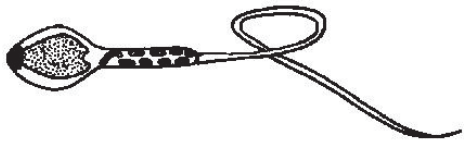
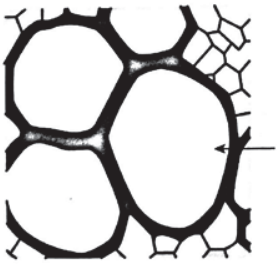
21 The diagrams below show four different types of cells. Which cell does not contain cytoplasm?

A

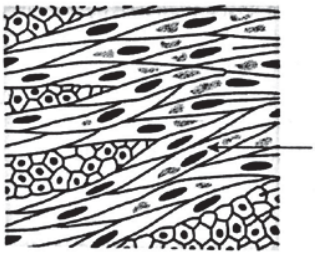
B



C



D



22 The table below shows the comparison between a red blood cell and a root hair cell.

feature number	feature	red blood cell	root hair cell
1	transport oxygen	yes	yes
2	cytoplasm present	no	yes
3	large surface area to volume ratio	yes	yes
4	nucleus present	no	yes

Which comparisons are correct?

A 1, 2 and 3

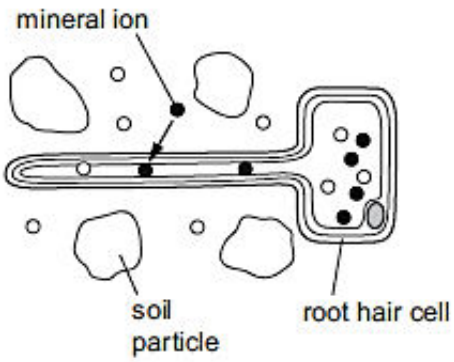
B 2, 3 and 4

C 1 and 2 only

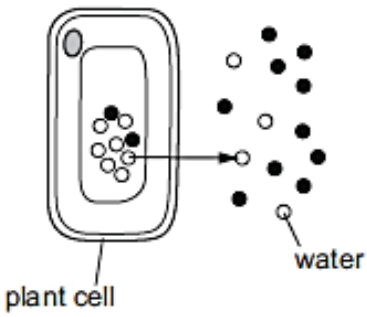
D 3 and 4 only

23 Which diagram illustrates the process of active transport?

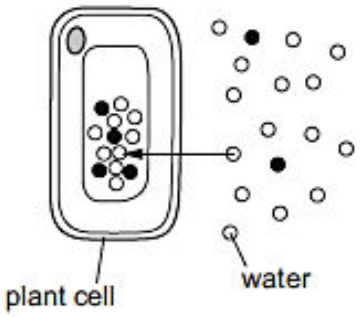
A



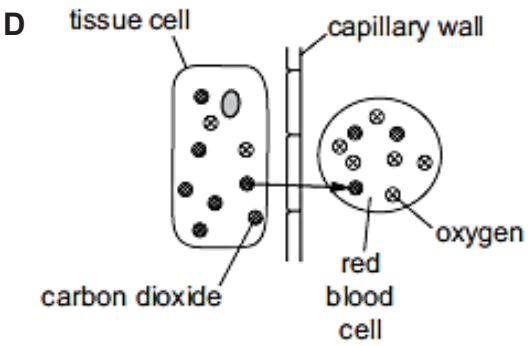
B



C



D



24 A student is tasked to determine if a food sample contains carbohydrates. Which of the following food test(s) should he carry out?

I Benedict's test II Biuret test III Ethanol-emulsion test IV Iodine test

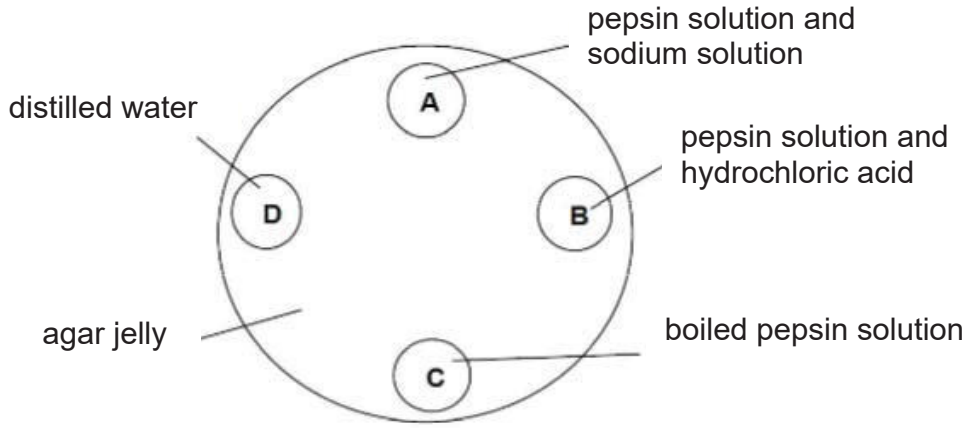
A I only

B I and II only

C I and IV only

D II and III only

25 A dish is filled with agar jelly containing egg white. Four holes are cut in the jelly and each is filled with the substances shown. Which hole will be surrounded by the largest egg white free region after 30 minutes?



