Established in 1879

Raffles Girls' School
(SECONDARY)

Name: _____

Class: _____ Register No: _____

BIOLOGY
YEAR THREE
Pen-and-Paper Assessment 1

Friday **30 Apr 2021** **1 hour**

INSTRUCTIONS TO CANDIDATES

Write your name and register number in the spaces provided.
Write in dark blue or black ink.
For **Section A**, indicate your answers on the separate Answer Sheet provided.
Answer all other questions in the space provided.

INFORMATION FOR CANDIDATES

The number of marks is given in brackets [ ] at the end of each question or part question.

The total number of marks for this paper is **40** and the weighting is **25%**.

For examiners' use	
Question/ Section	**Marks Obtained**
Section A / 10	
1 – 10	
Section B / 30	
11	**/ 8**
12	**/ 6**
13	**/ 3**
14	**/ 5**
15	**/ 5**
16	**/ 3**
Total Marks	**/40**

Parent's / Guardian's Name: _____

Signature: _____ Date: _____

Section A: Multiple Choice Questions (10 marks)

There are ten questions in this section. Answer **all** questions. For each question, there are four possible answers **A, B, C**, and **D**. Choose the **one** you consider correct and record your choice in soft pencil on the separate Answer Sheet.

1 A food sample was crushed and analysed using various food tests. The observations are presented in the table below.

Procedures performed	**Observations**
Iodine solution was added.	Mixture remained yellowish-orange.
Ethanol was added, mixed and allowed to stand. Ethanol was decanted into water and mixed.	Mixture remained clear when water was added.
Benedict's solution was added and heated over a boiling water bath.	Brick-red precipitate was obtained from a blue mixture.
Biuret reagent was added and mixed.	Mixture turned from blue to lilac.

What does the food sample contain?

A fats and starch

B reducing sugars and proteins

C reducing sugars only

D starch and proteins

2 The characteristics of four organelles are shown below.

I. contains chromosomes

II. contains light-trapping pigments

III. contains respiratory enzymes

IV. contains ribosomes attached to the membrane

Which of the following options correctly matches the organelles with their characteristics?

	I	**II**	**III**	**IV**
A	mitochondrion	nucleus	chloroplast	rough ER
B	mitochondrion	rough ER	nucleus	chloroplast
C	nucleus	chloroplast	mitochondrion	rough ER
D	nucleus	mitochondrion	chloroplast	rough ER

