10 SCIENCE 2014

BIOLOGY TEST TWO

Name: ANSWER KEY Teacher: _____ Mark: /52

Percentage %

SECTION A: **MULTIPLE CHOICE** **(4 marks)**

Select the best answer for each question below.

Answer question 1 and 2 using the information and table below.

A biologist who was studying a population of mice that lived in an area with few trees and scattered low shrubs separated from each other by large areas of bare soil. He found that the mice had two genes that controlled their coat colour. One tended to give the coat a dark-brown colour, while the other produced a lighter yellowish brown colour.
The area contained three different soil types: dark red clay, pale yellow sand and light grey sand. Studies of the proportion of mice with the different coat colour were done and are shown in the table. The are was a very dry semi-desert climate. The mice were preyed upon by hawks that hunted mainly in the morning and late afternoon.

Site	Soil colour	Per cent of mice with brown coat	Per cent of mice with yellowish coat
1	Red	82	18
2	Light grey	52	48
3	Pale yellow	41	59

1. Which of the following is a fair interpretation of the data?

(a) There are more brown-coated mice than yellow-coated mice in the population.
(b) Brown coats are more suited to red clay than they are to light-grey sand.
(c) Yellowish coats are more suited to the light-grey sand.
(d) Brown-coated mice are moving from pale-yellow sand and light-grey sand to the red clay.

2. Considering the information in the table, which of the following conclusions is likely?

(a) Hawks always prefer to eat mice with a yellowish coat colour.
(b) The climate is selecting for lighter coloured mice because they will absorb less heat.
(c) The coat colour provides the mice with camouflage protection from the hawk.
(d) Light colour soil selects for the yellowish coat colour.

ANSWER KEY

3. A horse has 64 chromosomes in its body cells. Choose the number of chromosomes it will have in each of its gametes.

(a) 46
(b) 23
(c) 32
(d) 64

4. Choose the genotype of a homozygous individual.

(a) r.
(b) RR.
(c) Rr.
(d) R.

SECTION B: SHORT ANSWER (48 marks)

1. Explain how light-coloured peppered moths gradually died out in the cities where pollution had changed the environment. (3 marks)

The light-coloured moths were being eaten (1) by birds because the birds could see them on the black coloured trees. (1)

2. Name the first person to propose the process of natural selection. (1 mark)

Charles Darwin

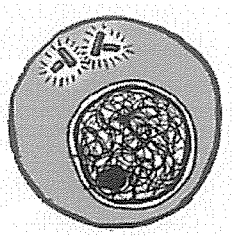
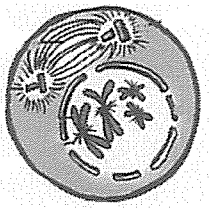
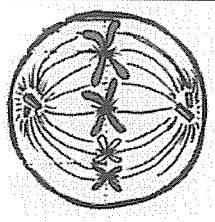
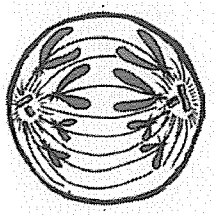
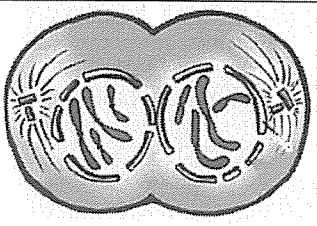
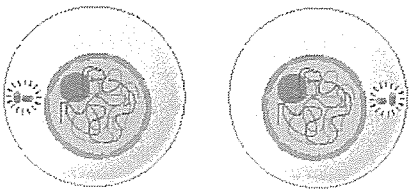
3. List two examples of biotic selective factors. choose 2 (2 marks)

predation, bacterial infection, competition

4. List two examples of physical selective factors. choose 2 (2 marks)

temperature, water, soil nutrients, fire

5. Fill in the table below showing the stages of mitosis. (12 marks)

Phase of mitosis	What is happening	Diagram
Interphase (1)	- DNA duplicates (0.5) - organelles duplicate (0.5)	
Prophase (1)	- nuclear membrane breaks down - chromosomes appear - spindle forms (any 2, 0.5 each)	
Metaphase (1)	- chromosomes line up at equator of cell (0.5) - centromeres attach to spindle fibres (0.5)	
Anaphase (1)	- chromatids split and move to opposite poles of cell (0.5) (0.5)	
Telophase (1)	- spindle apparatus breaks (0.5) - nuclear membranes form (0.5)	
Cytokinesis (1)	- cytoplasm splits to two cells (0.5) - two daughter cells are formed (0.5)	

