UNIT 4 BIOLOGY

Revision Booklet 15 (Human Intervention in Evolution) - SOLUTIONS

2012 – Question 7

Question 7a.

Marks	0	1	2	Average
%	64	26	10	0.5

Both of
- share a common ancestor or both retain genes relating to animal-like characteristics
- different mutations occurred as each animal evolved or different codons can code for the same amino acid.

Question 7b.

Marks	0	1	2	Average
%	41	39	20	0.8

Selective breeding involves humans choosing which organisms will breed. Natural selection is where a selective agent removes the unsuited, and the suited then breed.

Questions 7c.

Marks	0	1	Average
%	44	56	0.6

Genetically modified organism (GMO is a suitable abbreviation), transgenic or transfected

2010 – Question 9

Question 9a.

Marks	0	1	2	Average
%	24	30	46	1.2

The humans are the selective agent and the phenotype selected for is the tastiness/nuttiness of the fruit.

Many students restated the question stem by saying 'humans chose the best fruit', and then incorrectly stated that the selective agent was the tree and the fruit was the phenotype selected for.

Question 9b.

Marks	0	1	2	Average
%	45	31	25	0.8

9bi.
The genotype is identical or the plants are clones.

Many students incorrectly stated that the genotype is homozygous/pure breeding.

9bii.
The lack of variety means that for example, should a disease occur, the resistance would be the same and may lead to extinction.

Question 9c.

Marks	0	1	Average
%	55	45	0.5

No, as there has been no change to the plant's DNA/genome/genes.

A common incorrect answer was 'No, as it is not genetically modified.' Students must be aware that they should not simply reword the question.

2006 – Question 5

Question 5a.

Marks	0	1	Average
%	42	58	0.6

Making genetically identical copies (of organisms).

The key point was that the copies are genetically identical. Many students stated that the copies were identical or phenotypically identical; these responses were not awarded a mark.

Question 5b.

Marks	0	1	2	Average
%	15	37	49	1.4

5bi.
19

5bii.
Female. The donor of the nucleus was from the somatic cell of a female donor.

A common incorrect answer was 'The cell was an egg cell and this comes from females'.

Question 5c.

Marks	0	1	Average
%	85	15	0.2

The reason for the two numbers is that this locus is found on a pair of homologous chromosomes.

This part was not well answered. Many students incorrectly thought the two numbers were representative of the two strands of DNA.

Question 5d.

Marks	0	1	Average
%	88	12	0.1

The different values indicate that the individual being tested is heterozygous for this locus, indicating that the alleles are of different lengths.

Most students attempted this question, however, many students again related the numbers incorrectly to the two strands of DNA or made reference to the occurrence of mutations having occurred, which was also incorrect.

Question 5e.

Marks	0	1	Average
%	26	74	0.8

CC is a true clone as the DNA of CC is identical to the donor DNA and not the surrogate.

This was generally well answered, however students who stated the DNA was almost identical could not be awarded the mark.

2006 – Question 6

Question 6a.

Marks	0	1	Average
%	25	75	0.8

9

Question 6b.

Marks	0	1	2	Average
%	39	46	15	0.8

6bi.
18

6bii.

The chromosomes in the hybrid are not found in homologous pairs and are therefore unable to line up during meiosis.

Many students gave an odd number, such as 19, as the answer to part a. and then incorrectly argued that meiosis does not occur if the chromosome number is odd. Other students argued why the hybrid was not formed, but this is contrary to the information supplied.

Questions 6c–d.

Marks	0	1	2	Average
%	51	31	18	0.7

Question 6c.
Polyploid

The answers given here were varied and often incorrect, such as aneuploidy, trisomy plurypotent, polygenic and polysomatic.

Question 6d.
Due to the doubling process, the chromosomes from each species are now able to form homologous pairs during meiosis, which can now proceed normally.

Question 6e.

Marks	0	1	Average
%	44	56	0.6

In selective breeding humans choose organisms with a desirable trait and breed them. In random mating each bull and cow have an equal chance of mating.

It was important here that students made a comparison between the two.

Question 6f.

Marks	0	1	Average
%	27	73	0.8

Selective breeding reduces genetic variability.

This part was well answered, however many students did not gain the mark as they made further incorrect statements, such as that the number of genes were reduced. Students must realise that all members of the same species have the same genes, it is the alleles which may be different.

Question 6g.

Marks	0	1	Average
%	82	18	0.2

Artificial insemination will influence the frequency of alleles in the next generation by one bull contributing more frequently to the population.

This part was poorly answered. Many incorrect answers were seen, such as 'there would be less chance of mutation occurring' and 'evolution would stop'. A new word appeared, evolutionise, which was novel but incorrect.

2006 – Question 8

Questions 8a–c.

Marks	0	1	2	3	4	Average
%	33	26	21	15	5	1.3

Question 8a.
Inability to mate is not enough evidence; it is the inability to produce viable offspring which is important.

Question 8b.
Allopatric speciation

Incorrect answers included divergent evolution and founder effect.

Question 8c.
- There were different selection pressures in the two environments, which allowed differences in allele frequencies to develop.
- Over time there is an accumulation of genetic differences which changes a trait, such as mating behaviour.

This question was poorly answered and was generally not recognised as a 'natural selection' question. Students needed to provide both of the above points for two marks.

Question 8d.

Marks	0	1	Average
%	80	20	0.2

Either of
- thylacines were hunted to extinction by indigenous Australians
- thylacines were out-competed by another predator, for example, the dingo.

Too many students made vague statements such as 'unsuitable environment' or 'hunted'. It was also disappointing the number of students who made some statement about Europeans having an input into their demise. The question clearly asked why the thylacines were not found at the time of European settlement.

Question 8e.

Marks	0	1	Average
%	70	30	0.3

Either of
- no thylacines have been captured or found alive
- there is no specific, named evidence such as scats, recent remains or tracks.

Again the answers provided here were vague or incorrect, such as 'no evidence found', 'the thylacines had evolved into a different species' or other answers which restated the stem of the question.

Question 8f.

Marks	0	1	Average
%	65	35	0.4

Convergent evolution is when two species, which do not share a recent common ancestor, independently develop similar feature due to similar selection pressures.

This question required a definition. Students should be able to correctly define terms/concepts as specified in the study design.

2005 – Question 6

Question 6a.

Marks	0	1	2	3	Average
%	62	9	14	15	0.8

The following points needed to be made:
- the antibiotic X killed off the majority of bacteria but some of the population was resistant to the antibiotic and survived
- after treatment was finished these resistant bacteria multiplied
- since resistance is genetic (inherited), the resistant bacteria passed on their resistance to subsequent generations (and the symptoms returned).

Many students failed to recognise that this was essentially a straightforward question on natural selection.

Question 6b.

Marks	0	1	Average
%	31	69	0.7

Some examples of an important reason for extensive testing are:
- to ensure the release of the transgenic bacteria was safe (protect the health of humans/other animals/plants)
- to ensure the bacteria would not harm other environments
- to make sure that bacteria can grow and function in the environment.

Question 6c.

Marks	0	1	Average
%	61	39	0.4

An economic advantage had to be given, such as:
- reduces the time and money spent cleaning up non-degradable plastic material
- reduces the money spent on recycling non-degradable plastic material.

Many students gave non-economic reasons such as the harm to the environment caused by plastic. These were not awarded a mark.