



KS3 Science

Genetics

Mark Scheme

Time available: 43 minutes

Marks available: 47 marks

Mark schemes

1.

(a) any **one** from

- capillaries would get blocked
accept 'veins or arteries or blood vessels get blocked'
- less blood flow
*accept 'it is harder for them to flow **or** pass through'*
- blood clots form
*accept 'oxygen **or** glucose would not reach the cells'
or 'they cannot carry as much oxygen'
accept 'carbon dioxide
or waste would not be carried away from the cells'*

1

(b) any **one** from

- oxygen is used up in the tissues
*do **not** accept 'tissues have a low concentration'*
- oxygen is removed from blood in the tissues
accept 'oxygen is used in respiration'

1

(c) any **two** from

- people with only normal haemoglobin die of malaria
accept 'normal people die of malaria'
- people with only abnormal haemoglobin die of anaemia
accept 'abnormal people die of anaemia'
- more people with only one type of haemoglobin die
- fewer people with mixed haemoglobin die
*accept 'people with mixed haemoglobin do not die of malaria **or**
anaemia'*
- more people with mixed haemoglobin reproduce **or** pass on their genes

2

[4]

2. (a) it helps it to hide from its prey 1 (L6)

it helps it to hide from predators

answers may be in either order

*accept 'hides it from rabbits **or** from animals it eats'*

*accept 'hides it from animals which eat **or** hunt it'*

accept 'to camouflage it'

for one mark only accept 'it is an insulator'

***or** 'it keeps them warm'*

1 (L6)

(b) inherit 1 (L6)

genes 1 (L6)

nuclei 1 (L6)
accept 'nucleus'

[5]

3. (a) (i) Gg 1
accept 'she was heterozygous'

(ii) any **one** from

- two of her children **or** (6) and (9) were normal **or** inherited a recessive gene **or** g from her

accept 'some of her children were normal and some were affected' for both marks

- if she were GG, all her children would have the disease

1

any **one** from

- some of her children **or** (4) and (5) were affected **or** inherited a dominant gene **or** G from her

- she was affected so she had a dominant gene **or** G
accept 'she was affected'

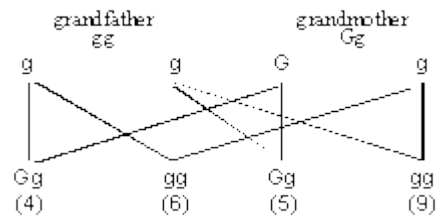
- if she were gg, none of her children would have the disease

accept a Punnett Square **or** a genetic diagram, for one mark, as part of the explanation:

either

		grandfather gg	
		g	g
grandmother Gg	G	(4) Gg	(5) Gg
	g	(6) gg	(9) gg

or



1

(b) (i) Gg

accept 'he was heterozygous'

1

(ii) he must have inherited a dominant gene

or G from his mother and a recessive gene **or** g from his father

accept 'he must have got g from his father' a mark may be awarded for a Punnett square or a genetic diagram as above

1

(c) 50% **or** ½ **or** 0.5

accept '1:1' or 'evens'

1

(d) (i) any **one** from

- a change in a gene **or** chromosome

accept 'damage to a gene'

- a change in the base sequence of DNA

accept 'a change in the DNA or the genetic information'

or 'wrong base added to DNA'

accept 'development of a new characteristic'

1

(ii) any **one** from

- X rays
- radiation
- UV light

accept 'sunlight'

accept a named mutagenic chemical such as 'benzene'

or *'cigarette tar'*

accept 'incorrect replication of DNA'

1

[8]

4.

