

MARK SCHEME

GCSE

BIOLOGY

AQA - TRIPLE SCIENCE

B6 - TEST 3

GENETICS

Intermediate

Mark schemes

- 1.** (a) (i) meiosis
allow mieosis 1
- (ii) testis / testes
allow testicle 1
- (b) (i) 23 1
- (ii) fuses / joins with cell D / with egg cell **or** used in fertilisation
allow fuse with another cell 1
- prevents doubling of chromosome number / restores original no. / 46 / diploid
no. / normal no. / full no.
accept 23 from each parent / from each gamete 1
- [5]**
- 2.** (a) kills weeds among crops / does not kill crops 1
- (kills weeds) so less competition for named factor eg light / water / ions
ignore space 1
- crops grow better / higher yield 1
- (b) (i) plasmid 1
- (ii) use an enzyme
allow correct example 1
- (iii) only some cells become GM / take up the plasmid / take up resistance gene
*allow idea of transfer of gene / plasmid to some plant cells from
bacteria* 1
- GM cells survive / non-GM cells are killed 1

- (c) Pro:
(positive) correlation between use of glyphosate and number of cases of kidney disease

allow 1 mark for justified conclusion that the claim is not justified

1

+ any **three** from:

Con:

- lack of controls / control group
- correlation does not prove a causal link
- some other factor could be the cause
accept obesity / infection
- no evidence that kidney patients actually consumed GM crops / crops treated with glyphosate / no evidence about amount consumed
or graph shows amount of herbicide not amount of GM crops grown
or graph shows data only for maize and soya / not for other (GM) crops
- data have been manipulated by carefully chosen scales to make it look like they coincide
- data from some years is missing
- no data for the dosage of herbicide used

allow kidney disease has been around for much longer than GM crops / better diagnosis of kidney disease.

3

[11]

3.

(a) any **two** from:

- most people still believed that God made all the animals / plants on Earth
allow against their 'religion'
- insufficient evidence
do not allow no proof / evidence
ignore 'fossil'
- the mechanism of inheritance / genes unknown (at the time)

2

(b) any **four** from:

- finches separated / isolated
- genetic variation / mutation (in finch population(s))
- finches with alleles / genes best suited to their environment survive
Do not allow 'characteristics'
- advantageous alleles / genes passed on (to offspring)
- after many generations / a long time, the populations can no longer successfully interbreed
Ignore 'speciation'

4

(c) (i) vegetarian finch

1

(ii) **R**

1

(iii) mangrove **and** woodpecker finches

1

[9]

4.

(a) (i) correct parental genotypes (man BB and woman bb)

1

all offspring Bb

		Woman	
		b	b
Man	B	Bb	Bb
	B	Bb	Bb

ignore 'brown' or 'brown eyes' on diagram

1

(ii) they have one B / dominant allele / heterozygous

or

B / brown allele / dominant allele is expressed even if only on one chromosome

1

(b) correct parental genotypes (both Bb)

can be shown in a diagram

can be shown as gametes

1

correct derivation of offspring genotypes from gametes

allow correct derivation from wrong gametes

1

bb identified as blue-eyed

1

[6]

5.

(a) any **three** from:

- parts of organisms have not decayed
accept in amber / resin
allow bones are preserved
- conditions needed for decay are absent
accept appropriate examples, eg acidic in bogs / lack of oxygen
- parts of the organism are replaced by other materials as they decay
accept mineralised
- or other preserved traces of organisms, eg footprints, burrows and rootlet traces
allow imprint or marking of organism

3

- (b) (i) teeth for biting (prey)
must give structure + explanation 1
- claws to grip (prey)
accept sensible uses 1
- wing / tail for flight to find (prey) 1
- (ii) any **two** from:
- new predators
 - new diseases
 - better competitors
 - catastrophe eg volcanic eruption, meteor
 - changes to environment over geological time
accept climate change
allow change in weather
 - prey dies out **or** lack of food
allow hunted to extinction 2

[8]

6.

- (a) (i) nucleus
correct spelling only
accept mitochondrion
ignore genes / genetic material / chromosomes 1
- (ii) base(s)
Accept all four correct names of bases
ignore nucleotides and refs to organic / N-containing 1
- (iii) 4 1
- (iv) codes for sequence / order of amino acids
ignore references to characteristics 1

codes for a (specific) protein / enzyme

or

the sequence / order of three bases / compounds / letters

codes for a specific amino acid

or

the sequence / order of 3 bases / compounds / letters

codes for the order / sequence of amino acids

1

(b) (i) DNA

1

circular / a ring **or** a vector / described

1

(ii) kills any cells not having **kan^r** gene / so only cells with **kan^r** gene survive

1

hence surviving cells will also contain **Bt** gene / plasmid

1

(iii) cells divide by mitosis

ignore ref to asexual reproduction

correct spelling only

1

genetic information is copied / each cell receives a copy of (all) the gene(s) / all cells produced are genetically identical / form a clone

1

(iv) any **two** from:

- gene may be passed to pathogenic bacteria
 - cannot then kill these pathogens with kanamycin
- or**
- cannot treat disease with kanamycin
 - may need to develop new antibiotics
 - gene may get into other organisms
 - outcome unpredictable

2

[13]

7.

(a) (different / alternative) forms of a gene

*do **not** accept types of genes*

1

- (b) DNA isolated from embryo 1
- (fluorescent) probe mixed with embryo DNA 1
- probe (then) binds with embryo DNA 1
- (UV light) to show alleles / gene for disorder 1
- (c) genotypes of parents and gametes correct (Man **D** and **d**, Wife **d** and **d**) 1
- allow half-size genetic diagram with only one **d** from wife*
- offspring genotypes correct ($\frac{1}{2}$ = **Dd** and $\frac{1}{2}$ = **dd**) 1
- allow ecf if parental genotypes are wrong*
- offspring phenotypes correctly assigned to genotypes 1
- (d) genotypes of parents and gametes correct (**N** and **n**) 1
- allow ecf if parental genotypes are wrong*
- offspring genotypes correct (**NN**, 2 × **Nn**, and **nn**) 1
- offspring phenotypes correctly assigned to genotypes; 1
- correct probability = 0.25 / $\frac{1}{4}$ / 25% / 1 in 4 / 1:3, only; 1
- do not allow '3:1' / '1:4'* 1

[12]

- 8.** (a) microorganism / bacteria / virus / fungus that causes (infectious) disease 1
- (b) reduce / stop use of (current) antibiotics 1
- (reduce / stop use) for non-serious / mild / viral infections 1
- allow ensure course is completed*
- allow use of variety of antibiotics* 1
- (c) (i) 40 °C 1

(ii) any **one** from:

- microorganisms grow / reproduce / work / act faster
- results / product acquired sooner

1

[5]