3 Which organ is correctly paired with its organ system?

A brain and excretory system

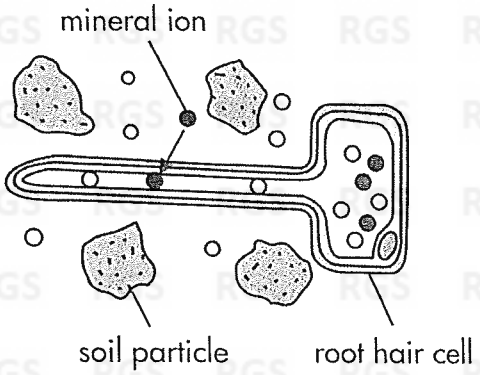
B eyes and reproductive system

C heart and respiratory system

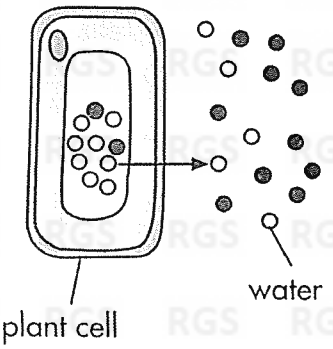
D lungs and respiratory system

4 Which of the following shows the process of active transport?

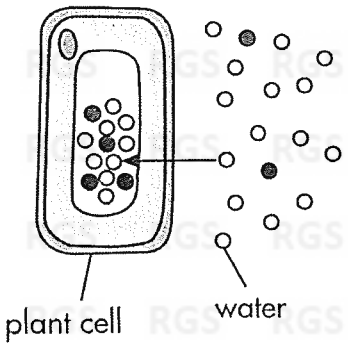
A



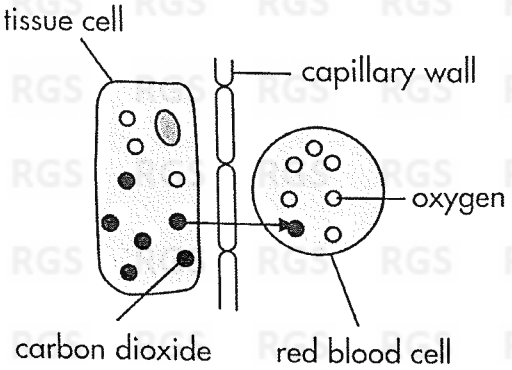
B



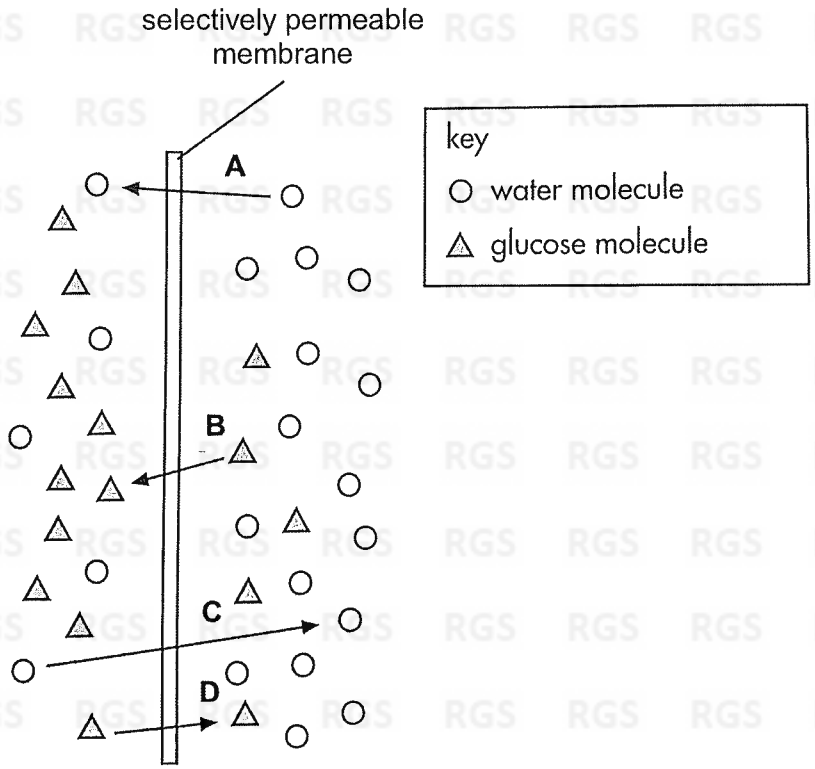
C



D



5 The diagram below shows the movement of water and glucose molecules across a selectively permeable membrane. Which arrow best describes diffusion?



6 Which factors are inversely proportional to the rate of diffusion?

A concentration gradient and surface area to volume ratio

B distance over which diffusion occurs and the size of diffusing particles

C size of diffusing particles and temperature

D surface area to volume ratio and surrounding temperature

7 Two enzyme-catalysed reactions are shown below.

$$\text{Fats} \xrightarrow{\text{Enzyme I}} \text{Fatty acids + glycerol}$$

$$\text{Fatty acids + Glycerol} \xrightarrow{\text{Enzyme II}} \text{Fats}$$

Which of the following statements can be inferred from the reactions shown?

A Enzyme I is a protease.

B Enzyme I is converted to Enzyme II.

C Enzyme II helps to lower the activation energy of the reaction.

D Enzymes I and II can catalyse anabolic reactions.

8 Which of the statements below best describes the active site of an enzyme?

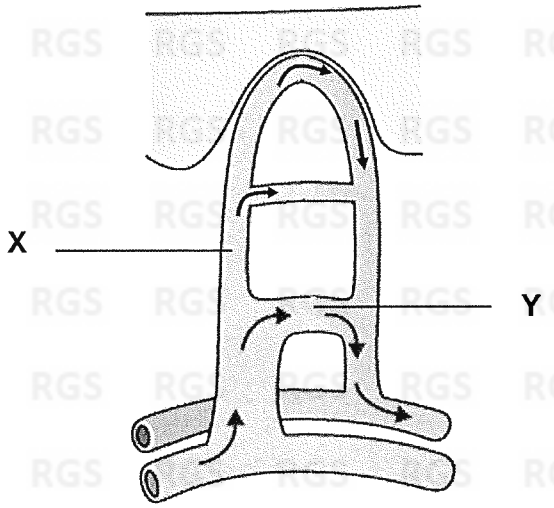
A It has a specific shape that is complementary to its substrate molecule.

