

25/1/13



THE KING'S SCHOOL

HALF YEARLY EXAMINATION

2013

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.
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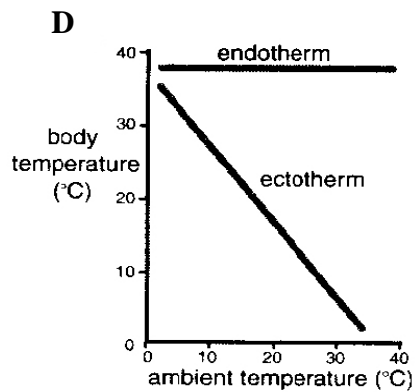
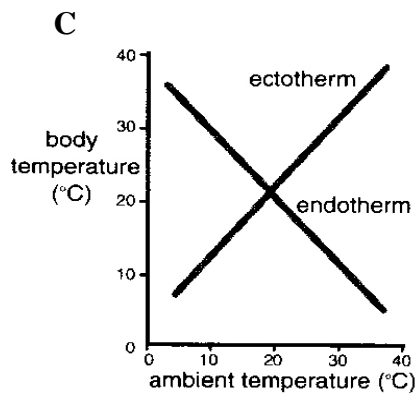
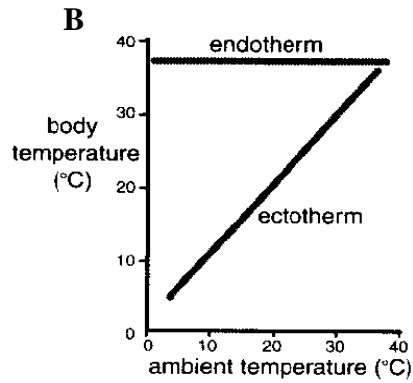
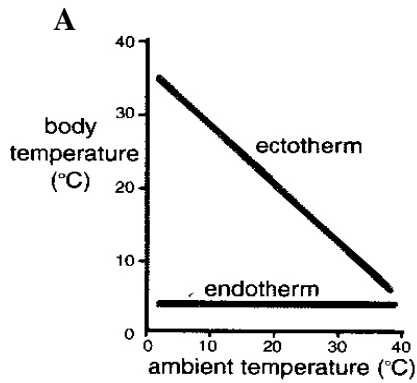
SECTION A

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.

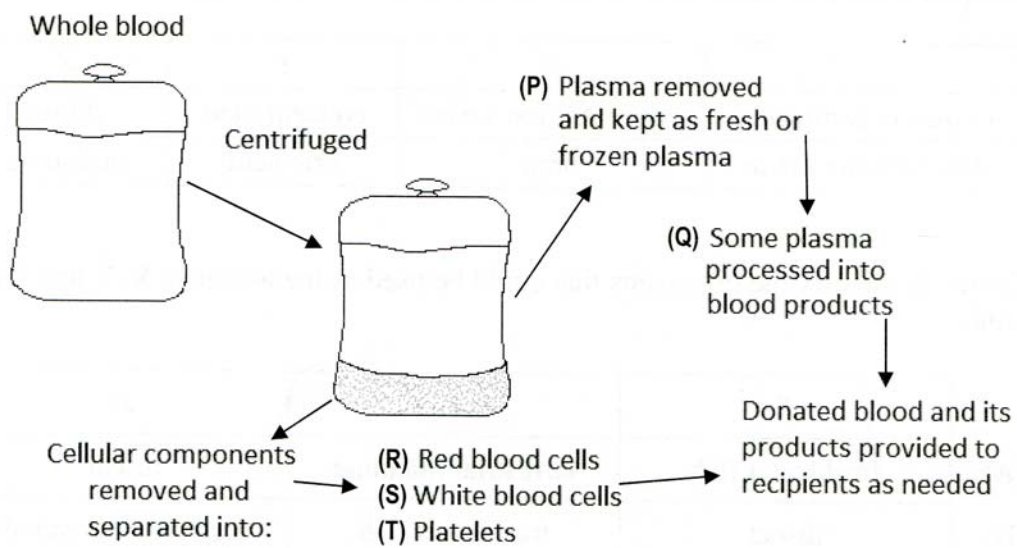
1. Which of the following most accurately shows the relationship between ambient temperature and body temperature for an ectotherm and an endotherm?



