COMMONWEALTH SECONDARY SCHOOL

PRELIMINARY EXAMINATION 2020

BIOLOGY
(6093/01)

Name: _____ ( ) Class: _____

SECONDARY FOUR EXPRESS
Biology
Paper 1 Multiple Choice

17 Sep 2020
1 hour
1030-1130

Additional Materials: Multiple Choice Answer Sheet

READ THESE INSTRUCTIONS FIRST

Write in soft pencil.
Do not use staples, paper clips, highlighters, glue or correction fluid.
Write your name, class and index number on the Answer Sheet.

There are **forty** questions on this paper. 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.

Read the instructions on the Answer Sheet very carefully.

Each correct answer will score one mark. A mark will not be deducted for a wrong answer.
Any rough working should be done in this booklet.

Parent's Signature

Biology Prelim	
Paper 1	40
Paper 2	80
Total	120

This document consists of **24** printed pages and 1 blank page.

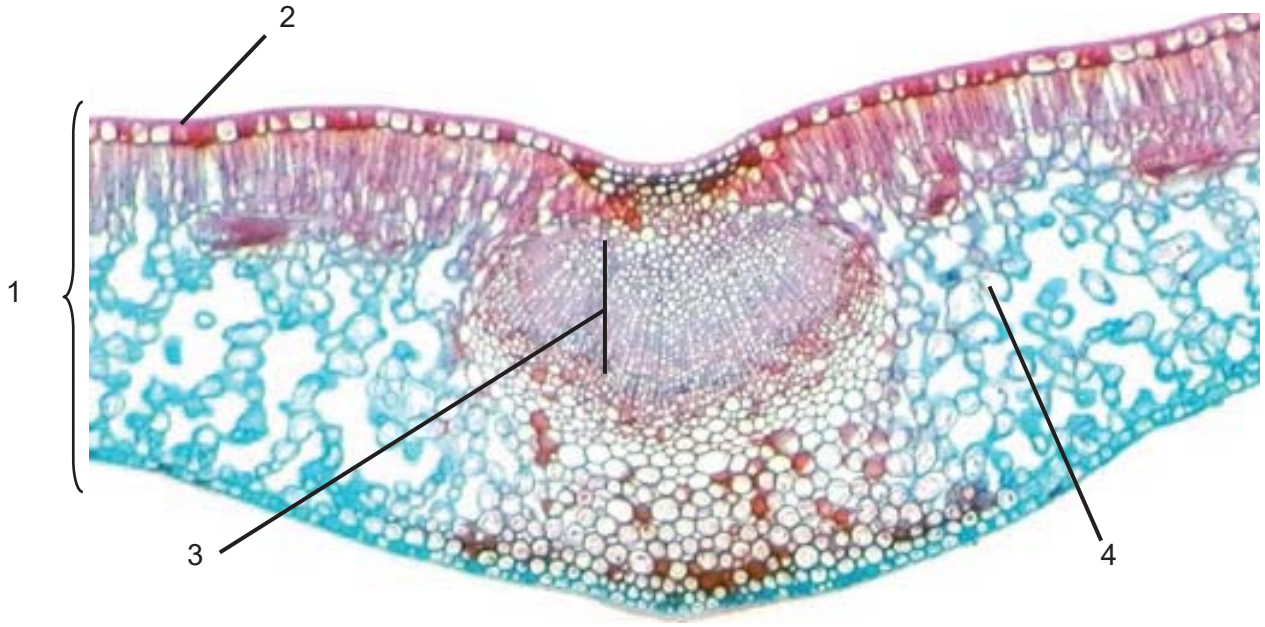
1 During a lesson about animal and plant cells, a student reads out several statements about cell structure. Which of the following statements are correct?

1. All cells have a cell wall.
2. Cell walls are made of cellulose.
3. Chromosomes carry DNA.
4. Cell walls contain starch.
5. All cells have a cell membrane.
6. A sap vacuole helps an animal cell maintain its turgor.
7. Chromosomes are found in the cytoplasm.

A 1, 3 and 7 **B** 2, 3 and 5 **C** 2, 4 and 6 **D** 4, 5 and 7

2 The diagram shows a micrograph of a cross section of a leaf.

Which option below shows the correct level of organisation of the various parts indicated below?



	cell	tissue	organ
A	3	2	1
B	4	1	2
C	4	2	3
D	2	3	1

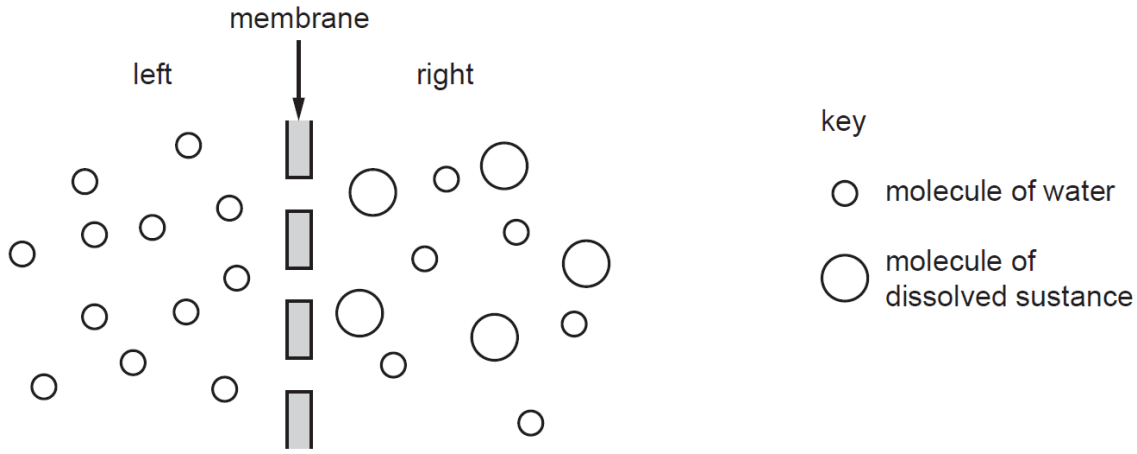
3 The table shows the rates of absorption of two different sugars, arabinose and glucose, in living and dead intestines. The concentrations of the sugars inside the intestines were the same in each case.

	rate of absorption / arbitrary units	
	arabinose	glucose
living intestine	31	102
dead intestine	31	34

What are the main methods of absorption of arabinose and glucose in the living intestine?

	arabinose	glucose
A	active transport	active transport
B	active transport	diffusion
C	diffusion	active transport
D	diffusion	diffusion

4 The diagram represents two substances, separated by a membrane through which osmosis can occur.



Which statement describes how the molecules will move?

A Molecules of dissolved substance move from left to right.
B Molecules of dissolved substance move from right to left.
C Overall, water molecules move from left to right.
D Overall, water molecules move from right to left.

5 The table below shows the chemical elements present in four unknown substances.

Which substance, A, B, C or D, could be an enzyme?

	carbon	hydrogen	oxygen	nitrogen
A	✓	✓	✓	✓
B	✓	✓	✓	X
C	✓	✓	X	✓
D	✓	X	✓	✓

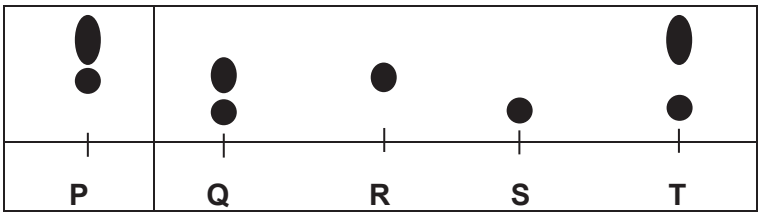
Key: ✓ present
X absent

6 A sample of urine from an individual suffering from glomerular disease is tested for nutrients. In such patients, their kidney can no longer remove waste and excess fluids efficiently. Blood and protein cannot be filtered and are excreted in the urine.

Which of the following correctly identifies the results of the food tests performed from his urine sample above?

	Benedict's test	iodine test	biuret test
A	orange precipitate	yellowish-brown solution	violet solution
B	orange precipitate	blue-black solution	violet solution
C	blue solution	yellowish-brown solution	violet solution
D	blue solution	yellowish-brown solution	blue solution

7 Five disaccharides were each hydrolysed in the presence of dilute acid and the purified products were separated by chromatography. The results are shown in the diagram below.



Sample **P** in the diagram represents the products obtained from the hydrolysis of sucrose to fructose and glucose.

Which of the following represents the results obtained from the hydrolysis of lactose and maltose?

	lactose	maltose
A	**Q**	**R**
B	**Q**	**S**
C	**T**	**Q**
D	**T**	**R**

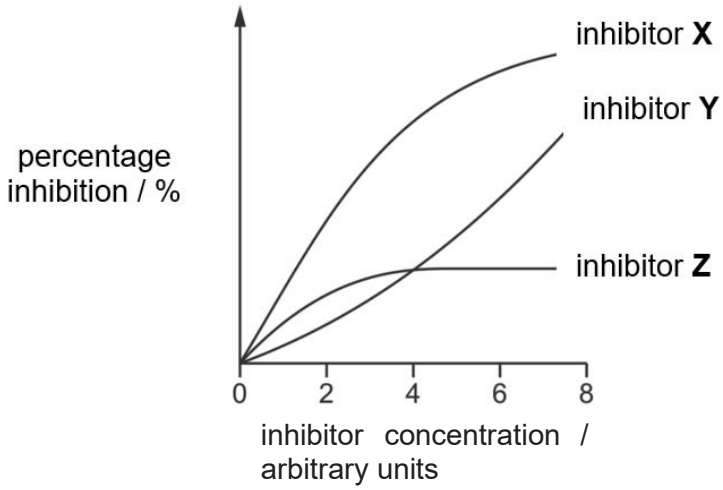
8 Lipase catalyses the conversion of fats into fatty acids and glycerol.

$$\text{fats} \xrightarrow{\text{lipase}} \text{fatty acids} + \text{glycerol}$$

Three different enzyme inhibitors of lipase **X**, **Y** and **Z,** which prevent the above reaction from occurring, were investigated.

The percentage inhibition of lipase was measured at different concentrations of inhibitor.

The graph shows the results of the investigation.

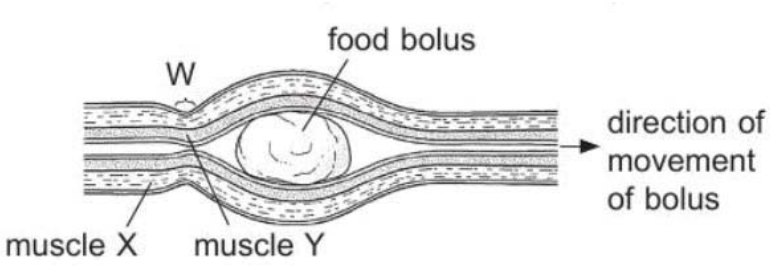


Which of the following are valid conclusions from these results?

1. The higher the concentration of inhibitor **X**, the lesser the amount of fats is broken down.
2. The production of fatty acids and glycerol using inhibitor **Y** is higher than when inhibitor **Z** is used.
3. The production of fatty acids and glycerol at an inhibitor concentration of 2 arbitrary units is lower than at an inhibitor concentration of 4 arbitrary units, for all inhibitors.

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

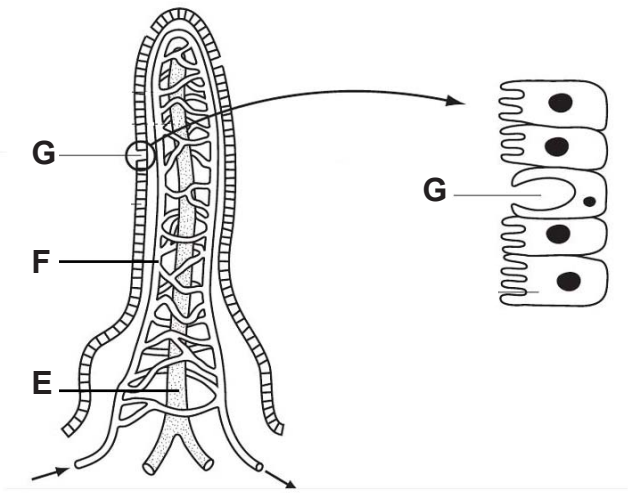
9 The diagram shows a food bolus moving down the oesophagus.