26 The digestion of starch allows nutrients to be _____.

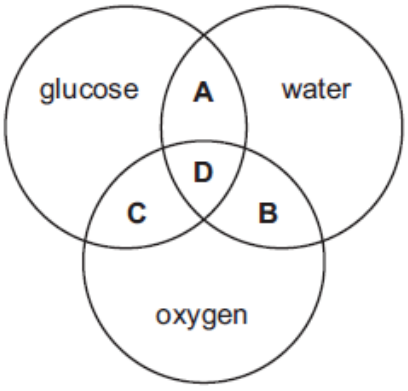
A absorbed into the blood.

B converted into amino acids.

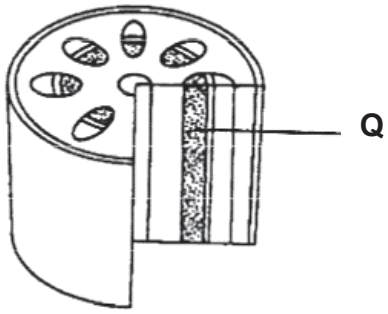
C ingested at the mouth.

D moved along the alimentary canal.

27 The diagram refers to some substances found in plant cells. Which area of the diagram represents the end products of photosynthesis?



28 The diagram below shows a section through a stem. Samples of the contents of structure Q were tested.

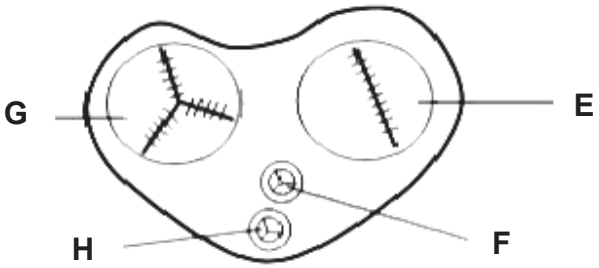


Which results are expected?

	Benedict's reagent	Iodine solution
A	+	+
B	+	-
C	-	+
D	-	-

Key
+ denotes positive results
– denotes negative results

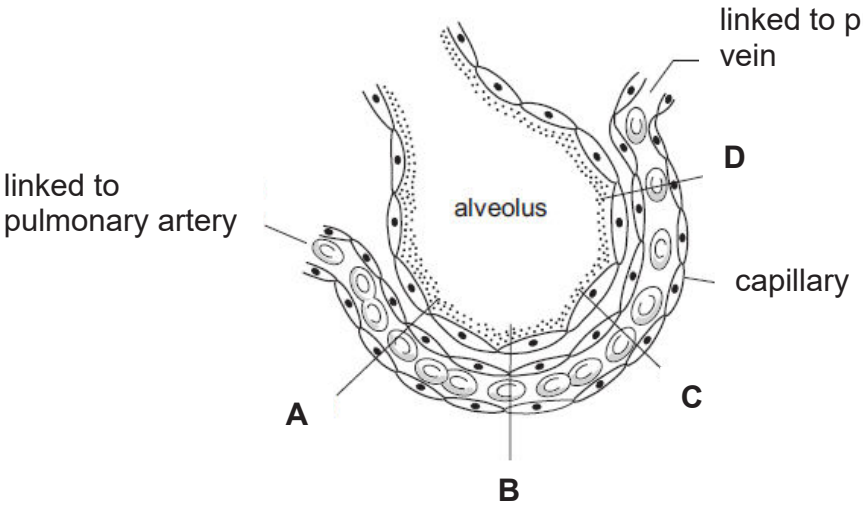
29 The diagram below shows the transverse section of a mammalian heart.



Which valves will open and close during ventricular contractions?

	open	close
A	E and F	F and H
B	E and G	F and G
C	F and G	E and F
D	F and H	E and G

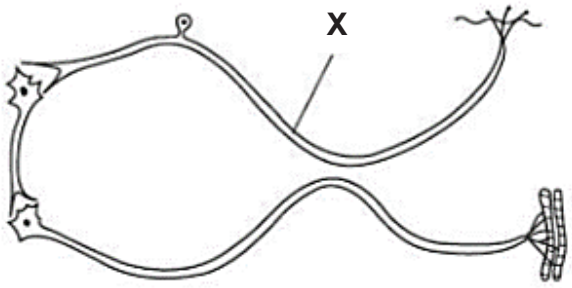
30 The diagram shows an alveolus and an associated blood capillary. At which point will the greatest rate of diffusion of carbon dioxide occur?



31 A girl stands 10 metres away from a sign and can see it clearly. She walks towards the sign and stops 0.5 metres from it. Which changes occur in her eyes so that the sign is still in focus?

	ciliary muscles	suspensory ligament	lens becomes	results in light rays refracted
A	contract	slacken	thicker	more
B	contract	tighten	thinner	less
C	relax	slacken	thinner	less
D	relax	tighten	thicker	more

32 The diagram below shows how nerve impulses are transmitted along three neurons.



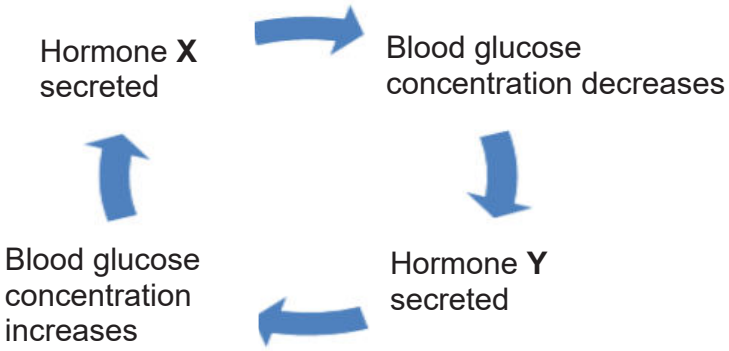
If a nerve block is administered at point X, how would the person respond to touching a hot object?

