

## UNIT 4 BIOLOGY

### Revision Booklet 12 - SOLUTIONS

#### 2009 – Question 3

##### Question 3ai-ii.

Marks	0	1	2	Average
%	5	68	27	1.2

##### 3ai.

Variety of (pea) plant

A common incorrect answer was the height of the plant. Even though this variable appears on the *x*-axis, it is the dependant variable.

##### 3aii.

One of:

- amount of (sun)light
- availability of water
- temperature.

Most students could identify an environmental variable; however, some gave vague answers such as 'climate', which were not awarded any marks.

##### Question 3b.

Marks	0	1	Average
%	65	35	0.4

9 cm

This question was clear in its requirements; however, many confused answers were given. A common incorrect answer was 5 cm; however, this is the height difference between the most numerous of each species, not the difference between the tallest – Palma: 31 cm, Vaspa: 22 cm.

##### Question 3c.

Marks	0	1	2	Average
%	22	46	33	1.1

Both of:

- many genes
- shows continuous variation.

##### Question 3d.

Marks	0	1	Average
%	55	45	0.5

The sum of alleles within a given population

The term 'gene pool' was not well understood. It is incorrect to state that it is the genes in a population. Incorrect responses given by students included variation (this could be environmental), genotypes, allele frequency or traits in a population, or the sum of alleles in an individual, species or community.

##### Question 3e.

Marks	0	1	2	Average
%	33	33	34	1

Both of:

- increase in genetic diversity/variation
- the greater the variation within a species, the more likely it is able to survive a change in the environment.

Many students did reasonably well on this question; however, many did not take the consequences of genetic variation to completion, for example, 'to help the possums survive' was deemed too vague to be awarded the mark.

2008 – Question 4

**Question 4**

**Question 4a.**

Marks	0	1	2	3	Average
%	37	36	21	5	1

Appropriate factors that should be considered are:

- the magnitude of exposure to the veterans
- the prevalence of disorders in general population/background mutation
- the comparison to other populations exposed to H bombs
- comparison of chromosomes of offspring and parent
- prior or subsequent exposure to mutagens by the veterans
- comparing offspring's chromosomes to parent's.

or

Appropriate factors to consider in the **design** of the experiment include:

- select veterans from a range of socio-economic groups
- select a control group of males for comparison with veterans
- the age distribution of the control group selected to match that of the veterans chosen
- living and work conditions of control group to be matched with those of the veterans
- similar chromosome tests for veterans and controls
- similar chromosome tests for children and grandchildren of veterans and controls.

**Question 4b.**

Marks	0	1	2	3	4	Average
%	29	28	22	14	7	1.5

**4bi.**

Both of:

- parts of non-homologous chromosomes have been translocated
- the insertion may have disrupted the function of other genes.

or

Normal proteins not produced in the new position.

**4bii.**

Both of:

- changes occurred in the gonads of the veterans
- these changes are passed on to offspring via gametes.

**Question 4c.**

Marks	0	1	Average
%	77	23	0.3

Disagree, as large sections of chromosomes have been translocated, and **many** or **thousands** of bases are involved, not a single base.

It was important that students made the link that the section consists of a large number of bases.

## 2007 – Question 8

### Questions 8

#### Question 8a.

Marks	0	1	Average
%	42	58	0.6

Inability to synthesise Vitamin C so it must be obtained from the diet.

#### Question 8b.

Marks	0	1	Average
%	41	59	0.6

Smell is most important to dogs and mice and least important to apes and humans.

Students were required to use the names of the specific examples given rather than making general statements.

#### Question 8c.

Marks	0	1	Average
%	80	20	0.2

Students needed to make both of the following points:

- apes and monkeys are less dependent on smell or more dependent on vision
- they would therefore have more pseudogenes or less smell genes.

This question was poorly answered as many students did not make the link that, as smell is less important to these animals, mutations are possible in genes responsible for smell as these will not affect the organism's chance of survival. These mutated genes are classed as pseudogenes.

Students who gained both marks clearly explained the outcome for both types of genes. Many students used the pronoun 'they' and it was not possible to interpret which gene was being discussed.

#### Question 8d.

Marks	0	1	2	Average
%	76	16	8	0.3

Students needed to make both of the following points:

- pseudogenes are not expressed and any mutation in them does not harm the offspring when passed on
- functional genes become inoperative or produce a different protein which could affect the survival of offspring.

## 2011 – Question 4

#### Question 4a.

Marks	0	1	Average
%	67	33	0.4

Homologous chromosomes have identical gene loci.

It was not sufficient to say they are a pair of chromosomes or to comment on their size or the position of the centromere.

#### Question 4b.

Marks	0	1	Average
%	70	30	0.3

Translocation has occurred (or a suitable description of this process).

#### Question 4c.

Marks	0	1	Average
%	70	30	0.3

The diploid number of these hybrid flies would be 7.

#### Question 4d.

Marks	0	1	2	Average
%	50	34	16	0.7

Both of:

- the chromosomes are not homologous and therefore do not pair during meiosis
- no gametes are produced, or viable offspring are not produced.

## 2011 – Question 6

### Question 6a.

Marks	0	1	Average
%	72	28	0.3

The change in allele frequency in a population by chance

Many students described gene flow. As these definitions are commonly confused, students are advised to revise the differences and ensure they are understood.

### Question 6b.

Marks	0	1	2	3	Average
%	24	29	29	18	1.4

#### 6bi

Students were required to give two valid points such as:

- fewer alleles present in the Illinois population
- less variation present
- greater risk of extinction.

#### 6bii.

Either of:

- gene flow or interbreeding has occurred between the two populations
- there has been a recent isolating mechanism.

Migration alone was not enough to gain the mark. Another incorrect answer was that the two populations experienced similar selection pressures.

### Questions6c.

Marks	0	1	2	3	Average
%	17	25	26	32	1.7

#### 6ci.

Both of:

- an environmental condition, such as a disease
- members of the population are more susceptible or at risk of extinction.

#### 6cii.

One of:

- breed with members of populations from other states
- use a captive breeding program
- habitat protection/modification.