Which row identifies the muscles and their actions at region W?

	muscle X		muscle Y	
	muscle type	muscle action	muscle type	muscle action
A	circular	contracting	longitudinal	relaxing
B	circular	relaxing	longitudinal	contracting
C	longitudinal	contracting	circular	relaxing
D	longitudinal	relaxing	circular	contracting

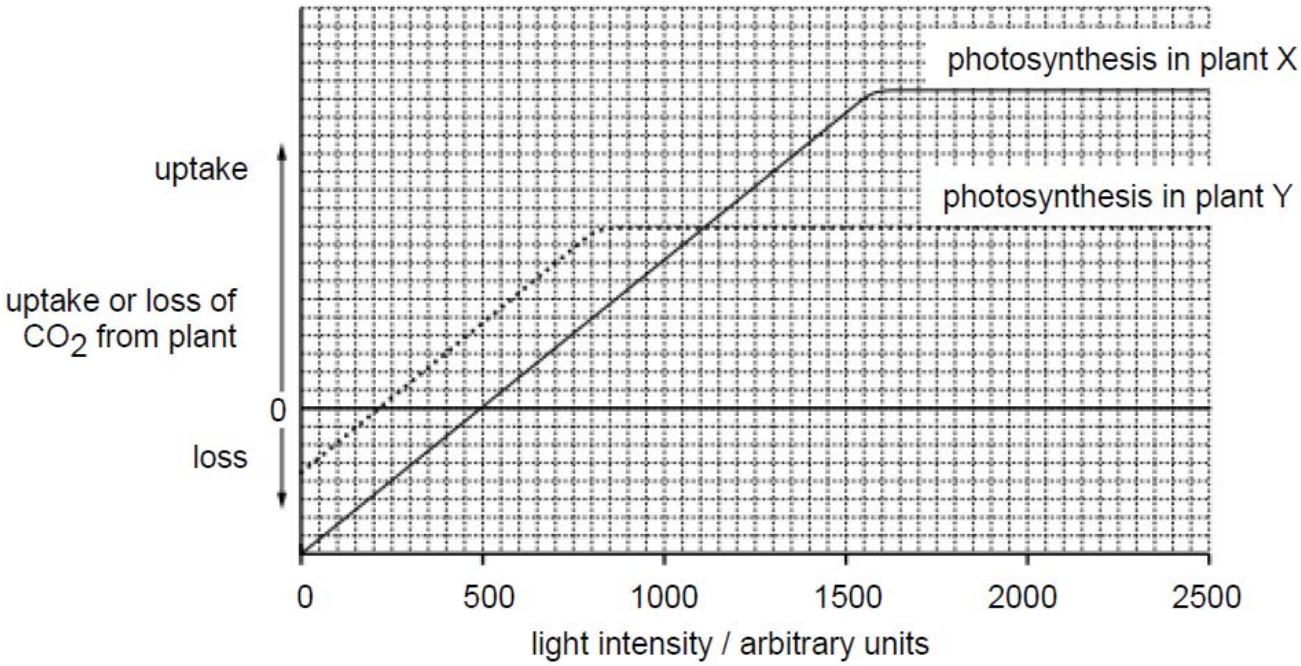
10 The diagram below shows part of the small intestine.



What is the function of the structures labelled **E**, **F** and **G**?

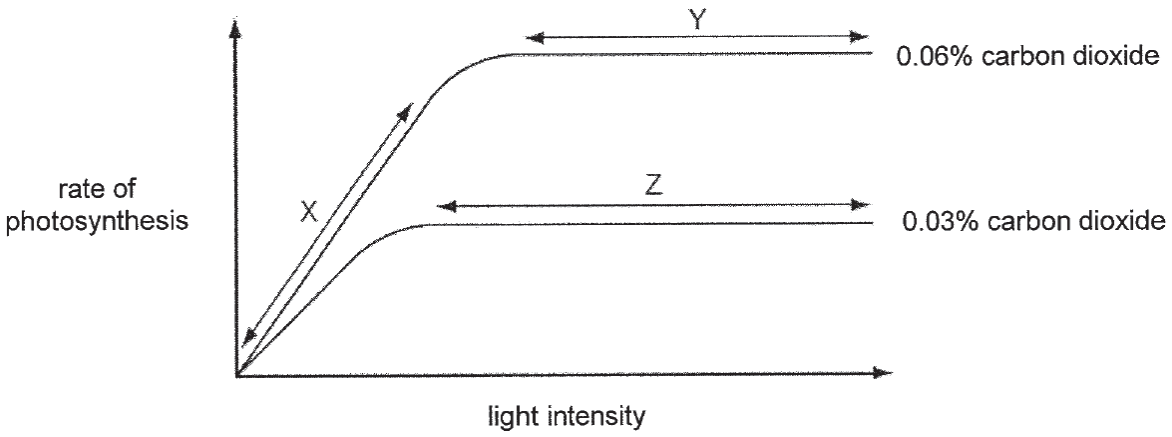
	E	**F**	**G**
A	fatty acids absorption	glucose absorption	enzymes production
B	fatty acids absorption	glucose absorption	collect undigested food
C	glucose absorption	fatty acids absorption	enzymes production
D	glucose absorption	fatty acids absorption	collect undigested food

11 With reference to the diagram below, which of the following statement is correct?



A Plant X is adapted to grow in the shade while plant Y is adapted to grow in bright light.
B Rate of photosynthesis is equal to rate of respiration at light intensity of 500 units for plant Y.
C Rate of photosynthesis in plants X and Y are equal at light intensity of 1100 units.
D Uptake of oxygen is higher than loss of oxygen in plant Y at light intensity above 200 units.

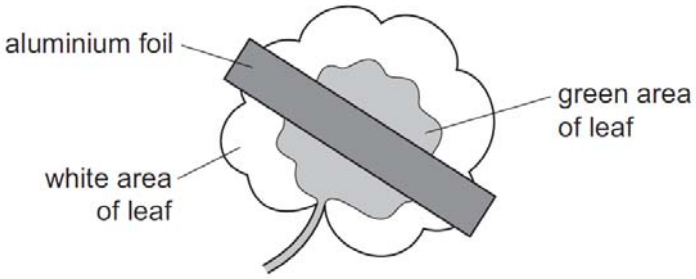
12 The graph shows the rate of photosynthesis of a plant at increasing light intensities at two different carbon dioxide concentrations.



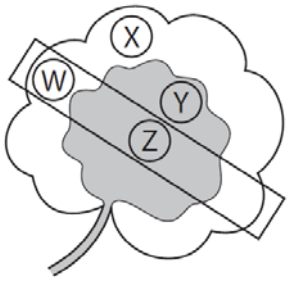
The temperature is kept constant. What may be limiting the rate of photosynthesis at X, Y and Z?

	X	Y	Z
A	carbon dioxide	light intensity	carbon dioxide
B	carbon dioxide	light intensity	light intensity
C	light intensity	carbon dioxide	carbon dioxide
D	light intensity	carbon dioxide	light intensity

13 A plant has leaves with both green and white areas. One of its leaves is partly covered with aluminium foil which blocks light.



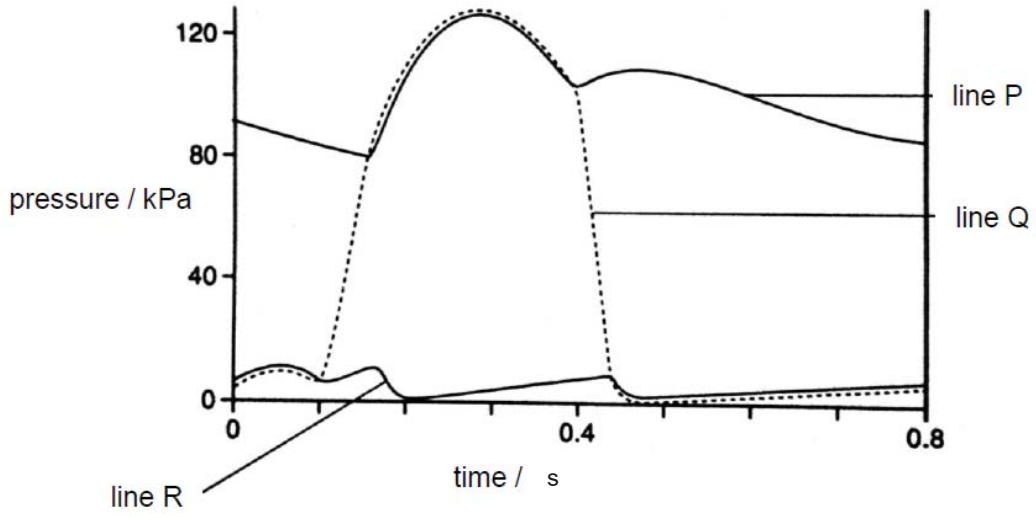
The plant is then placed under a lamp for 24 hours. After this time, discs are cut from the areas of the leaf shown and tested with iodine solution.



Which of the leaf discs will give a blue-black colour when tested with iodine solution?

A W and X **B** X only **C** Y and Z **D** Y only

14 The diagram shows changes in pressure in the left side of the heart during the cardiac cycle.



Which statements are correct?

1 The increase in pressure in line P from 0.15 to 0.30 s is due to the contraction of muscles in the left ventricular wall.

2 The increase in pressure in line Q from 0.0 to 0.05 s is due to the atrium filling up with blood.

3 The lower pressure in line Q than in line P after 0.4 s is due to ventricular diastole and the closure of bicuspid valves.

4 The ratio of the duration of arterial systole to the ventricular systole is 1:3.

A 1 and 2 **B** 1 and 4 **C** 2 and 3 **D** 3 and 4

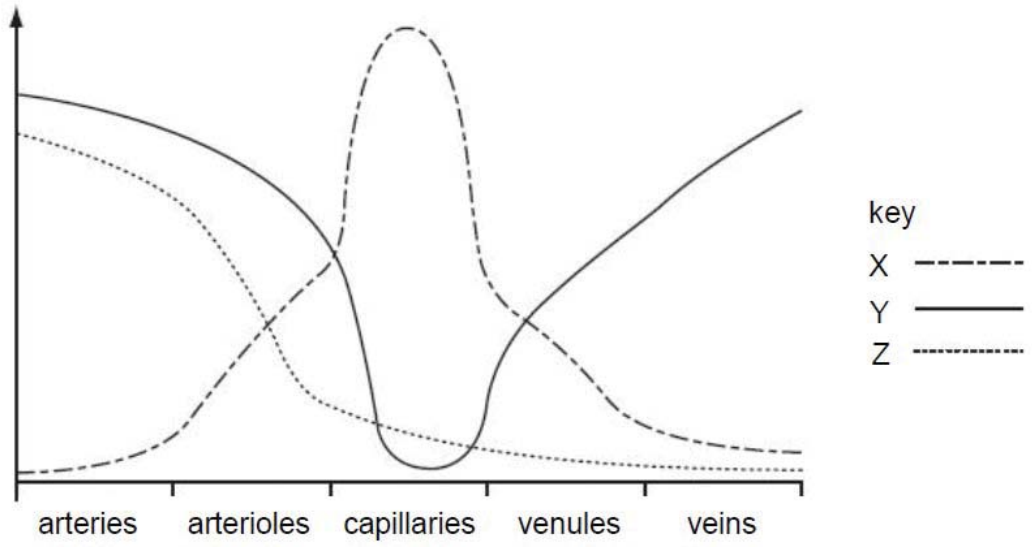
15 The table shows the blood test results of two students, **X** and **Y,** for blood transfusion.

		donor	
		X	**Y**
recipient	**X**	no agglutination	agglutination
	Y	no agglutination	no agglutination

Which of the following may be the blood types of students **X** and **Y**?

