



**LIFE SCIENCES: PAPER I**

**EXAMINATION NUMBER**

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**ANSWER BOOKLET**

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**There are ten (x) pages in this Answer Booklet.**

**QUESTION 1**

- 1.1 Select the term in Column B that best matches a description in Column A. Write the letter of the term in the corresponding space provided between the brackets.  
Each letter may be used only once.

**COLUMN A**

- [ ] This factor is manipulated in an experiment.
- [ ] A way to ask and answer scientific questions by making observations and doing experiments.
- [ ] A possible explanation for a natural event.
- [ ] A statement following an experiment as to whether the results support the hypothesis.
- [ ] This is the factor that we are measuring.
- [ ] A record of the actual outcome of an experiment.
- [ ] A statement that clearly indicates the purpose of the experiment.
- [ ] The factors kept constant in an experiment.
- [ ] Equipment used in scientific experiments.
- [ ] A list of steps to follow in an experiment.

**COLUMN B**

- A Hypothesis
- B Dependent variable
- C Apparatus
- D Results
- E Independent variable
- F Fixed variables
- G Aim
- H Conclusion
- I Method
- J Materials
- K Scientific question
- L The Scientific Method

1.2 Six multiple-choice questions are given below. Choose the most correct option in each question and write the letter of your choice in the space provided in the table below.

Question	1.2.1	1.2.2	1.2.3	1.2.4	1.2.5	1.2.6
Answer						

1.2.1 Which type of sugar and bonds are found in a DNA molecule?

	Type of sugar	Bonds linking complementary bases
A	Deoxyribose	Hydrogen
B	Deoxyribose	Peptide
C	Ribose	Hydrogen
D	Ribose	Peptide

(1)

1.2.2 The length of double-stranded DNA contains 90 nucleotides and codes for polypeptide X. What is the maximum length of polypeptide X?

- A 20 amino acids
- B 30 amino acids
- C 90 amino acids
- D 15 amino acids

(2)

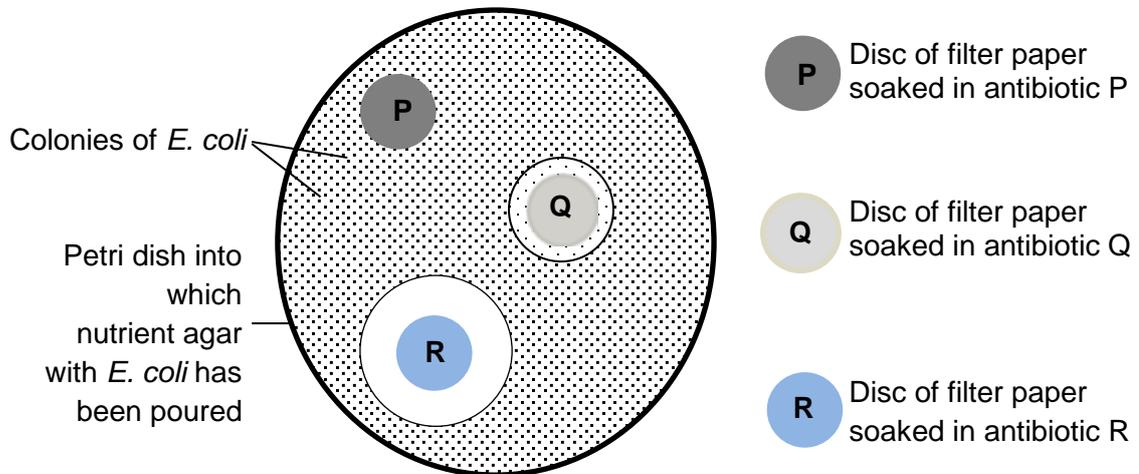
1.2.3 Which structures are involved in reproduction in both animals and plants?

- A ovary and testes
- B ovule and stigma
- C ovary and zygote
- D uterus and embryo

(1)

Questions 1.2.4 and 1.2.5 refer to the diagram below.

1.2.4 The diagram below shows the effects of antibiotics P, Q and R on the bacterium *E. coli*.



What can you deduce about the response of *E. coli* to the effects of the antibiotics?

