Name:	Class	Register Number

DUNEARN SECONDARY SCHOOL
Preliminary Examination 2018

Biology 6093
Paper 1
Secondary 4 Express

19 Sep 2018 (Wednesday) **0930 - 1030** **1 Hour**

INSTRUCTIONS TO CANDIDATES

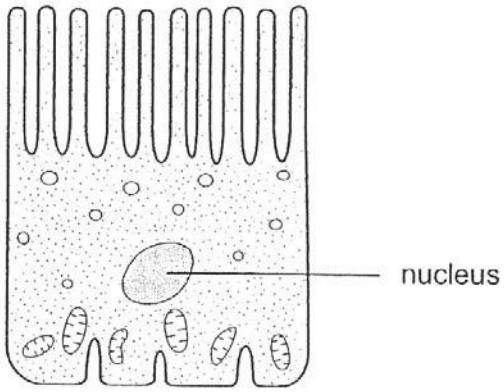
Write your name, class and register number in the spaces at the top of this page.

There are forty questions in this paper. Answer **ALL** questions. For each question, there are 4 possible answers, **A, B, C** and **D**. Choose the **one** you consider correct and shade in the OTAS provided.

Setter: Mr Ng Hock Ping

This question paper consists of **21** printed pages including the cover page.

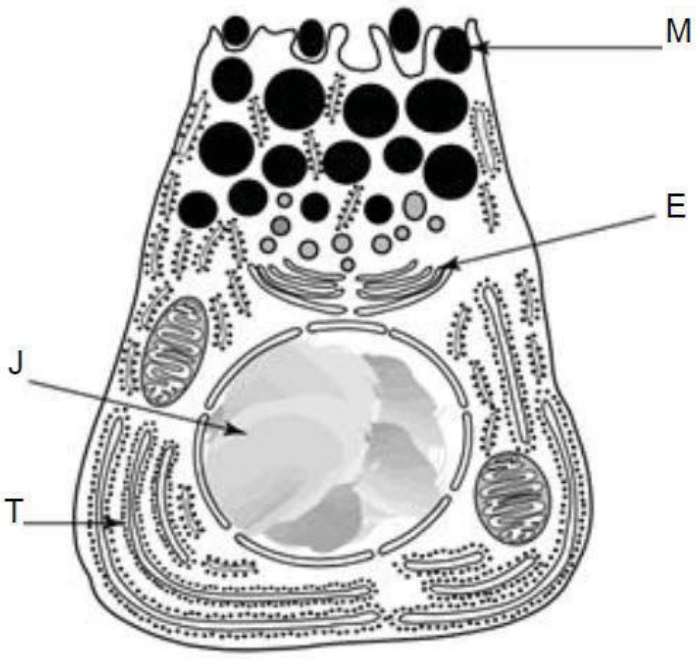
1 The diagram shows a cell found in an organ in the human body.



From its structures, what are the functions of this cell?

A intracellular digestion and storage of granules of product
B intake of substances and secretion
C secretion and transport of protective mucus
D uptake and transport of ions and molecules

2 The diagram below shows a pancreatic cell.



The order in which the parts of the cell play a role in the production and secretion of insulin is

A M, E, J, T
B T, J, M, E
C J, T, E, M
D E, M, T, J

3 Students were asked to share a statement regarding a fact they know about cells. Which of the following statements are **incorrect**?

I. Glucose molecules are able to diffuse into the cells, but cannot diffuse out because cell membranes are partially permeable.
II. Green plants are able to photosynthesize, therefore all the cells in green plants contain chloroplast.
III. The nucleus is the control centre of the cell, and it communicates with the rest of the cell via electrical impulses.
IV. Cells are the basic units of all living things.

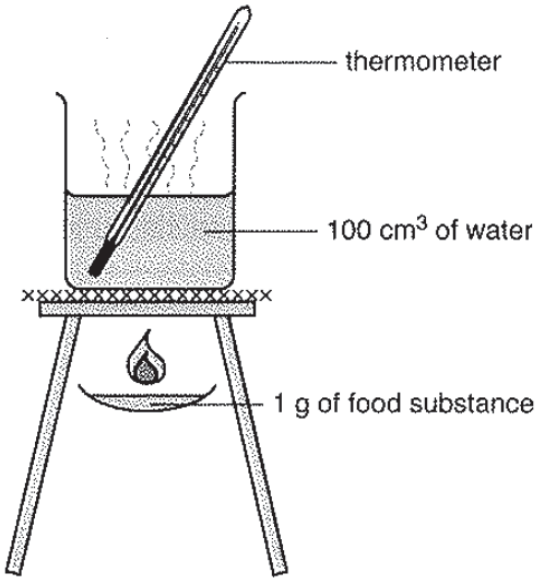
A **I** and **III** only
B **II** and **IV** only
C **I**, **II** and **III** only
D All of the above

4 Which processes can occur through a cell surface membrane?

	active transport	diffusion	osmosis
A	√	X	√
B	X	X	√
C	X	√	X
D	√	√	√

key
√ = yes
X = no

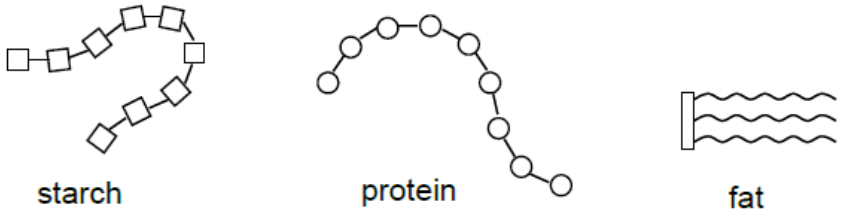
5 The apparatus shown can be used to compare the energy values of various food substances.



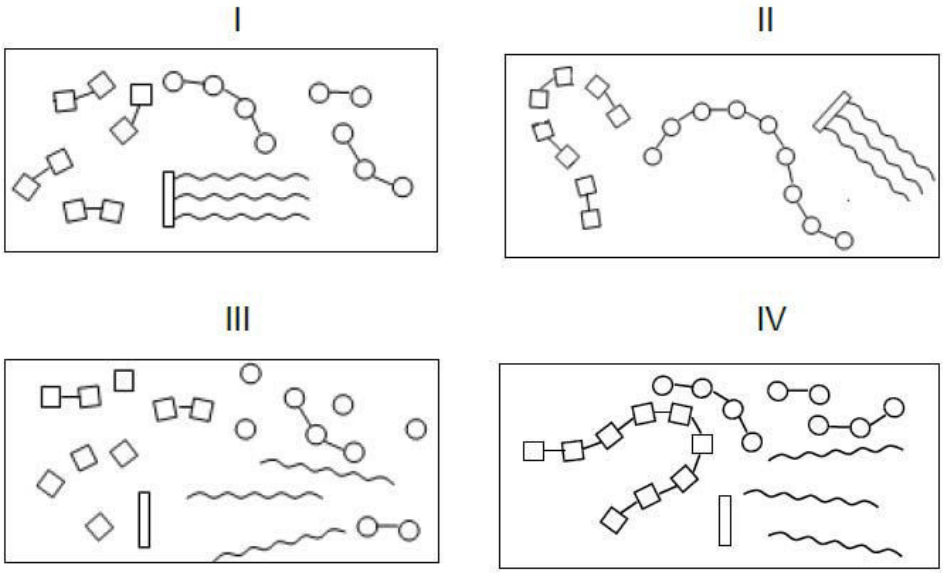
Which food substance would give the greatest rise in the temperature of water if 1 g of it were burnt?

A beef
B butter
C cooked rice
D potato

6 The diagrams below represent food molecules of starch, protein and fat.



The following shows the mixtures of food taken from part of the human alimentary canal during digestion of the above food molecules.



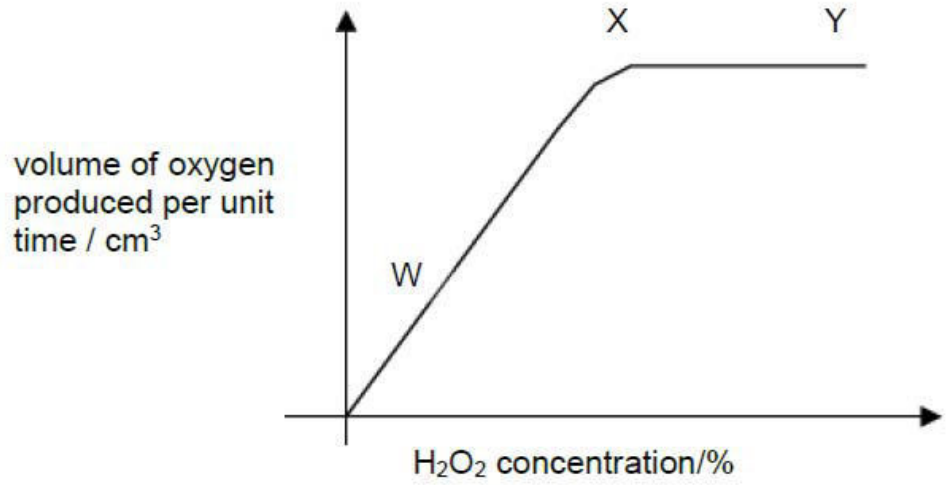
Which of the following gives a correct identification to the locations of the food molecules?

	mouth	stomach
A	I	III
B	II	I
C	II	III
D	IV	III

7 Amylase solution is tested with Benedict's solution, biuret solution and iodine solution. Which colours are obtained?

	Benedict's solution	biuret solution	iodine solution
A	blue	blue	blue-black
B	blue	blue	brown
C	blue	purple	brown
D	red	purple	blue-black

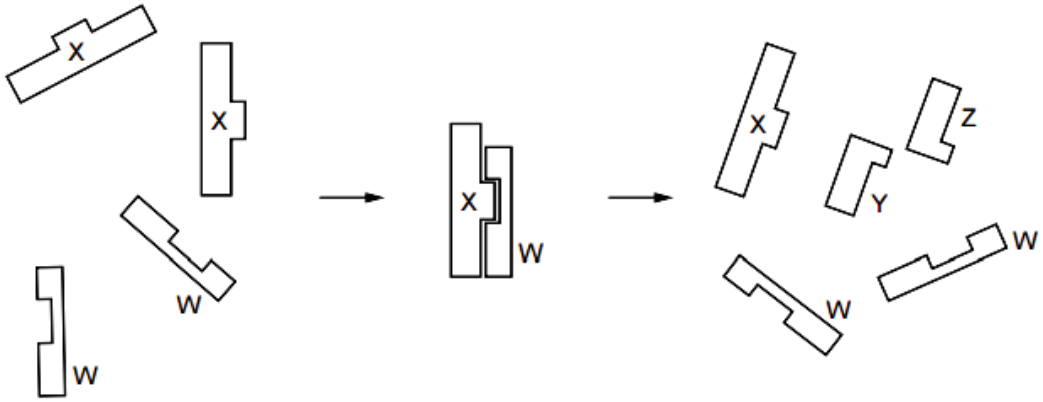
8 Hydrogen peroxide (H_2O_2) decomposes naturally into oxygen and water. The rate of this reaction can be increased by the addition of the enzyme, catalase. A student investigated the effect of hydrogen peroxide concentration on the rate of catalase activity and the graph below was obtained.



Which statement about the graph is **incorrect**?

A Between **W** and **X**, the number of H_2O_2 molecules is limiting.
B Between **X** and **Y**, the number of catalase molecules is limiting.
C Between **X** and **Y**, the number of H_2O_2 molecules is limiting.
D Between **X** and **Y**, the volume of oxygen produced per unit time/cm^3 remains the same.

