PEARSON EDEXCEL A-LEVEL BIOLOGY B · 9BI0

# BIOLOGY



## MARK SCHEME

TOPIC 10: ECOSYSTEMS

CORE PRACTICALS

| SCORE | PERCENTAGE |
| --- | --- |
| /91 | % |

STEMUP

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## Mark Scheme

Q1.

| Question Number | Answer | Additional Guidance | Mark |
|---|---|---|---|
| **(i)** | there is no difference in the (mean) height of *Galium verum* growing in meadow and dunes (1) | Accept reference to no significant difference in the (mean) height of *Galium verum* growing in meadow and dunes | **Exp (1)** |

| Question Number | Answer | Additional Guidance | Mark |
|---|---|---|---|
| **(ii)** | An answer that includes the following:<br><br>• use of random numbers to select sampling site (1)<br><br>• use of (frame or point) quadrat (to define sampling area) in meadow and dune (1)<br><br>• measurement of height of *Galium verum* (1)<br><br>• large sample size or use of running mean (1)<br><br>• attempt to {control / measure} named variable (1) | Accept description of setting up grid and using co- ordinates for random sampling<br><br>Accept closest plant to point selected in meadow and dune<br><br>eg at least 10 plants in each place<br><br>eg shading / slope / grazing / trampling / time of year / rainfall / use of herbicide<br>Ignore soil type / pH / time of day | **Exp (5)** |

| Question Number | Answer | Additional Guidance | Mark |
|---|---|---|---|
| **(iii)** | An explanation that includes the following points<br><br>• t-test (1)<br><br>• (because it) tests for the difference between the means of two sets of values (1) | Accept other suitable test eg Mann Whitney U test<br><br>Accept it tests for a (significant) difference between two sample sets | **Exp (2)** |

Q2.

| Question Number | Answer | Additional Guidance | Mark |
|---|---|---|---|
| (i) | • calculate the area of quadrat and calculate the area of grassland to calculate the number of quadrats in grassland (1)<br><br>• multiply number of quadrats in area of grassland by number of clover (1)<br><br>**Or**<br><br>• number of clover plants per $m^2$ (1)<br><br>• multiply by total area of grassland in $m^2$ (1) | <u>Example of calculation</u><br><br>$50 \times 50 = 2500\ cm^2$ / $0.25\ m^2$ and<br>$90 \times 45 = 4050\ m^2$<br><br>$4050 \times 4 = 16200$<br>$16200 \times 9 = 145800$<br><br>$9 \times 4 = 36$<br><br>$36 \times (90 \times 45) = 145800$<br><br>Correct answer with no working gains full marks | **(2)** |

| Question Number | Answer | Additional Guidance | Mark |
|---|---|---|---|
| (ii) | An explanation that makes reference to three of the following:<br><br>• use {several quadrats / larger quadrat} (1)<br><br>• therefore larger area sampled (1)<br><br>• place quadrats at random / use random number generation (1)<br><br>• therefore achieve a consistent measure of the mean (1) | **Accept** use of running mean | **(3)** |

Q3.

| Question Number | Answer | Additional Guidance | Mark |
|---|---|---|---|
| (i) | An explanation that makes reference to three of thefollowing:<br>• (biodiversity is low) because there are few species (1)<br>• because there is a lot of trampling (1)<br>• because animals are disturbed (by noise) (1)<br>• because grass is mown (makes it difficult for other species to establish themselves) (1) | | (3) |
| (ii) | An answer that makes reference to thefollowing:<br>• calculation of N(N-1) (1)<br>• calculation of sum of n(n-1) (1)<br>• calculation of D (1) | Example calculation 8556 1058<br>8.1 / 8.09 / 8.087<br>Correct answer with no working gains full marks | (3) |

| Question Number | Answer | Additional Guidance | Mark |
|---|---|---|---|
| (iii) | An answer that makes reference to six of the following:<br>• quadrats not placed at random (1)<br>• {size / number} of quadrats not mentioned (1)<br>• plants sampled at various intervals, animals at regular intervals (1)<br>• {animals observed / no mention of how animals are counted} (1)<br>• animals may {hide / move away / be counted twice} (1)<br>• {only path sampled / inner area of woodland not sampled} (1)<br>• not all animals identified to species level (1)<br>• survey done at only one {time of year / time of day} (1) | Allow size of sample area not mentioned<br>Allow description of pitfall traps, sweepnets, mark release recapture etc. couldbe used | (6) |

Q4.

| Question Number | Answer | Additional Guidance | Mark |
|---|---|---|---|
| | A description that makes reference to the following:<br>• sample at intervals along transect / sample from same place in quadrat (1)<br>• weighing, drying and reweighing (1)<br>• constant mass (1)<br>OR<br>• sample at intervals along transect / sample from same place in quadrat (1)<br>• insert probe into the soil (1)<br>• at same {depth / length of time} | **DO NOT ACCEPT** burning | (3) |

Q5.

