

Name of the Student: _____

Max. Marks : 27 Marks

Time : 27 Minutes

Mark Schemes

Q1.

(a) hhDD, hhDd;
(both correct 1 mark) 1

(b) Epistasis;
One gene controlling / inhibiting the expression of another; 2

(c) Gametes correct HD, Hd, hD, hd, hd
(correct for both parents);

Genotypes HhDd, Hhdd, hhDd, hhdd ;

Phenotypes wiry wiry non-wiry, short non-wiry, long

Ratio 2 1 1 ; 3

[6]

Q2.

(a) (i) BBX^AY , BbX^AY ;

1

(ii) BbX^AX^a , bbX^AX^a ;

1

(b) *parental genotypes* – BbX^AY x BbX^AX^a ;

1

Gametes – $(BX^A, bX^A, BY, bY, BX^A, B X^a, bX^A, b X^a)$;

1

Genotypes of sons – ;

		Male gametes	
		BY	bY
Female gametes	BX^A	BBX^AY	BbX^AY
	$B X^a$	$BB X^a Y$	$Bb X^a Y$
	bX^A	BbX^AY	bbX^AY
	$b X^a$	$Bb X^a Y$	$bb X^a Y$

1

0.125 / 12.5% / 1/8 ;

1

[6]

Q3.

- (a) Cannot make (active) enzyme A (which converts precursor to linamarin) / cannot make linamarin;

1

- (b) (i) **AL + AI + aL + al** ;

1

- (ii) Meiosis separates alleles / homologous chromosomes / pairs of chromosomes;
Independent assortment / means either of **A** / **a** can go with either of **L** / **I**;
[Accept: 'random segregation'] [Cancel: if reference to crossing-over]

2

- (c) From parental genotypes: **AaLI** × **AaLI** (no mark)

[Note: If wrong parental genotypes / wrong gametes: ALLOW correct derivation of offspring genotypes] (= max 1)

Correct derivation of offspring genotypes:

	AL	AI	aL	al
AL	AALL	AALl	AaLL	AaLl
AI	AALl	AAll	AaLl	Aall
aL	AaLL	AaLl	aaLL	aaLl
al	AaLl	Aall	aaLl	aall

Correct identification of offspring genotypes with at least one **A** and two **I** alleles (= grey cells in above table);

Correct proportion: 3 / 16 / 3:13 / 18.75% ;

3

- (d) (i) There was no (significant) difference in damage between cyanogenic and acyanogenic / being cyanogenic has no effect;

1

- (ii) The difference (from expected / from chance variation) is significant / difference / results not just due to chance;
Reject null hypothesis;
Being cyanogenic does help protect from slug damage;

3

- (e) High slug population:

- Find only cyanogenic plants / only cyanogenic plants survive;
 - (Cyanide release) limits / stops feeding by slugs / slugs killed;
- [Accept: converse argument re. acyanogenic plants]

Low slug population:

- Find both types of plant;
- Less selection pressure from slugs / no selective advantage / no selection / described;

4

[15]