A He experiences pain and withdraws his hand from the hot iron involuntarily.
B He experiences pain but does not withdraw his hand from the hot iron.
C He does not experience pain and does not withdraw his hand from the hot iron.
D He does not experience pain but withdraws his hand from the hot iron involuntarily.

33 Which of the following statements about flowering plants is correct?

A Fertilisation can take place without pollination.
B Pollination and fertilisation are the same.
C Pollination and fertilisation must occur at the same time.
D Pollination can take place without fertilisation

34 The diagram shows how blood glucose is controlled in human.



Based on the diagram above, a lack of hormone Y would mean that

A blood glucose levels cannot rise back to normal after a period of low glucose levels.
B blood glucose levels will always be high.
C hormone X will never be produced.
D levels of stored glycogen will be high.

35 Which of the following shows the correct pathway which a sperm travels upon entering the female body?

A ovary→ urethra→ vagina
B ovary→ vagina→ uterus
C vagina→ oviduct→ uterus
D vagina→ uterus→ oviduct

36 Which statement is always true of dominant alleles?

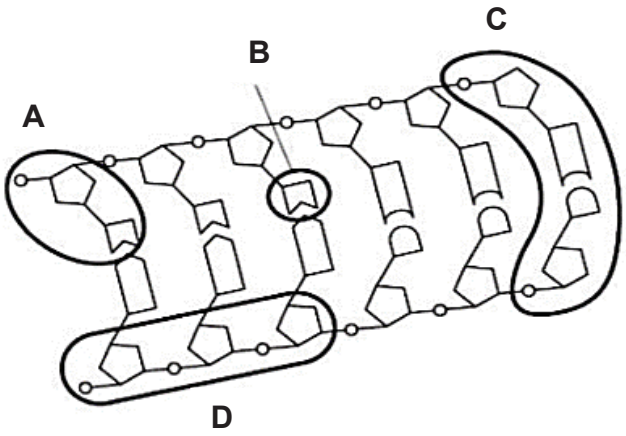
A They cannot undergo mutation.

B They give a greater chance of survival than recessive allele.

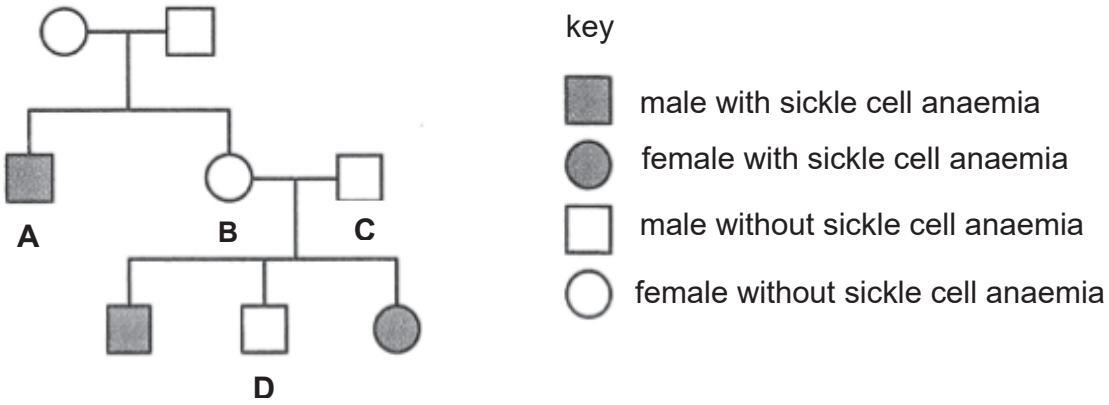
C The give the same phenotype in heterozygotes and homozygotes.

D They occur more frequently in the population than recessive alleles.

37 The diagram below shows the structure of a DNA molecule. Which one of the structures represents the sugar-phosphate backbone?



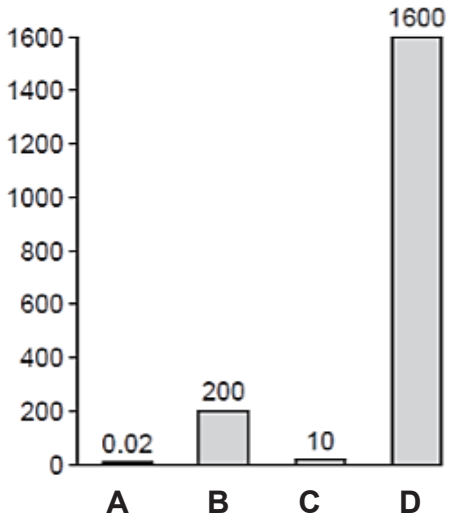
38 Sickle cell anaemia is a recessive condition. Which person has two alleles for sickle cell anaemia?



39 Sewage accidentally enters a river for several days. What are the changes to concentration of oxygen, the number of bacteria and the number of fishes?

	concentration of oxygen	number of bacteria	number of fishes
A	decreases	decreases	increases
B	decreases	increases	decreases
C	increases	decreases	decreases
D	increases	increases	increases

40 The graph shows the quantities of pesticide that accumulate in four populations, **A**, **B**, **C** and **D**, each at different trophic levels in a food chain. Which population is most likely to be herbivores?