B The active site acts as the "key" in the "lock and key" hypothesis.

C The products remain within the active site after reaction is completed.

D The shape of the active site is intact after denaturation.

9 The diagram below shows the blood vessels near the surface of the skin.



Which of the following best describes the changes in **X** and **Y** and the resultant effect following a sudden decrease in body temperature?

	X	Y	Resultant effect of changes
A	constrict	dilate	decreased blood flow to skin capillary
B	constrict	dilate	increased blood flow to skin capillary
C	dilate	constrict	decreased blood flow to skin capillary
D	dilate	constrict	increased blood flow to skin capillary

10 Which of the following statements about adrenaline is **not** true?

A After exerting its effect, it is eventually carried by blood to the liver and destroyed.

B It has an active site that binds to and breaks down glycogen into glucose.

C It is released by the adrenal gland under stress conditions.

D It stimulates an increase in the rate of cellular respiration.

Section B: Structured Questions (30 marks)

Answer **all** questions. Write your answers in the spaces provided.

11 Fig. 11.1 shows a plant cell obtained from the epidermis of a leaf.

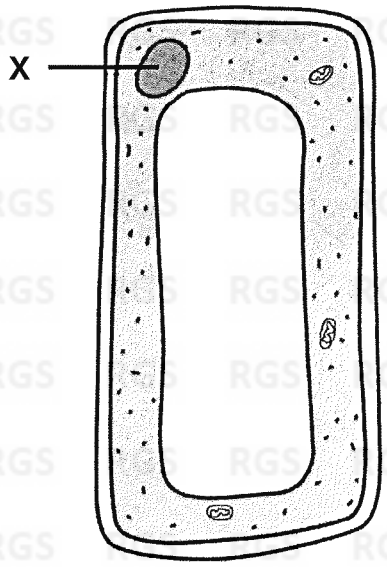


Fig. 11.1

(a) On Fig.11.1, identify and label two cell structures which indicate that the cell is obtained from a plant. [2]

(b) With reference to Fig. 11.1, describe the function of structure **X**.

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..... [1]

The cell in Fig. 11.1 is placed in a solution and the appearance of the same cell after 15 minutes is shown in Fig.11.2.

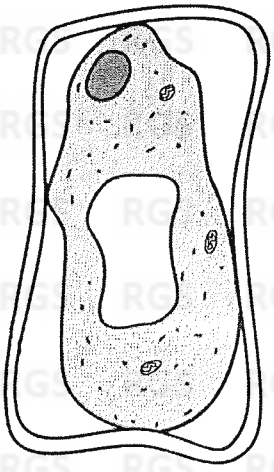

Fig. 11.2

(c) Describe and explain the appearance of the plant cell in Fig. 11.2

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..... [3]

Fig. 11.3 shows a plant cell obtained from another part of the same plant.

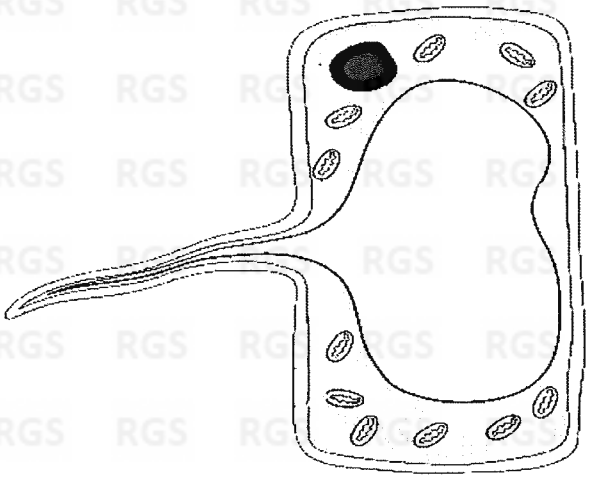

Fig. 11.3

(d) Describe one structural difference between this cell in Fig. 11.3 and the leaf epidermal cell in Fig. 11.1.

