PEARSON EDEXCEL IGCSE BIOLOGY · 4BI1

BIOLOGY



MARK SCHEME

SECTION 5: USE OF BIOLOGICAL RESOURCES (PACK 1)

SCORE	PERCENTAGE
/162	%

STEMUP

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Mark Scheme

Q1.

Question Number	Answer	additional guidance	Mark
(a)	• so semen contained sperm / (bull is) (sexually) mature / sperm in semen / gone through puberty / fully developed / eq	**accept converse** ignore cannot produce semen	**1 grad**

Question Number	Answer	additional guidance	Mark
(b)	An explanation that includes two of the following points • collect semen / sperm from **penis** of bull (1) • insert **straw** into / inject semen (into cow) (1) • put (it / semen / sperm) in **vagina / uterus** /womb /cervix(1)	 semen injected into uterus scores m2 and mp3	**2 exp**

Question Number	Answer	additional guidance	Mark
(c)(i)	• preserve (sperm)/ keep (sperm) alive / viable / prevent growth of microorganisms / slow down metabolism / eq	allow last longer ignore denatured	**1 grad**

Question Number	Answer	Mark
(c)(ii)	• provide females (produce milk) / will produce cows / eq	**1 grad**

Question Number	Answer	Additional guidance	Mark
(d)	• 500 000 ÷ 2.4 million = 0.2083 • 0.2083 × 100 = **20.83% / 21.0% / 20.8%**	award full marks for correct numerical answer without working allow 1 mark for ÷ 2.4 million	**2 grad**

Question Number	Answer	Mark
(e)	A description that makes reference to three of the following points • use semen (from each bull) to fertilise (many / similar) cows (1) • collect / measure milk yields / eq (1) • from each daughter / offspring of these cows / mother of bull (1) • select bull with highest (average) milk yield (across all daughters) (1)	**3 exp**

Question Number	Answer	Mark
(f)	An explanation that makes reference to two of the following points: • (milk that contains) (most) fat (1) • (most) protein (1) • (most) vitamins (1) • (milk that contains) (most) calcium (1)	**2 exp**

Question Number	Answer	additional guidance	Mark
(g)(i)	A description that makes reference to four of the following points: • nucleus from (**body) cell of bull** (1) • insert this nucleus into enucleated egg cell (1) • electric shock (1) • mitosis / cell division (1) • <u>embryo</u> into uterus / womb (1) • surrogate mother (1)	**reject from udder** **reject egg cell from bull**	**4 exp**

Question Number	Answer	Mark
(g)(ii)	An explanation that makes reference to two of the following points • **genetically** identical / no **genetic** variation / same (combination of) alleles (1) • quicker process (1)	**2 exp**
		Total =18 marks

Q2.

Question Number	Answer	Additional guidance	Mark
(a)	An explanation that makes reference to two of the following. • less oxygen (transported) (1) • to muscles (1) • less respiration / less ATP production / less energy release / more lactic acid / more anaerobic respiration (1)		**2**

Question Number	Answer	Additional guidance	Mark
(b)(i)	UUACCGCCGAGU (2)	one mark for one incorrect pairing or use of T instead of U e.g. UUACC**A**CCGAGU – one mark **TT**ACCGCCGAG**T** – one mark	**2**

Question Number	Answer	Additional guidance	Mark
(b)(ii)	A description that makes reference to four of the following. • transcription occurs in nucleus (1) • production of messenger RNA / mRNA (from DNA) (1) • translation occurs on ribosome / mRNA binds to ribosome / mRNA goes to ribosome (1) • tRNA brings / has amino acids (1) • codon binds to anticodon / codons are complementary to anticodons / (complementary) triplets on tRNA and mRNA bind / eq (1) • polypeptide produced / amino acids joined together /amino acid chain produced / eq (1)	**Ignore** protein produced / synthesised	**4**