END OF PAPER

NAME:	NO:	CLASS:

ADMIRALTY SECONDARY SCHOOL

PRELIMINARY EXAMINATION 2018

SUBJECT	:	Science (Biology)
CODE/PAPER	:	5078/04
LEVEL/STREAM	:	Secondary 4 Express/ 5 Academic
DATE	:	20th August 2018
TIME	:	0800h – 0915h
DURATION	:	1 hour 15 minutes

Instructions to candidates:
Write your name, index number and class on the cover page.
Write in dark blue or black pen.
Do not use staples, paper clips, highlighters, glue or correction fluid.

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

Section B
Answer any **two** questions.
Write your answers on the lined pages provided.
The number of marks is given in brackets [ ] at the end of each question or part question.

Candidates are reminded that all quantitative answers should include appropriate units.
The use of an approved scientific calculator is expected, where appropriate.
The number of marks is given in brackets [ ] at the end of each question or part question.

For Examiner's Use	
Section A	
Section B	
Total	

DO NOT TURN OVER THIS PAPER UNTIL YOU ARE TOLD TO DO SO.

Section A

Answer all questions.

1 (a) (i) Define the term mutation.

……

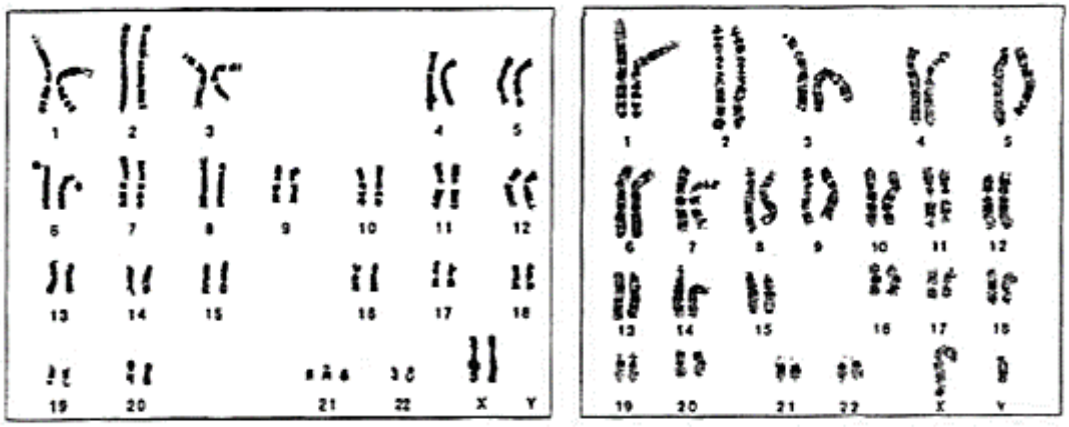
…… [1]

(ii) State two causes of mutation.

……

…… [2]

(b) Figure 1.1 shows the chromosomes of two people, person A and person B.



person A person B

Fig 1.1

(i) State two differences in terms of numbers and types, between the chromosomes of person A and the chromosomes of person B.

……

……

……

…… [2]

(ii) Who between the two has a genetic condition? Name the condition.

…… [2]

(iii) State the gender of person B. Give a reason for your answer.

……

…… [2]

2 Figure 2.1 below shows an experimental set-up used to investigate the rate of photosynthesis in a partially submerged water plant at different temperatures.

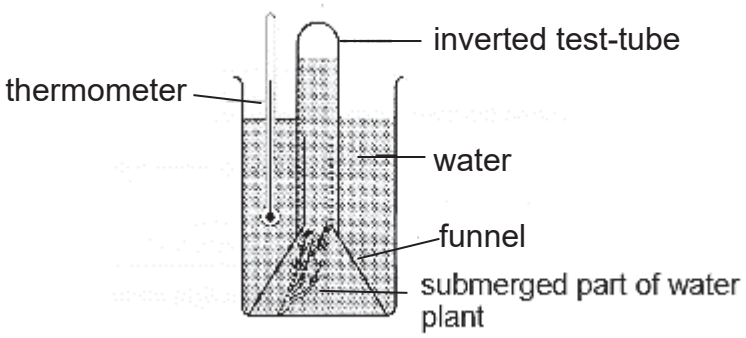


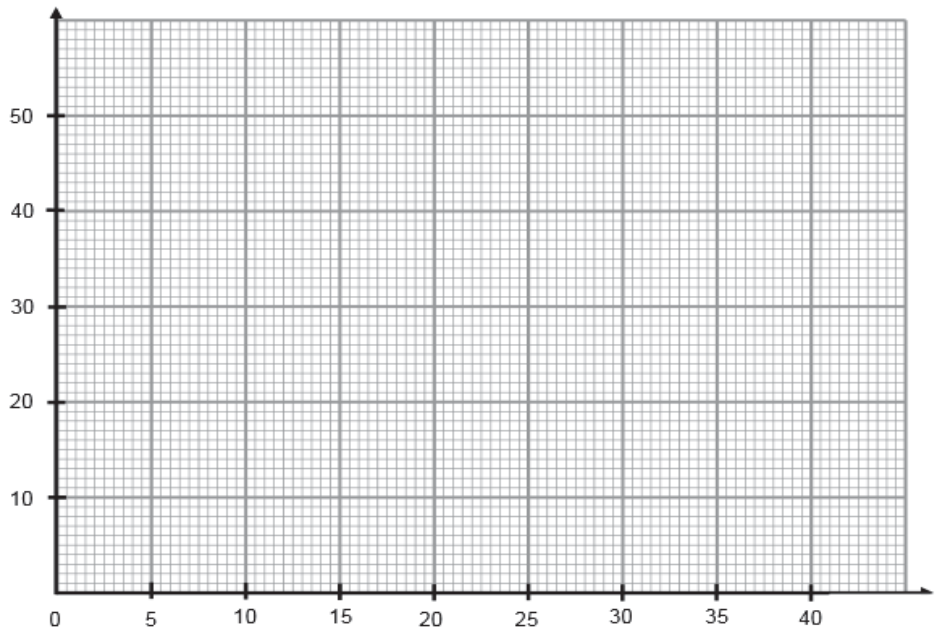
Fig 2.1

The rate of photosynthesis was measured by counting the number of bubbles produced per minute at each temperature. The results of the experiment are shown in the table below.