	student **X**	student **Y**
A	A	AB
B	A	O
C	B	B
D	AB	O

16 The graph represents data on blood vessels and blood flow.



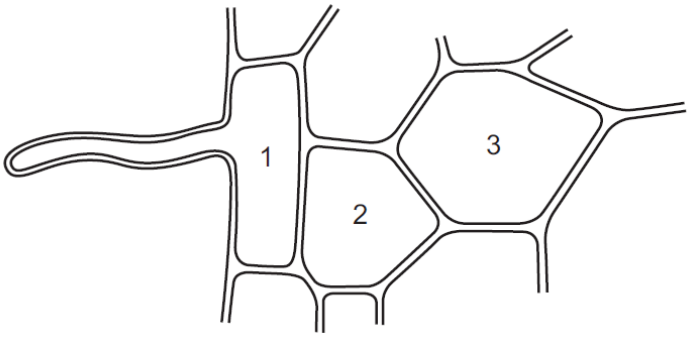
Which row correctly identifies the curves?

	pressure of blood	total cross-sectional area	velocity of blood flow
A	Y	Z	X
B	Z	Y	X
C	Z	X	Y
D	X	Y	Z

17 What happens when a person drinks a large volume of water?

	amount of anti-diuretic hormone secreted (ADH)	re-absorption of water from kidney tubule	volume of urine produced
A	less	less	more
B	less	more	less
C	more	less	more
D	more	more	less

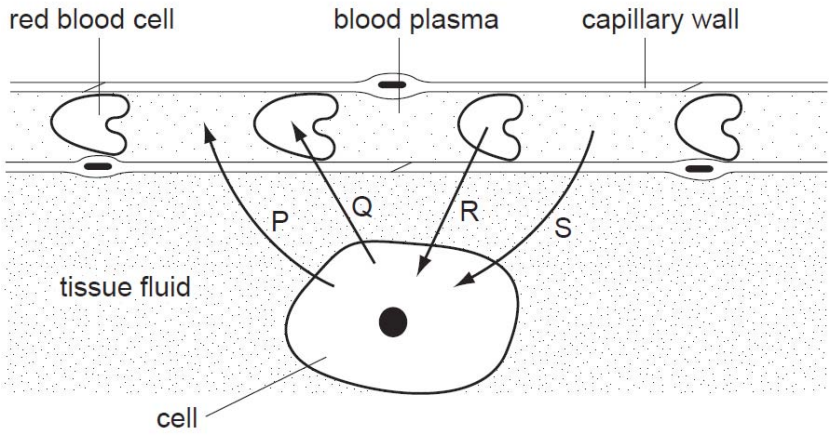
18 The diagram shows some cells in the root of a plant that is absorbing water from the soil.



How does the water potential of the cell marked 2 differ from the water potentials of the cells marked 1 and 3?

A higher than both cells 1 and 3 respectively
B higher than cell 1 and lower than cell 3 respectively
C lower than cell 1 and higher than cell 3 respectively
D lower than both cells 1 and 3 respectively

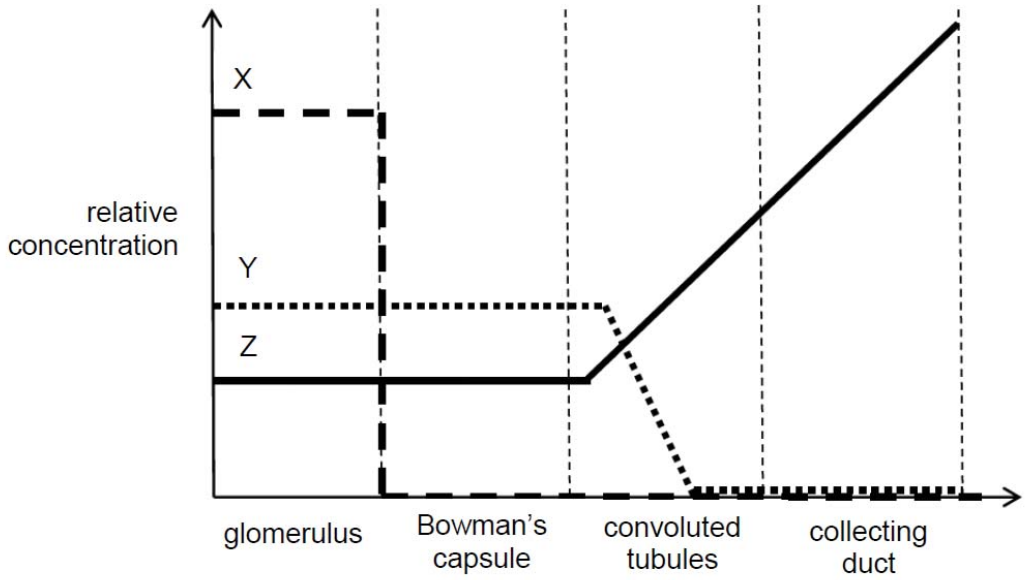
19 The diagram represents a blood capillary with an adjacent cell. The arrows represent the directions of movement of substances between the capillary and the cell.



Which of the following substances could represent P, Q, R and S?

	glucose	carbon dioxide	oxygen
A	P	R	Q
B	Q	S	P
C	R	Q	S
D	S	P	R

20 The line graphs show the relative concentration of glucose, protein and urea in the fluids obtained from various parts of the mammalian kidney.



Which option correctly matches the three line graphs?

	X	Y	Z
A	glucose	urea	protein
B	glucose	protein	urea
C	protein	urea	glucose
D	protein	glucose	urea

21 Which of the following affect the passage of substances from the afferent arteriole to the Bowman's capsule?

1. blood pressure
2. diffusion
3. osmosis
4. basement membrane of the glomerulus

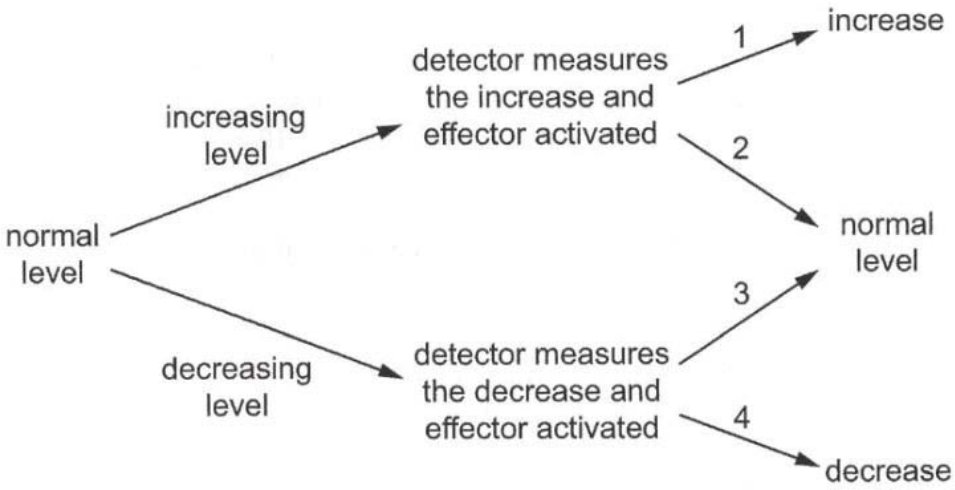
A 1 only

B 1 and 2 only

C 1 and 4 only

D 3 and 4 only

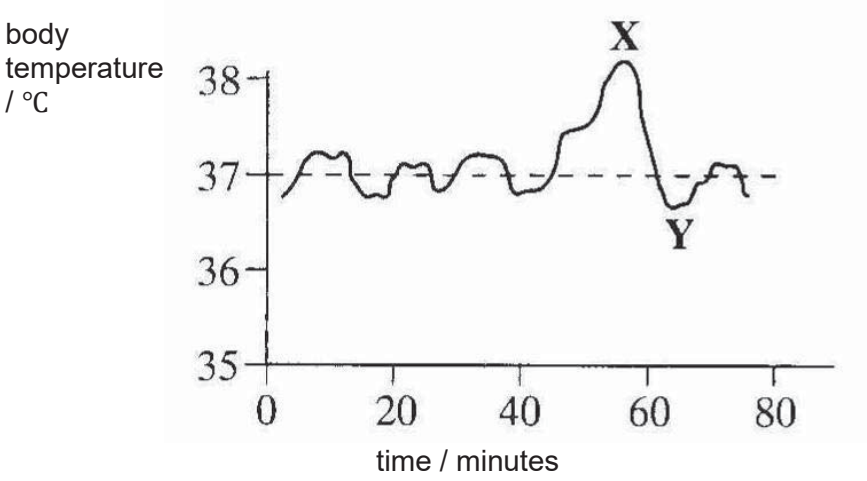
22 The diagram summarises the process of homeostasis.



Which numbered arrows represent the effects of negative feedback?

A 1 and 2 **B** 1 and 4 **C** 2 and 3 **D** 3 and 4

23 The graph below shows changes in a person's body temperature plotted against time.



What causes the change in temperature between **X** and **Y**?

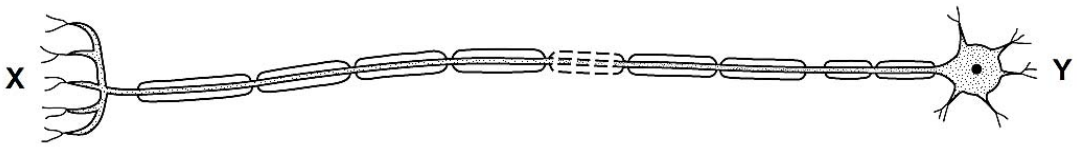
A increased evaporation of sweat

B reduced blood flow to skin

C shivering

D vasoconstriction of blood vessels under the epidermis

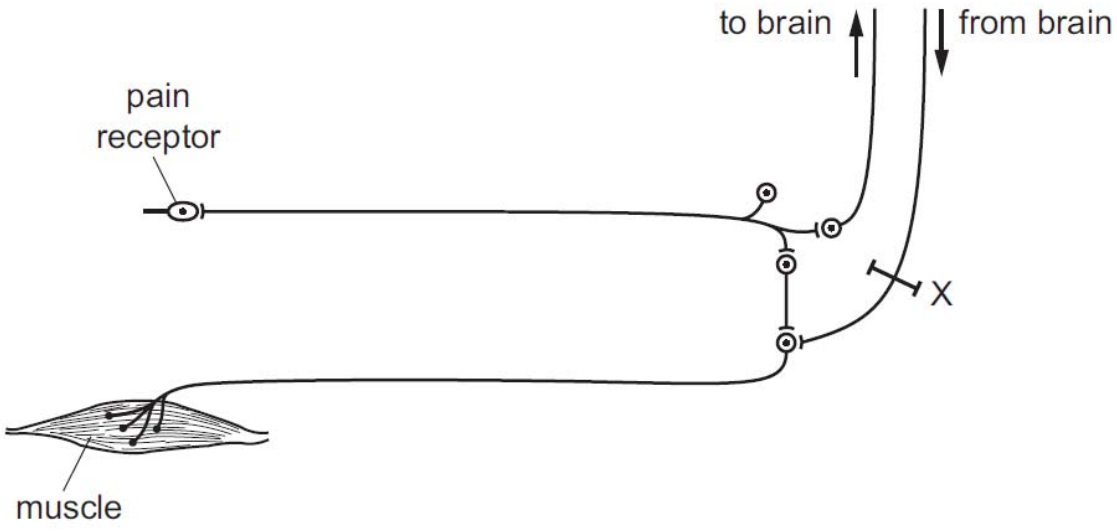
24 The diagram shows a neurone.



Which structures could be found at X and Y?

	X	Y
A	brain	intestine
B	brain	leg
C	eye	hand
D	gland	spinal cord

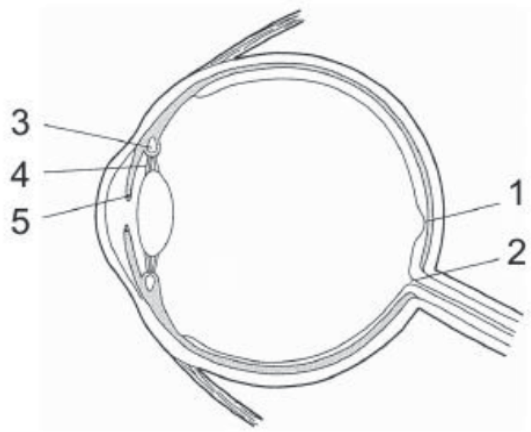
25 The diagram shows some of the nerve pathways associated in a person.