	Completely resistant	Not completely resistant	Not resistant
A	P	Q	R
B	Q	P	R
C	R	Q	P
D	P	R	Q

(2)

1.2.5 A suitable control in this experiment would be:

- A soak a disc of filter paper with a mixture of P, Q and R and place it on the same set of apparatus.
- B set up an identical petri dish and average the results.
- C soak a disc of filter paper with distilled water and place it on the same set of apparatus.
- D this experiment does not need a control.

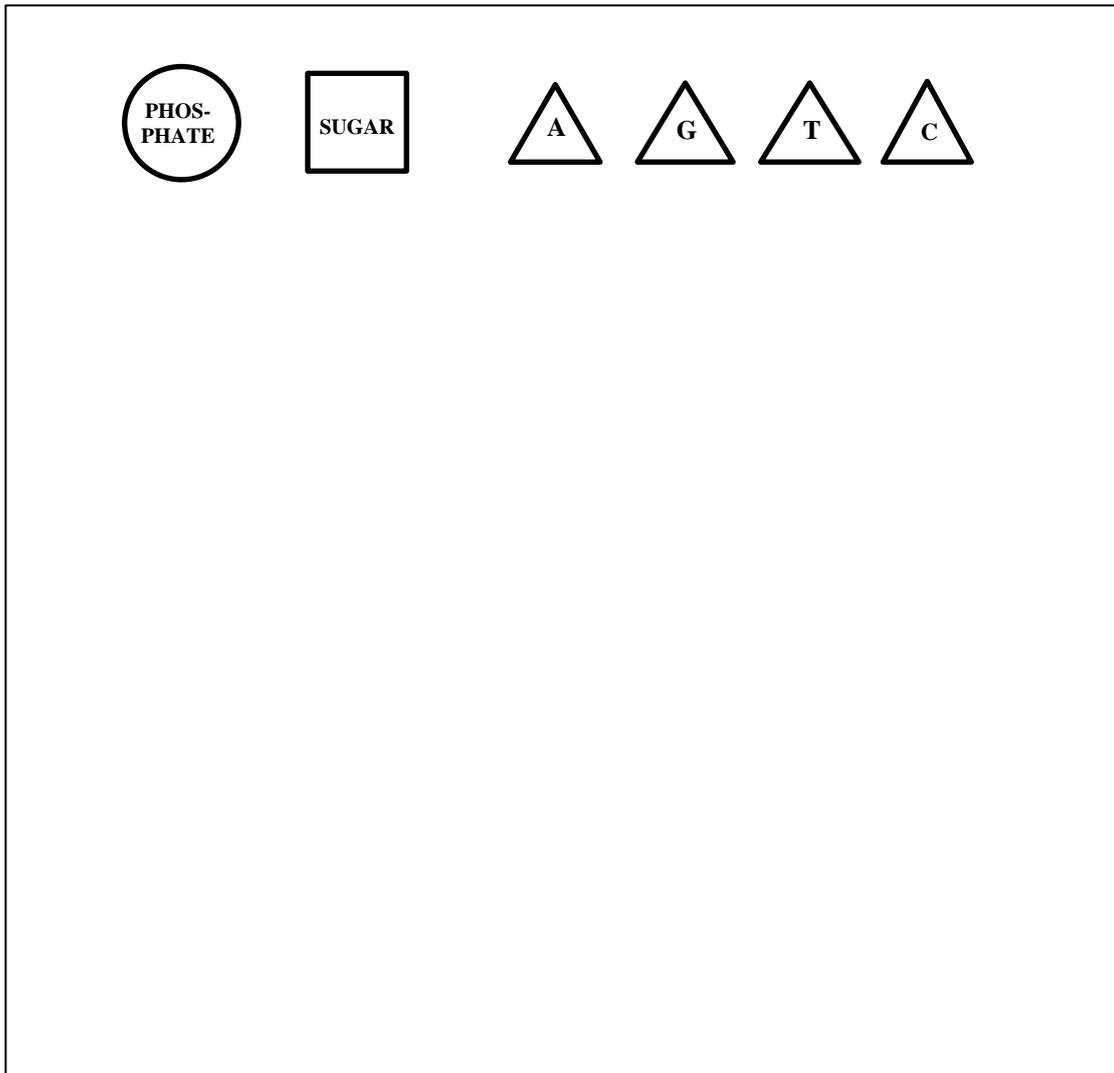
(2)

1.2.6 Which structure joins two sister chromatids?

- A Centriole
- B Centromere
- C Chiasmata
- D Centrosome

(1)

1.3 In the space below, draw a section of DNA consisting of 3 nucleotide pairs using the key below. You must use all the components in your diagram and show the bonds.



