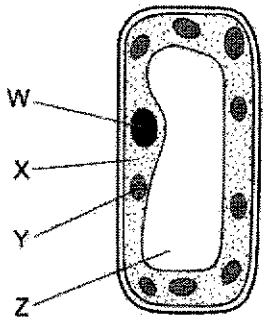
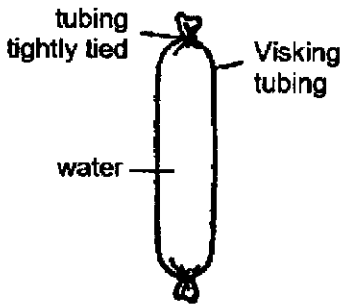
21. The diagram shows a palisade mesophyll cell from a green leaf.

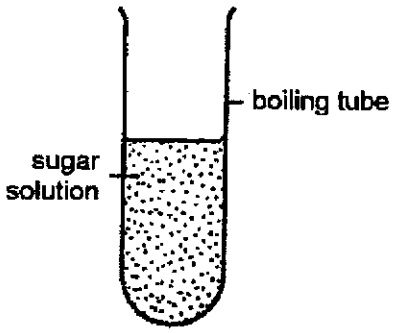


In which labelled part does photosynthesis occur and where are chromosomes found?

	photosynthesis occurs	where chromosomes are found
A	X	W
B	X	X
C	Y	Z
D	Y	W

22. The diagrams below show a Visking tubing containing water and a boiling tube containing sugar solution.





At the start of the experiment, the mass of the Visking tubing containing water and the boiling tube containing sugar solution were measured separately. The Visking tubing containing water was then placed inside the boiling tube.

After thirty minutes the Visking tubing was removed and both masses were taken.
Which of the following is the most likely result?

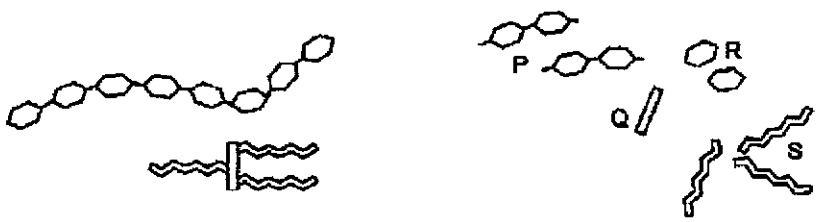
	mass of Visking tubing and contents	mass of boiling tube and contents
A	decreased	increased
B	decreased	stayed the same
C	increased	decreased
D	stayed the same	stayed the same

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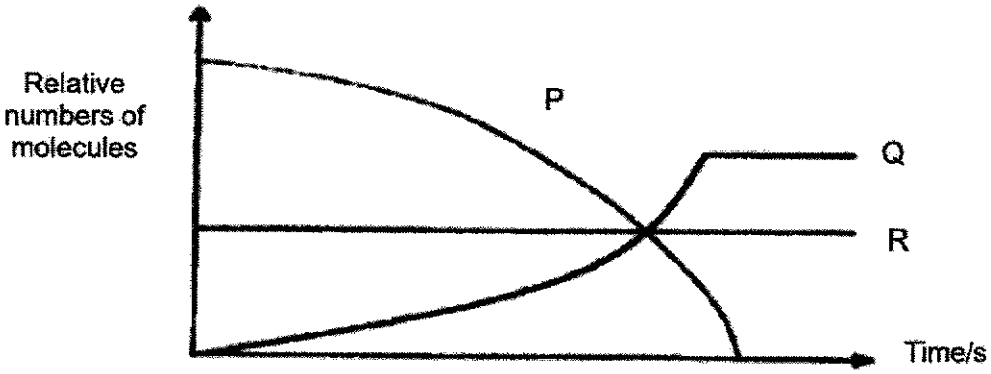
23. The diagram shows some food molecules before and after digestion.



Which is/are the product(s) of maltose digestion?

A P and R
B P only
C Q and S
D R only

24. The graph below represents the data collected for an enzyme-catalysed reaction.



What do the three lines indicated by P, Q and R represent?

	P	Q	R
A	substrate	product	enzyme
B	enzyme	product	substrate
C	product	enzyme	substrate
D	product	substrate	enzyme

25. A sample of food contains protein and starch.

Which food test results show this?

A Brick red precipitate formed with Benedict's solution and biuret solution turns purple.
B Benedict's solution remains blue and white emulsion formed with ethanol and water.
C Biuret solution turns purple and iodine solution turns blue/black.
D Biuret solution remains blue and iodine solution remains yellowish-brown.

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26. Why does chewing food help digestion?

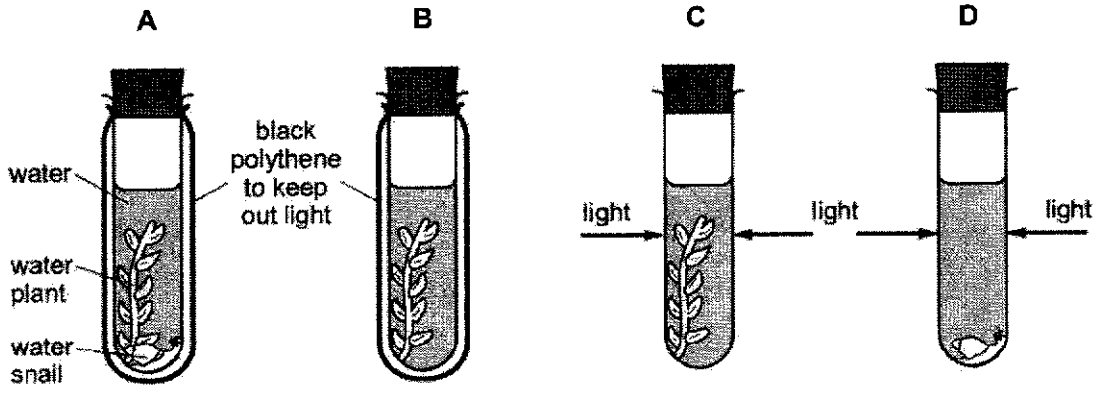
A The food is easier to swallow.
B The food has better taste.
C The food has increased surface area.
D The food is softer.

27. Hydrogencarbonate indicator is used to find out the concentration of dissolved carbon dioxide in solutions.

concentration of dissolved carbon dioxide as compared to the atmosphere	colour of hydrogencarbonate indicator
higher	yellow
same	red
lower	purple

An experiment was carried out using the apparatus shown.
Equal number of drops of hydrogencarbonate indicator was added to each test-tube before they were sealed with rubber stoppers.

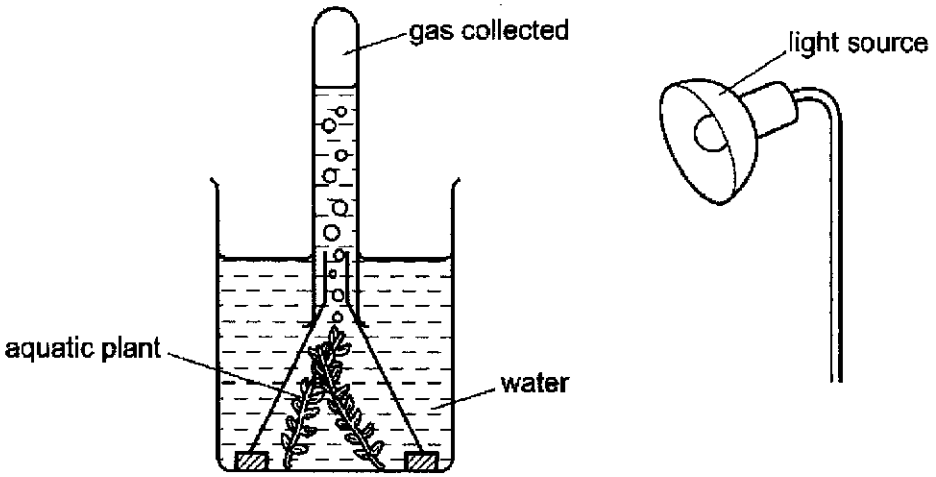
In which tube will the indicator turn purple fastest?



