Unit 1 Cell Biology Revision Questions

Key Area 4 Proteins

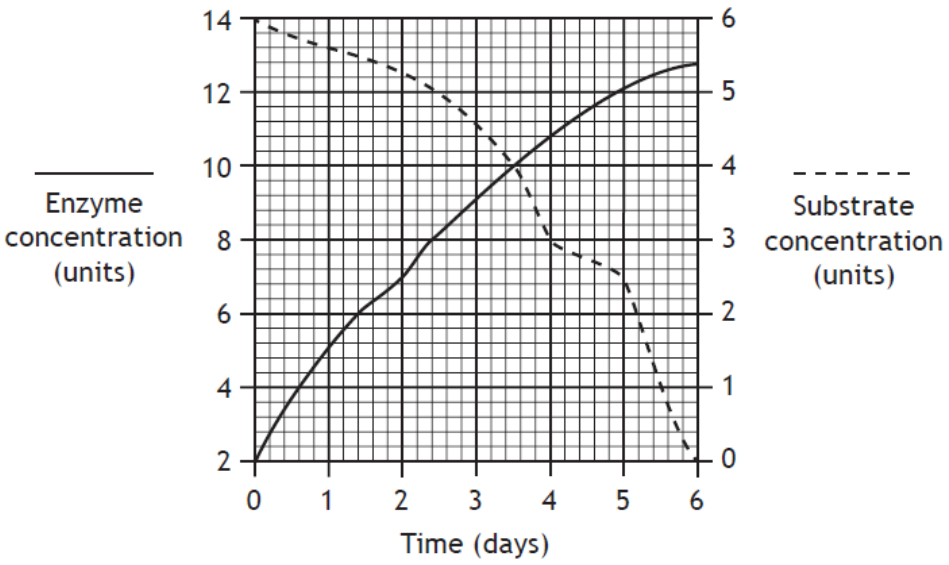
1. Which of the following are all types of proteins?

   A Hormones, enzymes and nitrates
   B Antibodies, enzymes and plasmids
   C Hormones, receptors and antibodies
   D Receptors, antibodies and nitrates

2. Hormones are composed of

   A glycerol
   B glucose
   C protein
   D starch.

3. The graph below shows changes in the enzyme and substrate concentrations in a seed over a period of time.



How many days does it take for the substrate concentration to decrease by 50%?

A 2
B 3
C 4
D 5

4.

Proteins have different functions. Which of the following statements identifies a **protein** and its function?

A Hormones carry oxygen around the body.

B Enzymes carry chemical messages around the body.

C Antibodies defend the body against disease.

D Cellulose provides strength and structure to a plant cell wall.

5. An enzyme reaction takes place because its active site is complementary to

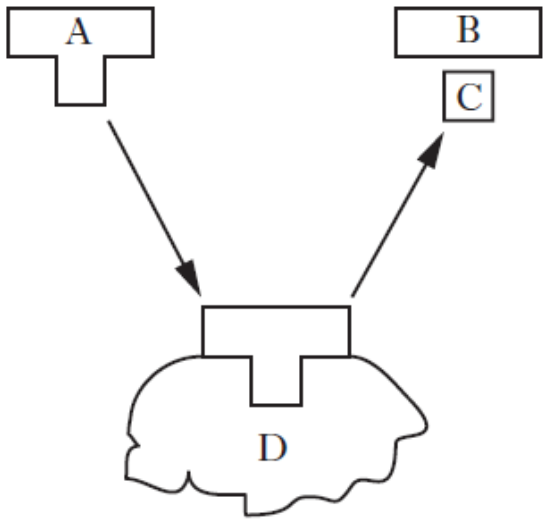
A one type of substrate molecule

B all types of substrate molecule

C one type of product molecule

D all types of product molecules.

6. The diagram below represents a degradation reaction involving an enzyme.



Which letter identifies the substrate?

7. The enzyme phosphorylase was added to a 4% glucose-1-phosphate solution. After one hour, the concentration of glucose-1-phosphate had fallen to 0·1%.

How many times lower was the concentration after one hour than at the start?