If the pathway at X is damaged, how does this affect the reflex?

A The person will not be aware that the reflex is occurring.
B The reflex cannot be controlled consciously.
C The response will occur without any stimulus.
D There is no response to the stimulus.

26 The diagram shows a section through the eye.



Which labelled structures are effectors and which are the receptors?

	effectors	receptors
A	1	4
B	3	2
C	4	3
D	5	1

27 The diagram shows two sections through the eye of the same person.

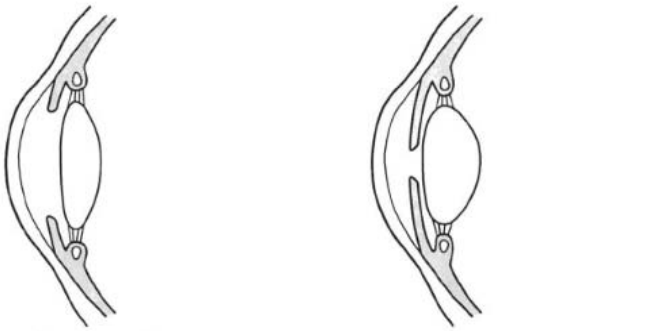


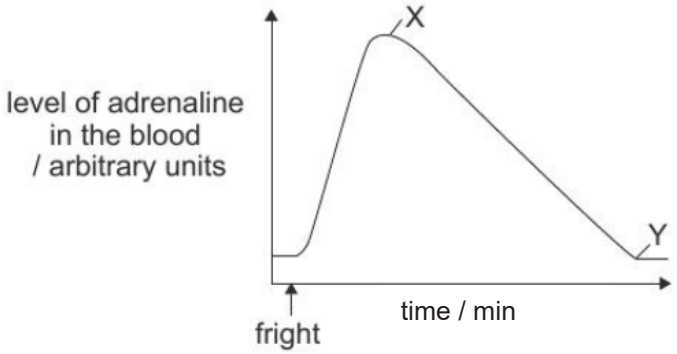
diagram 1
focusing on an object sixty metres away in dim light

diagram 2
focusing on an object one metre away in bright light

What happens to achieve the changes from the eye in diagram 1 to the eye in diagram 2 under the different conditions?

	ciliary muscles	iris radial muscles	iris circular muscles
A	contract	contract	relax
B	contract	relax	contract
C	relax	contract	relax
D	relax	relax	contract

28 In an experiment, a student is threatened by a large dog and has to run away to escape.
During the incident, the adrenaline levels in the student's blood are measured. The graph shows the results.



Which statement explains the change in adrenaline levels between point X and Y?

A Adrenaline is being broken down by the liver.

B Adrenaline is being excreted by the kidneys.

C Adrenaline is being returned to the endocrine gland that produced it.

D Adrenaline is used up by the target cells to perform the necessary task.

29 The following investigation was carried out using flower buds growing on three plants of the same species:

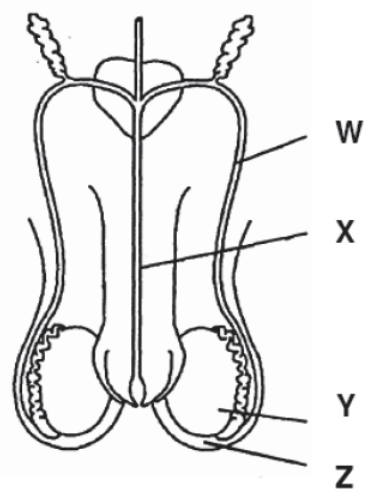
Plant 1 - The anthers were carefully removed and the buds left open to the air.
Plant 2 - The anthers were left untouched and a paper bag was tied tightly around each bud.
Plant 3 - The anthers were carefully removed and a paper bag was tied tightly around each bud.

Although all flowers later opened normally, only those on Plant 1 produced seeds.

What can we deduce from the above experiment?

A This result shows that in this species, only cross-pollination can take place.
B This result shows that in this species, only wind-pollination can take place.
C This result shows that in this species, only insect-pollination can take place.
D This result shows that in this species, both self-and cross-pollination can take place.

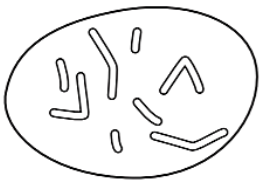
30 The diagram shows the reproductive system in man.



Which of the following is correct?

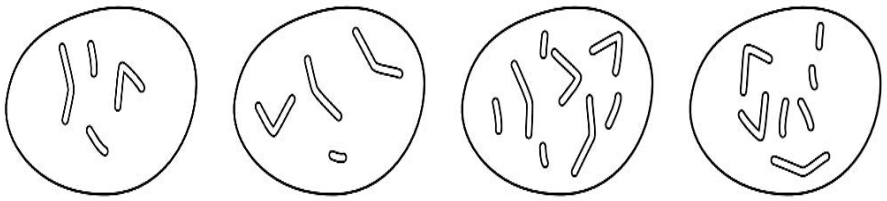
	W	X	Y	Z
A	passage of active sperms	passage of urine and sperms	production of sperms	assist the production of sperms
B	presence of semen	allows sperms to leave the body	storage of sperms	secretion of enzymes
C	presence of sperms	passage of active sperms	assist the production of sperms	storage of sperms
D	absence of semen	allows semen to leave the body	production of sperms	assist the development of sperms

31 The diagram shows the chromosomes in the nucleus of a cell that divides by mitosis.

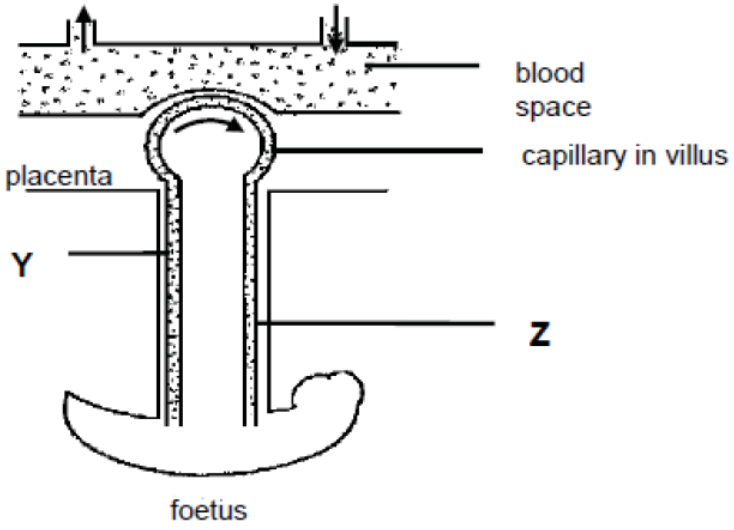


Which diagram shows the chromosomes in the nucleus of one of the daughter cells produced?

A **B** **C** **D**



32 The diagram shows the relationship between the blood systems of the foetus and that of the mother.



Which row shows the correct identity of the blood vessels and their contents?

	umbilical artery	umbilical vein	rich in waste products	rich in food and oxygen
A	Y	Z	Z	Y
B	Y	Z	Y	Z
C	Z	Y	Z	Y
D	Z	Y	Y	Z

33 The diagram shows a cell at anaphase I of meiosis.

Which diagram shows a normal gamete that can be produced from this cell?

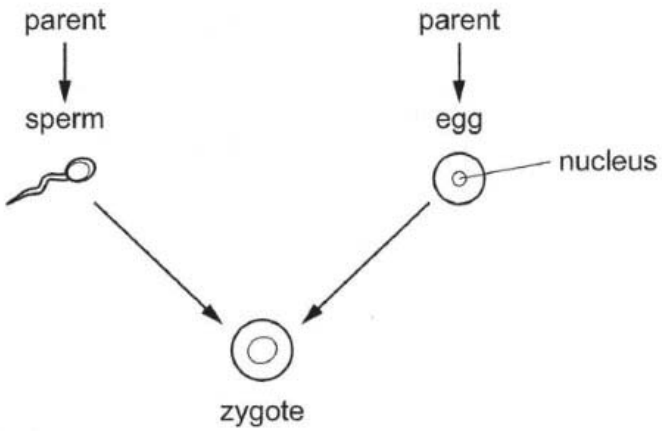
A

B

C

D

34 The diagram shows a human zygote being formed.

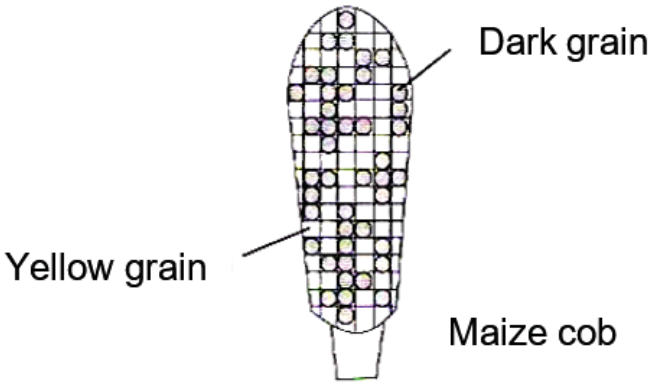


What describes the zygote?

	homologous chromosomes present	produced by mitosis	sex determined by the father
A	✓	×	✓
B	✓	×	×
C	×	✓	✓
D	×	✓	×

Key
✓ = correct statement
× = incorrect statement

35 The diagram shows a maize cob in which some grains have yellow skin and some have dark skin. The allele D for dark skin is dominant to the allele d for yellow skin.



What were the genotypes of the parent plants for skin colour of the grains?

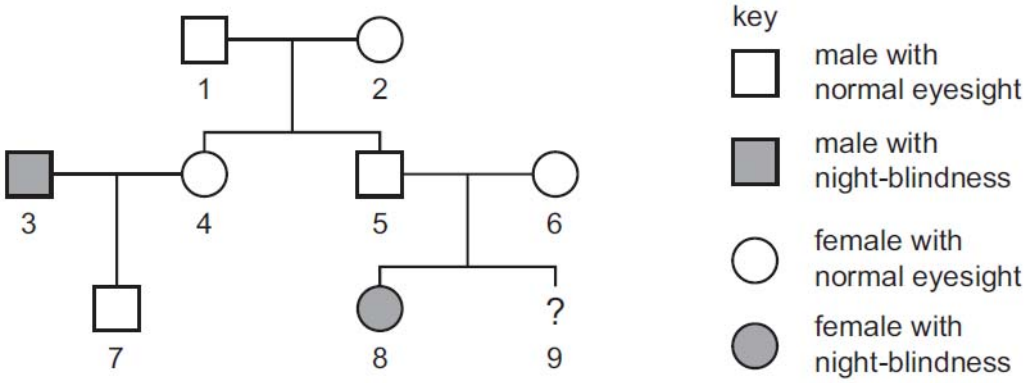
A DD x DD

B DD x dd

C Dd x Dd

D Dd x dd

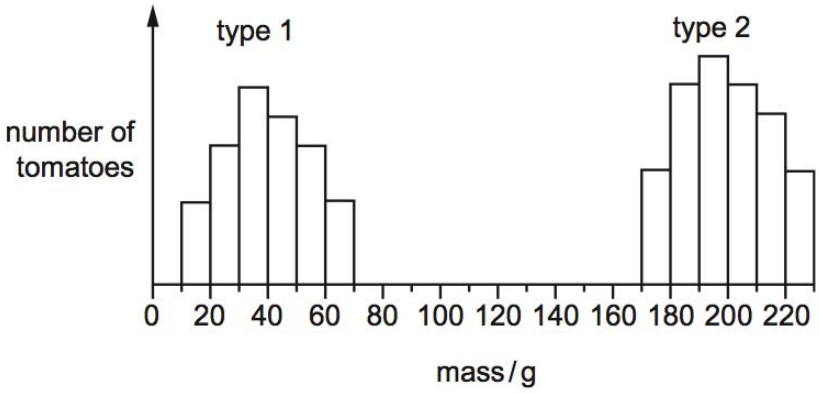
36 The diagram shows a family tree in which hereditary night-blindness occurs.



