



YEAR 10 SCIENCE

BIOLOGY UNIT TEST MAY 2014

NAME: _____

TEACHER: _____

Section A: 10 Multiple Choice Questions /10 Marks

Circle the best alternative on the answer sheet provided.

Answer all questions.

Section B: 8 Short Answer Questions /40 Marks

Answer all questions in the spaces provided.

Total Marks Available: / 50 Marks = % =

PART A: MULTIPLE CHOICE SECTION

Please circle the **most appropriate** response on the answer sheet provided.
(10 questions - 10 marks)

1. Which of the following are connected by hydrogen bonds?
 - A) Phosphate to base in a DNA molecule
 - B) Phosphate to sugar in a DNA molecule
 - C) Base to sugar in a DNA molecule
 - D) Base to base in a DNA molecule

2. What are the three molecules that form a DNA nucleotide?
 - A) phosphate, ribose and hydrogen base
 - B) phosphorus, deoxyribose and hydrogen base
 - C) phosphorus, ribose and nitrogenous base
 - D) phosphate, deoxyribose and nitrogenous base

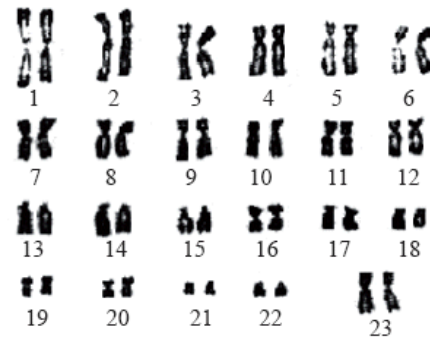
3. The percentage of thymine in the DNA of an organism is approximately 30%.
What is the percentage of guanine?
 - A) 70%
 - B) 30%
 - C) 40%
 - D) 20%

4. Which of these processes require mitosis?
 - A) Embryological development
 - B) Reducing the surface area to volume ratio
 - C) Maintaining cell size
 - D) Cell growth

5. How many autosomes are there in a human sperm?
 - A) 1
 - B) 22
 - C) 23
 - D) 46

6. What can be concluded from the karyotype provided below?

- A) There is a trisomy in the foetus.
- B) There is a monosomy in the foetus.
- C) The foetus is male.
- D) The foetus is female.



[Source: www.ds-health.com/trisomy.htm]

7. Which of the following genotypes is possible in the offspring of a homozygous male with blood group A and a female with blood group B?

- A) $I^A I^A$
- B) $I^A i$
- C) ii
- D) $I^B i$

8. According to Darwin's theory of evolution, what causes the struggle for survival in populations?

- A) Overproduction of offspring
- B) Favourable heritable variations
- C) Natural selection
- D) Competition between the fittest individuals in the population

9. The similarity of bone structure in the forelimbs of many vertebrates is an example of

- A) analogy
- B) codominance
- C) homology
- D) convergence

10. During their early stages of development, the embryos of reptiles, birds, and mammals look very similar. This suggests that reptiles, birds, and mammals

- A) are no longer undergoing evolution.
- B) have a common ancestor.
- C) have gotten rid of all their vestigial structures.
- D) live in the same types of environments.

PART B: SHORT ANSWER SECTION
(8 questions –36 marks)

1. The structure of DNA was first described in 1953.

(a) Which scientist(s) made this discovery?

[1]

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(b) Explain DNA structure, including its subunits and the way in which they are bonded together.

[4]

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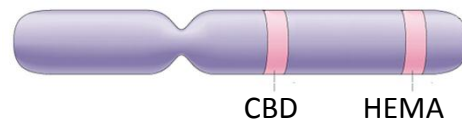
(Total 5 marks)

2. Consider the following diagram of two chromosomes found in humans.

Chromosome 1



X Chromosome



Gene	Function	Dominant allele	Recessive allele
El	Shape of red blood cells	Elliptical shape (E)	Round shape (e)
Rh	Rhesus factor	Positive (D)	Negative (d)
HEMA	Clotting factor	Normal production (H)	Haemophilia (h)
CBD	Colour vision	Normal (C)	Colour-blind (c)

- (a) What is the position of a gene on a chromosome called?

[1]

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- (b) What is the term given to genes found on the X chromosome?

[1]

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- (c) Explain why a male is more likely to be colour-blind than a female?

[2]

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- (d) A man with normal vision and round blood cells and a woman also with normal vision and elliptical blood cells, but whose father was colour-blind and had round shaped blood cells have a child.