Temperature/ ^{O}C	0	5	10	15	20	25	30	35	40
Rate of photosynthesis/ bubbles per min	2	3	7	12	20	36	47	46	5

(a) Using information from the table above, plot the results on the grid and draw a best fit curve. [2]

Rate of photosynthesis/ bubbles per min



(b) What do the bubbles represent?

…… [1]

(c) What does the graph show about the relationship between temperature and rate of photosynthesis?

……

…… [1]

(d) Describe and explain briefly what happens to the rate of photosynthesis when temperature increases beyond 40 ^{o}C.

……

……

…… [2]

(e) Describe briefly two ways how the structure of the leaf is adapted to photosynthesis?

……..

……..

…….. [2]

3 Figure 3.1 shows parts of the human digestive system.

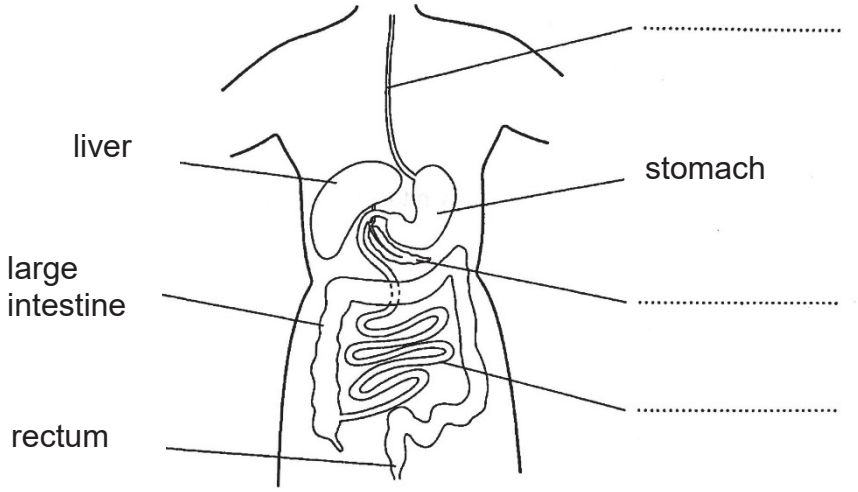


Fig 3.1

(a) Complete Fig 3.1 by adding the three missing labels. [3]

(b) Briefly state two functions of the liver.

……

……

……

…… [2]

(c) Injury or weakening of the rectal muscles may result from childbirth, ageing and other trauma. What do you think is a possible consequence of such injuries?

……

…… [1]

(d) In the alimentary canal, digestion is aided by three types of enzymes. Complete the table below to show the names, substrates and end-products of these three digestive enzymes.

name of enzyme	name of substrate	end-products
amylase		
protease		
	fat	

[3]

4 Figure 4.1 shows a bag containing sucrose solution. The bag is made from a material that acts as a partially permeable membrane.

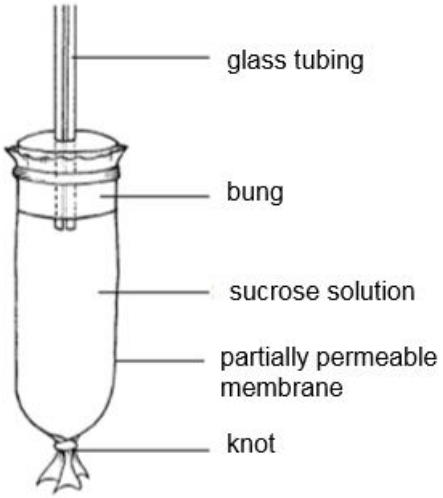


Fig 4.1.

(a) Define the term *partially permeable membrane*.

……

…… [1]

(b) At the start, the bag containing the sucrose solution weighed 30g. The bag was then put into a beaker of water for one hour. After one hour, the bag was taken out of the water and weighed again. It then weighed 33g. Calculate the percentage increase in mass of the bag after one hour. Show your working.

[2]

(c) Explain why the bag increased in mass after one hour.

……

……

……

…… [3]

5 **(a)** Table 5.1 below shows the names of the parts of a flower and their functions. Complete the table by filling in the four blank spaces.

part of flower	function
stigma	
	attract insects
stamen	
ovary	

[4]

Table 5.1

(b) **(i)** In some plants, pollen is produced before the carpel has finished growing. By the time the carpel is ready for pollination, pollen production has stopped. Suggest why this happens?

……

…… [1]

(ii) In what way is this an advantage to the plant?

