Evolution Booklet Exam Question Mark schemes

Lesson 1

Q1.

(a)

	Genes	Environment	Both	
Brown…	✓			1
Light…			✓	1
Short…		✓		1

Q2.

(a) ionising radiation

allow UV / X-rays / gamma (radiation)
allow environmental factors qualified e.g. carcinogenic chemicals

1

Q3.

(a) **only genetic causes**
any **one** from:

- pattern of scales
- number of fins
- eye colour

1

only environmental causes:

- scar

1

both genetic and environmental causes:

- length

(b) a change in the DNA / gene

1

(c) produces a different protein / enzyme that is responsible for colour

1

Q4.

(i) DNA

1

(ii) the <u>gene</u> / <u>allele</u> for being dark / dominant

1

Q5. *idea that* X-rays cause mutations

gains 1 mark

but X-rays can cause/increase chance of mutations

gains 2 marks

mutations usually harmful/produce abnormal growth

for 1 mark

serious effect on growing foetus/rapidly growing cells

for 1 mark

Lesson 2

Q1. (e) any **three** from:

- (farmer) selects heaviest / largest chickens / parents

  allow (farmer) selects chickens with the best / most meat

- (cross) breeds these chickens together
- (farmer) selects the heaviest / largest offspring (to breed)
- repeats this many times (until you have the desired chicken)

3

(f) high(er) income / profit

1

(g) the chickens may weigh too much to be able to stand

1

Q2.

(a) (the scientists)

chose / used (traditional varieties of) rice plants with short stems and rice plants with large grains
or
chose rice plants with short stems and large grains.

1

(cross) bred the rice plants

allow cross pollinated the rice plants

1

(from the offspring) chose the plants with best / desired characteristics
or
chose plants with short(est) stems and big(gest) grains

1

bred repeatedly until all plants had desired characteristics
or
bred repeatedly until they bred true
or
bred repeatedly until they produced IR8

1

Q3. (d) beef / meat

allow hardiness, disease resistance

1

milk yield

1

(e) higher veterinary costs

1

less income from sale of (milk and meat) products

1

Q4.

(a) any **two** from:

- so that they do not have specific genetic defects

- to produce docile cats or so they are not aggressive

  allow descriptions of aggression such as biting and scratching
- for aesthetic reasons

  allow descriptions of suitable aesthetic reasons

2

(b) (cats) are more likely to pass on (recessive) disorders
or
more likely to be susceptible to diseases

1

(c) **Level 2 (3–4 marks):**
A detailed and coherent explanation is given, which logically links the process of selective breeding with explanations of how this produces cats that do not cause allergic reactions.

Level 1 (1–2 marks):
Simple statements are made relating to process of selective breeding, but no attempt to link to explanations.

0 marks:
No relevant content.

Indicative content

process:
- parents with the desired characteristic are selected
- the parents are bred together to produce offspring
- offspring with the desired characteristics are selected and bred
- this is repeated over many generations.

explanations:
- parents who produce the least Fel D1 are initially selected
- in their offspring there will be individuals with differing amounts of Fel D1 produced
- care is taken to ensure cats are healthy and avoid possible problems associated with selective breeding
- over time the population of (selectively bred) cats will produce less Fel D1

4

Lesson 3

Q1.

(a) protection / defence
*ignore insulation **or** rolls into a ball*
ignore camouflage

1

from predators / from being attacked / from being eaten

1

(b) (i) natural selection

1

(ii) Darwin

1

(iii) simple life forms

1

Q4.

(a) present day organisms have evolved from simpler organisms
ignore answers in terms of natural selection

1

over long periods of time
or
millions / billions of years

1

Q2.

(a) variation (between organisms within species)
allow described example
*allow mutation – but **not** if caused by change in conditions*

1

those most suited / fittest survive

1

genes / alleles passed on (to offspring / next generation)
allow mutation passed on

1

Q3.