- A Graph A
- B Graph B
- C Graph C
- D Graph D

2. The adaptive advantage of haemoglobin means that:
- A there is a need for iron in the diet
 - B oxygen is dissolved in plasma for transport
 - C more oxygen can be transported by red blood cells
 - D carbon dioxide is excreted from cells

3. The following diagram illustrates how donated blood is separated into its products.



Which of the labelled blood products would be best given to a patient that needs to only increase their blood volume?

- A P only
 - B R only
 - C Q and T
 - D S and T
4. The concentration of ammonia in the urine produced by a freshwater fish was compared with the concentration of ammonia in the urine from a marine fish.

Identify the dependent and independent variables in this investigation.

	Dependent variable	Independent variable
A	type of fish	concentration of urine
B	concentration of ammonia	type of fish
C	concentration of ammonia	dilute urine
D	concentration of urine	type of fish

5. Which of the following most accurately explains homeostasis and enantiostasis?

	Homeostasis	Enantiostasis
A	maintenance of a relatively stable internal environment	maintenance of metabolic and physiological functions in response to variations in the environment
B	maintenance of metabolic and physiological functions in response to variations in the environment	maintenance of a relatively stable internal environment
C	maintenance of a relatively stable internal environment	responses of plants to temperature changes which assist temperature regulation
D	processes used by organisms to maintain water concentration within a narrow range for optimal function	processes used by plants for salt regulation in saline and estuarine environment

6. Consider the following extract from Koalas Have Human-like fingerprints, courtesy of Life's Little Mysteries.

A crime in a zoo's koala cage would probably confound the efforts of even the best detectives. Why? Because koalas, doll-sized marsupials that climb trees with babies on their backs, have fingerprints that are almost identical to human ones. Not even careful analysis under a microscope can easily distinguish the loopy, whirling ridges on koala's fingers from our own.

<http://www.lifslittlemysteries.com/1380-koalas-have-human-like-fingerprints.html>

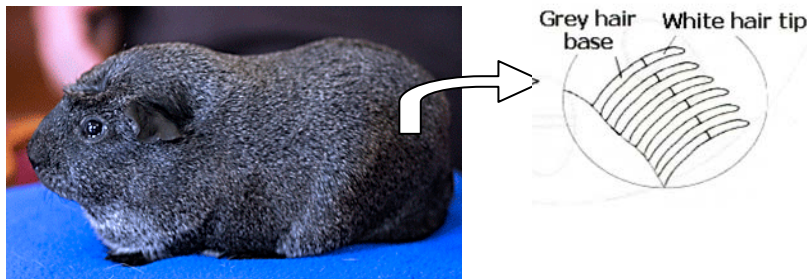
Which evolutionary perspective accounts for the similarity of fingerprints of koalas and humans?

- A punctuated equilibrium
- B divergent evolution
- C convergent evolution
- D comparative embryology

7. Which of the following is a reason why the importance of Mendel's work was not recognised until some time after it was published?
- A because Mendel was a monk and not a trained scientist, he did not carry a high profile among the scientific community
 - B Mendel's research was published in a relatively obscure journal that was not widely read
 - C Mendel's work was revolutionary in its scope, so it wasn't until other scientists' understanding 'caught up' with his research that its importance was understood
 - D all of the above

8. Guinea pigs have many different fur colours. One combination is called Silver Agouti. In these guinea pigs, each hair has a dark grey base and a white tip.

This combination is a co-dominant hair colouring where both the grey base and the white tips shows as the phenotype.

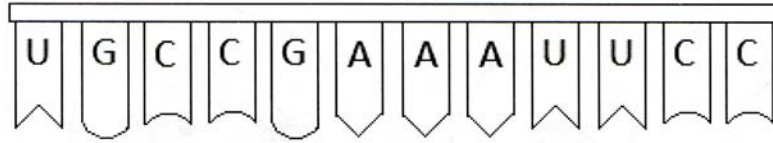


If a grey male guinea pig is mated with a Silver Agouti female, what is the probability that they will produce a Silver Agouti?

