PRESBYTERIAN HIGH SCHOOL
SCIENCE DEPARTMENT
SUGGESTED ANSWERS

Subject: BIOLOGY
Setter: Mr Chandra
Level: SEC 4 EXP

Exam: PRELIM
Year: 2020

PAPER 1 (40 marks)			
Q/N	**Answer**	**Q/N**	**Answer**
1	A	21	C
2	A	22	C
3	A	23	C
4	A	24	C
5	B	25	B
6	D	26	D
7	D	27	C
8	B	28	B
9	A	29	D
10	C	30	B
11	D	31	B
12	C	32	D
13	A	33	A
14	D	34	C
15	C	35	A
16	B	36	B
17	B	37	B
18	D	38	C
19	A	39	B
20	B	40	D

PRESBYTERIAN HIGH SCHOOL
SCIENCE DEPARTMENT
MARKSCHEME

Subject: BIOLOGY Exam: PRELIM EXAM
Setter: Chandra Year: 2020
Level: SEC 4 EXP

SECTION A (50 marks)			
Qn	**Suggested Answer**	**Sub-total**	**Total**
1a	Lactic acid;	1	1
b	Difference between oxygen supply and demand for oxygen; Or Amount of oxygen needed if all the energy released was from aerobic respiration	1 1	1
c	Oxygen needed to break down lactic acid; Oxygen needed to repay debt;	1 1	1
d	Steeper rise + longer time to reach starting level; Emphysema -walls b/w alveoli broken, total surface area decreases; -less oxygen absorbed per unit time; -cannot meet oxygen demand; + anaerobic faster -more time needed to breakdown lactic acid	1 ½ ½ ½ ½	1 2
			6
2a	Sucrose: min Meat: min	1 1	2
b	sucrose is in solution; no sucrase/no carbohydrate digestion in stomach therefore sucrose passes straight, through stomach / into small intestine; protein digestion starts in the stomach ; enzyme need time to digest large molecules ; meat is solid, small surface area + takes longer to digest; solid requires more mechanical digestion e.g. ref to churning	½ ½ ½ ½ 1 1	 3
			5
3a	A: umblical cord B: oviduct C: amniotic fluid D: uterus wall	½ ea	2
b	Label H on placenta	1	1
c	Ref to numerous villi + increased surface area + for diffusion of material; Dense network of capillaries [R blood vessels] + continuous blood flow maintains diffusion gradient;	1 1 1	 2

	Thin membrane separates maternal and fetus blood + short distance for diffusion;		
d	Sperm and ovum must be present for fertilisation to occur; Uses data – more than 50% chance between day 11 and day 14; Ovulation is only 1 day, day 12, 13 or 14; Ref to lifespan of ovum n sperm; From day 8, uterine lining is ready to accept embryo so chances increases;	½ 1 1 1 1	3
			8
4a	0.1s to 0.6 s	1	1
b	Duration of 1 beat = 0.9 – 0.1 = 0.8s 60s = 60/0.8 = 75 beats	1	1
ci	Either 0.3 or 0.4s to reach maximum but same duration to empty	1	1
ii	At rest = 0.14 x 5 = 0.7 dm^3 Exercise = 0.028 x 25 = 0.7 dm^3 No change, blood flow remains the same to coordinate many activities;	½ ½ 1	2
iii	rate of respiration is very high to meet energy demand; heat energy is a by-product; arterioles dilate/vasodilation + more blood to capillaries in skin; excess heat + lost via convection, radiation; high body temperature causes enzyme to denature;	1 ½ 1 ½ 1	4
			9
5a	Light rays passes through cornea, iris and falls on lens; Ciliary muscles relax + exert pull on suspensory ligament; Edges of lens stretched, lens become thin and longer; Light rays bent less, focused on retina	1 1 1 ½	3
b	Centre of vision is blurred	1	1
ci	Light rays need not pass through the lens but camera.	1	1
ii	Yes. The device produces impulse; Carried by optic nerve to brain;	 1 1	2
			7
6a	Nectar contains sugar + Energy-giving food for insects; Pollen contains male gametes; Must be carried from anther to stigma for fertilisation;	1 ½ ½	2
bi	Day 8 – day 12	1	1
bii	Pollen germinates to form pollen tube, grows down through style carrying male gamete; Enters ovary, reaches ovule + release male gamete; Fertilisation occurs, zygote starts to divide to form new cells; All these needs time;	1 1 1	3