[Turn over

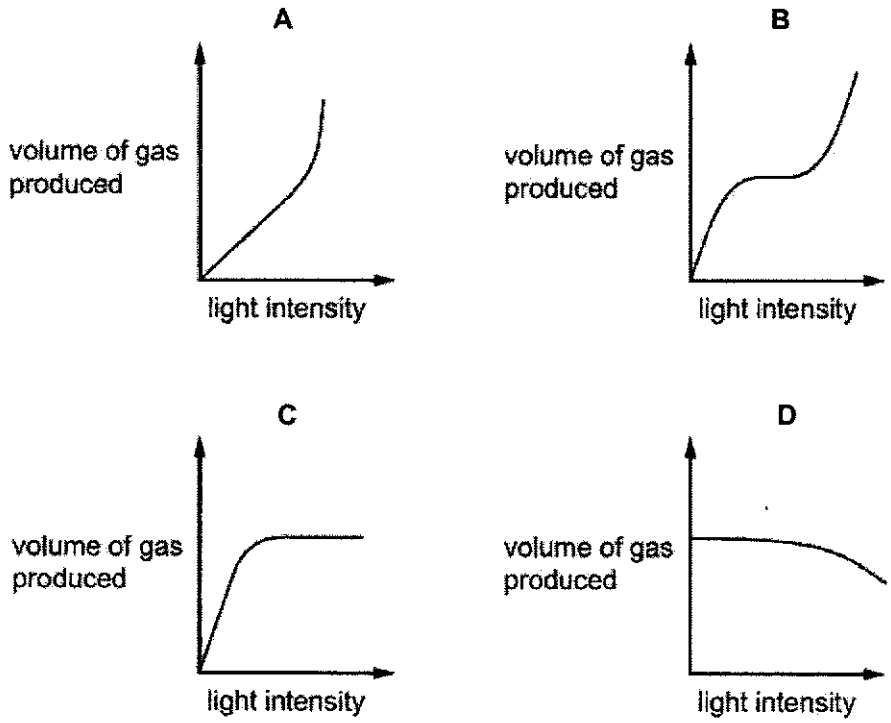
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28. An experiment is set up as shown. The volume of gas collected is measured after 30 minutes.



The experiment is repeated several times. Each time the light intensity is increased.

Which graph shows the results?

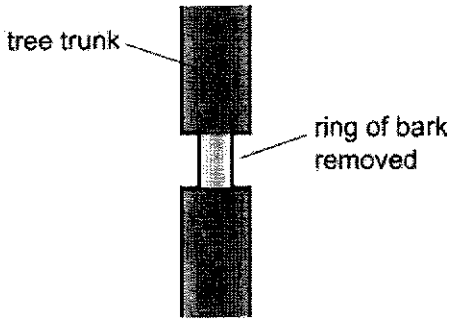


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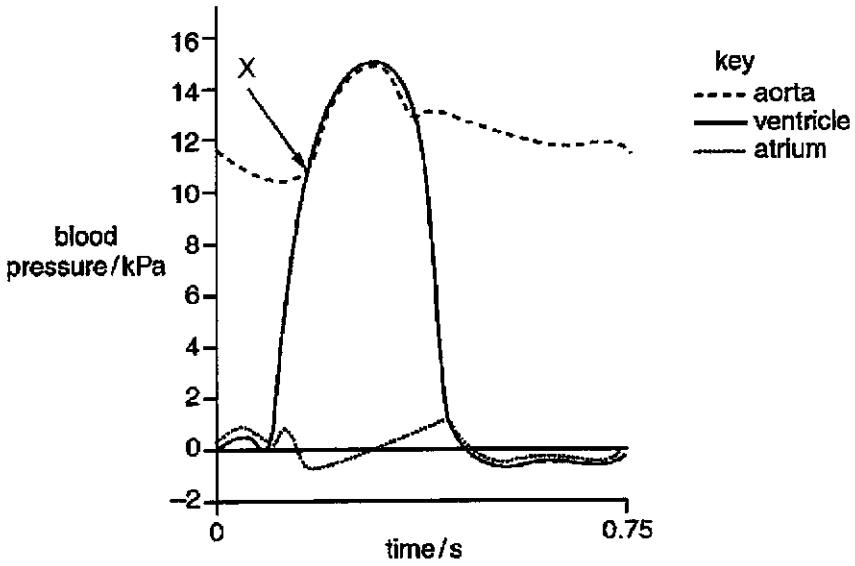
29. The diagram shows part of a tree trunk. A ring of bark including the phloem has been removed.



The tree will eventually die because removing the bark stops the transport of

A mineral salts to the leaves.
B organic nutrients to the roots.
C oxygen to the roots.
D water to the leaves.

30. The graph shows changes in blood pressure in the left side of the heart during one cardiac cycle.



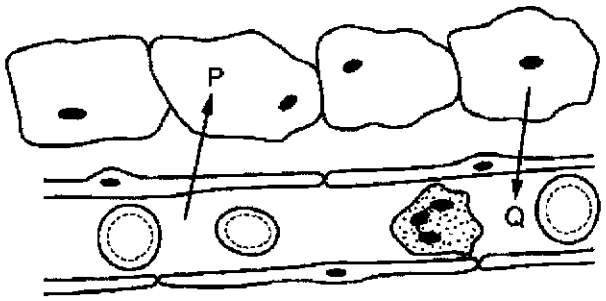
What is happening to the ventricular muscles and semilunar valve at X?

	ventricular muscles	semilunar valve
A	contracting	closing
B	contracting	opening
C	relaxing	closing
D	relaxing	opening

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31. The diagram shows chemicals being exchanged between some cells and a blood capillary.



What could be the identities of chemicals P and Q?

	P	Q
A	amino acids and oxygen	carbon dioxide and maltose
B	carbon dioxide and glucose	alcohol and oxygen
C	carbon dioxide and urea	oxygen and protein
D	glucose and oxygen	carbon dioxide and water

32. Which substance is produced by the muscles during anaerobic respiration?

A alcohol
B carbon dioxide
C lactic acid
D water

33. Hormones are chemicals involved in co-ordination in the body.

Which combination in the table is correct?

	hormones are carried by	hormones are destroyed by
A	blood plasma	kidney
B	red blood cells	kidney
C	blood plasma	liver
D	red blood cells	liver

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34. The diagrams show two sections through the eye of the same person.

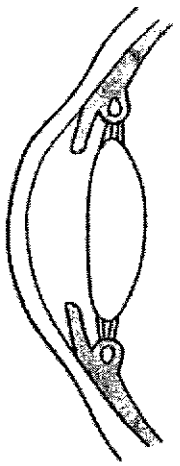


diagram 1
focusing on an object
sixty metres away in
daylight

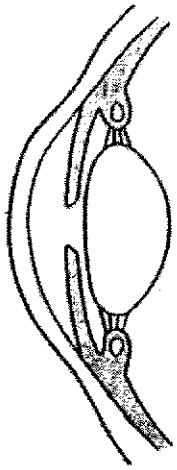


diagram 2
focusing on an object
one metre away in
very bright light

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

35. The calendar shows the days in February 2019.

	Sun	Mon	Tues	Wed	Thurs	Fri	Sat
						1	2
A	3	4	5	6	7	8	9
B	10	11	12	13	14	15	16
C	17	18	19	20	21	22	23
D	24	25	26	27	28		

A woman ovulates on 18 February.

In which week did menstruation start before ovulation takes place?

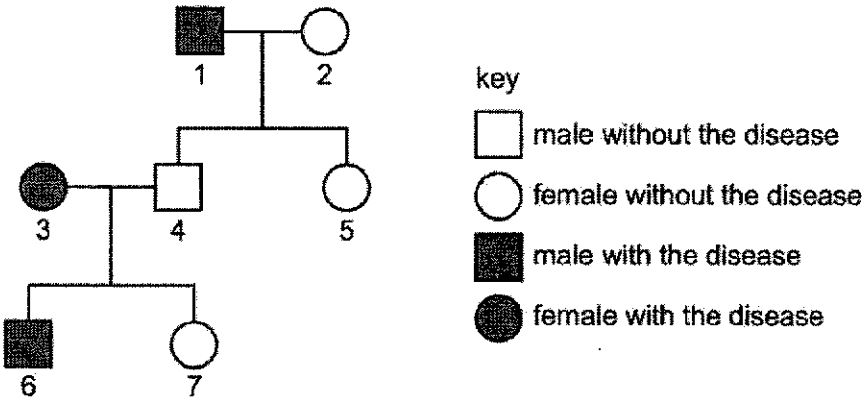
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36. What is an advantage of sexual reproduction over asexual reproduction?

A It allows variation to arise in the offspring.
B It ensures the survival and growth of species.
C It produces offspring more quickly.
D It protects the embryo during its early growth.

37. The diagram shows a family in which some members suffer from a disease caused by a recessive allele.



Which are two members of the family who **must** be heterozygous for the gene?