- A 25%
- B 50%
- C 75%
- D 100%

9. A section of transcribed mRNA and a table of amino acid codons are shown below.

What sequence of amino acids would be produced from this section of mRNA?



A		U		G		C	
AAA AAG	Lys	UAU UAC	Tyr	GAA GAG	Glu	CAU CAC	His
AAU AAC	Asn	UGU UGC	Cys	GAU GAC	Asp	CAA CAG	Gln
ACU ACC ACA ACG	Thr	UCC UCA UCG	Ser	GGU GGC GGA GGG	Gly	CGU CGC CGA CGG	Arg

- A Tyr – His – Lys – Cys
 B Ser – Arg – Asn – Cys
 C Thr – Gly – Ser – Asn
 D Cys – Arg – Asn – Ser
10. Artificial insemination, artificial pollination and cloning are all reproductive techniques.

What do they have in common?

- A promote reproduction of organisms with certain genes
 B increase genetic diversity
 C can be used to produce transgenic species
 D have been used by humans for over 100 years

SECTION B

Questions 11 – 20 - 40 marks

Attempt ALL questions

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

11. Enzyme X, found in tomatoes, acts on hydrogen peroxide, breaking it down into oxygen and water. It has been hypothesised that the storage of tomatoes at different temperatures will affect the amount of hydrogen peroxide broken down by enzyme X.

Design an experiment to show that storing tomatoes at cooler temperatures will affect the amount of hydrogen peroxide broken down by enzyme X.

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- Include in your answer:
- independent variable
 - dependent variable
 - controlled variables
 - method

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12. In the space below construct a flow chart which outlines the process of thermoregulation in mammals when the ambient temperature decreases.

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13. Describe ONE current theory which accounts for the movement of materials through phloem tissue in plants.

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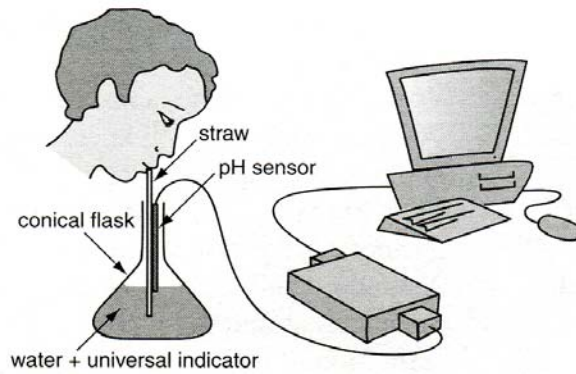
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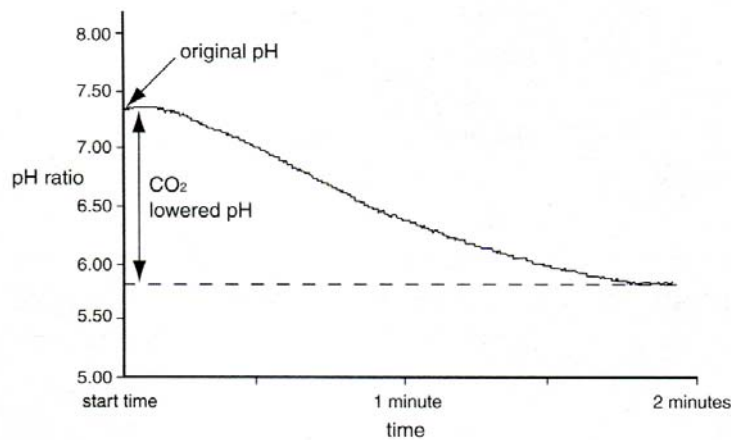
14. Some Biology students set up the following equipment to demonstrate the effect of dissolved carbon dioxide on the pH of water.



The students used the pH sensor with the datalogger, setting the x -axis as time and the y -axis as pH. Distilled water was placed in a dishwasher-cleaned conical flask. Universal indicator was added to the distilled water and it turned dark green.