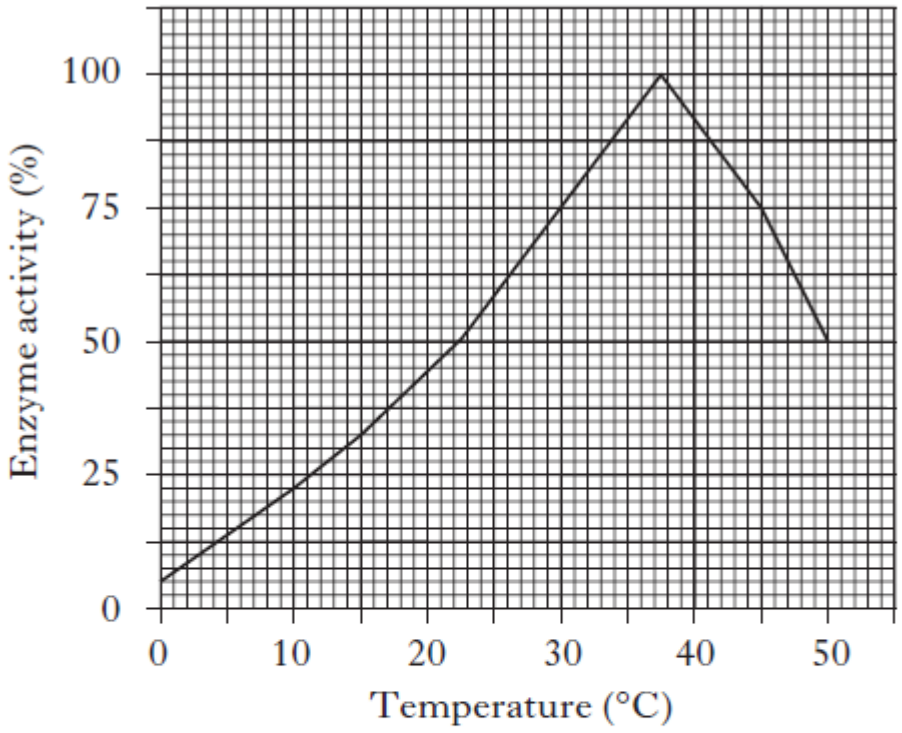
A 97·5

B 40·0

C 3·9

D 0·1

8. The graph below shows the effect of temperature on the activity of an enzyme.



The increase in enzyme activity (%) as the temperature rises from 22·5 °C to 30 °C is

