Candidate name……..

St Swithun's

# Biology

## Sixth Form Academic Assessment

Past Paper

Time allowed: 1 hour

**Instructions to candidates**

**Candidates should answer <u>all</u> questions.**

<u>Further Information</u>

Calculators are allowed

1. A student carried out an experiment was carried out to investigate the effect of changing pH on enzyme activity. Nine tubes of the same liquid food were heated to 37oC. Drops of acid or alkali were added to give different pH values. The enzyme was added to each tube and then the time taken for all the food to be digested was recorded. The results are shown in the following table:

| pH | Time for food to be digested/min |
|---|---|
| 1 | 4 |
| 2 | 2 |
| 4 | 4.5 |
| 6 | 10 |
| 7 | 12 |

   a. What was the dependent variable for this experiment?

      Dependent variable = _____

   b. Name TWO variables which should have been kept the same for each pH:

      1:_____

      2:_____

   c. How could the results of this experiment have been made more reliable?

      _____

      _____

   d. At what pH was this enzyme most active?

      _____

e.

i. In what region of the digestive system is this enzyme most likely to be found?

_____

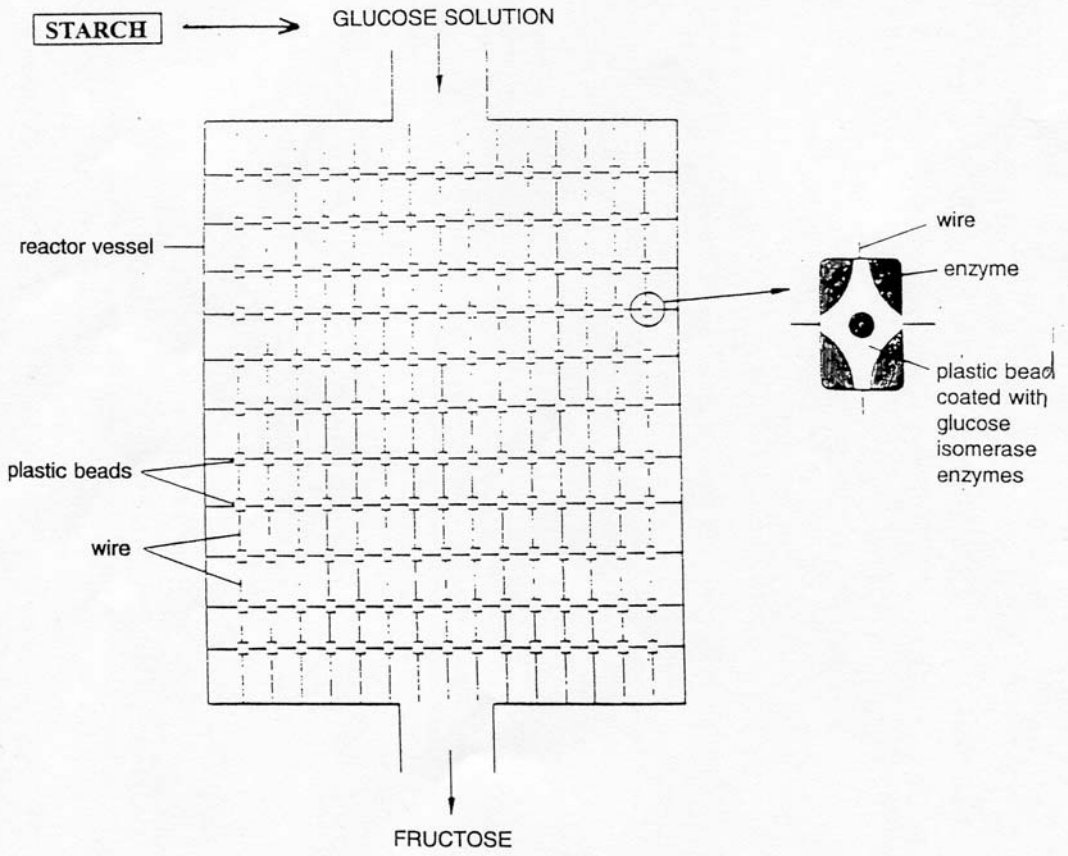
ii. Give the name of an enzyme found in this part of the digestive system

_____

iii. What does this enzyme do?

_____

f. Fructose can be used to sweeten processed foods. Fructose is usually obtained by in a two stage process. First starch is converted to glucose by an enzyme and then the glucose is converted into fructose using a different enzyme. The molecules of this enzyme are stuck onto plastic beads in a reactor vessel as shown in the diagram:



i. It is possible to add the enzyme directly to the glucose solution in a reactor vessel. The reaction takes place and fructose is formed. Suggest why fixing the enzyme to the surface of the plastic beads makes the process more economical.