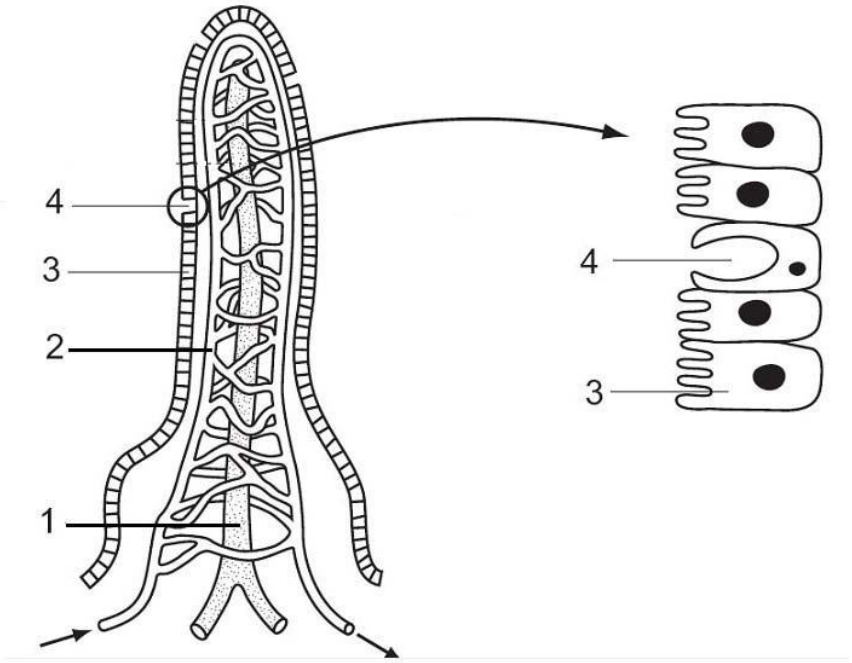
9 The diagram demonstrates the 'lock and key' hypothesis of enzyme action.



What could **W**, **X**, **Y** and **Z** be?

	W	X	Y	Z
A	erepsin	fats	fatty acids	glycerol
B	erepsin	polypeptide	amino acids	amino acids
C	maltase	maltose	glucose	glucose
D	maltase	starch	glucose	fructose

10 The following diagram represents a villus.



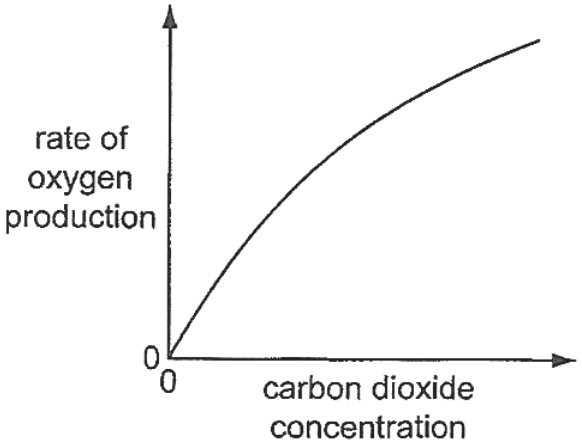
Which of the following shows the correct function of the structures labelled **1**, **2**, **3** and **4**?

	1	**2**	**3**	**4**
A	absorbs digested fats	absorbs glucose	produces enzymes	produces mucus
B	absorbs digested fats	absorbs glucose	produces mucus	produces enzymes
C	absorbs glucose	absorbs digested fats	produces enzymes	produces mucus
D	absorbs glucose	absorbs digested fats	produces mucus	produces enzymes

11 Which row describes photosynthesis?

	energy conversion	**immediate product of photosynthesis**	**storage product of photosynthesis**
A	chemical energy to light energy	glucose	starch
B	chemical energy to light energy	starch	glucose
C	light energy to chemical energy	glucose	starch
D	light energy to chemical energy	starch	glucose

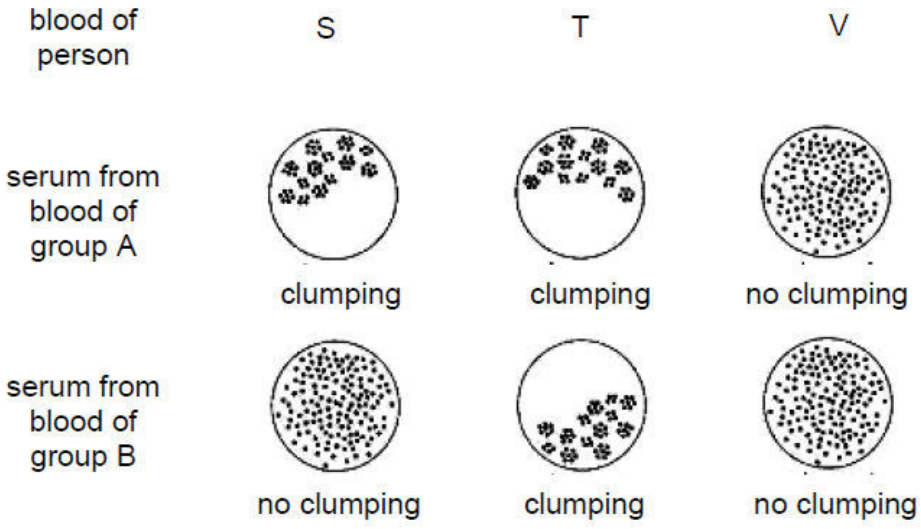
12 Some students investigated gaseous exchange in a green plant. The rate of oxygen production was plotted against carbon dioxide concentration.



What explains these results?

A Carbon dioxide controls the rate of respiration.
B Carbon dioxide controls the rate of photosynthesis.
C Oxygen controls the rate of photosynthesis.
D Oxygen controls the rate of respiration.

13 The blood of three people **S**, **T** and **V** were tested to determine their blood groups. The results are shown below.

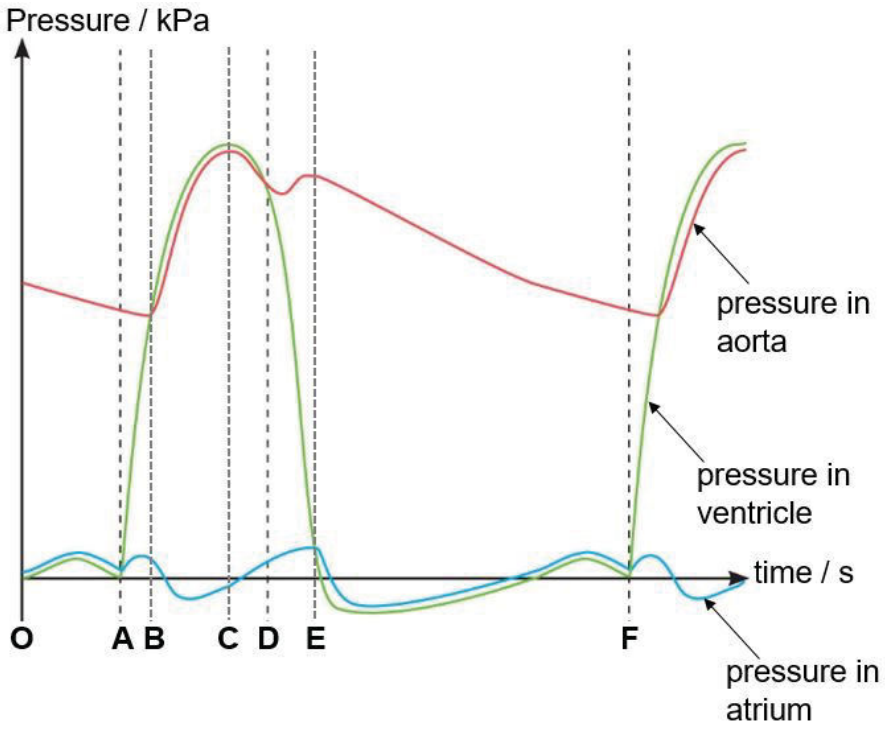


Which of the following shows the correct blood types of people **S**, **T** and **V**?

	S	**T**	**V**
A	A	AB	O
B	A	O	AB
C	B	AB	O
D	B	O	AB

14 The graph below shows the pressure changes in the left side of the heart.

Letters **O**, **A**, **B**, **C**, **D**, **E** and **F** represent time in seconds.



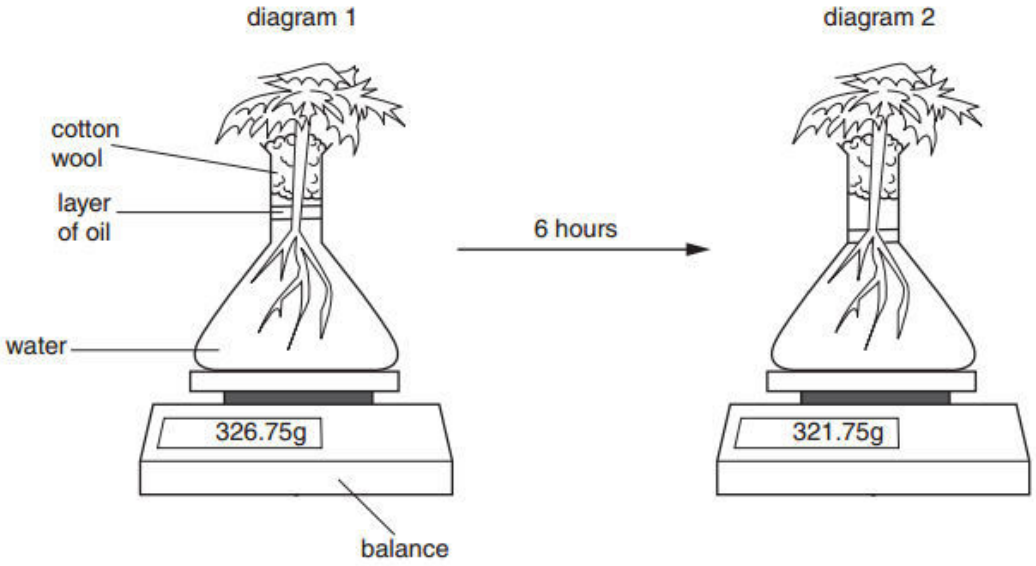
At which time frame does ventricular systole take place?

A between **A** and **C**
B between **A** and **D**
C between **A** and **E**
D between **O** and **A**

15 If a green plant was fed with water containing radioactive oxygen (^{18}O), radioactivity would finally be located in

A the carbon dioxide formed in respiration.
B the cellulose cell walls.
C the oxygen formed by photosynthesis.
D the starch granules in a leaf

16 The diagrams show a plant in a flask of water. It is left for six hours on a warm and windy day in bright sunshine.



Which process explains the result shown in diagram **2**?

A active transport of water into the root hairs
B evaporation of water from the flask
C photosynthesis in the leaves of the plant
D transpiration from the leaves of the plant

17 Two people of equal body mass do the same amount of exercise.
One person is in good health. The other person has emphysema.
The breathing rate and volume of each breath are measured during exercise.
The results are shown in the table.

	during exercise	
	breathing rate / breaths per minute	**volume of each breath / cm3**
healthy person	20	1000
person with emphysema	30	500

Which statement does **not** explain these results?

A The healthy person has a slower breathing rate.
B The healthy person has a larger lung volume.
C The person with emphysema has damaged alveoli with smaller surface area.
D The person with emphysema has a larger volume of air exchanged per minute.

18 The following reactions **X** and **Y** are catalyzed by the same enzyme, carbonic anhydrase found in red blood cells.