Question Number	Answer	Additional guidance	Mark
(b)(iii)	An answer that makes reference to four of the following. *Pros* ***(max 3)*** • patients produce red blood cells / can exercise / are not breathless / have more energy / eq (1) • independent life / transfusions not needed / better quality of life / no need to keep visiting hospitals / eq (1) • no rejection (1) • less risk of infectious disease (from blood) (1) • permanent treatment / long lasting / lasts a lifetime / cure / works for at least 15 months (1) *Cons* ***(max 3)*** • need to spend long time in isolation (for treatment) / eq (1) • side effects (1) • small sample size / only tested on two people / needs further testing / more repeats / eq (1) • could cause mutations in DNA / cause cancers (1) • need to be tested for more than 15 months / for longer / eq (1)	**Accept** converse **Accept** blood transfusions need frequent hospital visits need to be done often **Accept** transfusions have risk of infections **Accept** transfusions need to be done for life **Accept** need 15 months / several months in hospital **Accept** few side effects from transfusions **Accept** might not work for everyone / no mention of age / sex / health state/ eq **Accept** time period is too short to tell	**4**
			(Total mark for question = 12 marks)

Q3.

Question Number	Answer	Mark
(a)(i)	An answer that makes reference to the following points: • prevent loss of blood / stops bleeding (1) • prevent entry of pathogens / microbes / bacteria / viruses / fungi / eq / prevent infections (1)	**2 grad**

Question Number	Answer	Mark
(a)(ii)	An answer that makes reference to the following point: • graph showing drop at 37 °C then increase	**1 grad**

Question Number	Answer	Mark
(b)(i)	An explanation that makes reference to the following points: • (have been given) genetic material / gene / allele / DNA / genetically alter (1) • from human / different species (1)	**2 grad**

Question Number	Answer	Additional guidance	Mark
(b)(ii)	An answer that makes reference to six of the following points: • use enucleated egg / empty egg / remove nucleus from egg / eq (1) • nucleus from body cell / diploid nucleus (placed into empty egg) / fuse adult cell with empty egg (1) • use of electricity / shock (1) • cell division / mitosis (1) • embryo (1) • uterus / womb (1) • surrogate mother (1)	**Ignore** DNA	**6 exp**
			Total 11 marks

Q4.

Question Number	Answer	Mark
(a)(i)	• nucleus removed / without nucleus	**1**

Question Number	Answer	Additional guidance	Mark
(a)(ii)	A description that makes reference to two of the following points: • divides (many times) / produces ball of cells /cell division occurs (1) • by mitosis (1) • cells differentiate / specialise (1)	divides by mitosis = 2 marks	**2**

Question Number	Answer	Additional guidance	Mark
(b)	An answer that makes reference to four of the following points: Against fetal: • same number of offspring produced with each body cell (1) • fewer pregnancies with fetal cells / lower proportion of pregnancies with fetal cells (1) • fewer surrogates used for fetal cells (1) • 52% successful pregnancies / 29 % successful pregnancies (1) For fetal: • offspring from fetal cells are healthy / fetal cells produce more healthy offspring/ eq (1) Conclusion: • fetal cells are more successful (for cloning) / fetal should be used (1)	**Allow** both produce two offspring **Allow** converse for adult cells **Allow** converse for adult cells **Allow** other correct decimals **Allow** offspring from fetal cells survive longer / are not short lived / the two offspring from fetal cells survived	**4**

Q5.

Question Number	Answer	additional guidance	Mark
(a)	A description that makes reference to four of the following points: • nucleus from (body) cell of male horse (1) • insert this (nucleus) into enucleated egg cell / empty egg cell / eq (1) • <u>electric</u> shock / electricity (1) • mitosis / cell division / cell divides /eq (1) • <u>embryo</u> into <u>uterus / womb</u> (1) • <u>surrogate</u> mother (1)	reject from udder reject egg cell from male horse	**4**

Question Number	Answer	Additional guidance	Mark
(b)	An explanation that makes reference to three of the following points • no sperm / gametes produced / eq (1) • no fertilisation / cannot impregnate female / eq (1) • but in cloning all chromosome / genes / DNA / nucleus comes from body cells (diploid male) / cloning uses body cell /eq (1)	Allow converse for mp1 and mp 2	**3**

Question Number	Answer	Additional guidance	Mark
(c)	An answer that makes reference to one of the following points • to keep value of male / sire / eq (1) • prevent inbreeding / maintain genetic diversity / maintain genetic variation / prevent genetic disease / disorder / eq • limit number of offspring from each sire / stallion / eq (1) • to prevent fraud / confirm paternity / eq / (1) • ethical issues use of embryo / eq (1) • many attempts needed to get successful clone / eq (1) • idea of unfairness/ unequal competition / cheating / eq (1)	cloning will increase inbreeding and reduce diversity	**1**

Question Number	Answer	Additional guidance	Mark
(d)	An answer that makes reference to the following • clones are <u>genetically</u> identical / have same <u>genotype</u> / eq (1)	Allow converse GM produces <u>genetic</u> change / introduces <u>new genes</u> / <u>genetic</u> variation	**1**

Q6.