c	Only one parent plant is involved, so more likely to take place; Good qualities likely to be passed down; Its effective because not dependent on pollinating agents, especially in harsh environments; Its reliable if plants are widely scattered;	1 1 1 1	2
			8
7a	Patia has pointed abdomen/body	1	1
b	Birds have learnt not to prey on Methona by recognising wing pattern; Wing pattern of Patia resembles toxic Methona, do not prey on it as soon as they recognise wing pattern	1 1	2
c	Mutation Change in the genes controlling wing pattern; Independent assortment / crossing over of sister chromatids of homologous chromosomes during meiosis; Variety of gametes with different alleles for wing pattern; Random fertilisation Random combination of alleles for wing pattern in zygote	½ ½ ½ ½ ½ ½	Any Of 2 sets 4
			7
	Section B		
8a	-0.2 -0.7 -0.1 -0.2 no negative value = wrong value = no marks	0.5 0.5 0.5 0.5	2
b	Scale: even scale and graph able to fill up at least half the grid; Bars: drawn separately with correct labels (W, X, Y and Z); Axis: labelled with correct heading and unit: change in mass / g and leaf Plot: accurate values	1 1 1 1	4
c	More stomata found on upper surface; Water loss from upper surface is higher in both lighting condition	1	1
c	Warm condition increases transpiration; Film of moisture on mesophyll surfaces evaporate faster; Humidity of air in intercellular spaces increases; Greater concentration of water vapour molecules inside the leaf than outside atmosphere; Water vapour diffuses out through stomata; [reject water concentration]	1 ½ ½ ½ ½	3
			10

<table>
<tr><td>9a</td><td>
<table>
<tr><th>feature</th><th>explanation</th></tr>
<tr><td>Narrow/small diameter/microscopic</td><td>Contact with many cells/short diffusion distance between cells</td></tr>
<tr><td>Tiny gaps on wall</td><td>Allows fluids/nutrients out/ wbc;
Proteins cannot pass
[reject plasma]</td></tr>
<tr><td>Single cell layer/1 cell thick</td><td>Short distance for materials to diffuse through / rapid diffusion;</td></tr>
<tr><td>Smooth inner surface/endothelium;</td><td>Smooth blood flow</td></tr>
<tr><td>Large total surface area/reduces pressure</td><td>Slows flow for exchange / allows more exchange
[reject easier exchange]</td></tr>
</table>
</td><td>1
1
1
1
1</td><td>4</td></tr>
<tr><td>b</td><td>Phagocytes engulf + digest bacteria;
Lymphocytes release anti-bodies;
Causes agglutination + purpose;
Neutralise toxins;
Kills bacteria/virus
Antibodies remain + immune response</td><td>1
½
½
½
½
½</td><td>4</td></tr>
<tr><td>c</td><td>males have XY sex chromosomes;
female XX chromosomes ;
males require only one (b) recessive allele;
females require two recessive alleles;
greater chance that males will not have the dominant allele (B);</td><td>½
½
½
½</td><td>2</td></tr>
<tr><td></td><td></td><td></td><td>10</td></tr>
<tr><td>10ai</td><td>
<table>
<tr><th>Enzymes</th><th>Hormones</th></tr>
<tr><td>all are proteins</td><td>either steroids (eg. oestrogen) or protein (eg, insulin)</td></tr>
<tr><td>carried in ducts to site of action</td><td>carried in bloodstream to target organs</td></tr>
<tr><td>high molecular weight, so non-diffusible through cell membrane</td><td>low molecular weight, diffusible through membrane</td></tr>
<tr><td>catalyse a particular reaction</td><td>stimulate target cells to perform the required reactions</td></tr>
<tr><td>catalyse reversible & irreversible reactions</td><td>hormone controlled reactions are not reversible</td></tr>
<tr><td>Released in large quantities</td><td>Released in very small quantities</td></tr>
</table>
</td><td>1
1
1
1
1
1</td><td>3</td></tr>
<tr><td>ii</td><td>Any reasonable state of emergency; [reject chased by tiger, etc]
Increased heart rate/breathing rate/Increased alertness/increased metabolic rate [any 2]</td><td>1
1</td><td>2</td></tr>
</table>

<table>
<tr><td>b</td><td>
<table>
<tr><th>Differences</th><th>Reflex action/involuntary</th><th>Voluntary action</th></tr>
<tr><td>behaviour</td><td>in-born behaviour, automatic</td><td>controlled behaviour, involves decision making</td></tr>
<tr><td>speed of response</td><td>response is rapid</td><td>response is slower</td></tr>
<tr><td></td><td>response to an external stimulus</td><td>response initiated from the brain under conscious control</td></tr>
<tr><td>nature of response</td><td>Same stimulus always results in the same response</td><td>response varies according to situation</td></tr>
<tr><td>CNS</td><td>brain or spinal cord involved</td><td>always forebrain involved</td></tr>
<tr><td>effectors</td><td>muscles and/or glands</td><td>muscles only</td></tr>
<tr><td>Similarities</td><td colspan="2">both involve transmission of impulse along motor neurone to effectors</td></tr>
</table>
</td><td>1
1
1
1
1
1
1</td><td>5</td></tr>
<tr><td></td><td></td><td></td><td>10</td></tr>
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