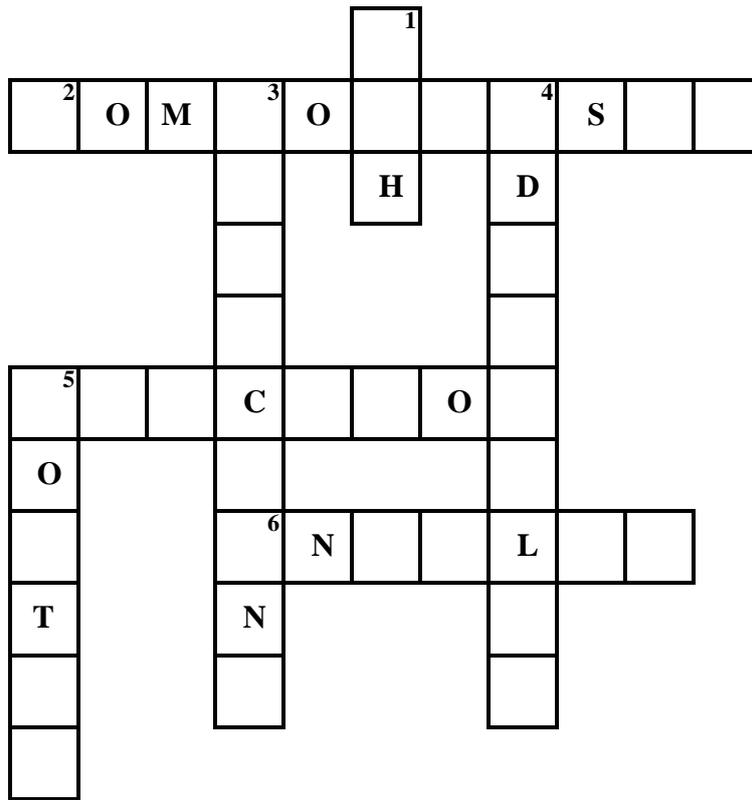
(6)

1.4 Complete the following table on meiosis by filling in the blank spaces.

Process	During which phase/stage of meiosis	Reason for the process
Centromeres split		
Crossing over		
Centromeres of bivalents repel		

(6)

1.5 Complete the crossword puzzle below using the clues provided. Write the missing letters into the empty blocks.



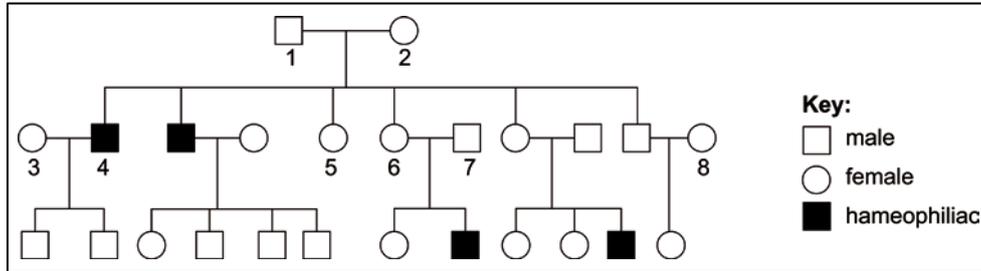
Clues:

- 1 Down: Reproductive hormone that targets the developing follicle.
- 3 Down: Ductless gland.
- 4 Down: Hormone secreted from glands that are situated on top of kidneys.
- 5 Down: A condition resulting from a malfunctioning thyroid gland.
- 2 Across: Maintenance of a constant internal environment.
- 5 Across: Pancreatic hormone secreted to increase blood sugar level.
- 6 Across: Hormone that is not produced in a person with Diabetes Type I.

(7)

1.6 Haemophilia A is a genetic disorder caused by a mutation in the gene coding for a blood-clotting factor known as Factor VIII. The mutation is located on the X-chromosome. Factor VIII is a type of protein that is absent in the blood plasma of people with Haemophilia A.