Question number	Answer	Mark
	A description that makes reference to four of the following points: • mammoth cell nucleus put into enucleated (elephant) egg cell (1) • electric shock/equivalent (1) • cell division/mitosis (1) • embryo (1) • uterus/womb (1) • surrogate mother (elephant) (1)	4

(Total for question = 4 marks)

Q7.

Question Number	Answer	Mark
(a)	277 x 50 • 13 850 (1)	**1**

Question Number	Answer	Mark
(b)	An answer that makes reference to five of the following points • nucleus from **(body) / adult /diploid** cell of **male** dog (1) • insert (this) nucleus into enucleated / empty egg cell/eq (1) • electric shock (1) • mitosis / cell division (1) • embryo into uterus / womb (1) • surrogate mother (1)	**5**

Question Number	Answer	Mark
(c)	An answer that makes reference to four of the following points For cloning • can produce genetically identical pet / reduced genetic variation/ eq (1) • may have similar appearance / features to pet / eq (1) • can be cloned before death / may stop owner grieving / eq (1) Against • expensive / eq (1) • pet may behave different due to environment / training / eq (1) • many dogs used / die in attempt / dog farming / unethical /eq (1) • shorter life span (1) • idea of reduce variation within breed/ inbreeding idea bad for breed health / eq (1)	4
		Total 10 marks

Q8.

Question Number	Answer	Additional guidance	Mark
(a)	• unfiltered increase of 28.5g • growth rate in unfiltered 28.5 ÷ 180 = 0.158 • 0.214 - 0.158 = 0.056 (3) or 38.5-28.5 = 10 kg 10 ÷180 = 0.056 allow 0.05 recurring	**Allow** 1 mark for 28.5 or 10 kg **Allow** 1 mark for ÷ 180 **Allow** 0.0556 or 0.055 recurring for 3 marks Award full marks for correct numerical answer without working	3

Question Number	Answer	Mark
(b)	An explanation that makes reference to three of the following points: • (in unfiltered water there is) less growth / eq (1) • less oxygen (1) • less respiration (1) • more disease / damage gills / eq (1)	**3**

Question Number	Answer	Mark
(c)	• species / type / mass of fish (at start) / eq (1)	**1**

Question Number	Answer	Mark
(d)	• use a net /cage / shoot predators / make noise / eq (1)	**1**
		Total = 8 marks

Q9.

Question Number	Answer	Additional guidance	Mark
(a)	An explanation that makes reference to two of the following points: • (damage to) alveoli (1) • reduces / less / small surface area (1) • (less) diffusion / (less) oxygen in / (less) carbon dioxide out (1)	Less surface area of alveoli = two marks	**2**

Question Number	Answer	Additional guidance	Mark
(b)	An explanation that makes reference to the following points: • bacteria / microorganisms / pathogens are killed / destroyed / removed / eq (1) • no / less chance of infection (with TB) / disease / catching *Mycobacterium* / *Mycobacterium bovis* / catching TB / eq (1)	**Allow** converse **Ignore** get sick / ill	**2**

Question Number	Answer	Additional guidance	Mark
(c)	An answer that makes reference to two of the following points: • fewer cattle (to be infected) (1) • fewer people in Europe (than in rest of world) (1) • cattle are screened / if infected are killed (1) • cattle are given antibiotics (1) • vaccination (of cattle / people / badgers in Europe) (1) • more pasteurised milk drunk / milk pasteurised (1) • fewer badgers (in Europe to transmit TB) / fewer other animals (in Europe to transmit TB) / badgers culled (in Europe) (1)	**Allow** converse	**2**

Question Number	Answer	Additional guidance	Mark
(d)	• 149 000 – 1290 = 147 710 and 13 400 – 103 = 13 297 (1) • 147 710 ÷ 13 297 = 11.1 : 1 (2)	award full marks for correct numerical answer without working **Allow** 11.11, 11.108 etc **Allow** full marks for 11.1 to 1 one mark for 13297 **and** 147710 or one mark for 1:11.1 or one mark for 11.1 alone	**2**