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

38. The following table shows the base ratios for DNA collected from four different animal species.

Which species of animal is likely to contain DNA with an adenine concentration of 21.1%?

	cytosine	guanine	thymine
A	24.8	24.9	25.4
B	29.6	29.2	20.1
C	31.6	32.4	18.0
D	32.1	31.9	17.6

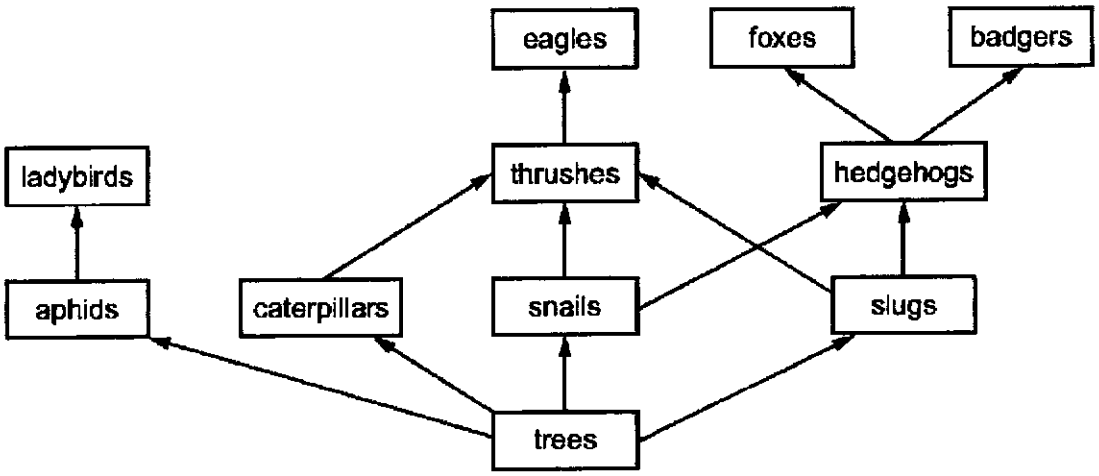
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39. Which statement correctly describes interactions in ecosystems?

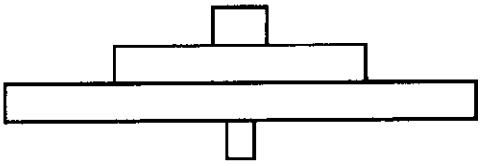
A Carbohydrates are passed from decomposers to producers.
B Energy is passed from carnivores to herbivores.
C Proteins are passed from primary consumers to producers.
D Water is passed from respiring decomposers to producers.

40. The diagram shows part of a food web.

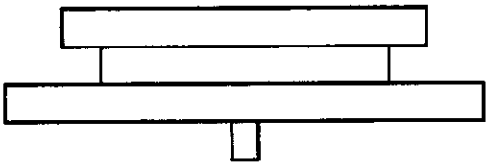


Which pyramid of numbers is based on this food web?

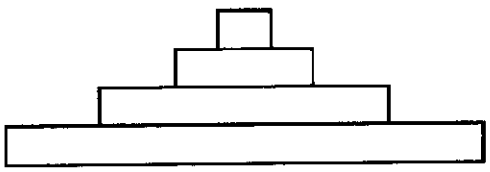
A



B



C



D



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Name	Class				Index Number		

BROADRICK SECONDARY SCHOOL
SECONDARY 4 EXPRESS/ 5 NORMAL ACADEMIC
PRELIMINARY EXAMINATION 2019

SCIENCE (CHEMISTRY/BIOLOGY) 5078/04

Paper 4 Biology

September 2019

Candidates answer on the Question Paper

1 hour 15 minutes

No Additional Materials are required.

READ THESE INSTRUCTIONS FIRST

Write your name, index number and class on the work you hand in.
You may use an HB pencil for any diagrams, graphs, tables or rough working.
Write in dark blue or black pen.
Do not use staples, paper clips, glue or correction fluid.

The use of an approved scientific calculator is expected, where appropriate.
You may lose marks if you do not show your working or if you do not use appropriate units.

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

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

Actual Grade:
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65

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

Setter: Miss Amanda Lee

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Section A [45 marks]

Answer **all** the questions in the spaces provided.

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1 The structure on the chicken (the comb) can be of different shapes. Fig. 1.1 shows how two different shapes of comb, 'walnut' and 'pea', were inherited in an experiment. The allele resulting in walnut comb is dominant.

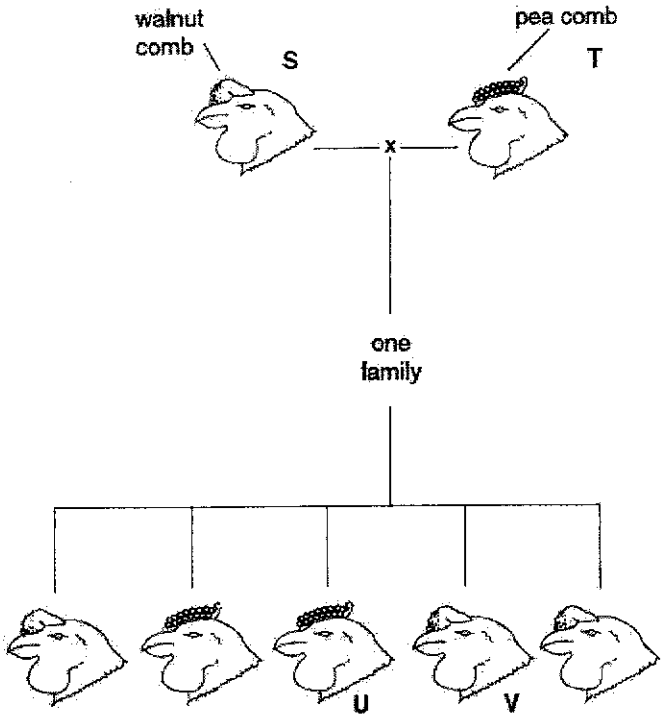


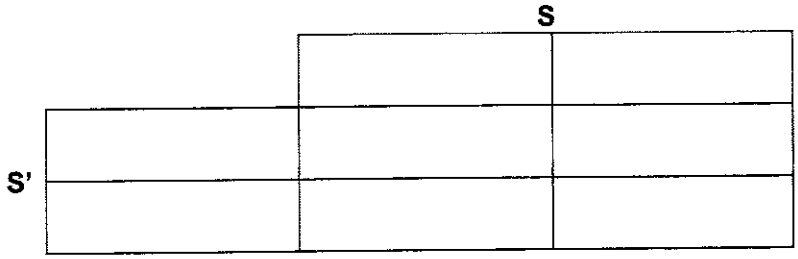
Fig. 1.1

(a) **(i)** Assuming that comb shape is controlled by one pair of alleles, use the symbols **Q** for the allele for walnut comb and **q** for the allele for pea comb to show the genotypes of the following chickens.

S ..... **T** .....

U ..... **V** ..... [4]

(ii) Carry out a cross between chicken **S** and chicken **S'** (heterozygous for comb shape).
Use the Punnett square to work out your answer. Use the symbols **Q** for the allele for walnut comb and **q** for the allele for pea comb.



[2]

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(iii) The phenotypic ratio from the cross in **(b) (ii)** was expected to be 3:1, but was found to be 2.67:1 ratio.

State why the observed ratio was different from the expected ratio.

.....

..... [1]

(b) Comb shape in chickens is an example of discontinuous variation.

State one example of discontinuous variation in humans.

..... [1]

(c) Fig 1.2 shows a chicken with rose comb. It is most likely due to a mutation.



Fig. 1.2

(i) State what a mutation is.

.....

..... [1]

(ii) State two causes of mutation.

1. .....