(a) mass ✓

if more than one box is ticked, award no mark

1

(b) (i) set 3 **or** Fred and Jack

consequential marking does not apply accept '3'

1

(ii) any **one** from

- they are similar apart from mass
- they have the same blood group, eye colour and sex
*consequential marking does **not** apply*
accept 'they have the same blood group and sex'
both *blood group and sex must be mentioned for the mark*
- all the characteristics determined by genes are the same
*accept 'because set 1 **or** Sasha and Ninvata have different blood groups and set 2 **or** Lucy and Tom are different sexes'*

1

(c) As woman get older, they produce more of each hormone. ✓

if more than one box is ticked, award no mark

1

(d) (i) any **one** from

- it halves the number of chromosomes
accept 'it produces 23 chromosomes'
or 'it halves the genetic material'
- it maintains the number of chromosomes in the next generation
accept 'so that the fertilised egg has 46 chromosomes'
- it leads to variation **or** it produces offspring with different characteristics

1

(ii) any **one** from

- so that all the cells have the same genotype
accept 'so that the genetic information in all the cells is the same'
- so that all the cells have the same number of chromosomes

1

[6]

5.

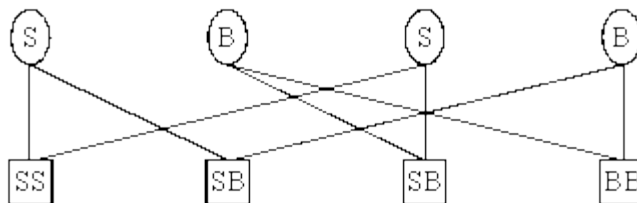
(a) SS

BB

answers must be in the correct order
***both** answers required for mark*

1

(b) (i)



all linkages must be correct but
*do **not** need to be in the order shown*
accept 'BS' for SB

1

(ii)

pale brown mid-brown mid-brown dark brown

or **or** **or** **or**

Siamese Tonkinese Tonkinese Burmese

*all **four** genotypes and corresponding colours must be correct for the mark*

1

(c) any **one** from

- because the SB genotype is neither Siamese nor Burmese
- because Tonkinese cats are between the colours of the parents
- because cross-breeds do not look like either parent
or cross-breeds have mid-brown fur
- because if one was dominant you would not get mid-Brown
or Tonkinese cats

accept 'they are co-dominant' or 'they are both as influential'

1

(d)

mitosis only	meiosis only	both mitosis and meiosis
	* ✓	
* ✓		
		* ✓
	* ✓	

*if more than one box is ticked in any row,
award no mark for that row*

4

[8]

6.

(a) (i) mitosis

1

(ii) any **one** from

- all have the same genotype **or** genetic make up as the parent plant
*accept 'genetic material or 'genetic information'
or 'chromosomes' or 'DNA' for genes*
- all contain identical genes
accept 'genes come from one parent'

1

(b) (i) meiosis

accept 'reduction division'

1

- (ii) any **one** from
- new **or** different combinations of genes
 - random fertilisation
 - random assortment of chromosomes
accept 'genes come from both parents'

1

[4]

7.

- (a) (i) unbanded

1

- (ii) **a reference to predators or prey is required for the mark**

they are less visible to predators **or** less visible to prey

accept 'can hide from' for 'less visible to'
*do **not** accept 'less visible against rocks'*

1

- (b) (i) proportion of strongly banded snakes would decrease
or proportion of unbanded snakes would increase
*accept 'fewer strongly banded' **or** 'more unbanded snakes'*

1

- (ii) the unbanded snakes are more likely to survive to breed
accept 'strongly banded snakes are less likely to survive to breed'

1

genes for the unbanded pattern are inherited by higher proportion of the offspring

*accept 'gene pool on island would contain a higher proportion of unbanded genes **or** a lower proportion of banded genes'*

1

[5]

8.

- (a) 5 2 1 4

1

- (b) any **two** from

- they reproduce rapidly
- they are easy to culture
- they contain plasmids
- they reproduce asexually **or** clone
or produce genetically identical populations
accept 'easy to grow'

2

[3]

9.

- (i) fewer hedges
marsh drained
less woodland/trees
more farm buildings
any 2 for 1 mark each

2

- (ii) fewer
e.g. fewer habitats
for 1 mark each

2

[4]