……

…… [1]

6 Figure 6.1 shows the changes to an eye as it was subjected to changes in the environment.

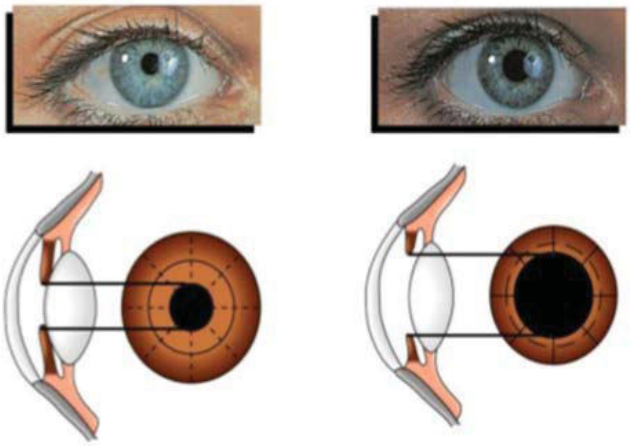


Fig 6.1

Upon the changes in the environment as shown in Fig.6.1, state with an explanation in each case, whether the eye

(a) **(i)** is looking at a nearer or further object;

……

……

…… [2]

(ii) is in brighter or dimmer light.

……

……

…… [2]

(b) Are both changes examples of voluntary or involuntary act? Explain your answer.

……

……

……

…… [3]

Section B

Answer two out of three questions.

7 Figure 7.1 shows the carbon cycle.

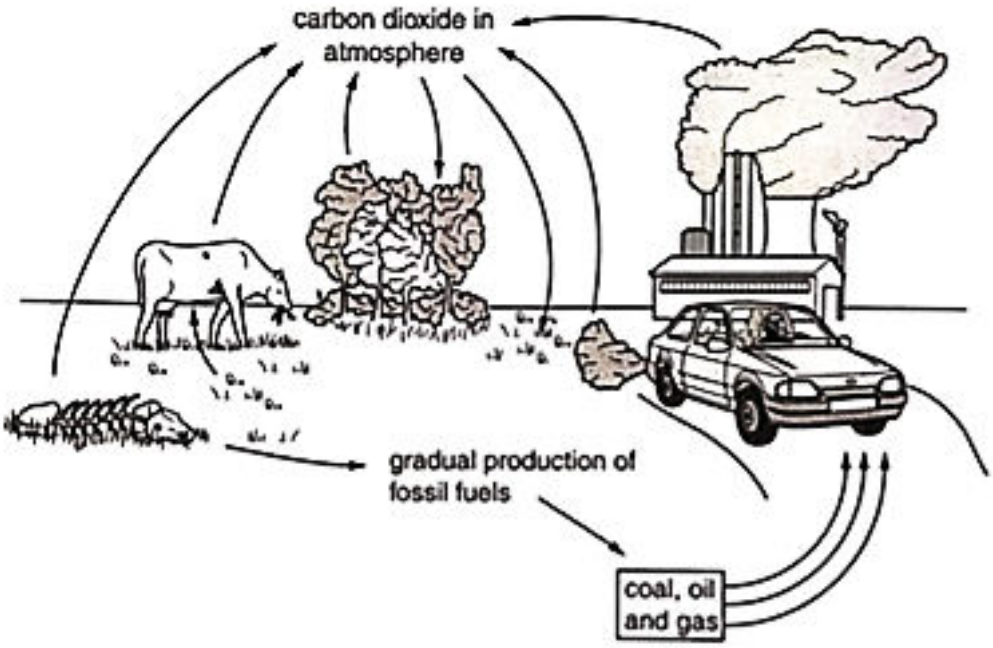


Fig 7.1

(a) Explain how photosynthesis, respiration and animal nutrition are involved in the carbon cycle.

……

……

……

……

……

……

…… [5]

(b) The burning of fossil fuels and the destruction of world's forests are both increasing. Predict and explain what effect these increases will have on the carbon cycle.

……...

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……...

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……... [5]

8 (a) (i) Figure 8.1 shows the changes in blood glucose concentration in person X and person Y.

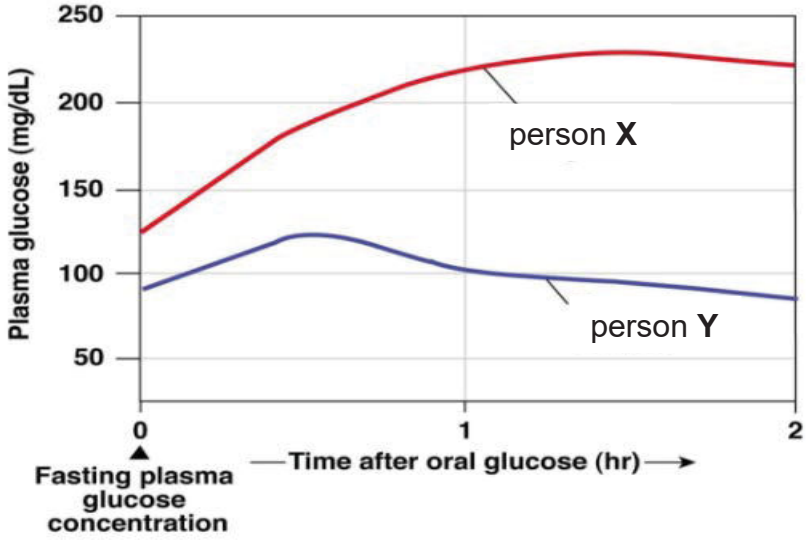


Fig 8.1

Which of the two person is suffering from diabetes? Explain your answer with reference to Fig 8.1.

.....

.....