A 25

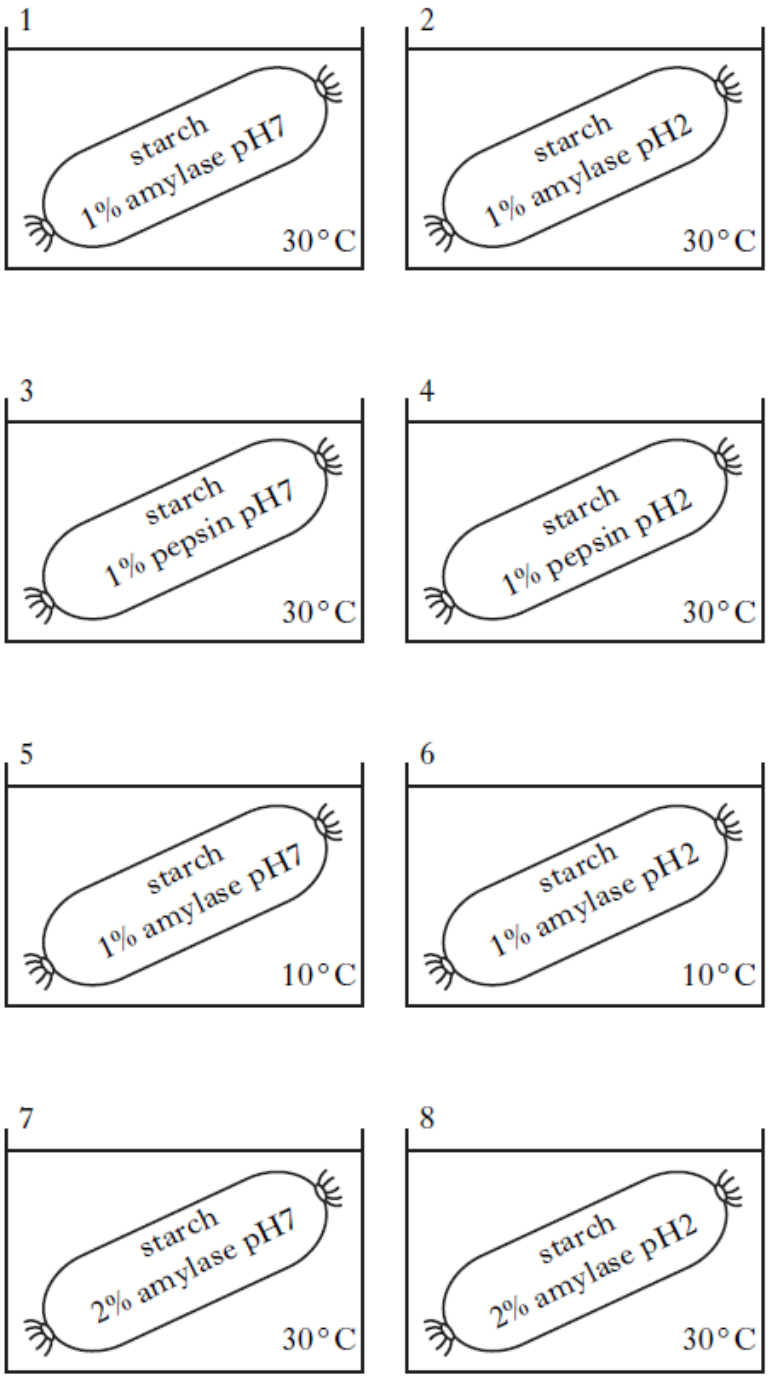
B 50

C 67

D 75.

9. Eight visking tubes (model gut) bags, as shown below, were placed into water baths.

Pepsin is an enzyme which breaks down protein and Amylase is an enzyme which breaks down starch.



Which two bags could be compared to investigate the effect of pH on the digestion of starch?

A 1 and 4

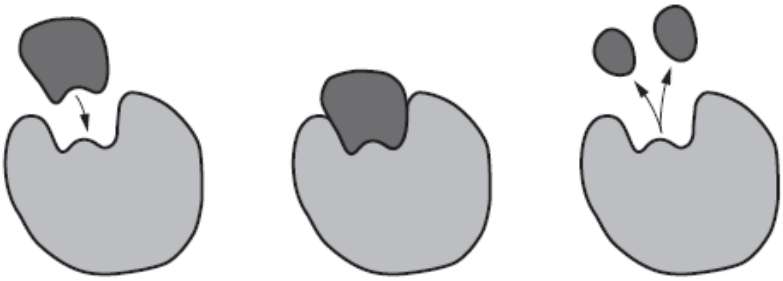
B 2 and 5

C 2 and 7

D 7 and 8

10.

The diagrams represent stages in an enzyme-controlled reaction.



Stage 1 Stage 2 Stage 3

(a) Enzymes are involved in two types of reaction.

Identify the type of reaction shown in the diagrams above. 1

_____

(b) Describe the events occurring in the enzyme reaction shown. 3

11.

Catalase, an enzyme found in living tissues, is involved in the breakdown of hydrogen peroxide into water and oxygen.

In an investigation, catalase was extracted in solution from a variety of tissues and used to soak paper discs. These discs were then dropped into beakers of hydrogen peroxide, as shown in Diagram 1. As the oxygen was released the discs returned to the surface, as shown in Diagram 2.