_____

_____

_____

ii. Suggest an advantage of supporting the beads on wires rather than filling the reactor vessel with the same number of loose beads.

_____

_____

_____

2. Each of the following structures is concerned with the movement of substances in animals or plants. Complete the table by giving the name of ONE substance that moves into or out of each structure and explain how the animal or plant benefits from movement of that substance.

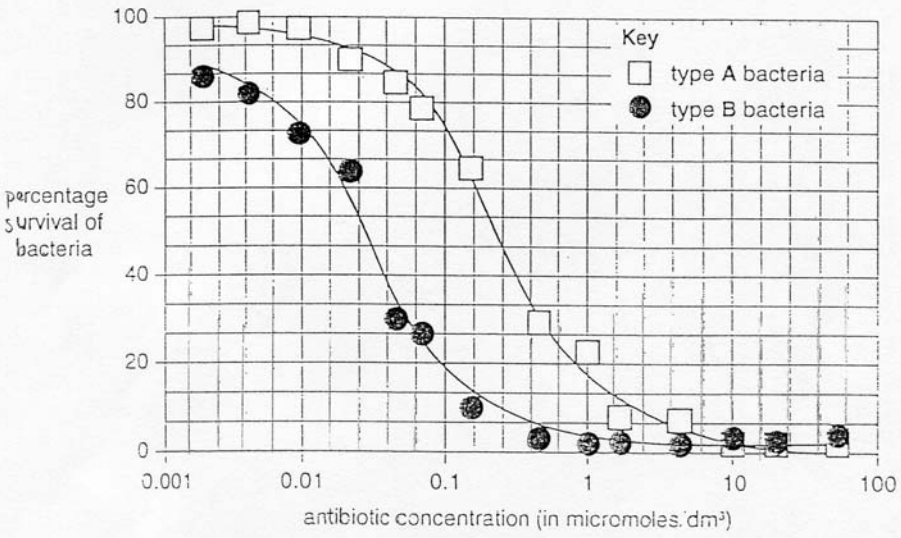
| Structure | Substance | Benefit to animal or plant |
|---|---|---|
| **Villus** | | |
| **Capillary in the lungs** | | |
| **Capillary in the cardiac muscle** | | |
| **Leaf** | | |
| **Root hair** | | |

3. Hospitals use antibiotics carefully. They do this to prevent the spread of antibiotic resistant bacteria.
   a. Explain what is meant by 'antibiotic resistance'

   _____

   _____

   b. Some bacteria (type A) have 'type A protein' in their cell membranes. This protein can pump antibiotic out of the bacteria. Other bacteria (type B) have a different 'type B protein' in the same position as the 'type A protein'.
   The two types of bacteria were grown together in different concentrations of antibiotic and the graph shows the results of this experiment.



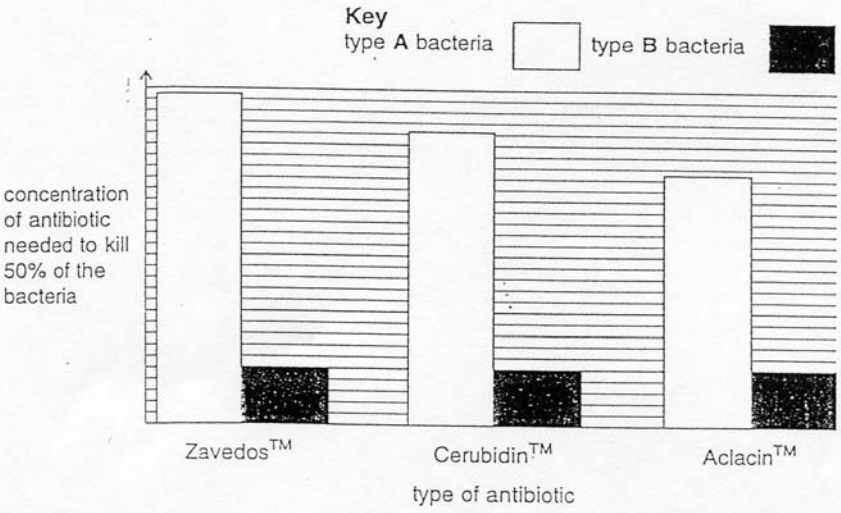

Describe the results shown on the graph and explain what they tell you:

_____

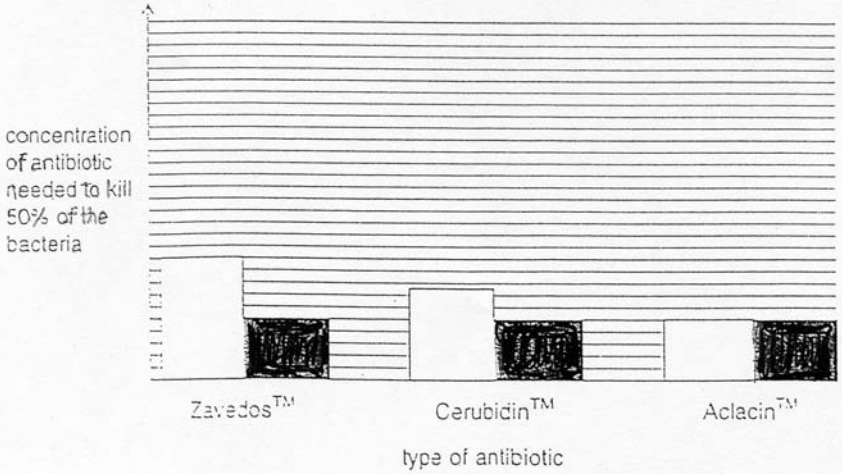
_____

_____

The graph below shows the results of an investigation into the effect of different antibiotics on type A and type B bacteria.




The investigation was repeated. This time a substance which stops type A proteins working was added to the bacteria as well as the antibiotics.



a. These graphs provide evidence for the fact that type B bacteria do not have type A proteins. Describe and explain this evidence.

_____

_____

_____

_____

b. Type A bacteria are only able to remove antibiotics from their cells when oxygen is available. Explain why this is so.

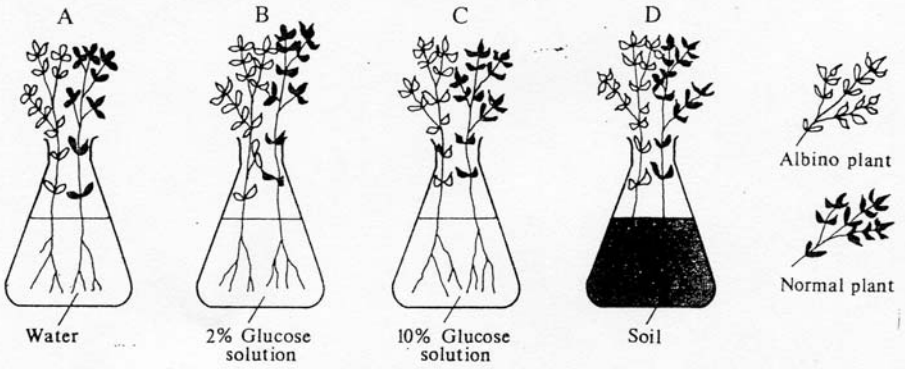
_____

_____

_____

_____

4. A student growing pea plants was surprised to see four plants in one batch which were white (**albino**) instead of the usual green colour. She wanted to investigate further and so she treated them as shown in the diagram:




At the beginning of the experiment all the plants were approximately 15cm tall. The plants were kept on a sunny windowsill and the results were recorded after two weeks. The results were as follows:

| Flask | Plant type | Height of plant after 2 weeks/cm | Condition of plant after 2 weeks |
|---|---|---|---|
| A | 'Normal' | 18 | Healthy |
| | Albino | Dead | Dead |
| B | 'Normal' | 22 | Healthy |
| | Albino | 19 | Healthy |
| C | 'Normal' | 16 | Wilted |
| | Albino | 15 | Wilted |
| D | 'Normal' | 27 | Healthy |
| | Albino | Dead | Dead |

a. Suggest why the 'normal' plant growing in soil grew taller than the 'normal' plant growing in water.

_____

_____

_____

Explain as fully as you can why BOTH plants in the 10% glucose solution had wilted after two weeks.

What is the evidence from the experiment which suggests that albino plants cannot make glucose?

The albino condition is caused by a recessive allele. The green colour of 'normal' plants is caused by a dominant allele. Explain how albino plants could be produced from 'normal' green plants. You may use a genetic diagram if you wish.

_____

_____

5. Use your biological knowledge to describe the following as fully as you can:

    a. Genetic engineering
    b. The carbon cycle
    c. A reflex arc

*Use the space beneath to write your answers, making it clear where each of the different answers starts.*

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____