What is the chance that unborn child, 9, will be a male with night-blindness?

A 1 in 2 **B** 1 in 4 **C** 1 in 8 **D** 3 in 4

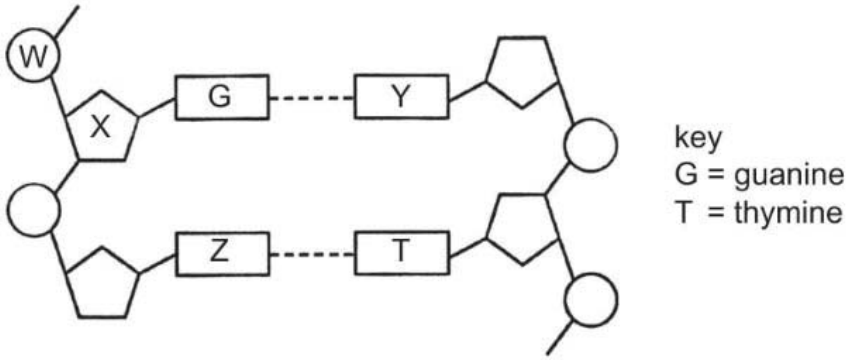
37 The graph shows the masses of two different types of tomato.



What can be concluded from the graph?

A Genes do not affect the mass of tomatoes.
B Type 1 tomatoes show continuous variation.
C Type 2 tomatoes are sometimes smaller than type 1 tomatoes.
D Type 2 tomatoes show discontinuous variation.

38 The diagram represents a short section of DNA.



Which row correctly identifies the parts labelled W, X, Y, Z?

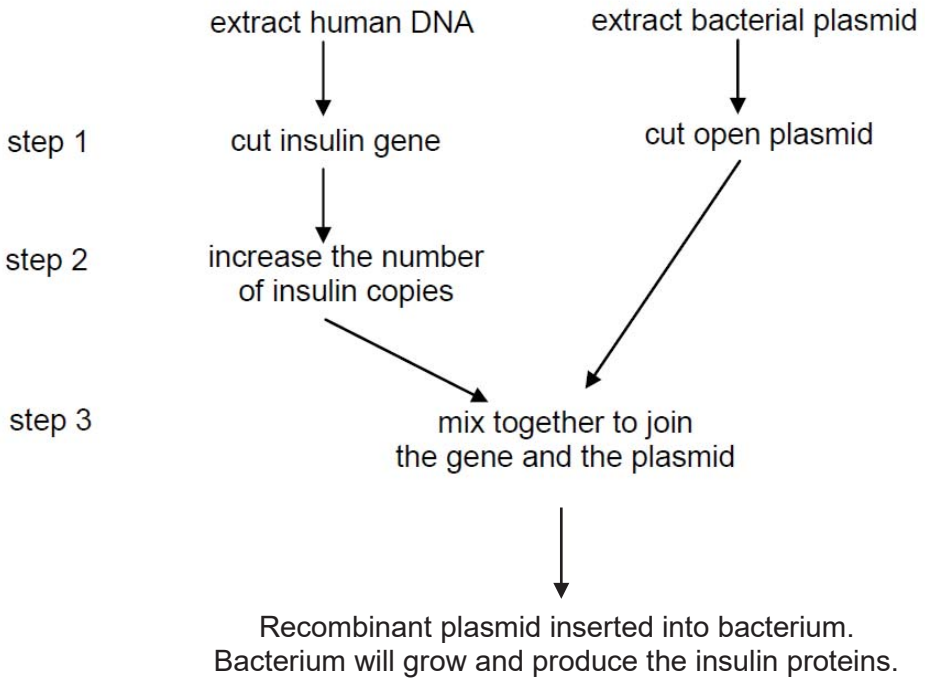
	W	X	Y	Z
A	adenine	cytosine	sugar	phosphate
B	cytosine	adenine	phosphate	sugar
C	phosphate	sugar	cytosine	adenine
D	sugar	phosphate	adenine	cytosine

39 Which processes over time help produce organisms best fitted for the natural environment?

1 competition
2 mitosis
3 gene mutation
4 random fertilisation
5 selective breeding

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

40 The diagram outlines part of the process to produce recombinant DNA that will synthesise human insulin when placed in the bacteria. At steps 1, 2 and 3, enzymes have to be used.



Which row correctly identifies the enzyme in each step and with the correct product formed?

	step 1	step 2	step 3	Insulin produced
A	polymerase	ligase	restriction	Same as the source
B	polymerase	restriction	ligase	different from the source
C	restriction	polymerase	polymerase	different from the source
D	restriction	polymerase	ligase	same as the source

End of Paper 1

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COMMONWEALTH SECONDARY SCHOOL

PRELIMINARY EXAMINATION 2020

BIOLOGY
(6093/02)

Name: _____ ( ) Class: _____

SECONDARY FOUR EXPRESS
Biology
Paper 2

14 Sep 2020
1 hour 45 minutes
1100-1245 hrs

No additional materials are required.

READ THESE INSTRUCTIONS FIRST
Write your name, index number and class on the question paper and any separate answer sheets used.
Write in dark blue or black pen.
You may use a pencil for any diagrams, graphs, tables or rough working.

Section A
Answer **all** questions.
Write your answers in the spaces provided on this booklet.
You are advised to spend no longer than one hour on this section.

Section B
Answer **all** questions.
Write your answers in the spaces provided on this booklet.

At the end of the examination, ensure that you have submitted all your work.
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	
7	
8	
9	
Total	/80

Parent's Signature

This document consists of **24** printed pages, including the cover page and 1 blank page.

Section A: Structured Questions (50 marks)

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

1 Fig. 1.1 shows a photograph of epithelial cells from a human cheek taken under a light microscope

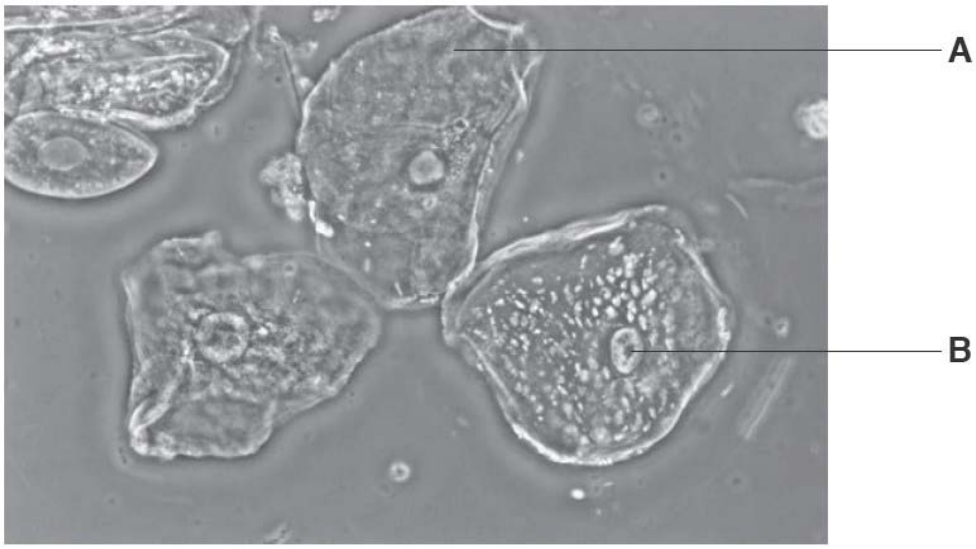


Fig. 1.1

(a) Identify the parts labelled A and B on Fig. 1.1.

A .....

B .....

[2]

(b) State the function of the part labelled B.

.....

..... **[1]**

(c) State one way in which the structure of a spongy mesophyll cell differs from the above epithelial cells shown in Fig. 1.1.

.....

..... **[1]**

Fig. 1.2 shows the translation of messenger RNA to produce a polypeptide by organelle D in one of the epithelial cells.

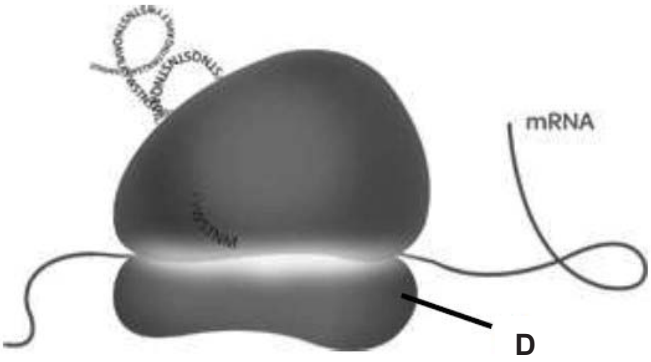


Fig. 1.2

(d) State the location where organelle D can be found in the epithelial cell.

.....

..... **[1]**

(e) After the polypeptide is produced by organelle D, it is transported to Golgi apparatus. What happens to the polypeptide at Golgi apparatus?

.....

..... **[1]**

(f) Table 1.1 shows different specialised cells and the average number of mitochondria each cell contains.

specialised cell type	average number of mitochondria
liver cell	1000–2000
red blood cell	0
sperm cell	50-80
heart muscle cell	1600

Table 1.1

Explain the differences between the average numbers of mitochondria in the cells shown in Table 1.1.

.....

.....

.....

.....

..... **[3]**

[Total: 9]

2 An experiment was carried out on **two juices A and B** collected separately from the stomach and small intestine.

Fig. 2.1 shows the effect of pH on the rate of reaction of **Enzyme Q** found in **Juice A**.

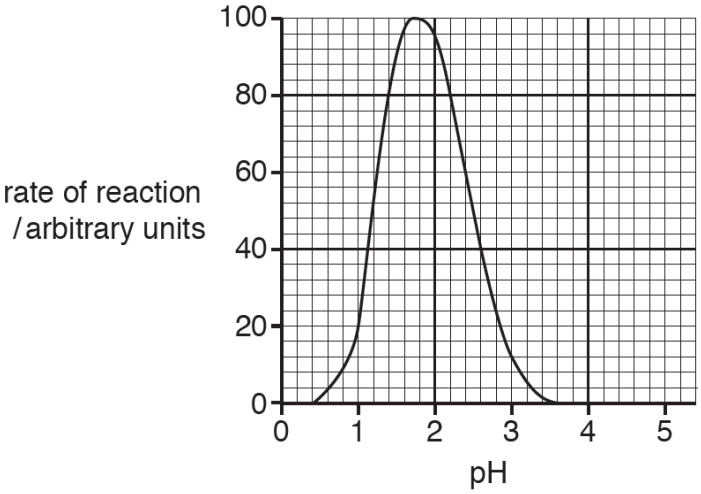


Fig. 2.1

(a) Using the information in Fig. 2.1, name the region of the alimentary canal where Juice A (containing enzyme Q) is obtained from.

Region of the alimentary canal where **Juice A** is obtained from: **..... [1]**

Two juices A and B were treated in five separate test tubes containing equal volumes of oil. Table 2.1 shows the results of the experiment.

Table 2.1

test tube	contents in tube	observation (After 15 min)	conclusion
1	Juice A + Oil	Layer of oil remains on clear mixture	Oil is not digested
2	Juice B + Oil	Clear mixture	Oil is fully digested
3	Juice A + Juice B + Oil	Layer of oil remains on clear mixture	Oil is not digested
4	Juice A (Boiled) + Juice B + Oil	Layer of oil remains on clear mixture	Oil is not digested
5	Juice A + Juice B (Boiled) + Oil	Layer of oil remains on clear mixture	Oil is not digested

(b) Using the information in table 2.1, identify the enzyme present in Juice B.

Enzyme present in Juice B: ..... **[1]**

(c) Explain the difference in observation between test tubes 2 and 3.

.....

.....

.....

..... **[2]**

(d) A few drops of acid were added to test tube 2.

Suggest how this will change the results for test tube 2. Explain your results.