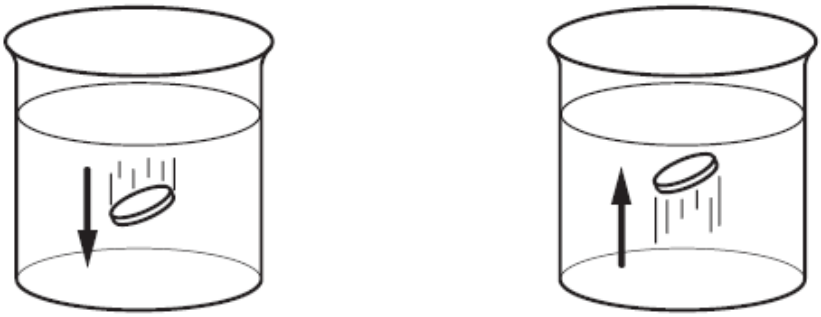


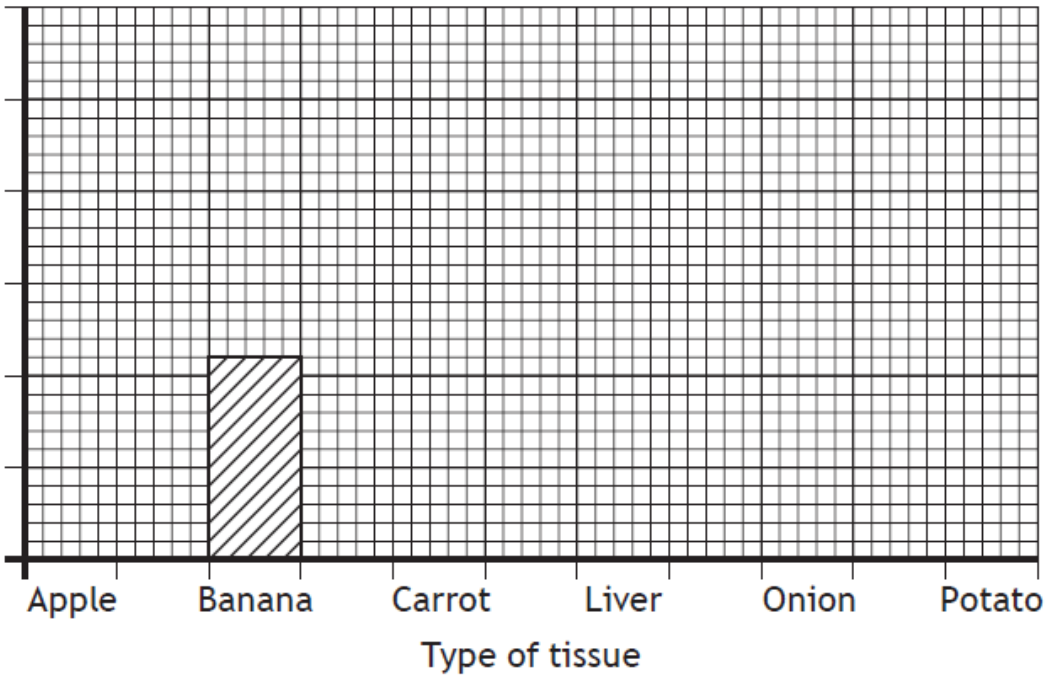
Diagram 1 Diagram 2

The time taken for these discs to return to the surface was recorded and shown in the table.

Type of tissue	*Time for disc to return to the surface* (s)
Apple	108
Banana	44
Carrot	68
Liver	8
Onion	70
Potato	72

(a) On the grid below, complete the vertical axis and the remaining bars to show the time taken for the discs to return to the surface, for each tissue. **2**

(An additional grid, if required, can be found on *Page 26*)



(b) The aim of the experiment was to investigate catalase activity in a variety of tissues.

