Student Number: …….

18/3/14

THE KING'S SCHOOL

HALF YEARLY EXAMINATION

2014

BIOLOGY

YEAR 12

INSTRUCTIONS

- Time allowed - 1½ hours
- DO NOT REMOVE this paper from the examination room
- Answer ALL questions in the spaces provided
- Write your Student number in ALL the spaces provided
- TOPICS: **Maintaining a Balance**
  Blueprint of Life
- SECTION A - 10 multiple choice questions – 1 mark each = 10 marks
  SECTION B - short answer questions = 40 marks
  TOTAL = 50 marks

Performance outcome for reporting	Demonstrates knowledge and understanding of scientific principles and concepts.

Student Number: …….

SECTION A

Questions 1 - 10 - multiple choice

Attempt ALL questions

Choose the best answer and indicate your choice by placing a cross (X) in the appropriate space on the Answer grid.

1. Marine fish living in seawater regulate their salt and water balance by:

   A producing concentrated urine and excreting salts
   B producing dilute urine and excreting salts
   C producing concentrated urine and absorbing salts
   D producing dilute urine and absorbing salts

2. Renal dialysis is necessary in patients whose kidneys do not function effectively. Dialysis fluid consists of a mixture of water, glucose, sodium, magnesium chloride ions, potassium and calcium.

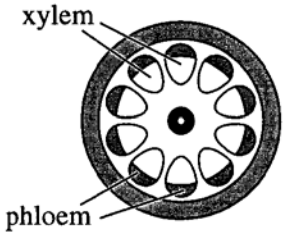
   Why are these substances intentionally included in the dialysis fluid?

   A to prevent the loss of valuable substances from the bloodstream to the dialysis fluid by diffusion across the porous membrane
   B to assist the movement of urea molecules from the bloodstream to the dialysis fluid by diffusion across the porous membrane
   C to reduce the need for active transport in the distal tubule of the nephron during dialysis
   D to ensure that the osmotic pressure of the dialysis fluid is as close to normal urine as possible

3. Which of the following correctly outlines the scientist's contribution to determining the structure of DNA?

A	Franklin	determined that the DNA molecule was a double helix
B	Crick	discovered that the complimentary bases were T–C and G–A
C	Watson	produced X-ray diffraction pictures which assisted in determining the DNA structure
D	Wilkins	passed on an unpublished X-ray diffraction picture of DNA to Watson and Crick

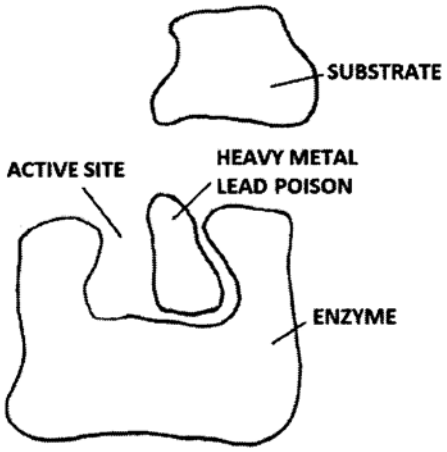
4. You will have carried out investigations into xylem and phloem. A simplified cross-section of vascular tissue is shown below.



Which of the following statements is true?

A the diagram above shows a longitudinal section of xylem and phloem
B the xylem transports glucose to cells throughout the plant for respiration
C the xylem transports water and dissolved nutrients absorbed from the roots to the leaves
D the phloem transports glucose absorbed through the roots to the leaves of the plants for respiration