.....

.....

.....

.....

.....

..... **[3]**

[Total: 7]

3 Fig. 3.1 shows two human organs and their associated blood vessels.

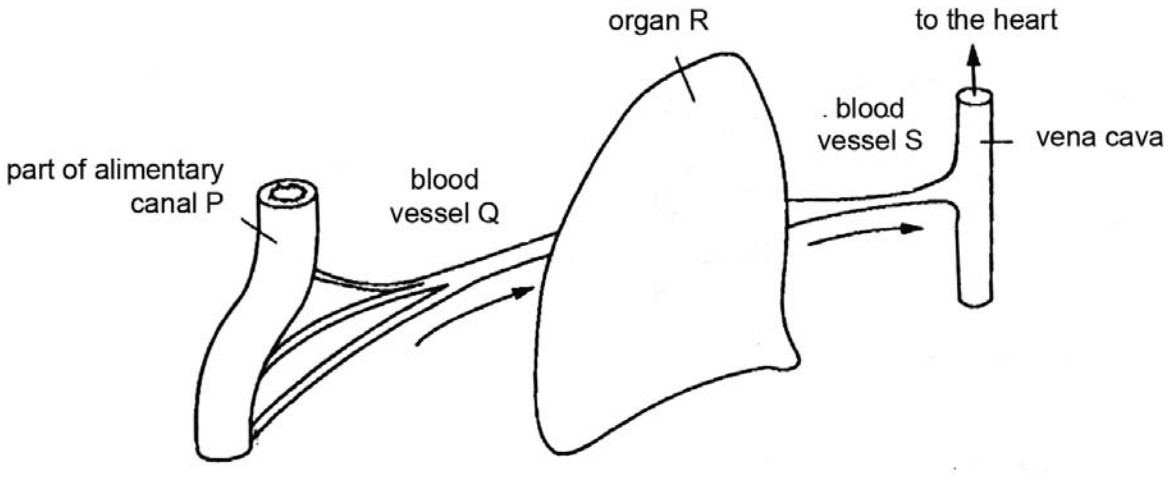


Fig. 3.1

(a) Identify organs P and R shown in Fig. 3.1.

P: .....

R: ..... **[1]**

(b) Explain why the blood glucose concentration in blood vessel Q fluctuates, while the blood glucose concentration in blood vessel S is relatively constant.

.....

.....

.....

..... **[2]**

(c) Coeliac disease is caused by a reaction to a protein called gluten which is commonly found in food made from grains. Fig. 3.2 shows the cross-section the walls of the organ P in a normal person as well as patient suffering from coeliac disease.

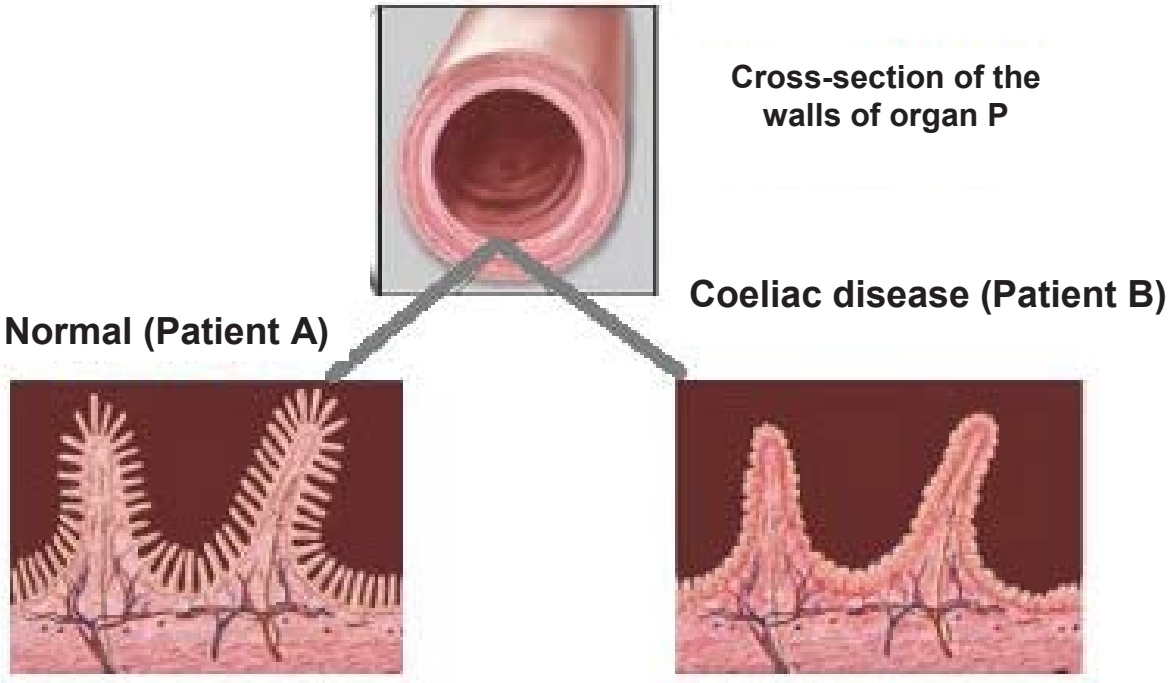


Fig. 3.2

(i) With reference to Fig. 3.2, describe one difference between the wall of patient A and the wall of patient B.

.....

.....

..... **[1]**

(ii) Explain how the change in the cross-section of the walls of organ P in coeliac patients will affect its function.

.....

.....

.....

..... **[2]**

[Total: 6]

4 Fig. 4.1 shows the human thorax.

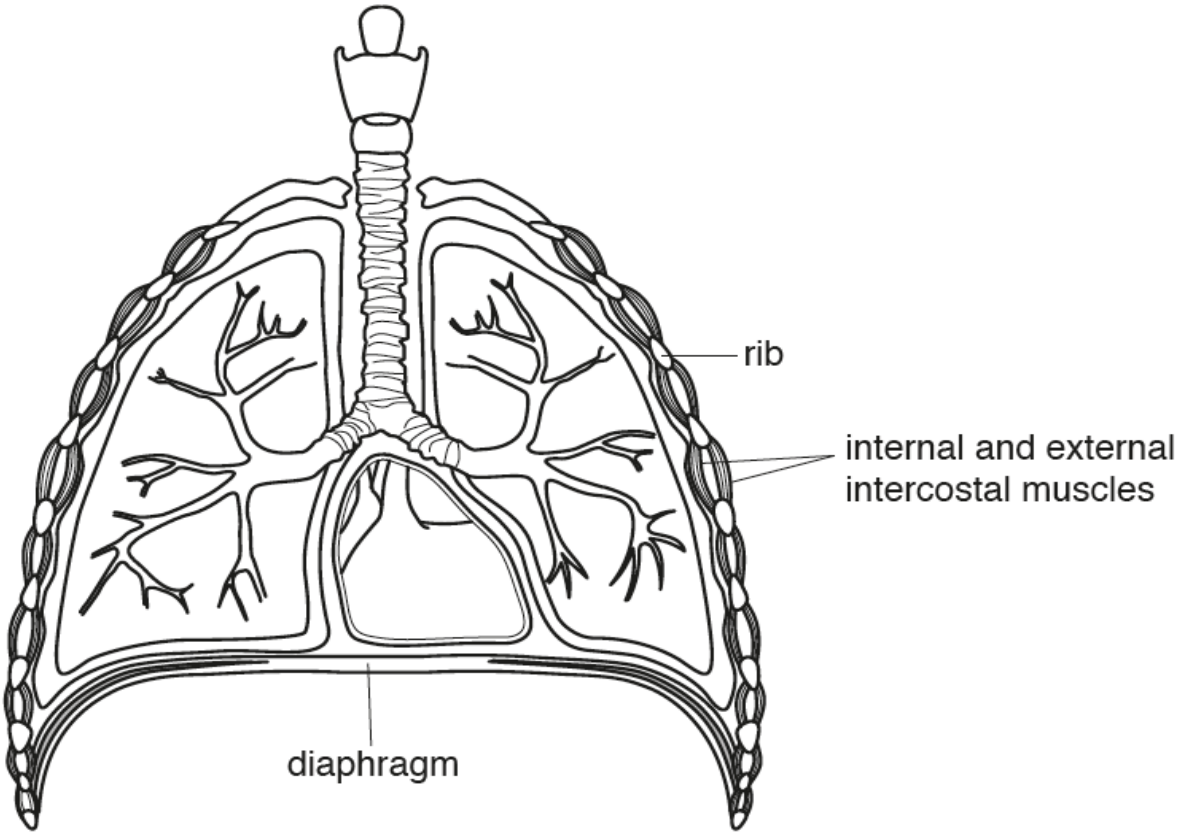


Fig. 4.1

(a) Describe how each of the structures named in the Fig. 4.1 is involved when a person takes in a single breath.

.....

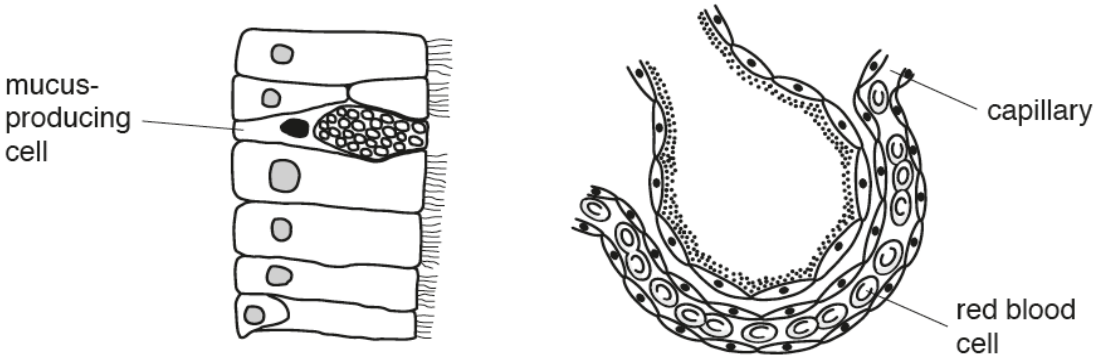
.....

.....

.....

..... **[3]**

The diagrams below show two magnified structures, **A** and **B**, from thorax.



structure A **structure B**

(b) **Draw lines** labelled A and B on the diagram of the thorax (Fig. 4.1, page 9) to indicate the positions of structure A and structure B. **[2]**

(c) Describe and explain how the alveolus is adapted for the exchange of gases.

.....

.....

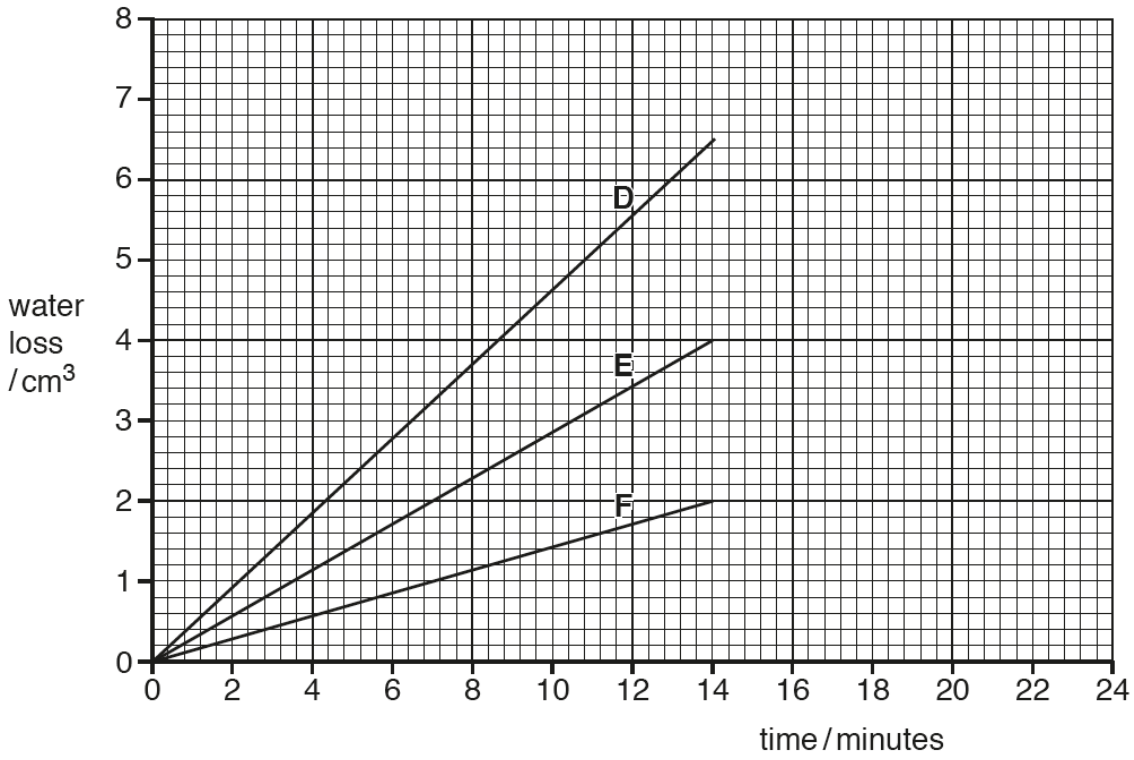
.....