2. ..... [2]

[Total: 11 marks]

[Turn over

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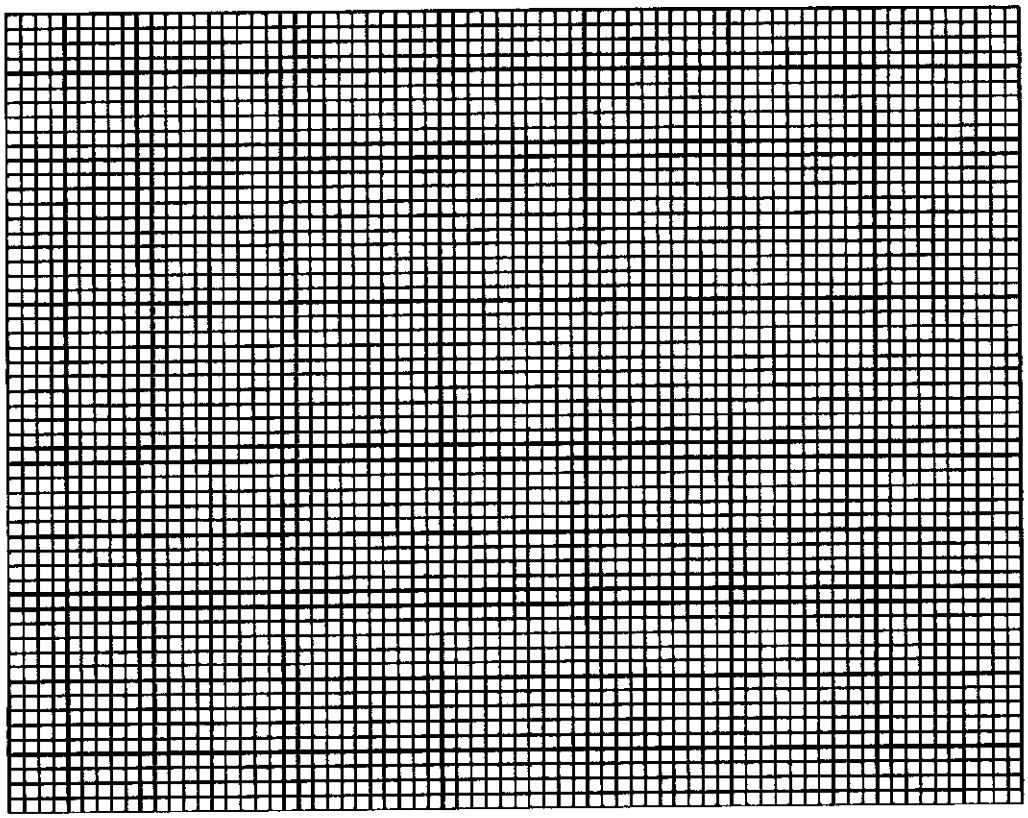
2 An experiment was set up to measure the rate of photosynthesis in two crop plants A and B at different light intensities. The results of the experiment are shown in Table 2.1.

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light intensity/ arbitrary units	rate of photosynthesis / arbitrary units	
	A	B
0	0	0
100	50	60
300	135	95
500	185	135
700	215	145
900	230	150
1100	245	150

Table 2.1

(a) Plot the rate of photosynthesis of the two crop plants against light intensity on the same grid provided below.



[4]

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(b) With reference to the plotted graphs, describe how increasing the light intensity affects the rate of photosynthesis of the two crops.

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..... [2]

(c) From the data, suggest, with reasons, which crop plant is better suited for growth in tropical conditions.

.....

.....

.....

..... [2]

[Total: 8 marks]

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3 Fig. 3.1 shows a cross-section of a rose flower.

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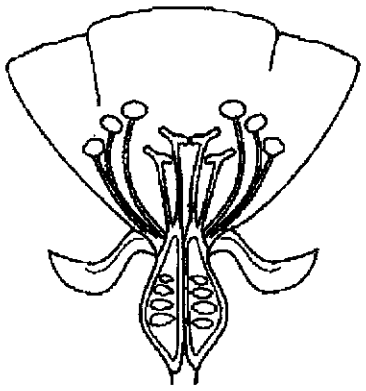


Fig. 3.1

(a) A gardener wants his rose flower to be pollinated by a different rose flower of a different plant.

(i) Define the term *pollination*.

.....

..... [2]

(ii) Based on Fig. 3.1, suggest one way the gardener can stop self-pollination in the rose flower.

.....

..... [1]

(b) Suggest **two** features of the pollen produced by the rose flower in Fig. 3.1.

.....

..... [2]

(c) In some species, there are plants with only male or female flowers. Explain one advantage of this to the species.

.....

..... [1]

[Total: 6 marks]

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4 Fig 4.1 shows a short segment of a DNA molecule.

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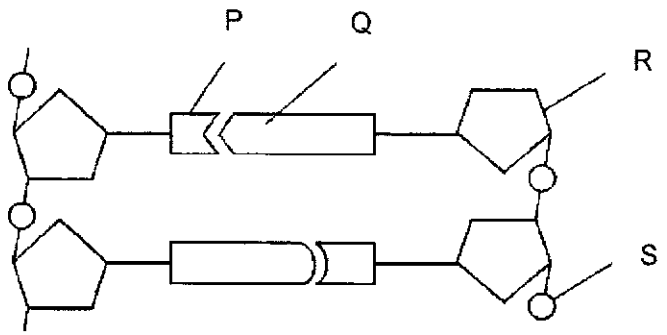


Fig. 4.1

(a) Name parts R and S.

R ..... S ..... [2]

(b) On Fig. 6.1, circle one nucleotide. [1]

(c) If part P is identified to be thymine, state the identity of part Q.

Q ..... [1]

(d) A group of researchers examined the DNA molecule and found a gene consisting 15 nucleotides. The order of the bases of the nucleotides in the gene was as follows:

CTTACATCAGCGTAG

Write down the sequence of nucleotides in the complementary strand of the DNA molecule.

..... [1]

(e) Use the diagram in Fig. 4.1 and your own knowledge of DNA to describe the structure of DNA.

.....

.....

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..... [4]

[Total: 9 marks]

[Turn over

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5 Fig. 5.1 shows the concentration of hormones in the menstrual cycle.

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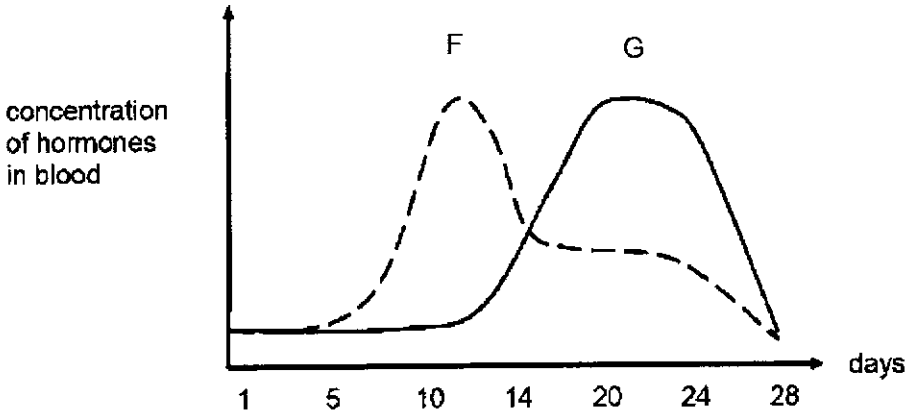


Fig. 5.1

(a) What hormones do F and G represent?

F ..... G ..... [2]

(b) With reference to the menstrual cycle, describe how changes in F and G affects the thickness of the uterine lining.

.....

.....

.....

.....

.....

..... [3]

[Total: 5 marks]

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6 Fig. 6.1 shows the mean distance molecules must travel during gas exchange between the lungs and blood in the circulatory system in birds and mammals.

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This distance is known as the mean thickness of the blood-gas barrier.

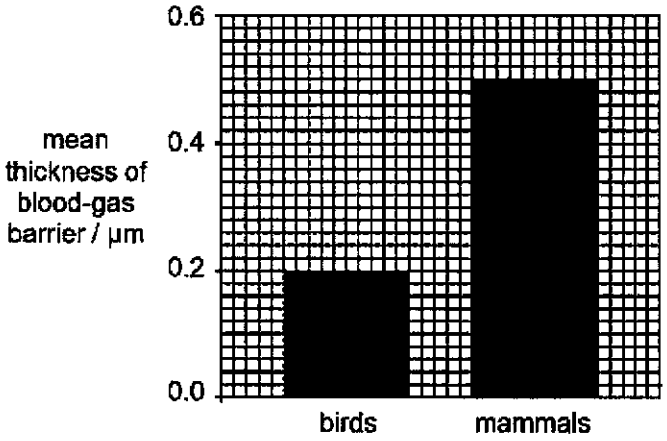


Fig. 6.1

(a) Name the process involved in the movement of molecules across the blood-gas barrier.

..... [1]

(b) Use information from Fig. 6.1 to compare the thickness of the blood-gas barrier in birds and mammals.

.....

.....

..... [2]

(c) Explain how the difference in the thickness of the blood-gas barrier suggests that movement of a bird by flying requires more energy than movement by a mammal on land.

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.....