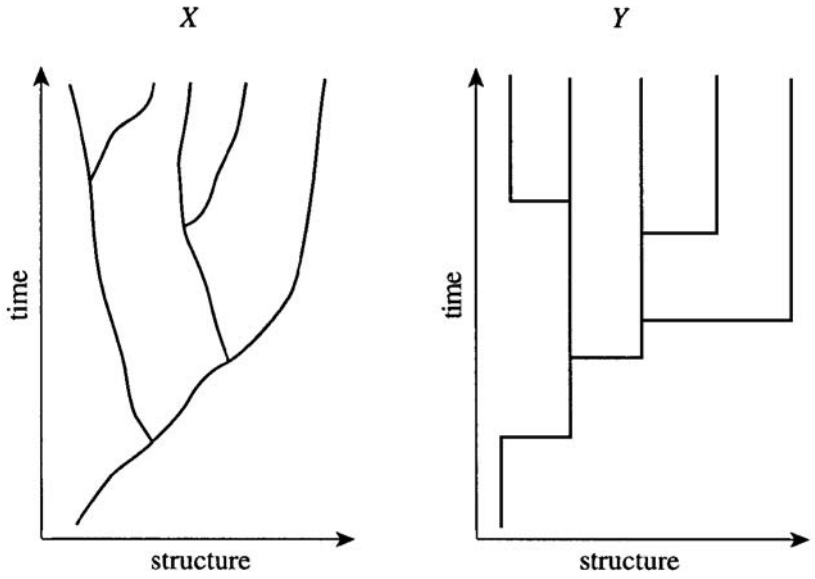
5. The diagram below is a model showing how a heavy metal like lead can affect enzyme activity.



What is the most likely outcome of heavy metals in the body?

A the active site of the enzyme will change shape to better fit the poison
B substrates will be forced to combine with the heavy metal to form products
C the substrate will change shape to better fit into the remaining space of the active site
D substrates will no longer be able to bind to the enzyme and products will not be formed

6. Which theories of evolution are shown by X and Y respectively?



	X	Y
A	Lamarckism	gradualism
B	Lamarckism	punctuated equilibrium
C	punctuated equilibrium	gradualism
D	gradualism	punctuated equilibrium

7. The Punnett square below represents a genetic cross for two parents who have normal colour vision.

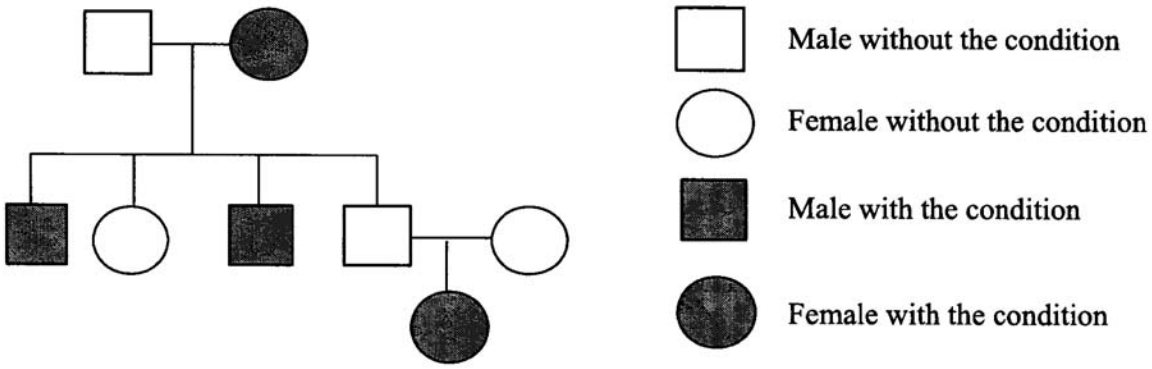
N represents the allele for normal colour vision
n represents the allele for colour blindness

P2 / P1	$\mathbf{X^N}$	**Y**
$\mathbf{X^N}$	X^NX^N	X^NY
$\mathbf{X^n}$	X^NX^n	X^nY

Using the information what percentage of their sons could be colour blind?

A 0
B 25
C 50
D 100

8. The following pedigree illustrates the pattern of inheritance for a mutation on chromosome 7.



What type of inheritance is shown in this disease?