| Question Number | Answer | Additional Guidance | Mark |
|---|---|---|---|
| (i) | An answer that makes reference to the following:<br>• named abiotic factor | e.g. light / temperature / pH / named mineral / salinity / wind | (1) |

| Question Number | Answer | Additional Guidance | Mark |
|---|---|---|---|
| (ii) | A description that makes reference to the following:<br>• apparatus (1)<br>• measure {by clover plants / in each quadrat / in same place / at same time of day} (1) | | (2) |

| Question Number | Answer | Additional Guidance | Mark |
|---|---|---|---|
| **(iii)** | An explanation that makes reference to two of the following:<br>• trampled soil has less {water / air / oxygen} (1)<br>• therefore {photosynthesis / respiration / absorption of mineral ions} affected (1)<br>• physical damage to plants / competition from other plants (adapted to compact soil) (1) | | **(2)** |

Q6.

| Question Number | Correct Answer | | | | | | Additional guidance | Mark |
|---|---|---|---|---|---|---|---|---|
| **(a)** | **Distance from low water mark / m** | **Rank of distance** | **Mean diameter of limpets / mm** | **Rank of diameters** | **Difference in the two ranks (D)** | **$D^2$** | | |
| | 0 | 9 | 19.8 | 3 | 6 | 36 | | |
| | 5 | 8 | 20.2 | 1 | 7 | 49 | | |
| | 10 | 7 | 19.6 | 4 | 3 | 9 | | |
| | 15 | 6 | 18.8 | 5 | 1 | 1 | | |
| | 20 | 5 | 20.1 | 2 | 3 | 9 | | |
| | 25 | 4 | 17.4 | 6 | -2 | 4 | | |
| | 30 | 3 | 16.1 | **9** | **-6** | **36** | | |
| | 35 | 2 | 16.9 | 8 | -6 | 36 | | |
| | 40 | 1 | 17.2 | **7** | **-6** | **36** | | |
| | | | | | $\Sigma D^2$ = | **216** | | |
| | • differences in ranks of distance and diameter (1)<br>• $D^2$ values correct (1) | | | | | | | **(2)** |

| Question Number | Correct Answer | Additional guidance | Mark |
|---|---|---|---|
| **(b)(i)** | • $6 \Sigma D^2 = 1296$ (1)<br>• $n (n^2-1) = 720$ (1)<br>• Correct $r_s$ value = -0.8(00) (1) | e.c.f. from (a)<br>Correct answer (with minus sign) gains full marks<br>Must be minus sign for marking point 3 | **(3)** |

| Question Number | Correct Answer | Additional guidance | Mark |
|---|---|---|---|
| **(b)(ii)** | An answer that makes reference to the following:<br><br>• there is a significant negative correlation between diameter of a limpet and height up the rocky shore (1)<br>• because calculated value is greater than critical value (1)<br>• at 5% significance level / 0.683 quoted (1) | Accept 2% or 1% critical value for m.ps 1 and 2 only<br><br>Where no value is calculated in (b)(i) then accept marks in b(ii) for MP2 and 3 for theoretical explanation<br><br>E.g. 'if value of $r_s$ was greater than critical value (0.683) then there would be a significant correlation' would gain 2 marks | **(3)** |

| Question Number | Correct Answer | Additional guidance | Mark |
|---|---|---|---|
| **(c)** | An answer that makes reference to five of the following:<br><br>• limpets kept in sea-water in tanks at the same {temperature / salinity} as they affect growth (1)<br>• suitable number of {limpets in each tank / tanks containing limpets} to ensure reliability (1)<br>• size of limpets in each tank selected to be within (narrow) range to start / or same distribution of sizes to ensure same potential for growth (1)<br>• provision of food for limpets in equal amounts in each tank as food affects growth (1)<br>• withdrawal of water from tanks for different periods of time (1)<br>• size measured {mass / diameter / area of foot} because dependent variable must be quantitative to allow for statistical testing (1) | | **(5)** |

Q7.

| Question Number | Correct Answer | Additional guidance | Mark |
|---|---|---|---|
| | An explanation that makes reference to the following:<br><br>• sea plantain (1)<br><br>• idea of different latitudes have different (mean) temperatures (1)<br><br>• sea plantain grows {better / eq} at all (three) temperatures / bog sedge does not grow very well at {lower temperatures / 10 °C and 14 °C} (1)<br><br>• credit appropriate comparative manipulated figures (1) | | **(4)** |

Q8.

| Question Number | Answer | Additional Guidance | Mark |
|---|---|---|---|
| | An answer that makes reference to five of the following:<br><br>**Inaccurate because**<br><br>• {births / deaths} may occur (1)<br><br>• migration may occur (1)<br><br>• marking may affect survival (1)<br><br>• mice may lose bands (1)<br><br>• food encourages capture / trap discourages capture (1)<br><br>**Accurate because**<br><br>• {time / a week} is long enough for random dispersal (1)<br><br>• a lot of traps were set / sample size large (1)<br><br>• traps were randomly placed (avoids bias) (1) | Accept that some animals are more or less likely than others to enter trap | (5) |

Q9.

| Question Number | Answer | Additional Guidance | Mark |
|---|---|---|---|
| | An explanation that makes reference to the following:<br><br>• because food attracts mouse into trap (1)<br><br>• because {small entrance / size of trap} allows {small animals / mice} to enter trap / larger animals cannot enter trap (1)<br><br>• because door slides down when the mouse {approaches the food / walks on board} (1) | Accept the entrance is big enough for mice to enter the trap | (3) |