.....

..... **[3]**

[Total: 8]

5 The graph shows the rates of water loss for three plants, **D**, **E** and **F**, during the first 14 minutes of an experiment. The plants are of different species and are growing in identical conditions.



(a) Name the process by which plants lose water to the atmosphere.

..... **[1]**

(b) Suggest one possible reason for the differences in rates of water loss shown by the three plant species.

.....

.....**[1]**

(c) In the experiment, after 14 minutes, air is blown across plant **E** for 2 minutes and a black bag is placed over plant **F** for the remaining 10 minutes.

(i) Continue the lines on the graph to show what would happen to the rates of water loss for plants **E** and **F**. **[2]**

(ii) Explain the shape of each line you have drawn.

Plant **E** .....

.....

.....[1]

Plant **F** .....

.....

.....[1]

(d) Fig. 5.1 is a photograph of a cross-section of a vascular bundle in a stem.

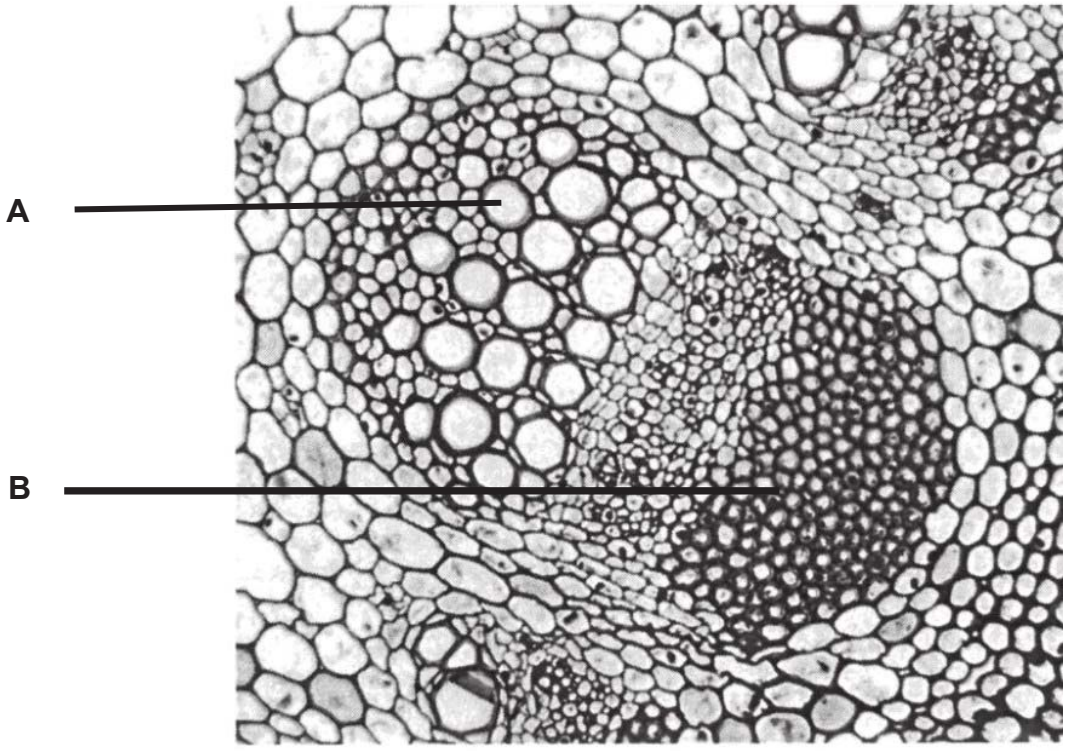


Fig. 5.1

Identify the structure A & B shown in Fig. 5.1 and explain how they are adapted to its function.

.....

.....

.....[2]

[Total: 8]

6 Fig. 6.1 shows stages in the life cycle of the plant *Epilobium hirsutum.*

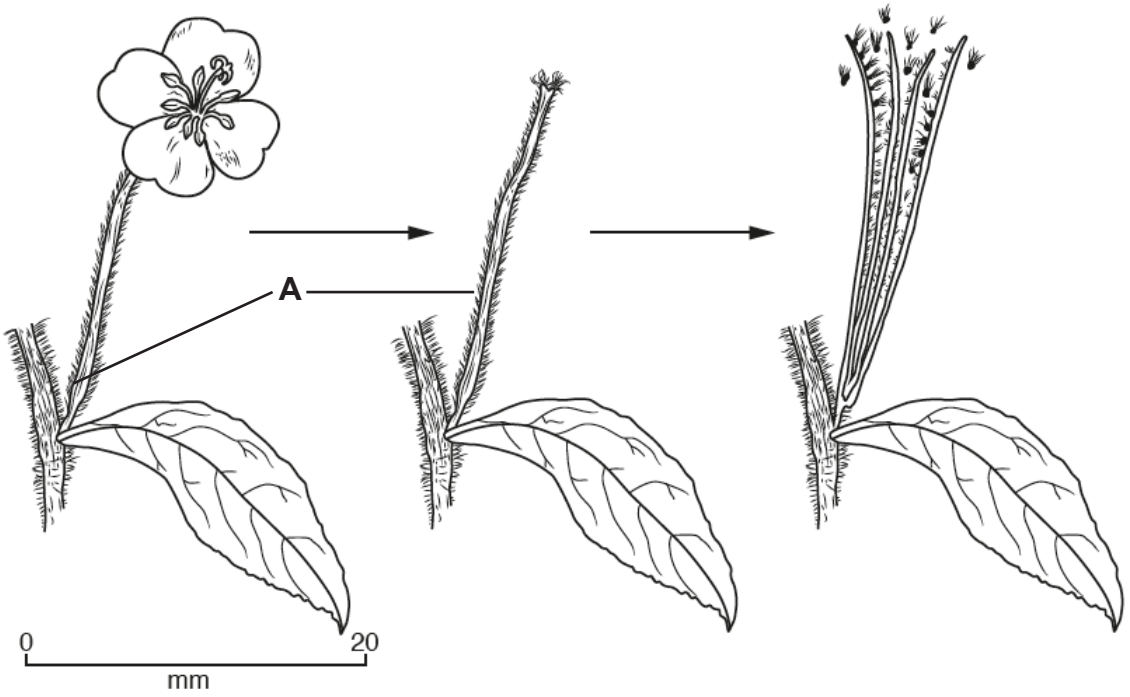


Fig. 6.1

(a) State the number of each of the following parts of the flower shown in Fig. 6.1.

petals: …… **filaments: ……** **[1]**

(b) Identify structure A shown in Fig. 6.1.

A: …… **[1]**

(c) For this plant shown in Fig. 6.1, state its method of pollination and give one reason for your answer.

(i) **method of pollination: ……..…**

(ii) **Reason: ……**

……..[2]

Another species of flowering plant has flowers of two types. Some of the plants of this species have flowers called pin and some of the plants have flowers called thrum.
Fig. 6.3 show sections through parts of these two types of flower.

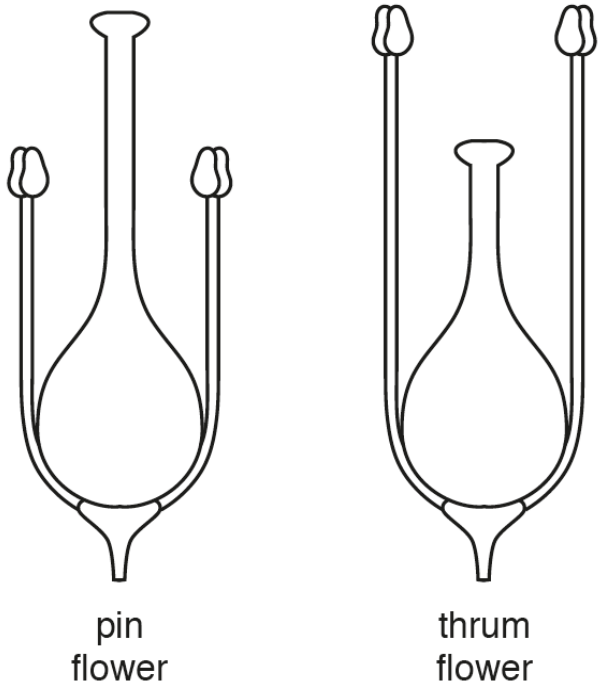


Fig. 6.3

(d) Describe how the structure of the pin type of flower differs from that of the thrum type of flower.

.....

.....

.....

..... **[2]**

Pollination in this species of plant is not always successful in leading to fertilisation. Examples of successful pollination and of unsuccessful pollination are shown in the diagram below.

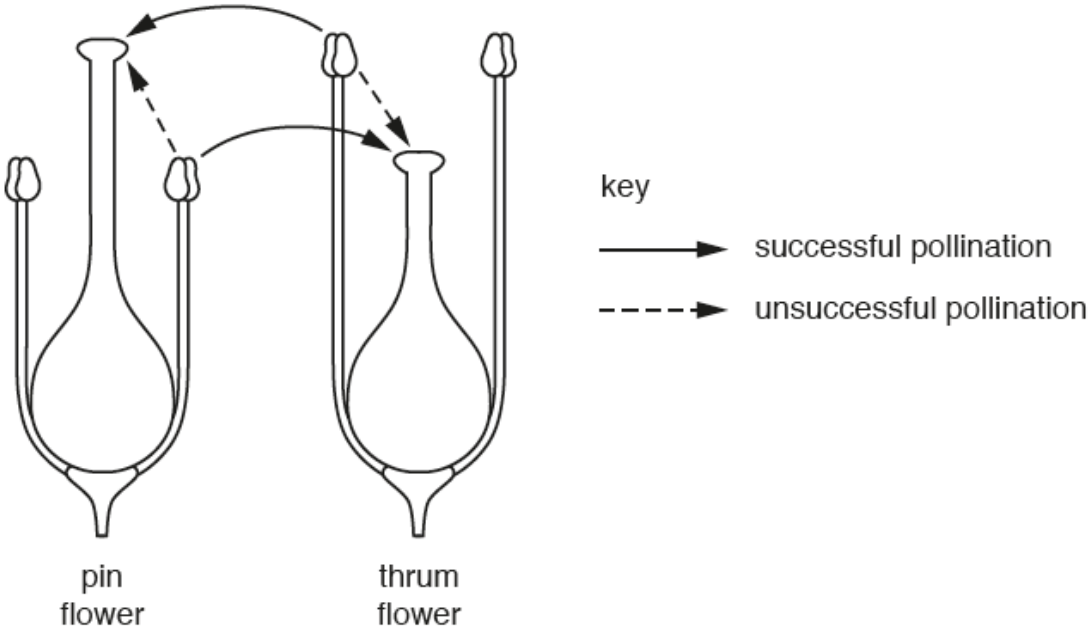


Fig. 6.4

(e) Use information from Fig. 6.4 to name the type of pollination that is successful **and** suggest the advantage to the species of this type of pollination.

type of pollination .....

advantage .....

.....