Study the family pedigree below and answer the questions that follow:



1.6.1 Complete the table below:

Number of the individual	Genotype
8	$X^H X^H$
4	
6	
7	

(3)

1.6.2 By means of a genetic diagram, show how individuals 1 and 2, neither of whom are haemophiliacs, have had two haemophiliac sons. Include the following in your answer:

- parental genotypes;
- a genetic cross or Punnett diagram; and
- the ratio of the possible genotypes and phenotypes of the offspring.

(6)

1.7 Read the following information and answer the questions that follow:

Records of human fertility for the period 1950 to 1990 have shown changes in the sperm counts of men. The table below summarises the changing percentages of men with high and men with low sperm counts for a period of 40 years.  
 High sperm count >  $100 \times 10^6$  sperm per  $\text{cm}^3$   
 Low sperm count <  $100 \times 10^6$  sperm per  $\text{cm}^3$

Year	Men with high sperm count (%)	Men with low sperm count (%)
1950	50	5
1960	45	4
1970	28	14
1980	21	11
1990	15	18

[Adapted from: *Advanced Biology*. Jones & Jones. 1997]

1.7.1 Describe the trends observed in the table above.

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(2)

1.7.2 Can you think of ONE reason why this trend observed in the table might have occurred?

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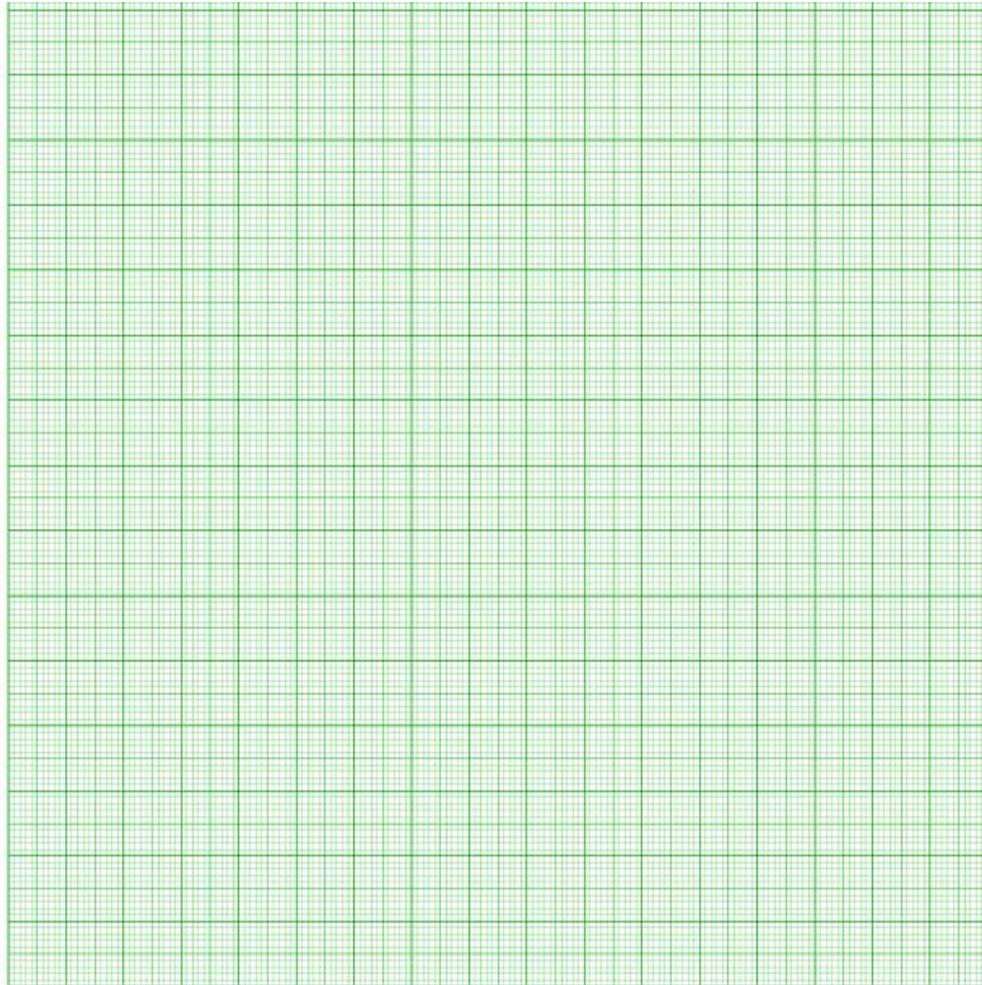