..... [3]

(ii) Describe and explain the role of hormones in maintaining a relatively constant blood glucose concentration.

.....

.....

.....

.....

.....

.....

.....

..... [7]

9 (a) A person touches a hot object and immediately pulls away his hand. Figure 9.1 shows the response. Explain how structures A, B, C and D enable the response to occur. Identify these four structures in your answer.

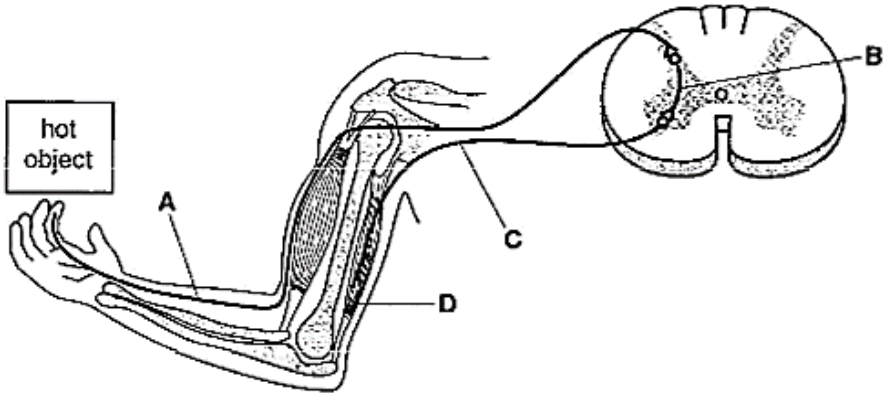


Fig 9.1

……

……

……

……

……

……

……

……

……

……

…… [6]

(b) In an experiment, a student used a photometer to measure the rate of transpiration of a leafy twig when it was blown by wind. The result was shown in Figure 9.2 below.

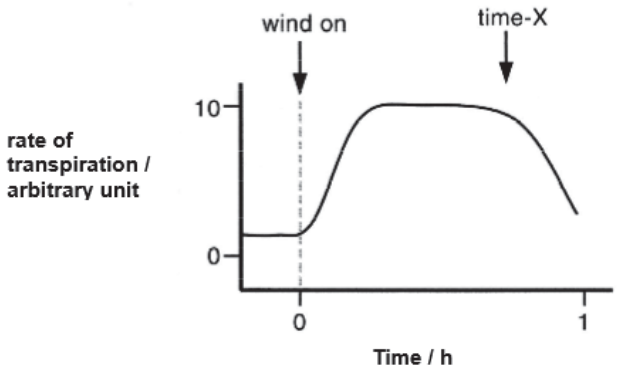


Fig 9.2

Describe and explain the effect of wind on the rate of transpiration of a leafy twig from 0 hour to just before time X.

……...

……...

……...

……...

……...

……... [4]

END OF PAPER

Secondary 4EXP/5NA

Mid Year Examinations 2018

Marking Scheme

Paper 1:

21. C	22. D	23. A	24. C	25. B	26. A	27. D	28. D	29. D	30. A
31. A	32. C	33. D	34. A	35. D	36. C	37. D	38. A	39. B	40. C

Paper 4:

SECTION A

1(a) (i) Mutation refers to the change/result in error in gene structure or chromosome number (1m)

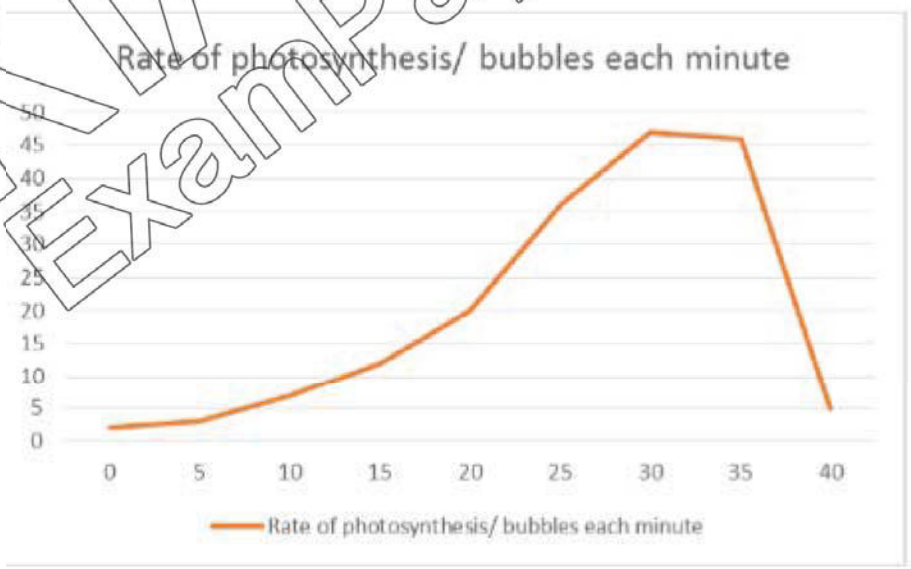
(ii) chemical agent/ radiation/ infectious agents/ mutagens (any 2, 1m each)

(b)(i) A has 47 chromosomes, while B has 46 chromosomes (1m). A has 2 X chromosomes, while B has 1 X and 1 Y chromosomes (1m).