(a) <u>mutation</u>
correct spelling only
ignore other adjectives eg random / spontaneous

1

Q6.

any **four** from:

- mutation (produces striped fur)
  *do **not** allow intention to mutate*
- there is variation in fur pattern / colour
- camouflaged / striped animals (more likely to) survive **or** catch food / prey
  *do **not** allow intention to adapt / become camouflaged*
  allow stripes give a <u>selective advantage</u>
  ignore natural selection unqualified
- (survivors) reproduce / breed
  allow mate
- gene / allele / mutation passed on to offspring / next generation.
  *max **3** marks if no reference to tiger / stripes*
  *allow characteristic / trait passed on **or** inherited by next generation*

4

Lesson 4

Q1. (i) genes from one organism are transferred to a different organism

1

(ii) (possible) harm to babies' long term health

allow don't know long-term / side effects (on baby)

accept idea that there may be other things in (genetically engineered) cow's milk that might harm babies' health e.g. bacteria

ignore ethical / religious arguments

1

Q2.

(a) ionising radiation

allow UV / X-rays / gamma (radiation)
allow environmental factors qualified e.g. carcinogenic chemicals

1

(b) enzymes

1

vectors

1

Q3.

(a) genes

1

chromosomes

1

(b) (i) higher yield

1

less use of pesticides

1

(ii) any **two** from:

- uncertain about effects on health
- fewer bees
- might breed with wild plant
- seeds only from one manufacturer

2

Challenge

- gene cut out/taken
- put in bacterial (cell) do not allow "nucleus")
- cells cultured / grown in bulk

1 mark each

(allow 1 mark for "genetic engineering" if no other marks gained) **[3]**

Lesson 5

Q1.

new predators

new diseases

new competitors

environmental changes (initiated by Man)

each for 1 mark

[3]

Q2.

(a) (i) reduced photosynthesis

ignore growth

*do **not** allow need light for respiration*

1

(ii) less food (for animals) **or** less oxygen (for animals)

allow loss of habitat

1

(iii) any **two** from:

accept 2 physical factors or 2 biological factors or one of each for full marks

examples of physical factors, eg

- flooding
- drought
- ice age / temperature change

  ignore pollution
- volcanic activity

examples of biological factors, eg

- (new) predators (allow hunters / poachers)
- (new) disease / named pathogen
- competition for food
- competition for mates
- cyclical nature of speciation
- isolation
- lack of habitat or habitat change

*If no other answers given allow natural disaster / climate change / weather change / catastrophic event / environmental change for **1** mark*

2

(b) (i) 3

1

(ii) fossils

ignore bones, remains, fossil fuels

Q3.

(a) remains / traces of organisms

1

from millions of years ago

1

(b) no individuals of a species still alive

1

Q4.

(a) (i) any **two** from:

- trapped / held (since sticky)
- engulfed / covered by resin

allow engulfed / covered by amber

- prevented decay.

2

Q5.

(b) covered in sediment / mud or sinks into the mud

1

soft parts decay / are eaten
or
bones / hard parts / shell do not decay

1

minerals enter bones / parts are replaced by minerals / mineralisation

accept turns to rock

allow 'is an impression' / 'imprint' / 'cast'

1

(c) skin is soft / skin not preserved / not fossilised / skin decays

accept not enough / no evidence / no-one has seen one

allow 'this fossil is only bones'

1

Lesson 6

Q1.

(a) (i) (remains of) an organism / a bone / a shell / hard part of an organism / part of organism that does not decay / impression of an organism / footprint / burrow / rootlet trace

1

further detail – eg in rock / ice / amber / mineralisation

or

from a long time ago / many years ago

if number, > 1000 years

ignore hundreds

1

Q2.

(a) (i) D

for 1 mark

1

(ii) D Y (*both*) or C X (*both*) or B W (*both*)

for 1 mark

1

(b) *N.B. answers must relate to fossils <u>providing evidence</u>*
show types of animals / plants that <u>no longer exist</u> / named ref eg dinosaur
show <u>changes</u> in types *(of animals / plants)*
similar fossils found in rocks of similar age
reference to sequence of change
or example
e.g. horse / limb

any two for 1 mark each

2

Q3.

(a) *idea about*

- environment change / habitat drier / climate change
- couldn't escape from predators / ref to predators / killed / eaten

  [Do not allow "died"]
- because feet not adapted to run on dry ground
- couldn't compete (with Merychippus) / more difficult to get food

[Use v + x = x principle]

any two for 1 mark each

2

(b) (i) fossil remains / from the bones

for 1 mark

1

(ii) (known) age of rock **<u>or</u>** any reason for knowing the age of the rock
eg by the rock layers by RA dating (not C-dating)**1**

(c) (present day) horses / species evolved / adapted / developed <u>from earlier species</u>/ <u>horses</u>

- over a long period of time / millions of years
- via many / gradual changes
- which gave a survival advantage /passed on genes / characteristics

any three for 1 mark each

[First bullet point answer is required before marks can be awarded for others] **3**

Q4.