.....

..... [1]

(e) With reference to Fig. 11.3, explain one structural feature that allows the cell to be adapted for its function.

.....

..... [1]

[Total: 8]

12 Detergents contain enzymes that can effectively break down organic matter. In an experiment using three shirts, **P**, **Q** and **R** with similar protein stains, the enzyme activity was investigated at three different temperatures, 10°C, 30°C and 60°C. The outcomes were shown in Fig. 12.1.

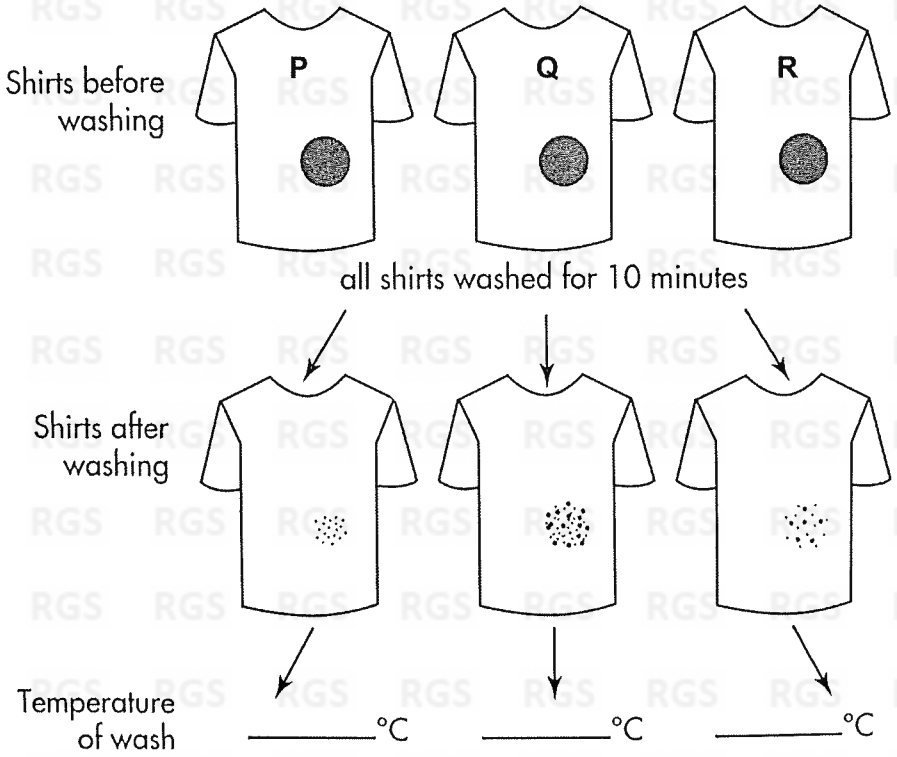

Fig. 12.1

(a) Complete Fig. 12.1 by filling in the temperatures at which the respective shirts were washed. [1]

(b) Explain your answers for **(a)**.

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..... [3]

A second investigation was performed to identify the pH at which the detergent enzymes could most effectively break down protein stains. The results are shown in Fig. 12.2.

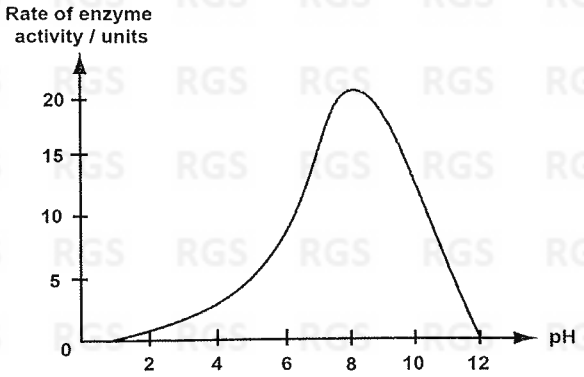

Fig. 12.2

(c) With reference to Fig.12.2, determine the most effective pH to remove the protein stains. Explain your answer.