..... [3]

[Total: 6 marks]

End of Section A

[Turn over

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Section B [20 marks]

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Answer any **two** questions from this section.

Write your answers in the spaces provided.

7 Fig. 7.1 shows how the concentration of insulin and glucagon in blood changes as concentration of glucose in blood changes.

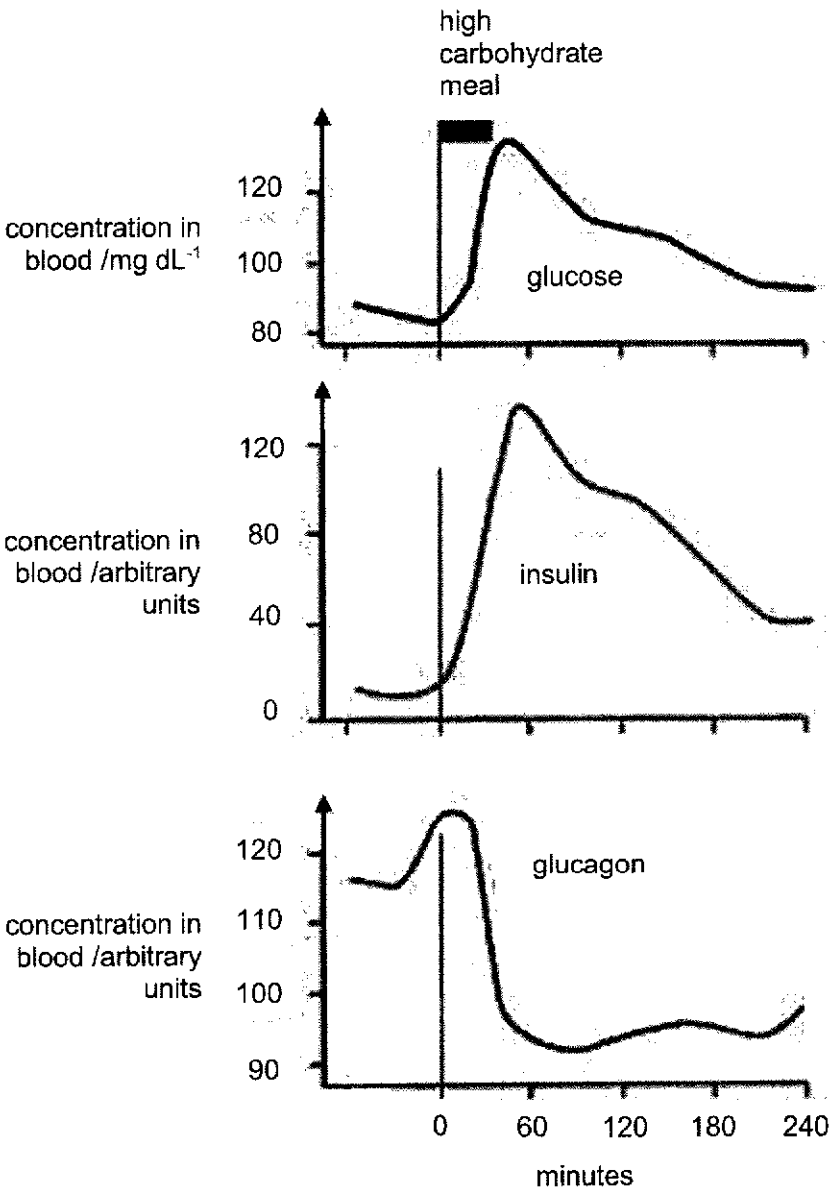


Fig. 7.1

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(a) Describe and explain the relationship between blood glucose concentration and concentration of insulin in the blood after the high carbohydrate meal was eaten.

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..... **[5]**

(b) Explain the change in glucagon concentration 60 minutes before and after the meal was taken.

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..... **[5]**

[Total: 10 marks]

[Turn over

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8 The graph shows how the percentage of carbon dioxide in the atmosphere has changed since the year 1700.

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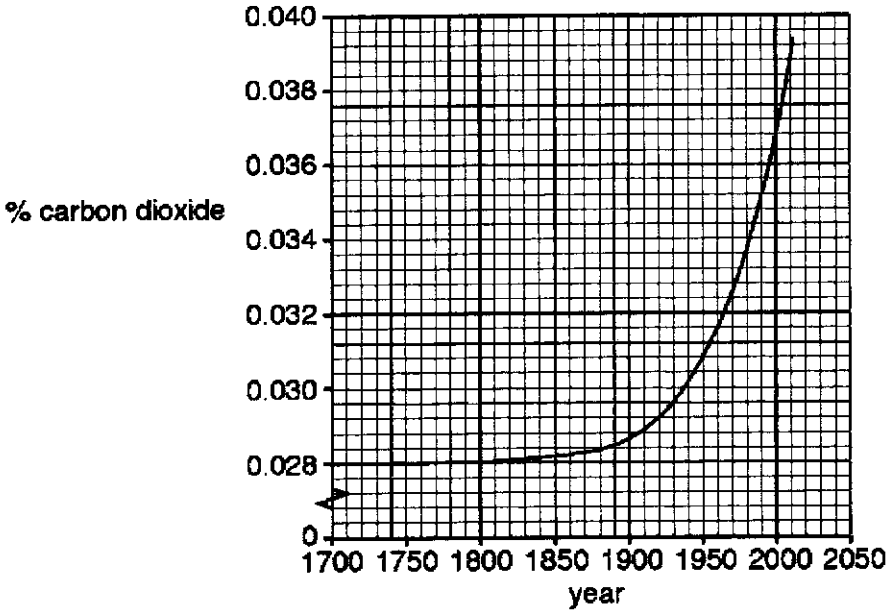


Fig. 8.1

(a) Explain how human activity is likely to have contributed to the change in the percentage of carbon dioxide.

.....

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.....

..... [5]

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(b) Describe and evaluate the effects of this change in the percentage of carbon dioxide.

For Examiner's Use

.....

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.....

..... [5]

[Total: 10 marks]

[Turn over

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9 Fig. 9.1 shows the longitudinal section through one vascular bundle in the stem of a dicotyledonous plant.

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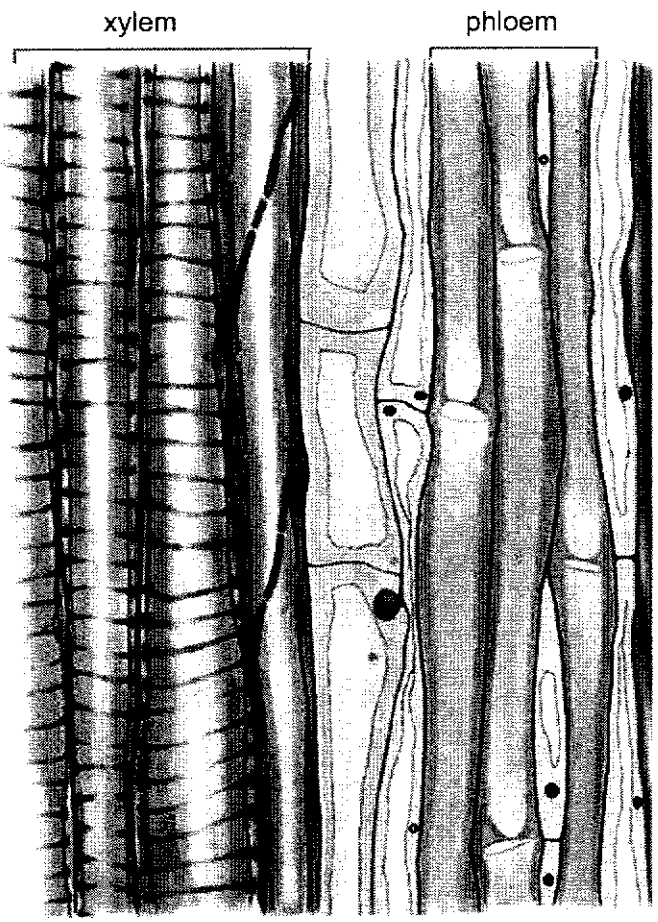


Fig. 9.1

(a) **(i)** Using Fig. 9.1, describe one structural difference between the xylem and the phloem.

.....

.....

..... [1]

(ii) Explain how the structural difference in **(a)(i)** helps in the function of the xylem.

.....

.....

..... [2]

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(b) Explain how a molecule of water in the soil moves through the plant and reaches the atmosphere.

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..... [5]

(c) Suggest why vascular bundles are found in anthers.

