TONBRIDGE SCHOOL

Test for Entrance into Year 12 in September 2015

Biology

Time allowed : 45 min

You are advised to spend the first 5 minutes reading through the paper (during which you should do no writing) and then 40 minutes writing your answers.

Total Marks : 40

Answer ALL the questions on the lined paper and graph paper provided.

In all questions the marks given for each part reflect how many separate points you are expected to make in your answer.

In order to test your ability to think, you will be asked some questions about things which *you have not already studied or are not on your syllabus.* In these cases, use your biological knowledge to help you attempt answers to the questions.

1. All organisms are **adapted** to their environments.

   Some fish swim in groups with other fish of the same species.

   a. Explain the advantages of this adaptation (2)

   b. Describe an experiment you could carry out to show that a particular fish prefers to swim with fish of the same species (4)

   c. Choose three other adaptations from other organisms (from at least two Kingdoms) and describe how they help an organism to survive in its habitat (6)

   (Total : 12)

2. Organisms exist in many different sizes, from single celled organisms such as bacteria to multicellular life such as trees. Existing at different scales requires different adaptations, particularly those that help an organism increase its surface area.

   Imagine an organism that is cube shaped. This organism exists in a variety of sizes.

   a. Copy and complete the following:

Side Length	Area of One Face (Units)	Total Surface Area ($Units^2$)	Volume ($Units^3$)	Surface Area to Volume Ratio
1		6		___:1
2				___:1
3			27	___:1
n				___:1

(7)

   b. Draw a graph showing the relationship between the Side Length and the Surface Area to Volume Ratio (4)

   c. Describe the trend in the final column as the first column increases (2)

   d. Suggest a reason why this creates problems for larger organisms (2)

   e. Give two examples (one animal based and one plant based) of how organisms overcome this difficulty. (2)

   (Total : 17)

3. Many organisms feed on other organisms. These organisms often use enzymes to break down their food

    a. Suggest a reason, with an example, why such break down needs to occur. (2)

Enzymes in the stomach break down protein molecules. These enzymes work best at very low pH levels.

    b. Suggest a reason why it is important that these enzymes **only** work at low pH levels. (2)

(Total : 4)

4. Your immune system works by attacking things that are identified as **non-self**, that is: objects that are not part of your body.

    a. Suggest a reason why the body needs to work on this basis rather than having a system that attacks known pathogens. (1)

    b. During blood transfusions this can be particularly dangerous.

    Copy and complete the following to show what antibodies the immune system makes:

Blood Type	Antigens on Outside of Blood Cell	Antibodies Made
A	A	
B	B	
AB	A and B	
O	None	

(2)

    If antibodies find **non-self** antigens they will attach to them. Each antibody can attach to two antigens. This will clump the antigens together.

    c. Suggest a reason why this would be a problem for the person receiving the wrong type of blood? (2)

    If two people with type A blood have children, those children can have type O blood.

    d. Suggest a reason how such inheritance can take place (2)

(Total : 7)

END OF PAPER

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