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..... [2]

[Total: 6]

13 Fig. 13.1 shows the fluid mosaic model of a cell membrane.

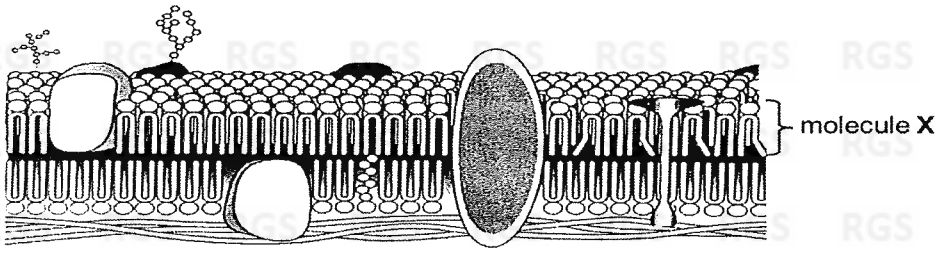

Fig. 13.1

(a) With reference to Fig. 13.1, justify how molecule **X** keeps the cell membrane fluid.

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..... [2]

(b) On Fig. 13.1, identify and label one molecule responsible for cell-cell recognition. [1]

[Total: 3]

14 Fig. 14.1 shows some biomolecules that are joined to form larger molecules.

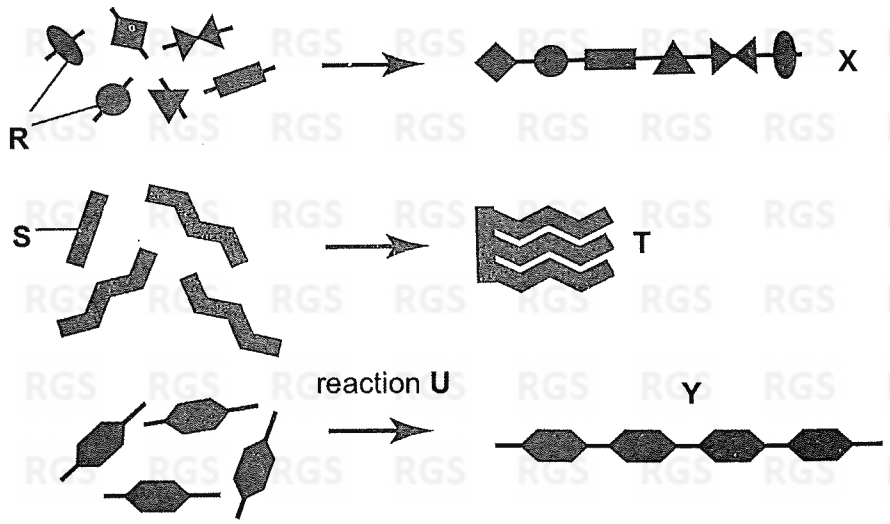

Fig. 14.1

(a) With reference to Fig. 14.1, identify **R**, **S**, **T** and **U**.

molecules **R:** .....

molecule **S**: .....

molecule **T:** .....

reaction **U**: ..... [2]

(b) Reaction **U** produces molecule **Y** in the human muscle cells. Identify a molecule in plants that has a similar function as molecule **Y**.

..... [1]

(c) Compare molecules **X** and **Y** in terms of their structures.

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..... [2]

[Total: 5]