Using the information given, write an appropriate conclusion for this experiment. 1

Conclusion _____

_____

_____

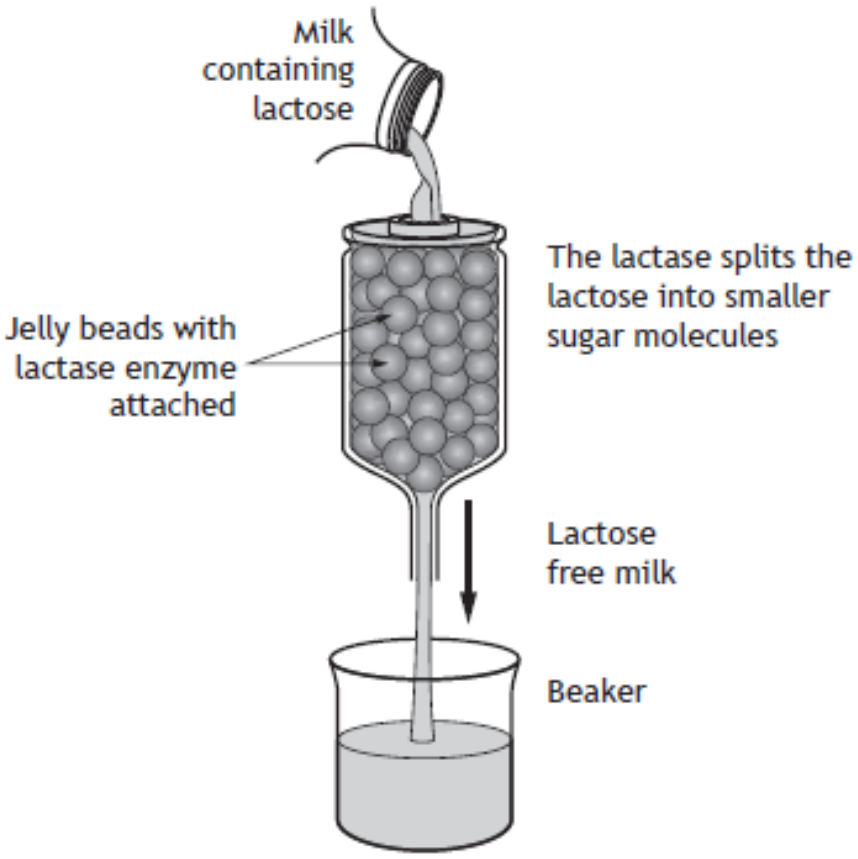
(c) The experiment was carried out at pH 7, the optimum pH for catalase.

Complete the following sentence, using the words **increase, decrease** or **stay the same**, to predict what would happen if the experiment was repeated at pH 4. 1

At pH 4, the rate of oxygen production would _____ in each tissue.

12.

The diagram below shows how the enzyme lactase is used in the production of lactose-free milk.



(a) (i) Underline one option in each of the brackets to make the following sentences correct. 2

This process is an example of a {degradation / synthesis} reaction.

In this reaction, lactose is the {product / substrate} of lactase.

(ii) A fault in the production resulted in boiling water running over the lactase enzyme.

Using your knowledge of enzymes, predict how the milk produced would differ from the expected product.

Explain your answer. 2

Prediction _____

_____

Explanation _____

_____

(b) Enzymes such as lactase are biological catalysts.

Explain the role of enzymes in living cells. 1

_____

_____

(c) Name the substance of which enzymes are made. 1

_____

13.

(a) Hydrogen peroxide can damage cells and lead to cell death. Catalase is an enzyme which breaks down hydrogen peroxide into oxygen and water.

Scientists in New Zealand investigated the link between the level of catalase in sheep livers and the fat in their meat. The hypothesis was that the higher the level of liver catalase, the greater the fat content of the meat.

In the investigation, they examined 9 sheep with a high percentage of fat and 15 sheep with a low percentage of fat. The sheep with the high percentage of fat had an average catalase level of 4800 K/g and those with the lower percentage of fat had an average catalase level of 3600 K/g.

The scientists concluded that their hypothesis was correct.

(i) Name the substrate of catalase. 1

(ii) Identify an aspect in the planning of the investigation that would suggest that the hypothesis might not be proven correct. 1

(iii) A further investigation proved that the hypothesis was correct.

Describe how this investigation could help farmers to select only sheep with a low percentage of fat, to provide meat for consumers following a low fat diet. 1

(b) The optimum temperature for the activity of catalase is 37°C.

Predict what would happen to the activity of catalase if the temperature was lowered to 34°C. 1