



2010 National Qualifying Exam – Biology Solutions

Section A (Multiple Choice)

Question	Answer	Question	Answer	Question	Answer
Q1	D	Q16	B	Q31	C
Q2	D	Q17	B	Q32	B
Q3	B	Q18	C	Q33	B
Q4	D	Q19	E	Q34	C
Q5	A	Q20	B	Q35	D
Q6	A	Q21	C	Q36	B
Q7	E	Q22	B	Q37	C
Q8	C	Q23	A	Q38	D
Q9	E	Q24	E	Q39	B
Q10	A	Q25	C	Q40	A
Q11	D	Q26	C	Q41	D
Q12	A	Q27	D	Q42	E
Q13	E	Q28	A	Q43	B
Q14	C	Q29	B	Q44	B
Q15	E	Q30	D	Q45	C

Section B (Multiple Choice)

Question	Answer	Question	Answer
Q46	B	Q52	2464
Q47a	III	Q53a	REJECTED
Q47b	III	Q53b	REJECTED
Q47c	IV	Q53c	NOT REJECTED
Q48	C	Q53d	NOT REJECTED
Q49	F	Q54a	II
Q50a	40.0%	Q54b	III
Q50b	01.5	Q54c	I
Q50c	01.0	Q55a	I & IV
Q50d	011.4g	Q55b	IV
Q51a	T	Q56	C
Q51b	F	Q57a	I
Q51c	T	Q57b	II
Q51d	T	Q57c	III

Section C (Hand Written)

58a.

Animal	Body mass M_b (kg)	Total O_2 consumption $\dot{V}_{O_2}$ (litre O_2 h ⁻¹)	O_2 consumption per kilogram, $\dot{V}_{O_2}/M_b$ (litre O_2 kg ⁻¹ h ⁻¹)
Shrew	0.0048	0.0355	7.40
Harvest mouse	0.0090	0.0225	2.50
Mouse	0.025	0.041	1.64
Rat	0.290	0.25	0.86
Cat	2.5	1.70	0.68
Sheep	42.7	9.59	0.22
Man	70	14.76	0.21
Elephant	3833	268.00	0.07

58b.

58c. Increasing oxygen consumption is associated decreasing body mass and the rate of change is greatest with smaller mammals.

58d. Accept from 0.005 to 0.25kg

58e. Higher metabolic rate in smaller mammals, therefore higher oxygen consumption. Surface area to volume ratio is larger in smaller animals. More heat is lost, more energy required to maintain body heat temperature.

59a.

59b.



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59c.

59d.

60a. Ice Strain will compete with Ice + reducing number of Ice +

60b. Could colonise / affect the weeds. Weeds would then be less susceptible to frost damage. Increased competition with crop plants.

60c. Plants treated the same but sprayed only with the carrier solution.

60d. Enables a large range of numbers to be plotted / grown is exponential / can plot both small and large numbers on the same scale

60e. Survival time or number (e.g. relativity sort survival time / survival only about 6 weeks so not likely to spread

61a. Prolific breeding / rapid reproduction rate / quick maturing / huge reproductive capacity; abundant food supply enabling rapid growth / little or no competition for food; no / few predators to reduce numbers; could burrow under fences

61b. No / very low numbers with natural resistance / immunity to the virus; rabbit population was dense / animals lived close together in burrows; thus supported a huge flea population / fleas could easily jump from

61c. A random gene mutation in the population – a few rabbits developed resistance / immunity to the virus; these rabbits survived and bred, passing on the resistance to their offspring; these also developed immunity to the virus (before it caused symptoms / killed them); thus resistant rabbits were selected and non-resistant rabbits died

61d. Not all rabbits inherit the resistance gene and so some succumb to the virus; the virus may have mutated changing its infectivity / pathogenicity



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- 62a.** Fat
- 62b.** During prolonged exercise, a higher % of fat is consumed during energy use
- 62c.** excess sugar/glucose, if not respired for energy will be converted to fat and stored; sugar/glucose has to be released from starch/glycogen by digestion (before it is available); digestion is not 100% efficient/some glucose from complex carbohydrate remains unavailable; cellulose/pectins cannot be digested and make up dietary fibre; reduces risk of constipation/diverticulosis/ulcerative colitis/cancer of the colon/enhances formation/removal of faeces/ slows down fat absorption
- 63a.**
- 63.b** Metabolites of DDT have been shown to have oestrogenic and anti-androgenic activities