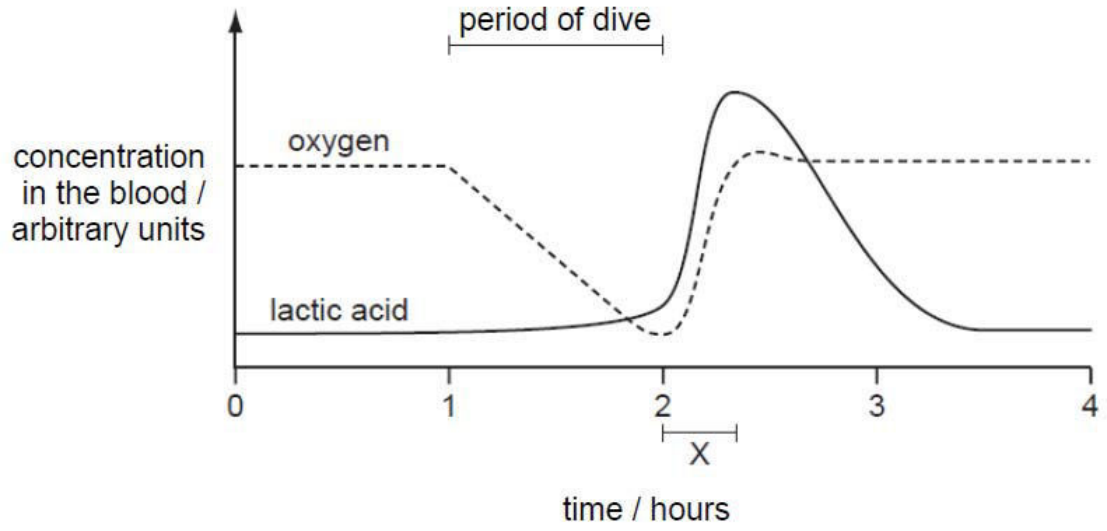
$$CO_2 + H_2O \underset{\text{reaction Y}}{\overset{\text{reaction X}}{\rightleftharpoons}} H_2CO_3 \rightleftharpoons H^+ + HCO_3^-$$

What is the homeostatic function of these reversible reactions and where do reactions **X** and **Y** occur in the human body?

	homeostatic function	**X**	**Y**
A	acid-base balance	respiring tissues	lungs
B	acid-base balance	lungs	respiring tissues
C	CO_2-O_2 balance	respiring tissues	lungs
D	CO_2-O_2 balance	lungs	respiring tissues

19 Seals are marine mammals. When they dive under water, they are capable of respiring anaerobically for long periods. During this time, blood flow to the muscles is greatly reduced but the muscles are able to tolerate high concentrations of lactic acid.

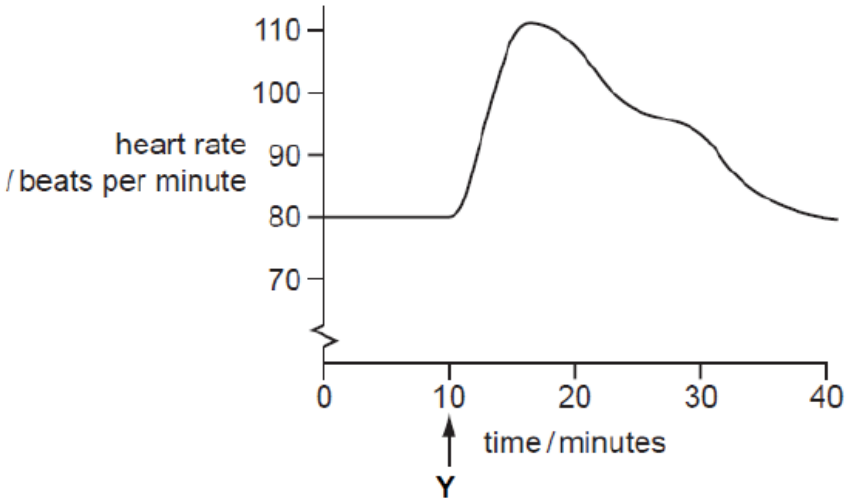
The graph shows the concentrations of lactic acid and oxygen in the blood of a seal before, during and after a dive.



What explains the change in lactic acid concentration during time **X**?

A increased lactic acid production
B increased blood flow to the muscles
C increased rate of aerobic respiration
D reduced rate of anaerobic respiration

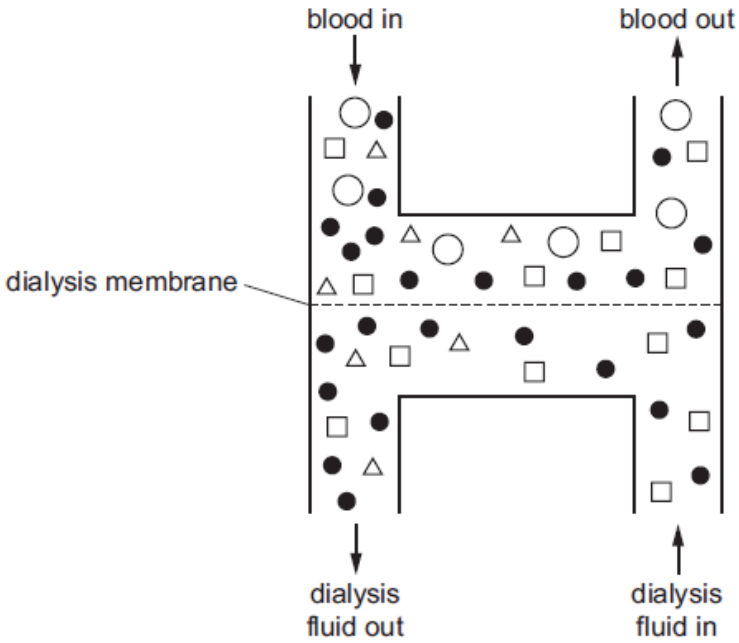
20 A person begins to smoke a cigarette at time **Y**. The graph shows how their heart rate changes.



Which substance in cigarette smoke is the main cause of the change in heart rate between 10 and 18 minutes?

A carbon monoxide
B nicotine
C smoke particles
D tar

21 The diagram shows how a kidney dialysis machine works. Each shape represents a molecule found in blood or dialysis fluid.



Which shape represents urea?

A ○ **B** ● **C** □ **D** △

22 The following table shows the volume of water lost in a student on a cool day.

water lost	volume of water lost / cm^3
urine	1500
faeces	100
expired air	400
sweat	800
total	2800

On a hot day, the student's water intake remains the same as on the cool day. What would be the possible volume of water lost on the hot day?

A

water lost	volume of water lost / cm^3
urine	700
faeces	100
expired air	700
sweat	1300
total	2800

B

water lost	volume of water lost / cm^3
urine	1500
faeces	100
expired air	400
sweat	800
total	2800

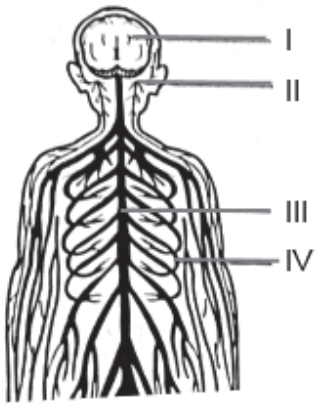
C

water lost	volume of water lost / cm^3
urine	1900
faeces	300
expired air	100
sweat	500
total	2800

D

water lost	volume of water lost / cm^3
urine	1800
faeces	100
expired air	600
sweat	300
total	2800

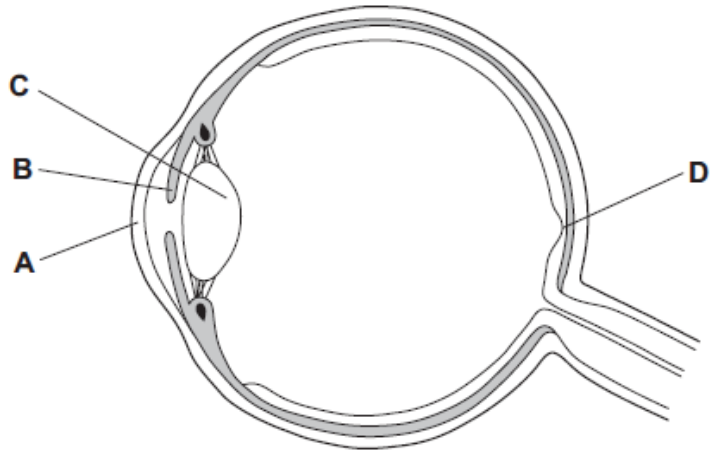
23 The diagram below shows part of the nervous system in a human being.



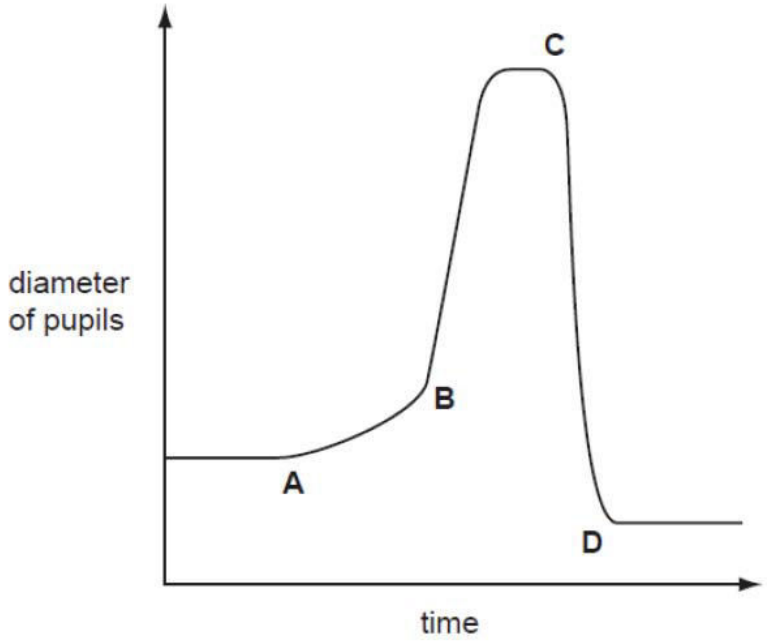
Which of the labeled parts form the central nervous system?

A **I** and **II** only
B **I** and **III** only
C **II** and **IV** only
D **III** and **IV** only

24 The diagram shows a section through an eye.
Which part is the receptor for the stimulus that results in a change in the size of the pupil?

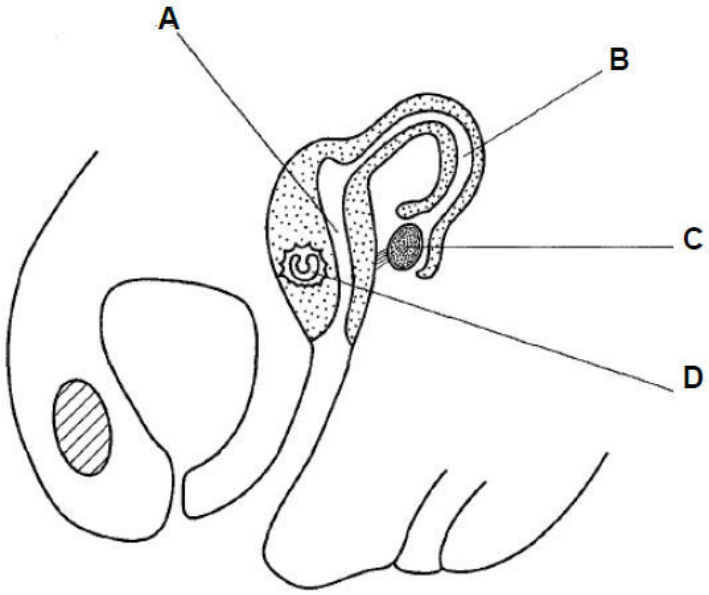


25 The graph shows changes in the diameter of a person's pupils while outdoors on a sunny day.
At which time did the person take off a pair of sunglasses?

