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# BIOLOGY

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### **SECTION A (40 MARKS)**

### Answer all the questions in this section in the spaces provided

1. A common species of rats has individuals with white, black or grey coats. During a study, a rat with white coat was crossed with a rat with black coat. Both parents were pure lines. All the off springs in  $F_1$  generation had grey coats. Using letter B to represent the gene for black coat and W for white coat, answer the questions that follow.

a) Work out the phenotypes of the $F_1$ generation.	3mks*NDI
b) Give a genetic explanation of the nature of off springs in the $F_1$ generation.	1mk*NDI*
c) State the significance of a Test cross in the study of genetics.	1mk*NDI*
d) State the importance of crossing over in meiosis.	2mks*NDI
e) Name one example of a characteristic in man that is transmitted by multiple	e alleles Q

\**NDI*\*1mk 2. In an experiment, a solution of human haemoglobin was exposed to samples of air containing different amounts of oxygen measured in kilopascals (kPa). At each oxygen concentration, the haemoglobin sample was tested to see how much oxygen it had absorbed. Study the graph below showing the results and use it to answer the following questions;



O<sub>2</sub> tension per Kpa

a) What is the approximate percentage saturation of human haemoglobin with oxygen at an oxygen concentration of

(i) 2 Kpa 1mk	
	*NDI*
(ii) 6 Kpa 1mk	*NDI*

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- b) In the lungs the oxygen concentration is about 13Kpa and in the muscles the concentration is about 4Kpa. Explain why? 3mks\*NDI\* 3mks\*NDI\*
- c) Explain how haemoglobin transports oxygen.
- 3. Study the food web below representing a certain ecosystem and use it to answer the questions that follow.



<ul><li>a) Distinguish between a food chain and a food web</li><li>b) With a reason name the organisms that would have the largest biomass</li></ul>	1mk*NDI*
Organism	1mk*NDI*
Reason	2mks*NDI*
<ul><li>c) Write down a food chain in which the vultures are tertiary consumers.</li><li>d) What would be the effect of introducing gazelles and termites into the ecosyste</li></ul>	1mk <i>*NDI*</i> em?

1mk\*UG\*

4.

e) State the trophic level occupied by the lion in the food web. 1mk\*NDI\*

f) What would be the role of bacteria in this ecosystem? 1mk \*NDI\* An experiment was carried out to investigate the process of photosynthesis in a sun plant and a

shade plant. The results were recorded in graphs as shown below.



a) Define the term compensation point.

2mks\*NDI\*

1mk\*NDI\*

1mk\*NDI\*

- b) (i) State the advantage of the shade plant reaching compensation point earlier in the day than sun plant. 2mks\*NDI\*
  - ii) What is represented by letter T?
  - iii) Estimate the compensation period of the sun plant.
- c) Compare photosynthesis and respiration processes as they occur in organisms2mks\*NDI\* **TURN OVER**

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5. The diagram below shows a stem of a passion fruit twinning around a post.



a) What is the name given to the type of growth movement shown above?	1mk*NDI*
b) What is the biological importance of this growth?	1mk*NDI*
c) (i) Account for the twinning growth pattern.	3mks*NDI*
(ii) Name three other types of growth responses exhibited by plants.	3mks*NDI*
SECTION B (40 MARKS)	

### Answer question 6 (compulsory) and either question 7 or 8 in the spaces provided.

a) Name the body organ which controls the blood sugar level. 1mk\**NDI*\*

b) The table below shows the changes in the level of blood sugar of a healthy man for 2 hours after a meal.

Time (minutes)	0	20	40	60	80	100	120
Blood sugar level mg/100cm <sup>3</sup> blood	90	95	115	140	110	100	90
i) On the grid provided, draw a graph showing blood sugar level against time 6mks* <i>NDI</i> *							
ii) How does the meal affect the blood sugar level? 2mks*NDA					VDI*		
iii) Use the graph to find the blood sugar level 30 minutes after the meal. 1mk* <i>NDI</i> *					DI*		
iv) Describe the process which occur as the body responds to this change in blood sugar							
level						4mks*/	VDI*
c) Suggest how the body cells might be affected by high blood sugar levels. 3mk				3mks*/	VDI*		
d) Name the condition in which a person passes out large amount of dilute urine 1mk*NDI*					DI*		
e) Which hormone stimulates the conversion of glycogen back to glucose? 1mk* <i>NDI</i> *					DI*		
f) Name the hormone that is responsible for conversion of glycogen to glucose during							
an emergency						1 mk * N	DI*
Describe how the xerophytes are adapted to their habitats. 20mks* <i>NDI</i>					DI*		
Describe the role of hormones in the menstrual cycle in humans. 20mks* <i>NDI</i> *					$I^*$		

#### **TURN OVER**

6

7. 8.

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