A co-dominant
B dominant
C recessive
D sex-linked

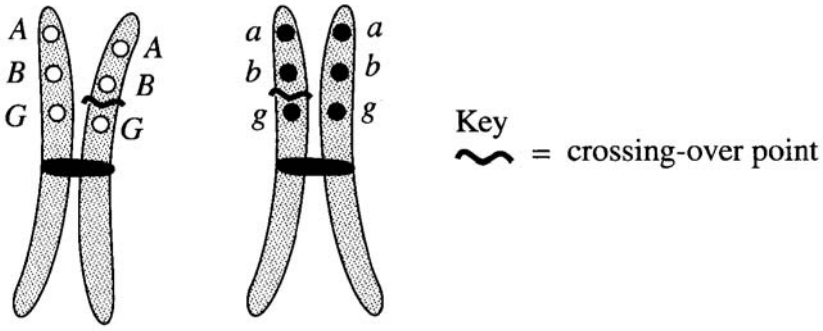
9. In some types of plants, when a red-flowered plant (R) is crossed with a white-flowered plant (W), the resulting offspring have white flowers with red spots. This is an example of co-dominant inheritance and is shown in the following Punnett square.

	W	**W**
R	RW	RW
R	RW	RW

Choose the option that correctly identifies the genotype and the phenotype of the offspring.

	Genotype	**Phenotype**
A	pink	RW
B	white flowers with red spots	RW
C	RW	white flowers with red spots
D	RW	pink

10. The diagram represents one pair of homologous chromosomes during meiosis. Crossing-over occurs and random segregation takes place.



What genotypes are produced?

A ABG, abG, ABg, abg
B ABG, aBG, Abg, abg
C ABG, ABG, abg, abg
D ABG, aBg, Abg, abg

Student Number: …….

SECTION B

Questions 11 – 23 - 40 marks

Attempt ALL questions

Write your answers in the space provided after each question.
Show all working where relevant.

11. Define the term *enantiostasis*. [1]

.....

.....

12. (a) The majority of carbon dioxide is carried in the blood in what form? [1]

.....

(b) Explain why its removal is important. [2]

.....

.....

.....

.....

13. During your course you investigated how changing the pH alters enzyme activity. Outline the procedure that you used and explain how you made sure your investigation was reliable. [4]

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

14. Describe an adaptation of a named Australian plant that assists it to minimise water loss. State briefly how the adaptation works. You may draw a labelled diagram to assist your explanation. [3]

.....

.....

.....

.....

15. ADH and aldosterone are two hormones vital to the functioning of mammalian kidneys. Compare and contrast these two hormones. [4]

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

16. Explain the adaptive advantage of haemoglobin. [2]

.....

.....

.....

.....

17. Justify continued research into artificial blood. [3]

.....

.....

.....

.....

.....

.....

BLANK PAGE

18. Describe how you performed a first-hand investigation to demonstrate the effect of environment on phenotype. Include how you ensured that your results were valid and also mention any safety precautions you carried out. [4]

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

19. Outline ONE advance in technology that you have studied and outline how it has resulted in a change to scientific thinking about evolutionary relationships. [3]

.....

.....

.....

.....

.....

.....

.....

.....

20. (a) Define the term *mutagen*. [1]

.....

.....

(b) In the space below construct a flow chart that **shows** how one change in the DNA sequence can result in changes in cell activity. [3]

21. Cloning is a current reproductive technique that results in offspring which are identical to a parent. Describe a methodology used in cloning. [3]

.....

.....

.....

.....

.....

.....

.....

.....

22. A change in the chemical conditions in the environment can impact on the evolution of plants and animals. Complete the table below. [3]

State ONE possible chemical condition change	.....
Describe how this change in the environment has impacted on EITHER a specific plant OR a specific animal	Plant/animal: ....

23. (a) Explain the work of Beadle and Tatum which led to the one gene-one enzyme hypothesis. [2]

.....

.....

.....

.....

(b) Discuss why this was changed to the one gene-one protein hypothesis. [1]

.....

.....

.....

End of paper