Question Number	Answer	Mark
(e)	An answer that makes reference to two of the following points: • (find / protect / less competition for) mates / females (1) • (protect) food / less competition for food / resources / obtain more food (1) • protect young (1)	**2**

Question Number	Answer	Additional guidance	Mark
(f)	An explanation that makes reference to three of the following points: • use attenuated / dead / weak / inactive pathogen / bacterium / eq (1) • antigens (1) • memory cells (1) • secondary immune (response) (1) • antibody production fast(er) / soon(er) / more / large amounts (1)	**Ignore** disease / virus no credit for antibody production alone	**3**

Question Number	Answer	Mark
(g)	An answer that makes reference to three of the following points: • vaccinate badgers in one area and not in another / eq (1) • (count) number of cattle with TB / see if there are fewer / more cases of TB (1) • same number / control number of badgers in each area (1) • same field size / area (1) • same number of cattle (1)	**3**

Q10.

Question Number	Answer		Mark
(a)(i)	methane / nitrous oxides / CFCs / water <u>vapour</u> / eq (1)	**Accept** other correct named greenhouse gases **Reject** carbon monoxide	**1**

Question Number	Answer	Additional guidance	Mark
(a)(ii)	1.8×10^{13} (3)	**Accept** 18 000 000 000 000 or 18 trillion for **two marks** **Accept** 18×10^{12} for **two marks** **Accept** 18 or (727 + 37 - 746) or 18 with other incorrect standard form for **one mark** *Example of calculation:* • *727 + 37 - 746 = 18* • *x 1 000 000 000 000* • *conversion to standard form*	**3**

Question Number	Answer	Additional guidance	Mark
(a)(iii)	An answer that makes reference to two of the following. • ice (caps) melt / glaciers melt / eq (1) • flooding / sea level rises / eq (1) • loss of habitat / desertification / droughts (1) • extinctions / disrupted food chains / migration of species / damaged ecosystems / decreased plant yields / decreased productivity / eq (1) • destruction of coral reefs / coral bleaching / eq (1) • spread of disease / pests / pathogens / eq (1) • extreme weather / climate change / changes in weather patterns / eq (1)	**Accept** two correct answers within one answer space	**2**

Question Number	Answer	Additional guidance	Mark
(b)	An explanation that makes reference to four of the following. • plants take in / absorb, carbon dioxide (1) • for photosynthesis (1) • carbon (dioxide) is converted into / stored as suberin / locked up in suberin / eq (1) • suberin does not decay for long periods / suberin decomposes slowly / suberin remains for long period of time / eq (1) • perennial plants remain for long periods of time / do not die off / grow for many years / don't die each year / don't have to be replanted / eq (1) • slower / less carbon dioxide is released from decomposition / decay / (respiration of) decomposers (1)	**Ignore** carbon **Accept** roots decompose slowly / eq **Ignore** carbon	**4**

Question Number	Answer	Additional guidance	Mark
(c)	The only correct answer is D A is incorrect as the amylase digests starch B is incorrect as ligase sticks DNA C is incorrect as lipase digests fats		**1**

Question Number	Answer	Additional guidance	Mark
(d)	An answer that makes reference to two of the following. • prevent water loss (1) • (due to) osmosis (1) • when water moves from a higher water potential to a lower water potential / eq prevents plant cells becoming flaccid / wilting / stay turgid (1)	**Ignore** water gain **Ignore** waterproof **Allow** water moves from dilute solution to more concentrated solution **Accept** movement from high concentration of water to low concentration of water	**2**

Question Number	Answer	Additional guidance	Mark
(e)	An answer that makes reference to three of the following. • produce large numbers / large scale / eq (1) • fast (process) / quick(er) / eq (1) • all crops produce suberin / all plants are (genetically) identical / all clones / eq / (1) • less risk of cross pollinating (with wild plants) / pollinating wild plants / spreading (trans)gene into wild / eq (1) • can be done at, any time of year / all year / eq (1)	**Ignore** faster growth of plants **Accept** no variation / guarantees characteristics/ all have the gene	**3**
		(Total for Question = 16 marks)	

Q11.

