B14- Variation and Evolution Exam Practice 1

Name:

Score:

Q1.

A cat breeder noticed that four kittens from one Siamese cat mother had a new blue colour at the tip of their tails.

(a) What has caused the new colour to appear?

Tick (✓) **one** box.

Fertilisation	☐
Mitosis	☐
Mutation	☐

(1)

(b) The cat breeder wants to use selective breeding so that all new kittens have blue tail tips.

Describe the process of selective breeding the cat breeder could use.

_____

_____

_____

_____

_____

_____

(3)

(c) Suggest **one** reason why the cat breeder wants to have all new kittens with the blue tail tips.

_____

_____

(1)

(d) Siamese cats can suffer from heart defects.

Why might there be more Siamese cats with heart defects amongst the kittens with blue tail tips?

Tick (✓) **one** box.

They are clones	☐
They are formed by mitosis	☐
They are formed by sexual reproduction	☐
They are produced by inbreeding	☐

(1)

With each pregnancy, the cat breeder expected that:

- 50% of the kittens would be male
- 50% of the kittens would be female.

The sex chromosomes in cats are inherited in the same way as in humans.

The sex chromosomes are X and Y.

(e) Give the combination of sex chromosomes present in a male cat and in a female cat.

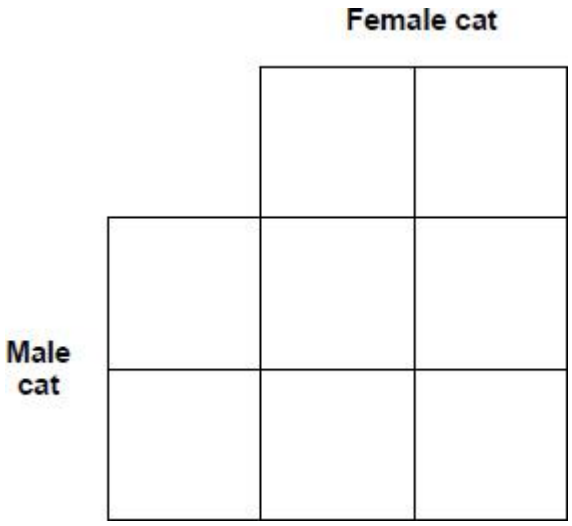
Male cat _____

Female cat _____

(1)

(f) The cat breeder expected 50% male kittens and 50% female kittens.

Complete the Punnett square in the diagram below to show why.



(2)

(g) In the first pregnancy there was one male kitten and three female kittens.

Give the reason why there were **not** two kittens of each sex.

_____

_____

(1)

(Total 10 marks)

Q2.

Scientists have produced many different types of GM (genetically modified) food crops.

(a) Use words from the box to complete the sentence about genetic engineering.

clones	chromosomes	embryos	genes

GM crops are produced by cutting _____ out of the _____ of one plant and inserting them into the cells of a crop plant.

(2)

(b) Read the information about GM food crops.

- Herbicide-resistant GM crops produce higher yields.
- Scientists are uncertain about how eating GM food affects our health.
- Insect-resistant GM crops reduce the total use of pesticides.
- GM crops might breed naturally with wild plants.
- Seeds for a GM crop can only be bought from one manufacturer.
- The numbers of bees will fall in areas where GM crops are grown.

Use this information to answer these questions.

(i) Give **two** reasons why some farmers are in favour of growing GM crops.

1. _____

_____

2. _____

_____

(2)

(ii) Give **two** reasons why many people are against the growing of GM crops.

1. _____

_____

2. _____

_____

(2)

(Total 6 marks)

Higher Tier Questions

Q3.

(a) Vectors are used in the process of genetic engineering.

Which **two** statements are correct?

Tick (✓) **two** boxes.

Vectors are enzymes used to 'cut open' the DNA molecule.	☐
Vectors are used to insert genes into cells.	☐
Vectors are used to isolate the required gene.	☐
Vectors are used to stimulate cell division.	☐
Vectors are usually plasmids or viruses.	☐

(2)

(b) Scientists have genetically engineered a variety of wheat to be resistant to herbicides.

The herbicide resistant variety of wheat will give a higher yield than the non-herbicide resistant variety.

Explain why.