- i. Work out the possible phenotype for this child with regards to shape of red blood cells. Remember to use correct symbols and show all necessary working. [3]

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- ii. Work out the possible phenotype for this child with regards to colour-blindness. Remember to use correct symbols and show all necessary working. [3]

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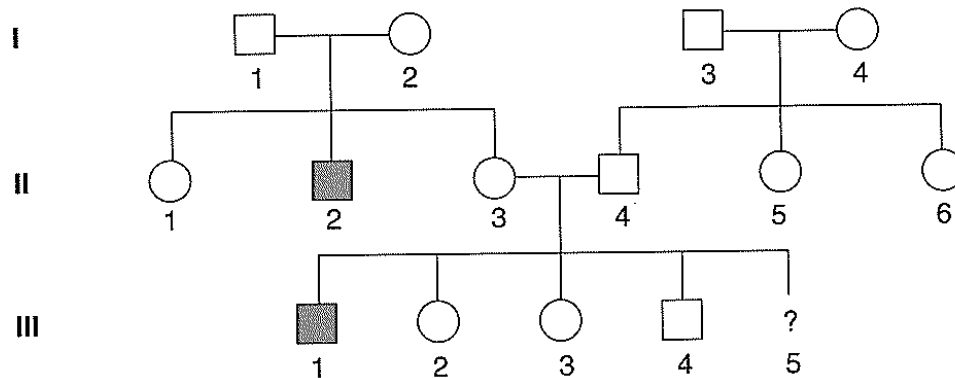
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- iii. Draw a pedigree for the three generations of this family, focusing on the colour-blindness trait. Include both sets of grandparents and one male child for the couple in question. [3]

(Total 13 marks)

3. Haemophilia is a sex-linked recessive trait. Consider the following information.



- (a) What is a carrier? [1]

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- (b) How many carriers are shown in the pedigree above? [1]

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- (c) Work out the possible genotypes of Individual III-5. [3]
(Hint: make sure that you use the correct symbols for a sex-linked trait)

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(Total 5 marks)

4. Scientists have long thought that males play a bigger part in human evolution than females.

This is because the cells that will become sperm divide many more times than cells that produce eggs. Mutations most frequently occur during cell division, so this provides more chances for genes in the male sex cells to mutate than female gametes.

Also, the Y chromosome carries very few genes, none of which are vital for survival. In contrast to this, the X chromosome carries many essential genes and it is thought to have a greater resistance to mutation in both male and females.

- (a) What type of cell division results in the production of sperm and eggs? [1]

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- (b) Describe 3 differences between the two types of cell division. [3]

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- (c) What is a mutation? [1]

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- (d) Explain why an increased mutation rate would lead to a faster rate of evolution? [2]

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(Total 6 marks)

5. It is believed that Australia's venomous snakes originally came from the African part of Gondwanaland, when a single species of the cobra family came to Australia.

(a) What type of evolution is described here?

[1]

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(b) Explain how scientists could determine that present Australian snakes evolved from a single species of cobra.

[2]

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(c) Explain the process of speciation that would have lead to an increase in the number of Australian snake species?

[4]

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(Total 7 marks)

6. The table below shows the amino acid sequence of part of the beta-haemoglobin molecule found in six different vertebrates. The beta globin chain has a total of 146 amino acids. The amino acids found in positions 101 to 116 are shown.

Amino acid position	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116
Human (Hu)	glu	asn	phe	arg	leu	leu	gly	asn	val	leu	val	cys	val	leu	ala	his
Red kangaroo (RK)	glu	asn	phe	lys	leu	leu	gly	asn	ile	ile	val	ile	cys	leu	ala	glu
Rhesus monkey (RM)	glu	asn	phe	lys	leu	leu	gly	asn	val	leu	val	cys	val	leu	ala	his
Gorilla (G)	glu	asn	phe	lys	leu	leu	gly	asn	val	leu	val	cys	val	leu	ala	his
Chimpanzee (C)	glu	asn	phe	arg	leu	leu	gly	asn	val	leu	val	cys	val	leu	ala	his
Horse (Ho)	glu	asn	phe	arg	leu	leu	gly	asn	val	leu	ala	leu	val	val	ala	arg

- (a) Which organism has the most amino acids in common with humans? [1]

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- (b) Which organism has the fewest amino acids in common with humans? [1]

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- (c) What can be determined from your answer provided in parts (a) and (b) above? [2]

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(Total 4 marks)

NAME:

Multiple Choice Answer Sheet:

Please circle the **most appropriate** response on the answer sheet.

1	a	b	c	d
2	a	b	c	d
3	a	b	c	d
4	a	b	c	d
5	a	b	c	d
6	a	b	c	d
7	a	b	c	d
8	a	b	c	d
9	a	b	c	d
10	a	b	c	d