Question Number	Answer	Mark
(a)	in glass / in test tube / in (Petri) dish (1)	**1**

Question Number	Answer	Mark
(b)(i)	An explanation that makes reference to two of the following points: • increases up to **pH** 6 and decreases above **pH** 6 (1) • enzymes (1) • optimum pH is 6 / (enzymes) denature at high / low pH / eq (1)	**2**

Question Number	Answer	Additional guidance	Mark
(b)(ii)	A description that makes reference to five of the following points: • use forceps / scalpel / knife / eq to remove explants / pieces from plant (1) • wash in bleach / hypochlorite / ethanol / alcohol / sterile wipes / eq (1) • (grow on) agar (1) • nutrients / minerals / carbohydrates / amino acids / named mineral / eq / growth factors / hormones (1) • add acid / alkali / buffer (1) • use several / multiple explants / repeat (1) • control temperature / carbon dioxide / light (1) • sterile agar / sterile tubes (1) • same age plant / same plant / same size of explants / eq (1) • count number of shoots after same / stated time (1)	**Ignore** sterilised alone **Allow** rooting powder **Allow** sterile cotton wool / **Allow** disinfected / ensure sterile conditions / sterilise equipment **Allow** roots	**6**

Question Number	Answer	Mark
(c)	An answer that makes reference to two of the following points: • lots produced (1) • genetically identical / no variation / all same type / identical / same characteristics / guaranteed plant / they are clones (1) • can grow GM plants / eq (1) • faster / quicker (1) • any time of year (1) • can be used for plants that are hard to germinate / grow from seed (1)	**2**
		Total 11 marks

Q12.

Question Number	Answer	additional guidance	Mark
(a)	An answer that makes reference to 5 of the following points. fish caught / traditional fishing graph 1 • 1 increased (in all countries) (1) • 2 increased by almost same proportion in each country (1) fish farming graph 2 • 3 increase in farming (in all countries) (1) • 4 increased most in A (1) • 5 higher growth in C than B (1) comparison • 6 more tonnes from farming / graph 2 than catching in A / more tonnes from farming / graph 2 than catching in C / less in B (1) • 7 A has the highest for both (caught and farmed) / eq (1) other • 8 no information on fish species / type of fish (1) • 9 no information on sustainability / fish supply /eq (1) • 10 data not expressed as per capita /eq (1)		**5**

Question Number	Answer	Additional guidance	Mark
(b)	An explanation that that makes reference to five of the following points: • separate different species to prevent predation / use nets to prevent predation / eq (1) • separate different sizes / ages to prevent predation / eq (1) • feed protein rich food / feed (frequently) in small quantities (to prevent accumulation of waste) / eq (1) • use antibiotics / fungicides to reduce disease eq (1) • (filter water to) remove faeces / waste / algae / remove dead fish / eq (1) • aerate water / use pumps to maintain oxygen levels / eq (1) • use selective breeding / GM (to maximise yield) /eq	not just control diet unqualified not just clean the water unqualified	**5**

Q13.

Question Number	Answer	Additional guidance	Mark
(a)	An explanation that makes reference to two of the following: • (select and) mate fish that grow quickly / have desired characteristics / eq (1) • (select and) mate offspring that grow quickly / repeat breeding over several generations / eq (1) • (so that) genes / alleles for fast growth are passed on / eq (1)	**Accept** fish that do not waste food for grow quickly **Ignore** large fish **Accept** repeat with offspring	**2**

Question Number	Answer	Additional guidance	Mark
(b)	A description that makes reference to two of the following: • nitrifying bacteria / nitrification (1) • (ammonium) to nitrite / nitrite to nitrate (1)		**2**

Question Number	Answer	Additional guidance	Mark
(c)	An explanation that makes reference to five of the following: 1. waste food / faeces eaten / removed (by lobsters and crabs) / eq (1) 2. less decomposition / fewer decomposers / fewer bacteria (1) 3. less disease / infection (due to fewer bacteria) (1) 4. less (bacterial/ decomposers) respiration (1) 5. more oxygen in the water / less removal of oxygen / seaweed releases oxygen (1) 6. nitrate / minerals / nutrients / carbon dioxide removed by seaweed (1) 7. less algae growth / algal bloom / eutrophication / eq (1) 8. more products to sell (1) 9. no need to buy food for lobsters / crabs / no need to buy minerals for seaweed (1)	**Accept** converse for mps **Accept** (more) fish / animal respiration / eq **Accept** other correct named minerals **Accept** fish provide carbon dioxide for seaweed **Accept** can sell crabs / lobsters / seaweed	**5**

Q14.