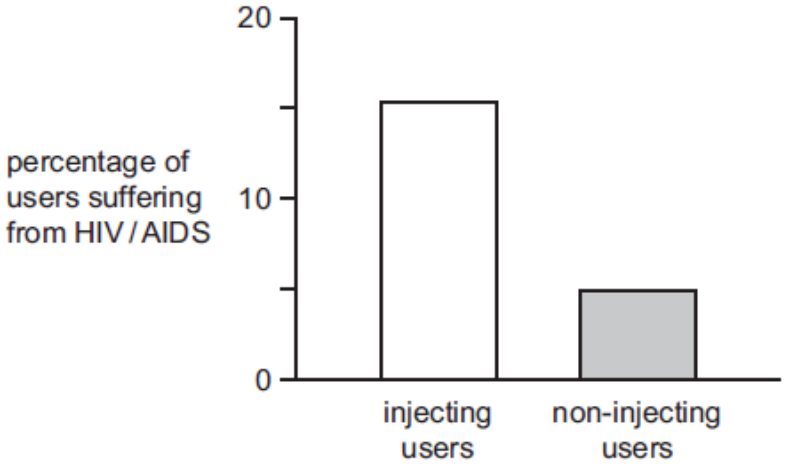


26 The diagram shows a side view of the female reproductive system with a developing embryo.

In which part is fertilisation likely to have taken place?



27 The diagram shows the percentages of injecting and non-injecting drug users who suffer from HIV / AIDS in a particular part of the world.

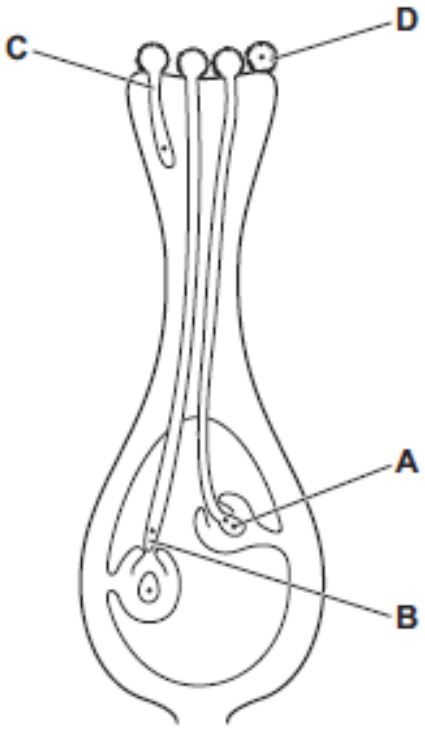


What accounts for the difference between the two groups of drug users?

A Condoms are used more often by injecting drug users.
B Injecting drugs is more common in areas of dense population.
C The same needle may be used by several injecting drug users.
D There are more injecting drug users than non-injecting drug users in this part of the world.

28 The diagram shows the stigma, style and ovary of a flower.

Where does fertilisation take place?



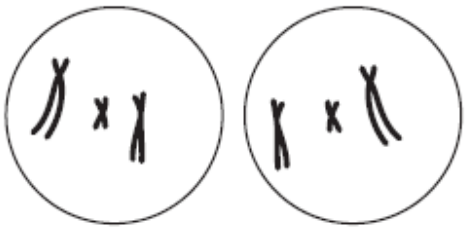
29 What are the conditions in a human cell just before the cell enters prophase?

	number of chromatids	number of molecules of DNA in nucleus	spindle present	nuclear envelope present
A	46	46	yes	no
B	92	46	no	yes
C	46	92	yes	yes
D	92	92	no	yes

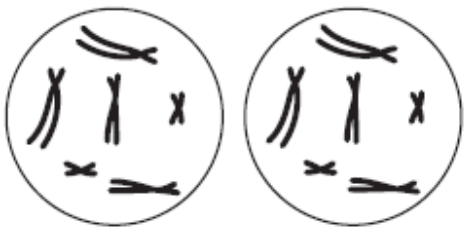
30 The diagram shows the chromosomes in a cell.

Which diagram shows the product of **one** division of the cell by mitosis?

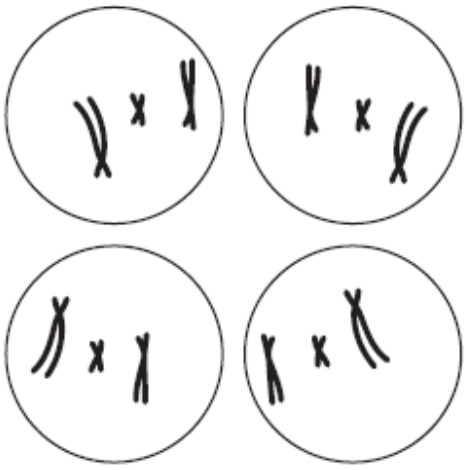
A



B

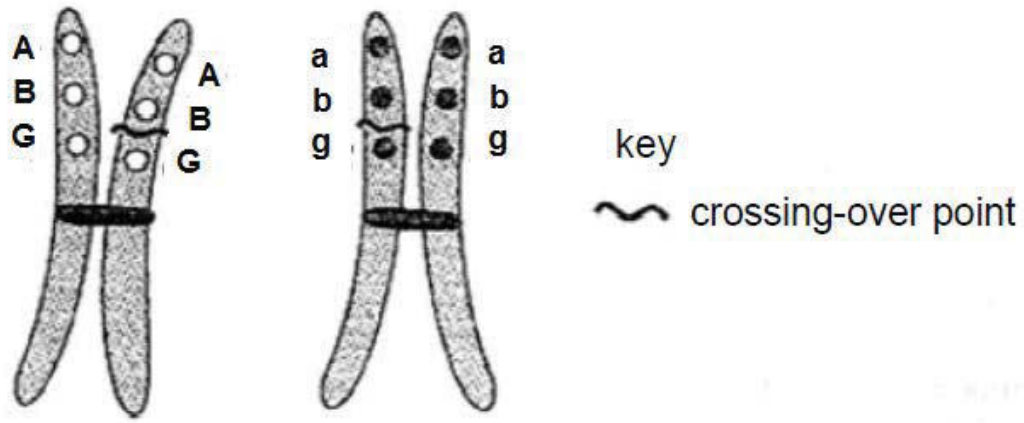


C



D

31 The diagram below represents one pair of homologous chromosomes during meiosis.



Crossing over occurs and random segregation takes place.
What are the genotypes of the resulting gametes?

A **ABG, abG, ABg, abg**
B **ABG, aBg, AbG, abg**
C **ABG, ABG, abg, abg**
D **ABG, aBG, Abg, abg**

32 The table shows the variation in foot length in a number of students.

foot length / cm	number of students
20.0–20.9	0
21.0–21.9	5
22.0–22.9	12
23.0–23.9	15
24.0–24.9	17
25.0–25.9	8
26.0–26.9	0

Which row identifies this type of variation and states its cause?

	type of variation	cause
A	continuous	genes and the environment
B	continuous	genes only
C	discontinuous	environment only
D	discontinuous	genes and the environment

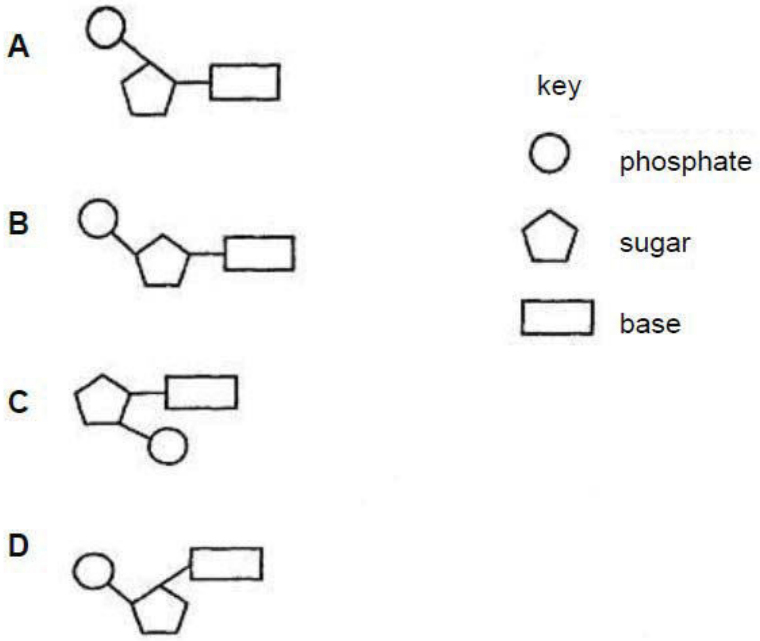
33 The colour of the fruit of tomato plants is determined by alleles of the same gene. A tomato plant with red fruit was crossed with a tomato plant with yellow fruit. Of the offspring, 26 plants had red fruit and 24 had yellow fruit.
Three explanations were suggested.

1 Both parents were homozygous.
2 One parent had two recessive alleles.
3 One parent was heterozygous.

Which of the explanation/s is/are **correct**?

A 1 only
B 3 only
C 1 and 2
D 2 and 3

34 What is the **correct** arrangement for the components in a nucleotide?



35 Which statements about natural selection are **correct**?

	natural selection can lead to better adapted species surviving	natural selection can lead to extinction of a species	natural selection can lead to gene mutations occurring
A	true	true	true
B	true	true	false
C	true	false	true
D	false	true	true

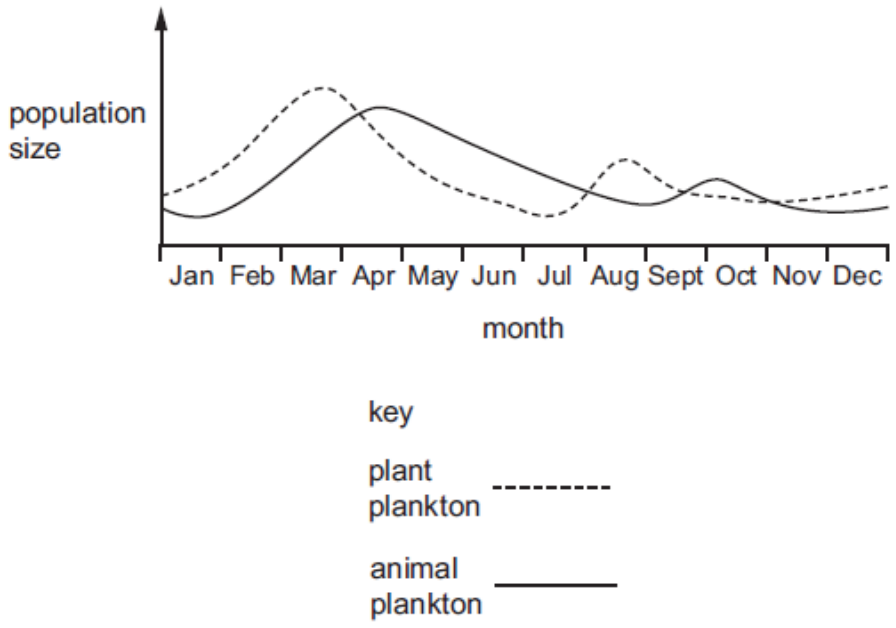
36 The following six statements refer to genetically engineered plants.

1 Cross-pollination with weeds could produce new varieties of weeds.
2 Genetically engineered plants may have improved nutritional value.
3 Some plants can be genetically modified to give resistance to diseases.
4 The increased yield from genetically engineered plants allows a smaller area of land to be farmed.
5 The use of genetically engineered crops may explain the increase in allergies in children.
6 There is more research needed on the long term effects of genetically engineered crops on the environment.

Which statements about genetically engineered plants show potential benefits?

