

Name of the Student: _____

Max. Marks : 18 Marks

Time : 18 Minutes

Mark Schemes

Q1.

- (a) 1. Cross with homozygous recessive (fly)

OR

Cross with a black (fly)

OR

Cross with gg (fly);

Accept cross with heterozygous (fly)

2. Black offspring/flies then is heterozygous/Gg

OR

Black and grey offspring/flies then is Heterozygous/Gg

OR

No black offspring/flies then is homozygous/GG

OR

All grey offspring/flies then is homozygous/GG;

Alternative mark scheme, if cross not used.

Mark as pairs 3 with 4, and 5 with 6.

3. DNA base sequencing;

4. Compare base sequence with known alleles;

5. Separate alleles using electrophoresis;

6. Use gene/DNA probes to identify alleles

OR

Compare position/banding with known alleles

OR

Homozygous forms one band, heterozygous forms two bands;

2

- (b) (If sex-linked) grey/male fly would only have / pass on grey/dominant allele

OR

(If sex-linked) females would receive the grey/dominant allele

OR

(If sex-linked) grey/male fly would **not** have / pass on black/recessive allele

OR

(If sex-linked) female (offspring) would be grey

OR

(If sex-linked) no female (offspring) would be black

OR

(If sex-linked) male (parent) could **not** have been heterozygous;

OR

(If sex-linked) only black male (parent) could produce a black bodied female;

Accept G for dominant allele and g for recessive allele.

1

- (c) 1. Correct answer of 18 (%) = **2 marks**;;
*Accept 0.18 for **one mark**.*
2. Incorrect answer but shows understanding that $2pq$ = heterozygous/carriers
= **1 mark**

OR

Incorrect answer but shows understanding that $1 - (p^2 + q^2)$ =
heterozygous/carriers = **1 mark**;

*Accept understanding of $2pq$ by using a calculation involving $2 \times$ two
different numbers.*

2

- (d) 1. RrGG and Rrgg;
2. RrGg, ($\times 2$), rrGg, (and RRGg);
*Accept the alleles in any order e.g. RGrG and accept if not shown on
answer lines.*
Accept if different letters than shown are used for the alleles.
3. Curly(-winged), grey(-bodied) and Normal(-winged), grey(-bodied) **and** ratio
2 : 1;
Accept ratios equivalent to 2 : 1.
*Note: If no mark awarded allow **one** (principle) **mark** when parental
genotypes are incorrect but correct dihybrid genotypes shown for
offspring from this cross.*

3

[8]

Q2.

- (a) 1. Use a grid

OR

Divide field/area into squares;

Accept use of tape measures/map/area with coordinates.

Accept Belt transect.

2. Method of obtaining random coordinates/numbers e.g. calculator/computer/random numbers table/generator;
If transect method used accept quadrats at regular intervals.
3. Count number/frequency in a quadrat;
Ignore amount/abundance.
4. Large sample and calculate mean number (per quadrat);
Accept large sample and method of calculating mean.
Accept many/multiple for large sample but ignore several.
If a specific number is given it must be 10 or more.
5. Multiply mean number of plants per m² by area of field

OR

Divide area of field by area of quadrat x mean number of plants per quadrat

OR

Multiply mean number of plants per quadrat/section by number of quadrats/sections in field;

Accept sections/squares for quadrats.

Accept 'average' for 'mean'.

Do not allow 'scale up' without further qualification.

5

- (b) 1. Interspecific (competition);
2. Less/no light (for potato plant) **so** less/no photosynthesis;
3. Less nitrates/nitrogen to produce amino acids/protein/DNA/RNA/ATP

OR

Less phosphate/phosphorus to produce

DNA/RNA/phospholipids/RuBP/GP/triose phosphate/NADP/ATP;

Accept any named organic nitrogen or phosphorus containing molecule.

3

- (c) Correct answer of 6.69 / 6.7 = **2 marks**;;

Incorrect answer but shows 669 / 67 (ignore position of any decimal point or preceding / subsequent zeros or numbers following 669) = **1 mark**

OR

Shows 0.012 = **1 mark**

OR

Shows $8.47 / 8.5 = 1$ mark

OR

Shows $8.69 = 1$ mark

OR

Shows 3.35×10^{-4} (in any correct mathematical form) = **1 mark**;

Ignore any numbers after 6.69

Ignore any numbers after 0.012

Ignore any numbers after $8.47 / 8.5$

*Accept answers which would round to 3.35×10^{-4} for **1 mark**.*

2

[10]