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..... [2]

[Total: 10 marks]

End of Section B

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Broadrick Secondary School
Secondary 4E5N Preliminary Examination (2019)
SCIENCE BIOLOGY (5078)
MARKING SCHEME

Q21.	Q22.	Q23.	Q24.	Q25.	Q26.	Q27.	Q28.	Q29.	Q30.
D	A	D	B	C	C	C	C	B	B
Q31.	Q32.	Q33.	Q34.	Q35.	Q36.	Q37.	Q38.	Q39.	Q40.
D	C	C	B	A	A	A	B	D	A

1 The structure on the chicken (the comb) can be of different shapes. Fig. 1.1 shows how two different shapes of comb, 'walnut' and 'pea', were inherited in an experiment. The allele resulting in walnut comb is dominant.

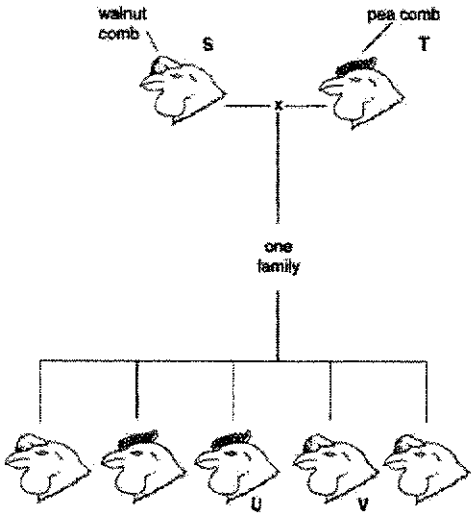


Fig. 1.1

(a) (i) Assuming that comb shape is controlled by one pair of alleles, use the symbols **Q** for the allele for walnut comb and **q** for the allele for pea comb to show the genotypes of the following chickens.

S Qq, **T** qq, **U** qq , **V** Qq

1 m for each correct

(ii) Carry out a cross between chicken **S** and chicken **S'** (heterozygous for comb shape).
Use the Punnett square to work out your answer. Use the symbols **Q** for the allele for walnut comb and **q** for the allele for pea comb.

[1] – correct combination of genotypes of offspring
[1] – circling of gametes and writing of phenotype under each genotype

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This question paper consists of **14** printed pages including this page.

Setter: Miss Amanda Lee

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		S	
		Q	q
S'	Q	QQ walnut comb	Qq walnut comb
	q	Qq walnut comb	qq pea comb

(iii) The phenotypic ratio from the cross in **(b) (ii)** was expected to be 3:1, but was found to be 2.67:1 ratio.

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State why the observed ratio was different from the expected ratio.

Any point 1 m

- The sample size was too small to guarantee the predicted ratio.
- The chance of a chicken having a particular comb does not affect the chance of another. / Fusion and production of gametes are independent events.
- Random fusion of gametes.
- Some chickens could have died before reaching maturity.

(b) Comb shape in chickens is an example of discontinuous variation.

State one example of discontinuous variation in humans.

Any 1 point, max 1 mark
blood type / eye color / rolling of tongue

(c) Fig 1.2 shows a chicken with rose comb. It is most likely due to a mutation.



Fig. 1.2

(i) State what a mutation is.

Mutation is the change in the number of chromosomes or a change in the structure of a gene.

Both must be present

(ii) State two causes of mutation.

chemical mutagens
ionising radiation

[1]
[1]

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[Total: 11 marks]

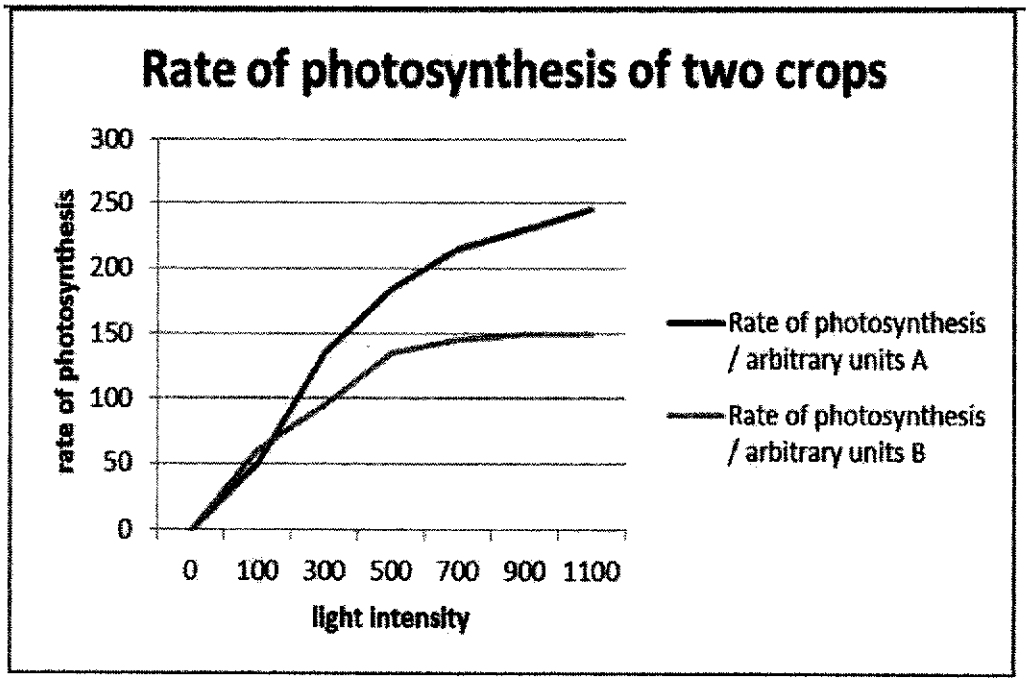
2 An experiment was set up to measure the rate of photosynthesis in two crop plants A and B at different light intensities. The results of the experiment are shown in Table 2.1.

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light intensity/ arbitrary units	rate of photosynthesis / arbitrary units	
	A	B
0	0	0
100	50	60
300	135	95
500	185	135
700	215	145
900	230	150
1100	245	150

Table 2.1

(a) Plot the rate of photosynthesis of the two crop plants against light intensity on the same grid provided below.



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Correct axes and suitable scale [1] - S
Graph A: Accurate plotting and best-fit graph [1] – L/P
Graph A: Accurate plotting and best-fit graph [1] –L/P
Axis Labelled - A

(b) With reference to the plotted graphs, describe how increasing the light intensity affects the rate of photosynthesis of the two crops.

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- As light intensity **increases** from **0 to 100 units**, there is a similar **increase** in the **rates** of photosynthesis for both crops. 1
- However, as the light intensity increases **beyond 100 units**, the **rate** of photosynthesis increases at **decreasing rate for B**, until light is no longer a limiting factor, while **A continues to increase**. 1

(c) From the data, suggest, with reasons, which crop plant is better suited for growth in tropical conditions.

- **Crop plant A** can photosynthesise at a **faster rate** compared to crop B at light intensities higher than 100 units. [both must be included in answer] 1
- Since **light intensity is generally higher in the tropics**, plant A is better suited for growth in tropical conditions. 1

[Total: 8 marks]

3 Fig. 3.1 shows a cross-section of a rose flower.

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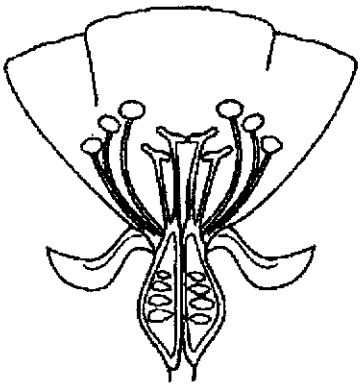


Fig. 3.1

(a) A gardener wants his rose flower to be pollinated by a different rose flower of a different plant.

(i) Define the term *pollination*.

Transfer of **pollen** grains; 1

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From **anther to stigma** of a flower 1

(ii) Based on Fig. 3.1, suggest one way the gardener can stop self-pollination in the rose flower.

Remove the anthers / **cut off** the **anthers** 1

(b) Suggest **two** features of the pollen produced by the rose flower in Fig. 3.1.