A 1, 2 and 3
B 1, 5 and 6
C 2, 3 and 4
D 3, 5 and 6

37 The graph shows changes in the populations of plant and animal plankton in a lake.

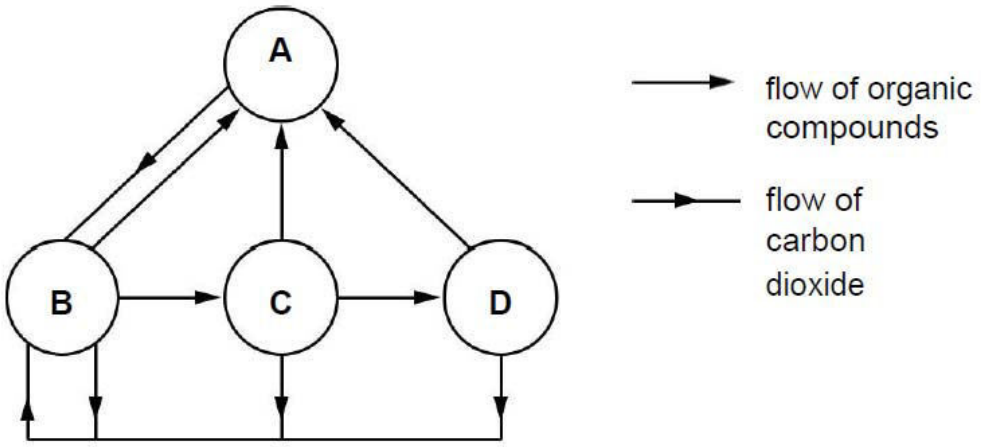


Consider the following statement in relation to the data provided by the graph.
'Population changes in animal plankton lag behind similar changes in plant plankton because the animals feed on the plants.'
Into which category does the statement fall?

A It is a reasonable interpretation of the data.
B It is a restatement of the data, not an interpretation.
C It is contradicted or not supported by the data.
D More data are required in order for this interpretation to be made.

38 In the diagram below, arrows represent the movements of carbon compounds in the carbon cycle. **A**, **B**, **C** and **D** represent carbon compounds in animals, decomposers, plants and the atmosphere.

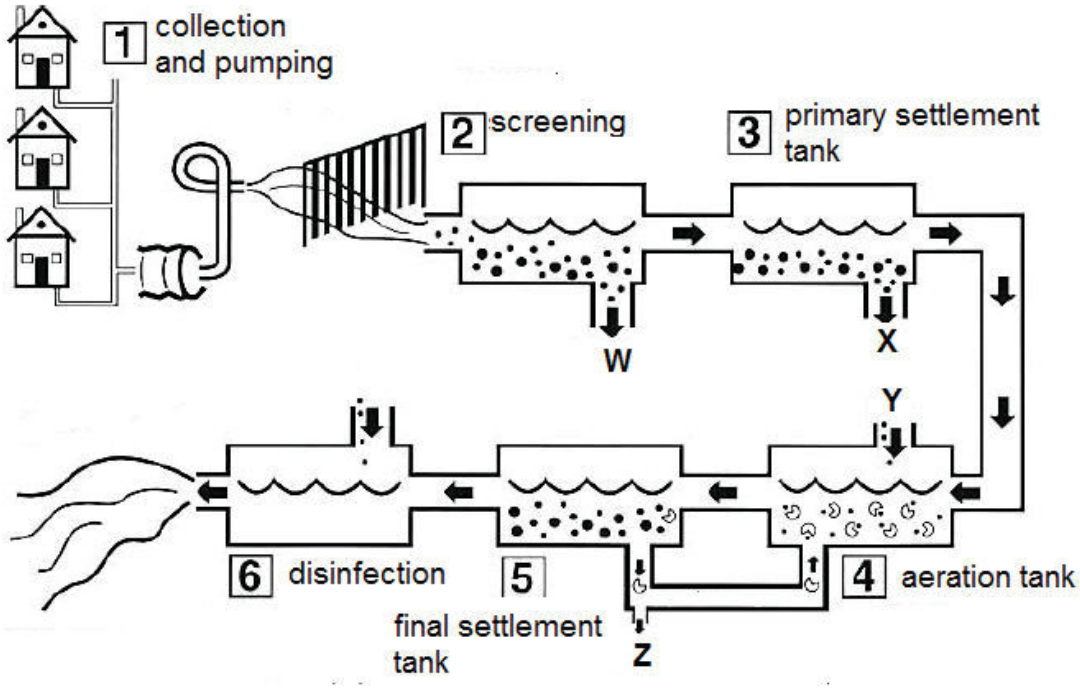
Which represents the producer?



39 Which of the following is **not** a conservation measure?

A banning the use of timber
B limiting the time a fishing vessel may fish
C planting new seedlings to replace trees that are cut down
D using nets of a specific mesh size

40 The diagram below shows how sewage is treated before it is released into water bodies.



Which of the following **correctly** identifies **W**, **X**, **Y** and **Z**?

	W	X	Y	Z
A	Grit and coarse materials	Sludge	Glucose	Methane
B	Grit and coarse materials	Sludge	Oxygen	Sludge
C	Sludge	Microorganisms	Oxygen	Carbon dioxide
D	Sludge	Sewage	Chlorine	Microorganisms

End of Paper

Name :	Class	Register number

DUNEARN SECONDARY SCHOOL
Preliminary Examination 2018

Biology 6093
Paper 2
Secondary 4 Express

11 Sep 2018 (Tuesday) **1030 – 1215** **1 h 45 min**

INSTRUCTIONS TO CANDIDATES

Section A
Answer **all** questions.
Write your answers in the spaces provided on the question paper.

Section B
Answer questions 7, 8 and **9 Either** or **9 Or** in the spaces provided.
If all the questions are answered, only the first 3 will be taken into account.

Paper 1	Paper 2							
	A1	A2	A3	A4	A5	A6	Sub-total for P2 Section A	/50
							Sub-total for P2 Section B	/30
/40	B7	B8	B9(E)	B9(O)			**Total marks for Paper 2**	/80
							Overall marks	**/ 120**

Setter: Mr Ng Hock Ping

Parent's Signature: ……..

This question paper consists of **15** printed pages including the cover page.

Section A [50 marks]
Answer all the questions in the spaces provided.

For Examiner's Use

1 **Fig. 1.1** below shows two experiments to investigate the partial permeability of the Visking tubing.

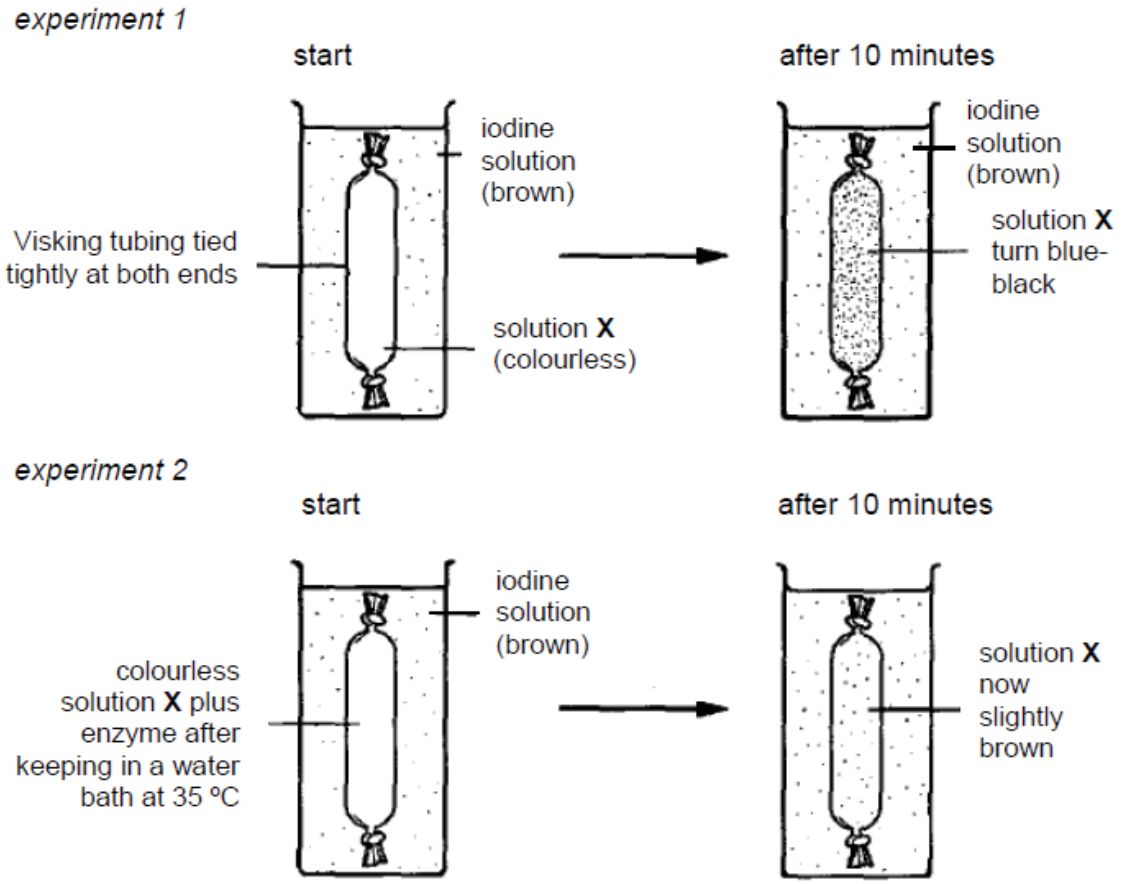


Fig. 1.1

(a) Suggest what solution **X** was likely to have been.

……[1]

(b) In experiment **1**, explain why

(i) solution **X** turned from colourless to blue-black;

……

……

……[2]

(ii) the iodine solution remained brown.

……...

……[1]

In experiment **2**, solution **X** and an enzyme were placed in a Visking tubing bag which was kept at 35°C for 30 minutes. After this time, the bag was placed in iodine solution. This experiment and the results are also shown in **Fig. 1.1**.

(c) In experiment **2**, explain

(i) why the bag was first kept at 35°C for 30 minutes;

……..

……[1]

(ii) why solution **X** did **not** turn blue-black.

……..

……[1]

At the end of experiment **2**, the student noticed a change in the condition of the Visking tubing bag after 24 hours.

(d) **(i)** What change might have been noticed?

……..

……[1]

(ii) Explain what caused this change.

……..

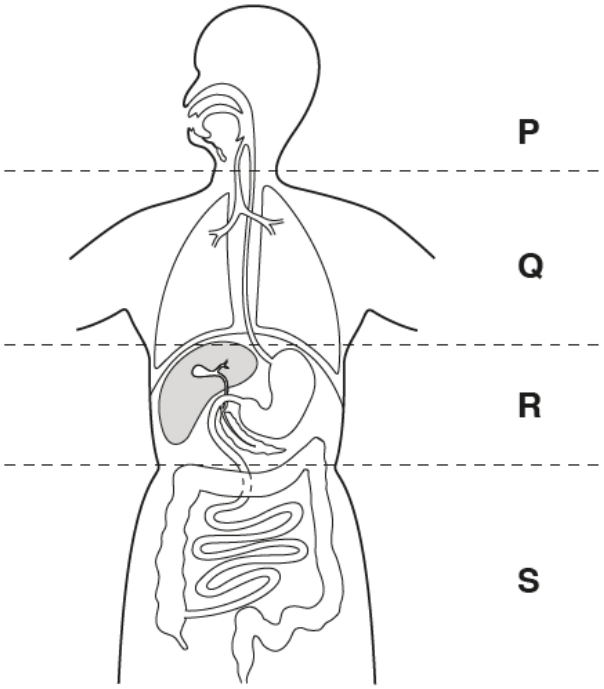
……..

……[2]

[Total: 9]

For Examiner's Use

2 The diagram shows a section through the human body divided into regions **P**, **Q**, **R** and **S**.



(a) Complete the table below by matching the letters from the diagram to the statements in the table. There may be one or more than one letter for each statement.

contains an organ which	region or regions
produces an acidic secretion	**R**
contains villi	
digests protein	
produces insulin	
contains bronchi	
secretes amylase	
ingests food	

[3]

(b) Compare and contrast the movement of air with food in region **Q**.

