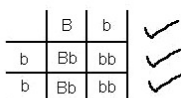
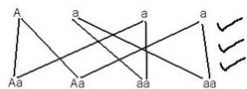
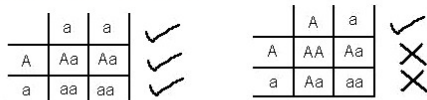


# Genetic Diagram and Mendel Works

## QUESTION 1

QUESTION	ANSWER	EXTRA INFORMATION	MARKS
a)	any two from: ✗ other scientists not aware of his work ✗ chromosomes / DNA / genes not seen / discovered / known ✗ other theories accepted at the time ✗ not considered to be a scientist / not eminent / respected	accept other logical / reasonable ideas  do not accept there was no interest in genetics  allow 'he was just / only a monk'	2
b)i	random selection	accept a method of achieving random selection eg "take a handful" if number given, minimum 20	1
b)ii)	any one from: ✗ 1:1 / one to one ✗ 19:21	accept any ratio to give correct answer, eg "50:50"  do not accept 21:19 unqualified	1
b)iii)	A + a as gametes from 1st parent a + a as gametes from 2nd parent (offspring / 2nd generation) Aa  correct identification of yellow (Aa) or green (aa) (if both given, both must be correct) examples of award of first three marks	allow a alone offspring must be derived from correct gametes other symbols correctly used can gain full marks  ignore references to previous generations if no other marks awarded, both correct parental genotypes given gains 1 mark	1 1 1 1



Total marks			8

### QUESTION 2

QUESTION	ANSWER	EXTRA INFORMATION	MARKS
a)	Mendel		1
b)i	TT		1
b)ii)	a dominant allele		1
c)	1 : 1		1
d)	100 short plants		1
Total marks			5

### QUESTION 3

QUESTION	ANSWER	EXTRA INFORMATION	MARKS
a)i)	dominant	allow clear indication	1
a)ii)	recessive	allow clear indication	1
b)i)	aa	extra ring drawn cancels the mark	1
b)ii)	Aa	extra ring drawn cancels the mark	1
c)	3 purple : 1 yellow	extra box ticked cancels the mark	1
Total marks			5

### QUESTION 4

QUESTION	ANSWER	EXTRA INFORMATION	MARKS
a)	Aa	allow dominant and recessive allow heterozygous	1
b)i	gametes A, a and A, a correctly derived offspring from cross identification of round and wrinkled offspring	max 1 if gametes are incorrect  (eg in punnet square) allow ecf from their gametes  for this mark the phenotype of each different offspring genotype must be indicated	1 1 1
b)ii)	(due to) chance or expected ratio is only a probability	accept the idea of small numbers not representative ignore anomaly / random / coincidence do not accept error	1
c)	any one idea from: • genes / chromosomes / alleles / DNA not discovered / known about	do not accept religious theme (ie confusion with Darwin's difficulties with the church)	1

	<ul style="list-style-type: none"> <li>published in obscure journal / few scientists read his work</li> </ul>		
Total marks			6

### QUESTION 5

QUESTION	ANSWER	EXTRA INFORMATION	MARKS
a)i)	3.15 : 1	accept 3.147:1 or 3.1 : 1 or 3 : 1 do not accept 3.14 : 1 Ignore 705:224	1
a)ii)	any two from: <ul style="list-style-type: none"> <li>fertilisation is random or ref. to chance combinations (of alleles / genes / chromosomes)</li> <li>more likely to get theoretical ratios or see (correct) pattern or get valid results if large number</li> <li>anomalies have limited effect / anomalies can be identified</li> </ul>	allow ref. to more representative / reliable do not allow more accurate or precise ignore fair / repeatable accept example of an anomaly	2
b)i)	in sequence: Homozygous Homozygous Heterozygous	All 3 correct = 2 marks 2 correct = 1 mark 1 or 0 correct = 0 marks	2
b)ii)	genetic diagram including: Parental genotypes: Nn and Nn or Gametes: N and n + N and n derivation of offspring genotypes: NN Nn Nn nn identification: NN and Nn as purple and nn as white	allow other characters / symbols  only if clearly defined  allow genotypes correctly  derived from candidate's P gametes allow correct identification of  candidate's offspring genotypes but only if some F2 are purple and some are white	1  1  1
c)	any two from: <ul style="list-style-type: none"> <li>did not know about chromosomes / genes / DNA</li> <li>or did not know chromosomes occurred in pairs</li> <li>had pre-conceived theories Mendel's (mathematical)</li> </ul>	ignore genetics  eg blending of inherited characters ignore religious ideas unless qualified allow his work was not understood or no other scientist had similar ideas	2

	<ul style="list-style-type: none"> <li>• approach was novel concept</li> <li>• Mendel was not part of academic establishment</li> <li>• work published in obscure journal / work lost for many years</li> <li>• peas gave unusual results cf other species</li> <li>• Mendel's results were not corroborated until later / 1900</li> </ul>	<p>allow he was not considered to be a scientist / not well known / he was only a monk</p> <p>allow he only worked on pea plants</p>	
Total marks			10