of barrier ; e.g. of organism ; must relate</p> <p>sympatric speciation ;</p> <p>example ;</p> <p>meiosis problems ;</p> <p>polyploidy ;</p> <p>behavioural / temporal / ecological / structural, isolation ;</p> <p>(isolated) populations, prevented from interbreeding / can only breed amongst themselves ;</p> <p>no, gene flow / gene mixing, (between populations) ;</p>	Max=8

No	Answer	Mark.
	<p>different selection pressures operate ;</p> <p>natural selection ;</p> <p>change in allele frequencies ;</p> <p>different gene pool ;</p> <p>over time (differences prevent interbreeding) ;</p> <p>reproductively isolated ;</p>	
10 (b)	<p>humans ; must be linked to, choosing / selecting / mating etc</p> <p>parents with desirable feature ;</p> <p>e.g. organism and feature ;</p> <p>bred / crossed ;</p> <p>select offspring with desirable feature ;</p> <p>repeat over many generations ;</p> <p>increase in frequency of desired allele(s) / decrease in frequency of undesired allele(s) ;</p> <p>background genes ;</p> <p>loss of hybrid vigour / increase in homozygosity / ref. inbreeding depression ;</p>	Max=7