Pollen grains are **large** in size; 1
Pollen grains have **rough** surfaces; 1

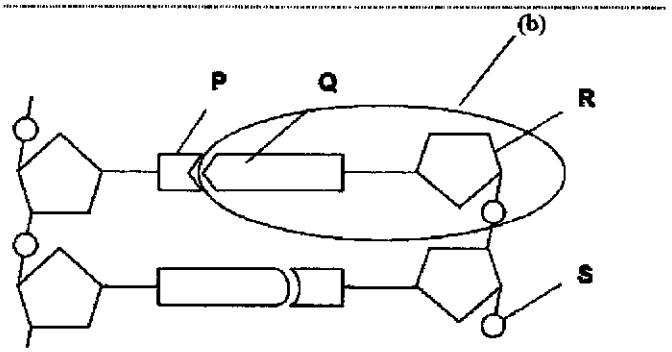
(c) In some species, there are plants with only male or female flowers. Explain one advantage of this to the species.

Any 1 of the following:
- Offspring may **inherited beneficial qualities** from **both** parents;
- **More genetic variation** which **increases** the **chance** of the species **surviving** changes in the environment
- Offspring may **express desirable traits** from both parents;
- **Reduce chances** where recessive **harmful alleles** will be expressed;

Students must have the idea that rose is by cross-pollination instead of self-pollination.

[Total: 7 marks]

4 Fig 4.1 shows a short segment of a DNA molecule. *For Examiner's Use*



(a) Name parts R and S.

R **deoxyribose sugar** ***(R: sugar only)*** 1
S **phosphate group** 1

(b) On Fig. 6.1, circle one nucleotide. 1

(c) If part P is identified to be thymine, state the identity of part Q.

Q **Adenine** [1]

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(d) A group of researchers examined the DNA molecule and found a gene consisting 15 nucleotides. The order of the bases of the nucleotides in the gene was as follows:

CTTACATCAGCGTAG

Write down the sequence of nucleotides in the complementary strand of the DNA molecule.

GAATGTAGTCGCATC [1]

(e) Use the diagram in Fig. 4.1 and your own knowledge of DNA to describe the structure of DNA.

Any 4 points below, max 4 marks:

- **two strands of polynucleotide** chains. / twisted around each other to form double helix shape.
- The DNA molecule is made up of basic units called **nucleotides**.
- Each nucleotide consists of three main parts- a deoxyribose sugar, a phosphate group and a nitrogen-containing base.
- The nucleotides join together to form polynucleotides.
- Each polynucleotide consisting of a **sugar-phosphate backbone** with bases
- The four nitrogen-containing bases in DNA are adenine (A), thymine (T), cytosine (C) and guanine (G).
- **A pairs with T, and C pairs with G by complementary base pairing.**

[Total: 9 marks]

5 Fig. 5.1 shows the concentration of hormones in the menstrual cycle.

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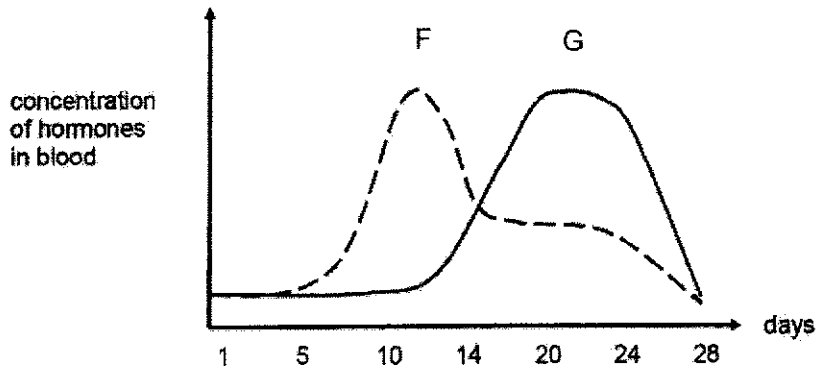


Fig. 5.1

(a) What hormones do F and G represent?

F **oestrogen** 1
G **progesterone** 1

(b) With reference to the menstrual cycle, describe how changes in F and G affects the thickness of the uterine lining.

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- When **F increases** from day 5 -10, **growth and repair** of the uterine lining causes it to **thicken**. 1
- From day 11 – 20, **increase in G maintains** the **thickness** of the uterine lining. 1
- From day 24 – 28, a **drop in G** causes the **uterine lining thickness** to **decrease**, leading to menstruation. 1

[Total: 5 marks]

6 Fig. 6.1 shows the mean distance molecules must travel during gas exchange between the lungs and blood in the circulatory system in birds and mammals.

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This distance is known as the mean thickness of the blood-gas barrier.

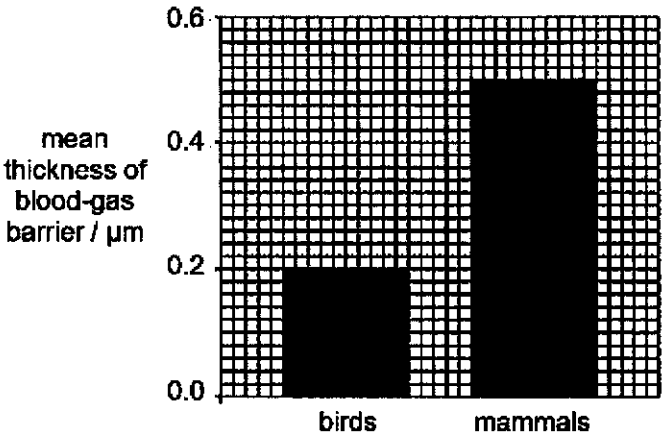


Fig. 6.1

(a) Name the process involved in the movement of molecules across the blood-gas barrier.

diffusion 1

(b) Use information from Fig. 6.1 to compare the thickness of the blood-gas barrier in birds and mammals.

- It is thicker in mammals 1
- by 2.5 times (any form of comparison, no need to show manipulation) 1

(c) Explain how the difference in the thickness of the blood-gas barrier suggests that movement of a bird by flying requires more energy than movement by a mammal on land.

Award 1 mark for each of the following:

- Thinner blood-gas barrier means that the **time taken for oxygen to diffuse** from lungs to blood **is shorter** / **faster diffusion of oxygen** from lungs into the blood 1
- This enables **more oxygen** to be supplied to the cells 1
- for **increased aerobic respiration** to release more energy 1
- for **muscular contractions** 1

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[Total: 6 marks]

End of Section A

Section B [20 marks]

For Examiner's Use

Answer any **two** questions from this section.

Write your answers in the spaces provided.

7 Fig. 7.1 shows how the concentration of insulin and glucagon in blood changes as concentration of glucose in blood changes.

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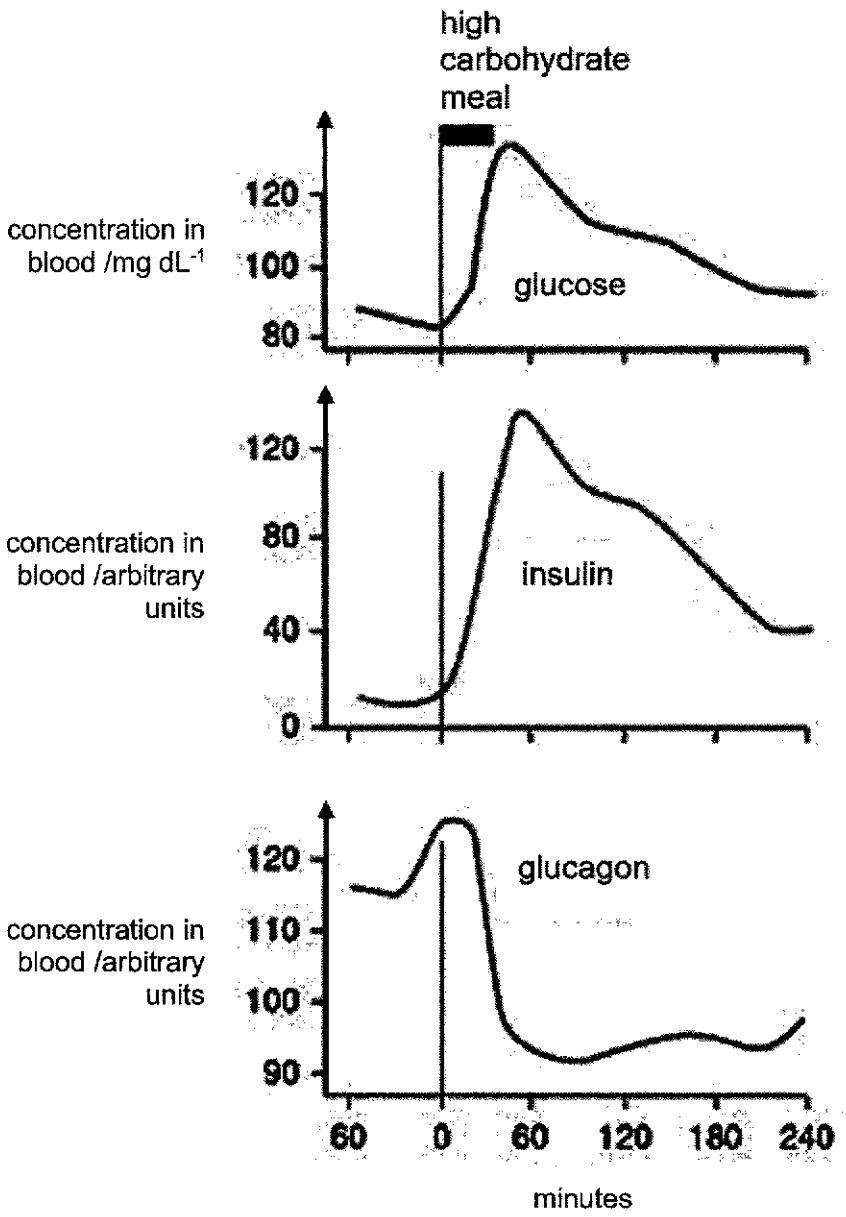


Fig. 7.1

(a) Describe and explain the relationship between blood glucose concentration and concentration of insulin in the blood after the high carbohydrate meal was eaten.