Question Number	Answer	Additional guidance	Mark
(a)(i)	An answer that makes reference to one of the following: • bleach / hypochlorite / disinfectant / antiseptic / chlorine (1) • alcohol / ethanol (1) • radiation / uv / gamma rays / X-rays (1)	Reject boil / steam or any method that kills cells Reject acid / alkali / anti-bacterial wash / antibiotic / sterilising solution Boiling in ethanol = 0	**1**

Question Number	Answer	Additional guidance	Mark
(a)(ii)	An answer that makes reference to one of the following: • nitrate / ammonium / magnesium / calcium / sulphate / potassium / phosphate / iron (1) • amino acids (1) • sucrose / glucose / fructose / sugar / starch (1)	Ignore water / phosphorus / nitrogen / mineral ions	**1**

Question Number	Answer	Additional guidance	Mark
(b)	An explanation answer that makes reference to two of the following points: • cells are differentiated / specialised / can only form one cell type / cells unable to differentiate / specialise / form other cell types (1) • no / fewer stem cells (1) • stem cells found in embryo / bone marrow / umbilical cord (1)	Ignore references to plant tissue	**2**

Q15.

Question Number	Answer	Mark
(a)	C ultrafiltration *A is incorrect because digestion is not a process in the kidneys* *B is incorrect because mutation is not a process in the kidneys* *D is incorrect because vaccination is not a process in the kidneys*	**1 comp**

Question Number	Answer	Additional guidance	Mark
(b)	An answer that makes reference to three of the following points: • stay out of water / wear waterproof clothes / eq (1) • treat drinking water / boil water (before drinking) / do not drink water / drink bottled water / eq (1) • sanitation / no faeces in water / no urine in water /eq (1) • remove snails /eq (1) • vaccination (1)	**Allow** do not go in infected rivers or lakes / cover skin when in water / avoid contact with affected water / only wash in clean water **Allow** filter water / do not drink river water / lake water **Allow** use sewage treatment system / use toilet with septic tank **Allow** don't touch snails	**3 exp**

Question Number	Answer	Mark
(c)	An answer that makes reference to two of the following points: • red blood cells / rbc (1) • white blood cells / wbc (1) • lymphocytes (1) • phagocytes / macrophages (1)	**2 grad**

Question Number	Answer	Mark
(d)	D 4 800 *A is incorrect because it is the wrong value* *B is incorrect because it is the wrong value* *C is incorrect because it is the wrong value*	**1 comp**

Question Number	Answer	Additional guidance	Mark
(e)	• $8 \times 10^{-4} = 0.0008$ • x 240 million = 192 000 ÷ 100 = 1920 (2)	**Allow** 1 mark for: 19200000 / 1920000 / 192000 / 19200 / 192 / 19.2 / 1.92 / 0.192 / 0.0192 Award full marks for correct numerical answer without working	**2 grad**

Question Number	Answer	Mark
(f)	A a circle of DNA *B is incorrect because it is not RNA* *C is incorrect because it is not a protein* *D is incorrect because it is not RNA*	**1 comp**

Question Number	Answer	Mark
(g)	An explanation that makes reference to three of the following points: • antigen (1) • memory cells / lymphocytes (1) • (secondary) immune response (1) • more antibodies / antibodies made sooner / faster / faster immune response / eq (1)	**3 exp**

Question Number	Answer		Mark
(h)(i)	• (a treatment with) no plasmid / no protein / only water / saline / eq (1)	**Allow** placebo vaccine / a placebo / plasmid with no gene / plasmid with no DNA / different DNA	**1 exp**

Question Number	Answer	Additional Guidance	Mark
(h)(ii)	An answer that makes reference to three of the following points: • reduced numbers / eq (1) • by 19 or by 47% / about 50% • schistosomes / worms, still present in body (1) • no idea of group size / needs to be repeated (1) • no idea of age / sex / health (1)	**Allow** reduces numbers of worms / worms decrease / lower number of worms after vaccine **Allow** more worms in control group **Allow** does not completely get rid of them **Allow** more testing / more people tested	**3 exp**
			Total = 17 marks