6. Spraying crops with pesticides has caused the development of pesticide-resistant insects. This is given as an example of natural selection even though humans are involved in the spraying. Identify the selective agent for natural selection in this case.

(1 mark)

The pesticide

7. Fill in the table below. (4 marks)

Advantages and disadvantages of sexual and asexual reproduction

	Sexual reproduction	Asexual reproduction
Advantages	• Gives genetic variation (1)	• large number of offspring produced quickly (1)
Disadvantages	• Two parents required (1)	• No genetic variation (1)

8. Fill in the table below. (5 marks)

Comparison of mitosis and meiosis

	Mitosis	Meiosis
The type of cells this occurs in	general body cells (autosomes) (0.5)	sex cells (gametes) (0.5)
The number of daughter cells that are produced	2 (0.5)	4 (0.5)
The number of divisions	1 (0.5)	2 (0.5)
Are the daughter cells genetically identical to the parent cells?	Yes (0.5)	No (0.5)
The number of chromosomes in each produced cell	46 (0.5)	23 (0.5)

9. Fill in the table below. (3 marks)

Comparison of sexual and asexual reproduction

	Sexual reproduction	Asexual reproduction
Number of parents required	2 (0.5)	(0.5) 1
Are the daughter cells identical or not identical to their parents	not identical (0.5)	identical (0.5)
Are the daughter cells identical or not identical to each other	not identical except identical twins (0.5)	identical (0.5)

10. Explain how the male determines the sex of the child. (3 marks)

Any three points

- There are male and female sperm.
- Half of the males sperm will carry an X chromosome and the othe half will have a Y chromosome
- If a sperm with an X chromosome fertilises an egg then the offspring will be female, if a sperm with a Y chromosome fertilises an egg then the offspring will be male.

11. Write a definition for the term mutagen. (2 marks)

(1)

A mistake that happens when DNA is copied, causing the base sequence to change (1)

12. Write the term under the correct definition. They must be spelt correctly. (5 marks)

~~Homologous chromosomes~~, ~~resistance~~, ~~haploid number~~, ~~sexual selection~~, variation, ~~sex chromosomes~~, ~~diploid number~~, ~~replication~~, ~~autosomes~~, ~~pure-breeding~~

The number of chromosomes in general body cells.

Diploid number (0.5)

The process of making copies of DNA.

Replication (0.5)

All individuals have the same genetic information for a characteristic generation after generation.

pure-breeding (0.5)

A type of natural selection where the environmental factor is the selection of a mate.

Sexual selection (0.5)

Chromosomes that determine the sex of an individual. (0.5)

sex chromosomes

Inherited ability of an organism to withstand chemicals.

resistance (0.5)

All chromosomes in a sex cell except sex chromosomes. (0.5)

autosomes

Chromosomes with genes for particular characteristics at the same location. (0.5)

Homologous chromosomes

The number of chromosomes in sex cells. (0.5)

haploid number

Differences in characteristics due to different genes. (0.5)

Variation

13. In guinea pigs, black fur is dominant over brown fur. Show the cross of a heterozygous black male with a homozygous brown female. B dominant black fur

(5 marks)

Parents

Male genotype = Bb Male phenotype = Black fur (1)

Female genotype = bb Female phenotype = Brown fur (1)

	B	b
b	Bb	bb
b	Bb	bb

(1)

Offspring

Genotype = Bb 50%. bb 50%. (1)

Phenotype = 50% black fur, 50% brown fur (1)