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(2)

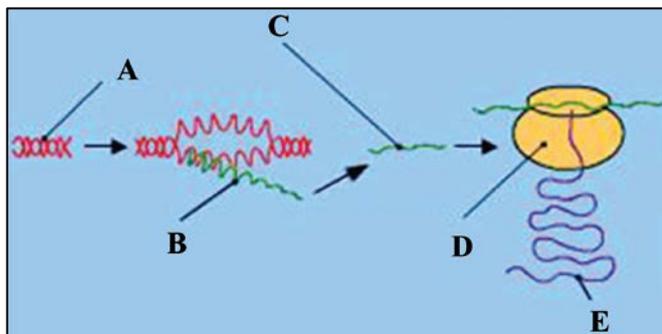
1.7.3 Plot the data from the table as line graphs onto the graph paper provided below. Also provide a suitable heading.

Heading: \_\_\_\_\_



(10)

1.8 Study the diagram below showing the process of protein synthesis and answer the questions that follow:



[Adapted from: <http://www.s-cool.co.uk>]

1.8.1 Which letter represents each of the following?

(a) Translation \_\_\_\_\_ (1)

(b) Transcription \_\_\_\_\_ (1)

1.8.2 Name the structures A, B, D and E.

A \_\_\_\_\_

B \_\_\_\_\_

D \_\_\_\_\_

E \_\_\_\_\_

(4)

1.8.3 Name the enzyme that co-ordinates the formation of B.

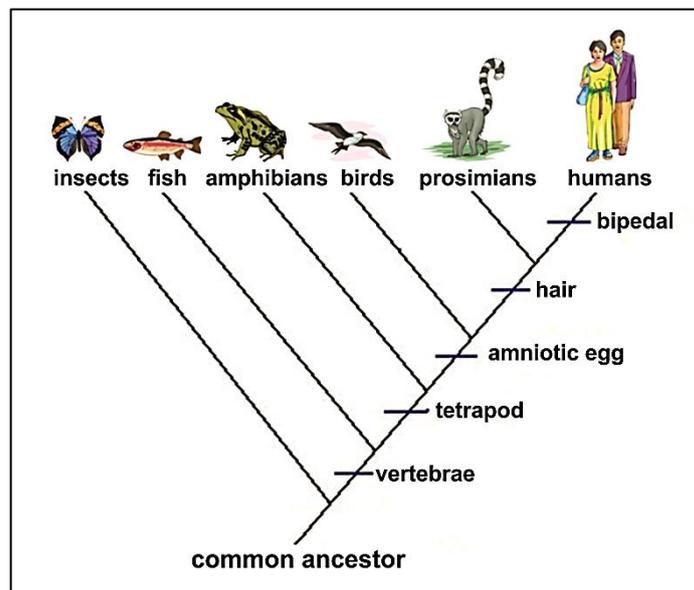
\_\_\_\_\_

(1)

1.8.4 Where in the cell is A found? \_\_\_\_\_

(1)

1.9 Study the cladogram below and answer the questions that follow:



[Adapted from: <<https://s-media-cache-ak0.pinimg.com>>]

1.9.1 State whether the following are true or false, using the information from the cladogram.

	Statement	True/False
(a)	Birds and humans have a closer genetic link than amphibians and humans.	
(b)	Insects, fish and birds are all vertebrates.	
(c)	Insects, amphibians and humans all have a common ancestor.	
(d)	Fish evolved before amphibians.	
(e)	The difference between humans and prosimians is the presence of body hair.	

(5)

1.9.2 The amniotic egg is regarded as a "key innovation" that allowed animals to move onto land.

(a) Explain TWO ways in which the amniotic egg differs from a fish egg or an amphibian egg.

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(2)

(b) Explain why the amniotic egg was so significant in the move onto land.

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(4)

**[80]**