.....

.....

.....

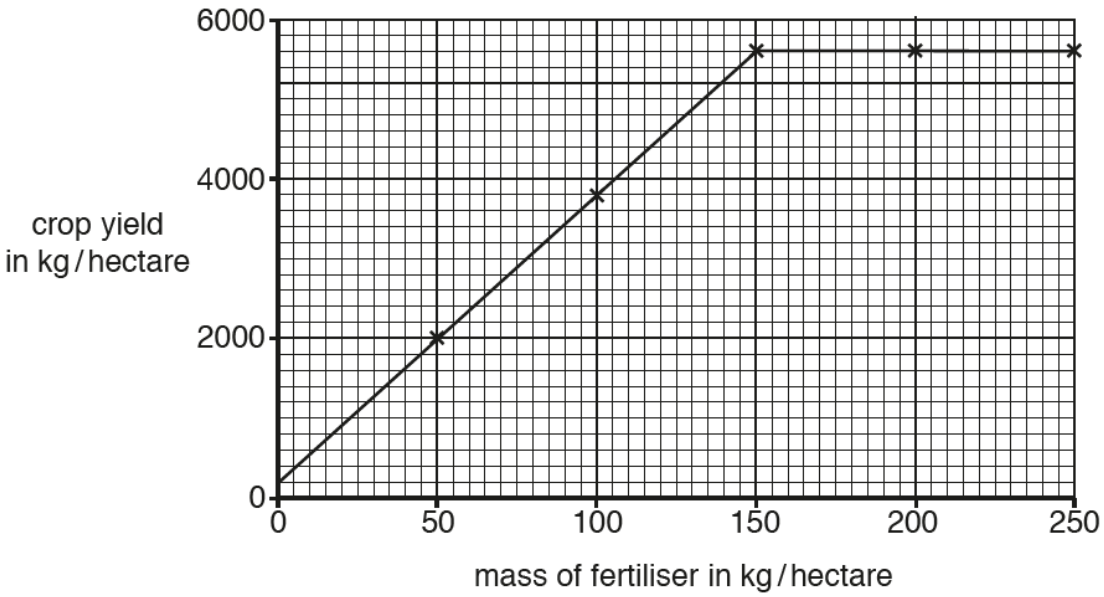
.....

..... [3]

[Total: 6]

3 The graph shows the effect on crop yield (amount harvested) of using fertilisers that contain nitrogen.

For Examiner's Use



(a) Use the information in the graph to describe the effect on crop yield of using an increasing mass of fertiliser.

.....

.....

.....

..... [3]

(b) The nitrogen in the fertiliser is in the form of nitrates.
Describe how the nitrogen in the fertiliser is absorbed by roots of the crop plants and transported to the leaves for use to give an increased yield.

.....

.....

.....

.....

.....

.....

..... [4]

(c) Suggest and explain why a farmer may decide to use a mass of fertiliser per hectare which is less than that needed for a maximum crop yield.

For Examiner's Use

.....

.....

.....

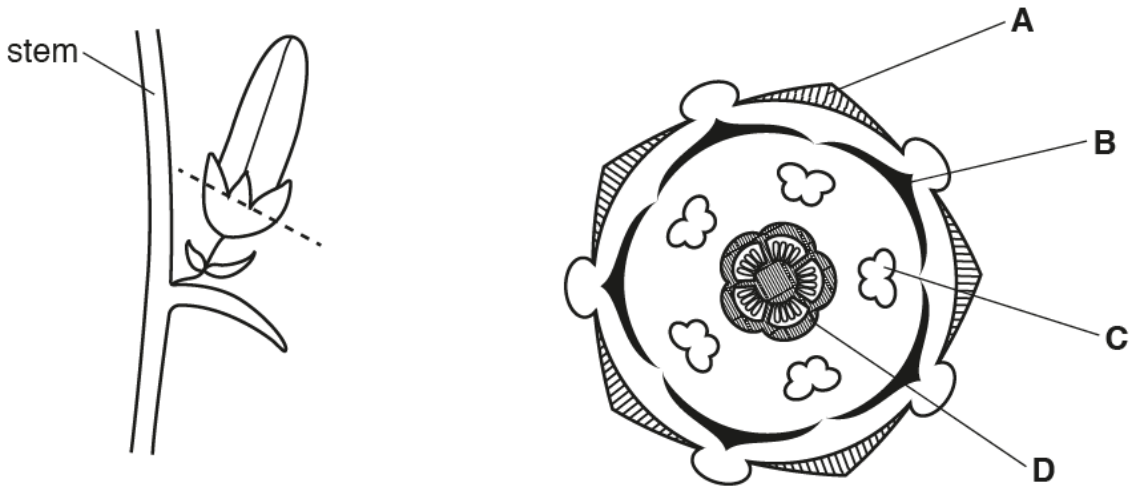
.....

.....

.....[3]

[Total: 10]

4 The diagrams show the bud of an insect-pollinated flower and a magnified transverse section through the same flower bud. The transverse section was taken at the position shown by the dotted line.



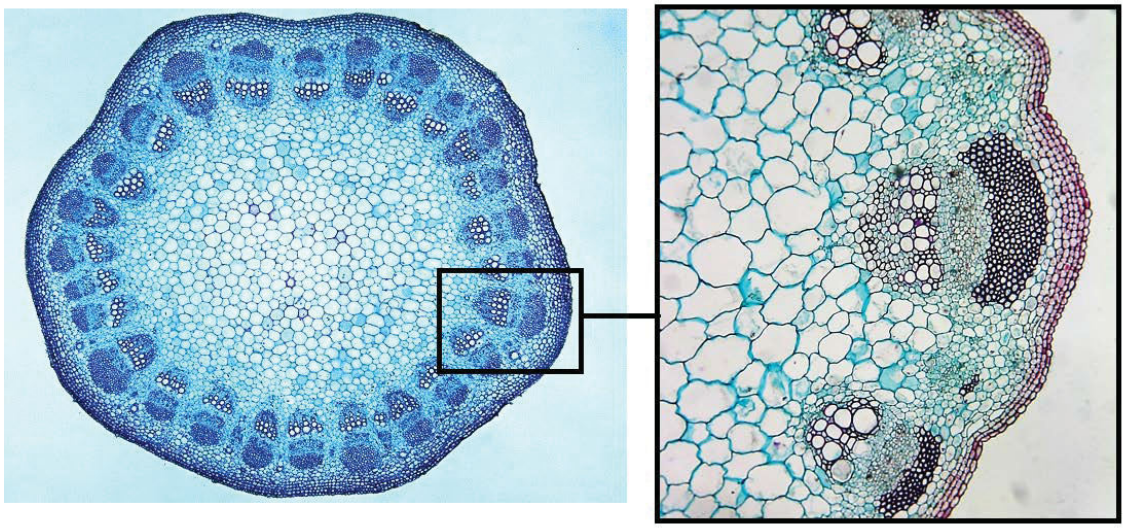
(a) Complete the table to show the name of each of structures **A** to **D** and to state one function of each structure.

letter	name of structure	function
A		
B		
C		
D		

[4]

For Examiner's Use

(b) The diagram shows a transverse section through the stem of this plant and a magnified section of the vascular bundle.



(i) Label on the magnified section of the vascular bundle in the diagram, the positions of each of the following tissues:

- xylem,
- phloem. [2]

(ii) State **one** function of xylem tissue.

.....

.....[1]
[Total: 7]

5 **(a)** Describe the cause of each of the following:

(i) Down's syndrome, ...

.....

.....

.....[2]

(ii) sickle cell anaemia .....

.....

..... [1]

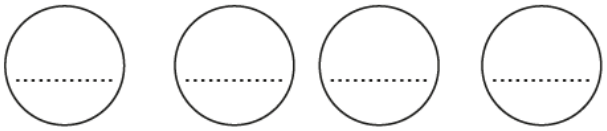
For Examiner's Use

(b) Two parents, one with blood group **B** and the other with blood group **A**, have a child with blood group **O**. The parents decide to have another child.

(i) Complete the genetic diagram to show the possible blood groups for the second child of these parents.

genotypes of parents ..... x .....

gametes



possible genotypes of child ....

possible blood groups of child ....

[4]

(ii) State the probability of each of the following for the second child of these parents:

- being the same sex as the first child

……..

…….. ..... [1]

- having the same blood group as the first child

……..

…….. ..... [1]

(iii) Name the type of inheritance shown by the alleles that produce the blood group **AB**.

……..... [1]

[Total: 10]

6 **Fig. 6.1** shows the relationships between a number of organisms living together in a South American rainforest.

For Examiner's Use

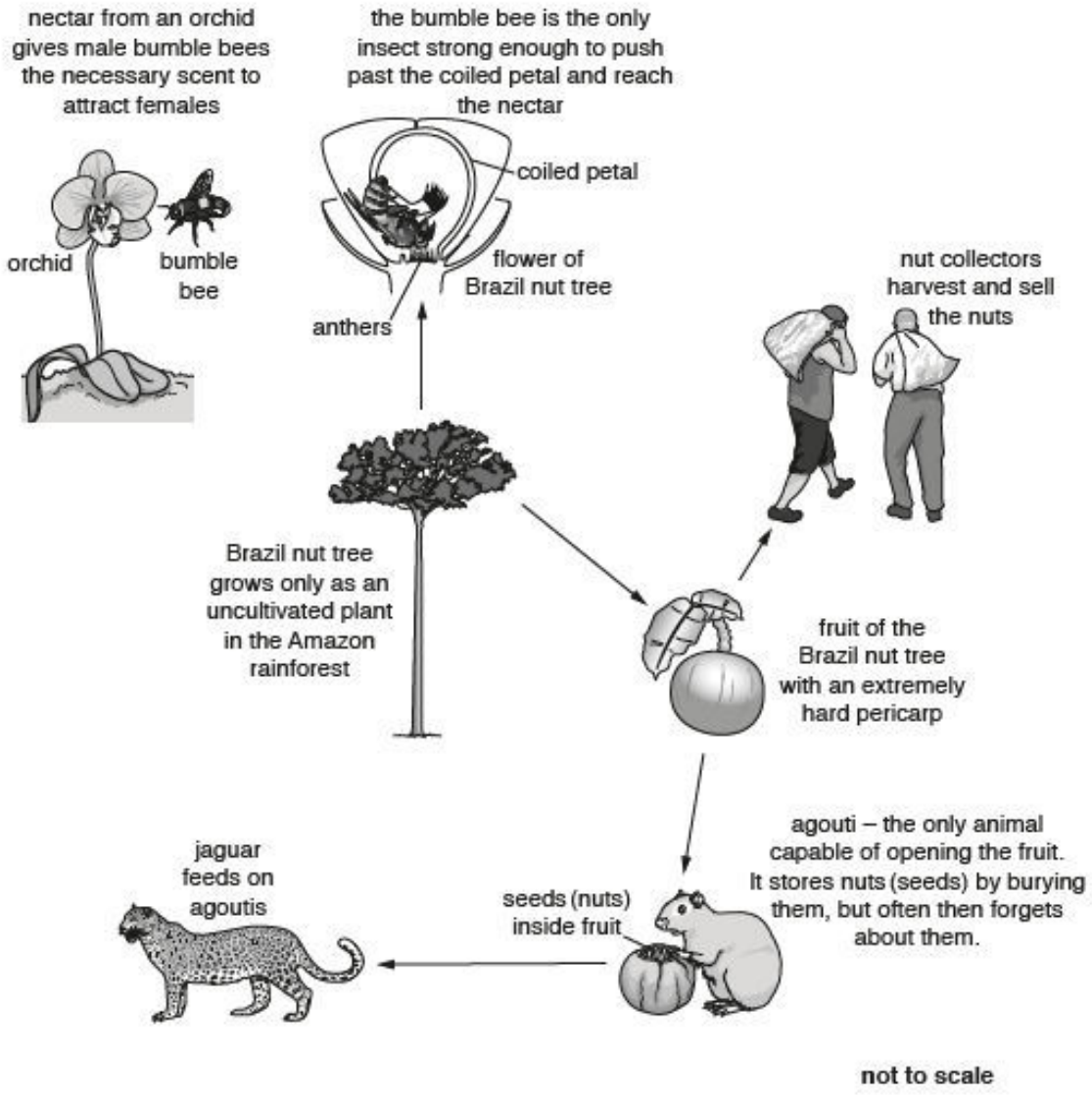
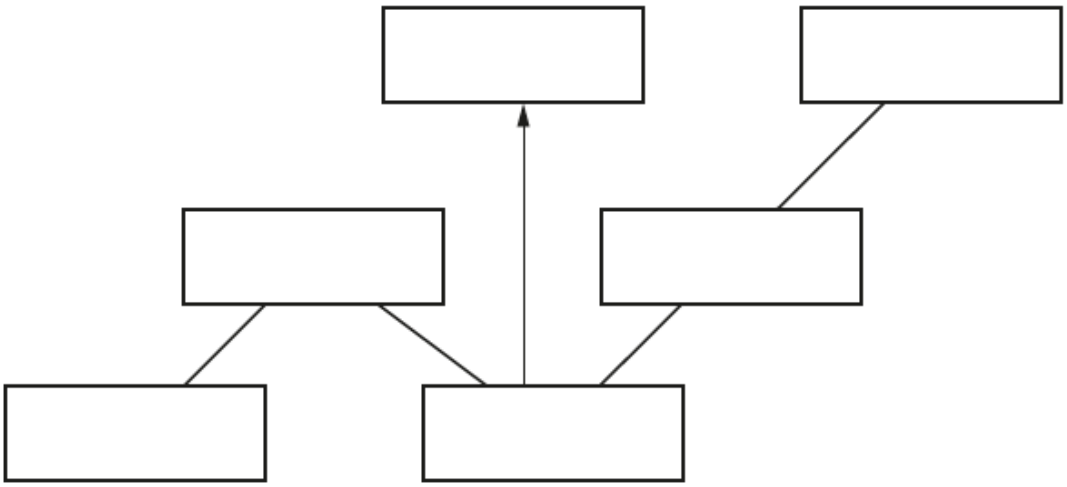