..... **[2]**

(f) The gene responsible for the production of the different types of flower has two alleles. One allele (T) is dominant to the other allele (t).

A plant with flowers of the **pin** type has a homozygous recessive genotype.
A plant with flowers of the **thrum** type has a heterozygous genotype.

Plant X with flowers of the pin type was successfully pollinated by a plant Y with flowers of the thrum type to produce a mixture of pin and thrum type flowers.

Complete the genetic diagram shown below to show the possible types of new plants produced.

phenotypes of parents	**Plant X, pin type flower**	**X**	**Plant Y, thrum type flowers**	
genotypes of parents	.....		.....	
gametes	.....	.....	.....	.....
genotypes of offsprings	.....	.....	.....	.....
phenotypes of offsprings	.....	.....	.....	.....

[4]

[Total: 12]

Section B (30 marks)
Answer all the three questions.

7 Fruits such as apples and bananas contain chemicals called polyphenols. An enzyme, polyphenol oxidase, is also present. It catalyses a reaction which converts the polyphenols into brown coloured compounds.

This reaction happens when the cells are damaged and exposed to oxygen in the air.
The following reaction occurs:

$$\text{polyphenols + oxygen} \xrightarrow{\text{polyphenol oxidase}} \text{brown-coloured compounds}$$

The enzymes polyphenol oxidase were extracted from two different fruits, apricot and avocado. These enzyme extracts were heated at 65 °C for a total of 60 minutes.

During this time, samples were removed every 15 minutes. The samples were tested to find out how much enzyme activity remained.

Table 7.1 shows the results of the experiment.

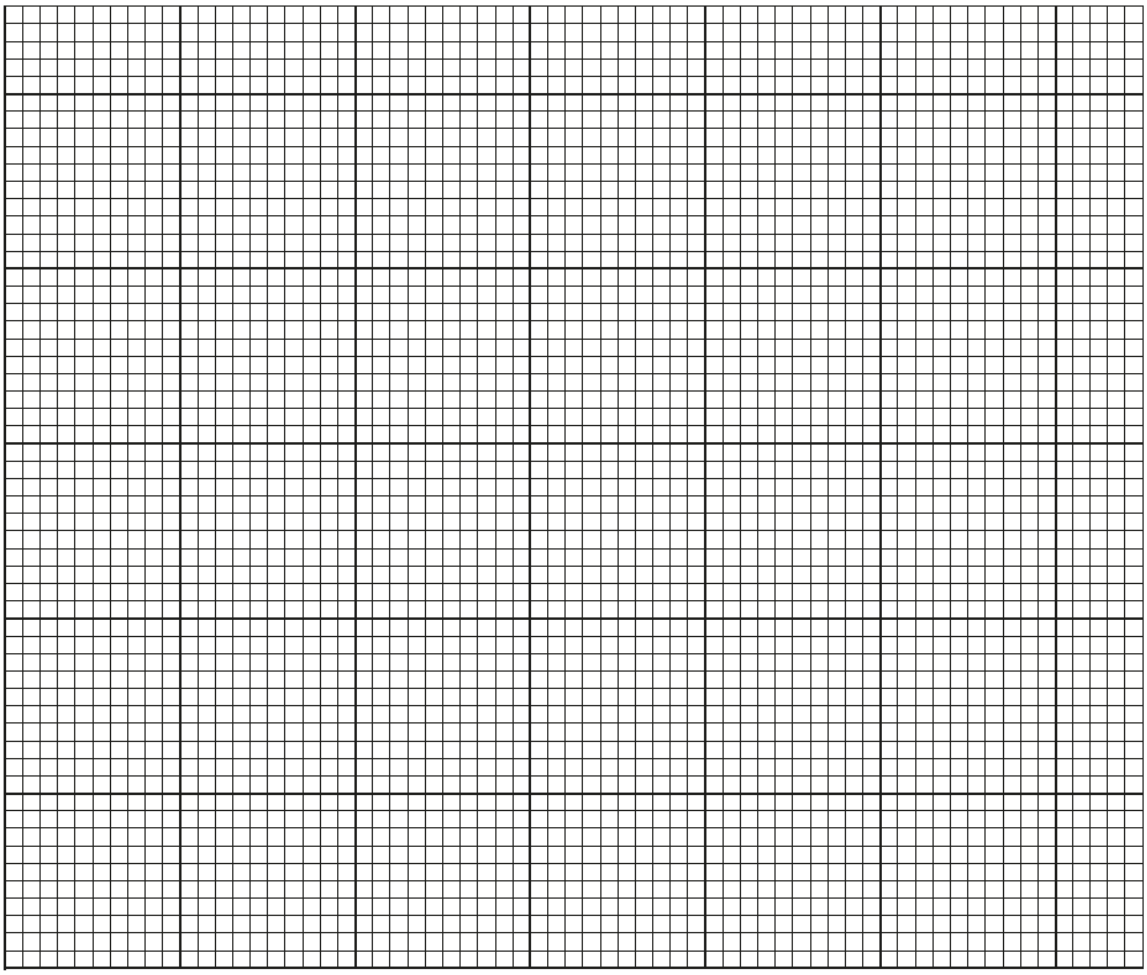
Table 7.1

Sample time / min	**Percentage of enzyme Polyphenol oxidase activity remaining / %**	
	apricot	**avocado**
0	100	100
15	10	40
30	5	25
45	0	20
55	0	
60	0	10

(a) State **one** factor that should be controlled in this investigation.

Factor ……[1]

(b) Plot graphs of percentage of enzyme polyphenol oxidase activity against sample time for the apricot and avocado respectively.



[4]

(c) Calculate the change in the percentage of enzyme activity in avocado remaining from **15 min to 45 min.**

…….....……..……..…….....[1]

(d) No measurement was taken at sample time of 55 min for avocado.

Use your graph to estimate the percentage of enzyme activity remaining at 55 min. Mark this point on your graph and write the value here.

…… % of enzyme activity remaining **[1]**

(e) State a conclusion for these results.

……

……**[1]**

(f) The DNA sequence of the above enzyme, polyphenol oxidase has been determined. A scientist would like to study this enzyme activity outside the plant tissues. Outline how this enzyme can be produced using bacteria through genetic engineering.

……

……

……

……

……

……

……

……

……**[4]**

[Total: 12]

8 Fig. 8.1 shows the changes in concentration of two hormones during one menstrual cycle.

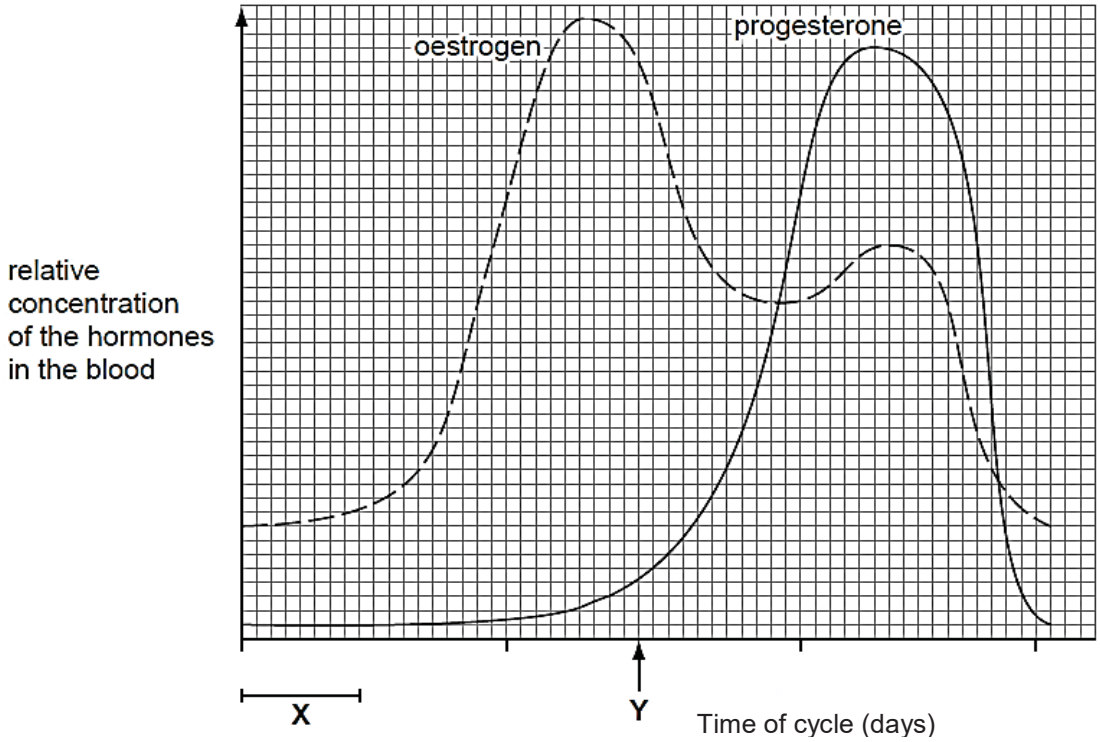


Fig. 8.1

(a) With reference to the changes in the levels of oestrogen and progesterone, state what happens at **X** and at **Y** during the menstrual cycle.

X: .....

Y: .....

[3]

(b) Low level of progesterone during pregnancy will lead to miscarriage in pregnant mothers. Suggest why this will happen.

.....

.....**[1]**

Fig. 8.2 shows the female reproductive system.

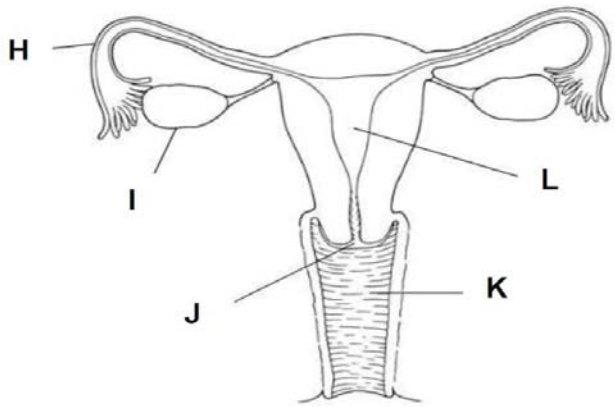


Fig. 8.2

(c) With reference to the labels **H to L** in Fig. 8.2, identify the region where

fertilisation will take place: **..... [1]**

female sex hormones are produced: **..... [1]**

(d) After fertilisation, the zygote develops into an embryo which is implanted in the uterine lining and a placenta develops.

Fig. 8.3 shows the structure of the placentas taken from two women, **M** and **N**.

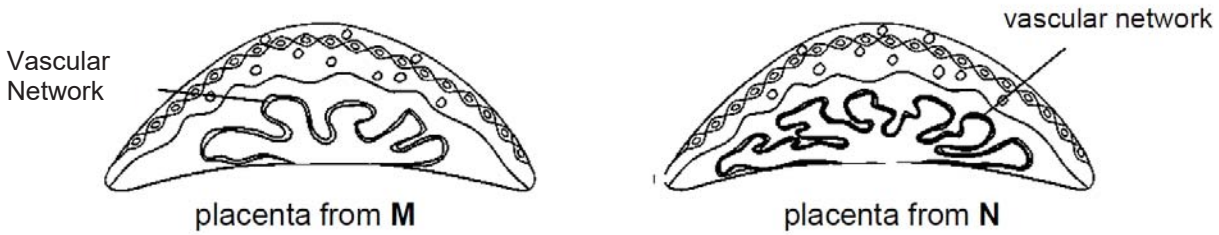


Fig. 8.3

Suggest and explain how the growth and development of the foetus in woman **M** will be different from that of woman **N**.

.....

.....

.....

.....

.....[2]

[Total: 8]

9 (a) Outline the nervous pathway that leads to the secretion of a named hormone when a hiker suddenly encounters a swarm of angry bees in a forest. List the responses arising from this hormonal secretion that allows him to survive this unexpected encounter.

……

……

……

……

……

……

……

…… **[5]**

(b) Compare between sexual and asexual reproduction.

……

……

……

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……

……

……

……

……

……

…… **[5]**

[Total: 10]

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