(a) (i) animal walking on soft material **or** suitably named material

or

further detail – eg dries out / buried / hardens / turns to rock

*do **not** allow general descriptions of how fossils are formed **or** reference to bones not decaying*

1

(c) older fossils simpler

to gain the mark there must be implication of change

or

<u>change</u> (with time)

ignore evolve
ignore extinction

1

(d) insufficient / no evidence / no remains **or** fossils survive

ignore no people were there
allow no proof

1

Q5.

(i) natural selection

1

(ii) Darwin

1

(iii) simple life forms

1

(d) believe that God created all organisms **or** humans there from the beginning

1

Q6.

(a) between 200 and 500 million years ago

2

(c) there are no organisms of that species alive todays

1

(h) older fossils have a simpler structure

1

Lesson 7

Q1.

(a) Relevant organelle found in cells such as nucleus, mitochondria

1

(b) Linnaeus

1

(c) Kingdom

1

(d) *Homo Sapiens*

ignore underlining, italics or not, capitals or not

1

(e) Any **one** from:

- to know which species are closely related
  or
  study evolution
- to monitor biodiversity
- to identify different organisms such as two different species

1

Q2.

(a)

	Animalia
Phylum	
Class	
Genus	*Spodoptera*
Species	

1
1

(b) any **one** from:

- compare the structural features with those of annelids and arthropods

  allow named structural features eg is it a segmented worm, does it form a pupa, does it turn into an adult with legs.
- carry out DNA analysis and compare with known annelids and arthropods
- carry out electron microscopy of internal parts to see fine structure and compare with known annelids and arthropods

1

Q3.

(a) *Triticum spelta*

1

Q4.

(a) same name to everyone

1

(genus) part gives information on ancestry

1

(b) any **one** from:

- DNA / RNA analysis
- improvements to (electron) microscopes
- improved understanding of biochemical processes
- evidence of internal structures being more developed

1

(c) primitive bacteria / prokaryotes

1

(often) from extreme environments / extremophiles

1

Q5.

(a) they survive in high temperatures

1

they survive where it is acidic

1

(d) any **three** from:

- based on DNA / chemical evidence

(the three domains are)

- (Archaea) − primitive / simple bacteria
- Prokaryota / Bacteria − true / modern bacteria
- Eukaryota − includes (protists, fungi,) plants and animals

allow Eukaryota − includes organisms with cells having a nucleus

*if no other mark awarded allow for **1** mark mention of Archaea, Prokaryota / Bacteria and Eukaryota*
or
three correct descriptions

3

(e) (these microorganisms) live in extreme conditions

allow (most Archaea) are extremophiles

1

Lesson 8

Q1. (i) tree

1

(ii) hippopotamus **and** pig

both required, either order

allow hippo

1

(iii) new evidence from fossils

1

Q2. (i) 2 (million years ago)

1

(ii) Snow leopard

*do **not** allow leopard*

1

Q3.

(a) (i) 3 (million years ago)

1

(ii) orangutans

1

Q4.

(c) (i) vegetarian finch

1

(ii) **R**

1

(iii) mangrove **and** woodpecker finches

1

Q5.

(a) Marginocephalia

1

(b) Protoceratops **and** Triceratops
(in either order)

allow

*Coronosaurus **and** Triceratops*

or

*Coronosaurus **and** Protoceratops*

or

*Marginocephalia **and** Pachycephalosaurus*

1

(c) any **one** from:

- the fossil record is not complete
- new fossils may have been found since 1970s
- DNA / chemical analysis may have given new information

1

[8]

[8]

(b) (i) natural selection

1

(ii) any **one** from:

- went against religious beliefs
- insufficient evidence (at the time)
  allow no proof
- mechanism of inheritance / variation not known (at the time)
- there were other theories e.g. Lamarck
  allow people couldn't accept the idea of evolving from other animals

1

Q6. (i) crocodile

1

(ii) 80 (million years ago)
*do **not** accept 80 years*

1