Any 5 marks below, max 5

- When blood glucose concentration increases (80 mg dL^{-1} to 135 mg dL^{-1}), insulin concentration increases (10 arbitrary units to 130 arbitrary units);
- More insulin is produced and released by islets of Langerhans, in the pancreas, into the bloodstream;
- insulin stimulates liver and muscles to take in more glucose;

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- and excess glucose is converted to glycogen and stored;
- (body) cells increase uptake of glucose and rate of respiration is increased;
- Blood glucose concentration then decreases back to norm, insulin production and release also decreases and (existing) insulin is destroyed in the liver;

(b) Explain the change in glucagon concentration 60 minutes before and after the meal was taken.

Before meal: - max 3 marks
(B1) glucagon concentration is high because blood glucose concentration is low;
(B2) More glucagon is produced and released by islets of Langerhans, in the pancreas, into the bloodstream;
(B3) Glucagon stimulates conversion of stored glycogen into glucose;
(B4) in the liver;
(B5) Glucose molecules diffuse into bloodstream and increase blood glucose concentration;

After meal: [need to include both] – 2 marks
(A1) Blood glucose concentration increases back to norm / increases;
(A2) Glucagon production and release decreases and (existing) glucagon is destroyed in the liver;

[Total: 10 marks]

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8 The graph shows how the percentage of carbon dioxide in the atmosphere has changed since the year 1700.

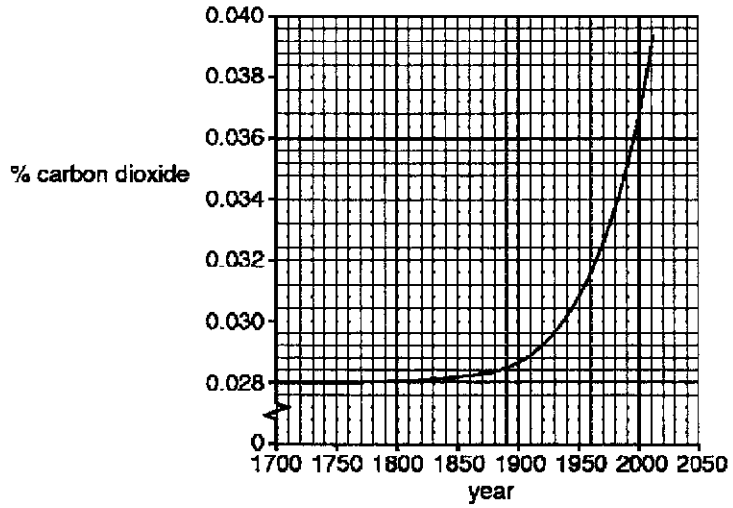


Fig. 8.1

(a) Explain how human activity is likely to have contributed to the change in the percentage of carbon dioxide.

Any 5 points below, max 5 marks:

rise in population ;
any named human invention requiring an energy supply ;
burning / combustion ;
fossil fuels / coal / oil / gas ;
production / release + of carbon dioxide ;
deforestation / fewer trees / fewer plants ;
less / no + absorption / uptake / use + of carbon dioxide ;
less / no + photosynthesis ;
decomposition / decay ;
respiration due to animal stock / production of animal feed in factories ;

(b) Describe and evaluate the effects of this change in the percentage of carbon dioxide.

greenhouse + gas / effect ; 1
global warming ; 1

any 3 further marks from: Any 3 marks

- extreme weather **AW** / flood / drought / storms **AW** / heat waves ;
- loss of + homes / habitat / life / crops / land / soil / food / income ;
- ice melting ;
- rise in sea levels ;
- migration ;
- invasive species more successful ;
- extinction ;
- water **AW** + warms / changed currents / acidified / oxygen depletion ;
- changed distribution + disease / vectors of disease (e.g. mosquito) ;

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9 Fig. 9.1 shows the longitudinal section through one vascular bundle in the stem of a dicotyledonous plant.

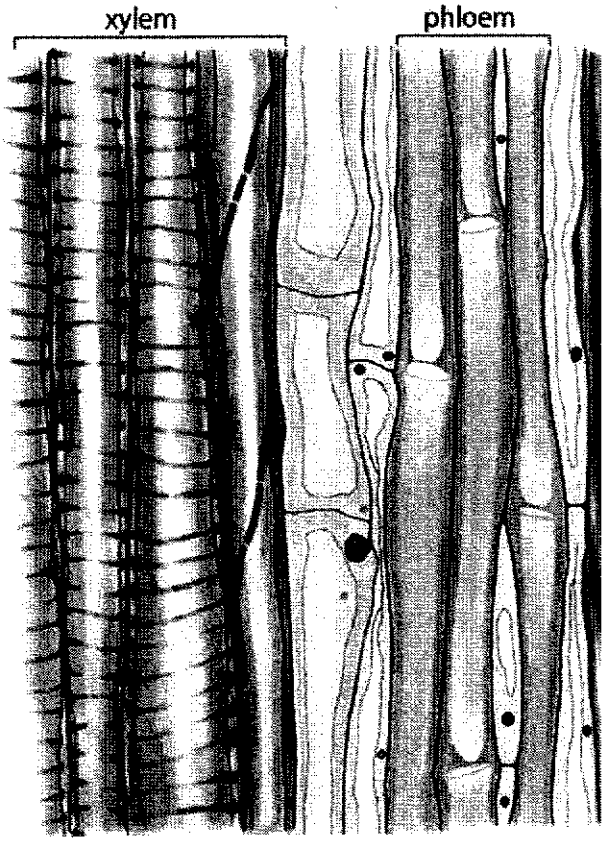


Fig. 9.1

(a) (i) Using Fig. 9.1, describe one structural difference between the xylem and the phloem.

xylem – no protoplasm + phloem – has protoplasm;
* xylem – lignified + phloem – not lignified;

Any 1 mark

(ii) Explain how the structural difference in **(a)(i)** helps in the function of the xylem.

forms a long, hollow and continuous tube; 1
no obstruction to movement of water up xylem + transport water and (dissolved) mineral salts from the roots to the leaves; 1
* gives strength to xylem; 1
provides support to the plant / prevents plant from collapsing; 1

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(b) Explain how a molecule of water in the soil moves through the plant and reaches the atmosphere.

Any 5 marks

- Water molecule (WM) + enters root hair cells + by osmosis;
- WM moves from root hair cells to root cells until it reaches xylem (in the roots) + by osmosis;
- WM moves up xylem + via transpiration pull + into a leaf;
- WM moves out of xylem + into mesophyll cells + by osmosis;
- WM exits / moves by osmosis out of (spongy) mesophyll cells + become part of thin film of moisture;
- Evaporation + WM becomes part of water vapour;
- (WM in the) water vapour exits stomata + into the atmosphere + via diffusion / transpiration;

(c) Suggest why vascular bundles are found in anthers.

Either 1m from each tissue

(P1) Phloem transports sugars / sucrose;
(P2) which is a source of energy / used in respiration to release energy;
(P3) and also a substrate to make pollen / for growth of anther;
or
(X1) Xylem transports water;
(X2) which hydrates cells / is a medium for chemical reaction;

Accept any logical reasoning that suggests that the production of pollen grain requries energy thus needs nutrients and water

[Total: 10 marks]

End of Section B

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