One student exhaled through the straw into the distilled water and the pH sensor recorded the change over 2 minutes.

the universal indicator turned yellow and the following graph shows the computer printout from the datalogger.



- (a) Compare the use of universal indicator and the pH sensor for accuracy. 1

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- (b) What is the effect of carbon dioxide on the pH of water? 1

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15. Draw a labelled diagram of a nephron and label the places where filtration, active transport and passive transport occur.

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16. Using a named example, analyse how advances in technology have changed scientific thinking about evolutionary relationships.

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17. In humans, the gene for red hair is recessive to the gene for brown hair. A man with red hair marries a woman with brown hair and they have two children – a daughter with red hair and a son with brown hair. His mother and his mother's father have red hair. His wife's father and sister have red hair.

(a) Draw a family tree to show the inheritance of red hair in this family.

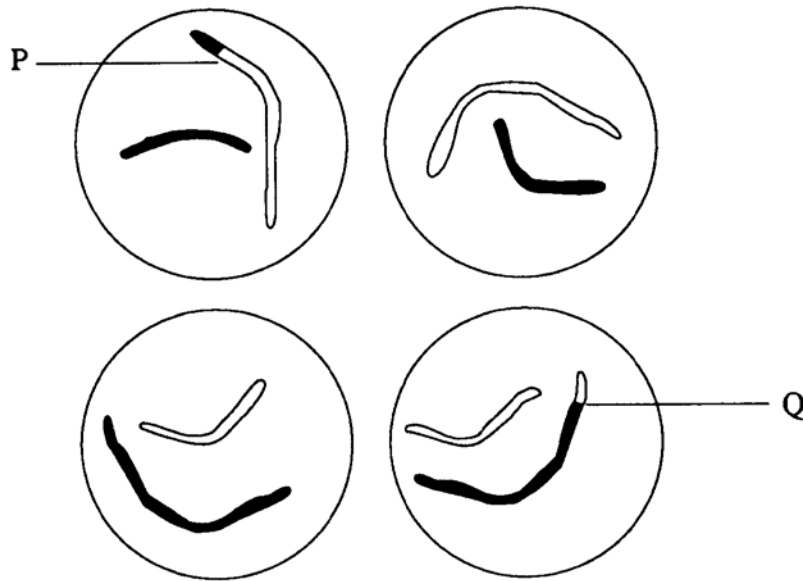
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(b) Calculate the genotypic and phenotypic ratios of the possible children resulting from this couple. Show all working.

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18. Shown below are four mammalian gametes which were formed from the division of a single parent cell.



(a) Name the type of cell division which produces gametes. 1

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(b) How many chromosomes were present in the parent cell? 1

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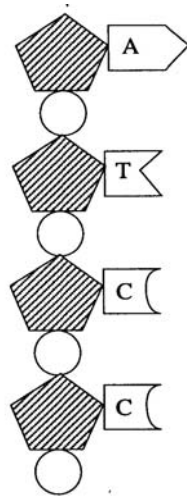
(c) (i) Name the process occurring during this cell division which produced the chromosomes P and Q. 1

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(ii) What role does this process play in the survival of the species? 1

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19. The diagram below shows a portion of a single strand of a DNA molecule.



(a) On the diagram above, draw the other strand which complements this strand of a DNA molecule. 1

(b) DNA replication is an important process. Describe how this process occurs (diagrams may assist). 3

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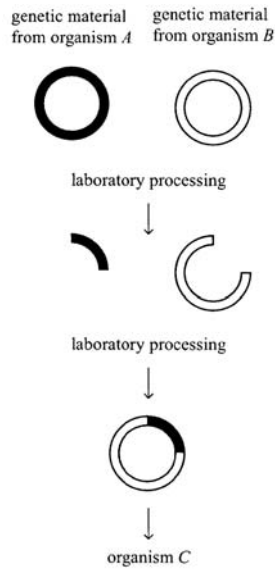
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20. The diagram below is a simplified version of a process used in modern biotechnology.



(a) Identify the technique which is shown in the process above. 1

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(b) This process has many applications in medicine, agriculture and other industries. With reference to a named example, describe how this process is used to manufacture a desired product and ONE possible reason for its use. 3

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