15 Fig. 15.1 shows a change taking place in the human skin in response to a sudden change in environmental temperature.

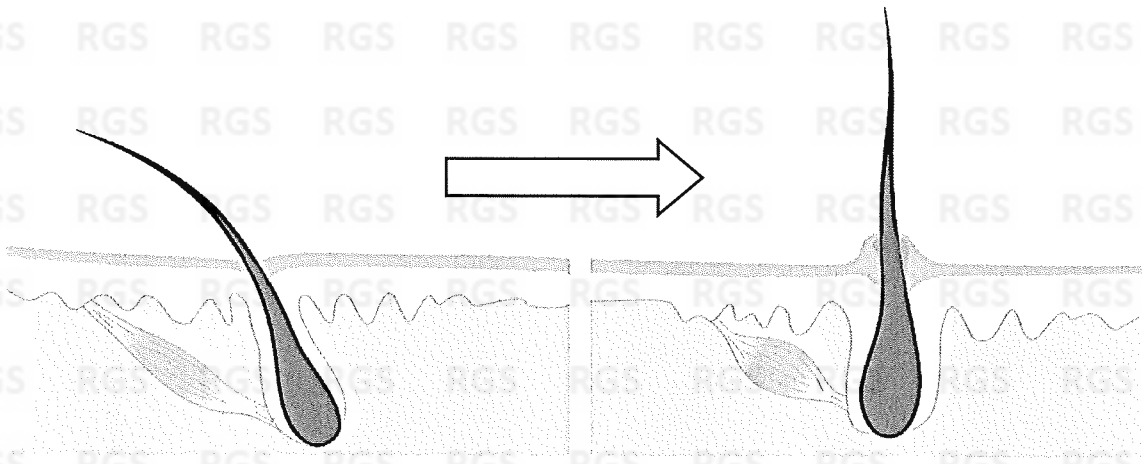

Fig. 15.1

(a) With reference to the components of a negative feedback system, describe the sequence of events leading towards the response shown in Fig. 15.1.

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..... [3]

(b) In response to the same change in environmental temperature in part **(a),** the activity of sweat glands in the skin were also altered.

Describe and explain how the change in activity of sweat glands contributed to the restoration of normal body temperature.

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..... [2]

[Total: 5]

16 Fig. 16.1 shows the changes in blood glucose concentration of two individuals, **X** and **Y**, after drinking the same volume of glucose solution. One individual is a healthy person, while the other individual is suffering from Type I diabetes.

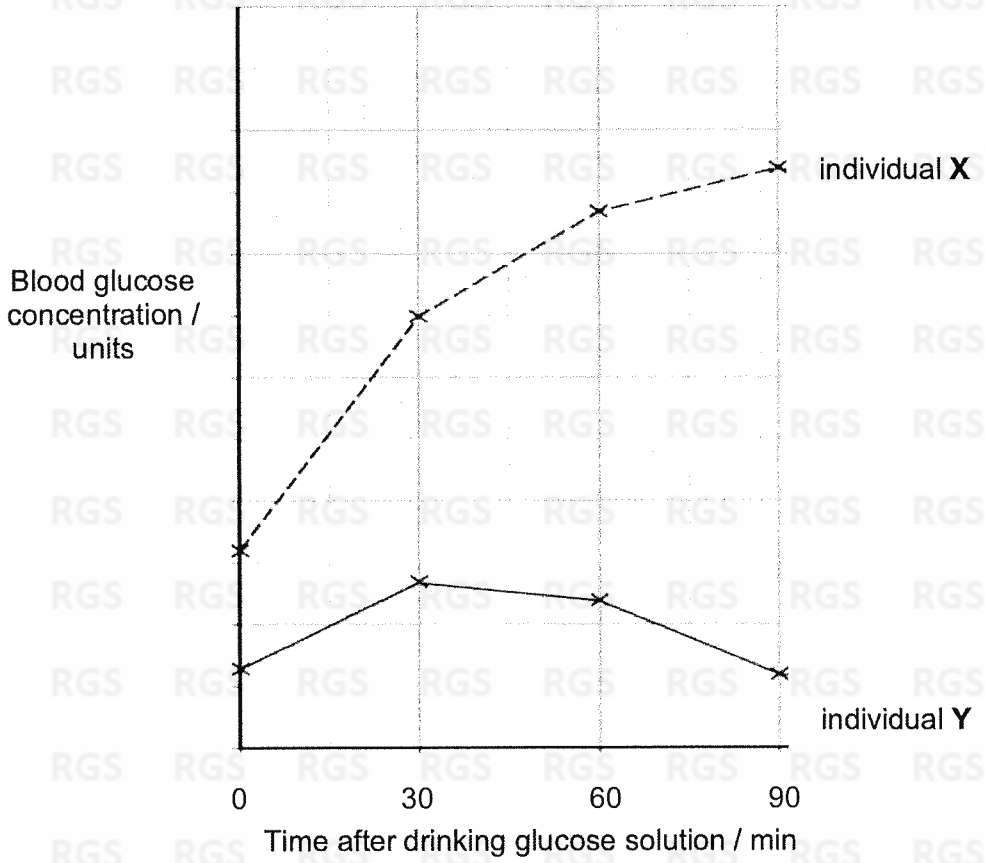

Fig. 16.1

(a) Identify the person who is suffering from Type I diabetes.

..... [1]

(b) Explain your reason for part (**a**).

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[Total: 3]

--- END OF PAPER ---