Q10.

| Question Number | Answer | Additional Guidance | Mark |
|---|---|---|---|
| | An explanation that makes reference to three of the following:<br>• *Salicornia* has {higher salt concentration / lower water potential} than the mud (1)<br>• because salt taken up by active transport (1)<br>• therefore water is taken up by osmosis (1) | | (3) |

Q11.

| Question Number | Answer | Mark |
|---|---|---|
| | An explanation that makes reference to three of the following:<br>• less {evaporation / transpiration / diffusion} (1)<br>• because {leaf is curled / small gap / hairs / sunken stomata / stomata in pits / waxy cuticle} (1)<br>• trap water vapour / reduce {diffusion / concentration / water potential} gradient (1) | (3) |

Q12.

| Question Number | Answer | Additional Guidance | Mark |
|---|---|---|---|
| (i) | An answer that makes reference to the following:<br>• axis for chlorophyll content is linear and uses at least half grid (1)<br>• accurate plot and standard deviation for little traffic (1) | | (2) |

| Question Number | Answer | Additional Guidance | Mark |
|---|---|---|---|
| (ii) | An explanation that makes reference to three of the following:<br>• quadrats placed at random / sampling at random (1)<br>• method of random number sampling (1)<br>• sampling done at same distance from {traffic / road} / transect placed parallel to {traffic / road} (1)<br>• therefore removes bias / obtain running mean / ensures valid data (1) | **e.g** use of random number generator | (3) |

| Question Number | Answer | Additional Guidance | Mark |
|---|---|---|---|
| (iii) | An answer that makes reference to two of the following:<br>• {heavy traffic / more lead} reduces chlorophyll content (1)<br>One from:<br>• photosynthesis not measured (1)<br>• lead may be from other sources / other named factor may be responsible (1)<br>• only one species of plant investigated (1) | **ACCEPT** converse<br>**e.g.** light / Mg / other pollutant | **(2)** |

Q13.

| Question Number | Answer | Additional Guidance | Mark |
|---|---|---|---|
| (a) | C ; nucleus and large (80S) ribosomes | | **(1)** |

| Question Number | Answer | Additional Guidance | Mark |
|---|---|---|---|
| (b) | A ; algae have chloroplasts, the fungi do not | | **(1)** |

| Question Number | Answer | Additional Guidance | Mark |
|---|---|---|---|
| (c) | 1. (advantage of sexual reproduction / meiosis) {genetically different / greater gene pool / greater genetic diversity /eq} ;<br>2. (advantage of asexual reproduction / mitosis) faster / one of each organism needed / conserves advantageous alleles ; | **2. Accept** don't need a mate | **(2)** |

| Question Number | Answer | Additional Guidance | Mark |
|---|---|---|---|
| (d)(i) | C ; area exposed to bright sunlight and protected from the wind | | **(1)** |

| Question Number | Answer | Additional Guidance | Mark |
|---|---|---|---|
| (d)(ii) | 1. idea of using a quadrat ;<br>2. idea of {random / systematic} sampling (of wall) ;<br>3. {count number of squares/ determine area} containing lichen /eq ;<br>4. credit an indication of how the percentage was calculated ; | **1. Accept** description of quadrat, use of photo and a grid<br>**3. NB** reference to measuring percentage cover only is too vague as it is repeating stem of question | **(3)** |

| Question Number | Answer | Additional Guidance | Mark |
|---|---|---|---|
| (d)(iii) | 1. ref to use of light {probe / sensor /eq} ;<br>2. idea of taking several measurements ; | **1 Accept** description of a light sensor<br>2. Accept ref to places or times of day | **(2)** |

| Question Number | Answer | Additional Guidance | Mark |
|---|---|---|---|
| (d)(iv) | 1. plot a (scatter) graph of light intensity against lichen / eq ;<br>2. reference to looking for a correlation ;<br>3. reference to use of statistics test ;<br>4. appropriate named test eg Spearman's rank, Pearson ; | **2. Accept** ref to line of best fit, ref to correlation coefficient also gets Mp 3 | **(3)** |

Q14.

| Question Number | Answer | Additional Guidance | Mark |
|---|---|---|---|
| | 50 (1) | | **(1)** |

Q15.

| Question Number | Acceptable Answers | Additional Guidance | Mark |
|---|---|---|---|
| | An answer that makes reference to six of the following:<br><br>• relevant abiotic factor named (1)<br><br>• select {sample sites with environmental differences /one site with environmental gradient} (1)<br><br>• {quadrats / point frame} used {at random /in a transect} (1)<br><br>• to measure presence or absence of lichens (1)<br><br>• method used to measure abiotic factor described (1)<br><br>• t test carried out to measure significant difference (1)<br><br>• other named variable controlled or measured (1) | eg light intensity, temperature, distance from sea, altitude<br><br>Allow calculation of percentage cover described<br><br>Allow correlation test carried out to measure correlation if appropriate Allow standard deviations compared. | **(6)** |