(ii) Person A (1m), Down syndrome (1m)

(iii) Male (1m), one X and one Y chromosome (1m)

2(a)



1 m for
correct points plotted, 1 m for joining the points

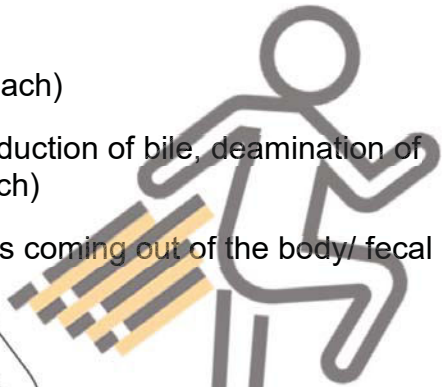
(b) The bubbles represent oxygen produced from photosynthesis (1m)

(c) Rate of photosynthesis increases as temperature increases (1m)

(d) As temperature goes beyond 40, rate of photosynthesis decreases (1m). Enzymes involved in photosynthesis starts to denature (1m)

(e) Palisade densely packed and has high number of chloroplast (1m) for maximum absorption of sunlight (1m)/ spongy mesophyll loosely packed (1) to create intercellular spaces for gaseous exchange (1m) /large and broad lamina to absorb maximum amount of light/ a petiole to hold leaf in a position to absorb sunlight / network of veins to transport water and manufactured food

Or any other possible explanation



3(a) oesophagus, pancreas, small intestine (1m each)

(b) regulation of blood glucose concentration, production of bile, deamination of amino acids, breakdown of alcohol (any 2, 1m each)

(c) They will not have the ability to hold their stools coming out of the body/ fecal incontinence/loose bowel movement (1m)

(d)

name of enzyme	name of substrate	end-products
amylase	Starch (1/2)	Maltose (1/2)
protease	Proteins (1/2)	Amino acids (1/2)
Lipase (1/2)	fat	Glycerol and fatty acids (1/2)

4(a) The term means the membrane allows only certain molecules/ particles through it (1m)

(b) (33-30)/30 x 100% = 10% (1m for correct working, 1 m for correct answer)

(c)

- Water potential in the beaker of water is higher than the water potential of the sucrose solution (1m)

- water molecules will move from a region of high water potential to a region of lower water potential by osmosis (1m)

- hence water molecules move across the partially permeable membrane and into the sucrose solution (1m)

5(a)

part of flower	function
Stigma	Receive pollen grains (1m)
Petals (1m)	attract insects
Stamen	Consists of anther and filament (1m)
Ovary	Contains 1 or more ovules (1m)

b(i) to allow for cross pollination/ to prevent self-pollination (1m)

(ii) only one parent needed / offsprings will inherit the beneficial genes and qualities from parents, and are likely to pass it down to their offsprings (1m)

6(a)(i) The eye is looking at distant/far objects (1m) as the lens is stretched thin/less convex (1m)

(ii) The eye is in dim light (1m) as the pupil diameter is larger (1m).

(b) Involuntary act (1m). Changes do not involve any conscious control (1m) as the neurons by pass the brain (1m)

SECTION B:

7(a)

- Carbon dioxide is taken in plants from the atmosphere during photosynthesis (1m)
- During photosynthesis, the carbon dioxide and other raw materials are used to make glucose and other carbon compounds (1m)
- Carbon compounds are transferred to animals/become part of animal bodies when animals eat plants/ feeding (1m)
- Glucose is broken down during respiration (1m)
- Carbon dioxide is released into the atmosphere during respiration (1m)

(b)

- When fossil fuels are burnt, carbon-containing compounds are converted into carbon dioxide and released in to the atmosphere (1m)

- increasing trend in burning of fossil fuels will cause an increase in carbon dioxide concentration in the atmosphere (1m)

- Plants remove carbon dioxide from the atmosphere during photosynthesis (1m).

- With increasing trends of deforestation, there will be fewer trees to remove carbon dioxide from the atmosphere (1m)

- This will lead to an overall increase in amount of carbon dioxide remaining in the atmosphere (1m)

8(a)(i) Person X (1m). Person X's resting plasma glucose concentration was at a high level (1m) and after the glucose consumption it remained high (1m).

(ii) At high blood glucose concentration, insulin will be produced by the islet of Langerhans in the pancreas (1m).

Insulin helps decrease blood glucose concentration (1m) by;

- increase uptake of glucose by the cells
- stimulate liver to convert the excess glucose to glycogen for storage
- increase oxidation of glucose for respiration

At low blood glucose concentration, glycogen will be produced by the islet of Langerhans in the pancreas (1m).

Glucagon helps to increase blood glucose concentration (1m) by;

- Converting glycogen to glucose
- Converting fat and amino acids into glucose
- Converting lactic acid to glucose
  Any 3 explanations, 1m each

9(a)

- Upon touching the hot object, heat receptors in the skin of the hand will be stimulated and produce nerve impulses (1m)
- Nerve impulses will be transmitted by A, the sensory neuron, into the spinal cord (1m)
- In the grey matter of the spinal cord, nerve impulses are transmitted across a synapse, into B, the relay neuron (1m)
- Relay neuron then transmit the nerve impulses into C, the motor neuron (1m)
- Motor neuron transmit the nerve impulses out of the spinal cord to D, the arm muscles (1m)
- Upon receiving the nerve impulses, the arm muscle contract and cause the hand to be pulled away from the hot object.

(b)

- increase in wind increases the rate of transpiration up to a maximum point, where it remains constant (1m)

- wind will blow away /remove the water vapour found outside the leafy twig (1m)

- this increases the concentration gradient of water vapour between the inside and outside of leaf (1m)

- more water vapour will diffuse out of the leaf (1m)

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