Fig. 6.1

(a) **Fig. 6.2** is an incomplete food web for these organisms. Complete **Fig. 6.2** by:

For Examiner's Use

- writing the name of an organism in each box,
- completing the arrows to show the flow of energy.



[4]

Fig. 6.2

(b) Which type of pollination (self or cross) is likely to be found in the Brazil nut tree. Give a reason for your answer.

.....

.....[1]

(c) Suggest the possible effects on the community in the rainforest if the orchids were killed by disease and poached by orchid collectors.

.....

.....

.....

.....

.....

.....

.....

.....[3]

[Total: 8]

Section B [30 marks]

Answer **three** questions in the spaces provided.
Question **9** is in the form of an **Either/Or** question.
Only one part should be answered.

For Examiner's Use

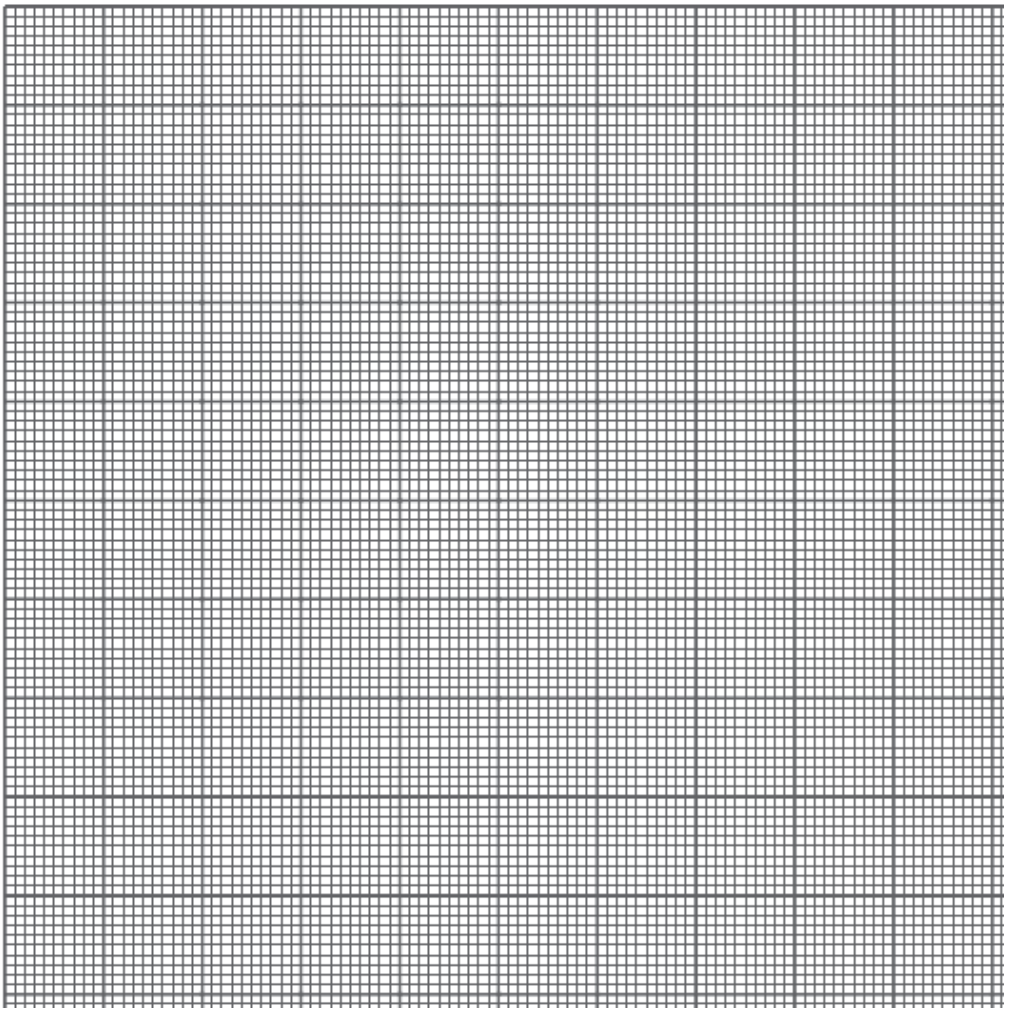
7 During a health examination, the heart rate of a patient was measured based on the number of "lub-dub" sounds heard for 5 seconds. This measurement was taken every minute for 7 minutes. The counts were recorded in **Table 7** below.

Table 7 : Heart rate of patient

Time/min	0	1	2	3	4	5	6	7
Number of "lub-dub" sounds heard for 5 seconds	6	6	9	12	9	7	6	5
Heart rate/min^{-1}								

(a) **(i)** Calculate the heart rate of the patient and fill up **Table 7**. [1]

(ii) Plot the heart rate of the patient in the grid below.



[3]

For Examiner's Use

(b) Explain how the "lub-dub" sounds are generated in the heart.

……

……

…… [2]

(c) Suggest an activity the patient could be carrying out during this period.

……

…… [1]

(d) Give a detailed explanation how a **named** hormone could cause this change observed in the patient during the health examination.

……

……

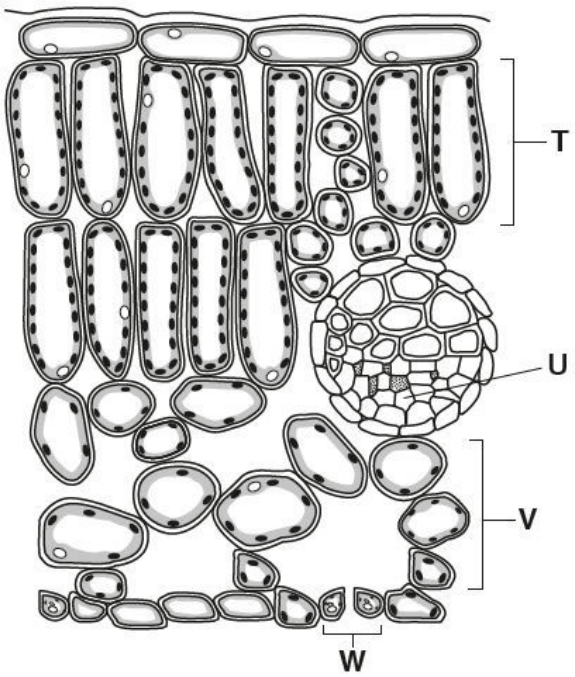
……

……

……

…… [3]
[Total: 10m]

8 The diagram shows a magnified transverse section through a leaf.



Name each of **T**, **U**, **V** and **W** and explain the importance of each in the process of photosynthesis.

For Examiner's Use

T .....

.....

.....

.....

.....

.....

U .....

.....

.....

.....

.....

.....

V .....

.....

.....

.....

.....

.....

W .....

.....

.....

.....

.....

.....[10]

[Total: 10]

9 Either

For Examiner's Use

(a) Describe **one** example of a simple reflex action and explain the importance to the body of this action.

.....

.....

.....

.....

.....

.....

.....

..... [4]

(b) Describe how **named** components of the nervous system are involved in producing a reflex action.

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....[6]

[Total: 10]

9 Or

For Examiner's Use

(a) Explain the concept of control by negative feedback.

.....

.....

.....

.....

.....

.....

.....

.....[4]

(b) Describe how **two named** components of the skin are involved in regulating body temperature in **hot** conditions.

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....[6]

[Total: 10]

End of Paper

Dunearn Secondary School
Preliminary Examination 2018
Secondary 4 Express Biology 6093
MARK SCHEME

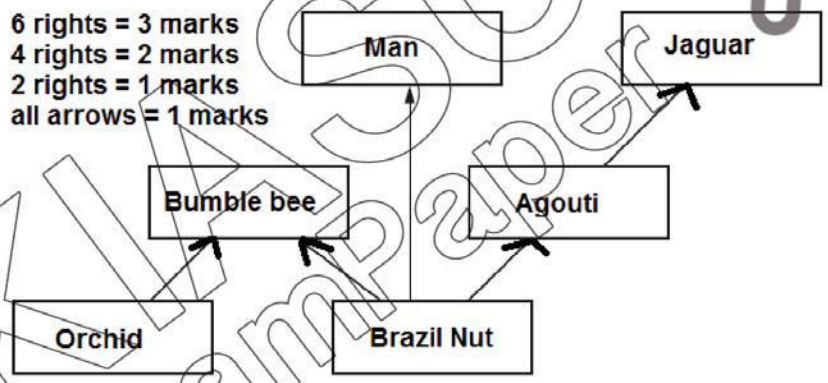
Paper 1: Multiple Choice Questions (40 marks)

1. **D**	11. **C**	21. **D**	31. **A**
2. **C**	12. **B**	22. **A**	32. **A**
3. **C**	13. **C**	23. **B**	33. **D**
4. **D**	14. **A**	24. **D**	34. **B**
5. **B**	15. **C**	25. **C**	35. **B**
6. **B**	16. **D**	26. **B**	36. **C**
7. **C**	17. **D**	27. **C**	37. **A**
8. **C**	18. **A**	28. **A**	38. **B**
9. **C**	19. **B**	29. **D**	39. **A**
10. **A**	20. **B**	30. **B**	40. **B**

Paper 2 Section A: Structured Questions (50 marks)