_____

_____

_____

_____

_____

_____

(3)

(c) Give **two** examples of genetic engineering in use today.

Do **not** refer to herbicide resistance in your answer.

1 _____

_____

2 _____

_____

(2)

(d) Scientists working on the 'Human Genome Project' have now mapped the entire genetic code of humans.

Explain **one** way this could be important for people in the future.

_____

_____

_____

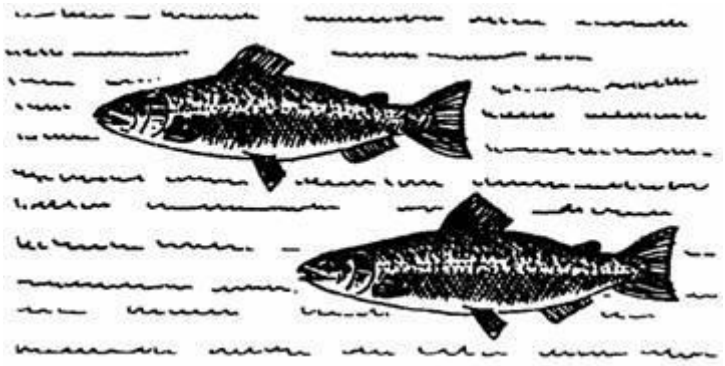
_____

(2)

(Total 9 marks)

Q4.

Wild salmon hatch from eggs laid in rivers. The small salmon then swim downstream to the sea. After 3-4 years they return to breed, usually in the same river in which they were hatched. If fish return to a different river they do not breed as successfully as those returning to the same one. This means that each river has its own breeding population of salmon. Each breeding population is slightly different from all the others.



Use the idea of natural selection to explain how each river has its own breeding population.

_____

_____

_____

_____

_____

(Total 4 marks)

Q1.

(a) mutation

1

(b) any **three** from:

- choose the cats with the blue tail

  allow choose the cats with the desired characteristic
- breed these cats together
- choose offspring with blue tails and breed these together
- repeat until all cats have blue tails

  allow breed for several generations

3

(c) they are rare / beautiful / expensive

allow description e.g. the breeder will make (more) profit

1

(d) they are produced by inbreeding

1

(e) (male cat) XY **or** YX
(female cat) XX

both required for the mark

allow lower case letters

1

(f)

	(X)	(X)
(X)	XX	XX
(Y)	XY	XY

*allow 2 **or** 3 derivation squares correct for **1** mark*

2

(g) random (if X or Y goes into each sperm)

allow it is a chance event

allow it is only a probability

1

[10]

Q2.

(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

[6]

Higher Tier Mark Scheme

Q3.

(a) vectors are used to insert genes into cells

1

vectors are usually plasmids or viruses

1

(b) wheat not affected by spraying / herbicide

allow only weeds affected / killed by spraying / herbicide

1

(so) wheat gets more light / water / nitrates / ions / minerals

allow less competition for light / water / nitrates / ions / minerals

ignore nutrients

ignore carbon dioxide

ignore space

1

(so) more photosynthesis / glucose / proteins (for more yield)

1

idea of more needed at least once for mp 2 and 3

(c) any **two** from:

- production of human insulin / medicines
- crops resistant to diseases / pests

allow examples such as potatoes resistant to blight

- crops resistant to frost
- crops resistant to drought
- crops / foods with added nutrients

allow examples such as golden rice with vitamin A gene

- plants / crops with more / bigger fruits **or** higher yield

allow examples such as larger tomatoes

- crops with improved taste
- crops with improved shelf life

2

(d) identify genes linked to (certain) disease

allow correctly named diseases such as cancer / diabetes

1

so can lead to better prevention / treatment of that disease

or

identify genes causing inherited disorders (1)

so may prevent children being born with the disorder by using IVF **or** gene therapy (1)

or

tracing human migration patterns from the past **or** evolution of humans (1)

so to better understand the ancient history of humans (1)

1

[9]

Q4.

idea that

- variations / mutations / differences in genes / alleles (in wild salmon population)
- adapted to own river
- any appropriate difference between rivers

  e.g. flow rate, waterfalls, pH, temperature, food supply, disease predators, competitors
- homing instinct

for 1 mark each

survive to breed

gains 1 mark

but

pass on genes to offspring

gains 2 marks

[4]