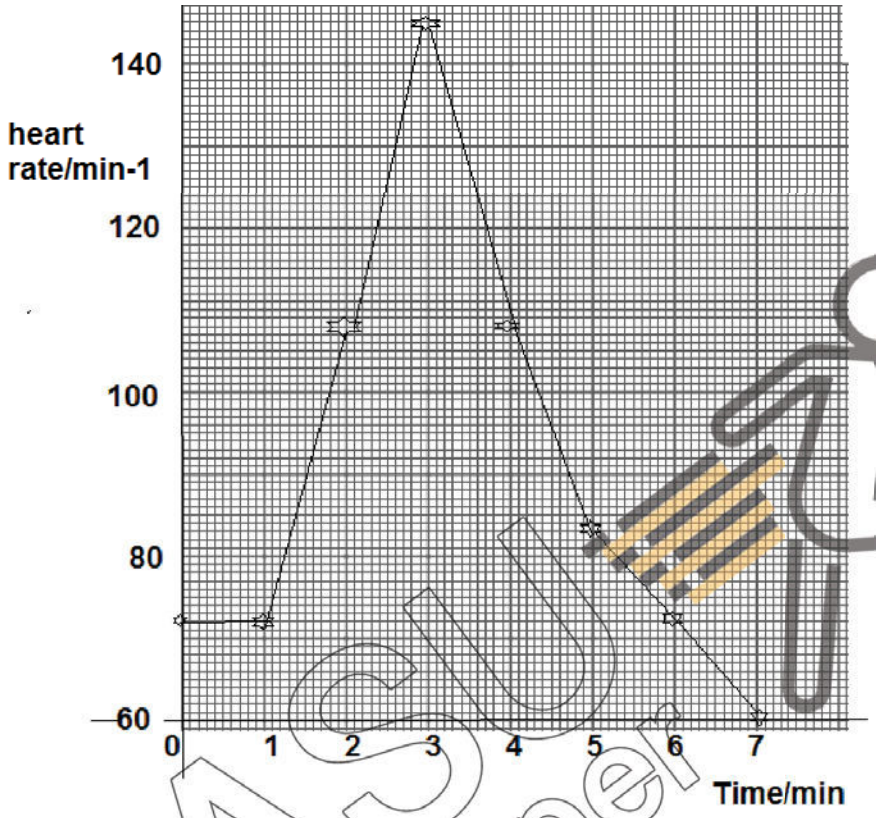
<table>
<tr><th>No</th><th>Answer Key</th><th>Mark</th></tr>
<tr><td>1(a)</td><td>Starch solution</td><td>1</td></tr>
<tr><td>(b)
(i)</td><td>Small iodine molecules;
diffuse through the Visking tubing ;</td><td>1
1</td></tr>
<tr><td>(ii)</td><td>Large starch molecules + unable to diffuse</td><td>1</td></tr>
<tr><td>(c)
(i)</td><td>Optimum temperature for enzyme + digestion of starch</td><td>1</td></tr>
<tr><td>(ii)</td><td>Starch has been completely digested to maltose/reducing sugar</td><td>1</td></tr>
<tr><td>(d)
(i)</td><td>The liquid level in the visking tubing has increased while the water level outside has decreased.;</td><td>1</td></tr>
<tr><td>(d)
(ii)</td><td>Osmosis of water molecules has occurred
due to the low water potential inside the Visking tubing</td><td>1
1</td></tr>
<tr><td></td><td>Total</td><td>9</td></tr>
<tr><td></td><td>Marker's comments:
Small molecules of iodine are usually omitted
Unable to recognize the optimal temperature rather than timing
Glucose is the final product of digestion rather than maltose
Leading to diffusion of glucose</td><td></td></tr>
<tr><td>2
(a)</td><td>
<table>
<tr><th>contains an organ which</th><th>region or regions</th></tr>
<tr><td>produces an acidic secretion</td><td>(R)</td></tr>
<tr><td>contains villi</td><td>R / S</td></tr>
<tr><td>digests protein</td><td>R / S</td></tr>
<tr><td>produces insulin</td><td>R</td></tr>
<tr><td>contains bronchi</td><td>Q</td></tr>
<tr><td>secretes amylase</td><td>P + R</td></tr>
<tr><td>ingests food</td><td>P</td></tr>
</table>
</td><td>0 right = 0 mark
2 rights = 1 mark
4 rights = 2 marks
6 rights = 3</td></tr>
</table>

		marks
(b)	Air – inhale and exhale through the trachea, bronchi, bronchioles and into the alveoli; pressure differences Food – peristalsis + oesophagus; Rhythmic contraction and relaxation of longitudinal and circular smooth muscle and antagonistic muscles in diaphragm and rib cages create both movements OR involuntary actions	1 1 1
	Total	6
	Marker's comments: Definition of process is given but no comparison or contrast was presented	
3 (a)	no fertiliser **+** yield is 200 (kg / hectare crop yield) **/** increased / more crop yield **;** reference to 150 (kg / hectare fertiliser) **or** 5600 (kg / hectare crop yield) **;** high fertiliser / above 150 **+** no increase in crop yield **;**	1 1 1
(b)	root hair **+** active transport / against concentration gradient / diffusion / down concentration gradient **;** **move along with the transpiration stream /up the xylem in the stem to the leaves;** production **AW** of **+** amino acids / protein **+** increased **AW +** growth **;**	1 1 1 1
(c)	run-off / leaching **AW ;** eutrophication **or** correct description of process **+** harm to animals **;** high cost / expensive **/** possible economic return not beneficial over increased cost **AW ;**	1 1 1
	Total	10
	Marker's comments: Mostly well-done except no reference to the quantities for some students. Most students just emphasized on eutrophication and miss out on leaching and cost	
4 (a)	**letter name of structure function** **(A)** sepal / calyx **;** protect **;** **(B)** petal / corolla **;** attract / landing platform **;** **(C)** stamen / anther **;** produces / contains **AW +** pollen / male gamete / male nucleus **;** **Or** filament **;** support anther **;** **(D)** ovary / carpel / pistil **;** produces / contains **AW +** ovum / ovule / egg / female gamete **;** **or** forms **AW** fruit / site of fertilisation **;**	 1 1 1 1
(b) (i)	'xylem' labelled on inside **+** 'phloem' labelled separately on outside of at least one oval vascular bundle **;**	1 1
(b) (ii)	**1** transports / carries **AW +** water / ions / minerals **;** **2** support **;**	1
	Total	7
	Marker's comments: Well-done for most except for some students who are not able to recognize the structures	
5 (a) (i)	*(Down's syndrome)* inherited / genetic mutation **+** chromosome **(**reference to	

	chromosome 21); **with** one extra **or** 3 instead of 2 **or** 47 not 46 **or** 24 not 23 in **+** gamete/egg/sperm **;** *(sickle cell anaemia)*	1 1
(ii)	inherited / genetic mutation **+** gene **with** homozygous recessive / two recessive alleles **;**	1
(b)	I^BI^O **+** I^AI^O **or** BO **+** AO **;**	1
(i)	I^B **+** I^O **+** I^A **+** I^O **or** B **+** O **+** A **+** O **or** gametes correct for stated parent genotypes **;**	1
	I^AIB **+** I^BI^O **+** I^AI^O **+** I^OI^O **or** AB **+** BO **+** AO **+** OO **or** possible genotypes of child correct for stated gametes **;**	1
	AB **+** B **+** A **+** O **or** possible blood groups of child correct for stated genotypes **;**	1
(b)	*(same sex)*	1
(ii)	50% / half / ½ / 0.5 / 2 in 4 / 1 in 2 / 1:1 **;** *(same blood group)*	1
	25% / quarter / ¼ / 0.25 / 1 in 4 / 1:3 **;**	1
(b)	codominance / codominant **;**	1
(iii)	**R** incomplete dominance	
	Total	10
	Marker's comments: Well done except for the definition	
6 (a)		3
(b)	Cross-pollinated **;** specialized pollinator, bumble bees	1 1
(C)	less nectar **for** male bees **+** lack scent/female bees **+** not attracted **;** less reproduction of bees **+** less pollination **+** less trees/less nut / fruit production **;** loss of jobs (for humans) / negative economic impact **AW ;** less food for agoutis **+** death / reduced population **+** of agoutis **OR** agoutis seek other food **+** less food for jaguars/death / reduced population **+** of jaguars **OR** jaguars seek other food **;**	1 1 1 1 Max 3
	Total	8
	Marker's comments: Well done for most of the students	

Paper 2 Section B: Free Response Questions (30 marks)

7 (a)	0	1	2	3	4	5	6	7	
	6 X	72	108	144	108	84	72	60	1

	60/5 =72	
	 correct axes and scale ; correct plot points ; best fit curve ;	1 1 1
(b)	"lub" formed by closing of AV valves; atrial diastole + ventricular Systole; "dub" formed by closing of SLV; ventricular diastole;	1 1
(c)	name any example of exercise that would result in rise in heart rate;	1
(d)	secretion of **adrenaline** by adrenal gland; into bloodstream and carried to heart + (stimulates increase in heart rate and rise in blood pressure) liver cells convert glycogen to glucose + (more glucose in bloodstream); oxygen and glucose carried faster to muscles; increased aerobic respiration to release more energy;	1 1 1 1 1 1 1 Max 3

	Total	10
	Marker's comments: Some students are not able to explain in details the closing of the valves is caused by the contraction and relaxation of the ventricular muscles.	
8	(***T***) Palisade mesophyll ; Main site of photosynthesis with numerous chloroplasts **;** Densely packed cylindrical cells to maximise sunlight absorption **;** ***(U)*** phloem**;** transport **+** dissolved manufactured food/ sucose + amino acids **;** from leaves to all parts of the plant **;** ***(V)*** Spongy mesophyll **;** air / intercellular **+** spaces **for gaseous exchange/**diffusion **of carbon dioxide and oxygen** water film **AW +** evaporation / water vapour **;** ***(W)*** stoma / stomata **controlled by** guard cell **;** open / close **+** reference **to** diffusion of **carbon dioxide, oxygen and water vapour**	 1 1 1 Max 3 1 1 1 1 1 1 1 1 max 3
	Total	10
	Marker's comments: Details of answer in relation to photosynthesis are often left out.	
9 E (a)	named stimulus / trigger for a specific reflex action **;** correct named receptor for stimulus given **;** action described correct for example given **;** importance of specific action explained **;**	1 1 1 1
(b)	synapse (anywhere in sequence) **;** impulse / electrical pulse (anywhere in sequence) **;** receptor **+** detection of stimulus **;** **then** sensory neurone **;** relay / inter(mediate) / connector neurone **;** reference to CNS / brain / spinal cord **;** **then** motor neurone **;** effector / named effector **;** action of effector or described **;**	1 1 1 1 1 1 1 1 1 Max 6
	Total	10
	Marker's comments:	

	Less student attempted this question as confidence in giving and example and relate the example is weak.	
9 O (a)	parameter / condition e.g. temperature ; change from set point / norm **AW +** detected ; reference to communication or named method (e.g.nerve / impulse / hormone) ; reference to control centre / coordinator / hypothalamus / brain ; response / corrective mechanism(s) **or** reversal /correction of initial change / return to set point or norm ;	1 1 1 1 1 Max 4
(b)	any two from nerve ending / blood vessels / sweat gland / hair *(nerve ending)* detects / receptor ; change / increase in temperature ; impulse / (message) to brain ; *(blood vessels)* dilate ; more blood to surface of skin ; reference to capillaries ; reference to increased radiation / heat loss ; *(sweat gland / duct*) secretion / release / skin surface **+** sweat ; reference to evaporation ; *(hair)* lowers ; less air trapped / loss of insulation ;	1 1 1 1 Max 3 1 1 1 1 Max 3 1 1 1 1 1 1 Max 6
	Total	10
	Marker's comments: Most attempted this question and able to do well.	